INDUSTRIAL PRACTICE REPORT
IN PT. RIAU ANDALAN PULP AND PAPER

Workload Analysis of Overhead Crane Operator in Pulp Warehouse

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INTERNATIONAL INDUSTRIAL ENGINEERING PROGRAM

FACULTY OF INDUSTRIAL TECHNOLOGY

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This is to certify that :

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has successfully completed internship program at **Logistic Department, PT. Riau Andalan Pulp and Paper**, from **July 1st, 2019 to August 9th, 2019.**

We wish him all the success for his future.

Pangkalan Kerinci, August 9th, 2019

APRIL LEARNING INSTITUTE

Muhammad Yamin
Talent Management Coordinator

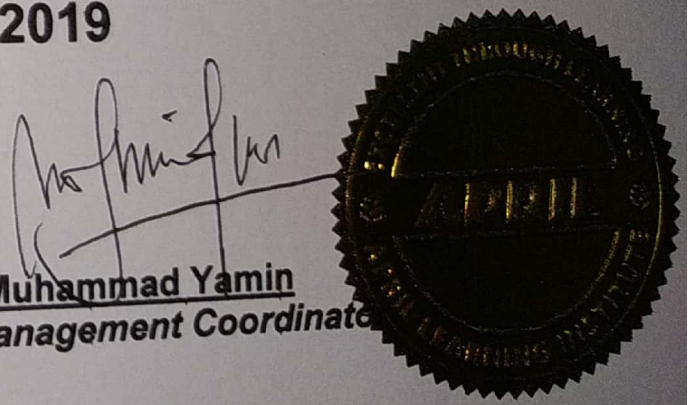
APRIL

Certificate of Accomplishment

This is to certify that

William

has successfully accomplished a
Internship Program
Held in
Dept. Logistic, PT. Riau Andalan Pulp and Paper
from July 1st 2019 to August 9th 2019



Muhammad Yamin
Talent Management Coordinato

PREFACE

Thankful for the presence of Almighty God, for the Abundance of Grace and His Guidance, compiler can complete and finish the industrial practice report in PT. Riau Andalan Pulp and Paper that has been conducted from 1 July 2019 until 9 August 2019.

On doing the industrial practice until finishing the report, compiler got lots of assistance, guidance, and support from a lot of party. Therefore, compiler wants to say sincere grateful to :

1. Mr. Taufik Azali as the main mentor that always gives explanation during Industrial Practice
2. Ir. B. Kristyanto, M.Eng., Ph.D., as a supervising Industrial Practice lecturer that helps and guides compiler on finishing the Industrial Practice report
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4. Families that always support compiler during Industrial Practice and completing Industrial Practice report
5. Employees in Pulp Warehouse that give explanation during Industrial Practice
6. All parties that helps compiler both directly and indirectly on doing the Industrial Practice until completing Industrial Practice report.

Compiler realizes that this report still has lots of mistakes. Nevertherless, compiler hopes that this report wll give benefits for readers.

Pangkalan Kerinci, August 9th, 2019

(Compiler)

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CHAPTER 1

INTRODUCTION

1.1. Background of Industrial Practice

Industrial Engineering study program, Faculty of Industrial Technology, Universitas Atma Jaya Yogyakarta obligates all students to conduct industrial practice that based on the curriculum in PSTI UAJY. PSTI UAJY views industrial practice as a medium for students to recognize the situation in industry and to grow, improve, and develop professional work ethics in order to become a prospective Bachelor of Industrial Engineering.

Industrial Practice can be concerned as a professional simulation event for Industrial Engineering student. The paradigm that must be instilled is students must work for the chosen company during Industrial Practice. In this case, working consists of planning, improving, implementing, and problem solving. Therefore, students must do several activities during Industrial Practice, those activities are :

a. Recognize the scope of the company
b. Follow the work processes in the company
c. Do and perform the tasks that are given from the mentor or field guidance
d. Observe the behavior of the system
e. Compile and arrange the report in written form
f. Do the Industrial Practice examination

1.2. Purposes of Industrial Practice

Several things that must be achieved on doing Industrial Practice are :

a. Train discipline of a student
b. Train the abilities to interact with subordinates, colleague, and superior of the company
c. Train the ability to adapt with the working environment
d. Directly observe the acivities in the company on producing and running its business
e. Complete the theories that have been gained in lecturer with the practice in the company

f. Add student's knowledge about production system and business process

1.3. Location and Period of Industrial Practice

Industrial Practice was conducted from 1st July 2019 until 9th August 2019 in PT. Riau Andalan Pulp and Paper (RAPP) which is located at Lintas Timur street, Pangkalan Kerinci sub district, Pelalawan district, Riau 2865. The working time starts from Monday to Friday and the time starts from 07.00 – 16.00 WIB with resting hour which starts from 11.30 – 13.00 WIB. On Saturday, the working time starts from 07.00 – 11.00 WIB.

During Industrial Practice, the location of placement was in Pulp Warehouse Department which is a part of Supply Chain Management Department.

CHAPTER 2

COMPANY OVERVIEW

2.1. Brief History of the Company

2.1.1. History of the Company

PT Riau Andalan Pulp and Paper (RAPP), one of company part of APRIL (Asia Pacific Resources Holding Ltd), is the biggest company in Asia that produces pulp and paper. APRIL itself is a subsidiary of a group called as RGE (Royal Golden Eagle). The founder of RGE is Mr. Sukanto Tanoto. Mr Sukanto Tanoto, who was born in 25th December 2019, is the eldest son from seven children. His business career started when all Chinese schools were shut down by Mr. Soeharto after Mr. Soeharto became the second president of Indonesia. In 1967, Mr. Sukanto joined a family company as a supplier for vehicle motor parts. In 1973, he established a company called as RGM (Raja Garuda Mas) which business was producing plywood. In 1979, Mr. Sukanto established Asian Agri which business was to manage oil palm plantation. In 1983, he established a firm called as Indorayon (now become Toba Pulp Lestari) that produced dissolving pulp in North Sumatra and the firm started to operate in 1988. In 1993, Mr Sukanto started Riau Andalan Pulp and Paper (RAPP) in Pangkalan Kerinci and APRIL is formed in 1994. When Asian financial crisis occurred in 1998, a viscose fibre mill in Finland was established (Sateri). In 2002, Sateri which produces rayon was also established in China (Jiangxi). In 2002, Pacific Oil & Gas was established. In 2006, APICAL was established which business is to manage downstream vegetable oil and biofuel processing. In 2009, Mr. Sukanto completed Bracell as a pulp mill expansion in Brazil. In 2013, Sateri started to produce viscose fibre in China (Puitan). The scheme of all companies or group under RGE (Royal Golden Eagle) is shown at Figure 2.1.

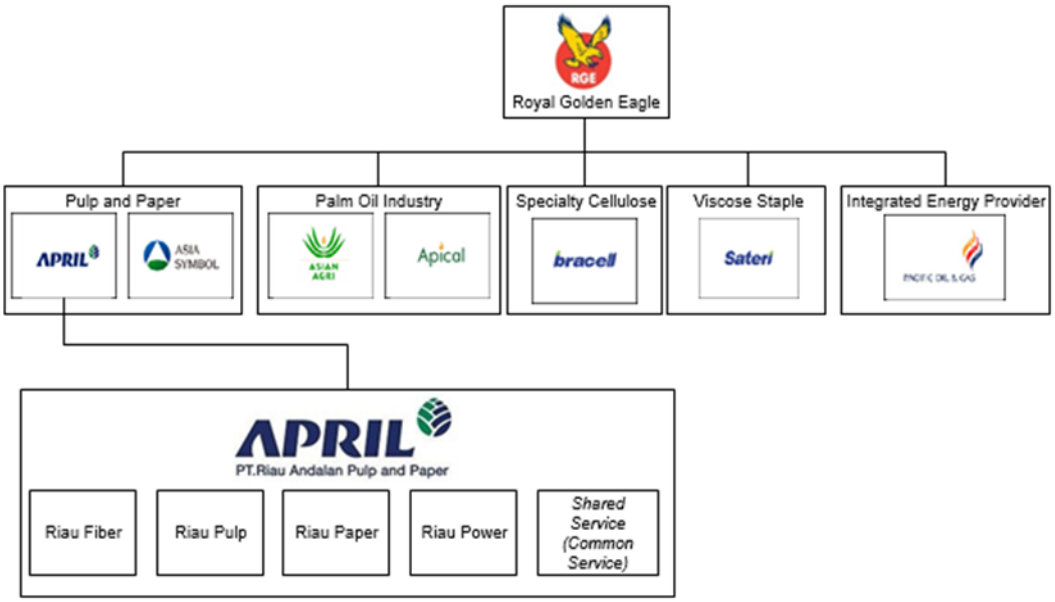


Figure 2.1. Scheme of Companies under RGE

All companies under RGE use natural resources to run the companies, such as wood, palm, etc. The natural resources are got from several countries, such as Indonesia, China, Brazil, Spain, and Canada . Nowadays, RGE has a asset around 18 billion US dollar (US$ 18 billion).

PT. Riau Andalan Pulp and Paper (RAPP) is located in Lintas Timur street, Pangkalan Kerinci sub-district, Pelalawan district, Riau 28654. This firm is located 75 km away from the Pekanbaru. The main office and the administration is located at Teluk Betung street, Central Jakarta, Indonesia. The main raw materials for producing pulp and paper is wood. The location of PT. RAPP can be considered as a strategic location because it is near with the source of raw materials (HTI / Hutan Taman Industri). In addition, the climate in Indonesia is suitable for planting the tree (Acasia and Eucalyptus) as the main raw materials to produce the products.

On running its business, APRIL or PT. RAPP is divided into several parts, those are:

a. Riau Fiber

Riau Fiber is a part of company which activities start from nursery (seed treatment, media preparation, sowing process, fertilizer application, and quality selection), plantation (planting, fertilizing, blanking, weeding, singling, and monitoring), harvesting

(pre debarking, felling, delimbing, complete debarking, bucking, stacking, and extraction), and transporting.

b. Riau Pulp

Riau Pulp is a part of company which converts raw materials (logs to be chips) from Riau Fiber to produce slush pulp and pulp.

c. Riau Paper

Riau Paper is a part of company which converts slushpulp from Riau Pulp as main raw materials to produce paper

d. Riau Power

Riau Power is a part of company that cultivates electicity and re-cultivate liquor, water, and chemical materials. This part has a production capacity around 535 MW which enables to supply electricity to whole firm and outside the firm (townsite area). Furthermore, this part can supply electricity to Pangkalan Kerinci.

e. Shared Service (Common Service)

Shared Service (Common Service) is a part of company that manages all service activities and company's logistics. This part consists of supply chain management, finance, HRD, and accounting.

APRIL or RAPP also corporates with PT. Pec-Tech on managing construction activities, such as building, road, and other infrastructures construction. PT. KIK (PT. Kawasan Industri Kampar) manages all industry sectors in RAPP.

The most high selling products that are produced in RAPP is PaperOne™ that is shown in Figure 2.2. This product is sold to around 70 countries in the world.

Figure 2.2. PaperOne™

Figure 2.3 shows another products that are produced by PT. Riau Andalan Pulp and Paper. Those products are Dunia Mas, Copy & Laser, Ixora, Lazer IT, ZAP, ZAP Premium, PPLite, Perfect Print, Excellent Copy Paper, BMO (Bright White Multi Purpose Office).

Figure 2.3. Products from PT Riau Andalan Pulp and Paper

2.1.2. Company's Certificates

On conducting continuous improvement and guarantee to the customers, bankers, and goverments, certificates are needed and those are one of the commitment from the company. Many certificates both from national and international have been achieved by PT. Riau Andalan Pulp and Paper. Those certificates give total guarantee that determine the quality of the end products (*Asia Pacific Resources International Holdings Ltd*, 2015). Those certificates are :

a. *Program from the Endorsement of Forest Certification* (PEFC)

PEFC (*Program from the Endorsement of Forest Certification*) is an international forestry certificate system that has been acknowledged with having accurate standard as a mechanism to verify dan increase sustainable forest management and wood products that have been produced . This certificate was achieved in December 2014. Therefore, this company can guarantee that the raw materials are taken legally from the nature or forest.

Figure 2.4. shows the PEFC certificate and also IFCC (*Indonesia Forest Certification Coorperation)*.

Figure 2.4. PEFC (Left) and IFCC (Right) Certificates

By having those certificates, PT. Riau Andalan Pulp and Paper can convince its customers about the raw materials to produce the products (pulp and paper) with prioritizing environment, social, and economical aspects. The raw materials are obtained from the forest will be sustainability managed and using the safe raw materials. PEFC certificate also shows company's responsibility as a real commitment from the company to conserve the environment.

b. OHSAS (*Occupational Health and Safety Assessment Series)* 18001

OHASS (*Occupational Health and Safety Assessment Series*) 18011 is an implementation of safety management system that based on international standard. Company that has achieved this certificate can reduce the potential of work hazards and minimize the risk of work hazard occurences in the company. PT. Riau Andalan Pulp and Paper has already achieved OHSAS 18001 certificates and it is shown in Figure 2.5.

Figure 2.5. OHSAS Certificate

c. ISO 9001

ISO 9001 is an implementation of quality management system that based on international standard. This certificate guarantee the quality of the product and production process in the company. This certificate has already been achieved by PT. Riau Andalan Pulp and Paper by ensuring and convincing its customers for ordering the products. Figure 2.6. shows the ISO 9001 certificate for PT. Riau Andalan Pulp and Paper.

Figure 2.6. ISO 9001 Certificate

d. ISO 14001

ISO 9001 is an implementation of quality management system in environment protection that based on international standard. This certificate shows that every end processes and produced products have fulfilled the commitment to the environment. PT. Riau Andalan Pulp and Paper have already achieved this certificate and it is shown in Figure 2.7.

Figure 2.7. ISO 14001 Certificate

This certificate shows that PT. Riau Andalan Pulp and Paper has a commitment to take responsibility for natural resources sustainability and minimize environmental impacts.

e. PTHL (*Pengelolaan Hutan Tanaman Lestari*)

PTHL (*Pengelolaan Hutan Tanaman Lestari*) is an activity to make plantation forest that ensure the sustainability from production, ecology, social, and obey regulation from the customers. This certificate has been achived by PT. Riau Andalan Pulp and Paper since 2006 under LEI (*Ekolabel Institut Indonesia*) standard. PTHL certificate is shown at Figure 2.8.

Figure 2.8. PTHL Certificates

f. PHPL-SVLK (*Pengelolaan Hutan Produksi Lestari dan Sistem Verifikasi dan Legalitas Kayu*)

PHPL-SVLK (*Pengelolaan Hutan Produksi Lestari dan Sistem Verifikasi dan Legalitas Kayu*) is a sertification system on sustainable production forest and verification on wood legalitaion for all manufacturing facility and forest operational. The purpose of this certificate is to ensure that this company can only accept and use legal wood and the existences of the imported items can be verified. PT. Riau Andalan Pulp and Paper achieved this certificates in October 2012 that have been developed by Europe Union with Indonesia's governments.

2.2. Organizational Structure and Job Description

2.2.1. Organizational Structure

PT. Riau Andalan Pulp and Paper has lots of departments and each department has its own organization structure. One of the organization structure in this company is Pulp Warehouse Department. The main activities in Pulp Warehouse Departement are :

1. Ensuring cargo and containers are ready for shipment
2. Responsible for controlling warehouse to produce pulp

The organization structure at Pulp Warehouse Department is shown at Attachment 1.

(Attached)

2.2.2. Job Description

The job descriptions that are assigned to each position at Pulp Warehouse department are :

a. Pulp Warehouse Superintendent

Pulp Warehouse Superintendent has responsibilities for executing and continuously improving the organization systems and methods to ensure efficient and cost effective operations of the warehouse.

b. Pulp Warehouse Supervisor

Pulp Warehouse Supervisor has responsibilities for supervising daily activities of crewmembers to have pulp arrived at customer in a best possible.

c. Stuffing Supervisor

Stuffing Supervisor has responsibilities for supervising personnel contractors and maintain handling of pulp out storage including pulp stuffing into container based on the standard operating to achieve the target.

d. Warehouse Planner

Warehouse Planner has responsibilities for ensuring equipment or tools and items are ready in the warehouse, maintenance, relation with vendor, controlling and counting the production quantity in the warehouse, and balancing in out products.

e. Administration Officer

Administration Officer has a responsibility for performing general office function to assist the supervisor with administrative duties.

f. EDT (Engineering Development Training)

EDTs has responsibility for managing all activities in Pulp Warehouse Department and giving recommendations to the department..

g. Stuffing and Quality Control

Stuffing and Quality Control has responsibility for checking the quality of the pulp before the pulp are being stuffed to the containers.

h. Shift Officer

Shift Officer has responsibility for supervising shift in handling of pulp based on the standard operating.

i. OHC Operator

OHC or Overhead Crane Operator has a responsibility for operating the overhead crane for either pulp hot loading or from conveyor to the stacking area in safe condition.

j. Barcodeman

Loadingman has responsibilities for printing and attaching barcode label on pulp unit ensuring the production rates and grade.

k. Loadingman

Barcodeman has responsibility for performing properly scanning and hooking on the pulp unit to be loaded on the flat bed.

l. FL (Forklift) Operator

Forklift Operator has responsibilities for operating the forklift and moving the pulp unit either to container or to storage.

m. Container Inspector / Administration

Container Inspector has responsibility for checking the condition of containers before the pulp are being stuffed to the container.

2.3. Management at the Company

2.3.1. Vision and Mission of the Company

PT. Riau Andalan Pulp and Paper has vision on running its business. The vision is same with RGE's vision, that is "To be one of the largest, best managed and sustainable resource based groups, creating value for the Community, Country, Climate, Customer, and Company".

The mission of PT. Riau Andalan Pulp and Paper is :

1. Generate sustainable growth
2. Be the leader in each industry and market segment we compete in
3. Maximize return to stakeholders while contributing to local and regional socio socio-economic development
4. Create value through modern technology and leverage on our industry knowledge, premium assets, networks and human resources base

2.3.2. Company's Core Value

The core value for PT. Riau Andalan Pulp and Paper is same with core value of RGE, that is **TOPICC**. Each value has its own meaning, those are :

a. Complementary Team

We are aligned by our common purpose and work together as a complementary team.

Behavioural Statements :

1. We put team's success ahead of our own
2. We give our best as a team and achieve more together
3. We work together based on mutual trust and respect
4. We are direct and open in our communication with each other
5. We share our knowledge and ideas with our colleagues and do not operate in silos
6. We align ourselves and support the development goals of countries we operate in

b. Ownership

We take ownership to achieve outstanding results and seek value at all times.

Behavioural Statements :

1. We are responsible and accountable for our actions
2. We practice hands-on management and lead by example
3. We set ambitious targets through internal and external benchmarking
4. We achieve results through people, process, system and structure
5. We seek out the best value when making decisions

6. We keep things simple and smart
7. We have a “can-do” attitude

c. People

We develop our people to grow with us.

Behavioural Statements :

1. We groom our talent by developing their skills and capabilities
2. We strive to build our organization from within
3. We promoteand reward based on performance and people development, in a fair and transparent way
4. We grow people to be better than ourselves
5. We learn from our mistakes and do not repeat them
6. We enable communities we operate in to grow with us

d. Integrity

We act with integrity all the times.

Behavioural Statements :

1. We are uncompromising on dishonesty
2. We put problems and issues on the table, and act without fear or favor
3. We do not accept corrupt practices
4. We safeguard company’s assets and knowledge

e. Customers

We understand our customers and deliver best value to them.

Behavioural Statements :

1. We regularly engage our customers to better understand their businesses and needs
2. We serve our customers through stable quality, supply and service
3. We track the pulse of the competitive landscape and market dynamics
4. We innovate and customize our products and services to produce win-win solutions for our customers

f. Continious Improvement

We act with zero complacency and always strive for continuous improvement.

Behavioural Statements :

1. We aim for today to be better than yesterday and tomorrow to be better than today
2. We strive to do better, faster, and at lower cost
3. We focus on quality, productivity and cost to always stay competitive
4. We understand the changing market landscape and trends, and their impact on the organization
5. We are always vigilant in ensuring health and safety, and strive for zero accidents and zero non-compliance
6. We do not tolerate wastage
7. We act in accordance with our RGE sustainability framework

2.3.3. Employment

PT. Riau Andalan Pulp and Paper has over 6000 employess on running its business. In Pulp Warehouse department, the number of employees is 39 people. There are two types of working time, those are general working time and shift working time. For general working time, the working time starts from 07.00 until 11.30 WIB, 11.30 – 13.00 WIB for resting time, and starts again at 13.00 until 16.00 WIB. For Saturday, the working time starts from 07.00–11.00 WIB. There are three shift for shift working time. The first shift starts from 07.00–15.00 WIB, second shift start from 15.00 – 22.00 WIB, and the third shift starts from 22.00–07.00 (next morning) WIB. One of the department that applies both shift and general working times is Pulp Warehouse Department. For information, the operational for PT. Riau Andalan Pulp and Paper is 24 hours so the production and machine will not stop (except machine breakdown and blow down).

2.3.4. Marketing

PT. Riau Andalan Pulp and Paper sells its products both in domestic and foreign market. The marketing activity is done by trading agent which locations are in Singapore and Malaysia. PT. Riau Andalan Pulp and Paper has two main trading agents, those are AIE (*April International Enterprise*) and AFEMY (*April Far East Malaysia*). AIE has the responsibility for fulfilling orders from India, Cambodia,

Myanmar, Malaysia, Filipine, Singapore, Vietnam, Africa, and Middle East. Furthermore, AFEMY has the responsibility for fulfilling orders from Australia, China, Hongkong, Indonesia, New Zealand, Japan, Korea, Turkey, Taiwan, USA, Canada, Europe, and Pacific Island.

The marketing activity for PT. Riau Andalan Pulp and Paper is shown at Figure 2.9.

Figure 2.9. Marketing Activity at PT. Riau Andalan Pulp and Paper

The quantities of products exported is larger, that is 75% will be sold in international market, compared with products that are sold in domestic. The products will be exported through 70 countries around the world. For pulp, the production system is Make to Stock (MTS) and the production system for paper is Make to Order (MTO).

For supporting import and export activities, there are two main ports that will be used. Those ports are Futong port and Buatan port. Buatan port is used to transport the products (pulp and paper) both in domestic and foreign customers by using container. Futong port is used to transport pulp products to foreign countries by using *break bulk* (pulp units are directly placed inside the ship without using any containers) and the destination is specially to Portklang. The destinations in domestic from Buatan Port are Tanjung Priok port in Jakarta, Tanjung Mas port in Semarang, and Tanjung Perak port in Surabaya. Tanjung Priok port will become the main port that will deliver the products to several local places, such as Kalimantan island, Batam, and several areas in West Java. Tanjung Perak port is the second biggest transit port behind

Tanjung Priok port with the delivery cost is cheaper so that the products can be delivered to several local places, such as Makassar, Bali island, etc.

PT. Riau Andalan Pulp and Paper uses *International Commercial Terms* (Incoterms) system that has been approved by the customers. Incoterms is a system that has been used for explain about the rights and obligations between seller and buyer on transporting the products in terms of international trading system. The rights and obligations on this system include transporting process, person in charge for import and export activities, person in charge that deals with cost, and the responsibility for the products if there are any changes on condition of the products. The Incoterms system in PT. Riau Andalan Pulp and Paper is shown at Figure 2.10.

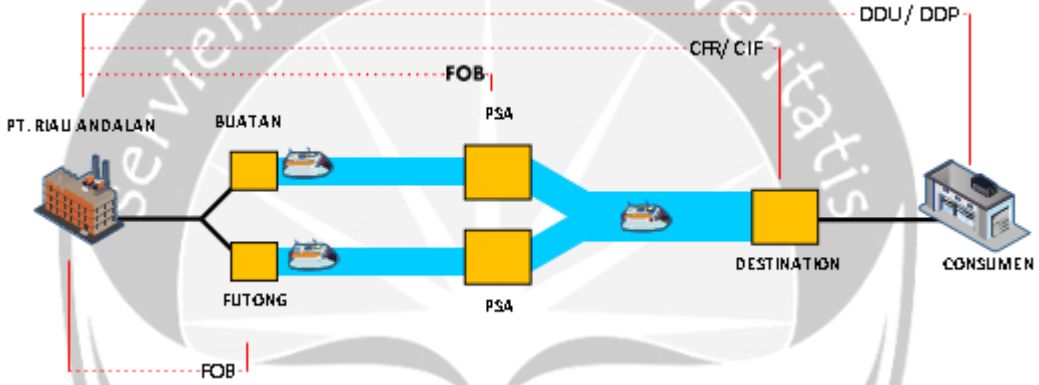


Figure 2.10. Incoterms System at PT. Riau Andalan Pulp and Paper

There are several Incoterms system that have been used by PT. Riau Andalan Pulp and Paper, those are :

a. *Free on Board* (FOB)

FOB is a term of transferring the products on the ship that has an effect for the customers. The customers must pay for all the costs and risks (such as lost or damaged products) which start when the sellers have an obligation to make export formality. There are two FOB locations in PT. Riau Andalan Pulp and Paper, those are Futong port and PSA (Singapore post) that loads the products from Buatan port.

b. *Cost on Freight* (CFR)

CFR is a term of transferring the products that have been done on the ship until the products arrive at the destination port and sellers must make a formality export. After

that, the risks and additional cost will be paid by the customers. CFR for PT. Riau Andalan Pulp and Paper is at the destination port.

c. *Cost, Insurance, and Freight* (CIF)

CIF is a term of transferring the products that have been done on the ship until the products arrive at the destination port and buyers must make a formality export. Buyers must also have an assurance about the risks of buying the products. CIF for PT. Riau Andalan Pulp and Paper is at the destination port.

d. *Delivery Duty Unpaid* (DDU)

DDU is a term of transferring the products that have been done on the ship until the destination country. Sellers must pay for all the risks occur and the costs, except customs duty, taxes, and other taxes. DDU is done in company's warehouse and it is held in domestic (Indonesia).

e. *Delivery Duty Paid* (DDP)

DDP is a term of transferring the products that have been done on the ship until the destination country. Buyers must pay for all the risks occur and the costs including customs duty, taxes, and other taxes. DDP is done in company's warehouse and it is held in domestic (Indonesia).

2.3.5. Facilities

PT. Riau Andalan Pulp and Paper provides facilities which purpose is to give comfortable environment for workers who work in this company. The facilities that have been provided are :

a. Transportation

PT. Riau Andalan Pulp and Paper provides bus and taxi commuter for the workers to go to office or plant. The reason is the area in this company is so big and it takes long time for the workers to go to work by walking. Figure 2.11 shows the bus that are provided by PT. Riau Andalan Pulp and Paper.

Figure 2.11. Transportation in PT. Riau Andalan Pulp and Paper

The destination for each bus are different because the location of each office or plant are different. Several destinations for the bus are Riau Paper, Mill, ALI, Riau Andalan Kertas (RAK), etc. The bus will arrive on time at the bus stop. The bus will send the workers to the office, going to rest, and send the workers back to mess (or home). Taxi commuters have a schedule where they will send the customers to plant area or outside plant area.

b. Housing

PT. Riau Andalan Pulp and Paper provides mess or home for workers who work in this company. This company has a commitment to give the best services. One of it is increase the comfortable environment to the workers so that the workers can work optimally. For workers who have not married, they will be allocated to mess and workers who have married will be allocated at the house. The housing area in PT. Riau Andalan Pulp and Paper is shown at Figure 2.12.

Figure 2.12. Housing in PT. Riau Andalan Pulp and Paper

c. Foodcourt

PT. Riau Andalan Pulp and Paper provides foodcourt for the workers because there is no any restaurant or places to eat inside the townsite (except cooking at home, and having meal in Unigraha Hotel and Shangri-La). There are several food stands inside the foodcourt that sell several kinds of foods. There is also bakery near the foodcourt.

Figure 2.13. Foodcourt in PT. Riau Andalan Pulp and Paper

d. Mini Market

PT. Riau Andalan Pulp and Paper provides mini market for the workers so that the workers can fulfill their daily needs. One mini market is located inside the foodcourt and two others are located near the mess.

e. Clinic

PT. Riau Andalan Pulp and Paper provides clinic for the workers so that the workers can have a medical check up, have diseases, or have medical first aid when the workers are having an accident. Figure 2.14 shows the clinic in PT. Riau Andalan Pulp and Paper.

Figure 2.14. Clinic in PT. Riau Andalan Pulp and Paper

f. Sport Facilities

PT. Riau Andalan Pulp and Paper provides sport facilities for the workers. The sport facilities is shown at Figure 2.15.

Figure 2.15. Sport Facilities in PT. Riau Andalan Pulp and Paper

f. Hotel

PT. Riau Andalan Pulp and Paper provides hotel and the name of the hotel is Hotel Unigraha. This hotel is used for resting area for the company's visitors or foreigners who come to work for several days in the company. Figure 2.16 shows the figure of Hotel Unigraha in PT. Riau Andalan Pulp and Paper.

Figure 2.16. Hotel Unigraha in PT. Riau Andalan Pulp and Paper

g. School

PT. Riau Andalan Pulp and Paper provides schools for the workers who have children. This company has three schools, those are *Sekolah Global Andalan* (shown in Figure 2.17), *Mutiara International School* (shown in Figure 2.18), and Sekolah Taruna Andalan (shown in Figure 2.19).

Figure 2.17. *Sekolah Global Andalan* in PT. Riau Andalan Pulp and Paper

Figure 2.18. *Sekolah Mutiara Andalan* in PT. Riau Andalan Pulp and Paper

Figure 2.19. *Sekolah Taruna Andalan* in PT. Riau Andalan Pulp and Paper

h. Worship Facilities

PT. Riau Andalan Pulp and Paper provides worship facilities for the workers. Those facilities are mosque, church, and temple. All those facilities are located inside this company.

i. Additional Facilities

Another facilities that have been provided by PT. Riau Andalan Pulp and Paper are providing scholarships for children through Tanoto Foundation. The children will be given scholarships if they want to study further in education world.

CHAPTER 3

COMPANY SYSTEM REVIEW

3.1. Company's Business Process

PT Riau Andalan Pulp and Paper also has business process on running its business where one department interacts or integrates with another department. Supply Chain Management department, including Pulp Warehouse, has an activity to control stuffing and logistics activity in the company. So, this department will integrate with another department, such as ICS (Internal Customer Service), PPIC (Production Planning and Control System), CY (Container Yard), Laboratory, and PD (Pulp Dryer).

There are four activities that are performed in Pulp Warehouse Department, those are customers, sales, ICS (Internal Customer Service), production, and shipping. Firstly, customers (trading agents that have demands from end customers) order the pulp and the order will be received by sales. Secondly, ICS will received information (order) from sales and ICS will generate the production planning and stuffing. The information about data planning and stuffing will be sent to Production Department and Pulp Warehouse Department. ICS will also book the container and *mother vessel* to prepare shipment.

Production Department will ensure that production will be able to fulfill customers demand. Pulp Warehouse Department has the responsibility for production results from Pulp Dryer, keeping the stock availability of the pulp, and ensuring that stuffing process is done smoothly. Stuffing process needs several components or items, such as pulp as the products, forklift, overhead crane, and container. In order to fulfill container needs, Pulp Warehouse Departments works together with CY (Container Yard). In reality, containers are not always be available and ready to stuffing. Therefore, ICS, Pulp Warehouse Department, and CY need *Exmill Date* (a date where containers must be ready at CY 3 days before *exmill date* and stuffing activities must be done at the *exmill date*). For example, the *exmill date* is on 26th July 2019. So, the containers must be ready at CY on 23rd July 2019 and the stuffing must be done on 26th July 2019/

3.2. Products

The products that are sold in PT Riau Andalan Pulp and Paper are pulp and paper which both products are sold in domestic and foreign market.

3.2.1. Pulp

Pulp is a semi-finished products that will be used to produce paper, tissue, rayon, etc. There are two kinds of pulp that are produced by PT Riau Andalan Pulp and Paper, those are sheet type that will be sold to customers and slush pulp that will be used by this company to produce paper. This company produces several types of pulp, those are AE (Dissolving Pulp) and KP (Kraft Pulp). Figure 3.1 shows the example of pulp products that are produce in PT Riau Andalan Pulp and Paper.

Figure 3.1. Pulp Product in PT Riau Andalan Pulp and Paper

The differences between AE and KP can be seen through the packaging where AE products are not wrapped and KP products are wrapped. The reason why AE products are not wrapped because of customers' demand, the container to distribute AE products do not need packaging, and the products are too thick to be packaged or wrapped. For addition, the quality of AE is better than KP.

a. AE (Dissolving Pulp)

AE can be classified into two types, those are AE (100% *acacia crassicarpa*) and AE# (90% *acacia crassicarpa* and 10% *eucalyptus*). AE pulp can be classified into five types, those are AE Pulp 1 (AE1 / ADP001), AE Pulp 2 (AE2 / ADP002), AE Pulp L (AEL / ADP003), ADP Pulp H (AEH / ADP004), and OFF (O / ADP005). Table 3.1 shows the characteristics of AE in PT Riau Andalan Pulp and Paper.

Table 3.1. Specification of AE Pulp in PT Riau Andalan Pulp and Paper

Characteristics	Unit	Reference	Dissolving Pulp Specification				
			AE 1	AE 2	AEL	AEH	O
Brightness	%ISO	TAPPI T 525	>=89	>=89	>=89	>=89	<89
Dirt Count	mm2/mm2	TAPPI T 213	<=10	<=10	<=10	<=10	>10
Viscosity	ml/g	ISO 5351-10	370-430	431-480	481-530	>530	<370
Solubility in 10% NaOH (S 10)	%	TAPPI T 235	<=7,5	<=7,5	<=7,5	<=7,5	>7,5
Solubility in 18% NaOH (S 18)	%	TAPPI T 235	<=3,5	<=3,5	<=3,5	<=3,5	>3,5
Alpha Cellulose	%	TAPPI T 203	>=94,5	>=94,5	>=94,5	>=94,5	<94,5
ASH Content	%	TAPPI T 211	<=0,12	<=0,12	<=0,12	<=0,12	>0,12
Silica as SiO2	ppm	TAPPI T 244	<=80	<=80	<=80	<=80	>80
Calcium as Ca	ppm	TAPPI T 266	<=75	<=75	<=75	<=75	>75
Iron as Fe	ppm	TAPPI T 266	<=10	<=10	<=10	<=10	>10
DCM Extractives	%	TAPPI T 204	<=0,20	<=0,20	<=0,20	<=0,20	>0,20

b. KP (Kraft Pulp)

KP can be classified into five types, those are Acacia Normal (ACA Normal / 10101DRYACA001), Acacia High Strenght (ACA HS / 10101DRYACA011), Acacia Extra Prime (ACA XP / 10101DRYACA021), Acacia X-tra Prime Low Brightness (ACA XPLB / 10101DRYACA031), and Acacia Fujifilm (ACA Fuji Film / 10101DRYACA051).

Table 3.2. Specification of KP Pulp in PT Riau Andalan Pulp and Paper

Characteristics	Pulp Specification				
	ACA001	ACA011	ACA021	ACA031	ACA051
Grade	Acacia Prime	Acacia Prime	Acacia Prime	Acacia Prime	Acacia Prime
Tensile Index @ 300 ml CSF	> 65 Nm/g	> 67 Nm/g	67 Nm/g (+- 5%)	67 Nm/g (+- 5%)	
DCM Extractives	< 0,25 %		< 0,15 %	<= 0,15%	
Brightness	>= 89,5 %	>= 89,5 %	>= 89,5 %	85-88% ISO	>= 91% ISO
High Initial Strenghts				> 21 Nm/g	

3.2.2. Paper

Paper that have been produced by PT Riau Andalan Pulp and Paper can be classified into three categories, those are :

a. Cut Size

Cut Size is a type of paper that can be seen in daily life. The size of cut size paper follows the international standard of paper size. This paper can be used in printing, such as in office, home, etc. Figure 3.2 shows the example of cut size paper that are produced in PT Riau Andalan Pulp and Paper.

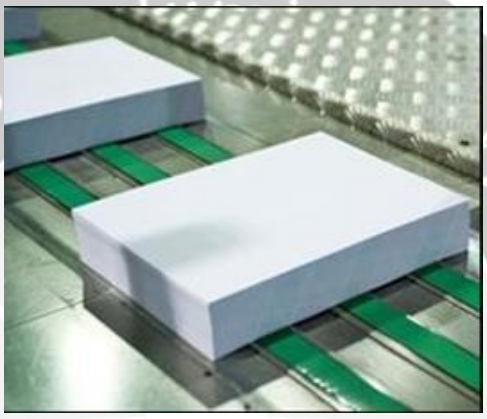


Figure 3.2. Paper Product in PT Riau Andalan Pulp and Paper

PT Riau Andalan Pulp and Paper produce several types of cut size paper, such as A4 (210 x 297 mm), Letter (216 x 279 mm), F4 (215 x 330 mm), A3 (297 x 420 mm), B4 (257 x 364 mm), B5 (182 x 257 mm), A4s (215 x 297 mm), and Quarto (215 x 280 mm).

The most popular cut size products that are produced by PT Riau Andalan Pulp and Paper is PaperOne™. PaperOne™ has three types, those are :

i. PaperOne™ All Purpose

This type of paper can be used in daily printing activities. This paper can adjust with the printer or fotocopy machine so that the best quality will be achieved at the paper. Figure 3.3 shows the PaperOne™ All Purpose that is produced in PT Riau Andalan Pulp and Paper.

Figure 3.3. PaperOne™ All Purpose

Table 3.3 shows the specification of PaperOne™ All Purpose in PT Riau Andalan Pulp and Paper.

Table 3.3. Specification of PaperOne™ All Purpose

Characteristics	Test Method	Tolerance	Quality Specification
Basis Weight (g/m2)	ISO 536	± 4%	80
Thickness (µm)	ISO 534	± 3	110
CIE Whiteness (#)	ISO 11475	± 2	167
ISO Brightness (%)	ISO 2470	± 2	99
ISO Opacity (%)	ISO 2471	± 2	95
Surface Roughness (ml/min)	ISO 8791-2	± 40	140

ii. PaperOne™ Copier

PaperOne™ Copier is used for printing activities in large scale and needs high speed for the printing process. Figure 3.4 shows PaperOne™ Copier that is produced in PT Riau Andalan Pulp and Paper.

Figure 3.4. PaperOne™ Copier

Table 3.4 shows the specification of PaperOne™ Copier in PT Riau Andalan Pulp and Paper.

Table 3.4. Specification of PaperOne™ Copier

Characteristics	Test Method	Tolerance	Quality Specification		
Basis Weight (g/m2)	ISO 536	± 4%	70	75	80
Thickness (µm)	ISO 534	± 3	100	103	107
CIE Whiteness (#)	ISO 11475	± 2	160	160	160
ISO Brightness (%)	ISO 2470	± 2	96	96	96
ISO Opacity (%)	ISO 2471	± 2	93	94	95
Surface Roughness (ml/min)	ISO 8791-2	± 40	190	190	190

iii. PaperOne™ Digital

PaperOne™ Copier is used for digital printing technology. Figure 3.5 shows PaperOne™ Digital that is produced in PT Riau Andalan Pulp and Paper.

Figure 3.5. PaperOne™ Digital

Table 3.5 shows the specification of PaperOne™ Digital in PT Riau Andalan Pulp and Paper.

Table 3.5. Specification of PaperOne™ Digital

Characteristics	Test Method	Tolerance	Quality Specification	
Basis Weight (g/m2)	ISO 536	± 4%	85	100
Thickness (µm)	ISO 534	± 3	110	120
CIE Whiteness (#)	ISO 11475	± 2	170	170
ISO Brightness (%)	ISO 2470	± 2	100	100
ISO Opacity (%)	ISO 2471	± 2	96	97
Surface Roughness (ml/min)	ISO 8791-2	± 40	100	60

b. Customer Roll

Customer Roll is a type of paper that are order based on the demand from the customers. PT Riau Andalan Pulp and Paper set the diameter for the customer roll and the diameter is 1000 mm. The height of the customer roll is determined based on the demand from the customers. Figure 3.6 shows the customer roll that is produced by PT Riau Andalan Pulp and Paper.

Figure 3.6. Customer Roll in PT Riau Andalan Pulp and Paper

c. Folio Sheet

Folio sheet is a type of paper which size is larger than cut size and this paper is produced based on demand from the customers. This paper can be used in printing because this paper can be cut based on the needs from the customers. Figure 3.7 shows the folio sheet that is produced in PT Riau Andalan Pulp and Paper.

Figure 3.7. Folio Sheet in PT Riau Andalan Pulp and Paper

Table 3.6 shows the specification of folio sheet in PT Riau Andalan Pulp and Paper.

Table 3.6. Specification of Folio Sheet

Characteristics	Test	Quality Specification							
Basis Weight (g/m2)	ISO 536	55	60	70	75	80	90	100	120
Thickness (µm)	ISO 534	68	77	87	94	99	111	121	143
Moisture (%)	ISO 287	5	5	5	5	5	5	5	5
CIE Whiteness (#)	ISO 11475	158	158	158	158	158	158	158	158
ISO Brightness (%)	ISO 2470	94	94	94	94	94	94	94	94
ISO Opacity (%)	ISO 2471	84	88	92	93	94	94	96	97
Kekasaran (ml/min)	ISO 8791-2	140	140	140	140	140	140	140	140

3.3. Production Process

Production process can be started from obtaining raw materials, production, and the quality control.

3.3.1. Raw Material

The raw materials that are used for producing pulp are different with raw materials that are used for producing paper.

a. Pulp

There are two raw materials that are used on producing pulp, those are :

i. Wood

The main raw materials for producing pulp is wood/ There are three kinds of wood that are used on producing the pulp, those are *Acasia Mangium*, *Acasia Crassicarpa*, and *Eucalyptus*. Those three types of wood is suitable for this company to produce the pulp because the growth of those trees are fast and they need around 5 years to grow until 30 meter high with diameter around 25-30 cm. There are three components inside the wood, those are cellulose fiber, hemicellulose fiber, and lignin. But, for producing the pulp, the components that are used just cellulose fiber and hemicellulose fiber.

ii. Chemical Materials

The chemical materials that are used on producing pulp are O_2 (Oxygen), ClO_2 (Chlorine Dioxide), NaOH (Natrium Hydroxide), H_2O_2 (Hydrogen Peoxide), and SO_2 (Sulfur Dioxide). NaOH and O_2 are used for decreasing the lignin level inside the pulp.

CLO_2, NaOH, H_2O_2, and SO_2 are used for whitening process so that the whitening degree can be achieved.

b. Paper

There are four raw materials that are used on producing paper, those are :

i. Slush Pulp

Pulp is the main raw materials on producing paper. There are two types of pulp that are used on producing the paper, those are pulp that has short fiber and pulp that has long fiber. Short fiber pulp are got from Riau Pulp (slush condition) that are flowed with conveyor to mixing process.

ii. Softwood Bale Pulp

Bale Pulp is the main raw materials on producing paper and this pulp has long fiber. This pulp is got by import from New Zealand and Canada. Bale pulp will be destroyed by bale pulper so that paper pulp can be directly flowed with conveyor to mixing process.

iii. Rejected Paper

Rejected paper is paper that are not qualified during inspection process and this paper is one of the main raw materials to produce pulp. Rejected paper can be divided into two types, those are wet type paper and dry type paper. Wet type paper is a type of paper which still have water content and this type of paper is produced from Paper Machine. Dry type paper is a type of paper which is produced from uncorrect paper cutting results and side trim which are obtained from winding and cutting process. Those rejected paper will be destroyed into pulp paper and flowed with conveyor to mixing process.

iv. Chemical Materials

Chemical materials are supporting materials on producing paper so that the quality of products can be achieved. The chemical materials that are used for producing paper are :

- *Defoamer*, is a chemical material that is used for stock preparation process when the foam is formed.

- *Foam Inhibitor*, is a chemical material that is used for preventing the foam formaton when doing the stock preparation process.

- *Tapioca flour*, is a chemical material that is used to increase dry strength of paper and the paper smoothness will be achieved.

- *Filler* ($CaCO_3$), is a chemical material that is used to fill paper pores and increase the whitening degree of the paper.

- DYE is a chemical material that is used as colorist for paper.

- ASA (*Alkenyl Succinic Anhydride*), is a chemical material that is used to modify paper characteristics on water absorption process.

- OBA (*Optical Brightness Agent*), is a chemical material that is used for controlling the brightness for paper.

- *Bentonite*, is a chemical process that is used for resin solvent.

3.3.2. Process

The production process on producing pulp is different with production process on producing paper.

a. Pulp

Figure 3.8 shows the production process on producing pulp in PT Riau Andalan Pulp and Paper.

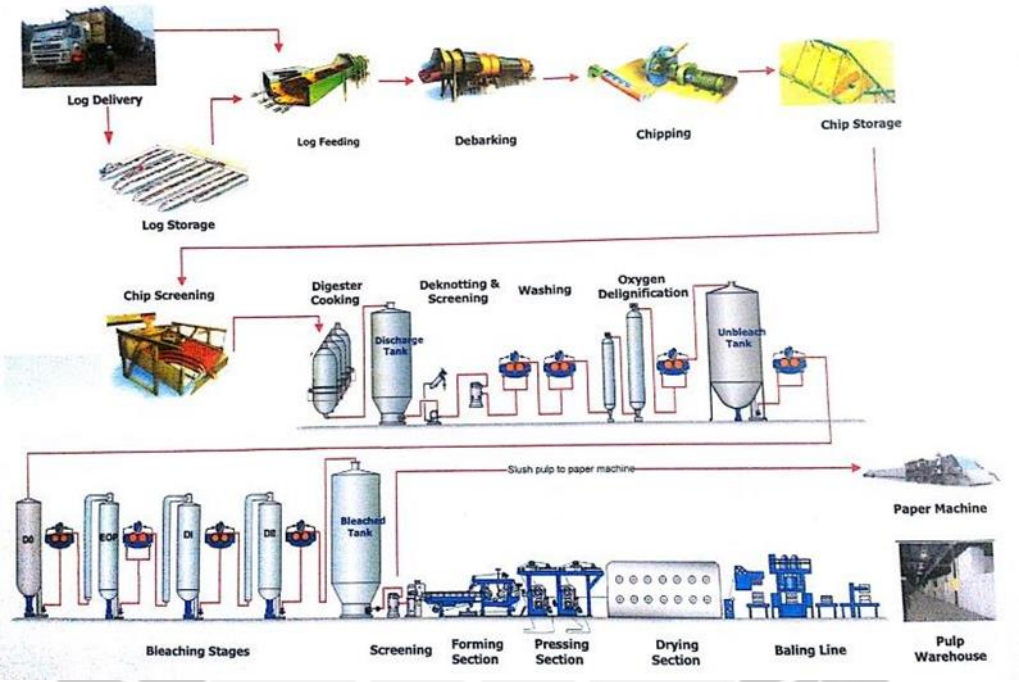


Figure 3.8. Pulp Production Overview

i. Wood Handling

Wood Handing is the first process on producing the pulp and the activities start from log delivery until chip screening. The process is receiving the woods (logs) that are planted and sent to Riau Fiber and Riau Pulp.

There are two types of logs that are being sent, those are logs that have not being skinned and log that have being skinned. Unskinned logs will enter to the log storage, stacked, and lastly being dried for one or two months. The purpose is to decrease the lignin (outer layer of woods that binds to cellulose and hemicellulose fibers) level of the logs. The skinned logs will be transported to *log feeding* through conveyor before entering *debarking* process. The conveyor is made so that *debarking* process can be performed well.

Debarking process is a process of stripping the barks because the barks are hardly to be transformed into the pulp so that there will be black stain on the pulp. When *debarking* is still ongoing, logs will be entered into the drum with 50% capacity of the drum. The drum will rotate with high speed so that the logs inside the drum will clash

with each other. The effect is the the bark will be peeled from the logs. Then, the barks will be used as the fuel for *power boiler*.

After the *debarking* process finishes, the logs will be sent to *chipping* process by using *roller table* and *washing station* which has been equipped with *metal detector*. The function of *metal detector* is to detect the metal which still occur on the logs. *Roller table* is equipped with gears on its surface so that the remaining barks will be peeled. *Washing station* is used to squirt water so that the logs will be easier to be chopped and clean the remaining barks on the logs. *Chipping* process is a dissipation process so that the logs will be easier to be cooked based on the specification in order to produce the logs in uniform size. *Chipping* process has 7 lines in which has 30.000 ton chip in each capacity for every day.

After finishing the *chipping* process, the chip will enter to *chip storage*. *Chip storage* is used to check the availability of the chip before being cooked in *digester*. There are several *chip storage* in PT Riau Andalan Pulp and Paper, those are two *rectangular chip pile*, one *circular chip pile*, and one *pin chip file*. After that, chip will enter to *screening* process. *Chip screening* is a process to separate chip which size is smaller or larger. The purpose of this process is to keep the uniform size of the chip. The chip can be categorized into four types, those are :

a) *Oversize* and *Overthick*

   Chip can be classified as *oversize* if the diameter is larger than 45 mm and *overthick* if the thickness exceeds 8 mm. *Oversize* and *overthick* chip will be cut again with specialized cutting machine and entered to *chip screening* process. Figure 3.9 shows the *oversize* and *overthick* chips that are produced in PT Riau Andalan Pulp and Paper.

Figure 3.9. *Oversize* and *Overthick* Chip

b) *Accept*

Chipping process will produce chips which size are acceptable. The diameter of chips which is acceptable is 8-45 mm and the thickness is 7 until 8 mm. Figure 3.10 shows the acceptable chips that are produced in PT Riau Andalan Pulp and Paper.

Figure 3.10. *Acceptable* Chip

c) *Pin*

Chipping process will produce chips which have uniform size. One of those size is *pin* size. The diameter of *pin* size is 3-7 mm. This size is still acceptable when producing the pulp. Figure 3.11 shows the *pin* size chips which are produced in PT Riau Andalan Pulp and Paper.

Figure 3.11. *Pin* Chip

d) *Fines*

Chipping process will also produce chip which diameter is less than 3 mm. Those size are called as *fine*. Those size cannot be used on producing the pulp and those size will be sent to *power boil* (convert to fuel). Figure 3.12 shows the *fines* size chips which are produced in PT Riau Andalan Pulp and Paper.

Figure 3.12. *Fines* Chip

ii. Digester Cooking

Chips that are acceptable will be cooked by using *white liquor*. The purpose of this process is to depolymerize the lignin structure and extract the lignin fragments out from the wood so that the cellulose and semicellulose fibers can be obtained. Active compounds that are contained in *white liquor* is 2 Na_2S and NaOH. There are three types of digesters that have been used in PT Riau Andalan Pulp and Paper, those are 2 unit of *Digester Superbatch Mode* (which has 14 unit digester in each unit) and 1 unit of *Digester Continious Mode*.

iii. *Deknotting* and *Screening*

Chips that have been processed in *Digester Cooking* will enter to *Deknotting* process. *Deknotting* process is a process of separating th eunripe pulp which is usually in the form of large chips and wood eyes. *Screening* process is also being carried out in this process based on different sizes and weight of the chip. *Filtering* process is used in four levels in order to minimize reject rate and increase the yield received of the pulp. *Screening* process will produce pure pulp which contain fiber.

iv. Washing

Washing process is the process of cleaning the pulp after being cooked in the cooking process by separating the wood fibers from unwanted impurities in the pulp production process. The dirts which are found during the *digester* process are lignin, soda, and *white liquor* which has turned into *black liquor*. The washing process is carried out repeatedly so that impurities can be separated from the pulp. The process expects that the pulp contains more water than the black liquor which are left over from the cooking results.

v. *Oxygen Delignification*

The next step is the pulp will enter *oxygen delignification* process. *Delignification* process is a process of decreasing the lignin content in the pulp before entering the *Bleaching* process. The chemicals that are used in this process are oxygen and NaOH. The function of using oxygen is to reduce lignin levels and help to whiten the pulp. This process has an expectation to result in 50% of brightness level so that the chemical used in *Bleaching* process can be minimized.

vi. *Bleaching Stages*

Bleaching stages is a process which is carried out after the pulp have been delignified. The aim of this process is to eliminate the remaining levels lignin after delignification process. Lignin can be removed by using a high-temperature reactor. However, the fiber content of cellulose and hemicellulose in wood is sensitive to high temperatures. So, the disadvantage of this process is to break the cellulose and hemicellulose chain shorter. Therefore, the results of pulp that have been produced by PT Riau Andalan Pulp and Paper have a short fiber.

There are four stages on *Bleaching* process, those are D0-EOP-D1-D2 which processes are done sequently.

a) D0

   D0 is the initial stage of the *bleaching* process which purposes are to separate the level of lignin in the pulp and increase brightness dramatically. D0 stage uses the reaction of ClO_2 which is an environmentally friendly ECF (Element Chlorine Free) chemical.

b) EOP Stage (Extraction, Oxidation, and Peroxide)

   EOP is the stage of extracting and oxidizing the lignin so the lignin content can be lost from the pulp. This stage uses H_2O_2 compounds which function is for bleaching. NaOH is used for lignin solvent in DO stage and O_2 is used for lignin oxidation process.

c) D1 Stage

   D1 is the stage of increasing the brightness until reaching the standard quality of the pulp which is worth selling with 90% of brightness level. The compound that is used in this stage is ClO_2.

d) D2

The purpose in D2 stage is to improve the brightness of the pulp as desired without fiber loss.

After the pulp are processed in *bleaching* stages, the pulp will be sent to the storage tank in order to reduce the temperature and homogenization. PT Riau Andalan Pulp and Paper has five storage tanks which Tank 1, 2, and 5 will be sent to Pulp Dryer process to be dried so that the pulp can be sold to the customers. Tank 3 an d4 will be sent to the paper machine so that the pulp can be processed into paper.

Figure 3.13 shows the *bleaching* stages in PT Riau Andalan Pulp and Paper.

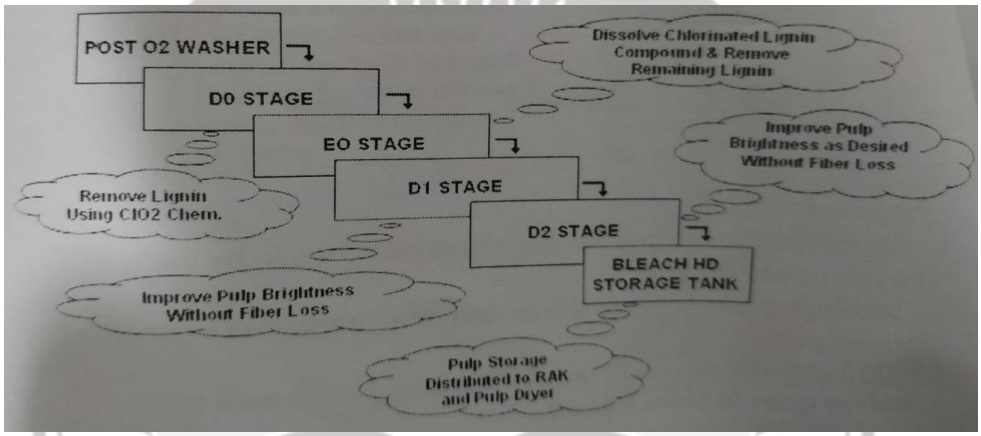


Figure 3.13. *Bleaching* Stages on Producing Pulp

vii. *Pulp Dryer*

Pulp Dryer is the last process of pulp processing before the pulp are going to be sold to end customers. This stage aims to separate water from the pulp and produce sheet pulps with 10% of moisture content. This process begins with *screening* process which purpose is to clean the pulp from the dirt before entering the *formation* process. The pulp that has been cleaned will enter the *forming* or *formation* process and the pulp will be formed into long continuous pulp sheet. Furthermore, the pulp that has been formed will be pressed so that the water content of the pulp will be reduced by 50%. After that, the pulp will be dried on the drying section in order to producea 10% of moisture content. The dried pulp will enter the *bailing line* (finishing) process. The process which is conducted in *bailing* line is used to cut the pulp so that it will become easier to deliver the pulp.

b. Paper

Figure 3.14 shows the production process on producing paper in PT Riau Andalan Pulp and Paper.

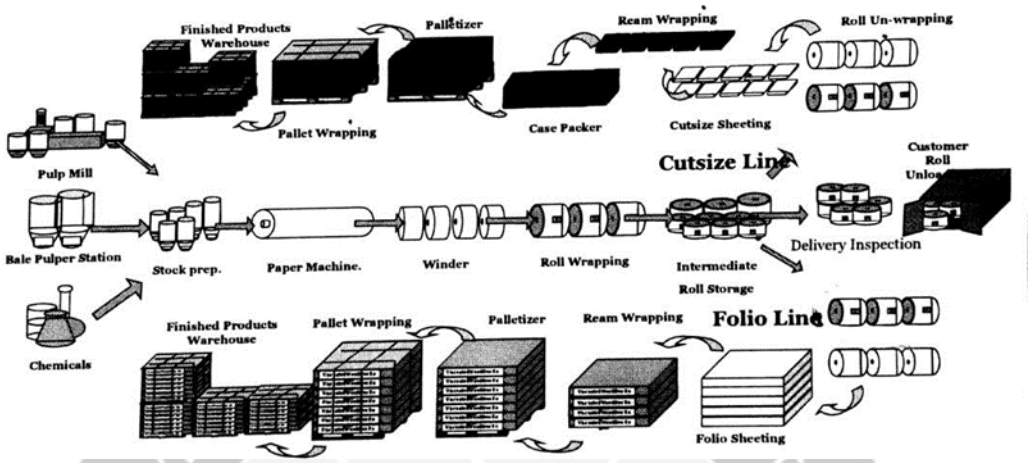


Figure 3.14. Paper Production Process Overview

The production process on producing the paper can be classified into several process insequently, those are stock preparation, paper machine, winder, roll wrapping, intermediate, and finishing products.

i. *Stock Preparation*

Stock Preparation is the initial process on producing the paper. The function of this process is to supply the raw materials that are needed by mixing fiber and chemicals with the required comparison before entering the paper machine process. Pulp mills, pulp bales, and chemicals are mixed homogenously in order to get the desired percentage of pulp mixture.

ii. *Paper Machine*

Paper Machine process is divided into four processes, those are forming, pressing, drying and rolling.

a) *Forming*

After the pulp in *Stock Preparation* has been mixed, then the mixed pulp will enter the *forming* process. *Forming* process is a process that forms pulp paper into sheets of paper that have been adjusted to the size of the machine. In this process, the water content which is contained in paper amounts 99% and the

consistency of the final products (paper) due to the gravitational force is around 15-25%.

b) *Pressing*

To get the results of paper that has a low water content, *pressing* process is needed which aim is to eliminate the water content. The way of working for the *pressing* process is to press the sheet mechanically so that the water can come out by itself from the paper fibers. The final consistency of paper products after performing the *pressing* process is around 33-55%.

c) *Drying*

The next step is the paper will be dried by the *evaporation* process. *Evaporation* process is carried out in order to remove water from the sheet without damaging the structure of the paper fibers that have been produced. The final consistency of paper products after performing the *drying process* is around 92-95%.

d) *Rolling*

After the paper has been dried in *drying* process, then the paper will be rolled into a jumbo paper roll. During the *rolling* process, the process of cutting the edge of the paper is uneven.

iii. *Winder*

After going through the *Paper Machine* process, then the paper will enter the *winder* process. *Winder* process is the process of cutting paper into the desired sized according to the customers' demand. The size can be cut size, customer roll, and folio sheet.

iv. *Roll Wrapping*

The cut paper will be wrapped in plastic wrap in *Roll Wrapping* process. The aims of this process are to keep the paper from dirt, not easily to be damaged, and the paper roll is maintained.

v. *Intermediate Storage*

This process is the process of storing the products that have been produced according to their purposes. The storing area in PT Riau Andalan Pulp and Paper is divided into two locations, those are SMC (a storage place for paper roll to produce cut sizes which are arranged horizontally and can accommodate around 2496 rolls) and AWA (a paper

roll storage for all types that are arranged vertically and can accommodate around 4618 rolls).

vi. *Finishing Products*

The types of finishing for cut size, customer roll, and folio size are different to each other.

a) Cut Size

To produce *cut size* products, the paper roll will be carried using the conveyor and enter to the finishing line in cut size section. The finishing process is the process of cutting the paper that has been adjusted to customers' demand that based on the predetermined standard sizes. The plastic wrap on the paper roll will be opened and placed on the cut size machine. The cut size machine will cut the paper based on the width of the paper. Cut paper will be collected per ream and will be wrapped according to the packaging.

If there is any damage to the packaging or the products, those damage will become the defective product. The defective products will be sent and reproduced into new products again.

After the products are wrapped, the *cut size* product will be stacked to enter the next packaging process. Those process is *cartoning*. Then, the products will be placed on the pallet and repackaged using pallet wrapping and labelling the production label. The *cut size* products will be stored in the warehouse and ready to be sent to the customers.

b) *Customer Roll*

For *customer roll* products, paper roll which are taken out from the storage will be inspected for shipment in order to check for defective or damaged products. Products that have passed the inspection process will be coded with a production label and the products are ready to be delivered to end customers.

c) *Folio Sheet*

To make a *folio sheet* product, the paper roll will be carried using a conveyor to the finishing line of the *folio sheet*. The plastic wrap on the paper roll will be opened and placed on the folio sheet machine. The folio machine will cut the paper based on the width of the paper. Cut paper will be collected per ream and will be wrapped according to the packaging.

If there is any damage to the packaging or to the paper product, it will be said that the damage is defective product. The defective product will be sent to be reprocessed into a new product again. After the product is wrapped, a *folio sheet* product will be stacked to enter the next packaging process, which is *cartoning*. Then, the product is placed on a pallet to be repackaged using pallet wrapping and labeling the production label. *Folio sheet* products will be stored in the warehouse and ready to be sent to the customer.

3.3.3. Quality Control

Quality Control is needed in order to ensure the quality of the products. This process will control every paper product from each paper machine that has finished producing. The sample taken to check the quality control section is the width of the paper that is produced by jumbo roll.

In PT Riau Andalan Pulp and Paper, automation system is used to conduct the quality control. The paper will be checked based on roughness, thickness, stiffness, color, dust, flexibility, and size. Each of these categories has a size with a predetermined tolerance limit.

In addition, there are also checking activities that are carried out manually which aim is to determine the absorption on paper called blotting. Paper samples will be taken and cut to the specified size. Then, the paper will be weighted and recorded the paper weight before blotting. Then, the top of the paper will be placed in the clamp container to carry out absorption tests. The container will be filled with water and counted for 45 seconds. After that, the water will be discarded and the paper will be taken from the clamp container and dried on the paper blot. Lastly, the dried paper will be weighed again and recorded after blotting.

3.4. Operating Facilities

Operating facilities are all items or components that can facilitate or support the production activities in effective and efficient way.

3.4.1. Machines

There are several machines that are used to produce pulp and paper, those are :

a. *Chipper*

Chipper is a wood cutting tool which function is to cut the logs into small pieces of wood. PT. Riau Andalan Pulp and Paper has 7 *chipper* machines and each machine is equipped with 2 cutting tools. So, the total chip cutter owned by the company is 14 units. Machine 1 and machine 2 are used to process wood that has been skinned. Machines 3, 4, 5, 6 and 7 are used to process wood that has not been skinned.

b. *Digester*

Digester is a tool that is used to cook chips into pulp. The digesters that are used is three, consisting of two *super batch digester* and one *continuous digester. Super batch digester* is used to process the rectangular chip pile while *continuous digester* is used for the cooking process of the pile chip pin.

c. *Washing Tank*

Washing tank is a tool that is used to filter out the particular dust found in the pulp and wash the pulp from the cooking lignin.

d. *Oxygen Blow Tank*

Oxygen blow tank is a tool that is used for the process of decreasing lignin levels in the pulp.

e. *Main Bleaching Tower*

Main Bleaching Tower is the place for the pulp to do the *bleaching* process and eliminate the remaining levels of lignin from the previous process.

f. *Pulp Dryer*

Pulp Dryer is a machine that is used to dry the pulp so that it can be in the form of sheets and sell it to the customers. The brand of *Pulp Dryer* that is used in PT Riau Andalan Pulp and Paper is *VALMET*.

g. *Paper Machine*

Paper Machine is a machine that is used to process pulp into paper and the brand of *Paper Machine* that is used by PT Riau Andalan Pulp and Paper is *VALMET*.

h. *Finishing Machine*

Finishing Machine is a machine that is used to process paper products from jumbo roll to *cut size* and *folio sheet*. The brand of *Finishing Machine* that is used in PT Riau Andalan Pulp and Paper is *Bielomatic* and *ECH Will*.

3.4.2. Material Handling Machines

There are several material handling machines that are used for transporting the products, those are

a. *Screw Reclaimer*

Screw Reclaimer is a driving device that is used for picking up chips (pieces of wood) from the pile chip and sending them to the conveyor. Each pile chip has two reclaimers that become the chip transportation tool.

b. *Conveyor*

Conveyor is a vehicle engine that is used during the product manufacturing process. At each processing process, there are different types conveyor which depend on the types of the transported products.

c. *Handlift*

Handlift is a tool that is used to transport the pallet by using hydraulic pressure.

d. *Pallet*

Pallet is a tool that is made of wood. The function is as a place to place products (*cut size, folio sheets*, etc) that have already been packaged and can facilitate the transportation of goods.

3.4.3. Facilities to Ensure Quality of the Products

There are several facilities that are used for checking the quality of the products (inspection), those are :

a. *Autoline L&W*

Autoline L&W is an automated machine that is to used in the quality control area which functions are to measure and check paper roughness, paper thickness, paper stiffness, paper color, paper dust, paper flexibility, and paper weight. Samples taken from the *Paper Machine* will be placed on the *L&W Autoline* engine and the machine

will measure every 30 cm. The results of these measurements will be connected to the computer so that they can be seen with using the graph method.

b. *Sample Punch*

Sample Punch is a conventional tool that is used for punching paper and the punched paper will be taken as a sample. The principle of using this *Sample Punch* is to put the sample paper and press the lever on the tool. Paper taken as a sample is paper that has been cut with a punch sample.

c. *L&W Bendtsen Tester*

L&W Bendtsen Tester is a conventional machine that is used to measure the roughness and permeability of the paper. The principle of using this machine is a paper sample placed on a flat glass surface. The machine is only able to count one size so that before making measurements, the machine is set firstly to calculate the roughness or permeability of the paper. Then, the tester is placed on a paper sample and the machine will give a size to one of these sizes. The size is obtained from the amount of air coming out of the paper. The more rough the paper sample, the more air can come out of the paper and the size given will be even greater.

d. *L&W Bendtsen Elrepho*

L&W Elrepho is a conventional machine that is used to see the color of paper. The principle of using this machine is the paper sample will be seen in color by using ultraviolet lights and the determination of color is determined manually.

e. *L&W Internal Bond Tester*

L&W Internal Bond Tester is a conventional machine that is used to see the strength of paper. Paper samples will be measured and taken as many as 5 paper samples. The five samples were affixed to an iron which is glued with insulation. The machine has a pendulum which functions is as a tool to determine the size of the strength of the paper. The pendulum will be dropped so that it hits the iron. Paper strength numbers will be printed on the machine. This was calculated five times to find out the average amount of paper strength.

f. *L&W Tensile Tester*

L&W Tensile Tester is a conventional machine that is used to see the flexibility of paper. Paper samples will be cut according to the specified size and placed on the

machine. The machine will pull the paper out so that the number results from the flexibility of the paper will come out.

g. *Micrometer*

Micrometer is a conventional tool that is used to measure the thickness of the paper. The principle of using this *micrometer* is to put the paper sample on the *micrometer* and the size of the paper sample thickness will be printed.

h. *Blot Paper*

Blot Paper serves as a tool that dries the sample paper when conducting the blotting test.

i. *Clamp Container*

Clamp container is a tool that is used to test water absorption.

3.4.4. Facilities to Ensure Work Health and Safety for the Workers

There are several facilities that are used for ensure the work health and safety for the workers, those are :

a. Safety Shoes

Safety shoes is the main protection tools for the workers and must be worn in all workplace. Safety shoes are equipped with iron which are mounted on shoes. The aim is to protect the workers' feet from the occurrence of accidents. The company will provide shoes to every worker when the employee starts working at PT. Riau Andalan Pulp and Paper.

b. Ear Plug and Ear Muff

Ear plug is a protective device that is provided by the company to every worker. Workers must have an ear plug or ear muff that which function is as a protection from noise caused by the sound of a machine or factory tool.

c. Mask

Masks are protection items that are provided by the company to every worker. Workers can use masks as a protection from gas and dust that results from the production process.

d. Helmet

Helmets are a protective device that are provided by the company to every worker. Helmets are used as protectors from work falling items from the top. The company has several helmet colors as markers which consisting of white, yellow and red. A white helmet indicates that the helmet is used by workers. The yellow helmet indicates that the helmet is used by visitors (visitors from outside). The red helmet indicates that the helmet is used by workers assigned to maintain safety.

e. Gloves

Gloves are a protection items that are provided by the company to the workers. Workers who work in the factory area must have or use gloves when conducting sampling or during maintenance. Gloves will serve as a hand protection from the occurrence of workplace accidents.

f. Glasses

Glasses are a protection items that are provided by companies to workers. Workers who work in the maintenance area must use glasses that is used as eye protection from the occurrence of workplace accidents.

g. *Body Hardness*

Body Hardness is a protection device that is provided by the company to some workers. Workers who work in maintenance areas that have a minimum height of 1.8 meters must use *body hardness*. The function of *body hardness* is as a body protector from the occurrence of workplace accidents.

CHAPTER 4

WORK LOAD ANALYSIS OF OHC OPERATOR IN PULP WAREHOUSE

4.1. Scope of Work

Industrial Practice is conducted in Pulp Warehouse Department. This department has responsibilities for ensuring cargo and containers are ready for shipment and controlling the warehouse which are used to store the pulp. Compiler is guided by Mr Taufik Azali as the superintendent in Pulp Warehouse during Industrial Practice. Furthermore, compiler is helped by another colleague. Those collague are :

1. Mr Jonifal, as Warehouse Supervisor which explains all the processes in Pulp Warehouse Department whether in the field or in the system.
2. Mr Dwitra Harkinata, as Warehouse Planner which explains the organization structure in Pulp Warehouse Department and input SAP
3. Mr Michael, as Area Personnel Supervisor which explains how to input the data of Forklift Personnel Summary Report and Task Force Meeting Report, and gives explanation about the system in Pulp Warehouse Department
4. Miss Chichi Maria Ayu, as Personnel Supervisor which explains how to input the data of Morning Report and activities in Pulp Warehouse Department
5. All colleagues who help compiler during Industrial Practice

4.2. Authorities and Responsibilities

On conducting Industrial Practice in PT Riau Andalan Pulp and Paper, tasks have been given and the tasks are making Morning Report from Production, inserting the performance of Forklift Operation in Forklift Personnel Summary Report, and VMB Board (contains all performances in Pulp Warehouse Department). Authority has also been given and the authority is to collect the performance data from the operator (Overhead Crane and Forklift), ask information about the system in Pulp Warehouse Department, and discuss about the task and development to Mr Taufik Azali as the superintendent in Pulp Warehouse Department.

4.3. Methodologies on Conducting Special Task

On conducting the Industrial Practice in PT Riau Andalan Pulp and Paper, special task has been given from Mr. Taufik Azali to find ad observe the problems which occur in

Pulp Warehouse Department. Figure 4.1. shows the flowchart for conducting the special task in PT Riau Andalan Pulp and Paper.

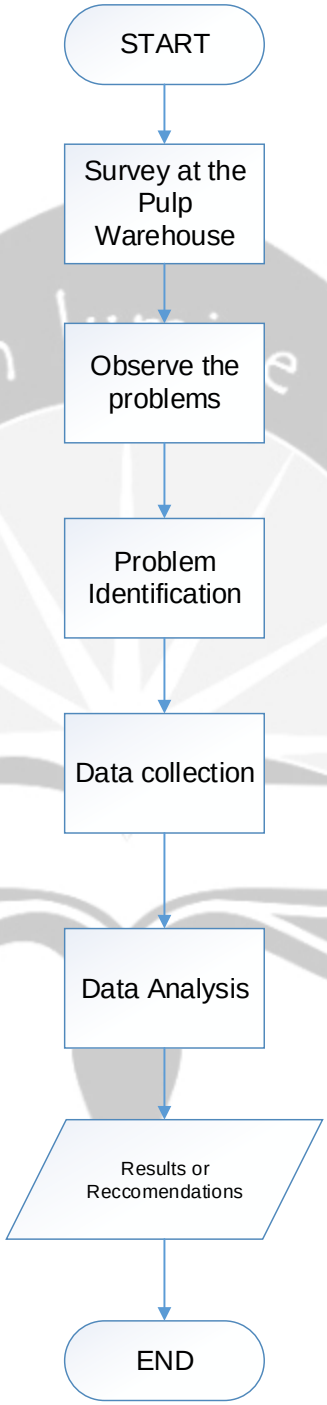


Figure 4.1. Methodologies for Conducting Special Task

4.3.1. Survey and Observation

The purpose of survey is to know the flow process and the job description for all employees and operators in Pulp Warehouse Department. In PT Riau Andalan Pulp and Paper, the pulp in each unit (1 unit = 8 bales) must be given a Delivery Order by Barcodeman, and the pulp will be carried to the warehouse by Overhead Crane Operator. After the pulp is carried, the barcode at the pulp in each unit will be scanned by Loadingman. Lastly, the forklift operator will put the pulp inside the container and pulp is ready for shipment.

4.3.2. Problem Identification

After conducting survey at the Pulp Warehouse, compiler found a problem which problem is the workload and productivity of the overhead crane operator. The reason is there is no general resting time for the operators so that it seems like the operators work nonstop in a shift. Fatigue and work accudents will occur when the operators work nonstop (if the workload exceeds the limit). After identifying the problems, compiler discussed the problems with Mr Taufik Azali and compiler are asked to analyze the workload and productivity for overhead crane operators in Pulp Warehouse 1, Pulp Warehouse 2, Pulp Warehouse 3, and lastly Pulp Warehouse 4.

a. Scope of Problems

i. Data are taken two days for each warehouse because of time limitations on Industrial Practice.
ii. Special task is just give results and reccomendations about the workload and productivity of overhead crane operators in each warehouse
iii. Time measurement is only by using stopwatch
iv. Data are only taken in one shift (07.00 – 15.00 WIB)

b. Assumption

i. The work performed by operators in each day and each shift is assumed to be same because the work is repetitive.
ii. Data are assumed enough and same because of limitations of observation time

c. Purposes

i. To know the workload and productivity of overhead crane operators in each warehouse

ii. To give results and recommendations to the company about the workload and productivity of overhead crane in PT Riau Andalan Pulp and Paper

4.3.3. Literature Study

According to Manuaba (2000), workload is the body's ability on accepting the work. Based on the ergonomics view point, every workload that someone receives must be appropriate and balanced against physical and psychological abilities of the workers who receive the workload. Workload can be divided into two types, those are physical workload and psychological workload. Physical workload can be in the form of heavy work, such as lifting, carrying, etc, while, psychological workload can be in the form of expertise and work performance that owned by individuals with other individuals (Tarwaka, 2004).

Too much workload will cause work stress both physically and psychologically and emotional reactions, such as headaches, indigestion and irritability. Whereas the workload is too little where work is done because of the repetition of motion that gives rise to boredom. Boredom in daily routine work due to assignments or work too little results in a lack of attention to work so that it is potentially harmful to workers (Manuaba, 2000). According to a recent study conducted by the National Safety Council (NSC), United States, about 13 percent of accidents that occur in the workplace are related to fatigue. The study also states that risk factors that cause fatigue can be identified and controlled.

4.3.4. Data Collection

The data is obtained from direct observation at each Pulp Warehouse and each Pulp Warehouse were observed twice. The data are shown in Attachment 3.

(Attached)

4.3.5. Data Analysis

a. Productivity Analysis

After the data have been collected, the data must be analyzed. Firstly, the tasks from each pulp warehouse must be classified. After the tasks have been classified, productive or non productive activities must be determined for each task. Table 4.1. shows the list of activities and productive-non productive activities for Pulp Warehouse 1.

Table 4.1. Activities of Overhead Crane in Pulp Warehouse 1

Code	Activity	Productive / Non Productive
A	Briefing	Productive
B	Walking to Pulp Warehouse 1	Non Productive
B	Reading Loading Data	Productive
C	Operating and Moving Overhead Crane	Productive
D	Carrying and Moving Bales to Destination	Productive
E	Positioning and Releasing Bales	Productive
F	Releasing Bales to Terberg	Productive
G	Resting	Non Productive
H	Waiting	Non Productive

In Table 4,1, it can be concluded that there are six productive activities and three non productive activities which are performed by overhead crane operator in Pulp Warehouse 1.

Table 4.2. shows the list of activities and productive-non productive activities for Pulp Warehouse 2.

Table 4.2. Activities of Overhead Crane in Pulp Warehouse 2

Code	Activity	Productive / Non Productive
A	Briefing	Productive
B	Walking to Pulp Warehouse 2	Non Productive
C	Setup	Productive
D	Operating Overhad Crane	Productive
E	Carrying and Moving Bales to Destination	Productive
F	Positioning and Releasing Bales	Productive
G	Operating Overhad Crane (3)	Productive
H	Carrying and Moving Bales to Destination (3)	Productive
I	Positioning and Releasing Bales (3)	Productive
J	Operating Overhead Crane (4)	Productive
K	Carrying and Moving Bales to Destination (4)	Productive
L	Positioning and Releasing Bales (4)	Productive
M	Operating Overhead Crane (5)	Productive
N	Carrying and Moving Bales to Destination (5)	Productive

Table 4.2. Continued

Code	Activity	Productive / Non Productive
O	Positioning and Releasing Bales (5)	Productive
P	Operating Overhead Crane (6)	Productive
Q	Carrying and Moving Bales to Destination (6)	Productive
R	Positioning and Releasing Bales (6)	Productive
S	Operating Overhead Crane (7)	Productive
T	Carrying and Moving Bales to Destination (7)	Productive
U	Positioning and Releasing Bales (7)	Productive
V	Operating Overhad Crane (8)	Productive
W	Carrying and Moving Bales to Destination (8)	Productive
X	Positioning and Releasing Bales (8)	Productive
Y	Resting	Non Productive
Z	Waiting	Non Productive

NB :

1. (3) means moving bales to Terberg which park in between Gate 1 and 2
2. (4) means moving bales to Terberg which park in between Gate 3 and 4
3. (5) means moving bales from Warehouse to FL in between Gate 1 and 2
4. (6) means moving bales from Warehouse to FL in between Gate 3 and 4
5. (7) means moving bales from Terberg to Warehouse
6. (8) means moving bales from Pulp Dryer directly to Terberg
7. () means moving bales from Pulp Dryer to Warehouse

In Table 4.2, it can concluded that twenty two productive activities and three non productive activities that are performed by overhead crane operator in Pulp Warehouse 2. The reason why there are lots of productive activities is because there are lots of activities that are performed by overhead crane in that warehouse.

Table 4.3. shows the list of activities and productive-non productive activities for Pulp Warehouse 3.

Table 4.3. Activities of Overhead Crane in Pulp Warehouse 3

Code	Activity	Productive / Non Productive
A	Briefing	Productive
B	Walking to Pulp Warehouse 3	Non Productive
C	Reading Loading Data	Productive
D	Operating and Moving Overhead Crane	Productive
E	Carrying and Moving Bales to Destination	Productive
F	Positioning and Releasing Bales	Productive
G	Releasing Bales to Terberg	Productive
H	Waiting	Non Productive
I	Resting	Non Productive
J	Talking	Non Productive

In Table 4,3, it can be concluded that there are six productive activities and four non productive activities which are performed by overhead crane operator in Pulp Warehouse 3.

Table 4.4. shows the list of activities and productive-non productive activities for Pulp Warehouse 4.

Table 4.4. Activities of Overhead Crane in Pulp Warehouse 4

Code	Activity	Productive / Non Productive
A	Briefing	Productive
B	Walking to Pulp Warehouse 4	Non Productive
C	Reading Loading Data	Productive
D	Operating and Moving Overhead Crane	Productive
E	Carrying and Moving Bales to Destination	Productive
F	Positioning and Releasing Bales	Productive
G	Releasing Bales to Terberg	Productive
H	Waiting	Non Productive
I	Resting	Non Productive
J	Talking	Non Productive

In Table 4,4, it can be concluded that there are six productive activities and four non productive activities which are performed by overhead crane operator in Pulp Warehouse 4.

The next step is listing the durations for each day at each Warehouse.

a. Duration in Pulp Warehouse 1

Table 4.5. Duration in Pulp Warehouse 1

Code	Activity	Total Time (in Minutes)	
		30th July 2019	29th July 2019
A	Briefing	23	16
B	Walking to Pulp Warehouse 1	0	0
B	Reading Loading Data	1	10
C	Operating and Moving Overhead Crane	90,61666667	64,95
D	Carrying and Moving Bales to Destination	53,48333333	28,11666667
E	Positioning and Releasing Bales	38,18333333	65,88333333
F	Releasing Bales to Terberg	46,33333333	0
G	Resting	51	53
H	Waiting	176,3833333	232,05
Total		480	470

The actual time is shown in the Attachment.
(Attached)

b. Duration in Pulp Warehouse 2

Table 4.6. Duration in Pulp Warehouse 2

Code	Activity	Total Time (in Minutes)	
		17th July 2019	18th July 2019
A	Briefing	19,00	20,000
B	Walking to Pulp Warehouse 2	1,00	1,000
C	Setup	3,00	5,000
D	Operating Overhad Crane	24,95	13,433
E	Carrying and Moving Bales to Destination	14,22	18,667
F	Positioning and Releasing Bales	21,27	33,950
G	Operating Overhad Crane (3)	2,95	1,600

Table 4.6. Continued

Code	Activity	Total Time (in Minutes)	
		17th July 2019	18th July 2019
H	Carrying and Moving Bales to Destination (3)	3,42	0,550
I	Positioning and Releasing Bales (3)	2,30	1,067
J	Operating Overhead Crane (4)	0,75	21,933
K	Carrying and Moving Bales to Destination (4)	0,28	9,767
L	Positioning and Releasing Bales (4)	0,72	18,617
M	Operating Overhead Crane (5)	20,52	5,500
N	Carrying and Moving Bales to Destination (5)	19,42	2,167
O	Positioning and Releasing Bales (5)	25,45	3,833
P	Operating Overhead Crane (6)	22,75	9,950
Q	Carrying and Moving Bales to Destination (6)	9,57	5,583
R	Positioning and Releasing Bales (6)	19,43	8,417
S	Operating Overhead Crane (7)	52,38	46,067
T	Carrying and Moving Bales to Destination (7)	26,47	25,850
U	Positioning and Releasing Bales (7)	47,05	36,383
V	Operating Overhad Crane (8)	9,77	23,167
W	Carrying and Moving Bales to Destination (8)	4,50	9,817
X	Positioning and Releasing Bales (8)	8,28	22,567
Y	Resting	33,00	53,000
Z	Waiting	59,57	82,117
Total		**452**	**480**

The actual time is shown in the Attachment.

(Attached)

c. Duration in Pulp Warehouse 3

Table 4.7. Duration in Pulp Warehouse 3

Code	Activity	Total Time (in Minutes)	
		15th July 2019	24th July 2019
A	Briefing	10,000	16,000
B	Walking to Pulp Warehouse 3	3,000	2,000
C	Reading Loading Data	1,000	5,000
D	Operating and Moving Overhead Crane	78,633	73,717
E	Waiting	45,133	71,817
F	Carrying and Moving Bales to Destination	63,150	94,967
G	Positioning and Releasing Bales	125,150	37,350
H	Releasing Bales to Terberg	41,250	93,000
I	Resting	110,000	62,150
J	Talking	2,683	
Total		**480**	**456**

The actual time is shown in the Attachment.
(Attached)

d. Duration in Pulp Warehouse 4

Table 4.8. Duration in Pulp Warehouse 4

Code	Activity	Total Time (in Minutes)	
		16th July 2019	23th July 2019
A	Briefing	5	9
B	Walking to Pulp Warehouse 4	3	3
C	Reading Loading Data	5	3
D	Operating and Moving Overhead Crane	45,36666667	53
E	Carrying and Moving Bales to Destination	65,05	31,46666667
F	Positioning and Releasing Bales	103,3333333	54,86666667
G	Releasing Bales to Terberg	115,25	11,86666667
H	Resting	51,8	281

Table 4.8. Continued

Code	Activity	Total Time (in Minutes)	
		16th July 2019	23th July 2019
I	Waiting	80,36666667	32,8
J	Talking	5,833333333	9
Total		**480**	**480**

The actual time is shown in the Attachment.
(Attached)

Then, the percentages of productive and non productive activities can be calculated. Table 4.9 shows the summary of productive and non productive durations of Overhead Crane operator in each Pulp Warehouse.

Table 4.9. Summary of Productive and Non Productive Time

Location	Date	Duration (in Minutes)	
		Productive	Non Productive
Pulp Warehouse 1	29th July 2019	184,95	285,05
	30th July 2019	252,617	227,38
Pulp Warehouse 2	17th July 2019	358,433	93,567
	18th July 2019	3343,833	136,117
Pulp Warehouse 3	15th July 2019	319,183	160,817
	25th July 2019	298,85	157,15
Pulp Warehouse 4	16th July 2019	339	141
	24th July 2019	163,2	316,8

From Table 4.9, it can be concluded that there are still lots of non productive durations that are performed in each Pulp Warehouse. The cause is because waiting time is affected by the loadingman which take times to chain the hook to the pulp which results to non productive time for the overhead crane operator.

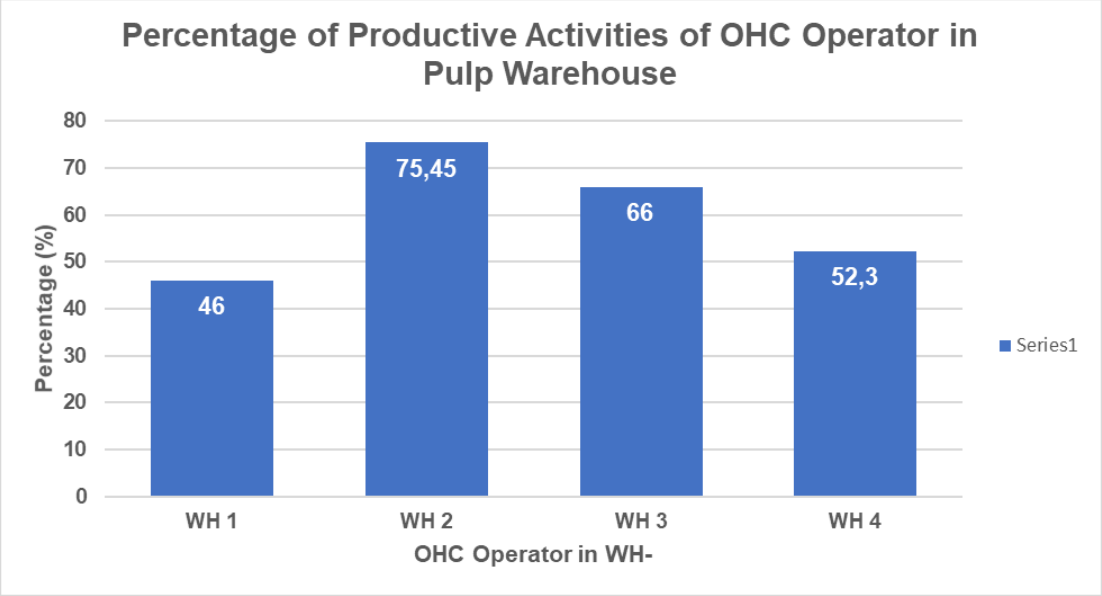
Table 4.10 shows the percentage of productive and non productive durations of Overhead Crane operator in each Pulp Warehouse.

Table 4.10. Percentage of Productive and Non Productive Time

Location	Date	Percentage (%)	
		Productive	Non Productive
Pulp Warehouse 1	29th July 2019	39,4	60,6
	30th July 2019	52,6	47,4
	Average	**46**	**54**
Pulp Warehouse 2	17th July 2019	79,3	20,7
	18th July 2019	71,6	28,4
	Average	**75,45**	**24,55**
Pulp Warehouse 3	15th July 2019	66,5	33,5
	25th July 2019	65,5	34,5
	Average	**66**	**34**
Pulp Warehouse 4	16th July 2019	70,6	29,4
	24th July 2019	34	66
	Average	**52,3**	**47,7**

From Table 4.10, it shows that overhead crane operator in Pulp Warehouse 2 has the highest percentage of productivity (75,45%), follows with overhead crane operator in Pulp Warehouse 3 (66%), overhead crane in Pulp Warehouse 4 (52,3%), and lastly is overhead crane in Pulp Warehouse 1 (46%).

Picture 4.2 shows the graph of productive activity that are performed by overhead crane operator in each Pulp Warehouse.



Picture 4.2. Graphs of Productive Activity for OHC Operator

b. Work Load Analysis (WLA)

The workload is determined based on the job description of the operators. The method used in this study is Work Load Analysis (WLA). Work Load Analysis (WLA) method is conducted to determine the level of work efficiency based on the total percentage of workload from the job given in completing the work. The steps on conducting Work Load Analysis (WLA) are :

1. Knowing the organizational structure and job description of each position
2. Determine the activity and time of completion of activities for each position. These activities are grouped in the job description carried out by related activities.
3. Make observations to calculate the percentage of productive and non-productive activities
4. Determine the duration of observation
5. Determine *Allowance* and *Performance Rating*
6. Calculation of the amount of workload
7. Results and recommendation

Performance Rating is the process by which the observer compares the real performance of the operator with the concept of performance fairness understood by

the observer. There are three methods on calculating *performance rating,* those are *Shummard* method, *Westinghouse* method, and Objective (work difficulties) Method. Performace Rating calculations can be done by adding up the factors that affect a person's speed in doing work and added with 1.

Allowances can be divided into three types, those are personel allowances (such as go to toilet), allowances to decrease fatigue, and allowances for unavoidable delay (machine adjustment, buffer, etc). *Allowances* can be done by summing the external factors that have magnitude someone's looseness in doing work and the value of each factor can be adjusted to the table concessions, including: Energy expended, Work Attitudes, Work Movements, Eye Fatigue, Circumstances, Workplace Temperature, Atmospheric Condition, Good Environmental Condition, and Personal Needs. The table of *allowances* can be seen in Attachment 2.

(Attached)

The formula on calculating the amount of workload is :

$$Workload = (\%Productive) \times (Performance\ rating) \times (1 + Allowance) \quad (4.1)$$

Work is being considered as overload if the percentage of workload exceeds 100%.

After the productive and non productive activities have been determined, the next step is calculating the workload of the overhead crane operator. Firstly, the performance ratings must be determined. There are three methods on determining the performance ratings (*Shummard, Westinghouse*, and *Objective*). At this task, *objective method* is used because *Shummard* and *Westinghouse* method are rated based on the subjective ratings from the compiler. So, *Objective* method will be used by determining the degree of difficulty of the task performed by overhead crane operator. Table 4.11. shows the degree of difficulty in *Objective* Method.

Table 4.11. Degree of Difficulty in *Objective Method*

KEADAAN	LAMBANG	PENYESUAIAN
Anggota Badan Terpakai		
Jari	A	0
Pergelangan tangan dan jari	B	1
Lengan bawah, pergelangan tangan dan jari	C	2
Lengan atas, lengan bawah, dst	D	5

Table 4.11. Continued

KEADAAN	LAMBANG	PENYESUAIAN
Badan	E	8
Mengangkat beban dari lantai dengan kaki	E 2	10
Pedal Kaki		
Tanpa pedal, atau satu pedal dengan sumbu dibawah kaki	F	0
Satu atau dua pedal dengan sumbu tidak dibawah kaki	G	5
Pengunaan Tangan		
Kedua tangan saling bantu atau bergantian	H	0
Kedua tangan mengerjakan gerakan yang sama pada setiap saat yang sama	H 2	18
Koordinasi Mata dengan Tangan		
Sangat sedikit	I	0
Cukup dekat	J	2
Konstan dengan dekat	K	4
Sangat dekat	L	7
Lebih kecil dari 0,04 cm	M	10
Peralatan		
Dapat ditangani dengan mudah	N	0
Dengan sedikit kontrol	O	1
Perlu kontrol dan penekanan	P	2
Perlu penanganan hati hati	Q	3
Mudah pecah, patah	R	5
Berat Badan (kg)		
		tangan / kaki
0,45	B - 1	2 / 1
0,9	B - 2	5 / 1
1,35	B - 3	6 / 1
1,8	B - 4	10 / 1
2,25	B - 5	13 / 3
2,7	B - 6	15 / 3
3,15	B - 7	17 / 4
3,6	B - 8	19 / 5
4,05	B - 9	20 / 6
4,5	B - 10	22 / 7
4,95	B - 11	24 / 8
5,4	B - 12	25 / 9

Table 4.11. Continued

KEADAAN	LAMBANG	PENYESUAIAN	
5,85	B - 13	27	10
6,3	B - 14	28	10

The performance ratings for each overhead crane operator in each Pulp Warehouse are shown in Attachment 4.

(Attached)

Next is determining the allowances factor for each overhead crane operator in each Pulp Warehouse. The performance ratings are shown in Attachment 5.

(Attached)

Table 4.12 shows the summary of performance ratings and allowances for each operator in each Pulp Warehouse.

Table 4.12. Summary of Performance Ratings and Allowances

Location	Date	Performance Ratings	Allowances
Pulp Warehouse 1	29th July 2019	19,1667	32,667
	30th July 2019	19,1667	22,667
Pulp Warehouse 2	17th July 2019	24,6667	26,0833
	18th July 2019	24,6667	26,0833
Pulp Warehouse 3	15th July 2019	16,5714	21,5
	25th July 2019	16,5714	21,5
Pulp Warehouse 4	16th July 2019	16,5714	24,643
	24th July 2019	16,5714	47,214

After determining the performance ratings and allowances, the calculation of Workload Analysis (WLA) can be conducted by using Equation 4.1. Table 4.13. shows the percentage of workload for each overhead crane operator in each Pulp Warehouse.

Table 4.13. Workload (%) for Each Operator in Each Pulp Warehouse

WH	Date	Productivity (%)	Performance Ratings	Allowances	Workload (%)
1	29th July 2019	39,4	19,1667	32,667	62,2
	30th July 2019	52,6	19,1667	22,667	76,93
2	17th July 2019	79,3	24,6667	26,0833	124,65
	18th July 2019	71,6	24,6667	26,0833	112,61
3	15th July 2019	66,5	16,5714	21,5	94,182
	25th July 2019	65,5	16,5714	21,5	92,823

Table 4.13. Workload (%) for Each Operator in Each Pulp Warehouse

WH	Date	Productivity (%)	Performance Ratings	Allowances	Workload (%)
4	16th July 2019	70,6	16,5714	24,643	100,97
	24th July 2019	34	16,5714	47,214	58,374

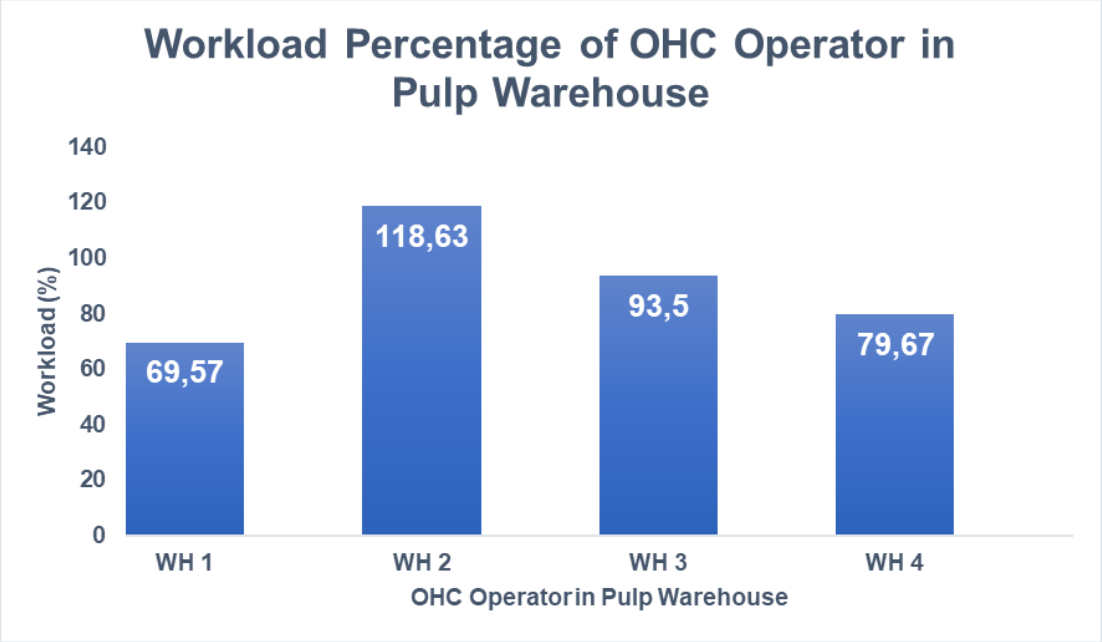
After the workload have been calculated for each day at each Pulp Warehouse, the last step is averaging the workload of overhead crane operator for each Pulp Warehouse. Table 4.14 shows the average workload of overhead crane operator for each Pulp Warehouse.

Table 4.14. Average Workload for Overhead Crane Operator

Location	Workload (%)	Average Workload (%)
Pulp Warehouse 1	62,2	69,57
	76,93	
Pulp Warehouse 2	124,65	118,63
	112,61	
Pulp Warehouse 3	94,182	93,5025
	92,823	
Pulp Warehouse 4	100,97	79,672
	58,374	

From Table 4.14, it shows that overhead crane operator in Pulp Warehouse 2 has the highest percentage of workload (118,63%), follows with overhead crane operator in Pulp Warehouse 3 (93,5025%), overhead crane in Pulp Warehouse 4 (79,672%), and lastly is overhead crane in Pulp Warehouse 1 (69,57%).

Picture 4.3 shows the graph of workload for Overhead Crane operator in each Pulp Warehouse.



Picture 4.3. Graphs of Workload for OHC Operator

4.3.6. Results and Reccomendations

a. Results

Based on the observation that have been conducted, it can be concluded that the workload of overhead crane operator is exceeds 100%. It means that the operator works overloaded.

This condition occurs because of there are lots of task that must be performed for the operator, such as moving bales to Terberg which park in between Gate 1 and 2, moving bales to Terberg which park in between Gate 3 and 4, moving bales from Warehouse to FL in between Gate 1 and 2, moving bales from Warehouse to FL in between Gate 3 and 4, moving bales from Terberg to Warehouse, moving bales from Pulp Dryer directly to Terberg, and moving bales from Pulp Dryer to Warehouse. Those all activities must be performed because the location of Pulp Warehouse 2 is near the stuffing area where the remaining pulp warehouse cannot access to the stuffing area. The overhead crane operator in Pulp Warehouse 2 must help the stuffing activities so that the stuffing activities can reach the *exmill date*.

The products that are stored in Pulp Warehouse 3 and 4 is KP and AE are stored in Pulp Warehouse 1 and 2. Because stuffing area must be done in Pulp Warehouse 2,

so products which will be delivered to customers from Pulp Warehouse 1, 3, and 4 must be transported to Pulp Warehouse 2 by using Terberg. Then, the products will be carried out with the help of overhead crane operator in Pulp Warehouse 2 and will be located in Pulp Warehouse 2. Next, the operator must also help the forklift to store the products to the containers.

In conclusion, the overhead crane operator in Pulp Warehouse 2 must carry out more task (such as helping stuffing activities, moving bales from another warehouse / Terberg to Pulp Warehouse 2, and carrying out bales from Pulp Dryer) than the overhead crane operator in Pulp Warehouse 1, 3, and 4 which results in the work for overhead crane operator in Pulp Warehouse 2 is overloaded.

In addition, the productivity of overhead crane operator in Pulp Warehouse 1 is below 50%, which means that the load for carrying the task is the smallest compared with another overhead crane operator in another Pulp Warehouse. This condition occurs because the speed of the machine is the slowest rather than other machine in other Pulp Warehouse (PD 1 = 1600 ton per day, PD 2 = 1800 ton per day, PD 3 = 2000 ton per day, and PD 4 = 2200 ton per day) which makes the productivity is low.

b. Recommendations

For reducing overloaded task which are performed by Overhead Crane operator in Pulp Warehouse 2, compiler can give several recommendations, those are :

1. Change the allocations of overhead crane operator in each pulp warehouse (For example : OHC operator A moves the OHC at Pulp Warehouse 2 in Monday, so the next day OHC operator B moves the OHC in Pulp Warehouse 2, etc)
2. Adding the quantities of overhead crane operator in Pulp Warehouse 2 so that the operator can change time to operate the overhead crane.
3. Because all stuffing activities are done in Pulp Warehouse 2, forklift can be used to move the products from one warehouse to Pulp Warehouse 2. By changing from moving products from one warehouse to Pulp Warehouse 2 by using Terberg with using forklift, the workload of OHC operator in Pulp Warehouse 2 can be reduced.

NB : To perform this activity , firstly, making the way for the forklift is needed so that the forklift can load the products at each warehouse to Pulp Warehouse 2.

For example : On Monday, the products that are going to be stuffed is KP where KP is located in Pulp Warehouse 3 and 4. Before that, to stuff the products, Terberg is used to load the products to Pulp Warehouse 2. After that, the overhead crane operator will carry the products from the Terberg and help stuffing activities. But, with the addition of forklift operator, the forklift operator just needs to carry the products from Pulp Warehouse 3 to Pulp Warehouse 2 so the OHC Operator in Pulp Warehouse 2 does not need to carry the products from another warehouse again.

4. Re-layout. Because of the locations of Pulp Warehouse 3 and 4 are far from the stuffing area, stuffing process for KP products must be done in Pulp Warehouse 2 and Overhead Crane Operator in Pulp Warehouse 2 must help to complete those task. Re-layouting the location of Pulp Warehouse 3 and 4 become near the stuffing area can be the solution for decreasing the workload of OHC Operator in Pulp Warehouse 2. But, the disadvantages of re-layouting are need high cost (setup for the overhead crane and construction) and takes longer time just to construction activities.

In addition, for reducing workload percentage of Overhead Crane operator in Pulp Warehouse 2 and increase productivity of Overhead Crane operator in Pulp Warehouse 1, Overhead Crane operator in Pulp Warehouse 1 can help to carry products that are resulted from the mid gate between Pulp Warehouse 1 and 2 (the products resulted from mid gate mostly are being carried by Overhead Crane Operator in Pulp Warehouse 2). For products which are delivered to APR, overhead crane operator in Pulp Warehouse 1 can also help to load the products from the mid gate to the Terberg.

CHAPTER 5

CONCLUSION AND SUGGESTION

5.1. Conclusion

During Industrial Practice, compiler can give several conclusions, those are :

1. Overhead crane operator at Pulp Warehouse 2 has the highest productivity percentage (75,45%) which results that the overhead crane operator in Pulp Warehouse 2 has worked overloaded (118,63%)
2. The reason why overhead crane operator in Pulp Warehouse 2 has worked overloaded because stuffing activities must be conducted in Pulp Warehouse 2. So, when delivering the products to the customers, all warehouse must deliver the products to Pulp Warehouse 2 and the overhead crane operator will help the stuffing activities.
3. The percentages value of unproductive activities in Pulp Warehouse 1 and 4 are still big enough because of the waiting time (barcodeman lock the chain to carry the pulp) and no terberg crossby in everytime.

5.2. Suggestions

There are several activities that can be conducted in order to increase the performance in Pulp Warehouse 2, such as :

1. Change the location of overhead crane operator everyday which resulting in no operator will operate the same overhead crane in next or next two day
2. Add one forklift which helps for transporting the pulp from another warehouse directly to stuffing area
3. Add overhead crane operator in Pulp Warehouse 2 so that the operator can change time to operate the overhead crane

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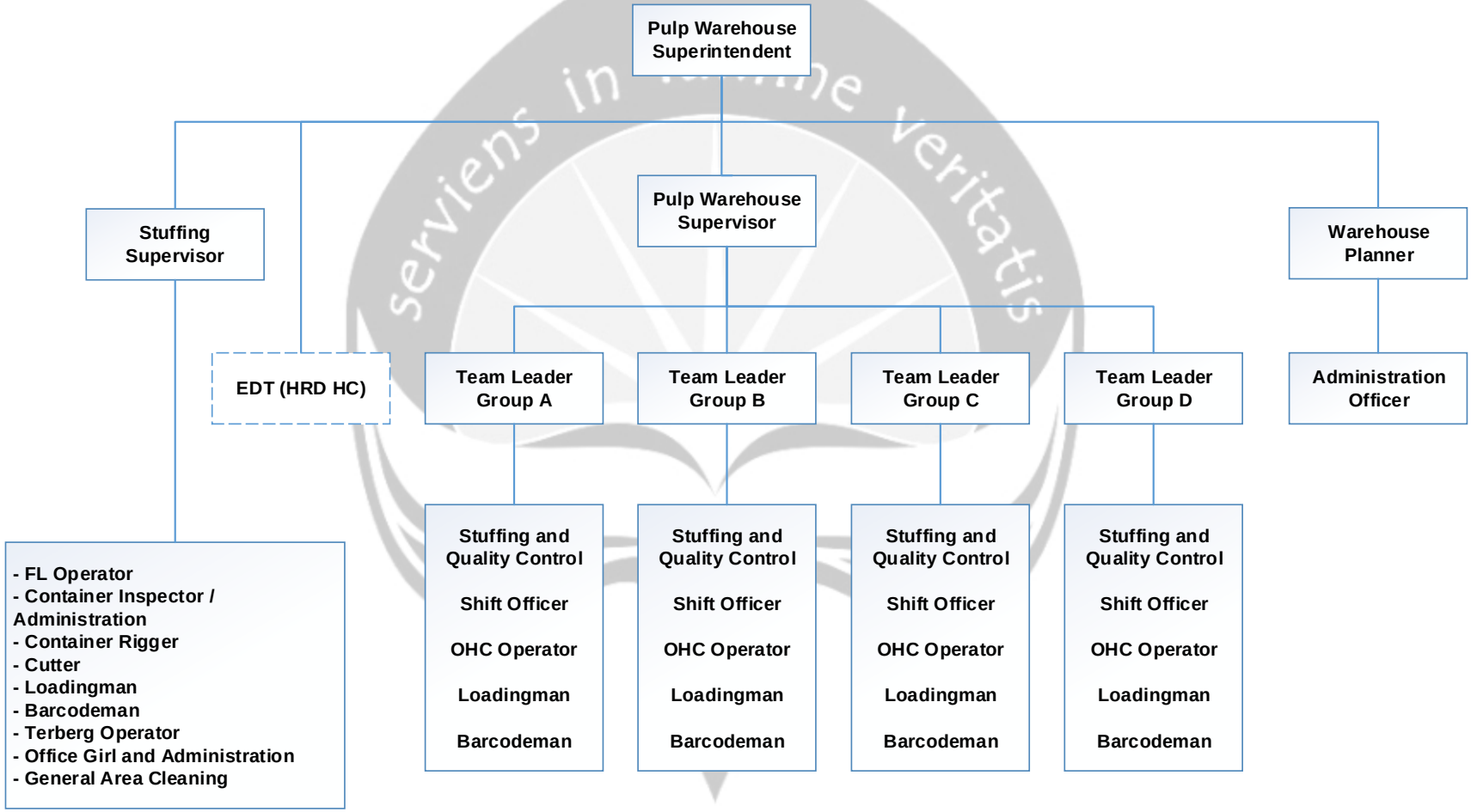
Attachment 1 : Organizational Structure



Picture 3.1. Organizational Structure in Pulp Warehouse Department

Attachment 2 : Allowances Rating

Table 3.2. Allowances Rating

FAKTOR	CONTOH PEKERJAAN		KELONGGARAN (%)	
A. Tenaga yang Dikeluarkan				
		Ekivalen beban	pria	wanita
1. Dapat diabaikan	bekerja di meja, duduk	tanpa beban	0,0 - 6,0	0,0 - 6,0
2. Sangat ringan	bekerja di meja, berdiri	0,00 - 2,25 kg	6,0 - 7,5	6,0 - 7,5
3. Ringan	menyekop, ringan	2,25 - 9,00	7,5 - 12,0	7,5 - 16,0
4. Sedang	mencangkul	9,00 - 18,00	12,0 - 19,0	16,0 - 30,0
5. Berat	mengayun palu yang berat	18,00 - 27,00	19,0 - 30,0	
6. Sangat berat	memanggul beban	27,00 - 50,00	30,0 - 50,0	
7. Luar biasa berat	memanggul karung berat	diatas 50,00 kg		
B. Sikap Kerja				
1. Duduk	bekerja duduk, ringan		0,0 - 1,0	
2. Berdiri diatas dua kaki	badan tegak, ditumou dua kaki		1,0 - 2,5	
3. Berdiri diatas satu kaki	satu kaki menggerakkan alat kontrol		2,5 - 4,0	
4. Berbaring	pada bagian sisi, belakang, atau depan badan		2,5 - 4,0	
5. Membungkuk	badan dibungkukkan bertumpu pada dua kaki		4,0 - 10,0	
C. Gerakan Kerja				
1. Normal	ayunan bebas dari palu		0	
2. Agak terbatas	ayunan terbatas dari palu		0 - 5	
3. Sulit	membawa beban berat dengan satu tangan		0 - 5	
4. Pada anggota badan terbatas	bekerja dengan tangan diatas kepala		5 - 10	
5. Seluruh anggota badan terbatas	bekerja di lorong lorong pertambangan yang sempit		10 - 15	

Table 3.2. Continued

FAKTOR	CONTOH PEKERJAAN	KELONGGARAN (%)	
D. Kelelahan Mata			
		pencahayaan baik	kurang
1. Pandangan yang terputus putus	membaca alat ukur	0	1
2. Pandangan yang hampir terus menerus	pekerjaan pekerjaan yang teliti	2	2
3. Pandangan terus menerus dengan fokus berubah ubah	memeriksa cacat cacat pada kain	2	5
4. Pandangan terus menerus dengan fokus tetap	pemeriksaan yang sangat teliti	4	8
E. Keadaan Temperatur Tempat Kerja			
	Temperatur	keadaan normal	keadaan berlebihan
1. Beku	Dibawah 0	diatas 10	diatas 12
2. Rendah	0 - 13	10 - 0	12 - 5
3. Sedang	13 - 22	5 - 0	8 - 0
4. Normal	22 - 28	0 - 5	0 - 8
5. Tinggi	28 - 38	5 - 40	8 - 100
6. Sangat tinggi	diatas 38	diatas 40	diatas 100
F. Keadaan Atmosfer			
1. Baik	ruangan yang berventilasi baik, udara segar	0	
2. Cukup	ventilasi kurang baik, ada bau-bauan tidak berbahaya	0 - 5	
3. Kurang baik	adanya debu debu beracun, atau tidak beracun tapi banyak	5 - 10	
4. Buruk	adanya bau berbahaya yang mengharuskan menggunakan alat pernafasan	10 - 20	

Table 3.2. Continued

FAKTOR	CONTOH PEKERJAAN	KELONGGARAN (%)
G. Keadaan Lingkungan yang Baik		
1. Bersih, sehat, cerah, dengan kebisingan rendah		0
2. Siklus kerja berulang ulang antara 5 - 10 detik		0 - 1
3. Siklus kerja berulang - ulang antara 0 - 5 detik		1 - 3
4. Sangat bising		0 - 5
5. Jika faktor-faktor yang berpengaruh dapat menurunkan kualitas		0 - 5
6. Terasa adanya getaran lantai		5 - 10
7. Keadaan-keadaan yang luar biasa (bunyi, kebersihan, dll)		5 - 15
KEBUTUHAN PRIBADI Pria = 0 - 2,5% Wanita = 2 - 5%		

Attachment 3 : Data Collection

Date : 15th July 2019

Location : Pulp Warehouse 3 (Shift 07.00 – 15.00 WIB)

Table 4.3. Data Collection on 15th July 2019

No	Time	Date Activity	Duration	
			Seconds	Minutes
1	07.00 - 07.10	Briefing	600	10
2	07.10 - 07.13	Walking to Pulp Warehouse 3	180	3
3	07.13 - 07.14	Reading Loading Data	60	1
4	07.14 - 07.15	Operating and Moving Overhead Crane	60	1
5	07.15 - 07.16	Waiting	60	1
6	07.16 - 07.17	Carrying and Moving Bales to Destination	60	1
7	07.17 - 07.20	Positioning and Releasing Bales	180	3
8	07.20 - 07.22	Operating and Moving Overhead Crane	120	2
9	07.22 - 07.23	Waiting	60	1
10	07.23 - 07.24	Carrying and Moving Bales to Destination	60	1
11	07.24 - 07.25	Positioning and Releasing Bales	60	1
12	07.25 - 07.26	Carrying and Moving Bales to Destination	60	1
13	07.26 - 07.27	Releasing Bales to Terberg	60	1
14	07.27 - 07.29	Positioning and Releasing Bales	20	0,3333
15		Carrying and Moving Bales to Destination	87	1,45
16		Waiting	13	0,2167
17	07.29 - 07.30	Carrying and Moving Bales to Destination	10	0,1667
18		Positioning and Releasing Bales	50	0,8333
19	07.30 - 07.31	Operating and Moving Overhead Crane	15	0,25
20		Waiting	20	0,3333
21		Carrying and Moving Bales to Destination	25	0,4167
22	07.31 - 07.32	Positioning and Releasing Bales	5	0,0833
23		Operating and Moving Overhead Crane	55	0,9167
24	07.32 - 07.34	Waiting	20	0,3333
25		Releasing Bales to Terberg	100	1,6667
26	07.34 - 07.36	Positioning and Releasing Bales	75	1,25
27		Operating and Moving Overhead Crane	45	0,75
28	07.36 - 07.37	Waiting	15	0,25
29		Carrying and Moving Bales to Destination	45	0,75
30	07.37 - 07.38	Positioning and Releasing Bales	60	1

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
31	07.38 - 07.39	Operating and Moving Overhead Crane	42	0,7
32		Waiting	18	0,3
33	07.39 - 07.40	Carrying and Moving Bales to Destination	10	0,1667
34		Positioning and Releasing Bales	10	0,1667
35		Operating and Moving Overhead Crane	40	0,6667
36	07.40 - 07.42	Waiting	65	1,0833
37		Carrying and Moving Bales to Destination	55	0,9167
38	07.42 - 07.45	Releasing Bales to Terberg	180	3
39	07.45 - 07.47	Operating and Moving Overhead Crane	10	0,1667
40		Waiting	16	0,2667
41		Releasing Bales to Terberg	94	1,5667
42	07.47 - 07.49	Operating and Moving Overhead Crane	3	0,05
43		Waiting	20	0,3333
44		Releasing Bales to Terberg	97	1,6167
45	07.49 - 07.51	Operating and Moving Overhead Crane	15	0,25
46		Waiting	15	0,25
47		Releasing Bales to Terberg	90	1,5
48	07.51 - 07.53	Operating and Moving Overhead Crane	14	0,2333
49		Waiting	18	0,3
50		Releasing Bales to Terberg	88	1,4667
51	07.53 - 07.55	Operating and Moving Overhead Crane	14	0,2333
52		Waiting	20	0,3333
53		Releasing Bales to Terberg	86	1,4333
54	07.55 - 07.56	Operating and Moving Overhead Crane	43	0,7167
55		Waiting	17	0,2833
56	07.56 - 07.57	Releasing Bales to Terberg	60	1
57	07.57 - 07.58	Operating and Moving Overhead Crane	46	0,7667
58		Waiting	14	0,2333
59	07.58 - 07.59	Releasing Bales to Terberg	60	1
60	07.59 - 08.00	Operating and Moving Overhead Crane	45	0,75
61		Waiting	15	0,25
62	08.00 - 08.02	Releasing Bales to Terberg	120	2
63	08.02 - 08.03	Operating and Moving Overhead Crane	42	0,7
64		Waiting	18	0,3

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
65	08.03 - 08.06	Releasing Bales to Terberg	180	3
66	08.06 - 08.07	Operating and Moving Overhead Crane	46	0,7667
67		Waiting	14	0,2333
68	08.07 - 08.10	Carrying and Moving Bales to Destination	180	3
69	08.10 - 08.11	Operating and Moving Overhead Crane	43	0,7167
70		Waiting	17	0,2833
71	08.11 - 08.13	Releasing Bales to Terberg	120	2
72	08.13 - 08.14	Operating and Moving Overhead Crane	44	0,7333
73		Waiting	16	0,2667
74	08.14 - 08.15	Carrying and Moving Bales to Destination	20	0,3333
75		Positioning and Releasing Bales	40	0,6667
76	08.15 - 08.17	Operating and Moving Overhead Crane	35	0,5833
77		Talking	85	1,4167
78	08.17 - 08.20	Resting	180	3
79	08.20 - 08.21	Operating and Moving Overhead Crane	46	0,7667
80		Waiting	14	0,2333
81	08.21 - 08.22	Carrying and Moving Bales to Destination	20	0,3333
82		Positioning and Releasing Bales	40	0,6667
83	08.22 - 08.24	Operating and Moving Overhead Crane	30	0,5
84		Waiting	90	1,5
85	08.24 - 08.25	Carrying and Moving Bales to Destination	15	0,25
86		Positioning and Releasing Bales	45	0,75
87	08.25 - 08.26	Operating and Moving Overhead Crane	15	0,25
88		Waiting	45	0,75
89	08.26 - 08.27	Carrying and Moving Bales to Destination	10	0,1667
90		Positioning and Releasing Bales	15	0,25
91		Waiting	35	0,5833
92	08.27 - 08.28	Operating and Moving Overhead Crane	40	0,6667
93		Waiting	20	0,3333
94	08.28 - 08.30	Carrying and Moving Bales to Destination	58	0,9667
95		Positioning and Releasing Bales	62	1,0333
96	08.30 - 08.32	Waiting	43	0,7167

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
97		Positioning and Releasing Bales	77	1,2833
98	08.32 - 08.33	Operating and Moving Overhead Crane	60	1
99	08.33 - 08.36	Waiting	15	0,25
100		Carrying and Moving Bales to Destination	88	1,4667
101		Positioning and Releasing Bales	77	1,2833
102	08.36 - 08.37	Operating and Moving Overhead Crane	47	0,7833
103		Waiting	13	0,2167
104	08.37 - 08.40	Carrying and Moving Bales to Destination	120	2
105		Positioning and Releasing Bales	60	1
106	08.40 -08.41	Operating and Moving Overhead Crane	48	0,8
107		Waiting	12	0,2
108	08.41 - 08.44	Carrying and Moving Bales to Destination	48	0,8
109		Positioning and Releasing Bales	132	2,2
110	08.44 - 08.45	Operating and Moving Overhead Crane	49	0,8167
111		Waiting	11	0,1833
112	08.45 - 08.47	Carrying and Moving Bales to Destination	64	1,0667
113		Positioning and Releasing Bales	56	0,9333
114	08.47 - 08.48	Operating and Moving Overhead Crane	41	0,6833
115		Waiting	19	0,3167
116	08.48 - 08.50	Carrying and Moving Bales to Destination	51	0,85
117		Positioning and Releasing Bales	69	1,15
118	08.50 - 08.51	Operating and Moving Overhead Crane	60	1
119	08.51 - 09.08	Resting	1020	17
120	09.08 - 09.09	Operating and Moving Overhead Crane	47	0,7833
121		Waiting	13	0,2167
122	09.09 - 09.11	Carrying and Moving Bales to Destination	45	0,75
123		Positioning and Releasing Bales	75	1,25
124	09.11 - 09.12	Operating and Moving Overhead Crane	46	0,7667
125		Waiting	14	0,2333
126	09.12 - 09.14	Carrying and Moving Bales to Destination	55	0,9167
127		Positioning and Releasing Bales	65	1,0833

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
128	09.14 - 09.15	Operating and Moving Overhead Crane	41	0,6833
129		Waiting	19	0,3167
130	09.15 - 09.17	Carrying and Moving Bales to Destination	52	0,8667
131		Positioning and Releasing Bales	68	1,1333
132	09.17 - 09.19	Operating and Moving Overhead Crane	45	0,75
133		Waiting	75	1,25
134	09.19 - 09.21	Carrying and Moving Bales to Destination	44	0,7333
135		Talking	76	1,2667
136	09.21 - 09.23	Carrying and Moving Bales to Destination	56	0,9333
137		Positioning and Releasing Bales	64	1,0667
138	09.23 - 09.24	Operating and Moving Overhead Crane	44	0,7333
139		Waiting	16	0,2667
140	09.24 - 09.26	Carrying and Moving Bales to Destination	53	0,8833
141		Positioning and Releasing Bales	67	1,1167
142	09.26 - 09.27	Operating and Moving Overhead Crane	42	0,7
143		Waiting	18	0,3
144	09.27 - 09.28	Carrying and Moving Bales to Destination	34	0,5667
145		Positioning and Releasing Bales	26	0,4333
146	09.28 - 09.31	Operating and Moving Overhead Crane	50	0,8333
147		Waiting	19	0,3167
148		Operating and Moving Overhead Crane	111	1,85
149	09.31 - 09.33	Carrying and Moving Bales to Destination	74	1,2333
150		Positioning and Releasing Bales	46	0,7667
151	09.33 - 09.36	Operating and Moving Overhead Crane	85	1,4167
152		Waiting	95	1,5833
153	09.36 - 09.38	Carrying and Moving Bales to Destination	54	0,9
154		Positioning and Releasing Bales	66	1,1
155	09.38 - 09.40	Operating and Moving Overhead Crane	44	0,7333
156		Waiting	76	1,2667
157	09.40 - 09.42	Carrying and Moving Bales to Destination	62	1,0333
158		Positioning and Releasing Bales	58	0,9667

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
159	09.42 - 09.46	Waiting	240	4
160	09.46 - 09.49	Carrying and Moving Bales to Destination	55	0,9167
161		Positioning and Releasing Bales	125	2,0833
162	09.49 - 09.50	Operating and Moving Overhead Crane	46	0,7667
163		Waiting	14	0,2333
164	09.50 - 09.52	Carrying and Moving Bales to Destination	74	1,2333
165		Positioning and Releasing Bales	46	0,7667
166	09.52 - 09.53	Operating and Moving Overhead Crane	42	0,7
167		Waiting	18	0,3
168	09.53 - 09.57	Carrying and Moving Bales to Destination	55	0,9167
169		Positioning and Releasing Bales	185	3,0833
170	09.57 - 09.59	Operating and Moving Overhead Crane	100	1,6667
171		Waiting	20	0,3333
172	09.59 - 10.02	Carrying and Moving Bales to Destination	60	1
173		Positioning and Releasing Bales	120	2
174	10.02 - 10.03	Operating and Moving Overhead Crane	44	0,7333
175		Waiting	16	0,2667
176	10.03 - 10.06	Carrying and Moving Bales to Destination	58	0,9667
177		Positioning and Releasing Bales	122	2,0333
178	10.06 - 10.10	Waiting	240	4
179	10.10 - 10.14	Operating and Moving Overhead Crane	25	0,4167
180		Carrying and Moving Bales to Destination	49	0,8167
181		Positioning and Releasing Bales	166	2,7667
182	10.14 - 10.27	Resting	780	13
183	10.27 - 10.28	Operating and Moving Overhead Crane	42	0,7
184		Waiting	18	0,3
185	10.28 - 10.31	Carrying and Moving Bales to Destination	51	0,85
186		Positioning and Releasing Bales	129	2,15
187	10.31 - 10.32	Operating and Moving Overhead Crane	43	0,7167
188		Waiting	17	0,2833
189	10.32 - 10.35	Carrying and Moving Bales to Destination	56	0,9333

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
190		Positioning and Releasing Bales	124	2,0667
191	10.35 - 10.36	Operating and Moving Overhead Crane	60	1
192	10.36 - 10.39	Carrying and Moving Bales to Destination	53	0,8833
193		Positioning and Releasing Bales	127	2,1167
194	10.39 - 10.41	Operating and Moving Overhead Crane	54	0,9
195		Waiting	66	1,1
196	10.41 - 10.43	Carrying and Moving Bales to Destination	53	0,8833
197		Positioning and Releasing Bales	67	1,1167
198	10.43 - 10.45	Operating and Moving Overhead Crane	53	0,8833
199		Waiting	67	1,1167
200	10.45 - 10.47	Carrying and Moving Bales to Destination	49	0,8167
201		Positioning and Releasing Bales	71	1,1833
202	10.47 - 10.48	Operating and Moving Overhead Crane	25	0,4167
203		Waiting	35	0,5833
204	10.48 - 11.02	Resting	840	14
205	11.02 - 11.03	Operating and Moving Overhead Crane	47	0,7833
206		Waiting	13	0,2167
207	11.03 - 11.05	Carrying and Moving Bales to Destination	49	0,8167
208		Positioning and Releasing Bales	71	1,1833
209	11.05 - 11.07	Operating and Moving Overhead Crane	109	1,8167
210		Waiting	11	0,1833
211	11.07 - 11.12	Carrying and Moving Bales to Destination	126	2,1
212		Positioning and Releasing Bales	174	2,9
213	11.12 - 11.13	Operating and Moving Overhead Crane	47	0,7833
214		Waiting	13	0,2167
215	11.13 - 11.17	Carrying and Moving Bales to Destination	38	0,6333
216		Positioning and Releasing Bales	202	3,3667
217	11.17 - 11.18	Operating and Moving Overhead Crane	48	0,8
218		Waiting	12	0,2
219	11.18 - 11.21	Carrying and Moving Bales to Destination	56	0,9333
220		Positioning and Releasing Bales	124	2,0667

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
221	11.21 - 11.23	Operating and Moving Overhead Crane	45	0,75
222		Waiting	15	0,25
223	11.23 - 11.26	Carrying and Moving Bales to Destination	47	0,7833
224		Positioning and Releasing Bales	133	2,2167
225	11.26 - 11.27	Operating and Moving Overhead Crane	46	0,7667
226		Waiting	14	0,2333
227	11.27 - 11.30	Carrying and Moving Bales to Destination	48	0,8
228		Positioning and Releasing Bales	132	2,2
229	11.30 - 11.44	Resting	840	14
230	11.44 - 11.45	Operating and Moving Overhead Crane	48	0,8
231		Waiting	12	0,2
232	11.45 - 11.47	Carrying and Moving Bales to Destination	48	0,8
233		Positioning and Releasing Bales	72	1,2
234	11.47 - 11.49	Operating and Moving Overhead Crane	74	1,2333
235		Waiting	46	0,7667
236	11.49 - 11.52	Carrying and Moving Bales to Destination	55	0,9167
237		Positioning and Releasing Bales	125	2,0833
238	11.52 - 11.53	Operating and Moving Overhead Crane	48	0,8
239		Waiting	12	0,2
240	11.53 - 11.55	Carrying and Moving Bales to Destination	50	0,8333
241		Positioning and Releasing Bales	70	1,1667
242	11.55 - 12.15	Resting	1200	20
243	12.15 - 12.17	Operating and Moving Overhead Crane	106	1,7667
244		Waiting	14	0,2333
245	12.17 - 12.19	Carrying and Moving Bales to Destination	49	0,8167
246		Positioning and Releasing Bales	131	2,1833
247	12.19 - 12.21	Operating and Moving Overhead Crane	96	1,6
248		Waiting	24	0,4
249	12.21 - 12.24	Carrying and Moving Bales to Destination	52	0,8667
250		Positioning and Releasing Bales	128	2,1333
251	12.24 - 12.25	Operating and Moving Overhead Crane	46	0,7667

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
252		Waiting	14	0,2333
253	12.25 - 12.27	Carrying and Moving Bales to Destination	26	0,4333
254		Positioning and Releasing Bales	94	1,5667
255	12.27 - 12.28	Operating and Moving Overhead Crane	45	0,75
256		Waiting	15	0,25
257	12.28 - 12.29	Carrying and Moving Bales to Destination	29	0,4833
258		Positioning and Releasing Bales	31	0,5167
259	12.29 - 12.44	Resting	900	15
260	12.44 - 12.46	Operating and Moving Overhead Crane	83	1,3833
261		Waiting	37	0,6167
262	12.46 - 12.49	Carrying and Moving Bales to Destination	50	0,8333
263		Positioning and Releasing Bales	130	2,1667
264	12.49 - 12.51	Operating and Moving Overhead Crane	99	1,65
265		Waiting	21	0,35
266	12.51 - 12.54	Carrying and Moving Bales to Destination	53	0,8833
267		Positioning and Releasing Bales	127	2,1167
268	12.54 - 12.55	Operating and Moving Overhead Crane	48	0,8
269		Waiting	12	0,2
270	12.55 - 12.57	Carrying and Moving Bales to Destination	56	0,9333
271		Positioning and Releasing Bales	64	1,0667
272	12.57 - 12.59	Operating and Moving Overhead Crane	105	1,75
273		Waiting	15	0,25
274	12.59 - 13.05	Carrying and Moving Bales to Destination	68	1,1333
275		Positioning and Releasing Bales	292	4,8667
276	13.05 - 13.08	Operating and Moving Overhead Crane	153	2,55
277		Waiting	27	0,45
278	13.08 - 13.10	Carrying and Moving Bales to Destination	51	0,85
279		Positioning and Releasing Bales	69	1,15
280	13.10 - 13.12	Operating and Moving Overhead Crane	98	1,6333
281		Waiting	22	0,3667
282	13.12 - 13.14	Carrying and Moving Bales to Destination	52	0,8667

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
283		Positioning and Releasing Bales	68	1,1333
284	13.14 - 13.15	Operating and Moving Overhead Crane	60	1
285	13.15 - 13.26	Resting	660	11
286	13.26 - 13.27	Operating and Moving Overhead Crane	46	0,7667
287		Waiting	14	0,2333
288	13.27 - 13.29	Carrying and Moving Bales to Destination	56	0,9333
289		Positioning and Releasing Bales	64	1,0667
290	13.29 - 13.31	Operating and Moving Overhead Crane	105	1,75
291		Waiting	15	0,25
292	13.31 - 13.33	Carrying and Moving Bales to Destination	55	0,9167
293		Positioning and Releasing Bales	65	1,0833
294	13.33 - 13.35	Operating and Moving Overhead Crane	106	1,7667
295		Waiting	14	0,2333
296	13.35 - 13.49	Carrying and Moving Bales to Destination	50	0,8333
297		Positioning and Releasing Bales	790	13,167
298	13.49 - 13.51	Operating and Moving Overhead Crane	105	1,75
299		Waiting	15	0,25
300	13.51 - 13.54	Carrying and Moving Bales to Destination	53	0,8833
301		Positioning and Releasing Bales	127	2,1167
302	13.54 - 13.56	Operating and Moving Overhead Crane	97	1,6167
303		Waiting	23	0,3833
304	13.56 - 14.00	Carrying and Moving Bales to Destination	58	0,9667
305		Positioning and Releasing Bales	182	3,0333
306	14.00 - 14.01	Operating and Moving Overhead Crane	46	0,7667
307		Waiting	14	0,2333
308	14.01 - 14.11	Carrying and Moving Bales to Destination	44	0,7333
309		Positioning and Releasing Bales	556	9,2667
310	14.11 - 14.15	Operating and Moving Overhead Crane	202	3,3667
311		Waiting	38	0,6333
312	14.15 - 14.17	Carrying and Moving Bales to Destination	48	0,8
313		Positioning and Releasing Bales	72	1,2

Table 4.3. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
314	14.17 - 14.18	Operating and Moving Overhead Crane	46	0,7667
315		Waiting	14	0,2333
316	14.18 - 14.23	Carrying and Moving Bales to Destination	56	0,9333
317		Positioning and Releasing Bales	244	4,0667
318	14.23 - 14.27	Operating and Moving Overhead Crane	120	2
319		Waiting	120	2
320	14.27 - 14.29	Carrying and Moving Bales to Destination	47	0,7833
321		Positioning and Releasing Bales	73	1,2167
322	14.29 - 14.32	Waiting	180	3
323	14.32 - 14.47	Releasing Bales to Terberg	900	15
324	14.47 - 14.48	Operating and Moving Overhead Crane	45	0,75
325		Waiting	15	0,25
326	14.48 - 14.50	Carrying and Moving Bales to Destination	40	0,6667
327		Positioning and Releasing Bales	80	1,3333
328	14.50 - 14.51	Operating and Moving Overhead Crane	47	0,7833
329		Waiting	13	0,2167
330	14.51 - 14.53	Carrying and Moving Bales to Destination	51	0,85
331		Positioning and Releasing Bales	69	1,15
332	14.53 - 14.57	Releasing Bales to Terberg	240	4
333	14.57 - 15.00	Resting	180	3

Date : 16th July 2019

Location : Pulp Warehouse 4 (Shift 07.00 – 15.00 WIB)

Table 4.4. Data Collection on 16th July 2019

No	Time	Date Activity	Duration	
			Seconds	Minutes
1	06.55 - 07.00	Briefing	300	5
2	07.00 - 07.03	Walking to Pulp Warehouse 4	180	3
3	07.03 - 07.04	Reading Loading Data	60	1
4	07.04 - 07.05	Operating and Moving Overhead Crane	60	1
5	07.05 - 07.06	Waiting	60	1
6	07.06 - 07.09	Carrying and Moving Bales to Destination	78	1,3
7		Positioning and Releasing Bales	102	1,7
8	07.09 - 07.10	Operating and Moving Overhead Crane	40	0,6666667
9		Waiting	20	0,3333333
10	07.10 - 07.13	Carrying and Moving Bales to Destination	50	0,8333333
11		Positioning and Releasing Bales	130	2,1666667
12	07.13 - 07.14	Operating and Moving Overhead Crane	37	0,6166667
13		Waiting	23	0,3833333
14	07.14 - 07.17	Carrying and Moving Bales to Destination	47	0,7833333
15		Positioning and Releasing Bales	133	2,2166667
16	07.17 - 07.26	Operating and Moving Overhead Crane	20	0,3333333
17		Waiting	18	0,3
18		Carrying and Moving Bales to Destination	54	0,9
19		Positioning and Releasing Bales	31	0,5166667
20		Waiting	10	0,1666667
21		Positioning and Releasing Bales	58	0,9666667
22		Waiting	21	0,35
23		Positioning and Releasing Bales	61	1,0166667
24		Waiting	23	0,3833333
25		Positioning and Releasing Bales	74	1,2333333
26		Waiting	21	0,35
27		Positioning and Releasing Bales	64	1,0666667
28		Waiting	22	0,3666667
29		Positioning and Releasing Bales	63	1,05
30	07.26 - 07.27	Operating and Moving Overhead Crane	37	0,6166667
31		Waiting	23	0,3833333
32	07.27 - 07.29	Carrying and Moving Bales to Destination	44	0,7333333
33		Positioning and Releasing Bales	76	1,2666667

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
34	07.29 - 07.32	Operating and Moving Overhead Crane	14	0,2333333
35		Resting	122	2,0333333
36		Operating and Moving Overhead Crane	24	0,4
37		Waiting	20	0,3333333
38	07.32 - 07.35	Carrying and Moving Bales to Destination	80	1,3333333
39		Positioning and Releasing Bales	100	1,6666667
40	07.35 - 07.37	Operating and Moving Overhead Crane	98	1,6333333
41		Waiting	22	0,3666667
42	07.37 - 07.39	Carrying and Moving Bales to Destination	54	0,9
43		Positioning and Releasing Bales	66	1,1
44	07.39 - 07.40	Operating and Moving Overhead Crane	35	0,5833333
45		Waiting	25	0,4166667
46	07.40 - 07.42	Carrying and Moving Bales to Destination	50	0,8333333
47		Positioning and Releasing Bales	70	1,1666667
48	07.42 - 07.51	Operating and Moving Overhead Crane	40	0,6666667
49		Resting	500	8,3333333
50	07.51 - 07.53	Carrying and Moving Bales to Destination	44	0,7333333
51		Positioning and Releasing Bales	76	1,2666667
52	07.53 - 07.55	Operating and Moving Overhead Crane	96	1,6
53		Waiting	24	0,4
54	07.55 - 07.57	Carrying and Moving Bales to Destination	44	0,7333333
55		Positioning and Releasing Bales	76	1,2666667
56	07.57 - 08.02	Operating and Moving Overhead Crane	16	0,2666667
57		Carrying and Moving Bales to Destination	7	0,1166667
58		Waiting	14	0,2333333
59		Releasing Bales to Terberg	100	1,6666667
60		Operating and Moving Overhead Crane	19	0,3166667
61		Waiting	26	0,4333333
62		Releasing Bales to Terberg	118	1,9666667
63	08.02 - 08.04	Operating and Moving Overhead Crane	57	0,95
64		Waiting	63	1,05
65	08.04 - 08.06	Carrying and Moving Bales to Destination	46	0,7666667
66		Positioning and Releasing Bales	74	1,2333333
67	08.06 - 08.32	Carrying and Moving Bales to Destination	250	4,1666667
68		Waiting	210	3,5
69		Releasing Bales to Terberg	1100	18,333333

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
70	08.32 - 08.33	Operating and Moving Overhead Crane	36	0,6
71		Waiting	24	0,4
72	08.33 - 08.35	Carrying and Moving Bales to Destination	33	0,55
73		Positioning and Releasing Bales	87	1,45
74	08.35 - 08.36	Operating and Moving Overhead Crane	41	0,6833333
75		Waiting	19	0,3166667
76	08.36 - 08.38	Carrying and Moving Bales to Destination	41	0,6833333
77		Positioning and Releasing Bales	79	1,3166667
78	08.38 - 08.43	Carrying and Moving Bales to Destination	65	1,0833333
79		Waiting	57	0,95
80		Releasing Bales to Terberg	178	2,9666667
81	08.43 - 08.44	Operating and Moving Overhead Crane	38	0,6333333
82		Waiting	22	0,3666667
83	08.44 - 08.46	Carrying and Moving Bales to Destination	44	0,7333333
84		Positioning and Releasing Bales	76	1,2666667
85	08.46 - 08.47	Operating and Moving Overhead Crane	36	0,6
86		Waiting	24	0,4
87	08.47 - 08.49	Carrying and Moving Bales to Destination	46	0,7666667
88		Positioning and Releasing Bales	74	1,2333333
89	08.49 - 08.51	Operating and Moving Overhead Crane	72	1,2
90		Waiting	48	0,8
91	08.51 - 08.52	Carrying and Moving Bales to Destination	37	0,6166667
92		Positioning and Releasing Bales	23	0,3833333
93	08.52 - 08.53	Operating and Moving Overhead Crane	41	0,6833333
94		Waiting	19	0,3166667
95	08.53 - 08.55	Carrying and Moving Bales to Destination	40	0,6666667
96		Positioning and Releasing Bales	80	1,3333333
97	08.55 - 08.57	Operating and Moving Overhead Crane	68	1,1333333
98		Waiting	52	0,8666667
99	08.57 - 09.01	Carrying and Moving Bales to Destination	51	0,85
100		Positioning and Releasing Bales	84	1,4
101		Waiting	105	1,75
102	09.01 - 09.16	Carrying and Moving Bales to Destination	100	1,6666667
103		Waiting	57	0,95
104		Releasing Bales to Terberg	743	12,383333
105	09.17 - 09.18	Operating and Moving Overhead Crane	34	0,5666667

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
106		Waiting	26	0,4333333
107	09.18 - 09.19	Carrying and Moving Bales to Destination	40	0,6666667
108		Positioning and Releasing Bales	20	0,3333333
109	09.19 - 09.24	Carrying and Moving Bales to Destination	50	0,8333333
110		Waiting	46	0,7666667
111		Releasing Bales to Terberg	204	3,4
112	09.24 - 09.25	Operating and Moving Overhead Crane	36	0,6
113		Waiting	24	0,4
114	09.25 - 09.27	Carrying and Moving Bales to Destination	27	0,45
115		Positioning and Releasing Bales	93	1,55
116	09.27 - 09.28	Operating and Moving Overhead Crane	42	0,7
117		Waiting	18	0,3
118	09.28 - 09.30	Carrying and Moving Bales to Destination	34	0,5666667
119		Positioning and Releasing Bales	86	1,4333333
120	09.30 - 09.31	Operating and Moving Overhead Crane	42	0,7
121		Waiting	18	0,3
122	09.31 - 09.33	Carrying and Moving Bales to Destination	29	0,4833333
123		Positioning and Releasing Bales	91	1,5166667
124	09.33 - 09.34	Operating and Moving Overhead Crane	38	0,6333333
125		Waiting	22	0,3666667
126	09.34 - 09.37	Carrying and Moving Bales to Destination	32	0,5333333
127		Positioning and Releasing Bales	148	2,4666667
128	09.37 - 09.39	Operating and Moving Overhead Crane	56	0,9333333
129		Waiting	64	1,0666667
130	09.39 - 09.41	Carrying and Moving Bales to Destination	39	0,65
131		Positioning and Releasing Bales	81	1,35
132	09.41 - 09.48	Resting	420	7
133	09.48 - 09.49	Operating and Moving Overhead Crane	24	0,4
134		Waiting	36	0,6
135	09.49 - 09.52	Carrying and Moving Bales to Destination	30	0,5
136		Positioning and Releasing Bales	150	2,5
137	09.52 - 09.53	Operating and Moving Overhead Crane	37	0,6166667
138		Waiting	23	0,3833333
139	09.53 - 09.54	Carrying and Moving Bales to Destination	39	0,65
140		Positioning and Releasing Bales	21	0,35
141	09.54 - 10.05	Carrying and Moving Bales to Destination	91	1,5166667

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
142		Waiting	76	1,2666667
143		Releasing Bales to Terberg	493	8,2166667
144	10.05 - 10.06	Operating and Moving Overhead Crane	39	0,65
145		Waiting	21	0,35
146	10.06 - 10.08	Carrying and Moving Bales to Destination	45	0,75
147		Positioning and Releasing Bales	75	1,25
148	10.08 - 10.09	Operating and Moving Overhead Crane	44	0,7333333
149		Waiting	16	0,2666667
150	10.09 - 10.12	Carrying and Moving Bales to Destination	48	0,8
151		Positioning and Releasing Bales	132	2,2
152	10.12 - 10.13	Operating and Moving Overhead Crane	36	0,6
153		Waiting	24	0,4
154	10.13 - 10.16	Carrying and Moving Bales to Destination	36	0,6
155		Positioning and Releasing Bales	144	2,4
156	10.16 - 10.27	Carrying and Moving Bales to Destination	106	1,7666667
157		Waiting	66	1,1
158		Releasing Bales to Terberg	488	8,1333333
159	10.27 - 10.29	Reading Loading Data	120	2
160	10.29 - 10.32	Resting	180	3
161	10.32 - 10.37	Operating and Moving Overhead Crane	19	0,3166667
162		Waiting	281	4,6833333
163	10.37 - 10.40	Carrying and Moving Bales to Destination	56	0,9333333
164		Positioning and Releasing Bales	124	2,0666667
165	10.40 - 10.41	Operating and Moving Overhead Crane	40	0,6666667
166		Waiting	20	0,3333333
167	10.41 - 10.43	Carrying and Moving Bales to Destination	54	0,9
168		Positioning and Releasing Bales	66	1,1
169	10.43 - 10.45	Operating and Moving Overhead Crane	98	1,6333333
170		Waiting	22	0,3666667
171	10.45 - 10.47	Carrying and Moving Bales to Destination	81	1,35
172		Positioning and Releasing Bales	39	0,65
173	10.47 - 10.54	Positioning and Releasing Bales	420	7
174	10.54 - 10.56	Resting	120	2
175	10.56 - 10.57	Operating and Moving Overhead Crane	38	0,6333333
176		Waiting	22	0,3666667
177	10.57 - 11.00	Carrying and Moving Bales to Destination	47	0,7833333

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
178		Positioning and Releasing Bales	133	2,2166667
179	11.00 - 11.01	Operating and Moving Overhead Crane	39	0,65
180		Waiting	21	0,35
181	11.01 - 11.03	Carrying and Moving Bales to Destination	53	0,8833333
182		Positioning and Releasing Bales	67	1,1166667
183	11.03 - 11.04	Operating and Moving Overhead Crane	38	0,6333333
184		Waiting	22	0,3666667
185	11.04 - 11.07	Carrying and Moving Bales to Destination	45	0,75
186		Positioning and Releasing Bales	135	2,25
187	11.07 - 11.15	Resting	480	8
188	11.15 - 11.16	Operating and Moving Overhead Crane	42	0,7
189		Waiting	18	0,3
190	11.16 - 11.18	Carrying and Moving Bales to Destination	51	0,85
191		Positioning and Releasing Bales	69	1,15
192	11.18 - 11.19	Operating and Moving Overhead Crane	39	0,65
193		Waiting	21	0,35
194	11.19 - 11.22	Carrying and Moving Bales to Destination	43	0,7166667
195		Positioning and Releasing Bales	137	2,2833333
196	11.22 - 11.24	Resting	120	2
197	11.24 - 11.25	Operating and Moving Overhead Crane	41	0,6833333
198		Waiting	19	0,3166667
199	11.25 - 11.27	Carrying and Moving Bales to Destination	43	0,7166667
200		Positioning and Releasing Bales	77	1,2833333
201	11.27 - 11.28	Reading Loading Data	60	1
202	11.29 - 11.34	Resting	300	5
203	11.34 - 11.53	Carrying and Moving Bales to Destination	103	1,7166667
204		Waiting	111	1,85
205		Releasing Bales to Terberg	926	15,433333
206	11.53 - 11.54	Operating and Moving Overhead Crane	41	0,6833333
207		Waiting	79	1,3166667
208	11.54 - 11.56	Carrying and Moving Bales to Destination	45	0,75
209		Positioning and Releasing Bales	75	1,25
210	11.56 - 11.57	Operating and Moving Overhead Crane	38	0,6333333
211		Waiting	22	0,3666667
212	11.57 - 11.59	Carrying and Moving Bales to Destination	46	0,7666667
213		Positioning and Releasing Bales	74	1,2333333

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
214	11.59 - 12.03	Carrying and Moving Bales to Destination	31	0,5166667
215		Waiting	25	0,4166667
216		Releasing Bales to Terberg	184	3,0666667
217	12.03 - 12.04	Operating and Moving Overhead Crane	37	0,6166667
218		Waiting	23	0,3833333
219	12.04 - 12.07	Carrying and Moving Bales to Destination	53	0,8833333
220		Positioning and Releasing Bales	127	2,1166667
221	12.07 - 12.08	Operating and Moving Overhead Crane	39	0,65
222		Waiting	21	0,35
223	12.08 - 12.11	Carrying and Moving Bales to Destination	47	0,7833333
224		Positioning and Releasing Bales	133	2,2166667
225	12.11 - 12.12	Operating and Moving Overhead Crane	40	0,6666667
226		Waiting	20	0,3333333
227	12.12 - 12.14	Carrying and Moving Bales to Destination	49	0,8166667
228		Positioning and Releasing Bales	71	1,1833333
229	12.14 - 12.15	Operating and Moving Overhead Crane	43	0,7166667
230		Waiting	17	0,2833333
231	12.15 - 12.18	Carrying and Moving Bales to Destination	51	0,85
232		Positioning and Releasing Bales	129	2,15
233	12.18 - 12.19	Operating and Moving Overhead Crane	34	0,5666667
234		Waiting	26	0,4333333
235	12.19 - 12.22	Carrying and Moving Bales to Destination	44	0,7333333
236		Positioning and Releasing Bales	136	2,2666667
237	12.22 - 12.38	Resting	960	16
238	12.38 - 12.39	Operating and Moving Overhead Crane	40	0,6666667
239		Waiting	20	0,3333333
240	12.39 - 12.41	Carrying and Moving Bales to Destination	49	0,8166667
241		Positioning and Releasing Bales	71	1,1833333
242	12.41 - 12.42	Operating and Moving Overhead Crane	43	0,7166667
243		Waiting	17	0,2833333
244	12.42 - 12.44	Carrying and Moving Bales to Destination	43	0,7166667
245		Positioning and Releasing Bales	77	1,2833333
246	12.44 - 12.45	Operating and Moving Overhead Crane	42	0,7
247		Waiting	18	0,3
248	12.45 - 12.47	Carrying and Moving Bales to Destination	43	0,7166667
249		Positioning and Releasing Bales	77	1,2833333

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
250	12.47 - 13.01	Carrying and Moving Bales to Destination	110	1,8333333
251		Waiting	83	1,3833333
252		Releasing Bales to Terberg	647	10,783333
253	13.01 - 13.02	Operating and Moving Overhead Crane	38	0,6333333
254		Waiting	22	0,3666667
255	13.02 - 13.04	Carrying and Moving Bales to Destination	37	0,6166667
256		Positioning and Releasing Bales	83	1,3833333
257	13.04 - 13.05	Operating and Moving Overhead Crane	37	0,6166667
258		Waiting	23	0,3833333
259	13.05 - 13.07	Carrying and Moving Bales to Destination	38	0,6333333
260		Positioning and Releasing Bales	82	1,3666667
261	13.07 - 13.10	Carrying and Moving Bales to Destination	47	0,7833333
262		Waiting	40	0,6666667
263		Releasing Bales to Terberg	93	1,55
264	13.10 - 13.11	Operating and Moving Overhead Crane	46	0,7666667
265		Waiting	14	0,2333333
266	13.11 - 13.13	Carrying and Moving Bales to Destination	33	0,55
267		Positioning and Releasing Bales	87	1,45
268	13.13 - 13.27	Carrying and Moving Bales to Destination	82	1,3666667
269		Waiting	50	0,8333333
270		Releasing Bales to Terberg	708	11,8
271	13.27 - 13.28	Operating and Moving Overhead Crane	41	0,6833333
272		Waiting	19	0,3166667
273	13.28 - 13.30	Carrying and Moving Bales to Destination	49	0,8166667
274		Positioning and Releasing Bales	71	1,1833333
275	13.30 - 13.31	Operating and Moving Overhead Crane	39	0,65
276		Waiting	21	0,35
277	13.31 - 13.33	Carrying and Moving Bales to Destination	50	0,8333333
278		Positioning and Releasing Bales	70	1,1666667
279	13.33 - 13.34	Operating and Moving Overhead Crane	42	0,7
280		Waiting	18	0,3
281	13.34 - 13.40	Carrying and Moving Bales to Destination	41	0,6833333
282		Positioning and Releasing Bales	41	0,6833333
283		Talking	278	4,6333333
284	13.41 - 13.42	Operating and Moving Overhead Crane	41	0,6833333
285		Waiting	19	0,3166667

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
286	13.42 - 13.46	Carrying and Moving Bales to Destination	39	0,65
287		Positioning and Releasing Bales	129	2,15
288		Talking	72	1,2
289	13.46 - 13.47	Operating and Moving Overhead Crane	42	0,7
290		Waiting	18	0,3
291	13.47 - 13.49	Carrying and Moving Bales to Destination	42	0,7
292		Positioning and Releasing Bales	78	1,3
293	13.49 - 13.50	Reading Loading Data	60	1
294	13.50 - 13.58	Resting	480	8
295	13.58 - 13.59	Operating and Moving Overhead Crane	41	0,6833333
296		Waiting	19	0,3166667
297	13.59 - 14.01	Carrying and Moving Bales to Destination	31	0,5166667
298		Positioning and Releasing Bales	89	1,4833333
299	14.01 - 14.02	Operating and Moving Overhead Crane	43	0,7166667
300		Waiting	17	0,2833333
301	14.02 - 14.04	Carrying and Moving Bales to Destination	33	0,55
302		Positioning and Releasing Bales	87	1,45
303	14.04 - 14.18	Resting	840	14
304	14.18 - 14.19	Operating and Moving Overhead Crane	41	0,6833333
305		Waiting	19	0,3166667
306	14.19 - 14.21	Carrying and Moving Bales to Destination	31	0,5166667
307		Positioning and Releasing Bales	89	1,4833333
308	14.21 - 14.23	Operating and Moving Overhead Crane	61	1,0166667
309		Waiting	59	0,9833333
310	14.23 - 14.25	Carrying and Moving Bales to Destination	33	0,55
311		Positioning and Releasing Bales	87	1,45
312	14.25 - 14.26	Operating and Moving Overhead Crane	42	0,7
313		Waiting	18	0,3
314	14.26 - 14.28	Carrying and Moving Bales to Destination	33	0,55
315		Positioning and Releasing Bales	87	1,45
316	14.28 - 14.45	Carrying and Moving Bales to Destination	111	1,85
317		Waiting	96	1,6
318		Releasing Bales to Terberg	933	15,55
319	14.45 - 14.48	Operating and Moving Overhead Crane	24	0,4
320		Waiting	156	2,6
321	14.48 - 14.50	Carrying and Moving Bales to Destination	35	0,5833333

Table 4.4. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
322		Positioning and Releasing Bales	85	1,4166667
323	14.50 - 14.55	Resting	300	5

Date : 17th July 2019

Location : Pulp Warehouse 2 (Shift 07.00 – 15.00 WIB)

Table 4.5. Data Collection on 17th July 2019

No	Time	Date Activity	Duration	
			Seconds	Minutes
1	07.00 - 07.19	Briefing	1140	19
2	07.19 - 07.20	Walking to Pulp Warehouse 2	60	1
3	07.20 - 07.21	Setup	60	1
4	07.21 - 07.23	Operating and Moving Overhead Crane	106	1,7666667
5		Waiting	14	0,2333333
6	07.23 - 07.25	Carrying and Moving Bales to Destination	89	1,4833333
7		Positioning and Releasing Bales	31	0,5166667
8	07.25 - 07.26	Operating and Moving Overhead Crane	45	0,75
9		Waiting	15	0,25
10	07.26 - 07.28	Carrying and Moving Bales to Destination	88	1,4666667
11		Positioning and Releasing Bales	32	0,5333333
12	07.28 - 07.29	Operating and Moving Overhead Crane	42	0,7
13		Waiting	18	0,3
14	07.29 - 07.30	Carrying and Moving Bales to Destination	30	0,5
15		Positioning and Releasing Bales	30	0,5
16	07.30 - 07.31	Operating and Moving Overhead Crane (7)	40	0,6666667
17		Waiting	20	0,3333333
18	07.31 - 07.32	Carrying and Moving Bales to Destination (7)	38	0,6333333
19		Positioning and Releasing Bales (7)	22	0,3666667
20	07.32 - 07.33	Operating and Moving Overhead Crane (7)	42	0,7
21		Waiting	18	0,3
22	07.33 - 07.35	Carrying and Moving Bales to Destination (7)	32	0,5333333
23		Positioning and Releasing Bales (7)	88	1,4666667
24	07.35 - 07.36	Operating and Moving Overhead Crane (3)	39	0,65
25		Waiting	21	0,35
26	07.36 - 07.37	Carrying and Moving Bales to Destination (3)	17	0,2833333
27		Positioning and Releasing Bales (3)	43	0,7166667
28	07.37 - 07.39	Operating and Moving Overhead Crane (3)	96	1,6
29		Waiting	24	0,4
30	07.39 - 07.40	Carrying and Moving Bales to Destination (3)	19	0,3166667
31		Positioning and Releasing Bales (3)	41	0,6833333
32	07.40 - 07.41	Operating and Moving Overhead Crane	46	0,7666667
33		Waiting	14	0,2333333

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
34	07.41 - 07.42	Carrying and Moving Bales to Destination	26	0,4333333
35		Positioning and Releasing Bales	34	0,5666667
36	07.42 - 07.43	Operating and Moving Overhead Crane (7)	47	0,7833333
37		Waiting	13	0,2166667
38	07.43 - 07.44	Carrying and Moving Bales to Destination (7)	30	0,5
39		Positioning and Releasing Bales (7)	30	0,5
40	07.44 - 07.45	Operating and Moving Overhead Crane (7)	45	0,75
41		Waiting	15	0,25
42	07.45 - 07.46	Carrying and Moving Bales to Destination (7)	13	0,2166667
43		Positioning and Releasing Bales (7)	47	0,7833333
44	07.46 - 07.47	Operating and Moving Overhead Crane (4)	45	0,75
45		Waiting	15	0,25
46	07.47 - 07.48	Carrying and Moving Bales to Destination (4)	17	0,2833333
47		Positioning and Releasing Bales (4)	43	0,7166667
48	07.48 - 07.49	Operating and Moving Overhead Crane	39	0,65
49		Waiting	21	0,35
50	07.49 - 07.50	Carrying and Moving Bales to Destination	23	0,3833333
51		Positioning and Releasing Bales	37	0,6166667
52	07.50 - 07.52	Operating and Moving Overhead Crane	104	1,7333333
53		Waiting	16	0,2666667
54	07.52 - 07.53	Carrying and Moving Bales to Destination	28	0,4666667
55		Positioning and Releasing Bales	32	0,5333333
56	07.53 - 07.56	Operating and Moving Overhead Crane	102	1,7
57		Waiting	78	1,3
58	07.56 - 07.57	Carrying and Moving Bales to Destination (5)	25	0,4166667
59		Positioning and Releasing Bales (5)	35	0,5833333
60	07.57 - 07.58	Operating and Moving Overhead Crane (5)	36	0,6
61		Waiting	24	0,4
62	07.58 - 08.00	Carrying and Moving Bales to Destination (5)	25	0,4166667
63		Positioning and Releasing Bales (5)	95	1,5833333
64	08.00 - 08.01	Operating and Moving Overhead Crane (6)	46	0,7666667
65		Waiting	14	0,2333333
66	08.01 - 08.02	Carrying and Moving Bales to Destination (6)	18	0,3
67		Positioning and Releasing Bales (6)	42	0,7
68	08.02 - 08.03	Operating and Moving Overhead Crane (6)	44	0,7333333
69		Waiting	16	0,2666667

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
70	08.03 - 08.04	Carrying and Moving Bales to Destination (6)	22	0,3666667
71		Positioning and Releasing Bales (6)	38	0,6333333
72	08.04 - 08.07	Operating and Moving Overhead Crane (7)	142	2,3666667
73		Waiting	38	0,6333333
74	08.07 - 08.08	Carrying and Moving Bales to Destination (7)	18	0,3
75		Positioning and Releasing Bales (7)	42	0,7
76	08.08 - 08.09	Operating and Moving Overhead Crane (7)	44	0,7333333
77		Waiting	16	0,2666667
78	08.09 - 08.11	Carrying and Moving Bales to Destination (7)	18	0,3
79		Positioning and Releasing Bales (7)	102	1,7
80	08.11 - 08.12	Operating and Moving Overhead Crane (7)	33	0,55
81		Waiting	27	0,45
82	08.12 - 08.13	Carrying and Moving Bales to Destination (7)	26	0,4333333
83		Positioning and Releasing Bales (7)	34	0,5666667
84	08.13 - 08.14	Operating and Moving Overhead Crane (7)	43	0,7166667
85		Waiting	17	0,2833333
86	08.14 - 08.15	Carrying and Moving Bales to Destination (7)	15	0,25
87		Positioning and Releasing Bales (7)	45	0,75
88	08.15 - 08.16	Operating and Moving Overhead Crane	39	0,65
89		Waiting	21	0,35
90	08.16 - 08.17	Carrying and Moving Bales to Destination	25	0,4166667
91		Positioning and Releasing Bales	35	0,5833333
92	08.17 - 08.19	Operating and Moving Overhead Crane	100	1,6666667
93		Waiting	20	0,3333333
94	08.19 - 08.21	Carrying and Moving Bales to Destination	27	0,45
95		Positioning and Releasing Bales	93	1,55
96	08.21 - 08.22	Operating and Moving Overhead Crane (7)	42	0,7
97		Waiting	18	0,3
98	08.22 - 08.23	Carrying and Moving Bales to Destination (7)	44	0,7333333
99		Positioning and Releasing Bales (7)	16	0,2666667
100	08.23 - 08.24	Operating and Moving Overhead Crane (7)	44	0,7333333
101		Waiting	16	0,2666667
102	08.24 - 08.26	Carrying and Moving Bales to Destination (7)	31	0,5166667
103		Positioning and Releasing Bales (7)	89	1,4833333
104	08.26 - 08.27	Carrying and Moving Bales to Destination (6)	14	0,2333333
105		Positioning and Releasing Bales (6)	46	0,7666667

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
106	08.27 - 08.28	Operating and Moving Overhead Crane (7)	43	0,7166667
107		Waiting	17	0,2833333
108	08.28 - 08.29	Carrying and Moving Bales to Destination (7)	18	0,3
109		Positioning and Releasing Bales (7)	42	0,7
110	08.29 - 08.30	Operating and Moving Overhead Crane (7)	44	0,7333333
111		Waiting	16	0,2666667
112	08.30 - 08.31	Carrying and Moving Bales to Destination (7)	18	0,3
113		Positioning and Releasing Bales (7)	42	0,7
114	08.31 - 08.32	Operating and Moving Overhead Crane (7)	46	0,7666667
115		Waiting	14	0,2333333
116	08.32 - 08.33	Carrying and Moving Bales to Destination (7)	14	0,2333333
117		Positioning and Releasing Bales (7)	46	0,7666667
118	08.33 - 08.34	Operating and Moving Overhead Crane	39	0,65
119		Waiting	21	0,35
120	08.34 - 08.35	Carrying and Moving Bales to Destination	27	0,45
121		Positioning and Releasing Bales	33	0,55
122	08.35 - 08.36	Operating and Moving Overhead Crane	44	0,7333333
123		Waiting	16	0,2666667
124	08.36 - 08.38	Carrying and Moving Bales to Destination	22	0,3666667
125		Positioning and Releasing Bales	98	1,6333333
126	08.38 - 08.39	Operating and Moving Overhead Crane	48	0,8
127		Waiting	12	0,2
128	08.39 - 08.40	Carrying and Moving Bales to Destination	34	0,5666667
129		Positioning and Releasing Bales	26	0,4333333
130	08.40 - 08.41	Operating and Moving Overhead Crane (7)	45	0,75
131		Waiting	15	0,25
132	08.41 - 08.42	Carrying and Moving Bales to Destination (7)	13	0,2166667
133		Positioning and Releasing Bales (7)	47	0,7833333
134	08.42 - 08.43	Operating and Moving Overhead Crane (7)	48	0,8
135		Waiting	12	0,2
136	08.43 - 08.44	Carrying and Moving Bales to Destination (7)	21	0,35
137		Positioning and Releasing Bales (7)	39	0,65
138	08.44 - 08.45	Operating and Moving Overhead Crane	47	0,7833333
139		Waiting	13	0,2166667
140	08.45 - 08.46	Carrying and Moving Bales to Destination	26	0,4333333
141		Positioning and Releasing Bales	34	0,5666667

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
142	08.46 - 08.50	Operating and Moving Overhead Crane (6)	168	2,8
143		Waiting	72	1,2
144	08.50 - 08.51	Carrying and Moving Bales to Destination (6)	26	0,4333333
145		Positioning and Releasing Bales (6)	34	0,5666667
146	08.51 - 08.53	Carrying and Moving Bales to Destination (6)	26	0,4333333
147		Positioning and Releasing Bales (6)	94	1,5666667
148	08.53 - 08.55	Operating and Moving Overhead Crane (7)	98	1,6333333
149		Waiting	22	0,3666667
150	08.55 - 08.57	Carrying and Moving Bales to Destination (7)	34	0,5666667
151		Positioning and Releasing Bales (7)	86	1,4333333
152	08.57 - 08.58	Operating and Moving Overhead Crane (7)	42	0,7
153		Waiting	18	0,3
154	08.58 - 08.59	Carrying and Moving Bales to Destination (7)	37	0,6166667
155		Positioning and Releasing Bales (7)	23	0,3833333
156	08.59 - 09.01	Operating and Moving Overhead Crane (6)	76	1,2666667
157		Waiting	44	0,7333333
158	09.01 - 09.04	Carrying and Moving Bales to Destination (6)	33	0,55
159		Positioning and Releasing Bales (6)	147	2,45
160	09.04 - 09.05	Operating and Moving Overhead Crane (6)	39	0,65
161		Waiting	21	0,35
162	09.05 - 09.07	Carrying and Moving Bales to Destination (6)	52	0,8666667
163		Positioning and Releasing Bales (6)	68	1,1333333
164	09.07 - 09.08	Operating and Moving Overhead Crane	37	0,6166667
165		Waiting	23	0,3833333
166	09.08 - 09.09	Carrying and Moving Bales to Destination	28	0,4666667
167		Positioning and Releasing Bales	32	0,5333333
168	09.09 - 09.10	Operating and Moving Overhead Crane	42	0,7
169		Waiting	18	0,3
170	09.10 - 09.11	Carrying and Moving Bales to Destination	22	0,3666667
171		Positioning and Releasing Bales	38	0,6333333
172	09.11 - 09.14	Operating and Moving Overhead Crane (5)	116	1,9333333
173		Waiting	64	1,0666667
174	09.14 - 09.16	Carrying and Moving Bales to Destination (5)	47	0,7833333
175		Positioning and Releasing Bales (5)	73	1,2166667
176	09.16 - 09.17	Operating and Moving Overhead Crane (5)	36	0,6
177		Waiting	24	0,4

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
178	09.17 - 09.18	Carrying and Moving Bales to Destination (5)	16	0,2666667
179		Positioning and Releasing Bales (5)	44	0,7333333
180	09.18 - 09.20	Operating and Moving Overhead Crane	91	1,5166667
181		Waiting	29	0,4833333
182	09.20 - 09.22	Carrying and Moving Bales to Destination	27	0,45
183		Positioning and Releasing Bales	93	1,55
184	09.22 - 09.23	Operating and Moving Overhead Crane (7)	42	0,7
185		Waiting	18	0,3
186	09.23 - 09.24	Carrying and Moving Bales to Destination (7)	23	0,3833333
187		Positioning and Releasing Bales (7)	37	0,6166667
188	09.24 - 09.25	Operating and Moving Overhead Crane (7)	44	0,7333333
189		Waiting	16	0,2666667
190	09.25 - 09.26	Carrying and Moving Bales to Destination (7)	23	0,3833333
191		Positioning and Releasing Bales (7)	37	0,6166667
192	09.26 - 09.27	Operating and Moving Overhead Crane (5)	46	0,7666667
193		Waiting	14	0,2333333
194	09.27 - 09.29	Carrying and Moving Bales to Destination (5)	15	0,25
195		Positioning and Releasing Bales (5)	105	1,75
196	09.29 - 09.30	Operating and Moving Overhead Crane (2)	43	0,7166667
197		Waiting	17	0,2833333
198	09.30 - 09.31	Carrying and Moving Bales to Destination (2)	23	0,3833333
199		Positioning and Releasing Bales (2)	37	0,6166667
200	09.31 - 09.33	Operating and Moving Overhead Crane (5)	44	0,7333333
201		Waiting	76	1,2666667
202	09.33 - 09.34	Carrying and Moving Bales to Destination (5)	23	0,3833333
203		Positioning and Releasing Bales (5)	37	0,6166667
204	09.34 - 09.35	Operating and Moving Overhead Crane	44	0,7333333
205		Waiting	16	0,2666667
206	09.35 - 09.36	Carrying and Moving Bales to Destination	30	0,5
207		Positioning and Releasing Bales	30	0,5
208	09.36 - 09.38	Operating and Moving Overhead Crane (7)	98	1,6333333
209		Waiting	22	0,3666667
210	09.38 - 09.39	Carrying and Moving Bales to Destination (7)	16	0,2666667
211		Positioning and Releasing Bales (7)	44	0,7333333
212	09.39 - 09.40	Operating and Moving Overhead Crane (7)	46	0,7666667
213		Waiting	14	0,2333333

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
214	09.40 - 09.41	Carrying and Moving Bales to Destination (7)	13	0,2166667
215		Positioning and Releasing Bales (7)	47	0,7833333
216	09.41 - 09.43	Carrying and Moving Bales to Destination (5)	41	0,6833333
217		Positioning and Releasing Bales (5)	79	1,3166667
218	09.43 - 09.44	Operating and Moving Overhead Crane (7)	39	0,65
219		Waiting	21	0,35
220	09.44 - 09.46	Carrying and Moving Bales to Destination (7)	53	0,8833333
221		Positioning and Releasing Bales (7)	67	1,1166667
222	09.46 - 09.47	Operating and Moving Overhead Crane (7)	48	0,8
223		Waiting	12	0,2
224	09.47 - 09.48	Carrying and Moving Bales to Destination (7)	33	0,55
225		Positioning and Releasing Bales (7)	27	0,45
226	09.48 - 09.51	Operating and Moving Overhead Crane (6)	112	1,8666667
227		Waiting	68	1,1333333
228	09.51 - 09.53	Carrying and Moving Bales to Destination (6)	32	0,5333333
229		Positioning and Releasing Bales (6)	88	1,4666667
230	09.53 - 09.54	Operating and Moving Overhead Crane (6)	47	0,7833333
231		Waiting	13	0,2166667
232	09.54 - 09.55	Carrying and Moving Bales to Destination (6)	29	0,4833333
233		Positioning and Releasing Bales (6)	31	0,5166667
234	09.55 - 09.56	Operating and Moving Overhead Crane (6)	34	0,5666667
235		Waiting	26	0,4333333
236	09.56 - 09.57	Carrying and Moving Bales to Destination (6)	22	0,3666667
237		Positioning and Releasing Bales (6)	38	0,6333333
238	09.57 - 09.58	Operating and Moving Overhead Crane (7)	41	0,6833333
239		Waiting	19	0,3166667
240	09.58 - 09.59	Carrying and Moving Bales to Destination (7)	18	0,3
241		Positioning and Releasing Bales (7)	42	0,7
242	09.59 - 10.00	Operating and Moving Overhead Crane (7)	38	0,6333333
243		Waiting	22	0,3666667
244	10.00 - 10.01	Carrying and Moving Bales to Destination (7)	16	0,2666667
245		Positioning and Releasing Bales (7)	44	0,7333333
246	10.01 - 10.03	Operating and Moving Overhead Crane (8)	86	1,4333333
247		Waiting	34	0,5666667
248	10.03 - 10.04	Carrying and Moving Bales to Destination (8)	9	0,15
249		Positioning and Releasing Bales (8)	51	0,85

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
250	10.04 - 10.05	Operating and Moving Overhead Crane	22	0,3666667
251		Waiting	38	0,6333333
252	10.05 - 10.06	Carrying and Moving Bales to Destination	31	0,5166667
253		Positioning and Releasing Bales	29	0,4833333
254	10.06 - 10.08	Operating and Moving Overhead Crane (6)	89	1,4833333
255		Waiting	31	0,5166667
256	10.08 - 10.09	Carrying and Moving Bales to Destination (6)	21	0,35
257		Positioning and Releasing Bales (6)	39	0,65
258	10.09 - 10.10	Operating and Moving Overhead Crane (5)	39	0,65
259		Waiting	21	0,35
260	10.10 - 10.12	Carrying and Moving Bales to Destination (5)	23	0,3833333
261		Positioning and Releasing Bales (5)	97	1,6166667
262	10.12 - 10.13	Operating and Moving Overhead Crane (5)	48	0,8
263		Waiting	12	0,2
264	10.13 - 10.14	Carrying and Moving Bales to Destination (5)	27	0,45
265		Positioning and Releasing Bales (5)	33	0,55
266	10.14 - 10.15	Operating and Moving Overhead Crane (7)	46	0,7666667
267		Waiting	14	0,2333333
268	10.15 - 10.16	Carrying and Moving Bales to Destination (7)	20	0,3333333
269		Positioning and Releasing Bales (7)	40	0,6666667
270	10.16 - 10.17	Operating and Moving Overhead Crane (7)	48	0,8
271		Waiting	12	0,2
272	10.17 - 10.18	Carrying and Moving Bales to Destination (7)	18	0,3
273		Positioning and Releasing Bales (7)	42	0,7
274	10.18 - 10.19	Operating and Moving Overhead Crane (6)	44	0,7333333
275		Waiting	16	0,2666667
276	10.19 - 10.21	Carrying and Moving Bales to Destination (6)	38	0,6333333
277		Positioning and Releasing Bales (6)	82	1,3666667
278	10.21 - 10.22	Operating and Moving Overhead Crane (6)	40	0,6666667
279		Waiting	20	0,3333333
280	10.22 - 10.23	Carrying and Moving Bales to Destination (6)	18	0,3
281		Positioning and Releasing Bales (6)	42	0,7
282	10.23 - 10.26	Operating and Moving Overhead Crane (7)	165	2,75
283		Waiting	15	0,25
284	10.26 - 10.27	Carrying and Moving Bales to Destination (7)	20	0,3333333
285		Positioning and Releasing Bales (7)	40	0,6666667

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
286	10.27 - 10.28	Operating and Moving Overhead Crane (7)	41	0,6833333
287		Waiting	19	0,3166667
288	10.28 - 10.29	Carrying and Moving Bales to Destination (7)	29	0,4833333
289		Positioning and Releasing Bales (7)	31	0,5166667
290	10.29 - 10.32	Operating and Moving Overhead Crane (7)	141	2,35
291		Waiting	39	0,65
292	10.32 - 10.33	Carrying and Moving Bales to Destination (7)	33	0,55
293		Positioning and Releasing Bales (7)	27	0,45
294	10.33 - 10.34	Operating and Moving Overhead Crane (7)	47	0,7833333
295		Waiting	13	0,2166667
296	10.34 - 10.36	Carrying and Moving Bales to Destination (7)	31	0,5166667
297		Positioning and Releasing Bales (7)	89	1,4833333
298	10.36 - 10.37	Operating and Moving Overhead Crane (8)	48	0,8
299		Waiting	12	0,2
300	10.37 - 10.38	Carrying and Moving Bales to Destination (8)	11	0,1833333
301		Positioning and Releasing Bales (8)	49	0,8166667
302	10.38 - 10.39	Operating and Moving Overhead Crane (8)	46	0,7666667
303		Waiting	14	0,2333333
304	10.39 - 10.40	Carrying and Moving Bales to Destination (8)	17	0,2833333
305		Positioning and Releasing Bales (8)	43	0,7166667
306	10.40 - 10.41	Operating and Moving Overhead Crane (6)	39	0,65
307		Waiting	21	0,35
308	10.41 - 10.42	Carrying and Moving Bales to Destination (6)	15	0,25
309		Positioning and Releasing Bales (6)	45	0,75
310	10.42 - 10.43	Operating and Moving Overhead Crane (5)	42	0,7
311		Waiting	18	0,3
312	10.43 - 10.42	Carrying and Moving Bales to Destination (5)	35	0,5833333
313		Positioning and Releasing Bales (5)	25	0,4166667
314	10.43 - 10.44	Operating and Moving Overhead Crane (7)	44	0,7333333
315		Waiting	16	0,2666667
316	10.44 - 10.45	Carrying and Moving Bales to Destination (7)	21	0,35
317		Positioning and Releasing Bales (7)	39	0,65
318	10.45 - 10.46	Operating and Moving Overhead Crane (7)	45	0,75
319		Waiting	15	0,25
320	10.46 - 10.47	Carrying and Moving Bales to Destination (7)	24	0,4
321		Positioning and Releasing Bales (7)	36	0,6

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
322	10.47 - 10.48	Operating and Moving Overhead Crane (7)	48	0,8
323		Waiting	12	0,2
324	10.48 - 10.50	Carrying and Moving Bales to Destination (7)	33	0,55
325		Positioning and Releasing Bales (7)	87	1,45
326	10.50 - 10.51	Operating and Moving Overhead Crane (7)	46	0,7666667
327		Waiting	14	0,2333333
328	10.51 - 10.52	Carrying and Moving Bales to Destination (7)	26	0,4333333
329		Positioning and Releasing Bales (7)	34	0,5666667
330	10.52 - 10.53	Operating and Moving Overhead Crane (8)	38	0,6333333
331		Waiting	22	0,3666667
332	10.53 - 10.54	Carrying and Moving Bales to Destination (8)	44	0,7333333
333		Positioning and Releasing Bales (8)	16	0,2666667
334	10.54 - 10.55	Operating and Moving Overhead Crane (8)	40	0,6666667
335		Waiting	20	0,3333333
336	10.55 - 10.56	Carrying and Moving Bales to Destination (8)	33	0,55
337		Positioning and Releasing Bales (8)	27	0,45
338	10.56 - 10.57	Resting	60	1
339	10.57 - 10.58	Operating and Moving Overhead Crane (7)	41	0,6833333
340		Waiting	19	0,3166667
341	10.58 - 11.00	Carrying and Moving Bales to Destination (7)	35	0,5833333
342		Positioning and Releasing Bales (7)	85	1,4166667
343	11.00 - 11.01	Operating and Moving Overhead Crane (7)	45	0,75
344		Waiting	15	0,25
345	11.01 - 11.02	Carrying and Moving Bales to Destination (7)	24	0,4
346		Positioning and Releasing Bales (7)	36	0,6
347	11.02 - 11.03	Operating and Moving Overhead Crane (7)	40	0,6666667
348		Waiting	20	0,3333333
349	11.03 - 11.04	Carrying and Moving Bales to Destination (7)	25	0,4166667
350		Positioning and Releasing Bales (7)	35	0,5833333
351	11.04 - 11.06	Operating and Moving Overhead Crane (7)	13	0,2166667
352		Waiting	16	0,2666667
353		Carrying and Moving Bales to Destination (7)	32	0,5333333
354		Positioning and Releasing Bales (7)	59	0,9833333
355	11.06 - 11.08	Resting	120	2
356	11.08 - 11.09	Operating and Moving Overhead Crane (8)	43	0,7166667
357		Waiting	17	0,2833333

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
358	11.09 - 11.10	Carrying and Moving Bales to Destination (8)	25	0,4166667
359		Positioning and Releasing Bales (8)	35	0,5833333
360	11.10 - 11.11	Operating and Moving Overhead Crane (8)	46	0,7666667
361		Waiting	14	0,2333333
362	11.11 - 11.12	Carrying and Moving Bales to Destination (8)	12	0,2
363		Positioning and Releasing Bales (8)	48	0,8
364	11.12 - 11.13	Operating and Moving Overhead Crane (7)	40	0,6666667
365		Waiting	20	0,3333333
366	11.13 - 11.14	Carrying and Moving Bales to Destination (7)	35	0,5833333
367		Positioning and Releasing Bales (7)	25	0,4166667
368	11.14 - 11.15	Operating and Moving Overhead Crane (7)	42	0,7
369		Waiting	18	0,3
370	11.15 - 11.16	Carrying and Moving Bales to Destination (7)	27	0,45
371		Positioning and Releasing Bales (7)	33	0,55
372	11.16 - 11.18	Operating and Moving Overhead Crane (6)	61	1,0166667
373		Waiting	59	0,9833333
374	11.18 - 11.19	Carrying and Moving Bales to Destination (6)	27	0,45
375		Positioning and Releasing Bales (6)	33	0,55
376	11.19 - 11.20	Carrying and Moving Bales to Destination (7)	21	0,35
377		Positioning and Releasing Bales (7)	39	0,65
378	11.20 - 11.22	Operating and Moving Overhead Crane (6)	90	1,5
379		Waiting	30	0,5
380	11.22 - 11.23	Carrying and Moving Bales to Destination (7)	24	0,4
381		Positioning and Releasing Bales (7)	36	0,6
382	11.23 - 11.25	Operating and Moving Overhead Crane (6)	100	1,6666667
383		Waiting	20	0,3333333
384	11.35 - 11.26	Carrying and Moving Bales to Destination (5)	27	0,45
385		Positioning and Releasing Bales (5)	33	0,55
386	11.26 - 11.27	Operating and Moving Overhead Crane (5)	43	0,7166667
387		Waiting	17	0,2833333
388	11.27 - 11.28	Carrying and Moving Bales to Destination (5)	23	0,3833333
389		Positioning and Releasing Bales (5)	37	0,6166667
390	11.28 - 11.29	Operating and Moving Overhead Crane (7)	39	0,65
391		Waiting	21	0,35
392	11.29 - 11.30	Carrying and Moving Bales to Destination (7)	34	0,5666667
393		Positioning and Releasing Bales (7)	26	0,4333333

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
394	11.30 - 11.31	Operating and Moving Overhead Crane (7)	43	0,7166667
395		Waiting	17	0,2833333
396	11.31 - 11.32	Carrying and Moving Bales to Destination (7)	19	0,3166667
397		Positioning and Releasing Bales (7)	41	0,6833333
398	11.32 - 11.33	Operating and Moving Overhead Crane (8)	16	0,2666667
399		Waiting	12	0,2
400		Carrying and Moving Bales to Destination (8)	11	0,1833333
401		Positioning and Releasing Bales (8)	21	0,35
402	11.33 - 11.35	Operating and Moving Overhead Crane (8)	36	0,6
403		Waiting	9	0,15
404		Carrying and Moving Bales to Destination (8)	31	0,5166667
405		Positioning and Releasing Bales (8)	44	0,7333333
406	11.35 - 11.37	Operating and Moving Overhead Crane (5)	84	1,4
407		Waiting	36	0,6
408	11.37 - 11.39	Carrying and Moving Bales to Destination (5)	27	0,45
409		Positioning and Releasing Bales (5)	93	1,55
410	11.39 - 11.40	Operating and Moving Overhead Crane (5)	47	0,7833333
411		Waiting	13	0,2166667
412	11.40 - 11.41	Carrying and Moving Bales to Destination (5)	24	0,4
413		Positioning and Releasing Bales (5)	36	0,6
414	11.41 - 11.42	Operating and Moving Overhead Crane (7)	49	0,8166667
415		Waiting	11	0,1833333
416	11.42 - 11.43	Carrying and Moving Bales to Destination (7)	19	0,3166667
417		Positioning and Releasing Bales (7)	41	0,6833333
418	11.43 - 11.44	Operating and Moving Overhead Crane (7)	48	0,8
419		Waiting	12	0,2
420	11.44 - 11.45	Carrying and Moving Bales to Destination (7)	13	0,2166667
421		Positioning and Releasing Bales (7)	47	0,7833333
422	11.45 - 11.46	Operating and Moving Overhead Crane (7)	42	0,7
423		Waiting	18	0,3
424	11.46 - 11.47	Carrying and Moving Bales to Destination (7)	18	0,3
425		Positioning and Releasing Bales (7)	42	0,7
426	11.47 - 11.48	Operating and Moving Overhead Crane (7)	44	0,7333333
427		Waiting	16	0,2666667
428	11.48 - 11.49	Carrying and Moving Bales to Destination (7)	22	0,3666667
429		Positioning and Releasing Bales (7)	38	0,6333333

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
430	11.49 - 11.50	Operating and Moving Overhead Crane	22	0,3666667
431		Waiting	9	0,15
432		Carrying and Moving Bales to Destination	12	0,2
433		Positioning and Releasing Bales	17	0,2833333
434	11.50 - 11.53	Resting	180	3
435	11.53 - 11.54	Operating and Moving Overhead Crane (7)	44	0,7333333
436		Waiting	16	0,2666667
437	11.54 - 11.55	Carrying and Moving Bales to Destination (7)	20	0,3333333
438		Positioning and Releasing Bales (7)	40	0,6666667
439	11.55 - 11.56	Operating and Moving Overhead Crane (7)	48	0,8
440		Waiting	12	0,2
441	11.56 - 11.57	Carrying and Moving Bales to Destination (7)	25	0,4166667
442		Positioning and Releasing Bales (7)	35	0,5833333
443	11.57 - 11.58	Resting	60	1
444	11.58 - 11.59	Operating and Moving Overhead Crane (7)	44	0,7333333
445		Waiting	16	0,2666667
446	11.59 - 12.00	Carrying and Moving Bales to Destination	18	0,3
447		Positioning and Releasing Bales	42	0,7
448	12.00 - 12.01	Operating and Moving Overhead Crane	47	0,7833333
449		Waiting	13	0,2166667
450	12.01 - 12.02	Carrying and Moving Bales to Destination	21	0,35
451		Positioning and Releasing Bales	39	0,65
452	12.02 - 12.03	Operating and Moving Overhead Crane	45	0,75
453		Waiting	15	0,25
454	12.03 - 12.04	Carrying and Moving Bales to Destination	21	0,35
455		Positioning and Releasing Bales	39	0,65
456	12.04 - 12.26	Resting	1320	22
457	12.26 - 12.27	Operating and Moving Overhead Crane	44	0,7333333
458		Waiting	16	0,2666667
459	12.27 - 12.29	Carrying and Moving Bales to Destination	26	0,4333333
460		Positioning and Releasing Bales	94	1,5666667
461	12.29 - 12.30	Operating and Moving Overhead Crane	43	0,7166667
462		Waiting	17	0,2833333
463	12.30 - 12.32	Carrying and Moving Bales to Destination	23	0,3833333
464		Positioning and Releasing Bales	97	1,6166667
465	13.00 - 13.01	Operating and Moving Overhead Crane	43	0,7166667

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
466		Waiting	17	0,2833333
467	13.01 - 13.02	Carrying and Moving Bales to Destination	23	0,3833333
468		Positioning and Releasing Bales	37	0,6166667
469	13.02 - 13.05	Setup	120	2
470	13.05 - 13.06	Operating and Moving Overhead Crane (7)	44	0,7333333
471		Waiting	16	0,2666667
472	13.06 - 13.08	Carrying and Moving Bales to Destination (7)	32	0,5333333
473		Positioning and Releasing Bales (7)	88	1,4666667
474	13.08 - 13.09	Operating and Moving Overhead Crane (7)	43	0,7166667
475		Waiting	17	0,2833333
476	13.09 - 13.10	Carrying and Moving Bales to Destination (7)	30	0,5
477		Positioning and Releasing Bales (7)	30	0,5
478	13.10 - 13.11	Operating and Moving Overhead Crane (8)	42	0,7
479		Waiting	18	0,3
480	13.11 - 13.12	Carrying and Moving Bales to Destination (8)	21	0,35
481		Positioning and Releasing Bales (8)	39	0,65
482	13.12 - 13.13	Operating and Moving Overhead Crane (8)	50	0,8333333
483		Waiting	10	0,1666667
484	13.13 - 13.14	Carrying and Moving Bales to Destination (8)	17	0,2833333
485		Positioning and Releasing Bales (8)	43	0,7166667
486	13.14 - 13.15	Operating and Moving Overhead Crane (5)	36	0,6
487		Waiting	24	0,4
488	13.15 - 13.16	Carrying and Moving Bales to Destination (5)	22	0,3666667
489		Positioning and Releasing Bales (5)	38	0,6333333
490	13.16 - 13.17	Operating and Moving Overhead Crane (5)	42	0,7
491		Waiting	18	0,3
492	13.17 - 13.18	Carrying and Moving Bales to Destination (5)	20	0,3333333
493		Positioning and Releasing Bales (5)	40	0,6666667
494	13.18 - 13.19	Operating and Moving Overhead Crane (6)	41	0,6833333
495		Waiting	19	0,3166667
496	13.19 - 13.20	Operating and Moving Overhead Crane (6)	47	0,7833333
497		Waiting	13	0,2166667
498	13.20 - 13.22	Carrying and Moving Bales to Destination (6)	31	0,5166667
499		Positioning and Releasing Bales (6)	89	1,4833333
500	13.22 - 13.23	Operating and Moving Overhead Crane (5)	46	0,7666667
501		Waiting	14	0,2333333

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
502	13.23 - 13.24	Carrying and Moving Bales to Destination (5)	19	0,3166667
503		Positioning and Releasing Bales (5)	41	0,6833333
504	13.24 - 13.25	Operating and Moving Overhead Crane (5)	39	0,65
505		Waiting	21	0,35
506	13.25 - 13.26	Carrying and Moving Bales to Destination (5)	26	0,4333333
507		Positioning and Releasing Bales (5)	34	0,5666667
508	13.26 - 13.27	Operating and Moving Overhead Crane (5)	32	0,5333333
509		Waiting	28	0,4666667
510	13.27 - 13.28	Carrying and Moving Bales to Destination (5)	17	0,2833333
511		Positioning and Releasing Bales (5)	43	0,7166667
512	13.28 - 13.29	Operating and Moving Overhead Crane (5)	39	0,65
513		Waiting	21	0,35
514	13.29 - 13.31	Carrying and Moving Bales to Destination (5)	74	1,2333333
515		Positioning and Releasing Bales (5)	46	0,7666667
516	13.31 - 13.32	Operating and Moving Overhead Crane (5)	11	0,1833333
517		Waiting	49	0,8166667
518	13.32 - 13.33	Carrying and Moving Bales to Destination (5)	26	0,4333333
519		Positioning and Releasing Bales (5)	34	0,5666667
520	13.33 - 13.34	Operating and Moving Overhead Crane (5)	48	0,8
521		Waiting	12	0,2
522	13.34 - 13.35	Carrying and Moving Bales to Destination (5)	21	0,35
523		Positioning and Releasing Bales (5)	39	0,65
524	13.35 - 13.36	Operating and Moving Overhead Crane (7)	43	0,7166667
525		Waiting	17	0,2833333
526	13.36 - 13.37	Carrying and Moving Bales to Destination (7)	23	0,3833333
527		Positioning and Releasing Bales (7)	37	0,6166667
528	13.37 - 13.38	Operating and Moving Overhead Crane (7)	33	0,55
529		Waiting	27	0,45
530	13.38 - 13.39	Carrying and Moving Bales to Destination (7)	21	0,35
531		Positioning and Releasing Bales (7)	39	0,65
532	13.39 - 13.41	Operating and Moving Overhead Crane (7)	43	0,7166667
533		Waiting	77	1,2833333
534	13.41 - 13.42	Carrying and Moving Bales to Destination (7)	21	0,35
535		Positioning and Releasing Bales (7)	39	0,65
536	13.42 - 13.43	Operating and Moving Overhead Crane (7)	44	0,7333333
537		Waiting	16	0,2666667

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
538	13.43 - 13.44	Carrying and Moving Bales to Destination (7)	28	0,4666667
539		Positioning and Releasing Bales (7)	32	0,5333333
540	13.44 - 13.45	Operating and Moving Overhead Crane (7)	45	0,75
541		Waiting	15	0,25
542	13.45 - 13.46	Carrying and Moving Bales to Destination (7)	19	0,3166667
543		Positioning and Releasing Bales (7)	41	0,6833333
544	13.46 - 13.47	Operating and Moving Overhead Crane (6)	45	0,75
545		Waiting	15	0,25
546	13.47 - 13.48	Carrying and Moving Bales to Destination (6)	19	0,3166667
547		Positioning and Releasing Bales (6)	41	0,6833333
548	13.48 - 13.51	Resting	180	3
549	13.51 - 13.52	Operating and Moving Overhead Crane (8)	42	0,7
550		Waiting	18	0,3
551	13.52 - 13.53	Carrying and Moving Bales to Destination (8)	21	0,35
552		Positioning and Releasing Bales (8)	39	0,65
553	13.53 - 13.55	Operating and Moving Overhead Crane (8)	53	0,8833333
554		Waiting	67	1,1166667
555	13.55 - 13.56	Carrying and Moving Bales to Destination (8)	18	0,3
556		Positioning and Releasing Bales (8)	42	0,7
557	13.56 - 13.58	Waiting	120	2
558	13.58 - 13.59	Operating and Moving Overhead Crane (7)	46	0,7666667
559		Waiting	14	0,2333333
560	13.59 - 14.00	Carrying and Moving Bales to Destination (7)	31	0,5166667
561		Positioning and Releasing Bales (7)	29	0,4833333
562	14.00 - 14.01	Operating and Moving Overhead Crane (7)	45	0,75
563		Waiting	15	0,25
564	14.01 - 14.02	Carrying and Moving Bales to Destination (7)	34	0,5666667
565		Positioning and Releasing Bales (7)	26	0,4333333
566	14.02 - 14.03	Operating and Moving Overhead Crane (7)	44	0,7333333
567		Waiting	16	0,2666667
568	14.03 - 14.04	Carrying and Moving Bales to Destination (7)	16	0,2666667
569		Positioning and Releasing Bales (7)	44	0,7333333
570	14.04 - 14.05	Operating and Moving Overhead Crane (7)	74	1,2333333
571		Waiting	46	0,7666667
572	14.05 - 14.06	Carrying and Moving Bales to Destination (7)	23	0,3833333
573		Positioning and Releasing Bales (7)	37	0,6166667

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
574	14.06 - 14.07	Operating and Moving Overhead Crane (5)	19	0,3166667
575		Waiting	41	0,6833333
576	14.07 - 14.09	Carrying and Moving Bales to Destination (5)	93	1,55
577		Positioning and Releasing Bales (5)	27	0,45
578	14.09 - 14.10	Operating and Moving Overhead Crane (5)	43	0,7166667
579		Waiting	17	0,2833333
580	14.10 - 14.13	Carrying and Moving Bales to Destination (5)	98	1,6333333
581		Positioning and Releasing Bales (5)	82	1,3666667
582	14.13 - 14.14	Carrying and Moving Bales to Destination (5)	23	0,3833333
583		Positioning and Releasing Bales (5)	37	0,6166667
584	14.14 - 14.15	Carrying and Moving Bales to Destination (5)	42	0,7
585		Positioning and Releasing Bales (5)	18	0,3
586	14.15 - 14.16	Operating and Moving Overhead Crane (7)	18	0,3
587		Waiting	42	0,7
588	14.16 - 14.17	Carrying and Moving Bales to Destination (7)	23	0,3833333
589		Positioning and Releasing Bales (7)	37	0,6166667
590	14.17 - 14.18	Operating and Moving Overhead Crane (7)	44	0,7333333
591		Waiting	16	0,2666667
592	14.18 - 14.19	Carrying and Moving Bales to Destination (7)	24	0,4
593		Positioning and Releasing Bales (7)	36	0,6
594	14.19 - 14.20	Carrying and Moving Bales to Destination (3)	41	0,6833333
595		Positioning and Releasing Bales (3)	19	0,3166667
596	14.20 - 14.21	Operating and Moving Overhead Crane (3)	42	0,7
597		Waiting	18	0,3
598	14.21 - 14.22	Carrying and Moving Bales to Destination (3)	25	0,4166667
599		Positioning and Releasing Bales (3)	35	0,5833333
600	14.22 - 14.23	Operating and Moving Overhead Crane (6)	42	0,7
601		Waiting	18	0,3
602	14.23 - 14.24	Carrying and Moving Bales to Destination (6)	25	0,4166667
603		Positioning and Releasing Bales (6)	35	0,5833333
604	14.24 - 14.25	Operating and Moving Overhead Crane (6)	38	0,6333333
605		Waiting	22	0,3666667
606	14.25 - 14.26	Carrying and Moving Bales to Destination (6)	47	0,7833333
607		Positioning and Releasing Bales (6)	13	0,2166667
608	14.26 - 14.27	Operating and Moving Overhead Crane (5)	46	0,7666667
609		Waiting	14	0,2333333

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
610	14.27 - 14.29	Carrying and Moving Bales to Destination (5)	93	1,55
611		Positioning and Releasing Bales (5)	27	0,45
612	14.29 - 14.30	Operating and Moving Overhead Crane (6)	42	0,7
613		Waiting	18	0,3
614	14.30 - 14.31	Carrying and Moving Bales to Destination (6)	20	0,3333333
615		Positioning and Releasing Bales (6)	40	0,6666667
616	14.31 - 14.32	Operating and Moving Overhead Crane	43	0,7166667
617		Waiting	17	0,2833333
618	14.33 - 14.34	Carrying and Moving Bales to Destination	26	0,4333333
619		Positioning and Releasing Bales	34	0,5666667
620	14.34 - 14.35	Operating and Moving Overhead Crane (5)	39	0,65
621		Waiting	21	0,35
622	14.35 - 14.36	Carrying and Moving Bales to Destination (5)	23	0,3833333
623		Positioning and Releasing Bales (5)	37	0,6166667
624	14.36 - 14.37	Operating and Moving Overhead Crane (5)	38	0,6333333
625		Waiting	22	0,3666667
626	14.37 - 14.38	Carrying and Moving Bales to Destination (5)	24	0,4
627		Positioning and Releasing Bales (5)	36	0,6
628	14.38 - 14.39	Operating and Moving Overhead Crane (5)	41	0,6833333
629		Waiting	19	0,3166667
630	14.39 - 14.41	Carrying and Moving Bales to Destination (5)	94	1,5666667
631		Positioning and Releasing Bales (5)	26	0,4333333
632	14.41 - 14.42	Operating and Moving Overhead Crane	44	0,7333333
633		Waiting	16	0,2666667
634	14.42 - 14.43	Carrying and Moving Bales to Destination	26	0,4333333
635		Positioning and Releasing Bales	34	0,5666667
636	14.43 - 14.44	Operating and Moving Overhead Crane	44	0,7333333
637		Waiting	16	0,2666667
638	14.44 - 14.45	Carrying and Moving Bales to Destination	24	0,4
639		Positioning and Releasing Bales	36	0,6
640	14.45 - 14.46	Resting	60	1
641	14.46 - 14.47	Operating and Moving Overhead Crane (5)	37	0,6166667
642		Waiting	23	0,3833333
643	14.47 - 14.48	Carrying and Moving Bales to Destination (5)	21	0,35
644		Positioning and Releasing Bales (5)	39	0,65
645	14.48 - 14.49	Operating and Moving Overhead Crane (6)	39	0,65

Table 4.5. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
646		Waiting	21	0,35
647	14.49 - 14.50	Carrying and Moving Bales to Destination (6)	22	0,3666667
648		Positioning and Releasing Bales (6)	38	0,6333333
649	14.50 - 14.51	Operating and Moving Overhead Crane (6)	42	0,7
650		Waiting	18	0,3
651	14.51 - 14.52	Carrying and Moving Bales to Destination (6)	17	0,2833333
652		Positioning and Releasing Bales (6)	43	0,7166667
653	14.52 - 14.54	Operating and Moving Overhead Crane (5)	55	0,9166667
654		Waiting	13	0,2166667
655		Carrying and Moving Bales to Destination (5)	28	0,4666667
656		Positioning and Releasing Bales (5)	24	0,4
657	14.54 - 14.55	Operating and Moving Overhead Crane (5)	39	0,65
658		Waiting	21	0,35
659	14.55 - 14.56	Carrying and Moving Bales to Destination (5)	23	0,3833333
660		Positioning and Releasing Bales (5)	37	0,6166667
661	14.56 - 14.57	Operating and Moving Overhead Crane	42	0,7
662		Waiting	18	0,3
663	14.57 - 14.58	Carrying and Moving Bales to Destination	25	0,4166667
664		Positioning and Releasing Bales	35	0,5833333
665	14.58 - 14.59	Operating and Moving Overhead Crane	43	0,7166667
666		Waiting	17	0,2833333
667	14.59 - 15.00	Carrying and Moving Bales to Destination	25	0,4166667
668		Positioning and Releasing Bales	35	0,5833333

Date : 18th July 2019

Location : Pulp Warehouse 2 (Shift 07.00 – 15.00 WIB)

Table 4.6. Data Collection on 18th July 2019

No	Time	Date Activity	Duration	
			Seconds	Minutes
1	07.00 - 07.20	Briefing	1200	20
2	07.20 - 07.21	Walking to Pulp Warehouse 2	60	1
3	07.21 - 07.22	Setup	60	1
4	07.22 - 07.23	Operating and Moving Overhead Crane	44	0,73333
5		Waiting	16	0,26667
6	07.23 - 07.24	Carrying and Moving Bales to Destination	22	0,36667
7		Positioning and Releasing Bales	38	0,63333
8	07.24 - 07.26	Operating and Moving Overhead Crane	105	1,75
9		Waiting	15	0,25
10	07.26 - 07.27	Carrying and Moving Bales to Destination	23	0,38333
11		Positioning and Releasing Bales	37	0,61667
12	07.27 - 07.28	Operating and Moving Overhead Crane	44	0,73333
13		Waiting	16	0,26667
14	07.28 - 07.30	Carrying and Moving Bales to Destination	28	0,46667
15		Positioning and Releasing Bales	92	1,53333
16	07.30 - 07.32	Operating and Moving Overhead Crane	94	1,56667
17		Waiting	26	0,43333
18	07.32 - 07.33	Carrying and Moving Bales to Destination	22	0,36667
19		Positioning and Releasing Bales	38	0,63333
20	07.33 - 07.34	Operating and Moving Overhead Crane (5)	47	0,78333
21		Waiting	13	0,21667
22	07.34 - 07.35	Carrying and Moving Bales to Destination (5)	26	0,43333
23		Positioning and Releasing Bales (5)	34	0,56667
24	07.35 - 07.36	Operating and Moving Overhead Crane (5)	45	0,75
25		Waiting	15	0,25
26	07.36 - 07.38	Carrying and Moving Bales to Destination (5)	32	0,53333
27		Positioning and Releasing Bales (5)	88	1,46667
28	07.38 - 07.40	Operating and Moving Overhead Crane (5)	87	1,45
29		Waiting	33	0,55
30	07.40 - 07.41	Carrying and Moving Bales to Destination (5)	19	0,31667
31		Positioning and Releasing Bales (5)	41	0,68333
32	07.41 - 07.42	Operating and Moving Overhead Crane (6)	46	0,76667
33		Waiting	14	0,23333

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
34	07.42 - 07.43	Carrying and Moving Bales to Destination (6)	43	0,71667
35		Positioning and Releasing Bales (6)	17	0,28333
36	07.43 - 07.44	Operating and Moving Overhead Crane (6)	48	0,8
37		Waiting	12	0,2
38	07.44 - 07.45	Carrying and Moving Bales to Destination (6)	40	0,66667
39		Positioning and Releasing Bales (6)	20	0,33333
40	07.45 - 07.46	Operating and Moving Overhead Crane (6)	46	0,76667
41		Waiting	14	0,23333
42	07.46 - 07.47	Carrying and Moving Bales to Destination (6)	42	0,7
43		Positioning and Releasing Bales (6)	18	0,3
44	07.47 - 07.48	Operating and Moving Overhead Crane (5)	48	0,8
45		Waiting	12	0,2
46	07.48 - 07.49	Carrying and Moving Bales to Destination (5)	29	0,48333
47		Positioning and Releasing Bales (5)	31	0,51667
48	07.49 - 07.51	Operating and Moving Overhead Crane	101	1,68333
49		Waiting	19	0,31667
50	07.51 - 07.52	Carrying and Moving Bales to Destination	22	0,36667
51		Positioning and Releasing Bales	38	0,63333
52	07.52 - 07.53	Operating and Moving Overhead Crane	42	0,7
53		Waiting	18	0,3
54	07.53 - 07.55	Carrying and Moving Bales to Destination	27	0,45
55		Positioning and Releasing Bales	93	1,55
56	07.55 - 07.57	Operating and Moving Overhead Crane (5)	103	1,71667
57		Waiting	17	0,28333
58	07.57 - 07.58	Carrying and Moving Bales to Destination (5)	24	0,4
59		Positioning and Releasing Bales (5)	36	0,6
60	07.58 - 07.59	Operating and Moving Overhead Crane (6)	43	0,71667
61		Waiting	17	0,28333
62	07.59 - 08.00	Carrying and Moving Bales to Destination (6)	11	0,18333
63		Positioning and Releasing Bales (6)	49	0,81667
64	08.00 - 08.01	Operating and Moving Overhead Crane (6)	43	0,71667
65		Waiting	17	0,28333
66	08.01 - 08.02	Carrying and Moving Bales to Destination (6)	11	0,18333
67		Positioning and Releasing Bales (6)	49	0,81667
68	08.02 - 08.03	Operating and Moving Overhead Crane (7)	14	0,23333
69		Waiting	46	0,76667

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
70	08.03 - 08.04	Carrying and Moving Bales to Destination (7)	23	0,38333
71		Positioning and Releasing Bales (7)	37	0,61667
72	08.04 - 08.05	Operating and Moving Overhead Crane (7)	15	0,25
73		Waiting	45	0,75
74	08.05 - 08.06	Carrying and Moving Bales to Destination (7)	28	0,46667
75		Positioning and Releasing Bales (7)	32	0,53333
76	08.06 - 08.07	Operating and Moving Overhead Crane	15	0,25
77		Waiting	45	0,75
78	08.07 - 08.08	Carrying and Moving Bales to Destination	22	0,36667
79		Positioning and Releasing Bales	38	0,63333
80	08.08 - 08.09	Operating and Moving Overhead Crane	17	0,28333
81		Waiting	43	0,71667
82	08.09 - 08.11	Carrying and Moving Bales to Destination	36	0,6
83		Positioning and Releasing Bales	84	1,4
84	08.11 - 08.12	Operating and Moving Overhead Crane	16	0,26667
85		Waiting	44	0,73333
86	08.12 - 08.14	Carrying and Moving Bales to Destination	35	0,58333
87		Positioning and Releasing Bales	85	1,41667
88	08.14 - 08.18	Resting	240	4
89	08.18 - 08.19	Operating and Moving Overhead Crane (7)	50	0,83333
90		Waiting	10	0,16667
91	08.19 - 08.20	Carrying and Moving Bales to Destination (7)	30	0,5
92		Positioning and Releasing Bales (7)	30	0,5
93	08.20 - 08.22	Operating and Moving Overhead Crane (7)	98	1,63333
94		Waiting	22	0,36667
95	08.22 - 08.23	Carrying and Moving Bales to Destination (7)	24	0,4
96		Positioning and Releasing Bales (7)	36	0,6
97	08.23 - 08.24	Operating and Moving Overhead Crane (8)	51	0,85
98		Waiting	9	0,15
99	08.24 - 08.25	Carrying and Moving Bales to Destination (8)	18	0,3
100		Positioning and Releasing Bales (8)	42	0,7
101	08.25 - 08.26	Operating and Moving Overhead Crane (8)	49	0,81667
102		Waiting	11	0,18333
103	08.26 - 08.27	Carrying and Moving Bales to Destination (8)	21	0,35
104		Positioning and Releasing Bales (8)	39	0,65
105	08.27 - 08.28	Operating and Moving Overhead Crane (7)	49	0,81667

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
106		Waiting	11	0,18333
107	08.28 - 08.29	Carrying and Moving Bales to Destination (7)	21	0,35
108		Positioning and Releasing Bales (7)	39	0,65
109	08.29 - 08.30	Operating and Moving Overhead Crane (7)	50	0,83333
110		Waiting	10	0,16667
111	08.30 - 08.31	Carrying and Moving Bales to Destination (7)	24	0,4
112		Positioning and Releasing Bales (7)	36	0,6
113	08.31 - 08.32	Operating and Moving Overhead Crane (7)	48	0,8
114		Waiting	12	0,2
115	08.32 - 08.33	Carrying and Moving Bales to Destination (7)	20	0,33333
116		Positioning and Releasing Bales (7)	40	0,66667
117	08.33 - 08.34	Operating and Moving Overhead Crane (7)	51	0,85
118		Waiting	9	0,15
119	08.34 - 08.35	Carrying and Moving Bales to Destination (7)	20	0,33333
120		Positioning and Releasing Bales (7)	40	0,66667
121	08.35 - 08.40	Waiting	300	5
122	08.40 - 08.41	Operating and Moving Overhead Crane (7)	50	0,83333
123		Waiting	10	0,16667
124	08.41 - 08.42	Carrying and Moving Bales to Destination (7)	27	0,45
125		Positioning and Releasing Bales (7)	33	0,55
126	08.42 - 08.43	Operating and Moving Overhead Crane (7)	47	0,78333
127		Waiting	13	0,21667
128	08.43 - 08.44	Carrying and Moving Bales to Destination (7)	30	0,5
129		Positioning and Releasing Bales (7)	30	0,5
130	08.44 - 08.45	Operating and Moving Overhead Crane (8)	48	0,8
131		Waiting	12	0,2
132	08.45 - 08.46	Carrying and Moving Bales to Destination (8)	15	0,25
133		Positioning and Releasing Bales (8)	45	0,75
134	08.46 - 08.47	Operating and Moving Overhead Crane (8)	49	0,81667
135		Waiting	11	0,18333
136	08.47 - 08.48	Carrying and Moving Bales to Destination (8)	17	0,28333
137		Positioning and Releasing Bales (8)	43	0,71667
138	08.48 - 08.49	Waiting	60	1
139	08.49 - 08.50	Operating and Moving Overhead Crane (7)	48	0,8
140		Waiting	12	0,2
141	08.50 - 08.51	Carrying and Moving Bales to Destination (7)	23	0,38333

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
142		Positioning and Releasing Bales (7)	37	0,61667
143	08.51 - 08.52	Operating and Moving Overhead Crane (7)	47	0,78333
144		Waiting	13	0,21667
145	08.52 - 08.53	Carrying and Moving Bales to Destination (7)	27	0,45
146		Positioning and Releasing Bales (7)	33	0,55
147	08.53 - 08.54	Operating and Moving Overhead Crane (7)	48	0,8
148		Waiting	12	0,2
149	08.54 - 08.55	Carrying and Moving Bales to Destination (7)	20	0,33333
150		Positioning and Releasing Bales (7)	40	0,66667
151	08.55 - 08.56	Operating and Moving Overhead Crane (7)	21	0,35
152		Waiting	12	0,2
153		Carrying and Moving Bales to Destination (7)	14	0,23333
154		Positioning and Releasing Bales (7)	13	0,21667
155	08.56 - 08.59	Waiting	180	3
156	08.59 - 09.01	Carrying and Moving Bales to Destination (6)	30	0,5
157		Positioning and Releasing Bales (6)	90	1,5
158	09.01 - 09.02	Operating and Moving Overhead Crane (6)	36	0,6
159		Waiting	24	0,4
160	09.02 - 09.03	Carrying and Moving Bales to Destination (6)	29	0,48333
161		Positioning and Releasing Bales (6)	31	0,51667
162	09.03 - 09.04	Operating and Moving Overhead Crane (8)	38	0,63333
163		Waiting	22	0,36667
164	09.04 - 09.06	Carrying and Moving Bales to Destination (8)	19	0,31667
165		Positioning and Releasing Bales (8)	101	1,68333
166	09.06 - 09.07	Operating and Moving Overhead Crane (8)	44	0,73333
167		Waiting	16	0,26667
168	09.07 - 09.08	Carrying and Moving Bales to Destination (8)	16	0,26667
169		Positioning and Releasing Bales (8)	44	0,73333
170	09.08 - 09.12	Resting	240	4
171	09.12 - 09.13	Operating and Moving Overhead Crane (7)	45	0,75
172		Waiting	15	0,25
173	09.13 - 09.14	Carrying and Moving Bales to Destination (7)	23	0,38333
174		Positioning and Releasing Bales (7)	37	0,61667
175	09.14 - 09.15	Operating and Moving Overhead Crane (7)	43	0,71667
176		Waiting	17	0,28333
177	09.15 - 09.16	Carrying and Moving Bales to Destination (7)	22	0,36667

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
178		Positioning and Releasing Bales (7)	38	0,63333
179	09.16 - 09.18	Operating and Moving Overhead Crane (7)	77	1,28333
180		Waiting	43	0,71667
181	09.18 - 09.19	Carrying and Moving Bales to Destination (7)	22	0,36667
182		Positioning and Releasing Bales (7)	38	0,63333
183	09.19 - 09.20	Operating and Moving Overhead Crane (7)	47	0,78333
184		Waiting	13	0,21667
185	09.20 - 09.21	Carrying and Moving Bales to Destination (7)	17	0,28333
186		Positioning and Releasing Bales (7)	43	0,71667
187	09.21 - 09.24	Waiting	180	3
188	09.24 - 09.25	Operating and Moving Overhead Crane (7)	44	0,73333
189		Waiting	16	0,26667
190	09.25 - 09.27	Carrying and Moving Bales to Destination (7)	98	1,63333
191		Positioning and Releasing Bales (7)	22	0,36667
192	09.27 - 09.28	Operating and Moving Overhead Crane (7)	47	0,78333
193		Waiting	13	0,21667
194	09.28 - 09.29	Carrying and Moving Bales to Destination (7)	24	0,4
195		Positioning and Releasing Bales (7)	36	0,6
196	09.29 - 09.30	Operating and Moving Overhead Crane (8)	43	0,71667
197		Waiting	17	0,28333
198	09.30 - 09.31	Carrying and Moving Bales to Destination (8)	28	0,46667
199		Positioning and Releasing Bales (8)	32	0,53333
200	09.31 - 09.32	Operating and Moving Overhead Crane (8)	48	0,8
201		Waiting	12	0,2
202	09.32 - 09.33	Carrying and Moving Bales to Destination (8)	18	0,3
203		Positioning and Releasing Bales (8)	42	0,7
204	09.33 - 09.34	Operating and Moving Overhead Crane (7)	45	0,75
205		Waiting	15	0,25
206	09.34 - 09.35	Carrying and Moving Bales to Destination (7)	22	0,36667
207		Positioning and Releasing Bales (7)	38	0,63333
208	09.35 - 09.36	Operating and Moving Overhead Crane (7)	50	0,83333
209		Waiting	10	0,16667
210	09.36 - 09.37	Carrying and Moving Bales to Destination (7)	23	0,38333
211		Positioning and Releasing Bales (7)	37	0,61667
212	09.37 - 10.04	Waiting	1620	27
213	10.04 - 10.05	Operating and Moving Overhead Crane (7)	48	0,8

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
214		Waiting	12	0,2
215	10.05 - 10.06	Carrying and Moving Bales to Destination (7)	23	0,38333
216		Positioning and Releasing Bales (7)	37	0,61667
217	10.06 - 10.07	Operating and Moving Overhead Crane (7)	46	0,76667
218		Waiting	14	0,23333
219	10.07 - 10.08	Carrying and Moving Bales to Destination (7)	27	0,45
220		Positioning and Releasing Bales (7)	33	0,55
221	10.08 - 10.10	Operating and Moving Overhead Crane (8)	84	1,4
222		Waiting	36	0,6
223	10.10 - 10.12	Carrying and Moving Bales to Destination (8)	18	0,3
224		Positioning and Releasing Bales (8)	102	1,7
225	10.12 - 10.16	Operating and Moving Overhead Crane (4)	194	3,23333
226		Waiting	46	0,76667
227	10.16 - 10.18	Carrying and Moving Bales to Destination (4)	18	0,3
228		Positioning and Releasing Bales (4)	102	1,7
229	10.18 - 10.19	Operating and Moving Overhead Crane (4)	49	0,81667
230		Waiting	11	0,18333
231	10.19 - 10.21	Carrying and Moving Bales to Destination (4)	23	0,38333
232		Positioning and Releasing Bales (4)	97	1,61667
233	10.21 - 10.22	Operating and Moving Overhead Crane (4)	48	0,8
234		Waiting	12	0,2
235	10.22 - 10.23	Carrying and Moving Bales to Destination (4)	23	0,38333
236		Positioning and Releasing Bales (3)	37	0,61667
237	10.23 - 10.24	Operating and Moving Overhead Crane (8)	46	0,76667
238		Waiting	14	0,23333
239	10.24 - 10.25	Carrying and Moving Bales to Destination (8)	14	0,23333
240		Positioning and Releasing Bales (8)	46	0,76667
241	10.25 - 10.26	Operating and Moving Overhead Crane (8)	47	0,78333
242		Waiting	13	0,21667
243	10.26 - 10.27	Carrying and Moving Bales to Destination (8)	23	0,38333
244		Positioning and Releasing Bales (8)	37	0,61667
245	10.27 - 10.29	Operating and Moving Overhead Crane (6)	94	1,56667
246		Waiting	26	0,43333
247	10.29 - 10.30	Carrying and Moving Bales to Destination (6)	22	0,36667
248		Positioning and Releasing Bales (6)	38	0,63333
249	10.30 - 10.31	Operating and Moving Overhead Crane (6)	44	0,73333

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
250		Waiting	16	0,26667
251	10.31 - 10.32	Carrying and Moving Bales to Destination (6)	21	0,35
252		Positioning and Releasing Bales (6)	39	0,65
253	10.32 - 10.34	Operating and Moving Overhead Crane (4)	83	1,38333
254		Waiting	37	0,61667
255	10.34 - 10.35	Carrying and Moving Bales to Destination (4)	19	0,31667
256		Positioning and Releasing Bales (4)	41	0,68333
257	10.35 - 10.36	Operating and Moving Overhead Crane (4)	47	0,78333
258		Waiting	13	0,21667
259	10.36 - 10.37	Carrying and Moving Bales to Destination (4)	19	0,31667
260		Positioning and Releasing Bales (4)	41	0,68333
261	10.37 - 10.38	Operating and Moving Overhead Crane (4)	45	0,75
262		Waiting	15	0,25
263	10.38 - 10.39	Carrying and Moving Bales to Destination (4)	22	0,36667
264		Positioning and Releasing Bales (4)	38	0,63333
265	10.39 - 10.40	Operating and Moving Overhead Crane (8)	45	0,75
266		Waiting	15	0,25
267	10.40 - 10.41	Carrying and Moving Bales to Destination (8)	15	0,25
268		Positioning and Releasing Bales (8)	45	0,75
269	10.41 - 10.42	Operating and Moving Overhead Crane (8)	42	0,7
270		Waiting	18	0,3
271	10.42 - 10.43	Carrying and Moving Bales to Destination (8)	20	0,33333
272		Positioning and Releasing Bales (8)	40	0,66667
273	10.43 - 10.44	Operating and Moving Overhead Crane (4)	46	0,76667
274		Waiting	14	0,23333
275	10.44 - 10.46	Carrying and Moving Bales to Destination (4)	28	0,46667
276		Positioning and Releasing Bales (4)	92	1,53333
277	10.46 - 10.47	Operating and Moving Overhead Crane (4)	46	0,76667
278		Waiting	14	0,23333
279	10.47 - 10.48	Carrying and Moving Bales to Destination (4)	28	0,46667
280		Positioning and Releasing Bales (4)	32	0,53333
281	10.48 - 10.49	Operating and Moving Overhead Crane (4)	46	0,76667
282		Waiting	14	0,23333
283	10.49 - 10.50	Carrying and Moving Bales to Destination (4)	28	0,46667
284		Positioning and Releasing Bales (4)	32	0,53333
285	10.50 - 10.51	Operating and Moving Overhead Crane (4)	49	0,81667

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
286		Waiting	11	0,18333
287	10.51 - 10.52	Carrying and Moving Bales to Destination (4)	24	0,4
288		Positioning and Releasing Bales (4)	36	0,6
289	10.52 - 10.53	Operating and Moving Overhead Crane (7)	45	0,75
290		Waiting	15	0,25
291	10.53 - 10.54	Carrying and Moving Bales to Destination (7)	13	0,21667
292		Positioning and Releasing Bales (7)	47	0,78333
293	10.54 - 10.55	Operating and Moving Overhead Crane (7)	45	0,75
294		Waiting	15	0,25
295	10.55 - 10.56	Carrying and Moving Bales to Destination (7)	22	0,36667
296		Positioning and Releasing Bales (7)	38	0,63333
297	10.56 - 10.57	Operating and Moving Overhead Crane (4)	46	0,76667
298		Waiting	14	0,23333
299	10.57 - 10.58	Carrying and Moving Bales to Destination (4)	17	0,28333
300		Positioning and Releasing Bales (4)	43	0,71667
301	10.58 - 11.00	Operating and Moving Overhead Crane (4)	104	1,73333
302		Waiting	16	0,26667
303	11.00 - 11.01	Carrying and Moving Bales to Destination (4)	23	0,38333
304		Positioning and Releasing Bales (4)	37	0,61667
305	11.01 - 11.02	Operating and Moving Overhead Crane (8)	49	0,81667
306		Waiting	11	0,18333
307	11.02 - 11.03	Carrying and Moving Bales to Destination (8)	14	0,23333
308		Positioning and Releasing Bales (8)	46	0,76667
309	11.03 - 11.04	Operating and Moving Overhead Crane (8)	50	0,83333
310		Waiting	10	0,16667
311	11.04 - 11.05	Carrying and Moving Bales to Destination (8)	13	0,21667
312		Positioning and Releasing Bales (8)	47	0,78333
313	11.05 - 11.06	Operating and Moving Overhead Crane (7)	43	0,71667
314		Waiting	17	0,28333
315	11.06 - 11.07	Carrying and Moving Bales to Destination (7)	31	0,51667
316		Positioning and Releasing Bales (7)	29	0,48333
317	11.07 - 11.08	Operating and Moving Overhead Crane (7)	45	0,75
318		Waiting	15	0,25
319	11.08 - 11.09	Carrying and Moving Bales to Destination (7)	35	0,58333
320		Positioning and Releasing Bales (7)	25	0,41667
321	11.09 - 11.10	Operating and Moving Overhead Crane (8)	46	0,76667

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
322		Waiting	14	0,23333
323	11.10 - 11.11	Carrying and Moving Bales to Destination (8)	23	0,38333
324		Positioning and Releasing Bales	37	0,61667
325	11.11 - 11.13	Waiting	120	2
326	11.13 - 11.15	Carrying and Moving Bales to Destination (8)	34	0,56667
327		Positioning and Releasing Bales (8)	86	1,43333
328	11.15 - 11.16	Operating and Moving Overhead Crane (8)	44	0,73333
329		Waiting	16	0,26667
330	11.16 - 11.17	Carrying and Moving Bales to Destination (8)	20	0,33333
331		Positioning and Releasing Bales (8)	40	0,66667
332	11.17 - 11.19	Carrying and Moving Bales to Destination	27	0,45
333		Positioning and Releasing Bales	93	1,55
334	11.19 - 11.21	Carrying and Moving Bales to Destination	23	0,38333
335		Positioning and Releasing Bales	97	1,61667
336	11.21 - 11.23	Carrying and Moving Bales to Destination	32	0,53333
337		Positioning and Releasing Bales	88	1,46667
338	11.23 - 11.24	Carrying and Moving Bales to Destination	21	0,35
339		Positioning and Releasing Bales	39	0,65
340	11.24 - 11.28	Resting	240	4
341	11.28 - 11.29	Operating and Moving Overhead Crane (8)	44	0,73333
342		Waiting	16	0,26667
343	11.29 - 11.31	Carrying and Moving Bales to Destination (8)	35	0,58333
344		Positioning and Releasing Bales (8)	85	1,41667
345	11.31 - 11.34	Waiting	180	3
346	11.34 - 11.35	Operating and Moving Overhead Crane (7)	39	0,65
347		Waiting	21	0,35
348	11.35 - 11.36	Carrying and Moving Bales to Destination (7)	21	0,35
349		Positioning and Releasing Bales (7)	39	0,65
350	11.36 - 11.37	Operating and Moving Overhead Crane (7)	50	0,83333
351		Waiting	10	0,16667
352	11.37 - 11.38	Carrying and Moving Bales to Destination (7)	25	0,41667
353		Positioning and Releasing Bales (7)	35	0,58333
354	11.38 - 11.42	Resting	240	4
355	11.42 - 11.43	Operating and Moving Overhead Crane (7)	46	0,76667
356		Waiting	14	0,23333
357	11.43 - 11.44	Carrying and Moving Bales to Destination (7)	22	0,36667

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
358		Positioning and Releasing Bales (7)	38	0,63333
359	11.44 - 11.45	Operating and Moving Overhead Crane (7)	45	0,75
360		Waiting	15	0,25
361	11.45 - 11.46	Carrying and Moving Bales to Destination (7)	22	0,36667
362		Positioning and Releasing Bales (7)	38	0,63333
363	11.46 - 11.48	Resting	120	2
364	11.48 - 11.49	Operating and Moving Overhead Crane (7)	46	0,76667
365		Waiting	14	0,23333
366	11.49 - 11.50	Carrying and Moving Bales to Destination (7)	29	0,48333
367		Positioning and Releasing Bales (7)	31	0,51667
368	11.50 - 11.51	Operating and Moving Overhead Crane (7)	48	0,8
369		Waiting	12	0,2
370	11.51 - 11.52	Carrying and Moving Bales to Destination (7)	22	0,36667
371		Positioning and Releasing Bales (7)	38	0,63333
372	11.52 - 11.55	Resting	180	3
373	11.55 - 11.56	Operating and Moving Overhead Crane (7)	46	0,76667
374		Waiting	14	0,23333
375	11.56 - 11.57	Carrying and Moving Bales to Destination (7)	19	0,31667
376		Positioning and Releasing Bales (7)	41	0,68333
377	11.57 - 11.58	Operating and Moving Overhead Crane (7)	45	0,75
378		Waiting	15	0,25
379	11.58 - 12.00	Carrying and Moving Bales to Destination (7)	32	0,53333
380		Positioning and Releasing Bales (7)	88	1,46667
381	12.00 - 12.15	Resting	900	15
382	12.15 - 12.17	Carrying and Moving Bales to Destination	42	0,7
383		Positioning and Releasing Bales	78	1,3
384	12.17 - 12.19	Carrying and Moving Bales to Destination	39	0,65
385		Positioning and Releasing Bales	81	1,35
386	12.19 - 12.21	Carrying and Moving Bales to Destination	33	0,55
387		Positioning and Releasing Bales	87	1,45
388	12.21 - 12.22	Carrying and Moving Bales to Destination	29	0,48333
389		Positioning and Releasing Bales	91	1,51667
390	12.22 - 12.24	Carrying and Moving Bales to Destination	44	0,73333
391		Positioning and Releasing Bales	76	1,26667
392	12.24 - 12.26	Operating and Moving Overhead Crane	95	1,58333
393		Waiting	25	0,41667

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
394	12.26 - 12.27	Carrying and Moving Bales to Destination	22	0,36667
395		Positioning and Releasing Bales	38	0,63333
396	12.27 - 12.28	Operating and Moving Overhead Crane	46	0,76667
397		Waiting	14	0,23333
398	12.28 - 12.29	Carrying and Moving Bales to Destination	25	0,41667
399		Positioning and Releasing Bales	35	0,58333
400	12.29 - 12.35	Resting	360	6
401	12.35 - 12.36	Operating and Moving Overhead Crane	49	0,81667
402		Waiting	11	0,18333
403	12.36 - 12.37	Carrying and Moving Bales to Destination	29	0,48333
404		Positioning and Releasing Bales	31	0,51667
405	12.37 - 12.38	Operating and Moving Overhead Crane	46	0,76667
406		Waiting	14	0,23333
407	12.38 - 12.39	Carrying and Moving Bales to Destination	25	0,41667
408		Positioning and Releasing Bales	35	0,58333
409	12.39 - 12.55	Carrying and Moving Bales to Destination	446	7,43333
410		Positioning and Releasing Bales	514	8,56667
411	12.55 - 13.04	Resting	480	8
412	13.04 - 13.05	Operating and Moving Overhead Crane (7)	49	0,81667
413		Waiting	11	0,18333
414	13.05 - 13.07	Carrying and Moving Bales to Destination (7)	33	0,55
415		Positioning and Releasing Bales (7)	87	1,45
416	13.07 - 13.08	Operating and Moving Overhead Crane (7)	46	0,76667
417		Waiting	14	0,23333
418	13.08 - 13.09	Carrying and Moving Bales to Destination (7)	30	0,5
419		Positioning and Releasing Bales (7)	30	0,5
420	13.09 - 13.11	Operating and Moving Overhead Crane (8)	105	1,75
421		Waiting	15	0,25
422	13.11 - 13.12	Carrying and Moving Bales to Destination (8)	15	0,25
423		Positioning and Releasing Bales (8)	45	0,75
424	13.12 - 13.13	Operating and Moving Overhead Crane (8)	44	0,73333
425		Waiting	16	0,26667
426	13.13 - 13.14	Carrying and Moving Bales to Destination (8)	25	0,41667
427		Positioning and Releasing Bales (8)	35	0,58333
428	13.14 - 13.15	Operating and Moving Overhead Crane (6)	50	0,83333
429		Waiting	10	0,16667

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
430	13.15 - 13.16	Carrying and Moving Bales to Destination (6)	16	0,26667
431		Positioning and Releasing Bales (6)	44	0,73333
432	13.16 - 13.17	Operating and Moving Overhead Crane (6)	48	0,8
433		Waiting	12	0,2
434	13.17 - 13.18	Carrying and Moving Bales to Destination (6)	36	0,6
435		Positioning and Releasing Bales (6)	24	0,4
436	13.18 - 13.19	Operating and Moving Overhead Crane (7)	46	0,76667
437		Waiting	14	0,23333
438	13.19 - 13.20	Carrying and Moving Bales to Destination (7)	22	0,36667
439		Positioning and Releasing Bales (7)	38	0,63333
440	13.20 - 13.21	Operating and Moving Overhead Crane (7)	45	0,75
441		Waiting	15	0,25
442	13.21 - 13.22	Carrying and Moving Bales to Destination (7)	20	0,33333
443		Positioning and Releasing Bales (7)	40	0,66667
444	13.22 - 13.26	Setup	240	4
445	13.26 - 13.27	Operating and Moving Overhead Crane (8)	43	0,71667
446		Waiting	17	0,28333
447	13.27 - 13.28	Carrying and Moving Bales to Destination (8)	16	0,26667
448		Positioning and Releasing Bales (8)	44	0,73333
449	13.28 - 13.29	Operating and Moving Overhead Crane (8)	49	0,81667
450		Waiting	11	0,18333
451	13.29 - 13.30	Carrying and Moving Bales to Destination (8)	15	0,25
452		Positioning and Releasing Bales (8)	45	0,75
453	13.30 - 13.31	Operating and Moving Overhead Crane (7)	44	0,73333
454		Waiting	16	0,26667
455	13.31 - 13.32	Carrying and Moving Bales to Destination (7)	31	0,51667
456		Positioning and Releasing Bales (7)	29	0,48333
457	13.32 - 13.33	Operating and Moving Overhead Crane (7)	47	0,78333
458		Waiting	13	0,21667
459	13.33 - 13.34	Carrying and Moving Bales to Destination (7)	28	0,46667
460		Positioning and Releasing Bales (7)	32	0,53333
461	13.34 - 13.35	Operating and Moving Overhead Crane (4)	48	0,8
462		Waiting	12	0,2
463	13.35 - 13.37	Carrying and Moving Bales to Destination (4)	51	0,85
464		Positioning and Releasing Bales (4)	69	1,15
465	13.37 - 13.38	Operating and Moving Overhead Crane (4)	36	0,6

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
466		Waiting	24	0,4
467	13.38 - 13.39	Carrying and Moving Bales to Destination (4)	31	0,51667
468		Positioning and Releasing Bales (4)	29	0,48333
469	13.39 - 13.40	Operating and Moving Overhead Crane (4)	49	0,81667
470		Waiting	11	0,18333
471	13.40 - 13.41	Carrying and Moving Bales to Destination (4)	22	0,36667
472		Positioning and Releasing Bales (4)	38	0,63333
473	13.41 - 13.42	Operating and Moving Overhead Crane (4)	40	0,66667
474		Waiting	20	0,33333
475	13.42 - 13.44	Carrying and Moving Bales to Destination (4)	30	0,5
476		Positioning and Releasing Bales (4)	90	1,5
477	13.44 - 13.45	Operating and Moving Overhead Crane (4)	47	0,78333
478		Waiting	13	0,21667
479	13.45 - 13.47	Carrying and Moving Bales to Destination (4)	37	0,61667
480		Positioning and Releasing Bales (4)	83	1,38333
481	13.47 - 13.48	Operating and Moving Overhead Crane (7)	45	0,75
482		Waiting	15	0,25
483	13.48 - 13.50	Carrying and Moving Bales to Destination (7)	45	0,75
484		Positioning and Releasing Bales (7)	75	1,25
485	13.50 - 13.51	Operating and Moving Overhead Crane (7)	48	0,8
486		Waiting	12	0,2
487	13.51 - 13.52	Carrying and Moving Bales to Destination (7)	20	0,33333
488		Positioning and Releasing Bales (7)	40	0,66667
489	13.52 - 13.53	Operating and Moving Overhead Crane (8)	42	0,7
490		Waiting	18	0,3
491	13.53 - 13.54	Carrying and Moving Bales to Destination (8)	18	0,3
492		Positioning and Releasing Bales (8)	42	0,7
493	13.54 - 13.55	Operating and Moving Overhead Crane (8)	46	0,76667
494		Waiting	14	0,23333
495	13.55 - 13.56	Carrying and Moving Bales to Destination (8)	26	0,43333
496		Positioning and Releasing Bales (8)	34	0,56667
497	13.56 - 13.57	Operating and Moving Overhead Crane (6)	49	0,81667
498		Waiting	11	0,18333
499	13.57 - 13.58	Carrying and Moving Bales to Destination (6)	19	0,31667
500		Positioning and Releasing Bales (6)	41	0,68333
501	13.58 - 13.59	Operating and Moving Overhead Crane (6)	50	0,83333

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
502		Waiting	10	0,16667
503	13.59 - 14.00	Carrying and Moving Bales to Destination (6)	15	0,25
504		Positioning and Releasing Bales (6)	45	0,75
505	14.00 - 14.01	Operating and Moving Overhead Crane (7)	48	0,8
506		Waiting	12	0,2
507	14.01 - 14.02	Carrying and Moving Bales to Destination (7)	32	0,53333
508		Positioning and Releasing Bales (7)	28	0,46667
509	14.02 - 14.03	Operating and Moving Overhead Crane (7)	50	0,83333
510		Waiting	10	0,16667
511	14.03 - 14.04	Carrying and Moving Bales to Destination (7)	30	0,5
512		Positioning and Releasing Bales (7)	30	0,5
513	14.04 - 14.05	Operating and Moving Overhead Crane (4)	48	0,8
514		Waiting	12	0,2
515	14.05 - 14.06	Carrying and Moving Bales to Destination (4)	24	0,4
516		Positioning and Releasing Bales (4)	36	0,6
517	14.06 - 14.07	Operating and Moving Overhead Crane (4)	49	0,81667
518		Waiting	11	0,18333
519	14.07 - 14.08	Carrying and Moving Bales to Destination (4)	29	0,48333
520		Positioning and Releasing Bales (4)	31	0,51667
521	14.08 - 14.09	Operating and Moving Overhead Crane (4)	46	0,76667
522		Waiting	14	0,23333
523	14.09 - 14.11	Carrying and Moving Bales to Destination (4)	35	0,58333
524		Positioning and Releasing Bales (4)	85	1,41667
525	14.11 - 14.12	Operating and Moving Overhead Crane (4)	44	0,73333
526		Waiting	16	0,26667
527	14.12 - 14.13	Carrying and Moving Bales to Destination (4)	26	0,43333
528		Positioning and Releasing Bales (4)	34	0,56667
529	14.13 - 14.15	Operating and Moving Overhead Crane (4)	106	1,76667
530		Waiting	14	0,23333
531	14.15 - 14.16	Carrying and Moving Bales to Destination (4)	29	0,48333
532		Positioning and Releasing Bales (4)	31	0,51667
533	14.16 - 14.17	Operating and Moving Overhead Crane (8)	49	0,81667
534		Waiting	11	0,18333
535	14.17 - 14.18	Carrying and Moving Bales to Destination (8)	21	0,35
536		Positioning and Releasing Bales (8)	39	0,65
537	14.18 - 14.19	Operating and Moving Overhead Crane (8)	51	0,85

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
538		Waiting	9	0,15
539	14.19 - 14.20	Carrying and Moving Bales to Destination (8)	16	0,26667
540		Positioning and Releasing Bales (8)	44	0,73333
541	14.20 - 14.21	Operating and Moving Overhead Crane (7)	48	0,8
542		Waiting	12	0,2
543	14.21 - 14.22	Carrying and Moving Bales to Destination (7)	20	0,33333
544		Positioning and Releasing Bales (7)	40	0,66667
545	14.22 - 14.23	Operating and Moving Overhead Crane (7)	47	0,78333
546		Waiting	13	0,21667
547	14.23 - 14.24	Carrying and Moving Bales to Destination (7)	29	0,48333
548		Positioning and Releasing Bales (7)	31	0,51667
549	14.24 - 14.25	Operating and Moving Overhead Crane (7)	44	0,73333
550		Waiting	16	0,26667
551	14.25 - 14.26	Carrying and Moving Bales to Destination (7)	27	0,45
552		Positioning and Releasing Bales (7)	33	0,55
553	14.26 - 14.27	Operating and Moving Overhead Crane (7)	49	0,81667
554		Waiting	11	0,18333
555	14.27 - 14.28	Carrying and Moving Bales to Destination (7)	23	0,38333
556		Positioning and Releasing Bales (7)	37	0,61667
557	14.28 - 14.30	Operating and Moving Overhead Crane (3)	96	1,6
558		Waiting	24	0,4
559	14.30 - 14.31	Carrying and Moving Bales to Destination (3)	33	0,55
560		Positioning and Releasing Bales (3)	27	0,45
561	14.31 - 14.32	Operating and Moving Overhead Crane (8)	48	0,8
562		Waiting	12	0,2
563	14.32 - 14.33	Carrying and Moving Bales to Destination (8)	33	0,55
564		Positioning and Releasing Bales (8)	27	0,45
565	14.33 - 14.34	Operating and Moving Overhead Crane (8)	46	0,76667
566		Waiting	14	0,23333
567	14.34 - 14.35	Carrying and Moving Bales to Destination (8)	23	0,38333
568		Positioning and Releasing Bales (8)	37	0,61667
569	14.35 - 14.36	Operating and Moving Overhead Crane (7)	45	0,75
570		Waiting	15	0,25
571	14.36 - 14.37	Carrying and Moving Bales to Destination (7)	35	0,58333
572		Positioning and Releasing Bales (7)	25	0,41667
573	14.37 - 14.38	Operating and Moving Overhead Crane (7)	48	0,8

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
574		Waiting	12	0,2
575	14.38 - 14.39	Carrying and Moving Bales to Destination (7)	22	0,36667
576		Positioning and Releasing Bales (7)	38	0,63333
577	14.39 - 14.40	Operating and Moving Overhead Crane (7)	47	0,78333
578		Waiting	13	0,21667
579	14.40 - 14.41	Carrying and Moving Bales to Destination (7)	27	0,45
580		Positioning and Releasing Bales (7)	33	0,55
581	14.41 - 14.43	Resting	120	2
582	14.43 - 14.44	Operating and Moving Overhead Crane (7)	25	0,41667
583		Waiting	12	0,2
584		Carrying and Moving Bales to Destination (7)	11	0,18333
585		Positioning and Releasing Bales (7)	12	0,2
586	14.44 - 14.45	Operating and Moving Overhead Crane (7)	49	0,81667
587		Waiting	11	0,18333
588	14.45 - 14.46	Carrying and Moving Bales to Destination (7)	28	0,46667
589		Positioning and Releasing Bales (7)	32	0,53333
590	14.46 - 14.48	Operating and Moving Overhead Crane (7)	105	1,75
591		Waiting	15	0,25
592	14.48 - 14.49	Carrying and Moving Bales to Destination (7)	26	0,43333
593		Positioning and Releasing Bales (7)	34	0,56667
594	14.49 - 14.50	Operating and Moving Overhead Crane (7)	25	0,41667
595		Waiting	11	0,18333
596		Carrying and Moving Bales to Destination (7)	10	0,16667
597		Positioning and Releasing Bales (7)	14	0,23333
598	14.50 - 14.51	Operating and Moving Overhead Crane	44	0,73333
599		Waiting	16	0,26667
600	14.51 - 14.52	Carrying and Moving Bales to Destination	26	0,43333
601		Positioning and Releasing Bales	34	0,56667
602	14.52- 14.53	Operating and Moving Overhead Crane	48	0,8
603		Waiting	12	0,2
604	14.53- 14.54	Carrying and Moving Bales to Destination	20	0,33333
605		Positioning and Releasing Bales	40	0,66667
606	14.54 - 14.55	Operating and Moving Overhead Crane (7)	46	0,76667
607		Waiting	14	0,23333
608	14.55 - 14.56	Carrying and Moving Bales to Destination (7)	31	0,51667
609		Positioning and Releasing Bales (7)	29	0,48333

Table 4.6. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
610	14.56 - 14.57	Operating and Moving Overhead Crane (7)	47	0,78333
611		Waiting	13	0,21667
612	14.57 - 14.59	Carrying and Moving Bales to Destination (7)	46	0,76667
613		Positioning and Releasing Bales (7)	74	1,23333
614	14.59 - 15.00	Resting	60	1

Date : 24rd July 2019

Location : Pulp Warehouse 4 (Shift 07.00 – 15.00 WIB)

Table 4.7. Data Collection on 24th July 2019

No	Time	Date Activity	Duration	
			Seconds	Minutes
1	07.00 - 07.09	Briefing	540	9
2	07.09 - 07.12	Walking to Pulp Warehouse 4	180	3
3	07.12 - 07.13	Setup	60	1
4	07.13 - 07.14	Operating and Moving Overhead Crane	48	0,8
5		Waiting	12	0,2
6	07.14 - 07.16	Carrying and Moving Bales to Destination	82	1,36667
7		Positioning and Releasing Bales	38	0,63333
8	07.16 - 07.17	Operating and Moving Overhead Crane	41	0,68333
9		Waiting	19	0,31667
10	07.17 - 07.18	Carrying and Moving Bales to Destination	23	0,38333
11		Positioning and Releasing Bales	37	0,61667
12	07.18 - 07.19	Operating and Moving Overhead Crane	39	0,65
13		Waiting	21	0,35
14	07.19 - 07.21	Carrying and Moving Bales to Destination	26	0,43333
15		Positioning and Releasing Bales	94	1,56667
16	07.21 - 07.22	Operating and Moving Overhead Crane	43	0,71667
17		Waiting	17	0,28333
18	07.22 - 07.24	Carrying and Moving Bales to Destination	29	0,48333
19		Positioning and Releasing Bales	91	1,51667
20	07.24 - 08.05	Resting	2460	41
21	08.05 - 08.06	Setup	60	1
22	08.06 - 08.08	Carrying and Moving Bales to Destination	46	0,76667
23		Waiting	12	0,2
24		Releasing Bales to Terberg	62	1,03333
25	08.08 - 08.10	Carrying and Moving Bales to Destination	57	0,95
26		Waiting	14	0,23333
27		Releasing Bales to Terberg	49	0,81667
28	08.10 - 08.11	Operating and Moving Overhead Crane	42	0,7
29		Waiting	18	0,3
30	08.11 - 08.13	Carrying and Moving Bales to Destination	27	0,45
31		Positioning and Releasing Bales	93	1,55
32	08.13 - 08.15	Carrying and Moving Bales to Destination	47	0,78333
33		Waiting	15	0,25

Table 4.7. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
34		Releasing Bales to Terberg	58	0,96667
35	08.15 - 08.17	Carrying and Moving Bales to Destination	53	0,88333
36		Waiting	12	0,2
37		Releasing Bales to Terberg	55	0,91667
38	08.17 - 09.03	Resting	2760	46
39	09.03 - 09.04	Setup	60	1
40	09.04 - 09.06	Carrying and Moving Bales to Destination	56	0,93333
41		Waiting	13	0,21667
42		Releasing Bales to Terberg	51	0,85
43	09.06 - 09.08	Carrying and Moving Bales to Destination	51	0,85
44		Waiting	15	0,25
45		Releasing Bales to Terberg	54	0,9
46	09.08 - 09.09	Operating and Moving Overhead Crane	44	0,73333
47		Waiting	16	0,26667
48	09.09 - 09.11	Carrying and Moving Bales to Destination	24	0,4
49		Positioning and Releasing Bales	96	1,6
50	09.11 - 09.12	Operating and Moving Overhead Crane	45	0,75
51		Waiting	15	0,25
52	09.12 - 09.15	Carrying and Moving Bales to Destination	41	0,68333
53		Positioning and Releasing Bales	139	2,31667
54	09.15 - 09.18	Operating and Moving Overhead Crane	162	2,7
55		Waiting	18	0,3
56	09.18 - 09.19	Carrying and Moving Bales to Destination	11	0,18333
57		Positioning and Releasing Bales	49	0,81667
58	09.19 - 09.24	Operating and Moving Overhead Crane	274	4,56667
59		Waiting	26	0,43333
60	09.24 - 09.25	Carrying and Moving Bales to Destination	18	0,3
61		Positioning and Releasing Bales	42	0,7
62	09.25 - 09.26	Operating and Moving Overhead Crane	44	0,73333
63		Waiting	16	0,26667
64	09.26 - 09.28	Carrying and Moving Bales to Destination	25	0,41667
65		Positioning and Releasing Bales	95	1,58333
66	09.28 - 09.29	Operating and Moving Overhead Crane	44	0,73333
67		Waiting	16	0,26667
68	09.29 - 09.31	Carrying and Moving Bales to Destination	28	0,46667
69		Positioning and Releasing Bales	92	1,53333

Table 4.7. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
70	09.31 - 09.44	Resting	720	12
71	09.44 - 09.46	Operating and Moving Overhead Crane	106	1,76667
72		Waiting	14	0,23333
73	09.46 - 09.47	Carrying and Moving Bales to Destination	26	0,43333
74		Positioning and Releasing Bales	34	0,56667
75	09.47 - 09.49	Operating and Moving Overhead Crane	108	1,8
76		Waiting	12	0,2
77	09.49 - 09.51	Carrying and Moving Bales to Destination	20	0,33333
78		Positioning and Releasing Bales	100	1,66667
79	09.51 - 10.02	Waiting	660	11
80	10.02 - 10.05	Operating and Moving Overhead Crane	159	2,65
81		Waiting	21	0,35
82	10.05 - 10.07	Carrying and Moving Bales to Destination	28	0,46667
83		Positioning and Releasing Bales	92	1,53333
84	10.07 - 10.08	Operating and Moving Overhead Crane	47	0,78333
85		Waiting	13	0,21667
86	10.08 - 10.09	Carrying and Moving Bales to Destination	35	0,58333
87		Positioning and Releasing Bales	25	0,41667
88	10.08 - 10.15	Resting	420	7
89	10.15 - 10.16	Operating and Moving Overhead Crane	48	0,8
90		Waiting	12	0,2
91	10.16 - 10.17	Carrying and Moving Bales to Destination	18	0,3
92		Positioning and Releasing Bales	42	0,7
93	10.17 - 10.18	Operating and Moving Overhead Crane	46	0,76667
94		Waiting	14	0,23333
95	10.18 - 10.20	Carrying and Moving Bales to Destination	22	0,36667
96		Positioning and Releasing Bales	98	1,63333
97	10.20 - 10.21	Operating and Moving Overhead Crane	48	0,8
98		Waiting	12	0,2
99	10.21 - 10.23	Carrying and Moving Bales to Destination	27	0,45
100		Positioning and Releasing Bales	93	1,55
101	10.23 - 10.24	Operating and Moving Overhead Crane	47	0,78333
102		Waiting	13	0,21667
103	10.24 - 10.25	Carrying and Moving Bales to Destination	21	0,35
104		Positioning and Releasing Bales	39	0,65
105	10.25 - 10.26	Operating and Moving Overhead Crane	44	0,73333

Table 4.7. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
106		Waiting	16	0,26667
107	10.26 - 10.27	Carrying and Moving Bales to Destination	24	0,4
108		Positioning and Releasing Bales	36	0,6
109	10.27 - 10.28	Operating and Moving Overhead Crane	46	0,76667
110		Waiting	14	0,23333
111	10.28 - 10.30	Carrying and Moving Bales to Destination	20	0,33333
112		Positioning and Releasing Bales	100	1,66667
113	10.30 - 10.31	Operating and Moving Overhead Crane	45	0,75
114		Waiting	15	0,25
115	10.31 - 10.34	Carrying and Moving Bales to Destination	15	0,25
116		Positioning and Releasing Bales	165	2,75
117	10.34 - 10.35	Operating and Moving Overhead Crane	46	0,76667
118		Waiting	14	0,23333
119	10.35 - 10.37	Carrying and Moving Bales to Destination	18	0,3
120		Positioning and Releasing Bales	102	1,7
121	10.37 - 10.39	Operating and Moving Overhead Crane	108	1,8
122		Waiting	12	0,2
123	10.39 - 10.41	Carrying and Moving Bales to Destination	33	0,55
124		Positioning and Releasing Bales	87	1,45
125	10.41 - 10.42	Operating and Moving Overhead Crane	46	0,76667
126		Waiting	14	0,23333
127	10.42 - 10.43	Carrying and Moving Bales to Destination	33	0,55
128		Positioning and Releasing Bales	27	0,45
129	10.43 - 10.44	Operating and Moving Overhead Crane	50	0,83333
130		Waiting	10	0,16667
131	10.44 - 10.45	Carrying and Moving Bales to Destination	17	0,28333
132		Positioning and Releasing Bales	43	0,71667
133	10.45 - 10.47	Carrying and Moving Bales to Destination	10	0,16667
134		Positioning and Releasing Bales	110	1,83333
135	10.47 - 10.49	Operating and Moving Overhead Crane	105	1,75
136		Waiting	15	0,25
137	10.49 - 10.50	Carrying and Moving Bales to Destination	8	0,13333
138		Positioning and Releasing Bales	52	0,86667
139	10.50 - 10.52	Operating and Moving Overhead Crane	106	1,76667
140		Waiting	14	0,23333
141	10.52 - 10.54	Carrying and Moving Bales to Destination	37	0,61667

Table 4.7. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
142		Positioning and Releasing Bales	83	1,38333
143	10.54 - 10.56	Operating and Moving Overhead Crane	88	1,46667
144		Waiting	32	0,53333
145	10.56 - 10.57	Carrying and Moving Bales to Destination	12	0,2
146		Positioning and Releasing Bales	48	0,8
147	10.57 - 10.59	Resting	120	2
148	10.59 - 11.00	Operating and Moving Overhead Crane	45	0,75
149		Waiting	15	0,25
150	11.00 - 11.01	Carrying and Moving Bales to Destination	23	0,38333
151		Positioning and Releasing Bales	37	0,61667
152	11.01 - 11.03	Operating and Moving Overhead Crane	102	1,7
153		Waiting	18	0,3
154	11.03 - 11.04	Carrying and Moving Bales to Destination	34	0,56667
155		Positioning and Releasing Bales	26	0,43333
156	11.04 - 11.06	Operating and Moving Overhead Crane	105	1,75
157		Waiting	15	0,25
158	11.06 - 11.07	Carrying and Moving Bales to Destination	11	0,18333
159		Positioning and Releasing Bales	49	0,81667
160	11.07 - 11.17	Resting	540	9
161	11.17 - 11.19	Operating and Moving Overhead Crane	102	1,7
162		Waiting	18	0,3
163	11.19 - 11.20	Carrying and Moving Bales to Destination	15	0,25
164		Positioning and Releasing Bales	45	0,75
165	11.20 - 11.24	Operating and Moving Overhead Crane	223	3,71667
166		Waiting	17	0,28333
167	11.24 - 11.25	Carrying and Moving Bales to Destination	19	0,31667
168		Positioning and Releasing Bales	41	0,68333
169	11.25 - 11.26	Operating and Moving Overhead Crane	48	0,8
170		Waiting	12	0,2
171	11.26 - 11.27	Carrying and Moving Bales to Destination	14	0,23333
172		Positioning and Releasing Bales	46	0,76667
173	11.27 - 11.33	Waiting	360	6
174	11.33 - 11.35	Operating and Moving Overhead Crane	105	1,75
175		Waiting	15	0,25
176	11.35 - 11.36	Carrying and Moving Bales to Destination	9	0,15
177		Positioning and Releasing Bales	51	0,85

Table 4.7. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
178	11.36 - 11.37	Waiting	60	1
179	11.37 - 11.38	Operating and Moving Overhead Crane	41	0,68333
180		Waiting	19	0,31667
181	11.38 - 11.40	Carrying and Moving Bales to Destination	17	0,28333
182		Positioning and Releasing Bales	103	1,71667
183	11.40 - 13.26	Resting	6360	106
184	13.26 - 13.29	Carrying and Moving Bales to Destination	83	1,38333
185		Waiting	31	0,51667
186		Releasing Bales to Terberg	66	1,1
187	13.29 - 13.32	Carrying and Moving Bales to Destination	103	1,71667
188		Waiting	20	0,33333
189		Releasing Bales to Terberg	57	0,95
190	13.32 - 13.34	Carrying and Moving Bales to Destination	41	0,68333
191		Waiting	31	0,51667
192		Releasing Bales to Terberg	48	0,8
193	13.34 - 13.37	Carrying and Moving Bales to Destination	91	1,51667
194		Waiting	17	0,28333
195		Releasing Bales to Terberg	72	1,2
196	13.37 - 13.43	Resting	360	6
197	11.43 - 11.49	Carrying and Moving Bales to Destination	88	1,46667
198		Positioning and Releasing Bales	272	4,53333
199	13.49 - 13.52	Carrying and Moving Bales to Destination	86	1,43333
200		Waiting	22	0,36667
201		Releasing Bales to Terberg	72	1,2
202	13.52 - 13.55	Carrying and Moving Bales to Destination	86	1,43333
203		Waiting	26	0,43333
204		Releasing Bales to Terberg	68	1,13333
205	13.55 - 14.05	Resting	600	10
206	14.05 - 14.07	Operating and Moving Overhead Crane	102	1,7
207		Waiting	18	0,3
208	14.07 - 14.08	Carrying and Moving Bales to Destination	20	0,33333
209		Positioning and Releasing Bales	40	0,66667
210	14.08 - 14.15	Resting	420	7
211	14.15 - 14.16	Operating and Moving Overhead Crane	46	0,76667
212		Waiting	14	0,23333
213	14.16 - 14.18	Carrying and Moving Bales to Destination	24	0,4

Table 4.7. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
214		Positioning and Releasing Bales	96	1,6
215	14.18 - 14.44	Resting	1560	26
216	14.44 - 14.45	Operating and Moving Overhead Crane	44	0,73333
217		Waiting	16	0,26667
218	14.44 - 14.47	Carrying and Moving Bales to Destination	33	0,55
219		Positioning and Releasing Bales	147	2,45
220	14.47 - 14.49	Operating and Moving Overhead Crane	98	1,63333
221		Waiting	22	0,36667
222	14.49 - 14.51	Carrying and Moving Bales to Destination	23	0,38333
223		Positioning and Releasing Bales	97	1,61667
224	14.51 - 15.00	Resting	540	9

Date : 25th July 2019

Location : Pulp Warehouse 3 (Shift 07.00 – 15.00 WIB)

Table 4.8. Data Collection on 25th July 2019

No	Time	Date Activity	Duration	
			Seconds	Minutes
1	07.00 - 07.16	Briefing	960	16
2	07.16 - 07.18	Walking to Pulp Warehouse 3	120	2
3	07.18 - 07.20	Setup	120	2
4	07.20 - 07.21	Operating and Moving Overhead Crane	47	0,78333
5		Waiting	13	0,21667
6	07.21 - 07.23	Carrying and Moving Bales to Destination	40	0,66667
7		Positioning and Releasing Bales	80	1,33333
8	07.23 - 07.24	Operating and Moving Overhead Crane	51	0,85
9		Waiting	9	0,15
10	07.24 - 07.25	Carrying and Moving Bales to Destination	33	0,55
11		Positioning and Releasing Bales	27	0,45
12	07.25 - 07.26	Operating and Moving Overhead Crane	50	0,83333
13		Waiting	10	0,16667
14	07.26 - 07.28	Carrying and Moving Bales to Destination	41	0,68333
15		Positioning and Releasing Bales	79	1,31667
16	07.28 - 07.29	Waiting	60	1
17	07.29 - 07.30	Operating and Moving Overhead Crane	45	0,75
18		Waiting	15	0,25
19	07.30 - 07.31	Carrying and Moving Bales to Destination	34	0,56667
20		Positioning and Releasing Bales	26	0,43333
21	07.31 - 07.36	Waiting	300	5
22	07.36 - 07.38	Carrying and Moving Bales to Destination	81	1,35
23		Waiting	8	0,13333
24		Releasing Bales to Terberg	31	0,51667
25	07.38 - 07.40	Carrying and Moving Bales to Destination	64	1,06667
26		Waiting	15	0,25
27		Releasing Bales to Terberg	41	0,68333
28	07.40 - 07.42	Operating and Moving Overhead Crane	110	1,83333
29		Waiting	10	0,16667
30	07.42 - 07.43	Carrying and Moving Bales to Destination	32	0,53333
31		Positioning and Releasing Bales	28	0,46667
32	07.43 - 07.45	Operating and Moving Overhead Crane	107	1,78333
33		Waiting	13	0,21667

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
34	07.45 - 07.46	Carrying and Moving Bales to Destination	23	0,38333
35		Positioning and Releasing Bales	37	0,61667
36	07.46 - 07.47	Operating and Moving Overhead Crane	46	0,76667
37		Waiting	14	0,23333
38	07.47 - 07.50	Carrying and Moving Bales to Destination	44	0,73333
39		Positioning and Releasing Bales	136	2,26667
40	07.50 - 07.51	Operating and Moving Overhead Crane	38	0,63333
41		Waiting	22	0,36667
42	07.51 - 07.52	Carrying and Moving Bales to Destination	15	0,25
43		Positioning and Releasing Bales	45	0,75
44	07.52 - 07.54	Operating and Moving Overhead Crane	105	1,75
45		Waiting	15	0,25
46	07.54 - 07.56	Carrying and Moving Bales to Destination	25	0,41667
47		Positioning and Releasing Bales	95	1,58333
48	07.56 - 07.59	Waiting	180	3
49	07.59 - 08.01	Carrying and Moving Bales to Destination	79	1,31667
50		Waiting	16	0,26667
51		Releasing Bales to Terberg	25	0,41667
52	08.01 - 08.04	Carrying and Moving Bales to Destination	132	2,2
53		Waiting	12	0,2
54		Releasing Bales to Terberg	36	0,6
55	08.04 - 08.05	Operating and Moving Overhead Crane	49	0,81667
56		Waiting	11	0,18333
57	08.05 - 08.07	Carrying and Moving Bales to Destination	32	0,53333
58		Positioning and Releasing Bales	88	1,46667
59	08.07 - 08.08	Operating and Moving Overhead Crane	48	0,8
60		Waiting	12	0,2
61	08.08 - 08.09	Carrying and Moving Bales to Destination	26	0,43333
62		Positioning and Releasing Bales	34	0,56667
63	08.09 - 08.10	Operating and Moving Overhead Crane	46	0,76667
64		Waiting	14	0,23333
65	08.10 - 08.12	Carrying and Moving Bales to Destination	30	0,5
66		Positioning and Releasing Bales	90	1,5
67	08.12 - 08.13	Carrying and Moving Bales to Destination	23	0,38333
68		Positioning and Releasing Bales	37	0,61667
69	08.13 - 08.15	Carrying and Moving Bales to Destination	42	0,7

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
70		Positioning and Releasing Bales	78	1,3
71	08.15 - 08.16	Carrying and Moving Bales to Destination	21	0,35
72		Positioning and Releasing Bales	39	0,65
73	08.16 - 08.18	Carrying and Moving Bales to Destination	37	0,61667
74		Positioning and Releasing Bales	83	1,38333
75	08.18 - 08.24	Resting	360	6
76	08.24 - 08.25	Operating and Moving Overhead Crane	45	0,75
77		Waiting	15	0,25
78	08.25 - 08.27	Carrying and Moving Bales to Destination	42	0,7
79		Positioning and Releasing Bales	78	1,3
80	08.27 - 08.28	Operating and Moving Overhead Crane	47	0,78333
81		Waiting	13	0,21667
82	08.28 - 08.30	Carrying and Moving Bales to Destination	24	0,4
83		Positioning and Releasing Bales	96	1,6
84	08.30 - 08.42	Resting	720	12
85	08.42 - 08.43	Operating and Moving Overhead Crane	50	0,83333
86		Waiting	10	0,16667
87	08.43 - 08.45	Carrying and Moving Bales to Destination	28	0,46667
88		Positioning and Releasing Bales	92	1,53333
89	08.45 - 08.46	Operating and Moving Overhead Crane	46	0,76667
90		Waiting	14	0,23333
91	08.46 - 08.48	Carrying and Moving Bales to Destination	30	0,5
92		Positioning and Releasing Bales	90	1,5
93	08.48 - 08.49	Operating and Moving Overhead Crane	48	0,8
94		Waiting	12	0,2
95	08.49 - 08.50	Carrying and Moving Bales to Destination	27	0,45
96		Positioning and Releasing Bales	33	0,55
97	08.50 - 08.51	Operating and Moving Overhead Crane	47	0,78333
98		Waiting	13	0,21667
99	08.51 - 08.52	Carrying and Moving Bales to Destination	12	0,2
100		Positioning and Releasing Bales	48	0,8
101	08.52 - 08.53	Operating and Moving Overhead Crane	48	0,8
102		Waiting	12	0,2
103	08.53 - 08.54	Carrying and Moving Bales to Destination	15	0,25

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
104		Positioning and Releasing Bales	45	0,75
105	08.54 - 08.55	Operating and Moving Overhead Crane	46	0,76667
106		Waiting	14	0,23333
107	08.55 - 08.56	Carrying and Moving Bales to Destination	11	0,18333
108		Positioning and Releasing Bales	49	0,81667
109	08.56 - 08.58	Operating and Moving Overhead Crane	106	1,76667
110		Waiting	14	0,23333
111	08.58 - 08.59	Carrying and Moving Bales to Destination	20	0,33333
112		Positioning and Releasing Bales	40	0,66667
113	08.59 - 09.00	Waiting	60	1
114	09.00 - 09.01	Operating and Moving Overhead Crane	47	0,78333
115		Waiting	13	0,21667
116	09.01 - 09.03	Carrying and Moving Bales to Destination	16	0,26667
117		Positioning and Releasing Bales	104	1,73333
118	09.03 - 09.04	Operating and Moving Overhead Crane	45	0,75
119		Waiting	15	0,25
120	09.04 - 09.06	Carrying and Moving Bales to Destination	12	0,2
121		Positioning and Releasing Bales	108	1,8
122	09.06 - 09.07	Waiting	60	1
123	09.07 - 09.08	Operating and Moving Overhead Crane	44	0,73333
124		Waiting	16	0,26667
125	09.08 - 09.10	Carrying and Moving Bales to Destination	19	0,31667
126		Positioning and Releasing Bales	101	1,68333
127	09.10 - 09.11	Operating and Moving Overhead Crane	43	0,71667
128		Waiting	17	0,28333
129	09.11 - 09.13	Carrying and Moving Bales to Destination	25	0,41667
130		Positioning and Releasing Bales	95	1,58333
131	09.13 - 09.14	Operating and Moving Overhead Crane	49	0,81667
132		Waiting	11	0,18333
133	09.14- 09.16	Carrying and Moving Bales to Destination	29	0,48333
134		Positioning and Releasing Bales	91	1,51667
135	09.16 - 09.17	Operating and Moving Overhead Crane	47	0,78333
136		Waiting	13	0,21667
137	09.17 - 09.19	Carrying and Moving Bales to Destination	27	0,45
138		Positioning and Releasing Bales	93	1,55
139	09.19 - 09.20	Operating and Moving Overhead Crane	46	0,76667

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
140		Waiting	14	0,23333
141	09.20 - 09.21	Carrying and Moving Bales to Destination	31	0,51667
142		Positioning and Releasing Bales	29	0,48333
143	09.21 - 09.22	Operating and Moving Overhead Crane	49	0,81667
144		Waiting	11	0,18333
145	09.22 - 09.23	Carrying and Moving Bales to Destination	23	0,38333
146		Positioning and Releasing Bales	37	0,61667
147	09.23 - 09.25	Operating and Moving Overhead Crane	106	1,76667
148		Waiting	14	0,23333
149	09.25 - 09.27	Carrying and Moving Bales to Destination	27	0,45
150		Positioning and Releasing Bales	93	1,55
151	09.27 - 09.28	Operating and Moving Overhead Crane	50	0,83333
152		Waiting	10	0,16667
153	09.28 - 09.30	Carrying and Moving Bales to Destination	25	0,41667
154		Positioning and Releasing Bales	95	1,58333
155	09.30 - 09.44	Resting	840	14
156	09.44 - 09.45	Operating and Moving Overhead Crane	44	0,73333
157		Waiting	16	0,26667
158	09.45 - 09.47	Carrying and Moving Bales to Destination	28	0,46667
159		Positioning and Releasing Bales	92	1,53333
160	09.47 - 09.48	Operating and Moving Overhead Crane	47	0,78333
161		Waiting	13	0,21667
162	09.48 - 09.50	Carrying and Moving Bales to Destination	31	0,51667
163		Positioning and Releasing Bales	89	1,48333
164	09.50 - 09.58	Resting	480	8
165	09.58 - 10.00	Operating and Moving Overhead Crane	105	1,75
166		Waiting	15	0,25
167	10.00 - 10.01	Carrying and Moving Bales to Destination	36	0,6
168		Positioning and Releasing Bales	24	0,4
169	10.01 - 10.02	Operating and Moving Overhead Crane	44	0,73333
170		Waiting	16	0,26667
171	10.02 - 10.04	Carrying and Moving Bales to Destination	29	0,48333
172		Positioning and Releasing Bales	91	1,51667
173	10.04 - 10.05	Carrying and Moving Bales to Destination	21	0,35
174		Positioning and Releasing Bales	39	0,65
175	10.05 - 10.06	Carrying and Moving Bales to Destination	17	0,28333

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
176		Positioning and Releasing Bales	43	0,71667
177	10.06 - 10.07	Carrying and Moving Bales to Destination	18	0,3
178		Positioning and Releasing Bales	42	0,7
179	10.07 - 10.08	Carrying and Moving Bales to Destination	15	0,25
180		Positioning and Releasing Bales	45	0,75
181	10.08 - 10.15	Resting	420	7
182	10.15 - 10.17	Operating and Moving Overhead Crane	104	1,73333
183		Waiting	16	0,26667
184	10.17 - 10.19	Carrying and Moving Bales to Destination	30	0,5
185		Positioning and Releasing Bales	90	1,5
186	10.19 - 10.22	Carrying and Moving Bales to Destination	110	1,83333
187		Waiting	16	0,26667
188		Releasing Bales to Terberg	54	0,9
189	10.22 - 10.24	Carrying and Moving Bales to Destination	64	1,06667
190		Waiting	12	0,2
191		Releasing Bales to Terberg	44	0,73333
192	10.24 - 10.26	Carrying and Moving Bales to Destination	59	0,98333
193		Waiting	14	0,23333
194		Releasing Bales to Terberg	47	0,78333
195	10.26 - 10.29	Carrying and Moving Bales to Destination	92	1,53333
196		Waiting	10	0,16667
197		Releasing Bales to Terberg	78	1,3
198	10.29 - 10.30	Operating and Moving Overhead Crane	47	0,78333
199		Waiting	13	0,21667
200	10.30 - 10.32	Carrying and Moving Bales to Destination	36	0,6
201		Positioning and Releasing Bales	84	1,4
202	10.32 - 10.33	Operating and Moving Overhead Crane	45	0,75
203		Waiting	15	0,25
204	10.33 - 10.35	Carrying and Moving Bales to Destination	33	0,55
205		Positioning and Releasing Bales	87	1,45
206	10.35 - 10.36	Operating and Moving Overhead Crane	47	0,78333
207		Waiting	13	0,21667
208	10.36 - 10.37	Carrying and Moving Bales to Destination	28	0,46667
209		Positioning and Releasing Bales	32	0,53333
210	10.37 - 10.40	Carrying and Moving Bales to Destination	101	1,68333
211		Waiting	14	0,23333

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
212		Releasing Bales to Terberg	65	1,08333
213	10.40 - 10.42	Carrying and Moving Bales to Destination	65	1,08333
214		Waiting	15	0,25
215		Releasing Bales to Terberg	40	0,66667
216	10.42 - 10.48	Waiting	360	6
217	10.48 - 10.49	Operating and Moving Overhead Crane	40	0,66667
218		Waiting	20	0,33333
219	10.49 - 10.51	Carrying and Moving Bales to Destination	32	0,53333
220		Positioning and Releasing Bales	88	1,46667
221	10.51 - 10.53	Operating and Moving Overhead Crane	82	1,36667
222		Waiting	38	0,63333
223	10.53 - 10.56	Carrying and Moving Bales to Destination	26	0,43333
224		Positioning and Releasing Bales	154	2,56667
225	10.56 - 10.57	Operating and Moving Overhead Crane	42	0,7
226		Waiting	18	0,3
227	10.57 - 10.58	Carrying and Moving Bales to Destination	19	0,31667
228		Releasing Bales to Terberg	41	0,68333
229	10.58 - 10.59	Operating and Moving Overhead Crane	45	0,75
230		Waiting	15	0,25
231	10.59 - 11.01	Carrying and Moving Bales to Destination	37	0,61667
232		Releasing Bales to Terberg	83	1,38333
233	11.01 - 11.07	Waiting	360	6
234	11.07 - 11.08	Operating and Moving Overhead Crane	47	0,78333
235		Waiting	13	0,21667
236	11.08 - 11.10	Carrying and Moving Bales to Destination	31	0,51667
237		Positioning and Releasing Bales	89	1,48333
238	11.10 - 11.11	Operating and Moving Overhead Crane	42	0,7
239		Waiting	18	0,3
240	11.11 - 11.13	Carrying and Moving Bales to Destination	40	0,66667
241		Positioning and Releasing Bales	80	1,33333
242	11.13 - 11.14	Waiting	60	1
243	11.14 - 11.16	Operating and Moving Overhead Crane	98	1,63333
244		Waiting	22	0,36667
245	11.16 - 11.18	Carrying and Moving Bales to Destination	37	0,61667
246		Releasing Bales to Terberg	83	1,38333
247	11.18 - 11.19	Operating and Moving Overhead Crane	38	0,63333

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
248		Waiting	22	0,36667
249	11.19 - 11.21	Carrying and Moving Bales to Destination	39	0,65
250		Releasing Bales to Terberg	81	1,35
251	11.21 - 11.22	Operating and Moving Overhead Crane	47	0,78333
252		Waiting	13	0,21667
253	11.22 - 11.24	Carrying and Moving Bales to Destination	38	0,63333
254		Positioning and Releasing Bales	82	1,36667
255	11.24 - 11.26	Operating and Moving Overhead Crane	104	1,73333
256		Waiting	16	0,26667
257	11.26 - 11.28	Carrying and Moving Bales to Destination	37	0,61667
258		Positioning and Releasing Bales	83	1,38333
259	11.28 - 11.29	Operating and Moving Overhead Crane	46	0,76667
260		Waiting	14	0,23333
261	11.29 - 11.31	Carrying and Moving Bales to Destination	36	0,6
262		Positioning and Releasing Bales	84	1,4
263	11.31 - 11.32	Operating and Moving Overhead Crane	39	0,65
264		Waiting	21	0,35
265	11.32 - 11.34	Carrying and Moving Bales to Destination	38	0,63333
266		Releasing Bales to Terberg	82	1,36667
267	11.34 - 11.35	Operating and Moving Overhead Crane	39	0,65
268		Waiting	21	0,35
269	11.35 - 11.37	Carrying and Moving Bales to Destination	46	0,76667
270		Releasing Bales to Terberg	74	1,23333
271	11.37 - 11.44	Waiting	420	7
272	11.44 - 11.45	Operating and Moving Overhead Crane	44	0,73333
273		Waiting	16	0,26667
274	11.45 - 11.46	Carrying and Moving Bales to Destination	12	0,2
275		Releasing Bales to Terberg	48	0,8
276	11.46 - 11.47	Operating and Moving Overhead Crane	45	0,75
277		Waiting	15	0,25
278	11.47 - 11.49	Carrying and Moving Bales to Destination	33	0,55
279		Releasing Bales to Terberg	87	1,45
280	11.49 -11.50	Operating and Moving Overhead Crane	45	0,75
281		Waiting	15	0,25
282	11.50 - 11.52	Carrying and Moving Bales to Destination	37	0,61667
283		Releasing Bales to Terberg	83	1,38333

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
284	11.52 - 11.53	Operating and Moving Overhead Crane	42	0,7
285		Waiting	18	0,3
286	11.53 - 11.55	Carrying and Moving Bales to Destination	35	0,58333
287		Releasing Bales to Terberg	85	1,41667
288	11.55 - 11.56	Operating and Moving Overhead Crane	47	0,78333
289		Waiting	13	0,21667
290	11.56 - 11.58	Carrying and Moving Bales to Destination	27	0,45
291		Positioning and Releasing Bales	93	1,55
292	11.58 - 11.59	Operating and Moving Overhead Crane	44	0,73333
293		Waiting	16	0,26667
294	11.59 - 12.01	Carrying and Moving Bales to Destination	41	0,68333
295		Releasing Bales to Terberg	79	1,31667
296	12.01 - 12.03	Operating and Moving Overhead Crane	99	1,65
297		Waiting	21	0,35
298	12.03 - 12.05	Carrying and Moving Bales to Destination	38	0,63333
299		Releasing Bales to Terberg	82	1,36667
300	12.05 - 12.06	Operating and Moving Overhead Crane	45	0,75
301		Waiting	15	0,25
302	12.06 - 12.08	Carrying and Moving Bales to Destination	36	0,6
303		Positioning and Releasing Bales	84	1,4
304	12.08 - 12.10	Operating and Moving Overhead Crane	106	1,76667
305		Waiting	14	0,23333
306	12.10 - 12.12	Carrying and Moving Bales to Destination	32	0,53333
307		Releasing Bales to Terberg	88	1,46667
308	12.12 - 12.14	Operating and Moving Overhead Crane	102	1,7
309		Waiting	18	0,3
310	12.14 - 12.17	Carrying and Moving Bales to Destination	53	0,88333
311		Releasing Bales to Terberg	127	2,11667
312	12.17 - 12.35	Resting	1080	18
313	12.35 - 12.36	Operating and Moving Overhead Crane	46	0,76667
314		Waiting	14	0,23333
315	12.36 - 12.38	Carrying and Moving Bales to Destination	39	0,65
316		Positioning and Releasing Bales	81	1,35
317	12.38 - 12.39	Operating and Moving Overhead Crane	47	0,78333
318		Waiting	13	0,21667
319	12.39 - 12.42	Carrying and Moving Bales to Destination	46	0,76667

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
320		Positioning and Releasing Bales	134	2,23333
321	12.42 - 12.43	Operating and Moving Overhead Crane	45	0,75
322		Waiting	15	0,25
323	12.43 - 12.46	Carrying and Moving Bales to Destination	37	0,61667
324		Releasing Bales to Terberg	143	2,38333
325	12.46 - 12.49	Carrying and Moving Bales to Destination	120	2
326		Waiting	20	0,33333
327		Releasing Bales to Terberg	40	0,66667
328	12.49 - 12.51	Operating and Moving Overhead Crane	107	1,78333
329		Waiting	13	0,21667
330	12.51 - 12.53	Carrying and Moving Bales to Destination	38	0,63333
331		Releasing Bales to Terberg	82	1,36667
332	12.53 - 12.54	Carrying and Moving Bales to Destination	19	0,31667
333		Positioning and Releasing Bales	41	0,68333
334	12.54 - 12.55	Carrying and Moving Bales to Destination	15	0,25
335		Positioning and Releasing Bales	45	0,75
336	12.55 - 12.57	Carrying and Moving Bales to Destination	22	0,36667
337		Positioning and Releasing Bales	98	1,63333
338	12.57 - 12.58	Carrying and Moving Bales to Destination	21	0,35
339		Positioning and Releasing Bales	39	0,65
340	12.58 - 13.00	Carrying and Moving Bales to Destination	26	0,43333
341		Positioning and Releasing Bales	94	1,56667
342	13.00 - 13.14	Resting	840	14
343	13.14 - 13.15	Carrying and Moving Bales to Destination	15	0,25
344		Positioning and Releasing Bales	45	0,75
345	13.15 - 13.18	Carrying and Moving Bales to Destination	27	0,45
346		Positioning and Releasing Bales	153	2,55
347	13.18 - 13.20	Carrying and Moving Bales to Destination	70	1,16667
348		Waiting	17	0,28333
349		Releasing Bales to Terberg	33	0,55
350	13.20 - 13.22	Carrying and Moving Bales to Destination	64	1,06667
351		Waiting	14	0,23333
352		Releasing Bales to Terberg	42	0,7
353	13.22 - 13.23	Operating and Moving Overhead Crane	43	0,71667
354		Waiting	17	0,28333
355	13.23 - 13.25	Carrying and Moving Bales to Destination	33	0,55

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
356		Positioning and Releasing Bales	87	1,45
357	13.25 - 13.32	Waiting	420	7
358	13.32 - 13.34	Setup	120	2
359	13.34 - 13.36	Carrying and Moving Bales to Destination	58	0,96667
360		Waiting	14	0,23333
361		Releasing Bales to Terberg	48	0,8
362	13.36 - 13.38	Carrying and Moving Bales to Destination	43	0,71667
363		Waiting	17	0,28333
364		Releasing Bales to Terberg	60	1
365	13.38 - 13.40	Carrying and Moving Bales to Destination	48	0,8
366		Waiting	20	0,33333
367		Releasing Bales to Terberg	52	0,86667
368	13.40 - 13.43	Carrying and Moving Bales to Destination	100	1,66667
369		Waiting	21	0,35
370		Releasing Bales to Terberg	59	0,98333
371	13.43 - 13.45	Operating and Moving Overhead Crane	106	1,76667
372		Waiting	14	0,23333
373	13.45 - 13.47	Carrying and Moving Bales to Destination	34	0,56667
374		Positioning and Releasing Bales	86	1,43333
375	13.47 - 13.48	Operating and Moving Overhead Crane	45	0,75
376		Waiting	15	0,25
377	13.48 - 13.50	Carrying and Moving Bales to Destination	39	0,65
378		Positioning and Releasing Bales	81	1,35
379	13.50 - 13.53	Carrying and Moving Bales to Destination	115	1,91667
380		Waiting	21	0,35
381		Releasing Bales to Terberg	44	0,73333
382	13.53 - 13.55	Carrying and Moving Bales to Destination	50	0,83333
383		Waiting	16	0,26667
384		Releasing Bales to Terberg	54	0,9
385	13.55 - 13.57	Carrying and Moving Bales to Destination	43	0,71667
386		Positioning and Releasing Bales	77	1,28333
387	13.57 - 13.59	Carrying and Moving Bales to Destination	48	0,8
388		Positioning and Releasing Bales	72	1,2
389	13.59 - 14.00	Carrying and Moving Bales to Destination	20	0,33333
390		Positioning and Releasing Bales	40	0,66667
391	14.00 - 14.14	Resting	840	14

Table 4.8. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
392	14.14 - 14.15	Setup	60	1
393	14.15 - 14.16	Operating and Moving Overhead Crane	48	0,8
394		Waiting	12	0,2
395	14.16 - 14.18	Carrying and Moving Bales to Destination	30	0,5
396		Positioning and Releasing Bales	90	1,5
397	14.18 - 14.19	Operating and Moving Overhead Crane	45	0,75
398		Waiting	15	0,25
399	14.19 - 14.21	Carrying and Moving Bales to Destination	33	0,55
400		Positioning and Releasing Bales	87	1,45
401	14.21 - 14.22	Operating and Moving Overhead Crane	46	0,76667
402		Waiting	14	0,23333
403	14.22 - 14.24	Carrying and Moving Bales to Destination	37	0,61667
404		Positioning and Releasing Bales	83	1,38333
405	14.24 - 14.26	Operating and Moving Overhead Crane	91	1,51667
406		Waiting	29	0,48333
407	14.26 - 14.28	Carrying and Moving Bales to Destination	40	0,66667
408		Positioning and Releasing Bales	80	1,33333
409	14.28 - 14.30	Operating and Moving Overhead Crane	102	1,7
410		Waiting	18	0,3
411	14.30 - 14.32	Carrying and Moving Bales to Destination	34	0,56667
412		Positioning and Releasing Bales	86	1,43333
413	14.32 - 14.34	Operating and Moving Overhead Crane	90	1,5
414		Waiting	30	0,5
415	14.34 - 14.36	Carrying and Moving Bales to Destination	35	0,58333
416		Positioning and Releasing Bales	85	1,41667

Date : 29th July 2019

Location : Pulp Warehouse 1 (Shift 07.00 – 15.00 WIB)

Table 4.9. Data Collection on 29th July 2019

No	Time	Date Activity	Duration	
			Seconds	Minutes
1	07.00 - 07.16	Briefing	960	16
2	07.16 - 07.17	Setup	60	1
3	07.17 - 07.18	Operating and Moving Overhead Crane	47	0,78333
4		Waiting	13	0,21667
5	07.18 - 07.19	Carrying and Moving Bales to Destination	23	0,38333
6		Positioning and Releasing Bales	37	0,61667
7	07.19 - 07.20	Operating and Moving Overhead Crane	43	0,71667
8		Waiting	17	0,28333
9	07.20 - 07.22	Carrying and Moving Bales to Destination	41	0,68333
10		Positioning and Releasing Bales	79	1,31667
11	07.22 - 07.24	Operating and Moving Overhead Crane	105	1,75
12		Waiting	15	0,25
13	07.24 - 07.25	Carrying and Moving Bales to Destination	33	0,55
14		Positioning and Releasing Bales	27	0,45
15	07.25 - 07.27	Operating and Moving Overhead Crane	120	2
16	07.27 - 07.42	Resting	900	15
17	07.42 - 07.43	Setup	60	1
18	07.43 - 07.45	Operating and Moving Overhead Crane	99	1,65
19		Waiting	21	0,35
20	07.45 - 07.46	Carrying and Moving Bales to Destination	16	0,26667
21		Positioning and Releasing Bales	44	0,73333
22	07.46 - 07.47	Operating and Moving Overhead Crane	43	0,71667
23		Waiting	17	0,28333
24	07.47 - 07.49	Carrying and Moving Bales to Destination	27	0,45
25		Positioning and Releasing Bales	93	1,55
26	07.49 - 07.54	Waiting	300	5
27	07.54 - 07.59	Operating and Moving Overhead Crane	250	4,16667
28		Waiting	50	0,83333
29	07.59 - 08.02	Carrying and Moving Bales to Destination	42	0,7
30		Positioning and Releasing Bales	138	2,3
31	08.02 - 08.05	Waiting	180	3

Table 4.9. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
32	08.05 - 08.07	Operating and Moving Overhead Crane	106	1,76667
33		Waiting	14	0,23333
34	08.07 - 08.09	Carrying and Moving Bales to Destination	41	0,68333
35		Positioning and Releasing Bales	79	1,31667
36	08.09 - 08.16	Waiting	420	7
37	08.16 - 08.17	Operating and Moving Overhead Crane	42	0,7
38		Waiting	18	0,3
39	08.17 - 08.19	Carrying and Moving Bales to Destination	32	0,53333
40		Positioning and Releasing Bales	88	1,46667
41	08.19 - 08.34	Waiting	900	15
42	08.34 - 08.37	Operating and Moving Overhead Crane	152	2,53333
43		Waiting	28	0,46667
44	08.37 - 08.39	Carrying and Moving Bales to Destination	40	0,66667
45		Positioning and Releasing Bales	80	1,33333
46	08.39 - 08.43	Waiting	240	4
47	08.43 - 08.44	Operating and Moving Overhead Crane	46	0,76667
48		Waiting	14	0,23333
49	08.44 - 08.46	Carrying and Moving Bales to Destination	45	0,75
50		Positioning and Releasing Bales	75	1,25
51	08.46 - 08.54	Waiting	480	8
52	08.54 - 08.55	Operating and Moving Overhead Crane	45	0,75
53		Waiting	15	0,25
54	08.55 - 08.57	Carrying and Moving Bales to Destination	49	0,81667
55		Positioning and Releasing Bales	71	1,18333
56	08.57 - 09.11	Waiting	840	14
57	09.11 - 09.12	Operating and Moving Overhead Crane	43	0,71667
58		Waiting	17	0,28333
59	09.12 - 09.15	Carrying and Moving Bales to Destination	51	0,85
60		Positioning and Releasing Bales	129	2,15
61	09.15 - 09.25	Waiting	600	10
62	09.25 - 09.27	Operating and Moving Overhead Crane	105	1,75
63		Waiting	15	0,25
64	09.27 - 09.29	Carrying and Moving Bales to Destination	39	0,65
65		Positioning and Releasing Bales	81	1,35

Table 4.9. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
66	09.29 - 09.38	Waiting	540	9
67	09.38 - 09.43	Operating and Moving Overhead Crane	242	4,03333
68		Waiting	58	0,96667
69	09.43 - 09.45	Carrying and Moving Bales to Destination	40	0,66667
70		Positioning and Releasing Bales	80	1,33333
71	09.45 - 09.47	Operating and Moving Overhead Crane	120	2
72	09.47 - 09.59	Waiting	720	12
73	09.59 - 10.00	Operating and Moving Overhead Crane	43	0,71667
74		Waiting	17	0,28333
75	10.00 - 10.03	Carrying and Moving Bales to Destination	52	0,86667
76		Positioning and Releasing Bales	128	2,13333
77	10.03 - 10.05	Waiting	120	2
78	10.05 - 10.06	Operating and Moving Overhead Crane	46	0,76667
79		Waiting	14	0,23333
80	10.06 - 10.07	Carrying and Moving Bales to Destination	12	0,2
81		Positioning and Releasing Bales	48	0,8
82	10.07 - 10.08	Operating and Moving Overhead Crane	48	0,8
83		Waiting	12	0,2
84	10.08 - 10.09	Carrying and Moving Bales to Destination	18	0,3
85		Positioning and Releasing Bales	42	0,7
86	10.09 - 10.12	Operating and Moving Overhead Crane	165	2,75
87		Waiting	15	0,25
88	10.12 - 10.15	Carrying and Moving Bales to Destination	42	0,7
89		Positioning and Releasing Bales	138	2,3
90	10.15 - 10.16	Setup	60	1
91	10.16 - 10.18	Operating and Moving Overhead Crane	46	0,76667
92		Waiting	14	0,23333
93	10.18 - 10.21	Carrying and Moving Bales to Destination	38	0,63333
94		Positioning and Releasing Bales	142	2,36667
95	10.21 - 10.30	Waiting	540	9
96	10.30 - 10.31	Operating and Moving Overhead Crane	41	0,68333
97		Waiting	19	0,31667
98	10.31 - 10.33	Carrying and Moving Bales to Destination	42	0,7
99		Positioning and Releasing Bales	78	1,3

Table 4.9. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
100	10.33 - 10.41	Waiting	480	8
101	10.41 - 10.43	Operating and Moving Overhead Crane	106	1,76667
102		Waiting	14	0,23333
103	10.43 - 10.46	Carrying and Moving Bales to Destination	34	0,56667
104		Positioning and Releasing Bales	146	2,43333
105	10.46 - 10.53	Waiting	420	7
106	10.53 - 10.55	Operating and Moving Overhead Crane	105	1,75
107		Waiting	15	0,25
108	10.55 - 10.57	Carrying and Moving Bales to Destination	38	0,63333
109		Positioning and Releasing Bales	82	1,36667
110	10.57 - 11.04	Waiting	420	7
111	11.04 - 11.06	Operating and Moving Overhead Crane	100	1,66667
112		Waiting	20	0,33333
113	11.06 - 11.08	Carrying and Moving Bales to Destination	43	0,71667
114		Positioning and Releasing Bales	77	1,28333
115	11.08 - 11.17	Waiting	540	9
116	11.17 - 11.19	Operating and Moving Overhead Crane	103	1,71667
117		Waiting	17	0,28333
118	11.19 - 11.21	Carrying and Moving Bales to Destination	41	0,68333
119		Positioning and Releasing Bales	79	1,31667
120	11.21 - 11.30	Waiting	540	9
121	11.30 - 11.31	Operating and Moving Overhead Crane	39	0,65
122		Waiting	21	0,35
123	11.31 - 11.34	Carrying and Moving Bales to Destination	38	0,63333
124		Positioning and Releasing Bales	142	2,36667
125	11.34 - 11.44	Waiting	600	10
126	11.44 - 11.45	Operating and Moving Overhead Crane	38	0,63333
127		Waiting	22	0,36667
128	11.45 - 11.48	Carrying and Moving Bales to Destination	49	0,81667
129		Positioning and Releasing Bales	131	2,18333
130	11.48 - 11.50	Operating and Moving Overhead Crane	98	1,63333
131		Waiting	22	0,36667
132	11.50 - 11.53	Carrying and Moving Bales to Destination	55	0,91667
133		Positioning and Releasing Bales	125	2,08333

Table 4.9. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
134	11.53 - 11.54	Setup	60	1
135	11.54 - 11.56	Operating and Moving Overhead Crane	104	1,73333
136		Waiting	16	0,26667
137	11.56 - 11.58	Carrying and Moving Bales to Destination	43	0,71667
138		Positioning and Releasing Bales	77	1,28333
139	11.58 - 12.10	Waiting	720	12
140	12.10 - 12.11	Operating and Moving Overhead Crane	105	1,75
141		Waiting	15	0,25
142	12.11 - 12.13	Carrying and Moving Bales to Destination	36	0,6
143		Positioning and Releasing Bales	84	1,4
144	12.13 - 12.33	Resting	1200	20
145	12.33 - 12.34	Setup	60	1
146	12.34 - 12.35	Operating and Moving Overhead Crane	45	0,75
147		Waiting	15	0,25
148	12.35 - 12.37	Carrying and Moving Bales to Destination	44	0,73333
149		Positioning and Releasing Bales	76	1,26667
150	12.37 - 12.38	Operating and Moving Overhead Crane	38	0,63333
151		Waiting	22	0,36667
152	12.38 - 12.40	Carrying and Moving Bales to Destination	43	0,71667
153		Positioning and Releasing Bales	77	1,28333
154	12.40 - 12.42	Operating and Moving Overhead Crane	104	1,73333
155		Waiting	16	0,26667
156	12.42 - 12.45	Carrying and Moving Bales to Destination	54	0,9
157		Positioning and Releasing Bales	126	2,1
158	12.45 - 13.03	Resting	1080	18
159	13.03 - 13.06	Setup	180	3
160	13.06 - 13.07	Operating and Moving Overhead Crane	43	0,71667
161		Waiting	17	0,28333
162	13.07 - 13.09	Carrying and Moving Bales to Destination	45	0,75
163		Positioning and Releasing Bales	75	1,25
164	13.09 - 13.10	Operating and Moving Overhead Crane	38	0,63333
165		Waiting	22	0,36667
166	13.10 - 13.12	Carrying and Moving Bales to Destination	43	0,71667
167		Positioning and Releasing Bales	77	1,28333

Table 4.9. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
168	13.12 - 13.29	Waiting	1020	17
169	13.29 - 13.31	Setup	120	2
170	13.31 - 13.33	Operating and Moving Overhead Crane	95	1,58333
171		Waiting	25	0,41667
172	13.33 - 13.35	Carrying and Moving Bales to Destination	49	0,81667
173		Positioning and Releasing Bales	71	1,18333
174	13.35 - 13.45	Waiting	600	10
175	13.45 - 13.47	Operating and Moving Overhead Crane	98	1,63333
176		Waiting	22	0,36667
177	13.47 - 13.49	Carrying and Moving Bales to Destination	45	0,75
178		Positioning and Releasing Bales	75	1,25
179	13.49 - 13.52	Waiting	180	3
180	13.52 - 13.53	Operating and Moving Overhead Crane	43	0,71667
181		Waiting	17	0,28333
182	13.53 - 13.55	Carrying and Moving Bales to Destination	41	0,68333
183		Positioning and Releasing Bales	79	1,31667
184	13.55 - 13.58	Operating and Moving Overhead Crane	129	2,15
185		Waiting	51	0,85
186	13.58 - 14.00	Carrying and Moving Bales to Destination	43	0,71667
187		Positioning and Releasing Bales	77	1,28333
188	14.00 - 14.06	Waiting	360	6
189	14.06 - 14.09	Operating and Moving Overhead Crane	132	2,2
190		Waiting	48	0,8
191	14.09 - 14.12	Carrying and Moving Bales to Destination	33	0,55
192		Positioning and Releasing Bales	147	2,45
193	14.12 - 14.23	Waiting	660	11
194	14.23 - 14.24	Operating and Moving Overhead Crane	45	0,75
195		Waiting	15	0,25
196	14.24 - 14.26	Carrying and Moving Bales to Destination	30	0,5
197		Positioning and Releasing Bales	90	1,5
198	14.26 - 14.28	Operating and Moving Overhead Crane	101	1,68333
199		Waiting	19	0,31667
200	14.28 - 14.30	Carrying and Moving Bales to Destination	23	0,38333
201		Positioning and Releasing Bales	97	1,61667

Table 4.9. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
202	14.30 - 14.31	Operating and Moving Overhead Crane	48	0,8
203		Waiting	12	0,2
204	14.31 - 14.32	Carrying and Moving Bales to Destination	17	0,28333
205		Positioning and Releasing Bales	43	0,71667
206	14.32 - 14.34	Operating and Moving Overhead Crane	99	1,65
207		Waiting	21	0,35
208	14.34 - 14.36	Carrying and Moving Bales to Destination	33	0,55
209		Positioning and Releasing Bales	87	1,45
210	14.36 - 14.46	Waiting	600	10
211	14.46 - 14.47	Operating and Moving Overhead Crane	44	0,73333
212		Waiting	16	0,26667
213	14.47 - 14.50	Carrying and Moving Bales to Destination	44	0,73333
214		Positioning and Releasing Bales	136	2,26667

Date : 30th July 2019

Location : Pulp Warehouse 1 (Shift 07.00 – 15.00 WIB)

Table 4.10. Data Collection on 30th July 2019

No	Time	Date Activity	Duration	
			Seconds	Minutes
1	07.00 - 07.23	Briefing	1380	23
2	07.23 - 07.24	Setup	60	1
3	07.24 - 07.25	Operating and Moving Overhead Crane	49	0,81667
4		Waiting	11	0,18333
5	07.25 - 07.26	Carrying and Moving Bales to Destination	26	0,43333
6		Positioning and Releasing Bales	34	0,56667
7	07.26 - 07.27	Operating and Moving Overhead Crane	35	0,58333
8		Waiting	25	0,41667
9	07.27 - 07.29	Carrying and Moving Bales to Destination	25	0,41667
10		Positioning and Releasing Bales	95	1,58333
11	07.29 - 07.32	Operating and Moving Overhead Crane	139	2,31667
12		Waiting	41	0,68333
13	07.32 - 07.33	Carrying and Moving Bales to Destination	41	0,68333
14		Positioning and Releasing Bales	19	0,31667
15	07.33 - 07.35	Operating and Moving Overhead Crane	103	1,71667
16		Waiting	17	0,28333
17	07.35 - 07.36	Carrying and Moving Bales to Destination	18	0,3
18		Releasing Bales to Terberg	42	0,7
19	07.36 - 07.37	Operating and Moving Overhead Crane	39	0,65
20		Waiting	21	0,35
21	07.37 - 07.38	Carrying and Moving Bales to Destination	32	0,53333
22		Positioning and Releasing Bales	28	0,46667
23	07.38 - 07.40	Operating and Moving Overhead Crane	83	1,38333
24		Waiting	37	0,61667
25	07.40 - 07.43	Waiting	180	3
26	07.43 - 07.44	Carrying and Moving Bales to Destination	13	0,21667
27		Positioning and Releasing Bales	47	0,78333
28	07.44 - 07.47	Operating and Moving Overhead Crane	113	1,88333
29		Waiting	67	1,11667
30	07.47 - 07.49	Carrying and Moving Bales to Destination	27	0,45
31		Releasing Bales to Terberg	93	1,55

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
32	07.49 - 07.51	Waiting	120	2
33	07.51 - 07.52	Operating and Moving Overhead Crane	44	0,73333
34		Waiting	16	0,26667
35	07.52 - 07.54	Carrying and Moving Bales to Destination	27	0,45
36		Releasing Bales to Terberg	93	1,55
37	07.54 - 07.55	Operating and Moving Overhead Crane	60	1
38	07.55 - 08.01	Waiting	360	6
39	08.01 - 08.03	Carrying and Moving Bales to Destination	31	0,51667
40		Positioning and Releasing Bales	89	1,48333
41	08.03 - 08.04	Operating and Moving Overhead Crane	60	1
42	08.04 - 08.12	Waiting	480	8
43	08.12 - 08.14	Carrying and Moving Bales to Destination	43	0,71667
44		Releasing Bales to Terberg	77	1,28333
45	08.14 - 08.17	Operating and Moving Overhead Crane	112	1,86667
46		Waiting	68	1,13333
47	08.17 - 08.18	Carrying and Moving Bales to Destination	37	0,61667
48		Releasing Bales to Terberg	23	0,38333
49	08.18 - 08.19	Operating and Moving Overhead Crane	45	0,75
50		Waiting	15	0,25
51	08.19 - 08.21	Carrying and Moving Bales to Destination	28	0,46667
52		Releasing Bales to Terberg	92	1,53333
53	08.21 - 08.23	Operating and Moving Overhead Crane	94	1,56667
54		Waiting	26	0,43333
55	08.23 - 08.24	Carrying and Moving Bales to Destination	36	0,6
56		Releasing Bales to Terberg	24	0,4
57	08.24 - 08.26	Operating and Moving Overhead Crane	106	1,76667
58		Waiting	14	0,23333
59	08.26 - 08.27	Carrying and Moving Bales to Destination	28	0,46667
60		Releasing Bales to Terberg	32	0,53333
61	08.27 - 08.28	Operating and Moving Overhead Crane	39	0,65
62		Waiting	21	0,35
63	08.28 - 08.29	Carrying and Moving Bales to Destination	23	0,38333
64		Positioning and Releasing Bales	37	0,61667
65	08.29 - 08.30	Operating and Moving Overhead Crane	60	1

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
66	08.30 - 08.36	Waiting	360	6
67	08.36 - 08.37	Carrying and Moving Bales to Destination	20	0,33333
68		Positioning and Releasing Bales	40	0,66667
69	08.37 - 08.38	Operating and Moving Overhead Crane	42	0,7
70		Waiting	18	0,3
71	08.38 - 08.40	Carrying and Moving Bales to Destination	27	0,45
72		Positioning and Releasing Bales	93	1,55
73	08.40 - 08.49	Waiting	540	9
74	08.49 - 08.50	Operating and Moving Overhead Crane	35	0,58333
75		Waiting	25	0,41667
76	08.50 - 08.51	Carrying and Moving Bales to Destination	27	0,45
77		Positioning and Releasing Bales	33	0,55
78	08.51 - 09.01	Waiting	600	10
79	09.01 - 09.03	Operating and Moving Overhead Crane	99	1,65
80		Waiting	21	0,35
81	09.03 - 09.04	Carrying and Moving Bales to Destination	36	0,6
82		Positioning and Releasing Bales	24	0,4
83	09.04 - 09.05	Operating and Moving Overhead Crane	35	0,58333
84		Waiting	25	0,41667
85	09.05 - 09.06	Carrying and Moving Bales to Destination	50	0,83333
86		Positioning and Releasing Bales	10	0,16667
87	09.06 - 09.08	Operating and Moving Overhead Crane	98	1,63333
88		Waiting	22	0,36667
89	09.08 - 09.10	Carrying and Moving Bales to Destination	49	0,81667
90		Positioning and Releasing Bales	71	1,18333
91	09.10 - 09.12	Operating and Moving Overhead Crane	97	1,61667
92		Waiting	23	0,38333
93	09.12 - 09.14	Carrying and Moving Bales to Destination	39	0,65
94		Positioning and Releasing Bales	81	1,35
95	09.14 - 09.18	Waiting	240	4
96	09.18 - 09.19	Carrying and Moving Bales to Destination	28	0,46667
97		Releasing Bales to Terberg	32	0,53333
98	09.19 - 09.20	Operating and Moving Overhead Crane	40	0,66667
99		Waiting	20	0,33333

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
100	09.20 - 09.22	Carrying and Moving Bales to Destination	54	0,9
101		Releasing Bales to Terberg	66	1,1
102	09.22 - 09.24	Operating and Moving Overhead Crane	98	1,63333
103		Waiting	22	0,36667
104	09.24 - 09.25	Carrying and Moving Bales to Destination	31	0,51667
105		Releasing Bales to Terberg	29	0,48333
106	09.25 - 09.26	Operating and Moving Overhead Crane	39	0,65
107		Waiting	21	0,35
108	09.26 - 09.28	Carrying and Moving Bales to Destination	17	0,28333
109		Releasing Bales to Terberg	103	1,71667
110	09.28 - 09.29	Operating and Moving Overhead Crane	26	0,43333
111		Waiting	34	0,56667
112	09.29 - 09.30	Carrying and Moving Bales to Destination	29	0,48333
113		Positioning and Releasing Bales	31	0,51667
114	09.30 - 09.31	Operating and Moving Overhead Crane	42	0,7
115		Waiting	18	0,3
116	09.31 - 09.33	Carrying and Moving Bales to Destination	33	0,55
117		Releasing Bales to Terberg	87	1,45
118	09.33 - 09.34	Operating and Moving Overhead Crane	46	0,76667
119		Waiting	14	0,23333
120	09.34 - 09.35	Carrying and Moving Bales to Destination	30	0,5
121		Releasing Bales to Terberg	30	0,5
122	09.35 - 09.37	Waiting	120	2
123	09.37 - 09.38	Carrying and Moving Bales to Destination	25	0,41667
124		Positioning and Releasing Bales	35	0,58333
125	09.38 - 09.39	Operating and Moving Overhead Crane	39	0,65
126		Waiting	21	0,35
127	09.39 - 09.42	Carrying and Moving Bales to Destination	35	0,58333
128		Positioning and Releasing Bales	145	2,41667
129	09.42 - 09.43	Operating and Moving Overhead Crane	37	0,61667
130		Waiting	23	0,38333
131	09.43 - 09.45	Carrying and Moving Bales to Destination	32	0,53333
132		Positioning and Releasing Bales	88	1,46667
133	09.45 - 09.46	Operating and Moving Overhead Crane	37	0,61667

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
134		Waiting	23	0,38333
135	09.46 - 09.48	Carrying and Moving Bales to Destination	37	0,61667
136		Positioning and Releasing Bales	83	1,38333
137	09.48 - 09.49	Operating and Moving Overhead Crane	37	0,61667
138		Waiting	23	0,38333
139	09.49 - 09.51	Carrying and Moving Bales to Destination	24	0,4
140		Positioning and Releasing Bales	96	1,6
141	09.51 - 09.52	Operating and Moving Overhead Crane	39	0,65
142		Waiting	21	0,35
143	09.52 - 09.53	Carrying and Moving Bales to Destination	36	0,6
144		Releasing Bales to Terberg	24	0,4
145	09.53 - 09.54	Operating and Moving Overhead Crane	41	0,68333
146		Waiting	19	0,31667
147	09.54 - 09.55	Carrying and Moving Bales to Destination	27	0,45
148		Positioning and Releasing Bales	33	0,55
149	09.55 - 09.56	Operating and Moving Overhead Crane	38	0,63333
150		Waiting	22	0,36667
151	09.56 - 09.57	Carrying and Moving Bales to Destination	32	0,53333
152		Releasing Bales to Terberg	28	0,46667
153	09.57 - 09.58	Operating and Moving Overhead Crane	40	0,66667
154		Waiting	20	0,33333
155	09.58 - 09.59	Carrying and Moving Bales to Destination	28	0,46667
156		Releasing Bales to Terberg	32	0,53333
157	09.59 - 10.00	Operating and Moving Overhead Crane	43	0,71667
158		Waiting	17	0,28333
159	10.00 - 10.01	Carrying and Moving Bales to Destination	27	0,45
160		Releasing Bales to Terberg	33	0,55
161	10.01 - 10.02	Operating and Moving Overhead Crane	37	0,61667
162		Waiting	23	0,38333
163	10.02 - 10.03	Carrying and Moving Bales to Destination	32	0,53333
164		Releasing Bales to Terberg	28	0,46667
165	10.03 - 10.04	Operating and Moving Overhead Crane	39	0,65
166		Waiting	21	0,35
167	10.04 - 10.05	Carrying and Moving Bales to Destination	36	0,6

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
168		Releasing Bales to Terberg	24	0,4
169	10.05 - 10.06	Operating and Moving Overhead Crane	42	0,7
170		Waiting	18	0,3
171	10.06 - 10.08	Carrying and Moving Bales to Destination	34	0,56667
172		Positioning and Releasing Bales	86	1,43333
173	10.08 - 10.09	Operating and Moving Overhead Crane	38	0,63333
174		Waiting	22	0,36667
175	10.09 - 10.10	Carrying and Moving Bales to Destination	31	0,51667
176		Positioning and Releasing Bales	29	0,48333
177	10.00 - 10.13	Waiting	180	3
178	10.13 - 10.14	Operating and Moving Overhead Crane	42	0,7
179		Waiting	18	0,3
180	10.14 - 10.16	Carrying and Moving Bales to Destination	26	0,43333
181		Releasing Bales to Terberg	94	1,56667
182	10.16 - 10.17	Operating and Moving Overhead Crane	41	0,68333
183		Waiting	19	0,31667
184	10.17 - 10.19	Carrying and Moving Bales to Destination	38	0,63333
185		Positioning and Releasing Bales	82	1,36667
186	10.19 - 10.20	Operating and Moving Overhead Crane	40	0,66667
187		Waiting	20	0,33333
188	10.20 - 10.22	Carrying and Moving Bales to Destination	35	0,58333
189		Positioning and Releasing Bales	85	1,41667
190	10.22 - 10.24	Waiting	120	2
191	10.24 - 10.25	Carrying and Moving Bales to Destination	31	0,51667
192		Releasing Bales to Terberg	29	0,48333
193	10.25- 10.27	Operating and Moving Overhead Crane	96	1,6
194		Waiting	24	0,4
195	10.27 - 10.28	Carrying and Moving Bales to Destination	33	0,55
196		Releasing Bales to Terberg	27	0,45
197	10.28 - 10.29	Operating and Moving Overhead Crane	46	0,76667
198		Waiting	14	0,23333
199	10.29 - 10.30	Carrying and Moving Bales to Destination	30	0,5
200		Positioning and Releasing Bales	30	0,5
201	10.30 - 10.31	Operating and Moving Overhead Crane	44	0,73333

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
202		Waiting	16	0,26667
203	10.31 - 10.32	Carrying and Moving Bales to Destination	35	0,58333
204		Releasing Bales to Terberg	25	0,41667
205	10.32 - 10.34	Operating and Moving Overhead Crane	88	1,46667
206		Waiting	32	0,53333
207	10.34 - 10.35	Carrying and Moving Bales to Destination	29	0,48333
208		Releasing Bales to Terberg	31	0,51667
209	10.35 - 10.36	Operating and Moving Overhead Crane	40	0,66667
210		Waiting	20	0,33333
211	10.36 - 10.38	Carrying and Moving Bales to Destination	31	0,51667
212		Positioning and Releasing Bales	89	1,48333
213	10.38 - 10.39	Operating and Moving Overhead Crane	35	0,58333
214		Waiting	25	0,41667
215	10.39 - 10.41	Carrying and Moving Bales to Destination	29	0,48333
216		Positioning and Releasing Bales	91	1,51667
217	10.41 - 10.42	Operating and Moving Overhead Crane	41	0,68333
218		Waiting	19	0,31667
219	10.42 - 10.43	Carrying and Moving Bales to Destination	40	0,66667
220		Releasing Bales to Terberg	20	0,33333
221	10.43 - 10.45	Operating and Moving Overhead Crane	89	1,48333
222		Waiting	31	0,51667
223	10.45 - 10.46	Carrying and Moving Bales to Destination	37	0,61667
224		Releasing Bales to Terberg	23	0,38333
225	10.46 - 10.47	Operating and Moving Overhead Crane	39	0,65
226		Waiting	21	0,35
227	10.47 - 10.49	Carrying and Moving Bales to Destination	39	0,65
228		Positioning and Releasing Bales	81	1,35
229	10.49 - 10.52	Operating and Moving Overhead Crane	99	1,65
230		Waiting	81	1,35
231	10.52 - 10.54	Carrying and Moving Bales to Destination	61	1,01667
232		Positioning and Releasing Bales	59	0,98333
233	10.54 - 10.55	Operating and Moving Overhead Crane	40	0,66667
234		Waiting	20	0,33333
235	10.55 - 10.57	Carrying and Moving Bales to Destination	29	0,48333

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
236		Positioning and Releasing Bales	91	1,51667
237	10.57 - 11.08	Waiting	660	11
238	11.08 - 11.10	Carrying and Moving Bales to Destination	49	0,81667
239		Positioning and Releasing Bales	71	1,18333
240	11.10 - 11.11	Operating and Moving Overhead Crane	41	0,68333
241		Waiting	19	0,31667
242	11.11 - 11.12	Carrying and Moving Bales to Destination	31	0,51667
243		Positioning and Releasing Bales	29	0,48333
244	11.12 - 11.13	Operating and Moving Overhead Crane	43	0,71667
245		Waiting	17	0,28333
246	11.13 - 11.15	Carrying and Moving Bales to Destination	41	0,68333
247		Positioning and Releasing Bales	79	1,31667
248	11.15 - 11.17	Operating and Moving Overhead Crane	98	1,63333
249		Waiting	22	0,36667
250	11.17 - 11.19	Carrying and Moving Bales to Destination	34	0,56667
251		Releasing Bales to Terberg	86	1,43333
252	11.19 - 11.22	Waiting	180	3
253	11.22 - 11.23	Carrying and Moving Bales to Destination	33	0,55
254		Releasing Bales to Terberg	27	0,45
255	11.23 - 11.29	Resting	360	6
256	11.29 - 11.30	Waiting	60	1
257	11.30 -11.31	Carrying and Moving Bales to Destination	30	0,5
258		Positioning and Releasing Bales	30	0,5
259	11.31 - 11.33	Waiting	120	2
260	11.33 - 11.35	Operating and Moving Overhead Crane	102	1,7
261		Waiting	18	0,3
262	11.35 - 11.36	Carrying and Moving Bales to Destination	27	0,45
263		Positioning and Releasing Bales	33	0,55
264	11.36 - 11.37	Operating and Moving Overhead Crane	44	0,73333
265		Waiting	16	0,26667
266	11.37 - 11.38	Carrying and Moving Bales to Destination	35	0,58333
267		Releasing Bales to Terberg	25	0,41667
268	11.38 - 11.39	Operating and Moving Overhead Crane	43	0,71667
269		Waiting	17	0,28333

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
270	11.39 - 11.40	Carrying and Moving Bales to Destination	24	0,4
271		Releasing Bales to Terberg	36	0,6
272	11.40 - 11.41	Waiting	60	1
273	11.41 - 11.43	Operating and Moving Overhead Crane	69	1,15
274		Waiting	51	0,85
275	11.43 - 11.44	Carrying and Moving Bales to Destination	26	0,43333
276		Releasing Bales to Terberg	34	0,56667
277	11.44 - 11.45	Operating and Moving Overhead Crane	32	0,53333
278		Waiting	28	0,46667
279	11.45 - 11.46	Carrying and Moving Bales to Destination	31	0,51667
280		Releasing Bales to Terberg	29	0,48333
281	11.46 - 12.18	Resting	1920	32
282	12.18 - 12.19	Waiting	60	1
283	12.19 - 12.20	Carrying and Moving Bales to Destination	22	0,36667
284		Positioning and Releasing Bales	38	0,63333
285	12.20 - 12.21	Operating and Moving Overhead Crane	60	1
286	12.21 - 12.22	Waiting	60	1
287	12.22 - 12.23	Carrying and Moving Bales to Destination	16	0,26667
288		Releasing Bales to Terberg	44	0,73333
289	12.23 - 12.27	Waiting	240	4
290	12.27 - 12.28	Carrying and Moving Bales to Destination	18	0,3
291		Releasing Bales to Terberg	42	0,7
292	12.28 - 12.38	Waiting	600	10
293	12.38 - 12.40	Carrying and Moving Bales to Destination	40	0,66667
294		Releasing Bales to Terberg	80	1,33333
295	12.40 - 12.43	Operating and Moving Overhead Crane	135	2,25
296		Waiting	45	0,75
297	12.43 - 12.45	Carrying and Moving Bales to Destination	38	0,63333
298		Releasing Bales to Terberg	82	1,36667
299	12.45 - 12.49	Operating and Moving Overhead Crane	104	1,73333
300		Waiting	136	2,26667
301	12.49 - 12.50	Carrying and Moving Bales to Destination	28	0,46667
302		Releasing Bales to Terberg	32	0,53333
303	12.50 - 12.51	Waiting	60	1

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
304	12.51 - 12.52	Operating and Moving Overhead Crane	38	0,63333
305		Waiting	22	0,36667
306	12.52 - 12.53	Carrying and Moving Bales to Destination	32	0,53333
307		Releasing Bales to Terberg	28	0,46667
308	12.53 - 12.54	Operating and Moving Overhead Crane	39	0,65
309		Waiting	21	0,35
310	12.54 - 12.55	Carrying and Moving Bales to Destination	26	0,43333
311		Releasing Bales to Terberg	34	0,56667
312	12.55 - 12.57	Operating and Moving Overhead Crane	96	1,6
313		Waiting	24	0,4
314	12.57 - 12.58	Carrying and Moving Bales to Destination	17	0,28333
315		Positioning and Releasing Bales	43	0,71667
316	12.58 - 12.59	Operating and Moving Overhead Crane	43	0,71667
317		Waiting	17	0,28333
318	12.59 - 13.00	Carrying and Moving Bales to Destination	27	0,45
319		Positioning and Releasing Bales	33	0,55
320	13.00 - 13.02	Operating and Moving Overhead Crane	105	1,75
321		Waiting	15	0,25
322	13.02 - 13.03	Carrying and Moving Bales to Destination	24	0,4
323		Releasing Bales to Terberg	36	0,6
324	13.03 - 13.04	Operating and Moving Overhead Crane	41	0,68333
325		Waiting	19	0,31667
326	13.04 - 13.05	Carrying and Moving Bales to Destination	25	0,41667
327		Releasing Bales to Terberg	35	0,58333
328	13.05 - 13.06	Operating and Moving Overhead Crane	39	0,65
329		Waiting	21	0,35
330	13.06 - 13.07	Carrying and Moving Bales to Destination	22	0,36667
331		Releasing Bales to Terberg	38	0,63333
332	13.07 - 13.09	Operating and Moving Overhead Crane	96	1,6
333		Waiting	24	0,4
334	13.09 - 13.10	Carrying and Moving Bales to Destination	23	0,38333
335		Releasing Bales to Terberg	37	0,61667
336	13.10 - 13.12	Operating and Moving Overhead Crane	43	0,71667
337		Waiting	77	1,28333

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
338	13.12 - 13.13	Carrying and Moving Bales to Destination	27	0,45
339		Releasing Bales to Terberg	33	0,55
340	13.13 - 13.14	Operating and Moving Overhead Crane	41	0,68333
341		Waiting	19	0,31667
342	13.14 - 13.16	Carrying and Moving Bales to Destination	26	0,43333
343		Releasing Bales to Terberg	94	1,56667
344	13.16 - 13.18	Waiting	120	2
345	13.18 - 13.19	Operating and Moving Overhead Crane	18	0,3
346		Waiting	42	0,7
347	13.19 - 13.20	Carrying and Moving Bales to Destination	26	0,43333
348		Releasing Bales to Terberg	34	0,56667
349	13.20 - 13.24	Waiting	240	4
350	13.24 - 13.25	Operating and Moving Overhead Crane	40	0,66667
351		Waiting	20	0,33333
352	13.25 - 13.26	Waiting	60	1
353	13.26 - 13.27	Carrying and Moving Bales to Destination	37	0,61667
354		Releasing Bales to Terberg	23	0,38333
355	13.27 - 13.29	Operating and Moving Overhead Crane	102	1,7
356		Waiting	18	0,3
357	13.29 - 13.30	Carrying and Moving Bales to Destination	21	0,35
358		Releasing Bales to Terberg	39	0,65
359	13.30 - 13.32	Waiting	120	2
360	13.32 - 13.33	Carrying and Moving Bales to Destination	20	0,33333
361		Releasing Bales to Terberg	40	0,66667
362	13.33 - 13.38	Waiting	300	5
363	13.38 - 13.41	Operating and Moving Overhead Crane	98	1,63333
364		Waiting	82	1,36667
365	13.41 - 13.42	Carrying and Moving Bales to Destination	46	0,76667
366		Releasing Bales to Terberg	14	0,23333
367	13.42 - 13.45	Waiting	180	3
368	13.45 - 13.47	Operating and Moving Overhead Crane	92	1,53333
369		Waiting	28	0,46667
370	13.47 - 13.48	Carrying and Moving Bales to Destination	35	0,58333
371		Releasing Bales to Terberg	25	0,41667

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
372	13.48 - 13.50	Operating and Moving Overhead Crane	92	1,53333
373		Waiting	28	0,46667
374	13.50 - 13.51	Carrying and Moving Bales to Destination	36	0,6
375		Releasing Bales to Terberg	24	0,4
376	13.51 - 13.53	Operating and Moving Overhead Crane	99	1,65
377		Waiting	21	0,35
378	13.53 -13.54	Carrying and Moving Bales to Destination	41	0,68333
379		Releasing Bales to Terberg	19	0,31667
380	13.54 - 13.55	Operating and Moving Overhead Crane	32	0,53333
381		Waiting	28	0,46667
382	13.55 - 13.56	Carrying and Moving Bales to Destination	16	0,26667
383		Releasing Bales to Terberg	44	0,73333
384	13.56 - 13.59	Waiting	180	3
385	13.59 - 14.00	Carrying and Moving Bales to Destination	20	0,33333
386		Releasing Bales to Terberg	40	0,66667
387	14.00 - 14.06	Waiting	360	6
388	14.06 - 14.07	Carrying and Moving Bales to Destination	24	0,4
389		Releasing Bales to Terberg	36	0,6
390	14.07 - 14.09	Operating and Moving Overhead Crane	88	1,46667
391		Waiting	32	0,53333
392	14.09 - 14.10	Carrying and Moving Bales to Destination	31	0,51667
393		Releasing Bales to Terberg	29	0,48333
394	14.10 - 14.13	Waiting	180	3
395	14.13 - 14.14	Operating and Moving Overhead Crane	38	0,63333
396		Waiting	22	0,36667
397	14.14 - 14.15	Carrying and Moving Bales to Destination	22	0,36667
398		Releasing Bales to Terberg	38	0,63333
399	14.15 - 14.16	Operating and Moving Overhead Crane	14	0,23333
400		Waiting	46	0,76667
401	14.16 - 14.17	Carrying and Moving Bales to Destination	22	0,36667
402		Releasing Bales to Terberg	38	0,63333
403	14.17 - 14.21	Waiting	240	4
404	14.21 - 14.22	Carrying and Moving Bales to Destination	23	0,38333
405		Releasing Bales to Terberg	37	0,61667

Table 4.10. Continued

No	Time	Date Activity	Duration	
			Seconds	Minutes
406	14.22 - 14.23	Operating and Moving Overhead Crane	36	0,6
407		Waiting	24	0,4
408	14.23 - 14.24	Carrying and Moving Bales to Destination	23	0,38333
409		Releasing Bales to Terberg	37	0,61667
410	14.24 - 14.35	Waiting	660	11
411	14.35 - 14.36	Operating and Moving Overhead Crane	35	0,58333
412		Waiting	25	0,41667
413	14.36 - 14.38	Carrying and Moving Bales to Destination	57	0,95
414		Releasing Bales to Terberg	63	1,05
415	14.38 - 14.39	Operating and Moving Overhead Crane	43	0,71667
416		Waiting	17	0,28333
417	14.39 - 14.40	Carrying and Moving Bales to Destination	23	0,38333
418		Releasing Bales to Terberg	37	0,61667
419	14.40 - 14.43	Waiting	180	3
420	14.43 - 14.44	Carrying and Moving Bales to Destination	12	0,2
421		Releasing Bales to Terberg	48	0,8
422	14.44 - 14.46	Operating and Moving Overhead Crane	93	1,55
423		Waiting	27	0,45
424	14.46 - 14.47	Carrying and Moving Bales to Destination	38	0,63333
425		Releasing Bales to Terberg	22	0,36667
426	14.47 - 15.00	Resting	780	13

Attachment 4 : Performance Ratings

Location : Pulp Warehouse 2

Table 4.11. Performance Ratings in Pulp Warehouse 2

Date	Activity	Objective Performance Rating						Total
		A	B	C	D	E	F	
17th July 2019	Briefing	0	0	0	0	0	1	1
	Walking to Pulp Warehouse 2	0	0	0	0	0	1	1
	Setup	0	0	0	2	0	0	2
	Operating Overhad Crane	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination	1	0	18	2	2	5	28
	Positioning and Releasing Bales	1	0	18	2	2	5	28
	Operating Overhad Crane (3)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (3)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (3)	1	0	18	2	2	5	28
	Operating Overhead Crane (4)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (4)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (4)	1	0	18	2	2	5	28
	Operating Overhead Crane (5)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (5)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (5)	1	0	18	2	2	5	28
	Operating Overhead Crane (6)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (6)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (6)	1	0	18	2	2	5	28
	Operating Overhead Crane (7)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (7)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (7)	1	0	18	2	2	5	28
	Operating Overhad Crane (8)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (8)	1	0	18	2	2	5	28

Table 4.11. Continued

Date	Activity	Objective Performance Rating						Total
		A	B	C	D	E	F	
	Positioning and Releasing Bales (8)	1	0	18	2	2	5	28
	Average							**24,667**
18th July 2019	Briefing	0	0	0	0	0	1	1
	Walking to Pulp Warehouse 2	0	0	0	0	0	1	1
	Setup	0	0	0	2	0	0	2
	Operating Overhad Crane	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination	1	0	18	2	2	5	28
	Positioning and Releasing Bales	1	0	18	2	2	5	28
	Operating Overhad Crane (3)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (3)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (3)	1	0	18	2	2	5	28
	Operating Overhead Crane (4)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (4)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (4)	1	0	18	2	2	5	28
	Operating Overhead Crane (5)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (5)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (5)	1	0	18	2	2	5	28
	Operating Overhead Crane (6)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (6)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (6)	1	0	18	2	2	5	28
	Operating Overhead Crane (7)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (7)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (7)	1	0	18	2	2	5	28
	Operating Overhad Crane (8)	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination (8)	1	0	18	2	2	5	28
	Positioning and Releasing Bales (8)	1	0	18	2	2	5	28
	Average							**24,667**

Location : Pulp Warehouse 3

Table 4.12. Performance Ratings in Pulp Warehouse 3

Date	Activity	Objective Perfomance Ratings						Total
		A	B	C	D	E	F	
15th July 2019	Briefing	0	0	0	0	0	1	1
	Walking to Pulp Warehouse 4	0	0	0	0	0	1	1
	Reading Loading Data	0	0	0	2	0	0	2
	Operating and Moving Overhead Crane	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination	1	0	18	2	2	5	28
	Positioning and Releasing Bales	1	0	18	2	2	5	28
	Releasing Bales to Terberg	1	0	18	2	2	5	28
	Average							**16,5714**
24th July 2019	Briefing	0	0	0	0	0	1	1
	Walking to Pulp Warehouse 4	0	0	0	0	0	1	1
	Reading Loading Data	0	0	0	2	0	0	2
	Operating and Moving Overhead Crane	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination	1	0	18	2	2	5	28
	Positioning and Releasing Bales	1	0	18	2	2	5	28
	Releasing Bales to Terberg	1	0	18	2	2	5	28
	Average							**16,5714**

Location : Pulp Warehouse 4

Table 4.13. Performance Ratings in Pulp Warehouse 4

Date	Activity	Objective Perfomance Ratings						Total
		A	B	C	D	E	F	
16th July 2019	Briefing	0	0	0	0	0	1	1
	Walking to Pulp Warehouse 4	0	0	0	0	0	1	1
	Reading Loading Data	0	0	0	2	0	0	2
	Operating and Moving Overhead Crane	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination	1	0	18	2	2	5	28
	Positioning and Releasing Bales	1	0	18	2	2	5	28
	Releasing Bales to Terberg	1	0	18	2	2	5	28
	Average							**16,5714**
23th July 2019	Briefing	0	0	0	0	0	1	1
	Walking to Pulp Warehouse 4	0	0	0	0	0	1	1
	Reading Loading Data	0	0	0	2	0	0	2
	Operating and Moving Overhead Crane	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination	1	0	18	2	2	5	28
	Positioning and Releasing Bales	1	0	18	2	2	5	28
	Releasing Bales to Terberg	1	0	18	2	2	5	28
	Average							**16,5714**

Location : Pulp Warehouse 1

Table 4.14. Performance Ratings in Pulp Warehouse 1

Date	Activity	Objective Perfomances Rating						Total
		A	B	C	D	E	F	
29th July 2019	Briefing	0	0	0	0	0	1	1
	Reading Loading Data	0	0	0	2	0	0	2
	Operating and Moving Overhead Crane	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination	1	0	18	2	2	5	28
	Positioning and Releasing Bales	1	0	18	2	2	5	28
	Releasing Bales to Terberg	1	0	18	2	2	5	28
	Average							**19,16667**
30th July 2019	Briefing	0	0	0	0	0	1	1
	Reading Loading Data	0	0	0	2	0	0	2
	Operating and Moving Overhead Crane	1	0	18	2	2	5	28
	Carrying and Moving Bales to Destination	1	0	18	2	2	5	28
	Positioning and Releasing Bales	1	0	18	2	2	5	28
	Releasing Bales to Terberg	1	0	18	2	2	5	28
	Average							**19,16667**

Attachment 5 : Allowance Factor

Location : Pulp Warehouse 2

Table 4.15. Allowances Factor in Pulp Warehouse 2

Activity	Allowances Factor										Total
	1	2	3	4	5	6	7	Fatigue	Unavoiable	Personel	
Briefing	0	1	0	0	5	1	3	1,5	1	2	14,5
Walking to Pulp Warehouse 2	0	1	0	0	5	1	3	1,5	1	2	14,5
Setup	1	1	2	2	5	1	3	1,5	1	2	19,5
Operating Overhad Crane	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhad Crane (3)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (3)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (3)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhead Crane (4)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (4)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (4)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhead Crane (5)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (5)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (5)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhead Crane (6)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (6)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (6)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhead Crane (7)	3	1	2	2	5	1	3	1,5	7	2	27,5

Table 4.15. Continued

Activity	Allowances Factor										Total
	1	2	3	4	5	6	7	Fatigue	Unavoiable	Personel	
Carrying and Moving Bales to Destination (7)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (7)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhad Crane (8)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (8)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (8)	3	1	2	2	5	1	3	1,5	7	2	27,5
Average											**26,083**
Briefing	0	1	0	0	5	1	3	1,5	1	2	14,5
Walking to Pulp Warehouse 2	0	1	0	0	5	1	3	1,5	1	2	14,5
Setup	1	1	2	2	5	1	3	1,5	1	2	19,5
Operating Overhad Crane	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhad Crane (3)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (3)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (3)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhead Crane (4)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (4)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (4)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhead Crane (5)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (5)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (5)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhead Crane (6)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (6)	3	1	2	2	5	1	3	1,5	7	2	27,5

Table 4.15. Continued

Activity	Allowances Factor										Total
	1	2	3	4	5	6	7	Fatigue	Unavoiable	Personel	
Positioning and Releasing Bales (6)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhead Crane (7)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (7)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (7)	3	1	2	2	5	1	3	1,5	7	2	27,5
Operating Overhad Crane (8)	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination (8)	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales (8)	3	1	2	2	5	1	3	1,5	7	2	27,5
Average											**26,083**

Location : Pulp Warehouse 3

Table 4.16. Allowances Factor in Pulp Warehouse 3

Activity	Allowances Factor										Total Allowances
	1	2	3	4	5	6	7	Fatigue	Unavoidable	Personnel	
Briefing	0	1	0	0	5	1	3	1,5	1	2	14,5
Walking to Pulp Warehouse 4	0	1	0	0	5	1	3	1,5	1	2	14,5
Reading Loading Data	1	1	2	2	5	1	3	1,5	1	2	19,5
Operating and Moving Overhead Crane	3	1	2	2	5	1	3	1,5	5	2	25,5
Carrying and Moving Bales to Destination	3	1	2	2	5	1	3	1,5	5	2	25,5
Positioning and Releasing Bales	3	1	2	2	5	1	3	1,5	5	2	25,5
Releasing Bales to Terberg	3	1	2	2	5	1	3	1,5	5	2	25,5
Average											**21,5**
Briefing	0	1	0	0	5	1	3	1,5	1	2	14,5
Walking to Pulp Warehouse 4	0	1	0	0	5	1	3	1,5	1	2	14,5
Reading Loading Data	1	1	2	2	5	1	3	1,5	1	2	19,5
Operating and Moving Overhead Crane	3	1	2	2	5	1	3	1,5	5	2	25,5
Carrying and Moving Bales to Destination	3	1	2	2	5	1	3	1,5	5	2	25,5
Positioning and Releasing Bales	3	1	2	2	5	1	3	1,5	5	2	25,5
Releasing Bales to Terberg	3	1	2	2	5	1	3	1,5	5	2	25,5
Average											**21,5**

Location : Pulp Warehouse 4

Table 4.17. Allowances Factor in Pulp Warehouse 4

Activity	Allowances Factor										Total Allowances
	1	2	3	4	5	6	7	Fatigue	Unavoidable	Personnel	
Briefing	0	1	0	0	5	1	3	1,5	1	2	14,5
Walking to Pulp Warehouse 4	0	1	0	0	5	1	3	1,5	1	2	14,5
Reading Loading Data	1	1	2	2	5	1	3	1,5	1	2	19,5
Operating and Moving Overhead Crane	3	1	2	2	5	1	3	1,5	7	2	27,5
Carrying and Moving Bales to Destination	3	1	2	2	5	1	3	1,5	7	2	27,5
Positioning and Releasing Bales	3	1	2	2	5	1	3	1,5	7	2	27,5
Releasing Bales to Terberg	3	1	2	2	5	1	3	1,5	7	2	27,5
Average											**22,643**
Briefing	0	1	0	0	5	1	3	1,5	1	2	14,5
Walking to Pulp Warehouse 4	0	1	0	0	5	1	3	1,5	1	2	14,5
Reading Loading Data	1	1	2	2	5	1	3	1,5	1	2	19,5
Operating and Moving Overhead Crane	3	1	2	2	5	1	3	1,5	50	2	70,5
Carrying and Moving Bales to Destination	3	1	2	2	5	1	3	1,5	50	2	70,5
Positioning and Releasing Bales	3	1	2	2	5	1	3	1,5	50	2	70,5
Releasing Bales to Terberg	3	1	2	2	5	1	3	1,5	50	2	70,5
Average											**47,214**

Location : Pulp Warehouse 1

Table 4.18. Allowances Factor in Pulp Warehouse 1

Date	Activity	Allowances Factor										Total Allowances
		1	2	3	4	5	6	7	Fatigue	Unavoidable	Personnel	
29th July 2019	Briefing	0	1	0	0	5	1	3	1,5	1	2	14,5
	Reading Loading Data	1	1	2	2	5	1	3	1,5	1	2	19,5
	Operating and Moving Overhead Crane	3	1	2	2	5	1	3	1,5	20	2	40,5
	Carrying and Moving Bales to Destination	3	1	2	2	5	1	3	1,5	20	2	40,5
	Positioning and Releasing Bales	3	1	2	2	5	1	3	1,5	20	2	40,5
	Releasing Bales to Terberg	3	1	2	2	5	1	3	1,5	20	2	40,5
	Average											**32,66667**
30th July 2019	Briefing	0	1	0	0	5	1	3	1,5	1	2	14,5
	Reading Loading Data	1	1	2	2	5	1	3	1,5	1	2	19,5
	Operating and Moving Overhead Crane	3	1	2	2	5	1	3	1,5	5	2	25,5
	Carrying and Moving Bales to Destination	3	1	2	2	5	1	3	1,5	5	2	25,5
	Positioning and Releasing Bales	3	1	2	2	5	1	3	1,5	5	2	25,5
	Releasing Bales to Terberg	3	1	2	2	5	1	3	1,5	5	2	25,5
	Average											**22,66667**

Laporan KP

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Lampiran 2. Lembar Bimbingan Pelaksanaan dan Penyusunan Laporan Kerja Praktek (QSR No. 086-QSR/Ind-FTI-UAJY/18-VIII/2017)

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Lembar Bimbingan Pelaksanaan dan Penyusunan
Laporan Kerja Praktek/ Magang

Nama Mahasiswa : William
NPM : 161408850
Perusahaan tempat KP : PT Riau Andalan Pulpand Paper
Tanggal pelaksanaan KP : 1 Juli 2019 - 9 Agustus 2019
Dosen Pembimbing : Ir. B. Kristyanto, M.Eng., Ph.D.

No	Tanggal	Agenda	Tanda Tangan Dosen Pembimbing
1	21/5 2019	Penyerahan surat pembimbingan dan Konsultasi persiapan Kerja Praktek	
2	21/5 2019	Laporan atau konsultasi penugasan dari perusahaan	
	20/8 2019	Laporan pertama setelah pelaksanaan Kerja Praktek dan konsultasi penyusunan laporan	
	20/8 2019	Penyerahan draft laporan Kerja Praktek untuk pertama kali	
	25/10 2019	Pengesahan laporan Kerja Praktek	

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Senin, 1 Juli 2019	07.00 - 11.30	Mendengar presentasi tentang RGE	

Catatan penting harian:

Catatan dari pembimbing lapangan:

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta Revisi 00

Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Selasa, 2 Juli 2019	07.00 – 10.00	Overview mengenai APRIL di ALI	
2.		10.00 – 11.30	Tanda tangan kontrak Magang	

Catatan penting harian:

Catatan dari pembimbing lapangan:

Revisi 00

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1	Rabu, 3 Juli 2019	08.00 - 11.00	Safety Induction oleh Pak Junaidi	Junaidi
2		14.00	Masuk ke Departemen Pulp Warehouse	PT. RAPP ANDALAN PULP RIAU PULP PULP WAREHOUSE
3		14.00 - 16.00	Perkenalan di pulp Warehouse	

Catatan penting harian:

Catatan dari pembimbing lapangan:

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Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Kamis, 4 Juli 2019	07.00 – 09.00	Cara membuat Morning Report 1 & 2	PT. RIAU ANDALAN PULP AND PAPER RIAU PULP PULP WAREHOUSE Sitorus Sitohang
		09.00 – 11.00	Overview mengenai SAP Logon	
2.		13.30 – 16.20	RTC	

Catatan penting harian:

Catatan dari pembimbing lapangan:

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Jumat, 5 Juli 2019	07.00 – 11.00	Cara membuat Taskforce Report	
2.		13.30 – 15.00	Review mengenai Taskforce Report	
		15.00 – 16.00	Menghitung estimasi outstorage stock (pulp) di area mill	

PT. RIAU ANDALAN PULP AND PAPER
RIAU PULP
PULP WAREHOUSE

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Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Sabtu, 6 Juli 2019	07.00 – 08.00	Membuat morning report	
2.		08.00 – 11.00	Membantu EDT dalam pembuatan report (FL Summary, Timestuffing)	

PT. RIAU ANDALAN PULP RIAU PULP PULP WAREHOUSE

Catatan penting harian:

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Senin, 8 Juli 2019	07.00 – 08.00	Membuat FL Summary Report	
2		08.00 – 11.00	Tinjau / observasi lapangan	
3		14.00 – 16.00	Mengikuti meeting antar departemen	

PT. RIAU ANDALAN PULP RIAU PULP PULP WAREHOUSE

Catatan penting harian:

Catatan dari pembimbing lapangan:

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Selasa, 9 Juli 2019	07.00 – 08.00	Membuat FL Summary Report	
2		08.00 – 11.00	Tinjau Lapangan	
3		13.30 – 16.00	Tinjau lapangan serta membantu rekan kerja	

PT. RIAU ANDALAN PULP & PAPER
RIAU PULP
PULP WAREHOUSE

Catatan penting harian:

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Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Rabu, 10 Juli 2019	07.00 – 09.00	Membuat report beserta membantu di kantor	PT. RIAU ANDALAN PULP & PAPER RIAU PULP PULP WAREHOUSE
2		09.00 – 10.00	Mengikuti meeting	
3		10.00 – 11.00	Membantu di kantor	
4.		13.30 – 15.00	Membantu di kantor	
5.		15.00 – 16.00	Merekap data & stock pengangkutan.	

Catatan penting harian:

Catatan dari pembimbing lapangan:

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta Revisi 00

Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Kamis, 11 juli 2019	07.00 – 09.00	Membuat morning report	PT. RIAU ANDALAN PULP AND PAPER RIAU PULP PULP WAREHOUSE
2		09.00 – 11.30	Membantu di kantor	
3		13.30 – 15.00	Mengisi data loading report	
		15.00 – 16.00	Membantu di kantor	

Catatan penting harian:

Catatan dari pembimbing lapangan:

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1	Jumat, 12 Juli 2019	07.00 – 09.00	Membuat morning report	RIAU PULP PULP WAREHOUSE
2		09.00 – 11.30	Mengisi FL Summary Report	
3		13.30 – 15.30	Mengisi data loading report	

Catatan penting harian:

Catatan dari pembimbing lapangan:

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Senin, 15 Juli 2019	07.00 – 15.00	Observasi di Lapangan	

Catatan penting harian:

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1	Selasa, 16 Juli 2019	09.00 – 15.00	Observasi di Lapangan	PT. RIAU ANDALAN PULP AND PAPER RIAU PULP PULP WAREHOUSE
2.		15.00 – 16.00	Mengisi data Loading Report	

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PEMBIMBING LAPANGAN
1.	Rabu, 17 Juli 2019	07.00 – 15.00	Observasi di Lapangan	
2.		15.00 – 16.00	Mengisi data Loading Report	

Catatan penting harian:

Catatan dari pembimbing lapangan:

JP-DSR/Ind-FTI-UAJY/18-VIII/2017

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Kamis, 18 Juli 2019	07.00 – 15.00	Observasi di Lapangan	
2.		15.00 – 17.00	Mengikuti rapat di Mill office	

PT. RIAU ANDALAN PULP AND PAPER
RIAU PULP
PULP WAREHOUSE

Catatan penting harian:

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1	Jumat, 19 Juli 2019	07.00 – 09.00	Membuat morning report	
2.		09.00 – 11.30	Membantu di kantor	
3.		13.30 – 15.00	Mengisi Loading Data Report	

PT. RIAU ANDALAN PULP & PAPER
RIAU PULP
PULP WAREHOUSE

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Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Senin, 22 Juli 2019	07.00 – 11.30	Observasi di Lapangan	(signature) PT. RIAU ANDALAN … RIAU PULP PULP WAREHOUS…
2.		13.30 – 16.00	Sortir Data	

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Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Selasa, 23 Juli 2019	07.00 – 09.00	Membuat morning report	
2		09.00 – 11.30	Mengisi data loading report	
3		13.30 – 15.30	Ikut meeting	

PT. RIAU ANDALAN PULP & PAPER
RIAU PULP WAREHOUSE

Catatan penting harian:

Catatan dari pembimbing lapangan:

F/...-QSR/Ind-FTI-UAJY/18-VIII/2017

Revisi 00

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Rabu, 24 Juli 2019	07.00 – 15.00	Observasi di Lapangan	PT. RIAU ANDALAN PULP & PAPER, RIAU PULP, PULP WAREHOUSE (stempel); tanda tangan
2.		15.00 – 16.00	Membuat Loading Data Report	

Catatan penting harian:

Catatan dari pembimbing lapangan:

FR-DSR/Ind-FTI-UAJY/18-VIII/2017

Revisi 00

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Kamis, 25 Juli 2019	07.00 – 15.00	Observasi di Lapangan	PT. RIAU ANDALAN PULP AND PAPER RIAU PULP PULP WAREHOUSE

Catatan penting harian:

Catatan dari pembimbing lapangan:

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

Revisi 00

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Jumat, 26 Juli 2019	07.00 – 09.00	Membuat morning report	PT. RAPP ANDALAN PULP RIAU PULP PULP WAREHOUSE
2.		09.00 – 11.30	Konsultasi	
3.		13.30 – 16.00	Mengikuti meeting P2K3	
4.		16.00 – 17.00	Belajar mengenai VMB Report	

Catatan penting harian:

Catatan dari pembimbing lapangan:

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta

Catatan Harian Pelaksanaan Kerja Praktek/ Magang

Revisi 00

No.	Hari, Tanggal	Jam	Kegiatan	Tanda tangan & stempel perusahaan
1.	Senin, 29 Juli 2019	07.00 – 15.00	Observasi di Lapangan	

Catatan penting harian:

Catatan dari pembimbing lapangan:

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta

Revisi 00

Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PEMBIMBING LAPANGAN
1	Selasa, 30 Juli 2019	07.00 – 15.00	Observasi di Lapangan	

Catatan penting harian:

Catatan dari pembimbing lapangan:

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta

Revisi 00

Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PEMBIMBING LAPANGAN
1.	Rabu, 31 Juli 2019	07.00 – 09.00	Membuat morning report	
		09.00 – 11.00	Mengecek stock di Pulp Warehouse	
		13.30 – 16.00	Mengisi VMB	

Catatan penting harian:

Catatan dari pembimbing lapangan:

FR-LOGR/Ind-FTI-UAJY/18-VIII/2017

Revisi 00

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Kamis, 1 Agustus 2019	07.00 – 09.00	Membuat morning report	PT. RIAU ANDALAN PULP & PAPER RIAU PULP PULP WAREHOUSE
2		09.00 – 11.30	Review mengenai Pulp Warehouse	
3		13.30 – 16.00	Review mengenai sistem order & dan alur di Pulp Warehouse	

Catatan penting harian:

Catatan dari pembimbing lapangan:

FR-03/Ind-FTI-UAJY/18-VIII/2017

Revisi 00

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Jumat, 2 Agustus 2019	07.00 – 11.30	Membuat report, mengisi FL Summary Report	PT. RIAU ANDALAN PULP AND PAPER RIAU PULP PULP WAREHOUSE
2.		13.30 – 16.00	Membantu di kantor	

Catatan penting harian:

Catatan dari pembimbing lapangan:

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta Revisi 00

Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Senin, 5 Agustus 2019	07.00 – 10.00	Membuat morning report	
2.		10.00 – 11.30	Presentasi hasil KP	
3.		13.30 – 16.00	Membantu di kantor	

Catatan penting harian:

Catatan dari pembimbing lapangan:

FR-DSR/Ind-FTI-UAJY/18-VIII/2019

Revisi 00

Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta
Catatan Harian Pelaksanaan Kerja Praktek/ Magang

NO.	HARI, TANGGAL	JAM	KEGIATAN	TANDA TANGAN & STEMPEL PERUSAHAAN
1.	Selasa, 6 Agustus 2019	07.00 – 08.00	Membuat morning report	PT. RIAU ANDALAN PULP & PAPER RIAU PULP WAREHOUSE
		08.00 – 11.00	Tinjau Lapangan	

Catatan penting harian:

Catatan dari pembimbing lapangan: