INDUSTRIAL INTERNSHIP REPORT

IN PT SRI REJEKI ISMAN, TBK, (SRITEX)

Submitted by:

Rafi Ibnu Ramadhan

NPM: 15 14 08270

DEPERTMENT OF INDUSTRIAL

FACULTY OF INDUSTRIAL TECHNOLOGY

UNIVERSITAS ATMA JAYA YOGYAKARTA

2018

HALAMAN PENGESAHAN

Laporan Kerja Praktek yang dilaksanakan di PT. Sri Rejeki Isman, Tbk, (Sritex) mulai tanggal 2 Juli 2018 sampai dengan 31 Juli 2018 disusun oleh:

Nama	: Rafi Ibnu Ramadhan
NPM	: 15 14 08270
Program Studi	: Teknik Industri Internasional
Fakultas	: Teknologi Industri

telah diperiksa dan disetujui.

Yogyakarta, 31 Juli 2018

Pembimbing Lapangan	Dosen Pembimbing
(SRIYANTO)	(Luciana Triani Dewi, ST. MT)

PT Sri Rejeki Isman Tbk
Integrated Vertical Textile Garment Company
Spinning Weaving Dyeing Printing Garment

SURAT KETERANGAN

NO : 1552/5.7/HRD/VII/2018

Yang bertanda tangan di bawah ini menerangkan bahwa Mahasiswa Universitas Atma Jaya Yogyakarta, yakni :

Nama	:	**RAFI IBNU RAMADHAN**
NIM	:	**151408270**
Jurusan	:	**Teknik Industri**

Telah melaksanakan Praktik Kerja Lapangan di Departemen Spinning X PT. Sri Rejeki Isman, Tbk Sukoharjo pada tanggal 2 Juli – 31 Juli 2018.

Demikian surat keterangan ini kami buat untuk dapat digunakan sebagaimana perlunya.

Sukoharjo, 31 Juli 2018

Ir. Sri Saptono Basuki, MM
GM HRD

CC : Arsip

CORPORATE & PRODUCTION COMPLEX :
Jl. KH. Samanhudi 88 Jetis, Sukoharjo 57511, Solo, Jawa Tengah, Indonesia • Tel: +62-271-593 188 • Fax: +62-271-593 488
e-mail : cmo@sritex.co.id • website : www.sritex.co.id

ACKNOWLEDGEMENT

Praise and thank God for His love and grace for the internship in PT Sri Rejeki Isman can be completed smoothly and reporting industrial Practice can be completed.

The purpose of internship is one of the obligatory academic requirements filled in Industrial Engineering University of Atma Jaya University Yogyakarta. Other than that, the purpose of the internship is to introduce student to the working world as a candidate in Industrial Engineering graduate. Completion of internship Report preparation did not escape the assistance and motivation and participation from all parties, for it with all humility the authors express their gratitude to:

1. PT Sri Rejeki Isman as a company that has received the author to be able carry out the internship
2. Mr. Sriyanto and Mr. Yuli as adviser in the field.
3. Mrs. Luciana Triani Dewi,S.T.,MT as the supervisor of Internship.

who help the writer to finish the industrial practice in PT Djarum.

4. All parties who have helped up to the series of internship can resolved.

The student is aware of the preparation of this report is still far from perfect. Therefore, the writer strongly expects the existence of criticism and constructive suggestions from reader. Student hope this report can be useful not only for the writer, but also for the company and expand the knowledge of the reader.

Yogyakarta, 14 November 2018

Rafi Ibnu Ramadhan

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

serviens in lumine veritatis

CHAPTER I
INTRODUCTION

1.1. Background

Department of Industrial Engineering, Faculty of Industrial Technology, University of Atma Jaya Yogyakarta (PSTI UAJY), requires all students to do an industrial internship in accordance with the curriculum in the department of industrial technology. The UAJYPSTI sees the industrial internship as a media for students to know the environment of work, industry, and also grow, improve, and develop a professional work ethic as a candidate for Industrial Engineering graduate.

An Industrial internship arguably as a professional simulation for Industrial Engineering students. The paradigm that must be invested in that during the internship student work in companies that choose. Work, in this case, includes the activities of planning, designing, improvement, implementation, and problem-solving. Therefore, an internship, the activities are undertaken by students:

a. Recognizing the scoop of company.
b. Following the business process in the company continuously.
c. Doing the assignments given by supervisor or field supervisors.
d. Observing the system.
e. Compiling reports in written form.
f. Doing internship examination.

Industrial Engineering is a field of study related with planning, designing, improvement, and installation of an integrated system consists of Man, Machine, Material, Method, Money, Energy, Environment, and Infductioormation. Also, the scope of Industrial Engineer is an integrated system between aspects mentioned above (Man, Machine, Material, Method, Money, Energy, Environment, and Information). This means that in doing the responsibilities, Industrial Engineer has to see the activities based on its integrated system's point of view.

Area of competencies for Industrial Engineer are including:

a. Work System Design and Analysis.
b. Production Planning and Controlling.
c. Inventory Management.

d. Quality Control System.
e. Material System.
f. Logistics and Supply Chain Management.
g. Product Design and Improvement.
h. Occupational Safety and Health.
i. Manufacturing Facility Planning.
j. Organizational Management.
k. Cost Analysis.
l. Industrial Feasibility Analysis.
m. CAD/CAM and Process Design, and others.

1.2. Purpose

Things to be achieved through the implementation of industrial practice are:

a. Practice self-discipline
b. Practice the ability to interact with employees
c. Practice the ability to adapt with the working environment
d. Observe the activity of company directors in running the production and business
e. Complete the theories in college with the real condition in factory
f. Enhance the knowledge about production and business system

1.3. Date and Place

This internship implemented as of July 2, 2018, until July 31, 2018, at PT. Sri Rejeki Isman Tbk (Sritex), Samanhudi street No.88, Jetis, Sukoharjo District, Central Java, 57511. Internship placement at the spinning X department. Spinning X department located at secondary plant.

CHAPTER 2
COMPANY OVERVIEW

2.1. Brief Company History

PT. Sri Rejeki Isman (Sritex) is a company that produces textile. This company established from a traditional trading company, the name of company is “Sri Redjeki.” This company founded by H.M Lukminto in 1966 at Klewer market, Solo, Central Java. In 1968 H.M. Lukminto established his first factory by producing bleached and dyed in Baturono Street number 81A, Solo. Then on October 16, 1978 “Sri Redjeki” change the status from UD (Trading Company) to PT (Limited Liability Company). So, the name of “Sri Redjeki” change to PT Sri Rejeki Isman. The Company officially issued an Initial Public Offering in 2013, thus automatically changed its name to PT Sri Rejeki Isman Tbk.

Currently, Sritex has more than 18 thousand employees and concern to produces the product with four production department consisting of spinning, weaving, (printing, dyeing) , and garment.

Sritex transforms into a modern company with professional staff from both inside and outside the country, such as South Korea, the Philippines, India, Germany, and China. Sritex also has customers from large and modern retailers, such as H&M, Walmart, K-Mart, and Jones Apparel Group

The company has achieved several awards. In 2001 PT Sri Rejeki Isman Tbk. has an achievement that able to withstand the financial crisis that occurred in Asia in 1998, the company not only able to maintain financial condition, but also multiple financial growths to 8 times increase compared to financial condition in 1992 when the company was first expanding into a large company that has a factory with 4 production department (spinning, weaving, finishing, garment).

Then in 2010, the company was able to pass the economic crisis. The reason the company can pass the economic crisis because this company has a marketing strategy that not owned by other companies. Then in 2012, PT. Sritex can increase the growth and performance compared to the performance in 2008. In 2015, the company received an award from the Indonesian Record Museum with categories

"*Pemrakarsa dan Penyelenggara penciptaan Investor Saham Terbanyak dalam Satu Perusahaan*." Then this company earned "Anugerah Nasional KekayaanIntelektual 2015" with categories "*IP Enterprise Trophy oleh Sritex dari WIPO (World Intellectual Property Organization*)." Then still the same year, the company was awarded as"Top performing Listed Companies Sektor Tekstil dan Garment "2015 from Investor magazine. Do not stop achievement in 2015, but in 2016 PT. Sri Rejeki Isman Tbk. It also has some achievements, such as awards of "Best Performance Listed Companies 2016" from investor magazine to PT Sritex. Then another award earned by the company in 2016 is the award of "Best Enterprise Achievers 2016with categories Local Giants from Obsession Media Group. The company also received an award as the best issuer of various industry sectors at" Bisnis Indonesia Awards 2016". Then another award earned by this company is this company successfully issue global bonds worth USD350 million with interest 8.25% which has maturity in 2021. PT. Sritex is one of the largest vertically integrated and textile producers in Southeast Asia with a significant competitive advantage. This company at the time of producing a product, this company always pay attention to quality, so this company has superior product quality and high customer satisfaction supported by modern production facilities and strict quality control system. Then this company has a good data record in terms to tailor the solution according to customer needs, this capability, not all companies have such strategies and capabilities, this ability is due to the company that has the principle that to do the production process, the production process should not more than WO (Work Order), so customer satisfaction guaranteed, this proven with a large customer base and high loyalty.

2.2. Organizational Structure

Organizational structure is an arrangement that provides a relationship between several parts of each position that exists in the company. Through the organizational structure can be clearly shown the separation of activities in each position, so that with this organizational structure is expected employee can achieve goals based on what targeted at employee and companies. Also, with the organizational structure, the worker can understand the responsibilities. Without an organizational structure, a company will not be able to perform its function correctly.

Organizational Structure of PT. Sri Rejeki Isman, Tbk.

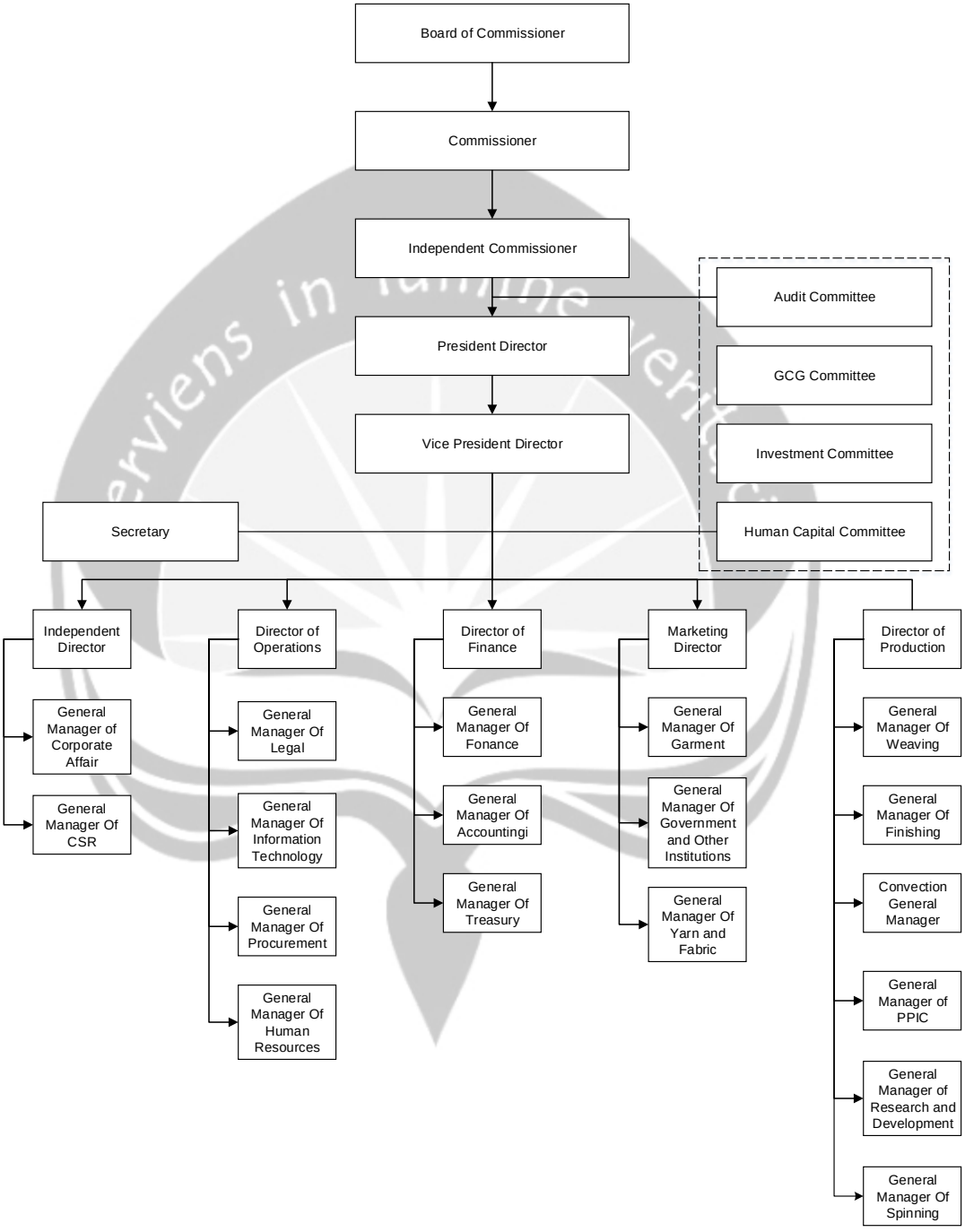


Figure 2.1. Organizational Structure of PT. Sri Rejeki Isman

2.2.1. Job Descriptions

To achieve welfare and to increase worker's morale in working to achieve the goal there are several job descriptions for each department, it is aimed to have the employee have a responsibility in doing the job and at the time of doing the job can be more focused. Job descriptions for each department explained in this chapter.

a. Board of Commissioners

The duties of the Board of Commissioners

i. Implementing duties based on the applicable laws and regulations and GMS decision;
ii. Analyzing annual report submitted by the Board of Directors and signing the report;
iii. Ratifying the company's work plan and budget;
iv. Supervising the implementation of the company's work plan and budget (RKAP) and submitting their assessment results and opinions to the GMS;
v. Keeping up to date with the company's development and providing input and advice to the board of directors on any issues considered important in the company's management according to its supervisory function in the company;
vi. Monitoring the effectiveness of the company's corporate governance practice and the implementation of its corporate social responsibility.

b. President Director

The Job of the Director are:

i. Provide guidance and control over the company's policies, vision, mission and strategy of the company;
ii. Determining and coordinating planning policy, control, achievement of the company's long-term targets, audit policy, improvement of culture, image, Good Corporate Governance (GCG) and problem-solving effort of the company;
iii. Responsible for the operational activities of the company;
iv. Represent the company inside or outside the court;
v. Deciding and determining the company's budget;
vi. Leading, coordinating, providing direction and instruction to members of the board of directors on its policies and implementation;
vii. Determining meeting agenda of board of directors and ensuring smooth meeting procedure of meeting with clear decision and agreemen;

viii. Organizing and presiding over the board of directors' meetings or other meetings if deemed necessary based on the proposal of the board of directors;
ix. Determining the board of directors' decision.

c. Vice President Director

The Job of Vice President Director:

i. Helping the president director to formulate, develop, and determine general concept and planning of the company;
ii. Helping the president director to conduct supervision and control on all performances of the company;
iii. Helping the president director to solve the company's issues and other matters in accordance with the board of directors resolution;
iv. Taking over the duties and authority of the president director in presiding over and controlling the company in the event of the president director is absent;

d. Director of Marketing

The Job of Marketing Director:

i. Responsible on all sales activities, marketing work units, and personnel involved in the sales and marketing of the company;
ii. Responsible for developing and managing as well as controlling sales budget and marketing;
iii. Directly presiding over daily operations from marketing sector while maintaining focus on the corporate strategic goals;
iv. Develop sustainable business growth strategies;
v. Determine performance goals for all employees at marketing work units and continuously monitor the performance;
vi. Supervise all recruitments, training and termination of employment with the personnel involved in the sales and marketing;
vii. Provide directions to marketing work unit in achieving the target set in the company's strategic plan;
viii. Initiate coordination with sales operations and marketing with the company's other work units;
ix. Prepare, develop and implement effective and strategic sales plan;
x. Build, develop and maintain and increase business relations with all customers of the company;

xi. Cooperate with product sectors in developing new products and services for the company's customers;
xii. Supervise the implementation of sales and marketing work unit at the company.

e. Director of Finance

The Job Director of Finance:

i. Presiding over and controlling policy development, financial management and reporting, including supervisory activities;
ii. Implementing and controlling all financial policies and implementing efficiency and effectiveness of financial functions at the head office, work units, and business units;
iii. Developing, determining, and coordinating the Corporate Work Plan and Budget (RKAP) and accounting control on revenues and profit as well as rate of return;
iv. Consolidate, control and supervise the development and implementation of cash flows of the company based on RKAP for the sake of efficiency improvement;
v. Direct and develop the company's financial management, including budget, financial and accounting policies;
vi. Manage financial investment portfolio and financial decision to achieve maximum added value and the achievement of the company's goals according to the Board of directors' determination;
vii. Periodically reviewing and improving the policy in the form of the establishment of system and work procedure on the company's financial management according to technological development and changes in economy and laws, as well as directing and solving general problems that include financial matter.

f. Independent Director

The Job of the Independent Director:

i. Managing company activities;
ii. Implementing policy, principles, values, strategies, goals, and performance target that evaluated;
iii. Ensuring long-term business sustainability;
iv. Ensuring the achievement of the performance target, implementation of regulation and prudence principles.

g. Director of Production

The Job of Director Production:

i. Reviewing the proposal of Corporate Work Plan and Budget (RKAP) from all divisions in the production division and proposing it at the meeting of the board of directors and board of commissioners;
ii. Planning and formulating strategic policies relating with the production;
iii. Monitoring and directing processes across the production division.
iv. Coordinating with related institutions, both domestic and foreign, to carry out Production strategies;
v. Providing input to the President Director in deciding matters related to the Production

h. Director of Operations

The Job of Director Operations:

i. Preparing, formulating, developing, determining concept and company general plan, directing and providing policy/ decision on all design-and-build and implementation of operational management towards the company's growth and development;
ii. Developing, managing, and controlling all operational management performance for the interest of the company;
iii. Supervising and controlling all operational management performances for the company's interests;
iv. Realizing and implementing plans and procedures implemented through delegation of authorities to the operations department;
v. Preparing a report on activities to the president director as accountability of all activities of the operational management;
vi. Supervising the performance of operations department;
vii. Creating basic concept, framework, and departmental procedure based on needs and concept proposed by operations department;
viii. Ensuring and supervising the application of each organizational aspect and receiver of motivation of operational management are integrated with the company's strategy target and contributing to the success of target accomplishments;

i. Audit Committee

The Job of Audit Committee:

i. Analyze each of the risks of the corporation and the implementation of risk management by the board of directors;
ii. Evaluate the work plan and conduct an internal audit;
iii. Review the status of implementation of significant recommendations regarding internal controls submitted by internal and external auditors;
iv. Review and report to the board of commissioners regarding complaints relating to the company.
v. Review financial information to be published by the company such as financial statements, financial projections, and other financial information;
j. Investment partnership.

The Job of Investment Partnership:

i. Understand the company's risk management that encompasses various corporate risks, including the company's strategy, system, risk management policy, and internal controls, including methodology and infrastructure;
ii. Reviewing policies, procedures, recommendations, and implementing business strategies;
iii. Evaluate a number of risk measurement models and provide further recommendations;
iv. Monitor the suitability between various policies and the implementation of risk management;
v. Evaluate various risk management models used by the company and provide recommendations;
vi. Evaluate a number of risk management policies at the request of the board of commissioners;
vii. Review company's investment policies and procedures.
k. Human Capital Committee

The Job of Human Capital Committee:

i. Establish transparent selection criteria, qualifications, requirements and nomination procedures for prospective members of the board of directors and senior management officers one level below the board of directors, including the secretary of the board of commissioners and members of the committee;

ii. Assist the board of commissioners in ensuring the nominations of candidates for the board of directors, including candidates for the secretary of the board of commissioners and members of the committee to be proposed, both within and outside the company, in accordance with the selection criteria and nomination procedures established;
iii. Ensure that the company has a formula for calculating remuneration, allowances, and facilities that are transparent to prepared as a proposal in the annual GMS;
iv. Assisting the board of commissioners in formulating and determining remuneration policies and other facilities for the board of commissioners, board of directors, secretary of the board of commissioners, committee members and other instruments of the board of commissioners.

l. Secretary

The Job of Secretary:

i. Delivery of information disclosure, quarterly and annual financial reports, as well as annual reports;
ii. Submission of the company's latest information to all stakeholders;
iii. Implementation of GCG implementation of the company.

Student of Secretary:

i. Following the development of capital markets, especially those relating to regulation;
ii. Providing input to the board of directors and board of commissioners of issuers or public companies on how to comply with the provisions of capital market laws and regulations;
iii. As a liaison between the Issuer or public company with shareholders of the issuer or public company, financial services authority, and other stakeholders.

m. Audit Internal

The Job of Audit Internal:

i. Developing and implementing internal audit plans;
ii. Examining and evaluating the implementation of internal controls in accordance with the company’s policies;
iii. Conducting inspections and assessments of the efficiency and effectiveness of finance, accounting, operations, information technology and other activities;

iv. Providing suggestions for improvements and objective information about the activities examined at all levels of management;
v. Creating audit reports and submitting the reports to the president director and the board of commissioners;
vi. Monitoring, analyzing, and reporting the implementation of the improvements that suggested;
vii. Working closely with the audit committee;
viii. Developing programs to evaluate the quality of the internal audit activities;
ix. Performing special inspections if necessary.

n. General Manager

The Job of General:

i. Managing the company's financial budget;
ii. Decide and make policies for the progress of the company;
iii. Establish company procedures and standards;
iv. Make important decisions on investment, integration, alliances and divestments;
v. Plan and execute the company's medium-term and long-term strategic plans for the company's progress;
vi. Attend meetings, seminars, conferences, and training.

Student of General Manager:

i. Leading the company;
ii. Coordinate the company;
iii. Managing the company.

o. Production Manager

The Job of Manager Production:

i. Scheduling and organizing production schedules;
ii. Establish product quality control standards;
iii. Supervise the production process;
iv. Organize routine maintenance and maintenance of production equipment;
v. Supervise the work of junior staff;
vi. Assess the feasibility of the project;
vii. Managing the purchase and ordering of production raw materials;
viii. Become a liaison with buyers, markets, and sales staff;

ix. Clarify and negotiate the client and manager's time span in terms of the production process;
x. Student of production manager provides advice and advice and assessment of the performance of subordinates;
xi. Providing sanctions against mistakes and violations of subordinates;
xii. Ask for advice, guidance and guidance from above;
xiii. Creating new innovations in production work;
xiv. Provide input to the company related to the department;
xv. Coordinate with other departments related to the department.

p. Marketing Manager

The Job Marketing Manager:

i. Planning a marketing strategy considering market trends and corporate resources;
ii. Conduct market opportunity analysis planning;
iii. Leading the entire department of marketing to create the highest level of efficiency, effectiveness, and productivity;
iv. Responding to problems related to customer complaints if not able to be handled by subordinates;
v. Monitoring the potential of subordinates to do coaching so that the better;
vi. Monitoring the efficiency and effectiveness of established marketing strategies.

q. Finance Manager

The Job of Finance Manager:

i. Financial Managers work with other managers, in charge of planning and forecasting some aspects of the company including general corporate financial planning;
ii. The financial manager is in charge of making important investment decisions and various financing and all matters related to the decision;
iii. The financial manager is in charge of running and operating the life of the company as efficiently as possible by collaborating with other managers;
iv. Financial managers serve as liaison between the company and the financial market so that it can get funds and trade corporate securities.

r. HRD

The Job of HRD:

i. Responsible for managing and developing human resources. This includes the planning, implementation and supervision of human resources and the development of the quality of human resources;
ii. Creating an effective and efficient HR system, for example by making SOP, job description, training and development system etc;
iii. Full responsibility in the recruitment process of employees, ranging from finding prospective employees, interviewing to selection;
iv. Conduct selection, promotion, transfer and demotion of employees as deemed necessary;
v. Conduct coaching activities, training, and activities related to the development of skills, potential, mental, skills and knowledge of employees in accordance with company standards;
vi. Responsible for matters relating to employee absences, salary calculations, bonuses and benefits;
vii. Creating an employee contract and renewing the term of the employment contract;
viii. Conduct disciplinary action against employees who violate company regulations or policies.

s. Supervisor

The Job of Supervisor:

i. Supervisor should manage the work of the executing staff (staff below);
ii. Supervisor must make job desc for his staff;
iii. Motivate under staff to work better;
iv. Make schedules for staff;
v. Implement briefing with staff below it;
vi. Determine what work will be done in the short and long term;
vii. Uphold the rules that have been made by the company in order to create work discipline;
viii. Controlling and evaluating subordinates

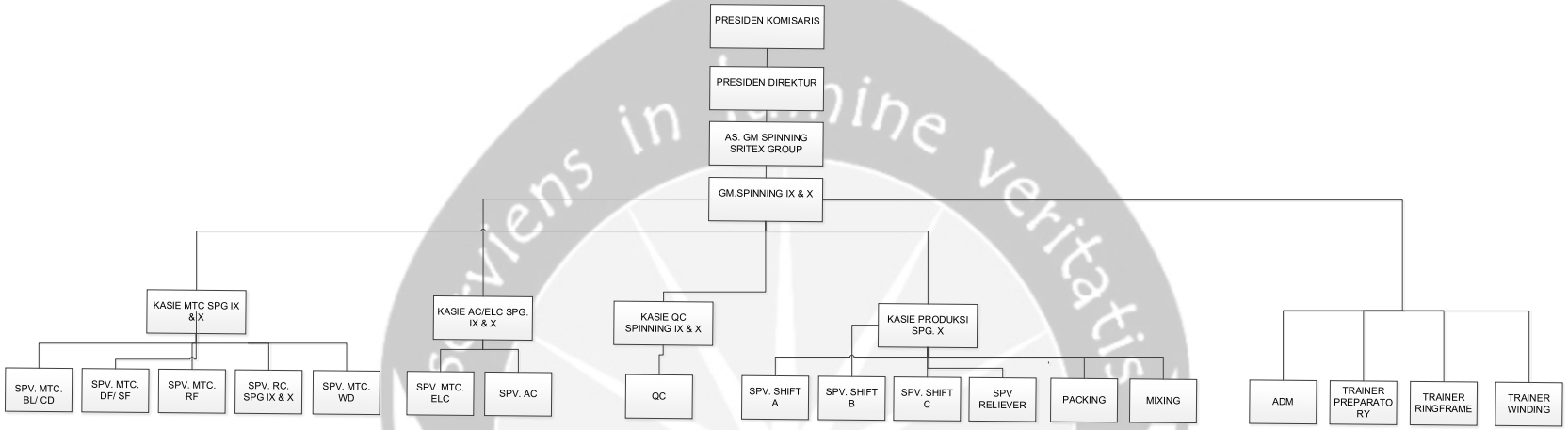


Figure 2.2. Organizational Structure of the Spinning X Department

Organizational structure in spinning X is used to describe the duties and responsibilities of employee contained in the spinning X department so, the work and responsibilities of an employee can be achieved in accordance with the objectives, a description for the tasks of each section explained in this chapter

a. Maintenance Head of Maintenance Section

i. Make scheduling for engine maintenance;

ii. Conduct routine monitoring and checking of problems with machines.

b. Head of Section AC / electric

i. Make scheduling for AC / other electrical checks;

ii. Conduct direct supervision when there are AC checks or other electricity.

c. Head of QC

i. Make a schedule for quality checking from raw materials to finished products;

ii. Direct supervision when the supervisor checks raw materials and finished products.

d. Head of Production Section

i. Make a schedule for production activities;

ii. Conduct direct supervision when production activities are taking place;

iii. Handling problems that occur in the production process or production order.

e. Supervisor Maintenance Blowing / Carding

Lead and be responsible for maintenance blowing or carding.

f. Supervisor Maintenance Drawing Finisher / Speed Frame

Lead and be responsible for maintenance drawing breakers or speed frames.

g. Supervisor Maintenance Ring Frame

Lead and be responsible for maintenance of the ring frame.

h. Supervisor Maintenance Roll Cleaning

Lead and be responsible for roll cleaning.

i. Supervisor Maintenance Winding

Lead and be responsible for maintenance winding.

j. AC Maintenance Supervisor

Lead and be responsible for air conditioning maintenance.

k. Supervisor Maintenance Electric

Lead and be responsible for electric maintenance.

l. Supervisor Maintenance Quality Control

Lead and be responsible for maintenance QC.

m. Supervisor Shift A

Lead and be responsible for the production of shift A.

n. Supervisor Shift B

Lead and be responsible for shift production B.

o. Supervisor Shift C

Lead and be responsible for shift production C.

p. Supervisor Reliever

Lead and be responsible for substitute shift A, shift B, and shift C.

q. Packing Supervisor

Lead and be responsible for the packing process.

r. Supervisor Mixing

Lead and be responsible for the mixing process.

s. Administrative Supervisor

Lead and be responsible for administrative files.

t. Trainer Supervisor

i. Provide guidance and introduction to company regulations to new employees;

ii. Providing training to new employees.

2.3. The Company Management

The company management in PT Sri Rejeki Isman (Sritex) has received the recognition of good quality based on ISO 9001: 2008 on Quality Management. Then not only good quality but this company has also received recognition from SGS United Kingdom that is ISO 14001: 2004 on Environmental Management System.

2.3.1. Vision and Mission

a. Vision

Becoming a leading textile and garment producer with the best reputation and credibility

b. Mission

i. To produce the most innovative products to meet the purpose and the needs of the customers;

ii. To become a profit and growth-oriented company in the interest of all stakeholders;
iii. To provide and maintain a conducive work environment for all employees;
iv. To contribute and add value to the surrounding community.

2.3.2. Trilogy and Tridharma of Company

a. Trilogy

i. The Company is our livelihoods;
ii. Today must be better than yesterday, and tomorrow must be better than today;
iii. We are Sritex family, and we make unity our priority/

b. Tridharma

i. Melu Handarbeni (Sense of Belonging);
ii. Melu Hongrungkebi(Being Responsible);
iii. Melu Sariro Hangrosowani(Always Aware).

2.3.3.Quality Policy

In maintaining customer quality and satisfaction, there are several policies implemented by PT Sri Rejeki Isman, the policy is called quality policy, there are several quality policies:

a. Meet customer standards;
b. Satisfy customers;
c. Are delivered on time;
d. Improve continuously.

2.3.4. Marketing

a. Marketing Strategy

PT Sri Rejeki Isman Tbk (PT Sritex) is a company that has been able to conduct the production of widespread products. The company is not only in domestic market but also in the international market. The company also becomes the supplier for German military uniforms and member states of The North Atlantic Treatu Organization (NATO).

The variety of products produced distinguishes marketing strategy conducted by PT Sritex. For products that have limited levels of variation, this company does a sales strategy with Made to Stock based on the current price or on the spot in the

international market. Examples of products produced by this company with a Made to Stock strategy are yarns produced in the Spinning department, and then for the Made to Order sales strategy for products with a high level of variation, for example, finished fabrics and garments in the Finishing debarment

b. Market Share

Market Share as seen in the Indonesian Textile Association (API) to serve as a reference that in the textile industry in Indonesia there are 2,930 textile companies and based on the Ministry of Industry of Indonesia, it as seen that there are 2600 companies that each use an old machine or machine age more than 20 year, but PT. Sritex is a company that has advantages in domestic market share compared with other textile industry companies in Indonesia. This is because the company has a competitive advantage that other textile companies do not have, for example, the company is in the production process, the machines used by the company to do the production are new machines.

2.3.5. Employment

PT. Sri Rejeki Isman Tbk. is a company that has many employees

Division of company working hours:

a. Staff Management

i. Monday – Friday : 08.00 – 16.00 (break time: 12.00 – 13.00);

ii. Saturday : 08.00 – 13.00.

b. Employment

i. Shift 1 : 06.00 – 14.00;

ii. Shift 2 : 14.00 – 22.00;

iii. Shift 3 : 22.00 – 06.00.

For the employee break schedule is divided into 4 steps for each shift, for details about employee break schedules as seen in table 2.1.

Table 2.1. Employee Break Schedule

STEP	SHIFT MORNING		SHIFT AFTERNOON		SHIFTEVENING	
	START	FINISH	START	FINISH	START	FINISH
I	08.00	08.30	16.00	16.30	24.00	00.30

Continued Table 2.1. Employee Break Schedule

STEP	SHIFT MORNING		SHIFT AFTERNOON		SHIFT EVENING	
	START	FINISH	START	FINISH	START	FINISH
II	09.00	09.30	17.00	17.30	01.00	01.30
III	10.00	10.30	18.00	18.30	02.00	02.30
IV	11.00	11.30	19.00	19.30	03.00	03.30

Based on the employee break schedule, it as seen that there an employee who works at night and the work time applies to all employee at PT. Sritex has been arranged in a rolling manner so that the working time applies both to the male and female employee. Responding to this matter, it has been stipulated in Article 76 of Law Number 13 of 2003 concerning labor regulations related to night work arrangements for women employee. Based on these regulations, an employee who works in this company is an employee who has more than 18 years of age. This company will not accept an employee who is 18 years old or less than 18 years old. The reason for this company to have rules regarding the age limit of the employee is above 18 years because of the possibility that the risks that arise will be higher and the provisions stated in Article 76 paragraph (1) of Law Number 13 of 2003 concerning Manpower. In that article, determined that employee or female employee age less than 18 years prohibited from being employed between 11:00 p.m. and 7 a.m.

Company policies based on laws and regulations:

a. The company ensures that all production activities and other activities carried out within the company must be based on an understanding of non-violence and anti-gender discrimination, anti-sexual abuse, and sexual harassment;
b. The Company ensures and guarantees the implementation of training and education on the meaning of violence, persecution, periodic understanding of gender discrimination and sexual harassment by observing the existing rules;
c. The Company ensures that there is a suggestion box, SMS (Short Message Service) center to facilitate reporting if there is a form of violence, abuse, gender discrimination in the process of work activities. The form of behavior that processed both physically and verbally or orally carried out;

d. The company ensures that the settlement will be completed by following the laws and regulations and prohibits carrying any objects that are not related to production activities.

2.3.4. Facilities

Layout of PT Sri Rejeki Isman 2 Company

PT Sri Rejeki Isman 2 divided into several facilities, post-security guard, parking, polyclinic space, canteen, mosque, garden utility, spinning 6 department, spinning 7 department, spinning 8department, spinning 9 department, spinning 10 department, storage for raw material, water treatment and mess. Details of PT Sri Rejeki Isman 2 layout presented in figure 2.3.

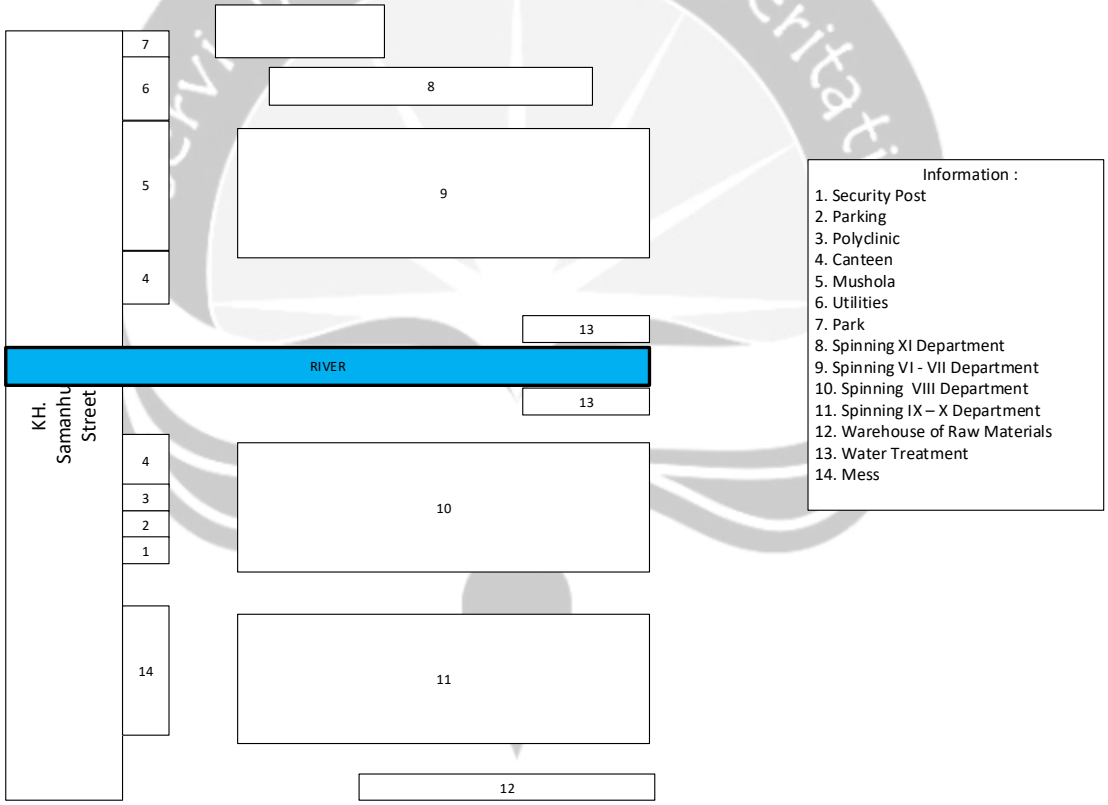


Figure 2.3. Layout of PT Sri Rejeki Isman 2 Company

a. Mess and Rusunawa Employees of PT Sri Rejeki Isman

The provision of mess and rusunawa facilities to employees can help the employee's cost of living, so with the existence of mess and rusunawa facility hopefully can give the spirit for the employee or employees in work, so that employee can focus on work and reduce factors delay for work to come to the company. Distance mess and rusunawa employees of PT Sri Rejeki Isman is close to the company.

b. Mosque

The mosque is a place to worship. At PT. Sri Rejeki IsmanTbk is building a mosque to facilitate Muslims at the time to carry out worship, especially on Friday. Every Friday this mosque is always used by Muslims to perform Friday prayers, so the employee does not need to go looking for mosques if they want to perform the Friday prayer. The figure of the company mosque as seen in Figure 2.4.

Figure 2.4. Company Mosque

c. Canteen

Canteen is one of the facilities of PT. Sri Rejeki Isman (Sritex) when an employee wants to do lunch or rest during break time. This canteen is built by the company to make easier the employee or operator when they want to rest and add energy. So, when employee or operator work again, the employee can work optimally and can start working again on time. The canteen image as seen in Figure 2.5

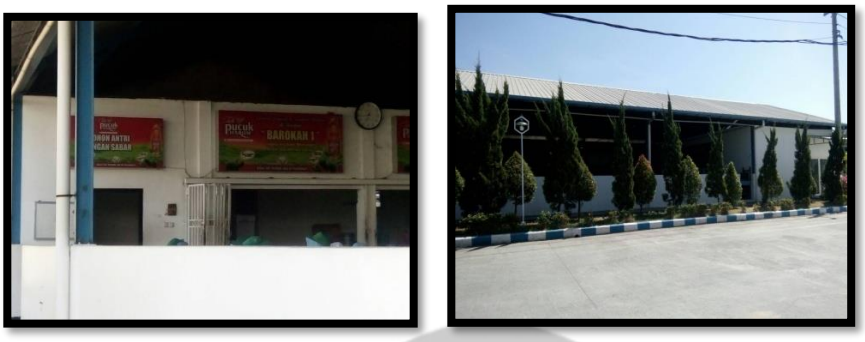


Figure 2.5. Company Canteen

d. Policlinic PT Sri Rejeki Isman

To fulfill the company's obligation to make the employee or worker keep healthy, PT Sri Rejeki Isman (Sritex) provides health insurance to its employee,the company also has a small polyclinic located in the factory area. The clinic located at the main entrance next to the security post. The clinic operates for 24 hours. The clinic may be used by the employee or the worker to consult a physician when the employee filling sick. In addition, the company also provides health insurance benefits to employees like health insurance BPJS, so employee experience illness and want to do the treatment to be healthy and can do some activity with optimal, employee can use BPJS when employee experience illness and employee can get a reasonable health insurance for fulfillment of basic needs of life of Indonesian population. The company polyclinic figure as seen in figure 2.6

Figure 2.6. Company Policlinic

CHAPTER 3
REVIEW OF ENTERPRISE SYSTEM

3.1. The Company Business Process

The business process is a series of interrelated jobs within a company. In this business process is a picture of some activities that interconnected with each other. The description of PT Sri Rejeki Isman's business process as seen in Figure 3.1

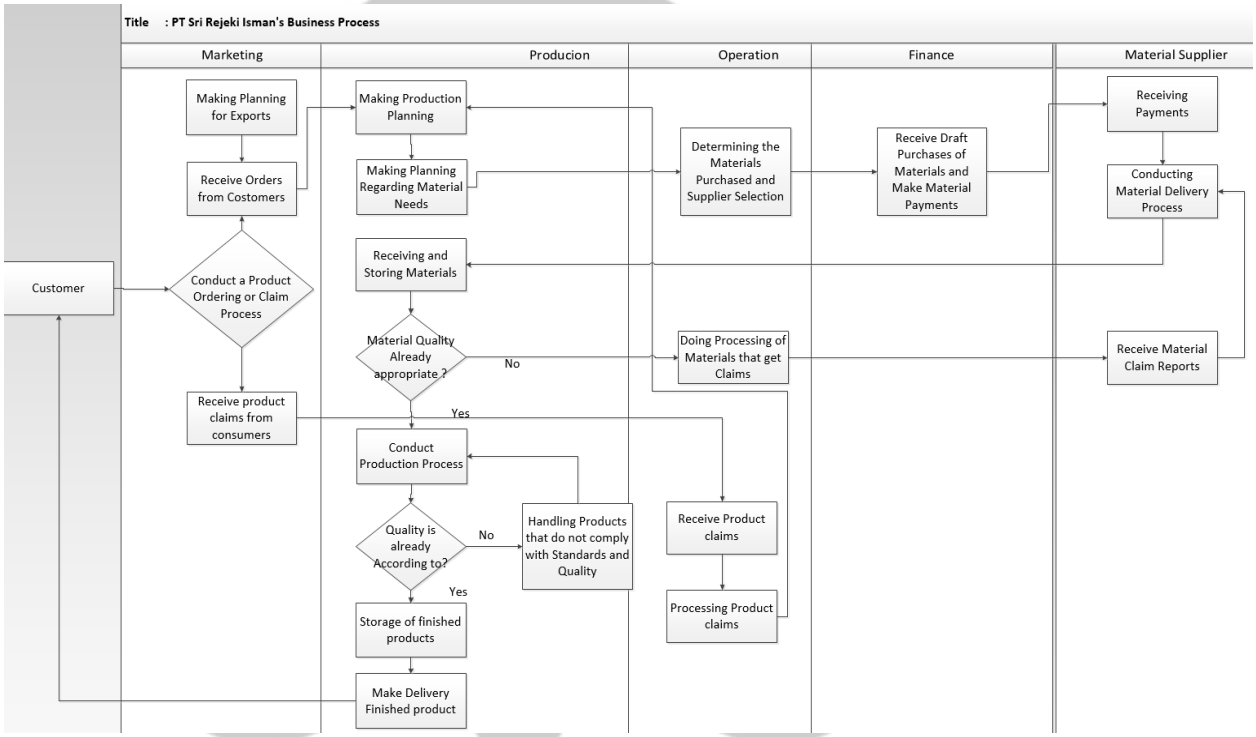


Figure 3.1 PT Sri Rejeki Isman's Business Process Flowchart

A business process of PT Sri Rejeki Isman started from the customer order and accepted by the marketing. The marketing will process the product ordered by the customer, at this process the marketing can accept the ordering of products or receive claims from customers of products received by customers. When accepting an order from the customer then this process will continue to process a customer order, but if marketing accepts the claim of the product from the customer, the marketing continues the process to operate.

The next activity, the marketing received an order from a customer and given to the production. The production makes a production based on the customer order. Before started production of the product, the production makes production planning first. After making production planning, then the next process plan about raw materials needed. Plan about raw materials submitted to the operation, the operation will determine what materials purchased and make supplier selection. Then the next activities of this operation, give to the financial about the purchase of payments to be given to customers, customers who make payments first it will be processed first.

Then after the customer approves the cost given from the finance and make payments to the financials, the financial will submit to the material suppliers, material suppliers will receive payment from the finance, after receiving payment, the next activities from the supplier delivery of materials to the production.

After production receiving raw materials from raw suppliers, the next activities keep material to the storage, in storage of materials, the production will see the quality of the material received, if the received material has a quality accordance with the quality of the company, then the production continue with production process, but if the quality of the raw material received does not accordance with the standard quality of the company, the production will report to the operation and the operation will process the material claimed to the suppliers of raw materials. After receiving the report of material claims from the operation, the material suppliers will make the process of delivery of new raw materials.

Then after obtaining the raw materials with the quality in accordance with the standards quality, the next activity, production process, at the time of production process will be checked or quality control whether the resulting product in accordance with standard quality that has been determined by the company or not, if not accordingly, the next activity is to handle the products that have not been in accordance with standard. After the product ready, the next activity, do the packaging as well as finished store products in the finished product warehouse. Ready products shipped to customers.

3.2. The Resulting Product

Products result of PT. Sritex, produced from various departments,there are spinning departments, weaving departments, dyeing, and printing (finishing) departments and lastly there is a garment department.

3.2.1. Product of the Spinning Department

The product result in this department is yarn. The process of making these yarns contain two types of raw materials, namely raw materials from natural fibers and raw materials from artificial fibers. During the production of products in this spinning department, two marketing strategies make up the characteristics of this spinning department, namely the application of the Make to Order (MTO) and Make to Stock (MTS) production systems. Products that perform the MTO sustainability system are yarn products that have received orders from customers,the resulting yarn products must match the criteria desired by customers. The system of MTO itself is the main focus of PT Sritex because most of the production process by this company is a product that has been ordered by customers.

Meanwhile, if the company has fulfilled the customer order then to fill the production activity the company is implementing the production system with MTS strategy. The product used by the MTS strategy is the NE 30'S yarn product, this is because the NE 30'S yarn product is the most desired product by customers in the market. Various products produced in the spinning process as seen in Table 3.1

Table 3.1 List of Spinning Products

No	Type of Yarn
1	30'S Rayon Wax
2	30'S Rayon
3	28'S Rayon
4	20'S Rayon
5	28'S Lenzing Modal Wax
6	30'S Lenzing Modal Wax
7	40'S Lenzing Modal Wax
8	14'S Lenzing Modal

An example of a product image of the spinning results as seen in Figure 3.2

Figure 3.2 Cones

3.2.2. Product of Weaving Department

Products result in weaving department is fabric in the form of rolls or fabric that is still raw, the fabric is plain fabric, fabric with batik motifs and cloths. As it known that PT. Sritex is concerned with quality, then the products produced in this department can compete with other companies, besides that, which makes this company able to compete with other company is this company produce various kinds of raw cloth. The strategy in the weaving department is Make to Stock (MTS) production system. In this department, the production system used is MTS caused in this department the company only produce fabric in the form of rolls. The products of weaving department as seen in Table 3.2.

Table 3.2 List of Weaving Products

No	Product Code
1	R11
2	R189
3	R 78
4	R 100
5	R 99
6	R 79
7	R 60
8	SW
9	R 29

An example of a product image of the weaving product as seen in Figure 3.3

Figure 3.3 Plain Fabric

3.2.3. Product of Finishing Department

Products result in finishing department, is finished cloth. The strategy in this finishing department is Make to Order (MTO). Implementation of this production system is MTO because this department does the production process with color and motif of cloth according to customer want, so in this production process flow, after finishing department accept an order from a customer in the form of motif and color of fabric, this department started. The products produced in this department are plain fabric and patterned fabric. Examples of product figure from finishing as seen in Figure 3.4

Figure 3.4 Finishing Fabrics

3.2.4. Product of Garment Department

In the garment department, the company produces ready-made products,these products are a variety of uniforms, both military and non-military uniforms. This uniform product is produced not only for Indonesia but also International companies

The implementation strategy of production done in this garment department is Make to Order (MTO). The application of MTO production because the production process of this department done after receiving orders from the customers about the product to be ordered, for example, the customer comes ordering the work uniform with a certain amount, then this department will make the customer with the time required to make the product ordered, after the deal occurs then this department will make the product in accordance with the ordering of customers with a period in accordance with the agreement. The products produced in this garment department are an intermediate jacket, pairing pants, children's clothing, adult clothing, and others. Examples of product figure from the garment result as seen in figure 3.5

Figure 3.5 Garment Products

3.3. Production Process

Production process conducted by PT Sritex consists of four divisions namely, Spinning, Weaving, Finishing and Garment

3.3.1. Spinning

This process is the process for making the fiber into yarn. In this spinning process, PT Sri Rejeki Isman Tbk already has 12 spinning departments.

In the spinning process itself there are several processes for making yarn from raw material to packing. The following is an explanation of the spinning process in the spinning department:

a. Raw Material

Raw materials are one of the critical processes in the production process of a product because the production process will run if the available raw materials. In spinning production process, the raw material used is fiber. In the raw materials used by PT Sri Rejeki Isman Tbk, there are two fibers that are divided into several parts, namely natural fibers, and artificial fibers. For natural fiber is divided into two types, namely fiber plants and animal fibers.

Plant fibers can be seeds (cotton); haired tree trunks (hemp, kanaf, sunn); leaves (albaka, sisal, hanaquen); fruit (coconut fiber). Then for animals can be wool and caterpillar (sutra).

Then for artificial fibers can use raw materials from organic, natural polymer (vikosa, cellulose, royan); artificial polymer (conditional polymer).

To get raw materials, PT Sritex has cooperated with several countries such as America, Australia, China. Some of these suppliers are Tangshan, IBR, Sateri, Yamei, Tairiyon, Tensile, and Birla modal. When the company make selection of raw materials, the first activity is to know the weight of raw materials needed, after that choose the good of the raw materials, for the quality of raw materials primarily to determine the quality of the raw materials, companies do the method with the strategy of price selection and raw material needs. However, to produce the quality of raw materials of interest, raw materials are still checked on the quality of raw materials by testing 4 samples on raw materials. Raw materials that have been in the storage must be processed in that period, for example, raw materials arrived in the storage of raw materials in May, then in May the raw materials that already exist in the storage of raw materials has to be done the production process, because if too long in the storage of raw material will cause the raw material to decrease the quality, for example the color fade, the dirt on the beetle animal who likes to stop at the raw material and so on, besides the economic factor also influence, at least 4% can become company loss if raw material which has arrived in the warehouse of raw materials is not immediately

done the production process. The details of the grain's standard presented in Table 3.3

Table 3.3 Standard Grains

BAG	Ne			Weight	
	Min	Std	Max	Std	Range
CD	0,113	0,110	0,107	454 Grain	Max = 467 Grain
					Min =441 Grain
BRK	0,123	0,120	0,117	416 Grain	Max = 426 Grain
					Min = 406 Grain
FNS	0,128	0,127	0,126	393 Grain	Max = 396 Grain
					Min = 390 Grain
RV	1,012	1,000	0,998	125 Grain	Max = 127 Grain
					Min = 124 Grain

CD is Carding; BRK is a Breaker; FNS is Finisher and RV is Raving. While the delivery in the yarn is the amount of production output

b. Mixing

After the raw materials through the process of selecting raw materials that done spinning process then the next step is the mixing process. Mixing machine used is bale plucker machine. In this process, the raw material is still a fiber. When do mixing process, in one line of production, raw materials must match the same brand because the brand of each raw material has different quality, so if the process of mixing is a

different brand, the quality of the product becomes decreased and not accordance with the criteria.

c. Unit Blowing

After going through the mixing process, then the next step is the unit blowing process. In the unit blowing process, the raw materials are sent through the “pipa fan opener” from mixing to the unit blowing to open and decompose the fibers. In this process consists of two processes, namely the process of cleaning and mixing process. The cleaning process is a process used to remove the contents of the dirt, from the cleaning process will affect the fiber strength. Then the mixing process, the mixing process is the process of mixing fiber of the same type. The purpose of the mixing process is to produce a flat yarn.

d. Carding

After going through the Unit Blowing process, the fiber will continue on the carding process, in this carding process the fibers that are still not yet fully open will be refined through this carding process and bringing the fibers in long size. The result of this process is the sliver accommodated inside the “Can.”

e. Drawing Breaker

In principle, the drawing process of this Breaker aims to straighten the fiber in the sliver so that the fibers in the sliver will be in equal size.

f. Drawing Finisher

Basically, between Drawing Breaker process and Drawing Finisher process is same, but the result of this drawing finisher processed will form a fiber straighter and separate between short fibers and long fibers

g. Speed Frame

Change sliver into roving. This roving rolled on a bobbin. Roving itself is the result of a sliver that has been longer and smaller. In this process, Roving will stretch again and length of roving will be affected by the number of threads to produce. Then the bobbin roving will be carried on the ring spinning machine/ring frame

h. Ring Frame

Ring frame process is change roving into cop and make yarn according to the standards.

i. Winding.

In the process of winding, this is the process of moving the coil of yarn from cop rolled in a cone. Cone in this winding process formed by paper cone.

j. Packaging

Packaging is one of the critical processes in production activities in a company. In this packing, some indicators provide information about the weight, type of goods or products, and the customer code that has ordered the product. At the time of the packing process, the company must also pay attention to the importance of packaged products so that the quality of products that do the packaging is guaranteed quality so that customers are not disappointed. There is a requirement that must be considered at the time of the process of packing goods or goods (in this discussion packing on yarn products produced by PT Sritex that is as a place of protected products, so that employers who do this packing process must also be careful during the process packing of this yarn product.

Flow of Rayon Yarn Spinning Process

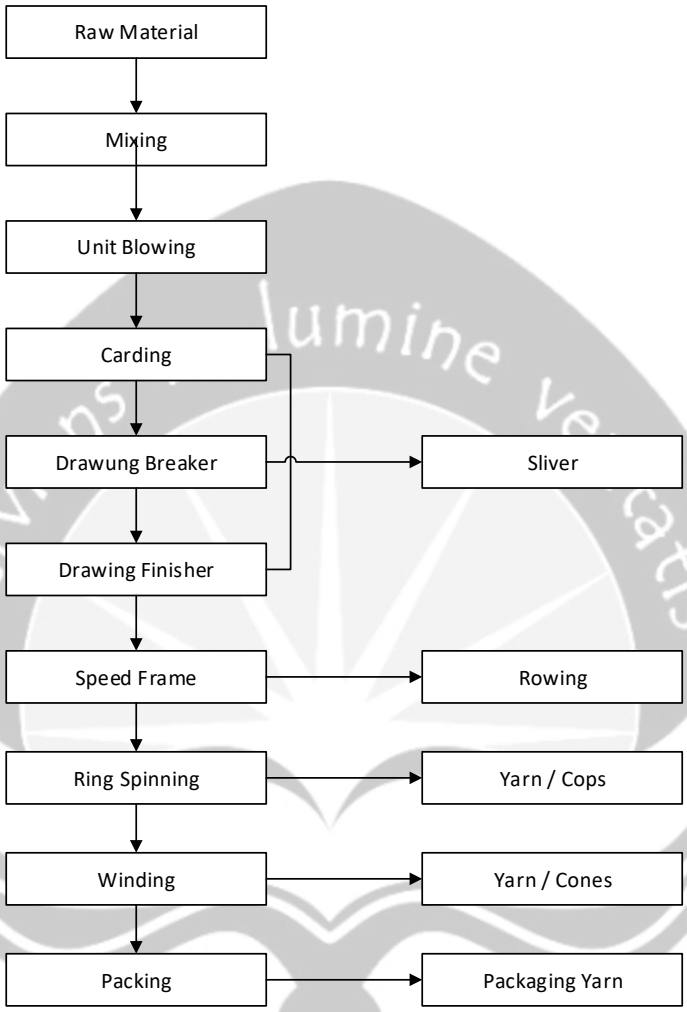


Figure 3.6 Flow Process of Spinning

3.3.2. Weaving

Weaving is a process used for various types of fabrics. In this process is making yarn into cloth. In weaving process is divided into warp and weft yarns. The warp yarn is a yarn processed through the process of starch (kanji) and weft yarn is a yarn done on the pirn winding process. In the first process of weaving starts from the raw material (the raw material used is the yarn), then to the next process (in this process, there are two parts, the process through starch process (kanji) or the process that directly to

loom. In the process through the starch process consists of the process of warping, sizing, reaching / tying, loom and inspection process. Then for the process through pirn winding process, the process starts from raw materials to pirn winding process after that to loom process. The process through starch process will meet the process through pirn winding process in loom process.

Warping process is a process of courage where in this process is the process of rolling the yarn with the direction of the parallel rolls (warp thread). Then after going through the process of warping, then the next step is entering the sizing process, the process of sizing is a process of kanji, the purpose of this kanji is to increase the strength or resistance in the yarn so that when weaving the yarn can withstand friction. After going through the sizing stage, then the next step is entering the reaching process, in the process of reaching this is the process of providing accessories, giving these accessories is to put the thread on the dropper, gun, and comb. The dropper used to stop the yarn when the thread broke,the gun is used to carry the yarn, ascending the yarn, carrying the yarn to open and close the warp, the comb is used to press the cloth. After going through the process of reaching, the next step is through the weaving process. After going through the weaving process then the next process is to inspect the fabric, whether the fabric of the weaving process has a defect or not. Flow process weaving as seen in Figure 3.7

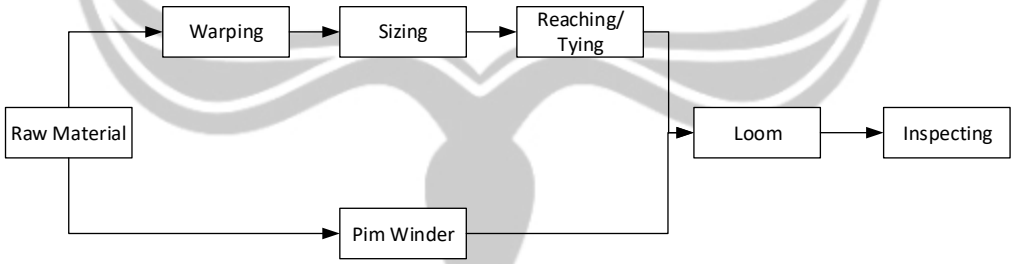


Figure 3.7 Flow Process of Weaving

3.3.3. Dyeing and Printing (Finishing)

In the production process by dyeing and printing, this is a process with the finished fabric. This process transforms the fabric into a finished fabric. The process flow in this finishing department begins from pretreatment process, then the dyeing process and printing process. The pretreatment process is a process to remove the hairs that

still exist in the fabric. In the pretreatment process, there are several processes, namely desizing process, scouring process, bleaching process, and mercerizing process. The desizing process is a process for starch removal, this process is the first process in pretreatment. Then after going through the desizing process, the next process is to the scouring process, in the scouring process the fabric will enter in the chemical washing process, the purpose of this chemical washing to remove the dirt of fabric is cannot dissolve. Then the next process is the bleaching process. In the bleaching process is a process done to remove the dirt by increasing the white color on the fabric. After going through the bleaching process then the next process is a mercerizing process, the purpose of the mercerizing process is to increase the fiber strength of the fabric.

Then after going through this pretreatment process then the next process is dyeing process and printing process, the difference of the dyeing process and the printing process is on dyeing process the fabric produced is plain fabric, while in the printing process, the resulting, fabric that has a pattern. Flow finishing process is as seen in Figure 3.8

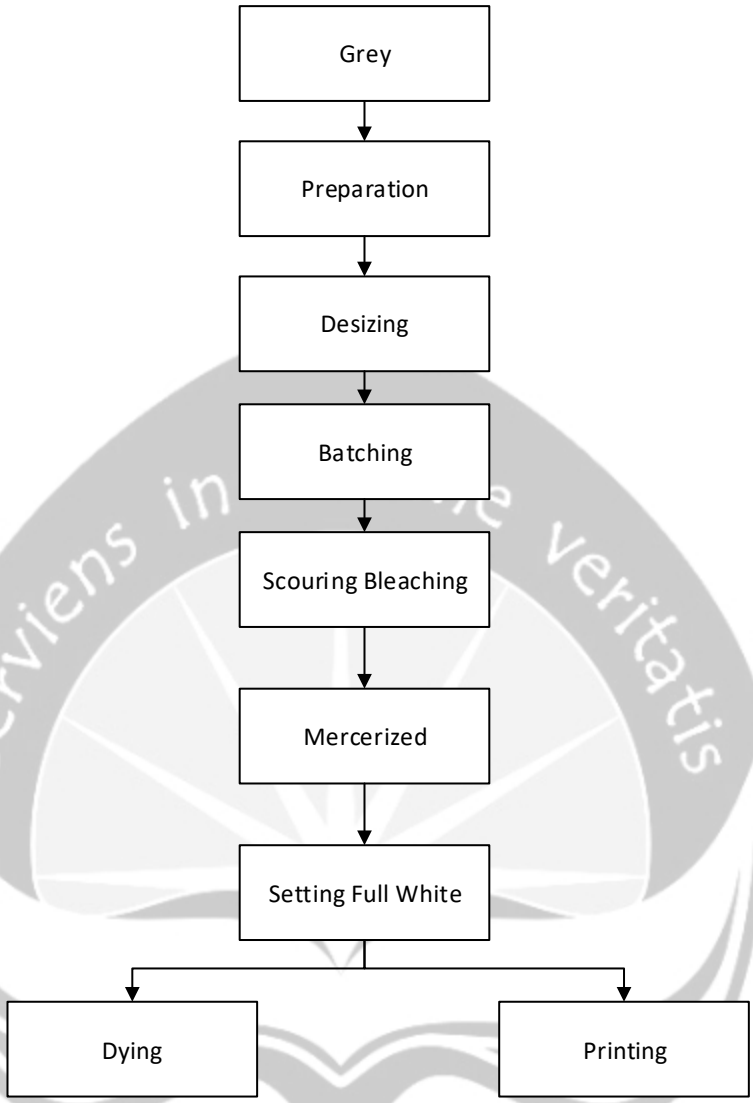


Figure 3.8 Flow Process of Finishing

3.3.4. Garment

In garment process is a process that changes the fabric into clothes. In this garment department, the final result is clothes. In this garment department, the production will do process when customers order the product, the first process forming patterns based on customer order.

After forming the pattern design, the next step makes a sample according to the pattern, after that checking the sample and ask approval to the customer, if the sample accordance with the customer order and customer approve the sample, so this

process continue to the cutting process, but if customers not approve the sample so the garment department will the make a new sample until accordance with customer want.

After going through the process of making the sample according to the pattern of customer want, then the next process is checked by quality control (QC). Next is entering the cutting process, the cutting process is the process of cutting the fabric. In the cutting process, there are several activities, namely marker, spreading, bundling and numbering. Marker is a process of fabric structuring for cutting process will be more efficient in the use of materials or accordance with the needs. Then spreading is the process of deploying the fabric, in this process the sheets of fabric stacked into a pile of fabric. After that bundling is the process of marking the components of the marker pattern that is ready for cutting. Numbering is then the process of assigning a number to the pattern component in the order of the stacks as the cloth performances.

Then the sewing process, in this sewing process is a process to tailor some of the clothing components are already clipped. The result of this process is clothing. After going through the sewing process then the next process is the packing process, but to enter the packing process, the product or clothing that must be checked or inspection in QC finishing, the purpose of this proses is to see clothes that really ready to send to the customers after through the process of tidying up the clothes. Then after the clothing done on QC finishing then the garment entered in the packing process, the packing process is clothing grouped according to the identity and size of the clothing. Flow garment process as seen in Figure 3.9

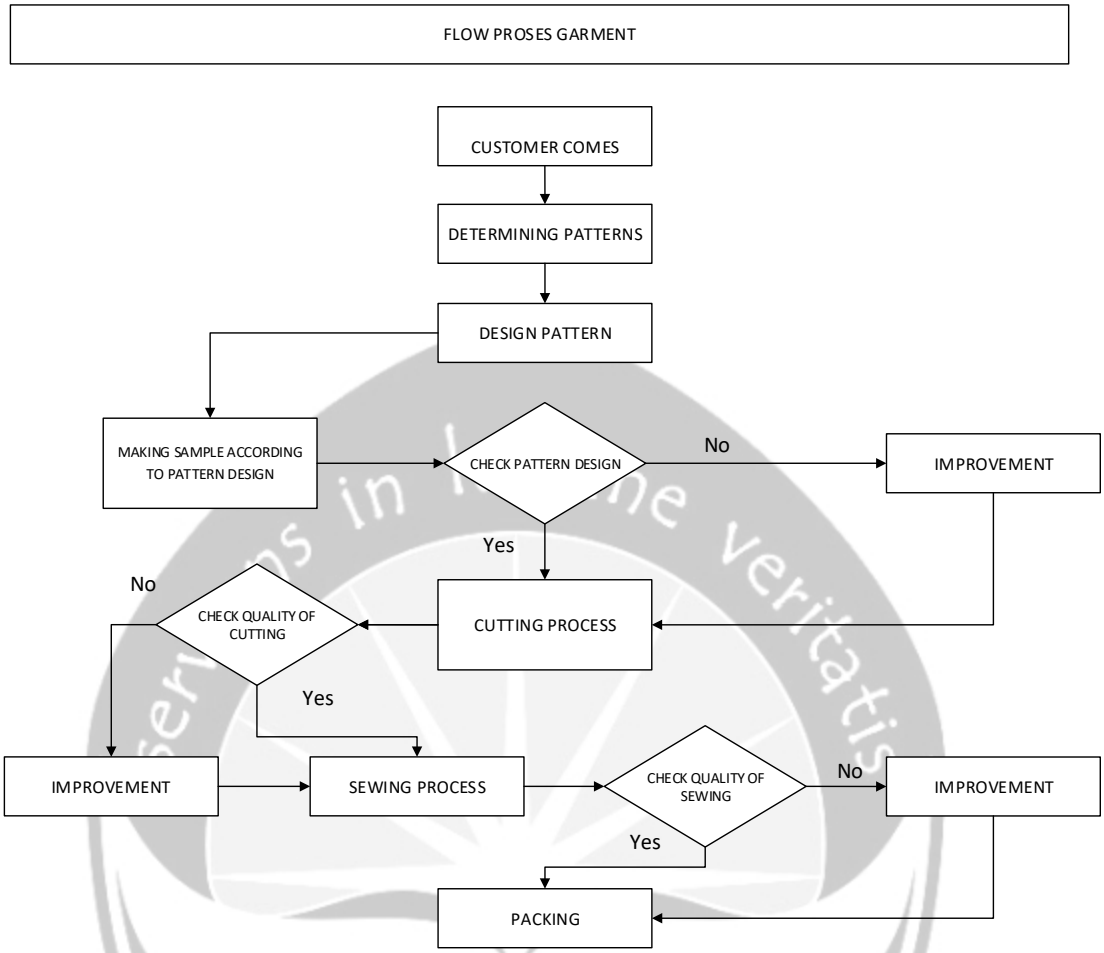


Figure 3.9 Flow Process of Garment

3.4. Production Facility

The Sritex facility is in a strategic location for the textile industry, the company located in a location that can be easily reached by employees and the Sritex production staff has a convenient location or access to the harbor

3.4.1. Production Department Facilities Layout

According to Wignjosoebroto (2009), facility layout is the procedure of arranging factory facilities to support the production process. Basically, the layout of a company's facilities will affect the smoothness of the company. The purpose of the layout design is to minimize the cost of construction, installation and minimize the cause of non-

small losses. The layout of PT Sri Rejeki Isman's spinning department detailed facilities in Figure 3.10.

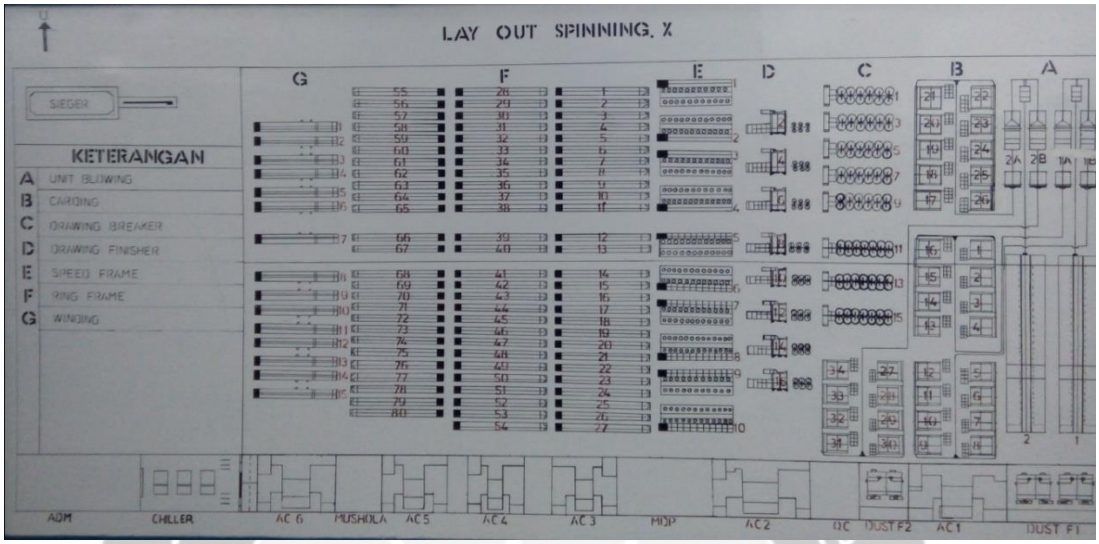


Figure 3.10 Layout of Production Floor for Department Spinning X

3.4.2. Machine Production

a. Bale Plucker Machine

This machine is used to mix from a collection of fibers,the material is still fiber material. Fiber is a type of material in the form of pieces of components that form a long and intact. In this Bale Plucker Machine, there is a separator machine that has a function to separate heavy foreign objects. The Bale Plucker machine image as seen in Figure 3.11

Figure 3.11 Bale Plucker Machine

b. Unit Blowing Machine

Unit Blowing machine is a machine used to break up or separate the fiber that has been collected from the mixing process by bale plucker machine. After that, the unit blowing machine will continue the process to the process of carding processed by using carding machine. In this unit blowing machine is divided into fan transfer machine, multi mixing machine, and fan opener machine. Fan transfer machine is a machine to remove dirt (just to pass through), this machine is a type FA125A. The company has two fan transfer machines for the X spinning department. Pictures of fan transfer engines as seen in Figure 3.12.

Figure 3.12. Fan Transfer Machine

Then multi mixing machine, multi mixing machine is a machine used to decompose and mix the fiber in the yarn. This multi mixing machine is a machine a type JWF 1031 and in spinning X department has 4 multi mixing machine. Multi mixing department as seen in Figure 3.13.

Figure 3.13. Multi Mixing Machine

Then the results of this multi mixing machine will be brought to the fine opener machine. Fine opener machine is a machine that works to open the fiber from multi mixing machine that will bring to the carding machine. This fine opener machine is type JWF 1115 type and the in-spinning X department has 4 fine opener machines. The fine opener machine as seen in Figure 3.14

Figure 3.14 Fan Opener Machine

c. Carding Machine

After going through the separating the fiber from the blowing machine (fine opener machine), then the next process will process by carding machine. Carding machine is a machine used to continue the blowing unit process, the result of this carding process is called sliver and the result of the sliver will be arranged and stored on a CAN. Type

of this machine is JWF 1203 this machine amounted to 34 machines. The image of the carding machine as seen in Figure 3.15

Figure 3.15 Carding Machine

d. Drawing Breaker Machine

After going through the carding machine then the next process will be processed on the drawing breaker machine. The drawing breaker machine is used to change the sliver of the carding process into a flatter and smaller size. This drawing breaker machine is usually called the FA306 A. The number of drawing breaker machines in spinning X department is eight units. Drawing machine drawing breaker as seen in Figure 3.16

Figure 3.16 Drawing Breaker Machine

e. Drawing Finisher Machine

After going through the drawing breaker machine, then the next process will process by drawing finisher machine. Drawing machine finisher is usually called the RSB D45 machine or RIETER. The number of RIETER machines in spinning X department is 14 machines. The results of this machine collected on a container called CAN. The function of this machine is to produce a sliver smoother. Drawing machine drawing finisher as seen in Figure 3.17.

Figure 3.17. Drawing Finisher Machine

f. Speed Frame Machine

Speed frame machine is used to form roving. The result of roving processed (use speed frame machine) rolled on a roving bobbin. Roving is a sliver that has been scaled down and given an extra twist, then wrapped into a large roll, bobbin roving is the name of the rolling roving. This machine is JWF 1415. The number of speed frame machine in this department are ten machines. The speed frame engine image as seen in Figure 3.18.

Figure 3.18. Ring Frame Machine

g. Ring Spinning Machine

Ring spinning machine is a machine used to provide stretch so that fibers that have been through some of the processes form a COP or yarn. The yarn formed will be rolled on a roller called TUBE. The type of this ring spinning machine is the F1508. This department has 80 machines. The image of the ring spinning machine as seen in Figure 3.19.

Figure 3.19. Ring Spinning Machine

h. Winding Machine

A winding machine is a machine used to change the roll of the cops (tubes containing the yarn) that come from the ring spinning machine and then form the roll of cones. The winding machine used by the X spinning department is the Schlafhorst X5 machine. This department has 15 Schlafshort X5 machines. The Schlafshort X5 machine image as seen in Figure 3.20.

Figure 3.20. Machine Winding

i. Steamer Machine

A steamer machine is a machine used to turn off hairy yarns, then to strengthen the yarn. The steamer machine as seen in Figure 3.21.

Figure 3.21. Steamer Machine

3.4.3. Material Handling

a. Forklift

Forklift is a material handling in this company for transportation of heavy goods. Forklifts in this company found in raw material storage. The figure of a forklift as seen in Figure 3.22.

Figure 3.22. Forklift

b. Trolley Langsir 1

Trolley langsir is a material handling used to move raw material from raw material to the preparation area or mixing. Trolley 1 as seen in Figure 3.23.

Figure 3.23. Trolley Langsir 1

c. Box Roving

Box roving is a material handling used to bring the production from speed frame machine to the ring frame machine. The result of production is roving.The figure of box roving as seen in Figure 3.24

Figure 3.24. Box Roving

d. Trolley Doping

Doping Trolley is a material handling used to perform doping or takes the product in the ring frame machine from the full tube replaced to empty tube. The trolley mostly found in the ring frame machine. The figure of trolley doping as seen in Figure 3.26

Figure 3.25. Trolley Doping

e. Trolley Langsir 2

Trolley Langsir 2 is a material handling used to bring the product from the ring frame to the winding (the production of cop in the ring frame). Material handling trolley langsir 2 as seen in Figure 3.26.

Figure 3.26. Trolley Langsir 2

f. Trolley Winding

Trolley winding is a material handling used to bring the production of winding machine in the form of cone to the packing area. The figure for material handling trolley winding as seen in Figure 3.27

Figure 3.27. *Trolley* Winding

g. Hand Lift

Hand Lift or hand pallet is a material handling used to move the goods. Hand lift figure as seen in Figure 3.28

Gambar 3.28. Hand Lift

CHAPTER 4
REVIEW OF STUDENT WORK

4.1. Scope of Work

On the internship, the student was given an opportunity by PT. Sri Rejeki Isman Tbk (Sritex) for 26 days, which starts on July 2, 2018, to learn everything. The student placed in spinning X department to make scheduling production based on work order given from the PPIC. Activities in this department is production process of yarn from raw materials until packaging. The student was given a place at administration room. The work hours on Monday to Friday are 08.00 to 16.00 and for Saturday is 08.00 to 16.00

The student was given the task by Mr. Sriyanto as the field supervisor to make observations on the production department. The observation aims to determine the productivity of workers. The result of the worker productivity was used as data to specify the right a job schedule.

The purpose of this project was to analyze existing scheduling PT Sri Rejeki Isman in order for an activity can run smoothly. The goal of this project was essential because in scheduling activities in design then the allocation of resources and human resources (worker) can operate in accordance with the process within a certain period. Some of the methods used in this task were the method of CDS, NEH method and FCFS method.

4.2. Job Responsibilities and Authorities

During internship in PT Sri Rejeki Isman, the student had the responsibility to observe all activity in the spinning X department to complete the data to make production scheduling and compare with scheduling applied in this company. When the student did observation, the student must follow all the rule in this company. In the first day, the student had introduced about places or locations that can be used to do observation and take some of the data. There are several authorities given by the company to student:

a. The student was allowed to observe all production floors in the Department of Spinning X;

b. The student was allowed to record all the information listed in each line of production process at the time of observation;
c. The student was allowed to ask all the employee in the Spinning X department to find the necessary data information, whether the machine works, the length of each machine's production process, machine capacity, production data;
d. The student was allowed to do documentation for the completeness of data and reports

4.3. Work Methodology

In figure 4.1, is the flowchart of the details steps when finish project.

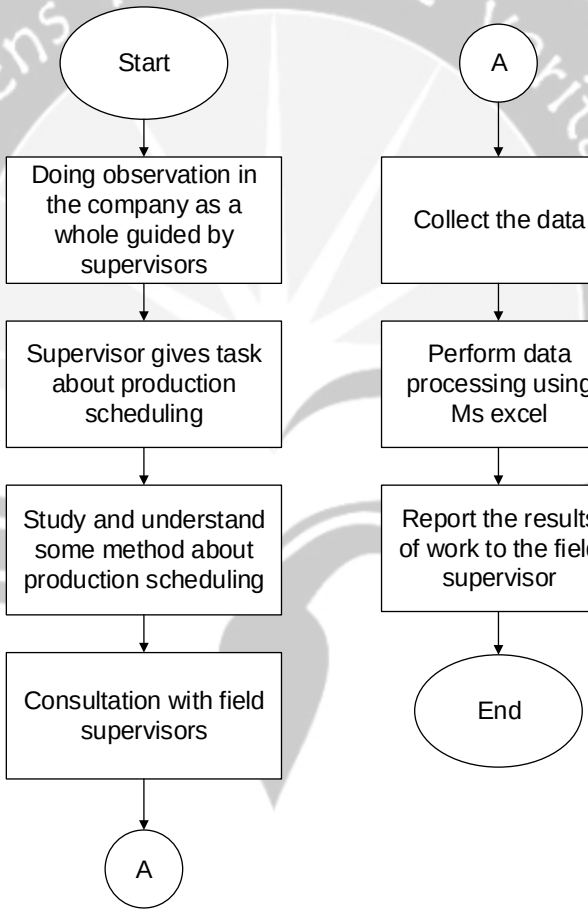


Figure 4.1. Work Implementation Methodology

The following is a breakdown of the steps when conducting an internship.

a. Start
b. Doing observation in the company as a whole guided by supervisors

   On the first-day students allowed to conduct the observations on the production floor in the spinning X department. When conducting this observation students will be guided by field supervisors. The field supervisor will explain the process of the yarn production in the spinning X starting from the warehouse until the packaging.
c. Supervisor gives task about production scheduling

   Then after the students conduct the observations guided by the supervisor, then the next activity the supervisor assigns tasks regarding production scheduling. The task given by the supervisor is a task that becomes the student's focus on developing a particular task when students carry out internships.
d. Study and understand some methods of production scheduling

   Then after getting assignments regarding production schedule, the next step is to learn several methods to help in completing the tasks given by the mentor.
e. Consultation with field supervisors

   After students learn and understand the method, the next activity is to consult with the supervisor to explain what activity will do by the student and consult the data needed to the supervisor.
f. Collect the data

   Then after the student has consulted with the supervisor, then the student begin with collect the data needed to complete the task given by the supervisor. This data collection is done through direct observation and on through interviews with supervisors.
g. Perform data processing using Ms. Excel

   Next, after all the data collected, the next activity is to process the data using MS Excel to facilitate the calculation and simplify the reading of data.
h. Report the results of work to the field supervisor

   Then after completing the data processing, the next step the student takes are to convey the results of the task given by the supervisor, the task is production scheduling. Discussion of these results is carried out by students to supervisors on the last day students conduct internships.

4.4. Working Result

4.4.1. Data and Discussion

a. Data

The data collected was Machine Data at Spinning X Department. Machine data obtained from observation, Machine data in spinning X department as seen in the Table 4.1.

Table 4.1 Machine Data in Spinning X Department

Number of Machines			
No.	**Work Station**	**Machine Code**	**Number of Machines**
1	Carding	M1	34
2	Drawing Breaker	M2	8
3	Drawing Finisher	M3	9
4	Speed Frame	M4	10
5	Ring Frame	M5	80
6	Winding	M6	50

After that students collect data regarding machine data at Spinning X Department, the next activity is to collect data about production data of spinning X department in June 2018. Production data obtained from the administrator, this data is the production data that occurred in spinning X department PT Sri Rejeki Isman in June 2018. Production data in the spinning department X in June 2018 as seen in the Table 4.2.

Table 4.2 Production Data

Production Data													
				NE									
No	Time of Order	Product	Amount (Bale)	Carding	Drawing Breaker	Drawing Finisher	Speed Frame	Ring Frame (10Ry Wax)	Ring Frame (20Ry Wax)	Ring Frame (30Ry Wax)	Ring Frame (30Ry Unwax)	Winding (10 dan 20 Ry Wax)	Winding (30 Ry dan 30 Ry Unwax)
1	Pemesan 1	Benang 30'S Rayon Wax	2152	0,11	0,12	0,126	1,01	10	20	30	30	10	30
2	Pemesan 2	Benang 30'S Rayon	146	0,11	0,12	0,126	1,01	1	1	1	1	1	1
3	Pemesan 3	Benang 28'S Rayon	0,021	0,11	0,12	0,126	1,01	1	1	1	1	1	1
4	Pemesan 4	Benang 20'S Rayon	32	0,11	0,12	0,126	1,01	1	1	1	1	1	1
Jumlah			2330,021										

After obtaining production data in June 2018, the next data required is performance rating of Westinghouse. The data obtained through observation on the production floor of spinning X department. This data based on four factors such as skills, effort,

conditions and consistency. performance rating of Westinghouse as seen in the Table 4.3. The Westinghouse method that as seen in figure 4.8.

Skill			Effort		
+0.15	A1	Superskill	+0.13	A1	Excessive
+0 13	A2		+0.12	A2	
+0.11	B1	Excellent	+0.10	B1	Excellent
+0 08	B2		+0 08	B2	
+0 06	C1	Good	+0 05	C1	Good
+0 03	C2		+0 02	C2	
0.00	D	Average	0 00	D	Average
−0 05	E1	Fair	−0 04	E1	Fair
−0.10	E2		−0 08	E2	
−0 16	F1	Poor	−0.12	F1	Poor
−0 22	F2		−0 17	F2	
Conditions			**Consistency**		
+0 06	A	Ideal	+0 04	A	Perfect
+0 04	B	Excellent	+0 03	B	Excellent
+0.02	C	Good	+0 01	C	Good
0 00	D	Average	0 00	D	Average
−0 03	E	Fair	−0.02	E	Fair
−0.07	F	Poor	−0.04	F	Poor

Figure 4.2. Performance Rating (Westinghouse)

Table 4.3. Performance Rating of Westinghouse

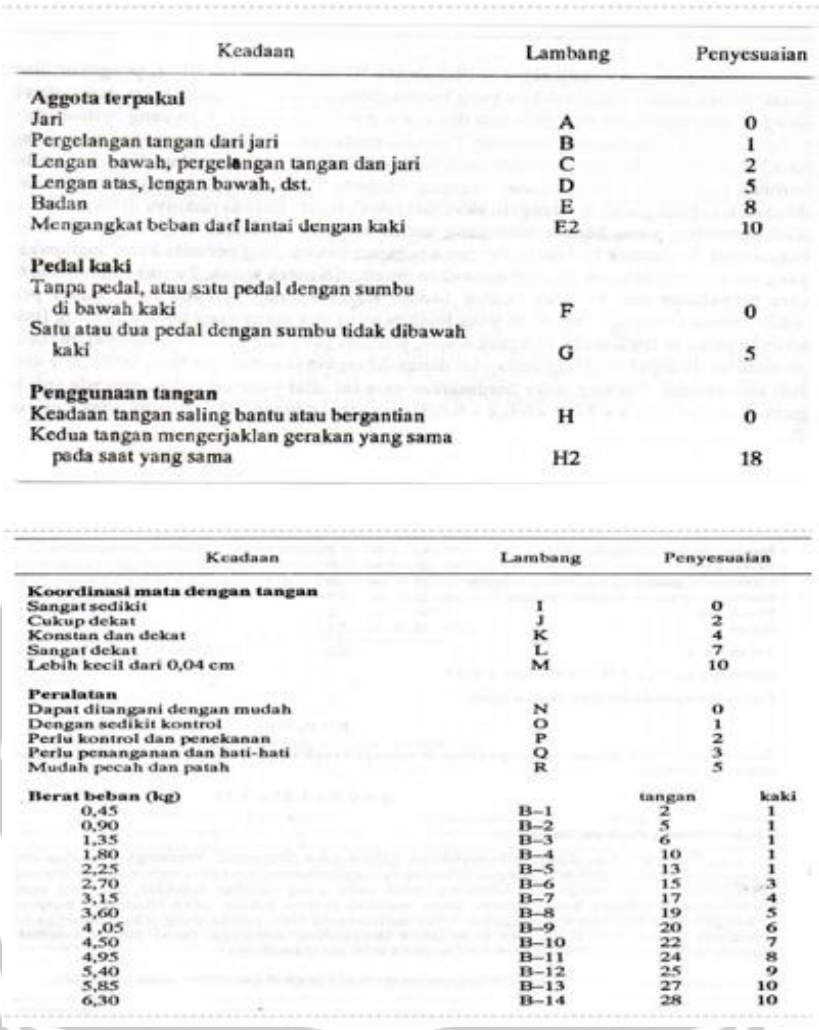
PERFORMANCE RATING OF WESTINGHOUSE

No.	*PERFORMANCE RATING*	Measurement			
		SYMBOL	RATING		
Carding					
1	Skills	Average D	0		
2	Effort	Average D	0		
3	Working Condition	Good C	0,02		
4	Consistency	Good C	0,02		
	Total Rating		0,04	1,04	
Drawing Breaker					
1	Skills	Average D	0		
2	Effort	Average D	0		
3	Working Condition	Good C	0,02		
4	Consistency	Good C	0,02		
	Total Rating		0,04	1,04	

Continued Table 4.3. Performance Rating of Westinghouse

Speed Frame				
1	Skills	Average D	0	
2	Effort	Average D	0	
3	Working Condition	Good C	0,02	
4	Consistency	Average D	0	
	Total Rating		0,02	1,02
Ring Frame				
1	Skills	Average D	0	
2	Effort	Average D	0	
3	Working Condition	Good C	0,02	
4	Consistency	Average D	0	
	Total Rating		0,02	1,02
Winding				
1	Skills	Average D	0	
2	Effort	Average D	0	
3	Working Condition	Good C	0,02	
4	Consistency	Average D	0	
	Total Rating		0,02	1,02

Job difficulty factors explained the condition of operator when the operator does a job, this data measured based on difficulty level of a worker on each workstation. Job difficulty is measured based on six factors such as body member, foot pedals, hand use, eye coordination with hands, equipment and load weight. Job difficulty factors as seen in the Table 4.4. The factors of job difficulty as seen in figure 4.9.



Keadaan	Lambang	Penyesuaian
Aggota terpakai		
Jari	A	0
Pergelangan tangan dari jari	B	1
Lengan bawah, pergelangan tangan dan jari	C	2
Lengan atas, lengan bawah, dst.	D	5
Badan	E	8
Mengangkat beban darf lantai dengan kaki	E2	10
Pedal kaki		
Tanpa pedal, atau satu pedal dengan sumbu di bawah kaki	F	0
Satu atau dua pedal dengan sumbu tidak dibawah kaki	G	5
Penggunaan tangan		
Keadaan tangan saling bantu atau bergantian	H	0
Kedua tangan mengerjaklan gerakan yang sama pada saat yang sama	H2	18

Keadaan	Lambang	Penyesuaian	
Koordinasi mata dengan tangan			
Sangat sedikit	I	0	
Cukup dekat	J	2	
Konstan dan 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 dan hati-hati	Q	3	
Mudah pecah dan patah	R	5	
Berat beban (kg)		tangan	kaki
0,45	B–1	2	1
0,90	B–2	5	1
1,35	B–3	6	1
1,80	B–4	10	1
2,25	B–5	13	1
2,70	B–6	15	3
3,15	B–7	17	4
3,60	B–8	19	5
4 ,05	B–9	20	6
4,50	B–10	22	7
4,95	B–11	24	8
5,40	B–12	25	9
5,85	B–13	27	10
6,30	B–14	28	10

Figure 4.3. An indicator of Job Difficulty Factors

Table 4.4 Job Difficulty Factors

No.	Description	Measurement		
		Condition	Symbol	Adjustment
Carding				
1	Used Body Members	Forearm, Wrist and Finger	C	2
2	Foot Pedal	Without Pedal	F	0
3	Hand Use	Both Hands Help Each Other or Alternately	H	0

Continued Table 4.4. Job Difficulty Factors

4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03
Drawing Breaker					
1	Used Body Members	Forearm, Wrist, and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03
Drawing Finisher					
1	Used Body Members	Forearm, Wrist, and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03
Speed Frame					
1	Used Body Members	Forearm, Wrist, and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	

Continued Table 4.4. Job Difficulty Factors

Speed Frame					
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03
Ring Spinning					
1	Used Body Members	Forearm, Wrist, and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03
Drawing Finisher					
1	Used Body Members	Forearm, Wrist, and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03
Speed Frame					
1	Used Body Members	Forearm, Wrist, and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03

Continued Table 4.4. Job Difficulty Factors

Drawing Finisher					
1	Used Body Members	Forearm, Wrist and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03
Speed Frame					
1	Used Body Members	Forearm, Wrist and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03
Ring Spinning					
1	Used Body Members	Forearm, Wrist and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03

Continued Table 4.4 Job Difficulty Factors

Winding					
1	Used Body Members	Forearm, Wrist and Finger	C	2	
2	Foot Pedal	Without Pedal	F	0	
3	Hand Use	Both Hands Help Each Other or Alternately	H	0	
4	Eye Coordination by hand	The least	I	0	
5	Equipment	Can be Handle Easily	N	0	
6	Load Weight	0,45 Kg	B-1 (Hand)	1	
	Total			3	1,03

Allowance factor data obtained from observation in the production floor. This data measurement on several factors such as power released, work attitude, work movements, eye fatigue, workplace temperature conditions, atmospheric conditions, proper environmental conditions and individual needs, it can be noted that impossible for operator work during the time of completion of the job, sometimes the operator needs rest time to eliminate fatigue when they work, it does not take long for the operator to do this, just to loosen fatigue. Allowance factor data as seen in the Table 4.5. The indicator of allowance factor as seen in figure 4.10.

Factor	Job Example	Equivalent Load	Allowance	
A. Energy released			Male	Female
1. Can be ignored	Working at the desk, sitting down	No load	0.0-6.0	0.0-6.0
2. Very light	Work at the table, stand up	0.00-2.25 kg	6.0-7.5	6.0-7.5
3. Lightweight	Shoved lightly	2.25-9.00	7.5-12.0	7.5-16.0
4. Medium	Hoeing	9.00-18.00	12.0-19.0	16.0-30
5. Weight	Swinging a heavy hammer	18.00-27.00	19.0-30.0	
6. Very heavy	Shouldering loads	27.00-50.00	30.0-50.0	
7. Unbelievably heavy	Bear heavy sacks	Above 50 kg		
B. Work attitude				
1. Sit down	Working sit, light		0.00-1.0	
2. Stand on two legs	Body upright, supported by two legs		1.0-2.5	
3. Stand on one leg	One leg working on the controller		2.5-4.0	
4. Lie down	On the side, back or front of the body		2.5-4.0	
5. Bending	The body is bent on both legs		4.0-10.0	
C. Work Motion				
1. Normal	Swinging a heavy hammer		0	
2. A bit limited	Limited swing from the hammer		0-5	
3. Hard	Carry heavy loads with one hand		0-5	
4. Only for limited limbs	Working with hands overhead		5-10	
5. All limbs are limited	Working in mines		10-15	
D. Eyestrain			Good Lights	Bad Lights
1. Dijointed view	Read measuring instrument		0	1
2. Almost continuous view	Meticulous work		2	2
3. Continuous view with changing focus	Check for defects on the fabric		2	5
4. Constant view with fixed focus	A very thorough examination		4	8
E. Workplace temperature conditions	(temperature degree celcius)		Normal Fatigue	Excessive
1. Frozen	Below 0		Above 10	Above 12
2. Low	0-13		10-0	12-5
3. Medium	13-22		5-0	8-0
4. Normal	22-28		0-5	0-8
5. High	28-38		5-40	8-100
6. Very high	Above 38		Above 40	Above 100
F. Atmosphere				
1. Good	Well ventilated room		0	
2. Enough	Bad ventilation, odors		0-5	
3. Not good	Toxic dust, or non-toxic but numerous		5-10	
4. Bad	Harmful odors that require to use breathing apparatus		10-20	
G. Good environmental conditions				
1. Clean, healthy, bright with low noise			0	
2. The work cycle repeatedly between 5-10 seconds			0-1	
3. Repetitive work cycle between 0-5 seconds			1-3	
4. Very noisy			0-5	
5. If influencing factors can degrade quality			0-5	
6. Feel the vibration of the floor			5-10	
7. Exceptional circumstances (sound, cleanliness, etc.)			5-15	

Figure 4.4. Allowance Factor

Table 4.5 Allowance Factor

No.	Factor	Allowance %	Information
Carding			
1	Power Released	1	Can be Ignored
2	Work Attitude	1	Stand on 2 legs
3	Work Movement	0	Normal
4	Eye Fatigue	1	Disconnected Views
5	Workplace Temperature Condition	1	Normal
6	Atmosphere Conditions	5	Not Good
7	Good Environmental Conditions	0	Clean, Healthy, with Low Noise
8	Individual Needs	1	
	Total	10	0,1
Drawing Breaker			
1	Power Released	1	Can be Ignored
2	Work Attitude	1	Stand on 2 legs
3	Work Movement	0	Normal
4	Eye Fatigue	1	Disconnected Views
5	Workplace Temperature Condition	1	Normal
6	Atmosphere Conditions	5	Not Good
7	Good Environmental Conditions	0	Clean, Healthy, with Low Noise
8	Individual Needs	1	
	Total	10	0,1
Drawing Finisher			
1	Power Released	1	Can be Ignored
2	Work Attitude	1	Stand on 2 legs
3	Work Movement	0	Normal
4	Eye Fatigue	1	Disconnected Views
5	Workplace Temperature Condition	1	Normal
6	Atmosphere Conditions	5	Not Good
7	Good Environmental Conditions	0	Clean, Healthy, with Low Noise
8	Individual Needs	1	
	Total	10	0,1

Continued Table 4.5 Allowance Factor

Speed Frame			
1	Power Released	1	Can be Ignored
2	Work Attitude	1	Stand on 2 legs
3	Work Movement	0	Normal
4	Eye Fatigue	1	Disconnected Views
5	Workplace Temperature Condition	1	Normal
6	Atmosphere Conditions	5	Not Good
7	Good Environmental Conditions	2	Very Noisy
8	Individual Needs	1	
	Total	12	0,12
Ring Frame			
1	Power Released	1	Can be Ignored
2	Work Attitude	1	Stand on 2 legs
3	Work Movement	0	Normal
4	Eye Fatigue	1	Disconnected Views
5	Workplace Temperature Condition	1	Normal
6	Atmosphere Conditions	5	Not Good
7	Good Environmental Conditions	2	Very Noisy
8	Individual Needs	1	
	Total	12	0,12
Winding			
1	Power Released	1	Can be Ignored
2	Work Attitude	1	Stand on 2 legs
3	Work Movement	0	Normal
4	Eye Fatigue	1	Disconnected Views
5	Workplace Temperature Condition	1	Normal
6	Atmosphere Conditions	5	Not Good
7	Good Environmental Conditions	0	Clean, Healthy, with Low Noise
8	Individual Needs	1	
	Total	10	0,1

The data has completed will be continued to the calculation of Standard time.

Performance factor data is the data influenced by performance rating of Westinghouse and job difficulty, for rating factor data as seen in table 4.6

Table 4.6 Performance Factor Data

No	Work Station	P1	P2	P *(Performance Factor)*
1	Carding	1,04	1,03	1,0712
2	Drawing Breaker	1,04	1,03	1,0712
3	Drawing Finisher	1,04	1,03	1,0712
4	Speed Frame	1,02	1,03	1,0506
5	Ring Spinning	1,02	1,03	1,0506
6	Winding	1,02	1,03	1,0506

Specifications of each machine data obtained from the "Production Overview" module provided by the supervisor. This module is given to understand the terms and calculations on the yarn in PT Sri Rejeki Isman. This data shows the speed, working time, delivery, number of machines and the efficiency of each machine. Speed is the speed of the machine during the production process, then working time is the working time for one shift, on one shift has 8 hours. On this data, time unit is minutes, so in 8 hours there are 480 minutes. Then delivery is the production output. Specification data of each machine as seen in the Table 4.7

Table 4.7 Specification Data of Each Machine

Bale	Carding	Drawing Breaker	Drawing Finisher	peed fram	Ring Frame				Winding			
					10Ry Wax	20Ry Wax	30Ry Wax	30Ry Unwax	10Ry Wax	20Ry Wax	30Ry Wax	30Ry Unwax
Speed	110	300	600	342,2695	28,27	24,64	23,07	22,44	1200		1300	
Work Time	480	480	480	480	480				480			
Delivery	1	2	1	120	516				60			
Number of Machine	34	8	9	10	80				15			
Eff (%)	0,95	0,85	0,85	0,85	0,92				0,85			

Speed data in speed frame machine has a different calculation than other machines because the speed frame machine influenced by Twist Per Inch (TPI). TPI is a twist of every 1-inch length required to give yarn strength. The calculation for this speed frame machine obtained from "*Sekilas Tentang Produksi*" module. Speed calculations for speed frame machine as seen in the Table 4.8

Table 4.8 Speed Calculation for Speed Frame Machine

Speed	
SF and RF	(Rpm x 25,4) / (Tpi x 1000)
Calculation :	
SF	((950*25,4)/(0,705*100)) = 342,2695

Units of yarn used to make easier data processing. Units of yarn as seen in the Table 4.9.

Table 4.9 Units of Yarn

Kategori	Keterangan	
768	Hank to Master	
Ne	Benang, Sliver atau Roving	
181,44	Bale to Kg	
25,4	Inchi to mm	Untuk menyatakan
1000	mm to meter	satuan (Meter/Menit)
2,2046	Kg to Lbs	

b. Data Processing

In data processing, there are several data explained such as processing data on cycle time, normal time, standard time, raw material time, process time, the capacity required of each machine, CDS method, NEH method and FCFS method. The formulation of cycle time, normal time and standard time obtained from APSK module which combined with the formula in "*Sekilas tentang Produksi*" module.

Table 4.10 Formulation for Cycle Time, Normal Time and Standard Time

Cycle Time	**Time/Bale**	**(768 x Ne x 181,44 x 2,2046) / (Speed x Time x Delivery x Amount of Shift)**
Normal Time	**Cycle Time x Rating Factor (RF)**	

Continued Table 4.10 Formulation for Cycle Time, Normal Time and Standard Time

Standard Time	**Normal Time**	$\frac{\textbf{100\%}}{\textbf{100\%-Allowance\%}}$

Cycle time is a calculation of the time that result obtain from direct observation. At this cycle time, each workstation has a different number of cycle times. Different cycle times at each workstation are speed, delivery and NE at each workstation. Detailed cycle time calculations as seen in the Table 4.11

Table 4.11 Cycle Time Calculation

Cycle Time	Carding	$\frac{(768 \times 0{,}11 \times 181{,}44 \times 2{,}2046 \times 24}{(110 \times 480 \times 1 \times 3)}$	5,1200	Hour /Bale
	Drawing Breaker	$\frac{(768 \times 0{,}12 \times 181{,}44 \times 2{,}2046 \times 24}{(300 \times 480 \times 2 \times 3)}$	1,0240	Hour /Bale
	Drawing Finisher	$\frac{768 \times 0{,}126 \times 181{,}44 \times 2{,}2046 \times 24}{(600 \times 480 \times 1 \times 3)}$	1,0752	Hour /Bale
	Speed Frame	$\frac{(768 \times 1{,}01 \times 181{,}44 \times 2{,}2046 \times}{(342{,}2695 \times 480 \times 120 \times 3)}$	0,1259	Hour /Bale
	Ring Frame (10Ry Wax)	$\frac{(768 \times 10 \times 181{,}44 \times 2{,}2046 \times 24)}{(28{,}27 \times 480 \times 516 \times 3)}$	3,6875	Hour /Bale
	Ring Frame (20Ry Wax)	$\frac{(768 \times 20 \times 181{,}44 \times 2{,}2046 \times 24)}{(24{,}64 \times 480 \times 516 \times 3)}$	8,4615	Hour /Bale
	Ring Frame (30Ry Wax)	$\frac{(768 \times 30 \times 181{,}44 \times 2{,}2046 \times 24)}{(23{,}07 \times 480 \times 516 \times 3)}$	12,9032	Hour /Bale
	Ring Frame (30Ry Unwax)	$\frac{(768 \times 30 \times 181{,}44 \times 2{,}2046 \times 24)}{(22{,}44 \times 480 \times 516 \times 3)}$	13,2654	Hour /Bale
	Winding (10Ry Wax dan 20Ry Wax)	$\frac{(768 \times 10 \times 181{,}44 \times 2{,}2046 \times 24)}{(1200 \times 480 \times 60 \times 3)}$	0,7111	Hour /Bale
	Winding (30Ry Wax dan 30Ry Unwax)	$\frac{(768 \times 30 \times 181{,}44 \times 2{,}2046 \times 24)}{(1300 \times 480 \times 60 \times 3)}$	1,9692	Hour /Bale

Normal time is used to know the working time used with attention to adjustment or rating factor and cycle time. Normal time calculations as seen in Table 4.12

Table 4.12 Normal Time Calculation

Normal Time	Carding	**5,1200 x 1,0712**	5,4846	Hour/Bale
	Drawing Breaker	**1,0240 x 1,0712**	1,0240	Hour /Bale
	Drawing Finisher	**1,0752 x 1,0712**	1,1518	Hour /Bale
	Speed Frame	**0,1259 x 1,0506**	0,1323	Hour /Bale
	Ring Frame (10Ry Wax)	**3,5099 x 1,0506**	3,5099	Hour /Bale
	Ring Frame (20Ry Wax)	**8,0540 x 1,0506**	8,4615	Hour /Bale
	Ring Frame (30Ry Wax)	**12,9032 x 1,0506**	13,5561	Hour /Bale
	Ring Frame (30Ry Unwax)	**13,2654 x 1,0506**	13,9367	Hour /Bale
	Winding (10Ry Wax dan 20Ry Wax)	**0,7111 x 1,0506**	0,7471	Hour /Bale
	Winding (30Ry Wax dan 30Ry Unwax)	**1,9692 x 1,0506**	2,0689	Hour /Bale

Standard time is the working time used by the operator to produce one-unit product type so with the standard time can know how much time required by the operator to producing 1 bale.

Table 4.13 Standard Time Calculation

Standard Time	Carding	**Normal Time x**	**100% / 100%-10%**	**6,0940**	Hour/Bale
	Drawing Breaker	**Normal Time x**	**100% / 100%-10%**	**1,2188**	Hour /Bale
	Drawing Finisher	**Normal Time x**	**100% / 100%-10%**	**1,2797**	Hour /Bale
	Speed Frame	**Normal Time x**	**100% / 100%-12%**	**0,1503**	Hour /Bale
	Ring Frame (10Ry Wax)	**Normal Time x**	**100% / 100%-12%**	**4,1904**	Hour /Bale
	Ring Frame (20Ry Wax)	**Normal Time x**	**100% / 100%-12%**	**9,6154**	Hour /Bale
	Ring Frame (30Ry Wax)	**Normal Time x**	**100% / 100%-12%**	**15,4046**	Hour /Bale
	Ring Frame (30Ry Unwax)	**Normal Time x**	**100% / 100%-12%**	**15,8371**	Hour /Bale
	Winding (10Ry Wax dan 20Ry Wax)	**Normal Time x**	**100% / 100%-12%**	**0,8301**	Hour /Bale
	Winding (30Ry Wax dan 30Ry Unwax)	**Normal Time x**	**100% / 100%-12%**	**2,2988**	Hour /Bale

After calculations processing time on each workstation, the next calculation to get the capacity required at each station. Several factors affect the capacity required at each station such as processing time, production target, number of machine and machine capacity. The following is the calculation of the required capacity of each station by comparing the number of orders.

i. 2152 bale of customer order

On this order the customer order the yarn 30'S Rayon Wax. Detailed calculations to determine the capacity required in each workstation by ordering 2152 bale as seen in the Table 4.14

Table 4.14 Calculation to Determine the Capacity Required by Each Station with Order 2152 Bale

M1	Carding Station					Perubahan 1 (Job 1)		
	Procssing Time / Bale	=	6,0940	Hour/Bale	D24		M1	Processing Time x Production Target in Day
	Production Target / Month	=	2152	Bale	D15			Number of Machine x Machine Capacity
	Number of Carding Machine	=	34	Units	C24			((D36*D37)/(D38*D39))
	Machine Capacity / Process	=	1		E24			386
M2	Drawing Breaker Station							
	Procssing Time / Bale	=	1,2188	Hour/Bale	D25		M2	Processing Time x Production Target in Day
	Production Target / Month	=	2152	Bale	D15			Number of Machine x Machine Capacity
	Number of Drawing Breaker Macl	=	8	Units	C25			((D43*D44)/(D45*D46))
	Machine Capacity / Process	=	1		E25			328
M3	Drawing Finisher Station							
	Procssing Time / Bale	=	1,2797	Hour/Bale	D26		M3	Processing Time x Production Target in Day
	Production Target / Month	=	2152	Bale	D15			Number of Machine x Machine Capacity
	Number of Drawing Finisher Mac	=	9	Units	C26			((D50*D51)/(D52*D53))
	Machine Capacity / Process	=	1		E26			306
M4	Speed Frame Station							
	Procssing Time / Bale	=	0,1503	Hour/Bale	D27		M4	Processing Time x Production Target in Day
	Production Target / Month	=	2152	Bale	D15			Number of Machine x Machine Capacity
	Number of Speed Frame Machine	=	10	Units	C27			((D57*D58)/(D59*D60))
	Machine Capacity / Process	=	1		E27			33
M5	Ring Frame Station							
	Procssing Time / Bale	=	15,4046	Hour/Bale	Standard Time (J46)		M5	Processing Time x Production Target in Day
	Production Target / Month	=	2152	Bale	D15			Number of Machine x Machine Capacity
	Number of Ring Frame Machine	=	80	Units	C28			((D63*D64)/(D65*D66))
	Machine Capacity / Process	=	1		E28			415
M6	Winding Station							
	Procssing Time / Bale	=	2,2988	Hour/Bale	Standard Time		M6	Processing Time x Production Target in Day
	Production Target / Month	=	2152	Bale	D15			Number of Machine x Machine Capacity
	Number of Carding Machine	=	50	Units	C29			((D70*D71)/(D72*D73))
	Machine Capacity / Process	=	1		E29			99

ii. 146 bale of customer order:

On this order, the customer orders the yarn 30'S Rayon. Detailed calculations to determine the capacity required by each workstation when ordering 146 bale as seen in the Table 4.15

Table 4.15 Calculation to Determine the Capacity Required by Each Station with Order 146 Bale

M1	Carding Station				Perubahan 2 (Job 2)						
	Procssing Time / Bale	=	6,0940	Hour/Bale	D24	M1	Processing Time x Production Target in Day				
	Production Target / Month	=	146	Bale	D16		Number of Machine x Machine Capacity				
	Number of Carding Machine	=	34	Units	C24		((R36*R37)/(R38*R39))				
	Machine Capacity / Process	=	1		E24		27				
M2	Drawing Breaker Station										
	Procssing Time / Bale	=	1,2188	Hour/Bale	D25	M2	Processing Time x Production Target in Day				
	Production Target / Month	=	146	Bale	D16		Number of Machine x Machine Capacity				
	Number of Drawing Breaker I	=	8	Units	C25		((R43*R44)/(R45*R46))				
	Machine Capacity / Process	=	1		E25		23				
M3	Drawing Finisher Station										
	Procssing Time / Bale	=	1,2797	Hour/Bale	D26	M3	Processing Time x Production Target in Day				
	Production Target / Month	=	146	Bale	D16		Number of Machine x Machine Capacity				
	Number of Drawing Finisher	=	9	Units	C26		((R50*R51)/(R52*R53))				
	Machine Capacity / Process	=	1		E26		21				
M4	Speed Frame Station										
	Procssing Time / Bale	=	0,1503	Hour/Bale	D27	M4	Processing Time x Production Target in Day				
	Production Target / Month	=	146	Bale	D16		Number of Machine x Machine Capacity				
	Number of Speed Frame Mac	=	10	Units	C27		((R57*R58)/(R59*R60))				
	Machine Capacity / Process	=	1		E27		3				
M5	Ring Frame Station										
	Procssing Time / Bale	=	15,4046	Hour/Bale	Standa	M5	Processing Time x Production Target in Day				
	Production Target / Month	=	146	Bale	D16		Number of Machine x Machine Capacity				
	Number of Ring Frame Machi	=	80	Units	C28		((R63*R64)/(R65*R66))				
	Machine Capacity / Process	=	1		E28		29				
M6	Winding Station										
	Procssing Time / Bale	=	2,2988	Hour/Bale	Standa	M6	Processing Time x Production Target in Day				
	Production Target / Month	=	146	Bale	D16		Number of Machine x Machine Capacity				
	Number of Carding Machine	=	50	Units	C29		((R70*R71)/(R72*R73))				
	Machine Capacity / Process	=	1		E29		7				

iii. 0,021 bale of customer order:

On this order, the customer orders the yarn 28'S Rayon. Detailed calculations to determine the capacity required by each workstation when ordering 0.021 bale as seen in the Table 4.16

Table 4.16 Calculation to Determine the Capacity Required by Each Station with Order 0,021 Bale

Job 1	Carding Station				Perubahan 3 (Job 3)		M1	Processing Time x Production Target in Day			
	Procssing Time / Bale	=	6,0940	Hour/Bale	D24			Number of Machine x Machine Capacity			
	Production Target / Month	=	0,021	Bale	D17			((AF36*AF37)/(AF38*AF39))			
	Number of Carding Machir	=	34	Units	C24			1			
	Machine Capacity / Proces	=	1		E24						
Job 2	Drawing Breaker Station						M2	Processing Time x Production Target in Day			
	Procssing Time / Bale	=	1,2188	Hour/Bale	D25			Number of Machine x Machine Capacity			
	Production Target / Month	=	0,021	Bale	D17			((AF43*AF44)/(AF45*AF46))			
	Number of Drawing Breake	=	8	Units	C25			1			
	Machine Capacity / Proces	=	1		E25						
Job 3	Drawing Finisher Station						M3	Processing Time x Production Target in Day			
	Procssing Time / Bale	=	1,2797	Hour/Bale	D26			Number of Machine x Machine Capacity			
	Production Target / Month	=	0,021	Bale	D17			((AF50*AF51)/(AF52*AF53))			
	Number of Drawing Finish	=	9	Units	C26			1			
	Machine Capacity / Proces	=	1		E26						
Job 4	Speed Frame Station						M4	Processing Time x Production Target in Day			
	Procssing Time / Bale	=	0,1503	Hour/Bale	D27			Number of Machine x Machine Capacity			
	Production Target / Month	=	0,021	Bale	D17			((AF57*AF58)/(AF59*AF60))			
	Number of Speed Frame M	=	10	Units	C27			1			
	Machine Capacity / Proces	=	1		E27						
Job 5	Ring Frame Station						M5	Processing Time x Production Target in Day			
	Procssing Time / Bale	=	15,4046	Hour/Bale	Standard Time (J46)			Number of Machine x Machine Capacity			
	Production Target / Month	=	0,021	Bale	D17			((AF63*AF64)/(AF65*AF66))			
	Number of Ring Frame Ma	=	80	Units	C28			1			
	Machine Capacity / Proces	=	1		E28						
Job 6	Winding Station						M6	Processing Time x Production Target in Day			
	Procssing Time / Bale	=	2,2988	Hour/Bale	Standard Time C (48)			Number of Machine x Machine Capacity			
	Production Target / Month	=	0,021	Bale	D17			((AF70*AF71)/(AF72*AF73))			
	Number of Carding Machir	=	50	Units	C29			1			
	Machine Capacity / Proces	=	1		E29						

iv. 32 bale of customer order:

On this order, the customer orders the yarn products 20'S Rayon. Detailed calculations to determine the capacity required by each workstation when ordering 32 bale as seen in the Table 4.17

Table 4.17 Calculation to Determine the Capacity Required by Each Station with Order 32 Bale

M1	Carding Station						Perubahan 4	
	Proccsing Time / Bale	=	6,0940	Hour/Bale	D24	M1	Processing Time x Production Target in Day	
	Production Target / Month	=	32	Bale	D18		Number of Machine x Machine Capacity	
	Number of Carding Machine	=	34	Units	C24		((D78*D79)/(D80*D81))	
	Machine Capacity / Process	=	1		E24		6	
M2	Drawing Breaker Station							
	Proccsing Time / Bale	=	1,2188	Hour/Bale	D25	M2	Processing Time x Production Target in Day	
	Production Target / Month	=	32	Bale	D18		Number of Machine x Machine Capacity	
	Number of Drawing Breaker Macl	=	8	Units	C25		((D85*D86)/(D87*D88))	
	Machine Capacity / Process	=	1		E25		5	
M3	Drawing Finisher Station							
	Proccsing Time / Bale	=	1,2797	Hour/Bale	D26	M3	Processing Time x Production Target in Day	
	Production Target / Month	=	32	Bale	D18		Number of Machine x Machine Capacity	
	Number of Drawing Finisher Mac	=	9	Units	C26		((D92*D93)/(D94*D95))	
	Machine Capacity / Process	=	1		E26		5	
M4	Speed Frame Station							
	Proccsing Time / Bale	=	0,1503	Hour/Bale	D27	M4	Processing Time x Production Target in Day	
	Production Target / Month	=	32	Bale	D18		Number of Machine x Machine Capacity	
	Number of Speed Frame Machine	=	10	Units	C27		((D99*D100)/(D101*D102))	
	Machine Capacity / Process	=	1		E27		1	
M5	Ring Frame Station							
	Proccsing Time / Bale	=	9,6154	Hour/Bale	Standard Time (G46)	M5	Processing Time x Production Target in Day	
	Production Target / Month	=	32	Bale	D18		Number of Machine x Machine Capacity	
	Number of Ring Frame Machine	=	80	Units	C28		((D105*D106)/(D107*D108))	
	Machine Capacity / Process	=	1		E28		4,0000	
M6	Winding Station							
	Proccsing Time / Bale	=	0,8301	Hour/Bale	Standard Time C (47)	M6	Processing Time x Production Target in Day	
	Production Target / Month	=	32	Bale	D18		Number of Machine x Machine Capacity	
	Number of Carding Machine	=	50	Units	C29		((D112*D113)/(D114*D115))	
	Machine Capacity / Process	=	1		E29		1,0000	

After doing the calculation then, the capacity required by each station can be summarized in the Table 4.18.

Table 4.18 Summary of Calculations for Capacity Required by Each Work Station

Job	M1	M2	M3	M4	M5	M6
1	386	328	306	33	415	99
2	27	23	21	3	29	7
3	1	1	1	1	1	1
4	6	5	5	1	4	1

c. CDS Method Data Processing

After all data completed, the next activity was determining the iterations based on CDS method with K = M-1; ti 1 '= (t1 + ... + tik). Based data, number of iterations is 5, this caused the number of machines used was 6 types of machines, such as carding machine, drawing breaker machine, drawing finisher machine, speed frame machine, ring frame machine, and winding machine. Iteration on the CDS method as seen in the Table 4.19.

Table 4.19. CDS Method Iteration

Iteration		
Number of machine	6	
Number of Iteration (K)	5	
5 Stages		
K=1		
ti 1' = ti 1		1 and 6
ti 2' = ti 6		
K=2		
ti 1' = ti 1 + ti2		1+2 and 5+6
ti 2' = ti 5 + ti 6		
K=3		1+2+3 and 4+5+6
ti 1' = ti 1+ ti 2 + ti 3		
ti 2' = ti 4 + ti 5 + ti 6		
K=4		1+2+3+4 and 3+4+5+6
ti 1' = ti 1 + ti 2 + ti 3 + ti 4		
ti 2' = ti 3+ ti 4 + ti 5 + ti 6		
K=5		1+2+3+4+5 and 2+3+4+5+6
ti 1' = ti 1 + ti 2 + ti 3 + ti 4 + ti 5		
ti 2' =ti 2+ ti 3+ ti 4 + ti 5 + ti 6		

After determining the iteration, the next step determines the sequence based on the data that has obtained from the calculation of capacity required for each workstation, then this sequence used to see which sequence had smallest makespan value, but to determine the sequence there are several conditions that must follow, these conditions as seen in the Table 4.20.

Table 4.20 Determine Sequence

How to Search for Sequence	
1	See if there is a number that has a number smaller than ti 1 'or not
2	If there is a number in ti 2 'which is smaller than ti 1' then place the job in the last sequence
3	If there are more than 1 jobs which are ti 2 'smaller than ti 1' then place the smallest ti 2 'in the last sequence
4	Then for other data that has ti 2 'data greater than ti 1' then look from ti 1 'the smallest to the biggest
5	Create Gant Chart

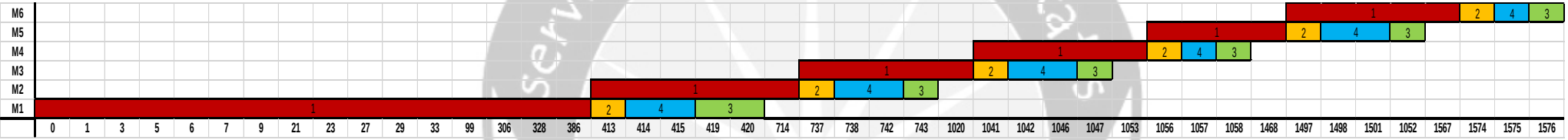
After understanding the conditions to determine the sequence, the details of the result as seen in the Table 4.21

Table 4.21 CDS Sequence

K=1				
Job	**1**	**2**	**3**	**4**
ti 1' = ti 1	386	27	1	6
ti 2' = ti 6	99	7	1	1
Sequence	1	2	3	4
	1	2	4	3
K=2				
Job	**1**	**2**	**3**	**4**
ti 1' = ti 1 + ti2	714	50	2	11
ti 2' = ti 5 + ti 6	514	36	2	5
Sequence	1	2	4	3
K=3				
Job	**1**	**2**	**3**	**4**
ti 1' = ti 1+ ti 2 + ti	1020	71	3	16
ti 2' = ti 4 + ti 5 + ti	547	39	3	6
Sequence	1	2	4	3
K=4				
Job	**1**	**2**	**3**	**4**
ti 1' = ti 1 + ti 2 + ti	1053	74	4	17
ti 2' = ti 3+ ti 4 + ti	853	60	4	11
Sequence	1	2	4	3
K=5				
Job	**1**	**2**	**3**	**4**
ti 1' = ti 1 + ti 2 + ti	1468	103	5	21
ti 2' =ti 2+ ti 3+ ti 4	1181	83	5	16
Sequence	1	2	4	3

Then after knowing the sequence in each iteration, then look for sequences using a Gantt chart. The Gantt chart details as seen in Figure 4.11.

Figure 4.11. Gant Chart CDS Method



d. NEH Method Data Processing

This data obtained from company data and calculations that have been discussion in the chapter of data processing. The capacity required by each workstation in the NEH method as seen in the Table 4.22.

Table 4.22 Machine Capacity Required in the NEH Method

Job	M1	M2	M3	M4	M5	M6
1	386	328	306	33	415	99
2	27	23	21	3	29	7
3	1	1	1	1	1	1
4	6	5	5	1	4	1

The next step was sum of all processes in each job needed to find out which jobs had the most processing time.

Calculation of Job n: M1 + M2 + M3 + ... + Mn

Example Calculation:

Calculation of Job 1: 386 + 328 + 306 + 415 + 99 = 1576

Calculation of the total process for each job can be in the Table 4.23.

Table 4.23 Total Time for Each Job Process

Job	M1	M2	M3	M4	M5	M6	Total
1	386	328	306	33	415	99	1567
2	27	23	21	3	29	7	110
3	1	1	1	1	1	1	6
4	6	5	5	1	4	1	22

Then, the next process was rank the total process of each job starting from the biggest job to the total process on the smallest job. The list of ranking sequence for each job as seen in table 4.24

Table 4.24 Ranking of Each Job

Job	M1	M2	M3	M4	M5	M6	Total	Rank
1	386	328	306	33	415	99	1567	4
2	27	23	21	3	29	7	110	3
3	1	1	1	1	1	1	6	1
4	6	5	5	1	4	1	22	2

After that make sequence with a set of K=2. At this calculation, the selected job is the job that has the highest processing time in the first sequence and second sequence. After calculating and select the jobs then looking for the smallest value of makespan. After that eliminate the unnecessary job.

Calculation : Ready Time = Duration Time + Start Time

: Start Time = Value where before M in the previous ready condition

Example : Ready Time M1 (Job 1) = 386 + 0 = 386

Ready Time M1 (Job 2) = 27 + 386 = 413

Time Starts M1 (Job 1) = 0 => because M1 (Job 1) just starts, so the time is ready on M1 (Job 1) the start time is 0

Time Starts M1 (Job 2) = 386 => 386 obtained from the ready value on M1

However, for calculations of starting and ready must be adjusted in the previous time, if the previous time greater than the time on the job, did the calculation based on the longest time.

The list of scheduling calculations in of NEH K = 2 as seen in the Table 4.25.

Table 4.25 Scheduling Method with K = 2

k = 2	1 2					2 1				
M	Job	Duration	Start	Finish		M	Job	Duration	Start	Finish
1	Job 1	386	0	386		1	Job 2	27	0	27
1	Job 2	27	386	413		1	Job 1	386	27	413
2	Job 1	328	386	714		2	Job 2	23	27	50
2	Job 2	23	714	737		2	Job 1	328	413	741
3	Job 1	306	714	1020		3	Job 2	21	50	71
3	Job 2	21	1020	1041		3	Job 1	306	741	1047
4	Job 1	33	1020	1053		4	Job 2	3	71	74
4	Job 2	3	1053	1056		4	Job 1	33	1047	1080
5	Job 1	415	1053	1468		5	Job 2	29	74	103
5	Job 2	29	1468	1497		5	Job 1	415	1080	1495
6	Job 1	99	1468	1567		6	Job 2	7	103	110
6	Job 2	7	1567	1574		6	Job 1	99	1495	1594
Makespan	1574					Makespan	1594			
Selected : Job 1 2										

The next calculation set K = 3. The list of calculations in the NEH K = 3 schedules as seen in the Table 4.26.

Table 4.26 Scheduling Method with K = 3

k=3	1 2 4			
M	Job	Duration	Start	Finish
1	Job 1	386	0	386
1	Job 2	27	386	413
1	Job 4	6	413	419
2	Job 1	328	386	714
2	Job 2	23	714	737
2	Job 4	5	737	742
3	Job 1	306	714	1020
3	Job 2	21	1020	1041
3	Job 4	5	1041	1046
4	Job 1	33	1020	1053
4	Job 2	3	1053	1056
4	Job 4	1	1056	1057
5	Job 1	415	1053	1468
5	Job 2	29	1468	1497
5	Job 4	4	1497	1501
6	Job 1	99	1468	1567
6	Job 2	7	1567	1574
6	Job 4	1	1574	1575
Makespan	1575		Flowtime	1572

	1 4 2			
M	Job	Duration	Start	Finish
1	Job 1	386	0	386
1	Job 4	6	386	392
1	Job 2	27	392	419
2	Job 1	328	386	714
2	Job 4	5	714	719
2	Job 2	23	719	742
3	Job 1	306	714	1020
3	Job 4	5	1020	1025
3	Job 2	21	1025	1046
4	Job 1	33	1020	1053
4	Job 4	1	1053	1054
4	Job 2	3	1054	1057
5	Job 1	415	1053	1468
5	Job 4	4	1468	1472
5	Job 2	29	1472	1501
6	Job 1	99	1468	1567
6	Job 4	1	1567	1568
6	Job 2	7	1568	1575
Makespan	1575	1570		

	4 1 2			
M	Job	Durasi	Mulai	Siap
1	Job 4	6	0	6
1	Job 1	386	6	392
1	Job 2	27	392	419
2	Job 4	5	6	11
2	Job 1	328	392	720
2	Job 2	23	720	743
3	Job 4	5	11	16
3	Job 1	306	720	1026
3	Job 2	21	1026	1047
4	Job 4	1	16	17
4	Job 1	33	1026	1059
4	Job 2	3	1059	1062
5	Job 4	4	17	21
5	Job 1	415	1059	1474
5	Job 2	29	1474	1503
6	Job 4	1	21	22
6	Job 1	99	1474	1573
6	Job 2	7	1573	1580
Makespan	1580			

Selected Job 2 - Job 4 - Job 1

Then the next calculation set K = 4 and find the smallest makespan value. The list of calculations of NEH K = 4 as seen in the Table 4.27.

Table 4.27 Scheduling Method with K = 4

k=4	1 4 3 2			
M	Job	Duration	Start	Finish
1	Job 1	386	0	386
1	Job 4	6	386	392
1	Job 3	1	392	393
1	Job 2	27	393	420
2	Job 1	328	386	714
2	Job 4	5	714	719
2	Job 3	1	719	720
2	Job 2	23	720	743
3	Job 1	306	714	1020
3	Job 4	5	1020	1025
3	Job 3	1	1025	1026
3	Job 2	21	1026	1047
4	Job 1	33	1020	1053
4	Job 4	1	1053	1054
4	Job 3	1	1054	1055
4	Job 2	3	1055	1058
5	Job 1	415	1053	1468
5	Job 4	4	1468	1472
5	Job 3	1	1472	1473
5	Job 2	29	1473	1502
6	Job 1	99	1468	1567
6	Job 4	1	1567	1568
6	Job 3	1	1568	1569
6	Job 2	7	1569	1576
	Makespan	1576	Flowtime	1570

	1 4 2 3			
M	Job	Duration	Start	Finish
1	Job 1	386	0	386
1	Job 4	6	386	392
1	Job 2	27	392	419
1	Job 3	1	419	420
2	Job 1	328	386	714
2	Job 4	5	714	719
2	Job 2	23	719	742
2	Job 3	1	742	743
3	Job 1	306	714	1020
3	Job 4	5	1020	1025
3	Job 2	21	1025	1046
3	Job 3	1	1046	1047
4	Job 1	33	1020	1053
4	Job 4	1	1053	1054
4	Job 2	3	1054	1057
4	Job 3	1	1057	1058
5	Job 1	415	1053	1468
5	Job 4	4	1468	1472
5	Job 2	29	1472	1501
5	Job 3	1	1501	1502
6	Job 1	99	1468	1567
6	Job 4	1	1567	1568
6	Job 2	7	1568	1575
6	Job 3	1	1575	1576
	Makespan	1576	Flowtime	1571,5

Continued Table 4.27 Scheduling Method with K = 4

Continue K = 4

3 1 4 2				
M	Job	Duration	Start	Finish
1	Job 3	1	0	1
1	Job 1	386	1	387
1	Job 4	6	387	393
1	Job 2	27	393	420
2	Job 3	1	1	2
2	Job 1	328	387	715
2	Job 4	5	715	720
2	Job 2	23	720	743
3	Job 3	1	2	3
3	Job 1	306	715	1021
3	Job 4	5	1021	1026
3	Job 2	21	1026	1047
4	Job 3	1	3	4
4	Job 1	33	1021	1054
4	Job 4	1	1054	1055
4	Job 2	3	1055	1058
5	Job 3	1	4	5
5	Job 1	415	1054	1469
5	Job 4	4	1469	1473
5	Job 2	29	1473	1502
6	Job 3	1	5	6
6	Job 1	99	1469	1568
6	Job 4	1	1568	1569
6	Job 2	7	1569	1576
	Makespan	1576	Flowtime	1179,75

1 3 4 2				
M	Job	Duration	Start	Finish
1	Job 1	386	0	386
1	Job 3	1	386	387
1	Job 4	6	387	393
1	Job 2	27	393	420
2	Job 1	328	386	714
2	Job 3	1	714	715
2	Job 4	5	715	720
2	Job 2	23	720	743
3	Job 1	306	714	1020
3	Job 3	1	1020	1021
3	Job 4	5	1021	1026
3	Job 2	21	1026	1047
4	Job 1	33	1020	1053
4	Job 3	1	1053	1054
4	Job 4	1	1054	1055
4	Job 2	3	1055	1058
5	Job 1	415	1053	1468
5	Job 3	1	1468	1469
5	Job 4	4	1469	1473
5	Job 2	29	1473	1502
6	Job 1	99	1468	1567
6	Job 3	1	1567	1568
6	Job 4	1	1568	1569
6	Job 2	7	1569	1576
	Makespan	1576	Flowtime	1570

Selected : Job 3-1-4-2

After all the makespan values have grouped, look for the smallest makespan value of the problem. Summaries of job sequences selected from each iteration based on the smallest makespan value as seen in the Table 4.28.

Table 4.28 List of Job Sequence

Job Sequence										
k=2	1 2	1574	k = 3	1 2 4	1575	k = 4	1 4 3 2	1 4 2 3	3 1 4 2	1 3 4 2
	2 1	1594		1 4 2	1575		1576	1576	1576	1576
				4 1 2	1580		Flowtime	Flowtime	Flowtime	Flowtime
							1570	1571,5	1179,75	1570

e. FCFS Method Data Process

FCFS method used to know the machine capacity required by each workstation. The data obtained from company data and the calculations of processing that had discussion in the data processing chapter. The table on the capacity required by each workstation in the FCFS method as seen in the Table 4.29.

Table 4.29 Machine Capacity Required in FCFS Method

Job	M1	M2	M3	M4	M5	M6
1	386	328	306	33	415	99
2	27	23	21	3	29	7
3	1	1	1	1	1	1
4	6	5	5	1	4	1

The rule of this method was the buyer who ordered the goods first. In this calculation process consists of some component such as start, time and finish times. Start is when the scheduling starts a job, then the time is the duration of the processing time on the machine and the finish is the completion of the process in each machine. The result of makespan from this method is 1576. The results of FCFS method as seen in the Table 4.30.

Table 4.30 Makespan for FCFS Method

CHR	1			2			3			4			5			6		
	START	TIME	FINISH	START	TIME	FINISH	START	TIME	FINISH	START	TIME	FINISH	START	TIME	FINISH	START	TIME	FINISH
1	0	386	386	386	328	714	714	306	1020	1020	33	1053	1053	415	1468	1468	99	1567
2	386	27	413	714	23	737	1020	21	1041	1053	3	1056	1468	29	1497	1567	7	1574
3	413	1	414	737	1	738	1041	1	1042	1056	1	1057	1497	1	1498	1574	1	1575
4	414	6	420	738	5	743	1042	5	1047	1057	1	1058	1498	4	1502	1575	1	1576

4.4.2. Job Result Evaluation

In internship at PT Sri Rejeki Isman (Sritex), students placed in spinning X department and assigned to compare a yarn production scheduling system used by company (FCFS) method with a system that had taught by students on campus (CDS and NEH) method. Production scheduling system at PT Sritex usually did by Mr. Sriyanto. Student contributions at PT Sritex can provide benefits to the company, especially Mr. Sriyanto, this caused student can helped the company and Mr. Sriyanto to compare the production scheduling system implemented by the company and analysis the result. Student can provide evidence to the company that system used by the company at this time was correct. This evidence is shown by the student based on the results of student analysis during the internship at PT Sritex through several methods (CDS, NEH) method then compared the methods had applied in the company.

Besides providing benefits to the company, students also get benefit from the company. The student during the internship can get experience in the process of yarn

production from raw materials until finished process, then students also get another benefit such as finding data directly in the field and did the processing data.

CHAPTER 5
CLOSING

Conclusion and Suggestion

After making a comparison with three methods, CDS method, NEH method and the method used by the company FCFS method, it as seen the comparison makespan value of each method. At the beginning of this analysis, the comparison method is CDS method with NEH method. In this analysis, NEH method has a smaller makespan value than CDS method. NEH method can get the value of makespan is 1179.75 hours while CDS method get the value of makespan is 1576 hours. In this analysis, NEH method can get the value of makespan is smaller than the CDS method because NEH method calculation value of makespan with made combination on each machine and continued with the combination on each job, then from the combination of each job is find the job that has the smallest sequence of makespan. For the CDS method the calculation is done only on two groups of machines, so the results will be more optimal when using the NEH method. After comparing the two methods (NEH and CDS), the comparison results are compared using the method used by the company (FCFS). On this method, the result of makespan value the same with CDS method because the FCFS method will process according to sequence order, from the first order, the second order and so on without seeing the sequence of jobs that have a faster or slower processing time, so the NEH method still has a smaller makespan value compared to the makespan value of FCFS method.

The suggestion for this scheduling based on a comparison of the three methods basically has the same makespan value, which is 1576 hours, but because in NEH method have some rule if in each sequence has the same makespan value, the makespan value obtained from the flow time value then this NEH method has the value of makespan is smaller, but when using the NEH method the value of makespan used is the value of makespan NEH, the makespan value obtained same.

So, from the analysis, the suggestion for the company is the company can maximize some factor, such as allowance factor and the adjustment factor. Allowance factor and adjustment factor is an essential factor because that factor will affect the process time.

REFERENCES

2017. Buku Pedoman Pelaksanaan Penulisan Laporan KP. Yogyakarta: Universitas Atma Jaya Yogyakarta

2017. Laporan Praktik Kerja Lapangan di PT Sri Rejeki Isman Tbk. Bandung: Politeknik STTT Bandung

ATTACHMENT

Kelas	p	Kelas	p
Superfast	100	Good -	65
Fast +	95	**NORMAL**	**60**
Fast	90	Fair+	55
Fast -	85	Fair	50
Excelent	80	Fair -	45
Good +	75	Poor	40
Good	70		

SKILL			***EFFORT***		
+ 0,15	A1	Superskill	+ 0,13	A1	Superskill
+ 0,13	A2		+ 0,12	A2	
+ 0,11	B1	Excellent	+ 0,10	B1	Excellent
+ 0,08	B2		+ 0,08	B2	
+ 0,06	C1	Good	+0,05	C1	Good
+ 0,03	C2		+0,02	C2	
0,00	D	Average	0,00	D	Average
- 0,05	E1	Fair	- 0,04	E1	Fair
- 0,10	E2		- 0,08	E2	
- 0,16	F1	Poor	- 0,12	F1	Poor
- 0,22	F2		- 0,17	F2	

CONDITION			***CONSISTENSY***		
+0,06	A	Ideal	+0,04	A	Ideal
+0,04	B	Excellent	+0,03	B	Excellent
+0,02	C	Good	+0,01	C	Good
0,00	D	Average	0,00	D	Average
-0,03	E	Fair	-0,02	E	Fair
-0,07	F	Poor	-0,04	F	Poor

FAKTOR TINGKAT KESULITAN

Keadaan	Lambang	Penyesuaian
Aggota terpakai		
Jari	A	0
Pergelangan tangan dari jari	B	1
Lengan bawah, pergelangan tangan dan jari	C	2
Lengan atas, lengan bawah, dst.	D	5
Badan	E	8
Mengangkat beban dari lantai dengan kaki	E2	10
Pedal kaki		
Tanpa pedal, atau satu pedal dengan sumbu di bawah kaki	F	0
Satu atau dua pedal dengan sumbu tidak dibawah kaki	G	5
Penggunaan tangan		
Keadaan tangan saling bantu atau bergantian	H	0
Kedua tangan mengerjaklan gerakan yang sama pada saat yang sama	H2	18

Keadaan	Lambang	Penyesuaian	
Koordinasi mata dengan tangan			
Sangat sedikit	I	0	
Cukup dekat	J	2	
Konstan dan 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 dan hati-hati	Q	3	
Mudah pecah dan patah	R	5	
Berat beban (kg)		tangan	kaki
0,45	B–1	2	1
0,90	B–2	5	1
1,35	B–3	6	1
1,80	B–4	10	1
2,25	B–5	13	1
2,70	B–6	15	3
3,15	B–7	17	4
3,60	B–8	19	5
4 ,05	B–9	20	6
4,50	B–10	22	7
4,95	B–11	24	8
5,40	B–12	25	9
5,85	B–13	27	10
6,30	B–14	28	10

Faktor	Contoh Pekerjaan	Kelonggaran		
A. Tenaga yang dikeluarkan		Ekuivalen Beban	Pria	Wanita
1. Dapat diabaikan	Bekerja dimeja, duduk	Tanpa beban	0,0-6,0	0,0-6,0
2. Sangat Ringan	Bekerja dimeja, berdiri	0,00-2,25	6,0-7,5	6,0-7,5
3. Ringan	Meyekop 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 berat	19,00-27,00	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 kg		
B. Sikap Kerja				
1. Duduk	Bekerja duduk, ringan	0,00-1,0		
2. Berdiri diatas dua kaki	Badan tegak, ditumpu kaki	1,0-2,5		
3. Berdiri diatas satu kaki	Satu kaki mengerjakan 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 kedua kaki	4,0-10		
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 dilorong pertambangan yang sempit	10-15		

Faktor	Contoh Pekerjaan	Kelonggaran	
D. Kelelahan mata		Pencahayaan baik	Buruk
1. Pandangan yang terputus-putus	Membawa alat ukur	0,0-6.0	0,0-6,0
2. Pandangan yang hampir terus menerus.	Pekerjaan-pekerjaan yang teliti	6,0-7,5	6,0-7,5
	Memeriksa cacat-cacat pada kain	7,5-12,0	7,5-16,0
3. Pandangan terus menerus dengan fokus berubah	Pemeriksaan yang sangat teliti	12,0-19,0	16,0-30,0
4. Pandangan terus menerus dengan fokus tetap			
E. Keadaan temperatur tempat kerja	Temperatur (^{0}C)	Kelemahan normal	Berlebihan
1. Beku	Dibawah 0	Diatas 10	Diatas 12
2. Rendah	0-13	10-20	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
E. Keadaan atmosfer			
1. Baik	Ruang yang berventilasi baik, udara segar	0	
2. Cukup	Ventilasi kurang baik, ada bau-bauan (tidak berbahaya)	0-5	
		0-5	
		5-10	
		10-15	