

BAB 6

KESIMPULAN DAN SARAN

6.1. Kesimpulan

Dari hasil penelitian mengenai meja perakitan dapat diperoleh kesimpulan sebagai berikut:

- 1) Dimensi dan hasil analisis RULA terhadap meja perakitan awal adalah sebagai berikut:
 - a. Tinggi meja perakitan statis adalah 75 cm
 - b. Panjang meja perakitan adalah 69,5 cm
 - c. Lebar meja perakitan adalah 43 cm
 - d. Tinggi pijakan kaki adalah 15 cm
 - e. Hasil nilai akhir RULA adalah 5 untuk postur bagian kanan dan 4 untuk postur bagian kiri.

Meja perakitan awal belum sesuai dengan dimensi antropometri pengguna sehingga dilakukan perancangan ulang meja perakitan dengan hasil sebagai berikut:

- a. Tinggi meja perakitan *adjustable* antara 61 - 80 cm
- b. Panjang meja perakitan adalah 80 cm
- c. Lebar meja perakitan adalah 55 cm
- d. Lebar *footrest* adalah 14 cm
- e. Tinggi *footrest* adalah 6 cm dan sudut Kemiringan 15°
- f. Lebar dan panjang laci adalah 18 cm
- g. Tinggi laci adalah 8 cm
- h. Hasil nilai akhir RULA adalah 4 untuk postur bagian kanan dan 3 untuk postur bagian kiri.

2) Alternatif perancangan meja perakitan yang dipilih adalah:

- a. Bahan landasan meja terbuat dari kayu mahoni
- b. Bahan kaki meja terbuat dari pipa *mild steel st.37*
- c. Bentuk landasan meja persegi panjang dengan *fillet* disudut-sudutnya sebesar 3 cm
- d. Jumlah kaki meja adalah 2 kaki yang melengkung 90° dengan radius 10 cm
- e. *Footrest* terbuat dari plat logam *mild steel* yang dilapisi karet agar tidak licin
- f. Pengaturan tinggi meja berskala
- g. Peletakkan laci di sisi bagian kiri meja perakitan

Biaya pembuatan meja perakitan hasil rancangan adalah Rp 651.675,00 untuk pembuatan minimal 4 unit meja perakitan.

6.2. Saran

- 1) Penggunaan bahan lain sebagai alternatif perancangan yang lebih baik dengan biaya produksi yang rendah tanpa mengurangi kualitas hasil rancangan.
- 2) Penelitian lebih lanjut mengenai pengaturan ketinggian meja perakitan *adjustable* secara mekanis tanpa kenaikan biaya produksi yang signifikan dari meja perakitan *adjustable* secara manual.

DAFTAR PUSTAKA

- Bridger, R.S., 1994, *Introduction to Ergonomics*, McGraw-Hill, USA.
- Cross, N., 1994, *Engineering Design Methods: Strategies for Product Design*, ed. 2nd, John Wiley and Sons, USA.
- Lueder, R., 1996, *A Proposed RULA for Computer Users*, Humanics ErgoSystems, Inc.
- Napitupulu, M., 2005, *Perancangan Ulang Meja Kerja Stasiun Pola pada Penjahit Pakaian Wanita*, skripsi di Program Studi Teknik Industri Universitas Atma Jaya Yogyakarta, Yogyakarta.
- Niebel, B., dan Freivalds, A., 2003, *Methods, Standards, and Work Design*, ed. 11th, McGraw-Hill Companies, Inc.
- Nurmianto, E., 2004, *Ergonomi Konsep Dasar dan Aplikasinya*, Edisi Kedua, Guna Widya, Surabaya.
- Panero, J., dan Zelnik, M., 2003, *Dimensi Manusia dan Ruang Interior*, Erlangga, Jakarta.
- Popov, E.P., 1996, *Mekanika Teknik* (terjemahan Astamar, Z.), ed. 2nd, Erlangga, Jakarta.
- Pratisto, A., 2004, *Cara Mudah Mengatasi Masalah Statistik dan Rancangan Percobaan dengan SPSS 12*, Elek Media Komputindo, Jakarta.
- Pulat, B.M., 1992, *Fundamentals of Industrial Ergonomics*, Waveland Press Inc., Oklahoma.
- Rimmer, J.G., dan Titherington, D., 1984, *Mekanika Terapan* (terjemahan Prasetyo, L.), ed. 2nd, Erlangga, Jakarta.

Sanders, M.S., dan McCormick, E.J., 1993, *Human Factors in Engineering and Design*, ed. 7th, McGraw-Hill Companies, Inc., Singapore.

Santoso, G., 2004, *Ergonomi Manusia, Peralatan dan Lingkungan*, Prestasi Pustaka Publisher, Jakarta.

Sorensen, M.J., 2002, *Ergonomic Analysis of Company XYZ's Depalletizing Workstation*, A Research Paper University of Wisconsin-Stout.

Sugiarto, Siagian, D., Sunaryanto, L.T., dan Oetomo, D.S., 2003, *Teknik Sampling*, PT Gramedia Pustaka Utama, Jakarta.

Sutalaksana, I.Z., Anggawisastra, R., dan Tjakraatmadja, J.H., 2006, *Teknik Perancangan Sistem Kerja*, Edisi Kedua, ITB, Bandung.

Sutrisno, H., 1991, *Analisis Butir untuk Instrumen, Andi Offset*, Yogyakarta.

Wahyono, T., 2004, *Cara Mudah Melakukan Analisa Statistik dengan SPSS*, Gava Media, Yogyakarta.

[Www.ergo.human.cornell.edu/ahRULA.html](http://www.ergo.human.cornell.edu/ahRULA.html), diakses tanggal 29 Januari 2007 jam 11.49 WIB.

[Www.ergo.human.cornell.edu/Pub/AHquest/CURULA.pdf](http://www.ergo.human.cornell.edu/Pub/AHquest/CURULA.pdf), diakses tanggal 14 Februari 2007 jam 13.44 WIB.



LAMPIRAN

LAMPIRAN 1

KUESIONER

Sehubungan dengan dilakukannya Tugas Akhir yang bertema "Perancangan Meja Perakitan yang Ergonomis, di Laboratorium APSK dan Ergonomi", maka Saya yang melakukan penelitian:

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NIM : 03 06 04073
Program Studi : Teknik Industri

Mengharapkan bantuan saudara/ saudari untuk berpartisipasi dalam mengisi kuesioner ini. Atas kesediaannya saya ucapkan terima kasih.

Bagian I : Data Responden

Petunjuk : Jawablah pertanyaan berikut dengan memberi tanda (\checkmark) pada kotak sesuai dengan jawaban Anda atau mengisi jawaban pada tempat yang telah disediakan.

1. Jenis Kelamin
 Laki-laki Perempuan
2. Apakah Anda berperan sebagai operator saat melakukan praktikum?
 Ya Tidak (sebagai pengamat)
3. Menurut Anda, apakah meja perakitan yang ada sekarang dengan bentuk yang statis mempengaruhi kenyamanan mahasiswa dalam merakit produk?
 Ya, Mempengaruhi
 Tidak mempengaruhi

Bagi Anda sebagai pengamat, langsung menjawab ke pertanyaan no. 7

4. Bagi Anda sebagai operator, Apakah sudah merasa nyaman melakukan praktikum dengan menggunakan meja perakitan yang ada sekarang?
 Sudah Belum

5. Jika jawaban Anda pada no. 4 diatas "Sudah", maka kenyamanan seperti apa yang Anda rasakan saat menggunakan meja perakitan yang ada sekarang?*)

- Tinggi meja perakitan telah sesuai (tidak terlalu tinggi dan tidak terlalu rendah)
- Luas landasan meja perakitan telah sesuai
- Tinggi pijakan kaki telah sesuai
- Dapat memuat komponen-komponen perakitan produk tanpa mengganggu keleluasaan kerja.

6. Jika jawaban Anda pada no. 4 diatas "Belum", maka ketidaknyamanan seperti apa yang Anda alami? *)

No.	Keterangan	Uraian
1	Tinggi meja yang statis	<input type="checkbox"/> Terlalu tinggi <input type="checkbox"/> Terlalu rendah
2	Luas landasan meja	<input type="checkbox"/> Terlalu sempit untuk meletakkan komponen-komponen yang dibutuhkan untuk perakitan produk <input type="checkbox"/> Area kerja operator diatas meja tidak leluasa
3	Tinggi Pijakan kaki	<input type="checkbox"/> Terlalu tinggi <input type="checkbox"/> Terlalu rendah <input type="checkbox"/> Tidak terdapat sandaran kaki (footrest)

7. Apakah perlu dilakukan perancangan ulang meja perakitan?

- Ya, Perlu
- Tidak perlu

8. Menurut Anda perbaikan apa yang perlu dilakukan terhadap meja perakitan yang ada sekarang? *)

- Tinggi meja dibuat *Adjustable* (dapat disesuaikan dengan pengguna)
- Luas landasan meja dibuat dengan memperhitungan tempat untuk meletakkan komponen dan area kerja operator
- Tinggi pijakan kaki dibuat *Adjustable*
- Dibuat *footrest*
- Perbaikan lainnya menurut Anda?

.....

*) = dapat memilih lebih dari 1 jawaban

Bagian II : Preferensi Responden

Petunjuk : Berilah penilaian terhadap kriteria-kriteria yang berhubungan dengan penggunaan meja perakitan dengan memberi tanda (√) pada tabel dibawah ini, sesuai dengan pilihan Anda.

No	KRITERIA	STP (1)	TP (2)	CP (3)	P (4)	SP (5)
1	Nyaman bagi mahasiswa (meja sesuai dengan anthropometri mahasiswa)					
2	Keawetan bahan (tidak mudah keropos dan tahan korosi)					
3	Bentuk meja perakitan menarik (alas meja dibuat persegi panjang atau setengah lingkaran)					
4	Warna meja perakitan dibuat sesuai dengan warna alami dari logam dan kayu					
5	Mudah dirawat dan dibersihkan					
6	Konstruksi kaki meja perakitan kuat					
7	Meja perakitan mudah dipindahkan					
8	Kemudahan dalam <i>set-up</i> (mengatur ketinggian meja perakitan dengan memutar baut pengunci)					
9	Terdapat sandaran kaki (<i>footrest</i>)					
10	Terdapat laci untuk menampung produk yang <i>direject</i>					
11	Aman digunakan atau tidak mendatangkan bahaya bagi mahasiswa saat praktikum					
12	Mempermudah kerja operator (luas landasan meja tidak terlalu sempit)					

Keterangan Penilaian :

- STP = Sangat Tidak Penting
- TP = Tidak Penting
- CP = Cukup Penting
- P = Penting
- SP = Sangat Penting

Terima kasih atas kesediaan saudara/ saudari untuk mengisi kuesioner yang telah peneliti buat ini.

LAMPIRAN 2

HASIL PREFERENSI RESPONDEN

No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	TOTAL
1	3	4	2	2	4	4	3	4	4	3	5	5	43
2	2	3	2	2	4	3	2	5	4	4	5	5	41
3	4	5	4	4	5	5	4	3	4	3	5	5	51
4	5	5	4	3	4	5	4	5	4	4	4	4	51
5	3	4	2	2	3	4	3	2	4	3	3	3	36
6	4	3	3	3	4	3	3	5	4	4	5	5	46
7	4	5	3	3	4	5	4	4	5	2	5	5	49
8	5	5	5	5	5	5	4	3	4	4	3	4	52
9	4	4	1	2	4	4	4	4	4	3	5	5	44
10	4	4	4	4	4	4	4	4	4	4	4	4	48
11	5	5	5	5	5	5	5	5	5	5	5	5	60
12	3	4	1	2	5	4	2	5	4	1	4	5	40
13	4	4	3	3	4	5	5	5	4	4	5	5	51
14	4	4	4	3	4	5	5	3	4	4	5	5	50
15	5	4	2	2	4	5	4	3	3	3	4	5	44
16	3	4	3	3	3	4	3	3	5	4	5	5	45
17	5	5	4	4	5	5	5	5	5	5	5	5	58
18	4	4	4	3	4	5	4	4	4	3	5	4	48
19	5	4	2	2	3	4	3	4	4	4	4	5	44
20	3	4	2	3	4	4	4	4	4	4	4	4	44
21	5	5	5	3	4	4	3	4	4	5	5	4	51
22	5	5	2	5	5	2	4	1	4	5	5	5	48
23	5	4	3	3	3	5	4	5	4	4	5	5	50
24	3	3	2	2	3	3	3	3	2	3	3	4	34
25	5	4	2	2	2	3	3	4	3	4	4	4	40
26	5	5	4	4	5	5	4	4	4	3	5	5	53
27	4	5	2	2	5	4	3	3	4	2	5	4	43
28	5	4	2	2	3	4	4	4	2	4	3	4	41
29	5	4	5	3	4	5	5	4	4	3	4	4	50
30	5	3	2	2	3	3	3	4	5	2	4	4	40
31	5	4	3	2	4	4	4	4	4	4	4	4	46
32	5	4	3	3	5	5	4	3	3	2	5	5	47
33	3	5	2	2	3	4	4	4	3	3	5	5	43
34	4	4	3	3	4	4	4	4	4	4	4	4	46
35	3	3	4	3	5	5	4	3	4	4	5	5	48
36	5	4	3	2	4	5	5	5	3	4	4	4	48
37	4	5	2	4	5	4	4	4	4	3	5	5	49
38	5	5	4	4	5	5	5	5	4	4	4	5	55
39	5	4	2	2	3	5	5	4	4	4	5	4	47
40	4	4	4	3	4	5	5	5	5	3	4	5	51

HASIL PREFERENSI RESPONDEN (Lanjutan)

No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	TOTAL
41	4	4	3	3	5	5	4	3	3	4	4	4	46
42	3	3	3	2	4	5	5	5	4	4	5	5	48
43	5	5	4	4	5	5	5	4	4	4	4	5	54
44	4	4	3	2	4	5	5	5	4	3	4	4	47
45	5	5	4	4	5	5	5	5	5	4	5	5	57
46	4	4	3	3	3	4	4	3	3	3	4	4	42
47	5	5	4	4	4	5	5	4	4	4	5	5	54
48	3	4	2	2	4	4	4	4	4	4	5	5	45
49	4	4	4	4	4	4	4	4	4	4	4	4	48
50	5	5	3	3	4	5	4	4	4	4	5	5	51
51	4	4	3	1	4	4	4	3	3	2	5	5	42
52	5	4	4	3	3	5	3	3	2	2	4	4	42
53	3	4	3	3	4	4	4	3	3	4	4	4	43
54	5	4	5	4	5	5	5	5	5	4	5	5	57
55	4	5	4	2	4	5	4	3	3	2	5	5	46
56	3	4	4	3	5	5	5	4	4	4	5	5	51
57	4	4	5	5	5	5	3	3	4	1	3	2	44
58	5	4	2	2	4	3	3	3	2	3	5	5	41
59	4	4	4	3	4	4	5	5	4	3	4	4	48
60	4	4	3	2	4	4	3	3	4	2	4	5	42
61	5	4	4	3	4	4	4	4	5	4	5	5	51
62	4	5	4	4	5	5	5	5	2	4	5	5	53
63	5	5	3	3	4	5	5	4	3	3	4	4	48
64	4	4	2	2	4	4	3	3	2	2	5	5	40
65	4	4	3	3	4	5	4	4	5	4	5	5	50
66	4	4	3	2	3	4	4	3	2	2	5	5	41
67	4	4	4	4	4	5	5	4	4	4	5	5	52
68	4	5	3	2	4	5	4	4	4	3	4	4	46
69	5	5	3	3	5	5	4	4	4	4	4	5	51
70	4	4	4	4	5	5	4	4	4	3	4	4	49

LAMPIRAN 3

Reliability

*****Method 1 (spacc saver) will be used for this analysis*****

RELIABILITY ANALYSIS - SCALE (ALPHA)

		Mean	Std Dev	Cases
1.	Q1	4.2143	.7782	70.0
2.	Q2	4.2286	.5940	70.0
3.	Q3	3.1714	1.0068	70.0
4.	Q4	2.9286	.9219	70.0
5.	Q5	4.1000	.7253	70.0
6.	Q6	4.4286	.7137	70.0
7.	Q7	4.0143	.7893	70.0
8.	Q8	3.8857	.8434	70.0
9.	Q9	3.7857	.8146	70.0
10.	Q10	3.4143	.9088	70.0
11.	Q11	4.4714	.6307	70.0
12.	Q12	4.5571	.6052	70.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	47.2000	26.4522	5.1432	12

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
Q1	42.9857	23.5505	.3040	.7805
Q2	42.9714	23.5934	.4343	.7693
Q3	44.0286	20.2600	.5714	.7508
Q4	44.2714	20.6934	.5853	.7494
Q5	43.1000	22.6130	.4803	.7634
Q6	42.7714	22.4687	.5135	.7604
Q7	43.1857	21.3128	.6197	.7479
Q8	43.3143	23.1172	.3235	.7796
Q9	43.4143	22.6810	.4005	.7711
Q10	43.7857	22.3737	.3783	.7746
Q11	42.7286	24.5484	.2410	.7842
Q12	42.6429	24.7547	.2211	.7854

Reliability Coefficients

N of Cases = 70.0

N of Items = 12

Alpha = .7839

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Q1	4.21	.778	70
Q2	4.23	.594	70
Q3	3.17	1.007	70
Q4	2.93	.922	70
Q5	4.10	.725	70
Q6	4.43	.714	70
Q7	4.01	.789	70
Q8	3.89	.843	70
Q9	3.79	.815	70
Q10	3.41	.909	70
Q11	4.47	.631	70
Q12	4.56	.605	70
TOTAL	47.20	5.143	70

Correlations

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	TOTAL
Pearson Correlation	1	.426**	.304*	.284*	.064	.224	.302*	.082	.028	.180	-.081	-.011	.438**
Sig. (2-tailed)		.000	.011	.017	.598	.063	.011	.500	.820	.138	.615	.928	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.426**	1	.273*	.427**	.384**	.347**	.302*	-.005	.103	.117	.134	.124	.526**
Sig. (2-tailed)	.000		.022	.000	.001	.003	.011	.967	.398	.333	.270	.305	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.304*	.273*	1	.654**	.393**	.562**	.471**	.177	.275*	.222	.008	-.111	.696**
Sig. (2-tailed)	.011	.022		.000	.001	.000	.000	.143	.021	.064	.948	.358	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.284*	.427**	.654**	1	.574**	.290*	.360**	.045	.346**	.347**	.008	-.032	.697**
Sig. (2-tailed)	.017	.000	.000		.000	.015	.002	.710	.003	.003	.942	.795	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.064	.384**	.393**	.574**	1	.364**	.276*	.080	.282*	.088	.181	.201	.585**
Sig. (2-tailed)	.598	.001	.001	.000		.002	.021	.459	.018	.575	.135	.095	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.224	.347**	.562**	.290*	.364**	1	.606**	.299*	.185	.013	.080	.043	.612**
Sig. (2-tailed)	.063	.003	.000	.015	.002		.000	.012	.125	.916	.623	.723	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.302*	.302*	.471**	.360**	.276*	.606**	1	.351**	.185	.386**	.161	.165	.710**
Sig. (2-tailed)	.011	.011	.000	.002	.021	.000		.003	.125	.001	.183	.172	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.082	-.005	.177	.045	.090	.299*	.351**	1	.344**	.271*	.130	.183	.466**
Sig. (2-tailed)	.500	.967	.143	.710	.459	.012	.003		.004	.023	.283	.129	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.028	.103	.275*	.346**	.282*	.185	.185	.344**	1	.278*	.199	.128	.529**
Sig. (2-tailed)	.820	.398	.021	.003	.018	.125	.125	.004		.020	.098	.291	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.180	.117	.222	.347**	.068	.013	.396**	.271*	.278*	1	.160	.180	.525**
Sig. (2-tailed)	.136	.333	.064	.003	.575	.916	.001	.023	.020		.166	.135	.000
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	-.061	.134	.008	.009	.181	.060	.161	.130	.199	.160	1	.707**	.355**
Sig. (2-tailed)	.615	.270	.949	.942	.135	.623	.183	.283	.088	.186		.000	.003
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	-.011	.124	-.111	-.032	.201	.043	.165	.183	.128	.180	.707**	1	.332**
Sig. (2-tailed)	.928	.305	.358	.795	.095	.723	.172	.129	.291	.135	.000		.005
N	70	70	70	70	70	70	70	70	70	70	70	70	70
Pearson Correlation	.438**	.526**	.696**	.697**	.585**	.612**	.710**	.466**	.529**	.525**	.355**	.332**	1
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.003	.005	
N	70	70	70	70	70	70	70	70	70	70	70	70	70

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

VALIDITAS dan RELIABILITAS

$$N = 70$$

$$df = N - 2 = 70 - 2 = 68$$

Interpolasi:

$$\frac{70-68}{70-60} = \frac{0,1528-df}{0,1528-0,1650}$$

$$0,2 = (0,1528-df)/-0,0122$$

$$0,2 \cdot -0,0122 = 0,1528-df$$

$$df = 0,0024 + 0,1528 = 0,1552$$

1) Validitas

Questions	Corrected Item-Total Correlation (R hitung)	R tabel	Validitas
Q1	0,3040	0,1552	Valid
Q2	0,4343	0,1552	Valid
Q3	0,5714	0,1552	Valid
Q4	0,5853	0,1552	Valid
Q5	0,4803	0,1552	Valid
Q6	0,5135	0,1552	Valid
Q7	0,6197	0,1552	Valid
Q8	0,3235	0,1552	Valid
Q9	0,4005	0,1552	Valid
Q10	0,3783	0,1552	Valid
Q11	0,2410	0,1552	Valid
Q12	0,2211	0,1552	Valid

R hitung positif dan R hitung > R tabel maka dinyatakan *valid*.

2) Reliabilitas

R alpha 0,7839 dan R tabel 0,1552. R alpha positif dan lebih besar dari R tabel maka dinyatakan reliabel.

LAMPIRAN 4

TABEL R 5%

df	r	df	r
1	0,9511	21	0,2774
2	0,8000	22	0,2711
3	0,6870	23	0,2653
4	0,6084	24	0,2598
5	0,5509	25	0,2546
6	0,5067	26	0,2497
7	0,4716	27	0,2451
8	0,4428	28	0,2407
9	0,4187	29	0,2366
10	0,3981	30	0,2327
11	0,3802	40	0,2018
12	0,3646	50	0,1806
13	0,3507	60	0,1650
14	0,3383	70	0,1528
15	0,3271	80	0,1430
16	0,3170	90	0,1348
17	0,3077	100	0,1279
18	0,2992	130	0,1123
19	0,2914	160	0,1012
20	0,2841	200	0.0905

Sumber: Pratisto, 2004

LAMPIRAN 5

UJI KESERAGAMAN DATA

1. Uji keseragaman data TSD

$k = 1 + 3,3 \log N$

$N = 112$

$k = 7,762 = 8$

subgrup	Data (xi)																Rata2	Ket
	23,0	25,0	21,0	20,0	22,8	31,0	26,4	24,0	24,0	20,0	28,5	21,5	25,9	25,0	24,2	seragam		
1	23,0	25,0	21,0	20,0	22,8	31,0	26,4	24,0	24,0	20,0	28,5	21,5	25,9	25,0	24,2	seragam		
2	23,5	22,0	24,5	23,8	26,6	22,5	30,0	26,3	20,2	20,0	22,0	24,0	24,5	20,7	23,6	seragam		
3	23,7	28,0	24,7	22,0	21,0	26,0	21,0	23,0	27,0	28,6	27,0	21,9	23,4	22,0	24,2	seragam		
4	23,0	26,5	24,0	27,9	27,0	22,5	19,9	25,0	25,0	27,2	26,0	25,0	30,2	23,0	25,2	seragam		
5	25,0	24,3	24,0	26,5	27,0	21,2	23,0	22,0	26,7	30,0	20,9	22,5	21,5	23,0	24,1	seragam		
6	22,9	23,5	26,5	28,0	23,2	24,0	28,3	20,4	21,4	25,0	24,3	23,0	24,5	26,8	24,4	seragam		
7	21,5	25,0	24,5	25,2	28,0	20,6	23,3	21,0	25,0	24,9	24,1	24,2	26,0	20,5	23,8	seragam		
8	22,1	22,0	27,0	21,6	16,5	27,2	25,4	23,1	23,3	25,0	20,0	26,5	22,5	26,0	23,4	seragam		
Jumlah Rata-Rata Subgrup																193,0		

Rata2 subgroup	24,12
SD	2,6472
SD rata2	0,7075
BKA	26,24
BKB	22,00
Keterangan	Data seragam

2. Uji keseragaman data TPD

$$k = 1 + 3,3 \log N$$

$$N = 112$$

$$k = 7,762 = 8$$

subgrup	Data (Xi)																Rata2	Ket
	47,5	46,0	44,0	42,4	42,5	40,5	40,5	44,9	44,0	48,8	42,4	45,5	49,0	42,2	40,0	44,3		
1	47,5	46,0	44,0	42,4	42,5	40,5	40,5	44,9	44,0	48,8	42,4	45,5	49,0	42,2	40,0	44,3	seragam	
2	46,1	42,5	43,5	42,3	40,6	45,7	43,5	45,1	42,4	41,7	43,5	46,8	44,5	44,5	49,5	44,1	seragam	
3	40,7	46,5	44,0	47,2	43,5	42,5	41,5	48,8	40,3	45,2	43,2	44,0	44,6	44,6	40,6	43,8	seragam	
4	49,3	40,7	42,2	45,5	48,0	47,9	45,3	47,5	41,5	48,0	44,0	45,7	45,4	43,5	45,3	45,3	seragam	
5	45,6	47,7	40,5	43,6	44,9	43,7	45,3	46,5	48,4	41,5	42,5	48,4	38,6	45,0	44,4	44,4	seragam	
6	42,2	42,3	46,9	41,0	41,5	46,5	42,5	47,6	40,8	47,0	43,5	43,6	42,4	45,6	43,8	43,8	seragam	
7	41,8	43,0	43,5	43,3	42,5	43,5	42,6	47,2	42,0	41,2	42,1	45,2	41,1	42,2	42,9	42,9	seragam	
8	40,6	42,4	42,7	44,3	42,6	41,0	42,5	44,9	46,4	43,0	48,0	43,0	47,6	41,5	43,6	43,6	seragam	
Jumlah Rata-Rata Subgrup																		
																	352,3	

Rata2 subgroup	44,03
SD	2,5035
SD rata2	0,6691
BKA	46,04
BKB	42,03
Keterangan	Data seragam

3. Uji keseragaman data JKT

$$k = 1 + 3,3 \log N$$

$$N = 112$$

$$k = 7,762 = 8$$

subgroup	Data (Xi)																Rata2	Ket
	86,1	72,4	81,3	82,3	74,0	76,0	82,6	75,4	77,0	74,4	77,9	90,5	71,2	70,1	77,9	seragam		
1	86,1	72,4	81,3	82,3	74,0	76,0	82,6	75,4	77,0	74,4	77,9	90,5	71,2	70,1	77,9	seragam		
2	87,6	79,3	84,4	77,0	75,5	73,8	76,3	86,4	81,9	78,7	79,4	81,0	83,4	89,5	81,0	seragam		
3	65,3	85,0	82,5	85,2	80,0	71,5	68,5	84,0	76,5	76,6	82,2	76,0	78,6	75,8	77,7	seragam		
4	83,0	81,2	78,6	84,7	84,5	85,6	84,0	87,3	69,7	86,6	77,2	84,6	81,5	83,9	82,3	seragam		
5	80,0	87,4	71,3	73,8	78,5	74,9	80,7	85,2	85,4	73,2	77,7	79,8	73,8	78,2	78,6	seragam		
6	77,5	82,6	83,4	78,8	70,6	86,7	73,8	88,1	79,3	81,7	72,5	74,5	76,9	79,8	79,0	seragam		
7	83,9	82,0	72,0	77,2	80,4	74,7	84,5	76,5	72,0	74,0	77,4	86,2	72,0	71,8	77,5	seragam		
8	69,0	76,5	79,8	77,9	75,9	75,6	69,0	87,3	90,5	80,0	89,3	82,3	84,1	86,3	80,3	seragam		
Jumlah Rata-Rata Subgroup																		
																634,3		

Rata2 subgroup	79,28
SD	5,5497
SD rata2	1,4832
BKA	83,73
BKB	74,83
Keterangan	Data seragam

4. Uji keseragaman data TMK

$k = 1 + 3,3 \log N$

$N = 112$

$k = 7,762 = 8$

subgrup	Data (Xi)																Rata2	Ket
	9,0	8,0	6,8	6,1	7,4	6,6	6,3	8,4	7,6	5,5	8,0	8,0	8,0	6,9	4,9	7,1		
1	9,0	8,0	6,8	6,1	7,4	6,6	6,3	8,4	7,6	5,5	8,0	8,0	8,0	6,9	4,9	7,1	seragam	
2	5,7	7,6	6,7	7,3	6,2	5,5	6,5	7,0	6,6	5,6	6,6	6,5	6,5	8,0	8,2	6,7	seragam	
3	8,0	7,0	7,5	5,6	5,7	6,2	6,0	6,3	5,6	6,0	4,8	7,0	7,9	5,9	6,4	6,4	seragam	
4	5,4	8,0	6,1	6,8	7,1	8,7	7,9	7,3	6,4	6,6	6,9	8,1	8,0	7,0	7,2	7,2	seragam	
5	8,8	7,4	5,9	6,5	5,7	6,5	7,4	7,9	8,0	7,8	7,5	6,8	5,9	7,3	7,1	7,1	seragam	
6	6,6	7,5	6,4	6,5	6,1	7,0	6,2	7,3	5,3	7,5	5,2	6,4	8,0	7,7	6,7	6,7	seragam	
7	5,7	7,1	5,8	5,6	7,0	5,9	8,8	6,0	6,7	6,1	7,3	7,1	5,9	5,8	6,5	6,5	seragam	
8	5,5	6,5	7,9	5,4	6,4	7,7	7,3	6,1	7,5	7,8	7,0	7,2	6,0	6,4	6,8	6,8	seragam	
Jumlah Rata-Rata Subgrup																		
																54,4		

Rata2 subgroup	6,80
SD	0,9365
SD rata2	0,2503
BKA	7,55
BKB	6,05
Keterangan	Data seragam

5. Uji keseragaman data PTX

$k = 1 + 3,3 \log N$

$N = 112$

$k = 7,762 = 8$

subgrup	Data (Xi)																Rata2	Ket
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
1	28,0	24,0	24,0	24,0	26,0	23,1	25,0	25,3	23,0	26,0	23,5	25,4	25,5	23,3	21,5	24,5	seragam	
2	27,0	21,0	25,0	21,8	24,0	24,0	23,5	24,2	28,5	27,8	23,0	23,0	25,0	26,0	28,0	24,8	seragam	
3	22,9	26,5	26,0	24,5	24,5	25,0	22,0	20,0	27,0	24,0	25,0	25,0	22,7	24,0	23,0	24,1	seragam	
4	24,0	25,0	24,0	26,8	26,0	26,0	26,0	24,1	25,0	23,0	27,0	24,0	25,0	27,5	28,0	25,4	seragam	
5	26,0	27,4	21,4	22,5	24,7	24,7	24,0	26,9	26,1	23,4	24,0	22,7	27,0	24,0	25,0	24,7	seragam	
6	24,0	24,0	24,6	25,5	21,7	26,0	26,0	24,4	26,6	21,2	26,9	23,0	25,0	25,7	26,0	24,6	seragam	
7	25,0	24,0	23,5	23,2	26,5	26,5	24,5	26,0	26,0	23,0	22,0	24,1	27,0	22,3	22,9	24,3	seragam	
8	20,1	22,0	25,5	24,0	23,5	23,5	22,0	24,0	25,0	27,0	23,5	26,5	26,0	26,5	27,5	24,5	seragam	
Jumlah Rata-Rata Subgrup																196,9		

Rata2 subgroup	24,62
SD	1,8389
SD rata2	0,4915
BKA	26,09
BKB	23,14
Keterangan	Data seragam

6. Uji keseragaman data PTT

$k = 1 + 3,3 \log N$

$N = 112$

$k = 7,762 = 8$

subgrup	Data (Xi)																Rata2	Ket
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
1	19,9	17,3	16,3	18,6	16,0	18,6	18,9	17,1	18,5	15,7	18,9	18,8	16,9	15,6	17,7	seragam		
2	19,7	17,0	17,9	16,7	16,5	17,1	18,0	19,7	17,6	17,4	18,8	17,6	17,7	18,9	17,9	seragam		
3	15,9	19,1	18,3	17,3	18,2	16,6	16,0	19,3	16,5	17,9	17,2	17,1	17,7	15,8	17,4	seragam		
4	18,0	18,1	16,6	18,4	18,5	19,2	17,6	17,6	16,3	18,7	17,2	17,2	18,8	18,8	17,9	seragam		
5	18,6	19,4	16,3	16,0	16,2	16,5	18,7	18,0	19,2	18,4	16,1	18,7	16,6	17,7	17,6	seragam		
6	17,1	17,5	19,0	17,9	15,6	19,9	16,8	18,7	16,4	18,7	18,0	17,2	18,5	17,7	17,8	seragam		
7	17,8	16,6	16,8	16,6	19,1	17,5	19,0	17,8	16,7	15,2	16,7	20,0	16,2	16,5	17,3	seragam		
8	15,6	16,2	19,2	16,4	17,5	18,1	16,6	17,9	18,5	17,6	18,9	17,4	19,5	18,9	17,7	seragam		
Jumlah Rata-Rata Subgrup																141,3		

Rata2 subgrup	17,66
SD	1,1608
SD rata2	0,3102
BKA	18,59
BKB	16,73
Keterangan	Data seragam

8. Uji keseragaman data Irb

$k = 1 + 3,3 \log N$

$N = 112$

$k = 7,762 = 8$

subgrup	Data (Xi)																Rata2	Ket
	9,8	9,6	8,9	9,5	8,7	9,6	10,0	8,7	10,5	7,9	8,9	10,1	8,0	8,2	9,2	seragam		
1	9,6	9,6	9,8	8,7	8,8	9,0	8,7	10,8	9,5	8,6	9,5	9,4	10,6	10,1	9,5	seragam		
2	10,0	10,2	9,0	9,2	9,5	8,5	8,8	9,6	8,7	9,1	8,8	8,3	9,1	8,6	9,1	seragam		
3	9,5	9,0	8,3	10,6	9,6	10,8	9,5	9,7	8,5	10,0	9,5	8,8	9,6	9,7	9,5	seragam		
4	9,5	10,0	8,1	8,0	9,3	9,5	10,1	10,0	9,6	8,9	8,5	9,9	8,7	8,9	9,2	seragam		
5	9,2	8,7	10,3	9,5	8,3	10,1	8,4	9,7	8,1	9,9	7,3	9,4	9,0	10,7	9,2	seragam		
6	9,4	8,1	8,8	8,1	9,7	8,9	10,0	9,7	8,0	8,0	9,4	11,1	8,2	8,5	9,0	seragam		
7	8,4	9,5	9,9	7,8	9,0	10,0	9,3	9,1	10,5	9,3	10,0	9,1	10,6	9,8	9,4	seragam		
8	Jumlah Rata-Rata Subgrup																74,1	

Rata2 subgrup	9,26
SD	0,7723
SD rata2	0,2064
BKA	9,88
BKB	8,64
Keterangan	Data seragam

LAMPIRAN 6

UJI KENORMALAN DATA

1. Uji Kenormalan Data TSD

One-Sample Kolmogorov-Smirnov Test

		TSD
N		112
Normal Parameters ^{a,b}	Mean	24.121
	Std. Deviation	2.6472
Most Extreme Differences	Absolute	.066
	Positive	.066
	Negative	-.046
Kolmogorov-Smirnov Z		.703
Asymp. Sig. (2-tailed)		.706

a. Test distribution is Normal.

b. Calculated from data.

2. Uji Kenormalan Data TPD

One-Sample Kolmogorov-Smirnov Test

		TPD
N		112
Normal Parameters ^{a,b}	Mean	44.034
	Std. Deviation	2.5035
Most Extreme Differences	Absolute	.109
	Positive	.109
	Negative	-.060
Kolmogorov-Smirnov Z		1.158
Asymp. Sig. (2-tailed)		.137

a. Test distribution is Normal.

b. Calculated from data.

3. Uji Kenormalan Data JKT

One-Sample Kolmogorov-Smirnov Test

		JKT
N		112
Normal Parameters ^{a,b}	Mean	79.283
	Std. Deviation	5.5497
Most Extreme Differences	Absolute	.065
	Positive	.039
	Negative	-.065
Kolmogorov-Smirnov Z		.689
Asymp. Sig. (2-tailed)		.729

a. Test distribution is Normal.

b. Calculated from data.

4. Uji Kenormalan Data TMK

One-Sample Kolmogorov-Smirnov Test

		TMK
N		112
Normal Parameters ^{a,b}	Mean	6.803
	Std. Deviation	.9364
Most Extreme Differences	Absolute	.068
	Positive	.068
	Negative	-.059
Kolmogorov-Smirnov Z		.721
Asymp. Sig. (2-tailed)		.676

a. Test distribution is Normal.

b. Calculated from data.

5. Uji Kenormalan Data PTK

One-Sample Kolmogorov-Smirnov Test

		PTK
N		112
Normal Parameters ^{a,b}	Mean	24.618
	Std. Deviation	1.8389
Most Extreme Differences	Absolute	.086
	Positive	.078
	Negative	-.086
Kolmogorov-Smirnov Z		.914
Asymp. Sig. (2-tailed)		.374

a. Test distribution is Normal.

b. Calculated from data.

6. Uji Kenormalan Data PTT

One-Sample Kolmogorov-Smirnov Test

		PTT
N		112
Normal Parameters ^{a,b}	Mean	17.659
	Std. Deviation	1.1603
Most Extreme Differences	Absolute	.087
	Positive	.081
	Negative	-.087
Kolmogorov-Smirnov Z		.922
Asymp. Sig. (2-tailed)		.363

a. Test distribution is Normal.

b. Calculated from data.

7. Uji Kenormalan Data TTT

One-Sample Kolmogorov-Smirnov Test

		TTT
N		112
Normal Parameters ^{a,b}	Mean	2.800
	Std. Deviation	.2757
Most Extreme Differences	Absolute	.105
	Positive	.097
	Negative	-.105
Kolmogorov-Smirnov Z		1.113
Asymp. Sig. (2-tailed)		.168

a. Test distribution is Normal.

b. Calculated from data.

8. Uji Kenormalan Data LTB

One-Sample Kolmogorov-Smirnov Test

		LTB
N		112
Normal Parameters ^{a,b}	Mean	9.262
	Std. Deviation	.7718
Most Extreme Differences	Absolute	.094
	Positive	.047
	Negative	-.094
Kolmogorov-Smirnov Z		.995
Asymp. Sig. (2-tailed)		.275

a. Test distribution is Normal.

b. Calculated from data.

LAMPIRAN 7

UJI KECUKUPAN DATA

1. Uji kecukupan data TSD

	%	Nilai
Keyakinan	99	3
ketelitian	5	0,05
K/S		60

N hitung = 42,97

Keterangan = Data cukup

		Data Xi													
529,0	625,0	441,0	400,0	519,8	961,0	697,0	576,0	576,0	400,0	812,3	462,3	670,8	625,0		
552,3	484,0	600,3	566,4	707,6	506,3	900,0	691,7	408,0	400,0	484,0	576,0	600,3	428,5		
561,7	784,0	610,1	484,0	441,0	676,0	441,0	529,0	729,0	818,0	729,0	479,6	547,6	484,0		
529,0	702,3	576,0	778,4	729,0	506,3	396,0	625,0	625,0	739,8	676,0	625,0	912,0	529,0		
625,0	590,5	576,0	702,3	729,0	449,4	529,0	484,0	712,9	900,0	436,8	506,3	462,3	529,0		
524,4	552,3	702,3	784,0	538,2	576,0	800,9	416,2	458,0	625,0	590,5	529,0	600,3	718,2		
462,3	625,0	600,3	635,0	784,0	424,4	542,9	441,0	625,0	620,0	580,8	585,6	676,0	420,3		
488,4	484,0	729,0	466,6	272,3	739,8	645,2	533,6	542,9	625,0	400,0	702,3	506,3	676,0		
Jumlah (Xi ²)												65944,3			
Jumlah Xi												2701,6			
(Jumlah Xi) ²												7298642,56			

2. Uji kecukupan data TPD

	%	Nilai
Keyakinan	99	3
ketelitian	5	0,05
K/S		60

N hitung = 11,532

Keterangan = Data cukup

Data Xi															
2256,3	2116,0	1936,0	1797,8	1806,3	1640,3	2016,0	1936,0	2381,4	1797,8	2070,3	2401,0	1780,8	1600,0		
2125,2	1806,3	1892,3	1789,3	1648,4	2088,5	1892,3	2034,0	1797,8	1738,9	1892,3	2190,2	1980,3	2450,3		
1656,5	2162,3	1936,0	2227,8	1892,3	1806,3	1722,3	2381,4	1624,1	2043,0	1866,2	1936,0	1989,2	1648,4		
2430,5	1656,5	1780,8	2070,3	2304,0	2294,4	2052,1	2256,3	1722,3	2304,0	1936,0	2088,5	2061,2	1892,3		
2079,4	2275,3	1640,3	1901,0	2016,0	1909,7	2052,1	2162,3	2342,6	1722,3	1806,3	2342,6	1490,0	2025,0		
1780,8	1789,3	2199,6	1681,0	1722,3	2162,3	1806,3	2265,8	1664,6	2209,0	1892,3	1901,0	1797,8	2079,4		
1747,2	1849,0	1892,3	1874,9	1806,3	1892,3	1814,8	2227,8	1764,0	1697,4	1772,4	2043,0	1689,2	1780,8		
1648,4	1797,8	1823,3	1962,5	1814,8	1681,0	1806,3	2016,0	2153,0	1849,0	2304,0	1849,0	2265,8	1722,3		
Jumlah (Xi ²)													217862,2		
Jumlah Xi													4931,8		
(Jumlah Xi) ^2													24322651,24		

3. Uji kecukupan data JKT

	%	Nilai
Keyakinan	99	3
ketelitian	5	0,05
K/S		60

N hitung = 17,4816

Keterangan = Data cukup

Data Xi															
7413,2	5241,8	6609,7	6773,3	5476,0	5776,0	6822,8	5685,2	5929,0	5535,4	6068,4	8190,3	5069,4	4914,0		
7673,8	6288,5	7123,4	5929,0	5700,3	5446,4	5821,7	7465,0	6707,6	6193,7	6304,4	6561,0	6955,6	8010,3		
4264,1	7225,0	6806,3	7259,0	6400,0	5112,3	4692,3	7056,0	5852,3	5867,6	6756,8	5776,0	6178,0	5745,6		
6889,0	6593,4	6178,0	7174,1	7140,3	7327,4	7056,0	7621,3	4858,1	7499,6	5959,8	7157,2	6642,3	7039,2		
6400,0	7638,8	5083,7	5446,4	6162,3	5610,0	6512,5	7259,0	7293,2	5358,2	6037,3	6368,0	5446,4	6115,2		
6006,3	6822,8	6955,6	6209,4	4984,4	7516,9	5446,4	7761,6	6288,5	6674,9	5256,3	5550,3	5913,6	6368,0		
7039,2	6724,0	5184,0	5959,8	6464,2	5580,1	7140,3	5852,3	5184,0	5476,0	5990,8	7430,4	5184,0	5155,2		
4761,0	5852,3	6368,0	6068,4	5760,8	5715,4	4761,0	7621,3	8190,3	6400,0	7974,5	6773,3	7072,8	7447,7		
Jumlah (Xi ²)												707428,3			
Jumlah Xi												8879,7			
(Jumlah Xi) ²												78849072,09			

4. Uji kecukupan data TMK

	%	Nilai
Keyakinan	99	3
ketelitian	5	0,05
K/S		60

N hitung = 67,628

Keterangan = Data cukup

Data Xi													
81,0	64,0	46,2	37,2	54,8	43,6	39,7	70,6	57,8	30,3	64,0	64,0	47,6	24,0
32,5	57,8	44,9	53,3	38,4	30,3	42,3	49,0	43,6	31,4	43,6	42,3	64,0	67,2
64,0	49,0	56,3	31,4	32,5	38,4	36,0	39,7	31,4	36,0	23,0	49,0	62,4	34,8
29,2	64,0	37,2	46,2	50,4	75,7	62,4	53,3	41,0	42,9	47,6	65,6	64,0	49,0
77,4	54,8	34,8	42,3	32,5	42,3	54,8	62,4	64,0	60,8	56,3	46,2	34,8	53,3
43,6	56,3	41,0	42,3	37,2	49,0	38,4	53,3	28,1	56,3	27,0	41,0	64,0	59,3
32,5	50,4	33,6	31,4	49,0	34,8	77,4	36,0	44,9	37,2	53,3	50,4	34,8	33,6
30,3	42,3	62,4	29,2	41,0	59,3	53,3	37,2	56,3	60,8	49,0	51,8	36,0	41,0
Jumlah (Xi ²)												5279,6	
Jumlah Xi												761,9	
(Jumlah Xi) ²												580415,42	

5. Uji kecukupan data PTK

	%	Nilai
Keyakinan	99	3
ketelitian	5	0,05
K/S		60

N hitung = 19,908

Keterangan = Data cukup

Data Xi															
784,0	576,0	576,0	676,0	533,6	625,0	640,1	529,0	676,0	552,3	645,2	650,3	542,9	462,3		
729,0	441,0	625,0	475,2	576,0	552,3	585,6	812,3	772,8	529,0	529,0	625,0	676,0	784,0		
524,4	702,3	676,0	600,3	625,0	484,0	400,0	729,0	576,0	625,0	625,0	515,3	576,0	529,0		
576,0	625,0	576,0	718,2	676,0	676,0	580,8	625,0	529,0	729,0	576,0	625,0	756,3	784,0		
676,0	750,8	458,0	506,3	610,1	576,0	723,6	681,2	547,6	576,0	515,3	729,0	576,0	625,0		
576,0	576,0	605,2	650,3	470,9	676,0	595,4	707,6	449,4	723,6	529,0	625,0	660,5	676,0		
625,0	576,0	552,3	538,2	702,3	600,3	676,0	676,0	529,0	484,0	580,8	729,0	497,3	524,4		
404,0	484,0	650,3	576,0	552,3	484,0	576,0	625,0	729,0	552,3	702,3	676,0	702,3	756,3		
Jumlah (Xi ²)												68251,7			
Jumlah Xi												2757,2			
(Jumlah Xi) ²												7602151,84			

6. Uji kecukupan data PTT

	%	Nilai
Keyakinan	99	3
ketelitian	5	0,05
K/S		60

N hitung = 15,417

Keterangan = Data cukup

Data Xi														
396,0	299,3	265,7	346,0	256,0	346,0	357,2	292,4	342,3	246,5	357,2	353,4	285,6	243,4	
388,1	289,0	320,4	278,9	272,3	292,4	324,0	388,1	309,8	302,8	353,4	309,8	313,3	357,2	
252,8	364,8	334,9	299,3	331,2	275,6	256,0	372,5	272,3	320,4	295,8	292,4	313,3	249,6	
324,0	327,6	275,6	338,6	342,3	368,6	309,8	309,8	265,7	349,7	295,8	295,8	353,4	353,4	
346,0	376,4	265,7	256,0	262,4	272,3	349,7	324,0	368,6	338,6	259,2	347,8	275,6	313,3	
292,4	306,3	361,0	320,4	243,4	396,0	282,2	349,7	269,0	349,7	324,0	295,8	342,3	313,3	
316,8	275,6	282,2	275,6	364,8	306,3	361,0	316,8	278,9	231,0	278,9	400,0	262,4	272,3	
241,8	262,4	368,6	269,0	306,3	327,6	275,6	320,4	342,3	309,8	357,2	302,8	380,3	357,2	
Jumlah (Xi ²)												35071,9		
Jumlah Xi												1977,7		
(Jumlah Xi) ²												3911297,29		

7. Uji kecukupan data TTT

	%	Nilai
Keyakinan	99	3
ketelitian	5	0,05
K/S		60

N hitung = 34,603

Keterangan = Data cukup

Data Xi												
8,4	9,0	5,8	6,3	6,8	8,4	11,6	7,3	10,2	6,8	10,2	7,8	7,3
9,0	9,0	6,8	6,3	6,3	8,4	7,3	10,9	10,2	6,8	8,4	10,9	9,0
9,6	7,3	9,0	6,8	7,8	10,2	5,8	7,8	5,3	7,3	8,4	7,3	7,8
7,8	7,8	7,3	9,6	10,2	9,6	7,3	7,8	7,3	8,4	7,8	9,0	7,8
9,6	10,2	7,8	5,3	6,8	9,6	9,6	6,8	9,0	8,4	6,8	7,8	7,3
9,0	9,0	10,9	6,3	4,8	9,6	7,3	7,8	4,8	9,6	5,8	10,2	9,6
7,3	6,8	6,8	5,3	9,0	6,8	7,3	7,3	8,4	6,8	10,2	6,3	6,8
5,3	5,8	7,8	4,8	6,3	8,4	9,6	6,8	9,0	7,8	6,8	9,0	9,0
Jumlah (Xi ²)												886,5
Jumlah Xi												313,6
(Jumlah Xi) ²												98344,96

8. Uji kecukupan data LTB

	%	Nilai
Keyakinan	99	3
ketelitian	5	0,05
K/S		60

N hitung = 24,809

Keterangan = Data cukup

Data Xi													
96,0	92,2	79,2	90,3	75,7	92,2	100,0	75,7	110,3	62,4	79,2	102,0	64,0	67,2
92,2	92,2	96,0	75,7	77,4	81,0	75,7	116,6	90,3	74,0	90,3	88,4	112,4	102,0
100,0	104,0	81,0	84,6	90,3	72,3	77,4	92,2	75,7	82,8	77,4	68,9	82,8	74,0
90,3	81,0	68,9	112,4	92,2	116,6	90,3	94,1	72,3	100,0	90,3	77,4	92,2	94,1
90,3	100,0	65,6	64,0	86,5	90,3	102,0	100,0	92,2	79,2	72,3	98,0	75,7	79,2
84,6	75,7	106,1	90,3	68,9	102,0	70,6	94,1	65,6	98,0	53,3	88,4	81,0	114,5
88,4	65,6	77,4	65,6	94,1	79,2	100,0	94,1	64,0	64,0	88,4	123,2	67,2	72,3
69,7	90,3	98,0	60,8	81,0	100,0	86,5	82,8	110,3	86,5	100,0	82,8	112,4	96,0
Jumlah (Xi ²)													9674,2
Jumlah Xi													1037,4
(Jumlah Xi) ²													1076095,02

LAMPIRAN 8

PERHITUNGAN NILAI PERSENTIL

Statistics

	TSD	TPD	JKT	TMK	PTK	PTT	TTT	LTB
N	112	112	112	112	112	112	112	112
Valid	0	0	0	0	0	0	0	0
Missing	24.000	43.500	79.300	6.750	24.550	17.650	2.800	9.400
Median	25.0	43.5	73.8	8.0	24.0	16.6	2.6	9.5
Mode	7.0075	6.2673	30.7989	.8768	3.3817	1.3464	.0760	.5957
Variance	14.5	10.9	25.2	4.2	8.5	4.8	1.2	3.8
Range	16.5	38.6	65.3	4.8	20.0	15.2	2.2	7.3
Minimum	31.0	49.5	90.5	9.0	28.5	20.0	3.4	11.1
Maximum	2701.6	4931.8	8879.7	761.9	2757.2	1977.8	313.6	1037.4
Sum	20.000	40.565	69.960	5.400	21.465	15.765	2.300	8.000
Percentiles	24.000	43.500	79.300	6.750	24.550	17.650	2.800	9.400
	28.535	48.540	87.775	8.270	27.605	19.570	3.200	10.600

RULA Assessment Worksheet

Upper Arm Score

Adjustments:
 Add 1 if shoulder is raised or upper arm abducted
 Subtract 1 if arm is supported or trunk is leaning

Upper Arm

Lower Arm Score

Adjustments:
 Add 1 if working across midline or to side of body

Lower Arm

Wrist Score

Adjustments:
 Add 1 if wrist is bent laterally from midline

Wrist

Wrist Twist Score

Wrist Twist

Neck Score

Adjustments:
 Add 1 if neck is twisted or bent to side

Neck

Trunk Score

1 if trunk is well supported while seated, 2 if not

Trunk

Leg Score

1 if legs and feet are well supported in a balanced posture, 2 if not

Legs

- Procedure:
1. Observe postures and enter scores
 2. Look up arm/wrist score in Table 1
 3. Look up neck/trunk/legs score in Table 2
 4. Adjust scores for frequency and force
 5. Look up RULA score in Table 3

RULA Score

Subject: Mahasiswa TI
 Task: Merakit stop kontak (Bagian kiri)
 Scorer: Murni
 Date: 15 februari 2007

RULA Assessment Worksheet

- Frequency Adjustment:**
 0 if moderate posture, neither static nor highly repetitive
 1 if static posture maintained for more than 1 minute or highly repetitive posture repeated more than 4 time/minute
- Force Adjustment:**
 0 No resistance, or less than 2 kg intermittent force or load
 1 2-10 kg intermittent force or load
 2 2-10 kg static force or load, or 2-10 kg repeated force or load
 3 10 kg or more static or repeated force or load
 4 Shock or forces with rapid buildup

Calculation:
 Upper Arm Score Neck Score
 Lower Arm Score Trunk Score
 Wrist Score Leg Score
 Wrist Twist Score

Table 1 Score + =

Frequency Adj. + =

Force Adj. + =

Total Score + =

Table 3 Score

Action Levels:
 1,2 = Acceptable
 3,4 = Investigate further
 5,6 = Investigate and change soon
 7 = Immediate action

Table 1

Upper Arm	Lower Arm	Wrist							
		1		2		3		4	
		Twist	Twist	Twist	Twist	Twist	Twist	Twist	Twist
1	1	1	2	2	2	2	3	3	3
	2	2	2	2	2	3	3	3	3
	3	2	3	3	3	3	4	4	4
2	1	2	3	3	3	4	4	4	4
	2	3	3	3	3	3	4	4	4
	3	3	4	4	4	4	4	5	5
3	1	3	3	4	4	4	4	5	5
	2	3	4	4	4	4	4	5	5
	3	4	4	4	4	4	4	5	5
4	1	4	4	4	4	4	4	5	5
	2	4	4	4	4	4	4	5	5
	3	4	4	4	4	4	4	5	5
5	1	5	5	5	5	5	5	6	6
	2	5	6	6	6	6	6	7	7
	3	6	6	6	6	6	6	7	7
6	1	7	7	7	7	7	7	8	8
	2	8	8	8	8	8	8	9	9
	3	9	9	9	9	9	9	9	9

Table 2

	Trunk											
	1		2		3		4		5		6	
	Legs	Legs	Legs	Legs	Legs	Legs	Legs	Legs	Legs	Legs	Legs	
1	1	2	2	3	3	3	4	4	5	5	6	
	2	3	3	4	4	4	5	5	6	6	7	
	3	3	3	4	4	4	5	5	6	6	7	
2	2	3	3	4	4	4	5	5	6	6	7	
	3	3	3	4	4	4	5	5	6	6	7	
	4	5	5	6	6	6	7	7	8	8	8	
3	3	4	4	4	4	4	5	5	6	6	7	
	4	5	5	6	6	6	7	7	8	8	8	
	5	6	6	7	7	7	8	8	8	8	8	
4	4	5	5	6	6	6	7	7	8	8	8	
	5	6	6	7	7	7	8	8	8	8	8	
5	5	6	6	7	7	7	8	8	8	8	8	
	6	7	7	8	8	8	8	8	8	8	8	
6	6	7	7	8	8	8	8	8	8	8	8	

Table 3

	Neck, trunk and leg						
	1	2	3	4	5	6	7+
W	1	2	3	3	4	5	6
r	1	2	3	3	4	5	5
i	2	2	3	4	4	5	5
s	3	3	3	4	4	5	6
t	4	3	3	4	4	5	6
	5	4	4	4	5	6	6
a	6	4	4	5	6	6	7
r	7	5	5	6	6	7	7
m	8+	5	5	6	7	7	7

RULA Assessment Worksheet

Upper Arm Score

Adjustments:
 Add 1 if shoulder is raised or upper arm abducted
 Subtract 1 if arm is supported or trunk is leaning

Upper Arm:

Lower Arm Score

Adjustments:
 Add 1 if working across midline or to side of body

Lower Arm:

Wrist Score

Adjustments:
 Add 1 if wrist is bent laterally from midline

Wrist Twist Score
 1 if wrist twist is in mid-range, 2 if near limit

Wrist:
 Wrist Twist:

Neck Score

Adjustments:
 Add 1 if neck is twisted or bent to side

Neck:

Trunk Score

Leg Score
 1 if legs and feet are well supported in a balanced posture, 2 if not

Trunk:
 Legs:

RULA Score

Procedure:
 1. Observe postures and enter scores
 2. Look up arm/wrist score in Table 1
 3. Look up neck/trunk/legs score in Table 2
 4. Adjust scores for frequency and force
 5. Look up RULA score in Table 3

Subject: Mahasiswa TI
 Task: Merakit Stop Kontak (Bayan Kataran)
 Scorer: Murri
 Date: 30 April 2007

RULA Score:

RULA Assessment Worksheet

Frequency Adjustment:

- 0 if moderate posture, neither static nor highly repetitive
- 1 if static posture maintained for more than 1 minute or highly repetitive posture repeated more than 4 time/minute

Force Adjustment:

- 0 No resistance, or less than 2 kg intermittent force or load
- 1 2-10 kg intermittent force or load
- 2 2-10 kg static force or load, or 2-10 kg repeated force or load
- 3 10 kg or more static or repeated force or load
- 4 Shock or forces with rapid buildup

Calculation:

Upper Arm Score Neck Score

Lower Arm Score Trunk Score

Wrist Score Leg Score

Wrist Twist Score

Table 1 Score Table 2 Score

Frequency Adj. +

Force Adj. +

Total Score +

Table 3 Score

Action Levels:

- 1,2 = Acceptable
- 3,4 = Investigate further
- 5,6 = Investigate and change soon
- 7 = Immediate action

Table 1

	Upper Arm	Lower Arm	Wrist				
			1	2	3	4	
1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
	3	2	3	3	3	3	3
2	1	2	3	3	3	4	4
	2	3	3	3	4	4	4
	3	3	4	4	4	4	5
3	1	3	4	4	4	4	5
	2	3	4	4	4	4	5
	3	4	4	4	4	5	5
4	1	4	4	4	4	5	5
	2	4	4	4	4	5	5
	3	4	4	4	4	5	5
5	1	5	5	5	5	6	6
	2	5	6	6	6	6	7
	3	6	6	6	6	7	7
6	1	7	7	7	7	7	8
	2	8	8	8	8	8	9
	3	9	9	9	9	9	9

Table 2

	Legs	Trunk	Legs				Trunk				
			1	2	3	4	5	6	Legs	Trunk	
1	1	1	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2
	3	2	3	3	3	3	3	3	3	3	3
2	1	2	3	3	3	3	3	3	3	3	3
	2	3	3	3	4	4	4	4	4	4	4
	3	3	4	4	4	4	4	4	4	4	5
3	1	3	4	4	4	4	4	4	4	4	5
	2	3	4	4	4	4	4	4	4	4	5
	3	4	4	4	4	4	4	4	4	5	5
4	1	4	4	4	4	4	4	4	4	4	5
	2	4	4	4	4	4	4	4	4	4	5
	3	4	4	4	4	4	4	4	4	4	5
5	1	5	5	5	5	5	5	5	5	5	6
	2	5	6	6	6	6	6	6	6	6	7
	3	6	6	6	6	6	6	6	6	6	7
6	1	7	7	7	7	7	7	7	7	7	8
	2	8	8	8	8	8	8	8	8	8	9
	3	9	9	9	9	9	9	9	9	9	9

Table 3

	Neck, trunk and leg						
W	1	2	3	4	5	6	7+
r	1	1	2	3	3	4	5
i	2	2	2	3	4	4	5
s	3	3	3	4	4	5	6
t	4	3	3	3	4	5	6
a	5	4	4	4	5	6	7
r	6	4	4	5	6	6	7
m	7	5	5	6	6	7	7
8+	5	5	5	6	7	7	7

RULA Assessment Worksheet

Upper Arm Score

Adjustments:
 Add 1 if shoulder is raised or upper arm abducted
 Subtract 1 if arm is supported or trunk is leaning

Upper Arm

Lower Arm Score

Adjustments:
 Add 1 if working across midline or to side of body

Lower Arm

Wrist Score

Adjustments:
 Add 1 if wrist is bent laterally from midline

Wrist

Wrist Twist Score

Wrist Twist

Neck Score

Adjustments:
 Add 1 if neck is twisted or bent to side

Neck

Trunk Score

Adjustments:
 1 if trunk is well supported and while seated, 2 if not

Trunk

Leg Score

Legs

RULA Score

Procedure:
 1. Observe postures and enter scores
 2. Look up arm/wrist score in Table 1
 3. Look up neck/trunk/legs score in Table 2
 4. Adjust scores for frequency and force
 5. Look up RULA score in Table 3

Subject: Mahasiswa TI
 Task: Merakit stop Kontak (Bagian Kiri)
 Scorer: Murni
 Date: 30 April 2007

RULA Assessment Worksheet

Frequency Adjustment:

- 0 if moderate posture, neither static nor highly repetitive
- 1 if static posture maintained for more than 1 minute or highly repetitive posture repeated more than 4 time/minute

Force Adjustment:

- 0 No resistance, or less than 2 kg intermittent force or load
- 1 2-10 kg intermittent force or load
- 2 2-10 kg static force or load, or 2-10 kg repeated force or load
- 3 10 kg or more static or repeated force or load
- 4 Shock or forces with rapid buildup

Calculation:

Upper Arm Score Neck Score

Lower Arm Score Trunk Score

Wrist Score Leg Score

Wrist Twist Score

Table 1 Score + = Table 2 Score

Frequency Adj. +

Force Adj. +

Total Score +

Table 3 Score

Action Levels:

- 1,2 = Acceptable
- 3,4 = Investigate further
- 5,6 = Investigate and change soon
- 7 = Immediate action

Table 1

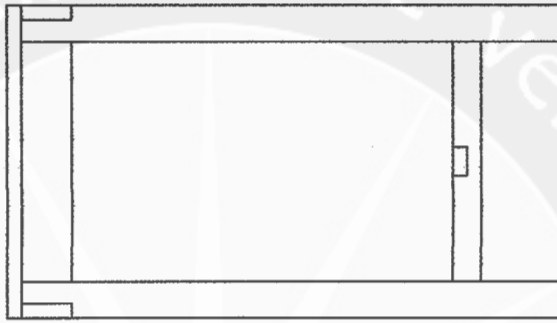
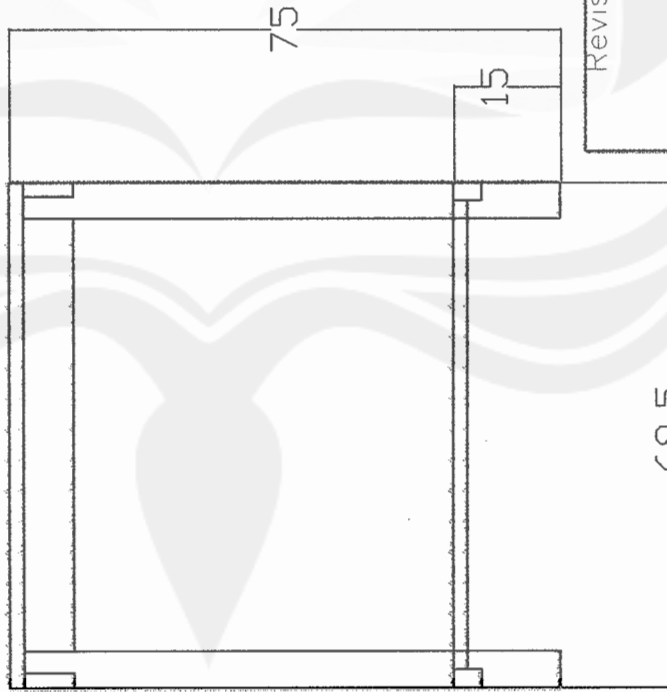
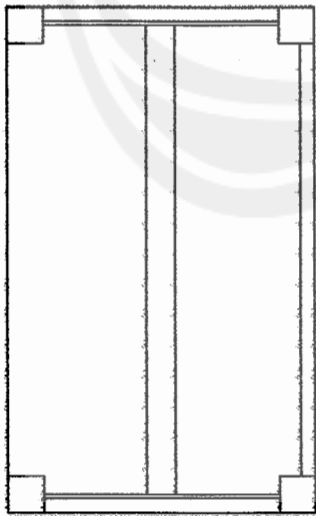
	Upper Arm	Lower Arm	Wrist						
			1	2	3	4			
1	1	1	Twist	1	2	1	2	1	2
			Twist	1	2	2	2	3	3
			Twist	2	2	2	2	3	3
2	2	2	Twist	2	3	3	3	4	4
			Twist	2	3	3	3	4	4
			Twist	3	3	3	3	4	4
3	3	3	Twist	3	4	4	4	5	5
			Twist	3	4	4	4	5	5
			Twist	4	4	4	4	5	5
4	4	4	Twist	4	4	4	4	5	5
			Twist	4	4	4	4	5	5
			Twist	5	5	5	5	6	6
5	5	5	Twist	5	5	5	5	6	6
			Twist	5	5	5	5	6	6
			Twist	6	6	6	6	7	7
6	6	6	Twist	6	6	6	6	7	7
			Twist	6	6	6	6	7	7
			Twist	7	7	7	7	8	8
7	7	7	Twist	7	7	7	7	8	8
			Twist	7	7	7	7	8	8
			Twist	8	8	8	8	9	9
8	8	8	Twist	8	8	8	8	9	9
			Twist	8	8	8	8	9	9
			Twist	9	9	9	9	9	9

Table 2

	Upper Arm	Lower Arm	Trunk						
			1	2	3	4			
1	1	1	Legs	1	2	1	2	1	2
			Legs	1	2	1	2	1	2
			Legs	2	3	3	3	4	5
2	2	2	Legs	2	3	3	3	4	5
			Legs	2	3	3	3	4	5
			Legs	3	3	3	3	4	5
3	3	3	Legs	3	3	3	3	4	5
			Legs	3	3	3	3	4	5
			Legs	4	4	4	4	5	6
4	4	4	Legs	4	4	4	4	5	6
			Legs	4	4	4	4	5	6
			Legs	5	5	5	5	6	7
5	5	5	Legs	5	5	5	5	6	7
			Legs	5	5	5	5	6	7
			Legs	6	6	6	6	7	8
6	6	6	Legs	6	6	6	6	7	8
			Legs	6	6	6	6	7	8
			Legs	7	7	7	7	8	9
7	7	7	Legs	7	7	7	7	8	9
			Legs	7	7	7	7	8	9
			Legs	8	8	8	8	9	9
8	8	8	Legs	8	8	8	8	9	9
			Legs	8	8	8	8	9	9
			Legs	9	9	9	9	9	9

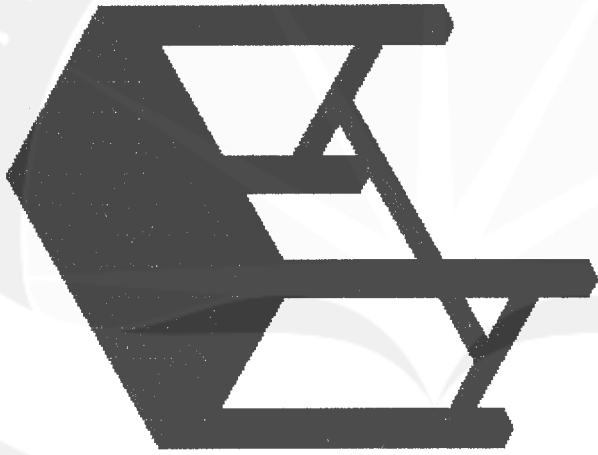
Table 3

	Neck, trunk and leg						
W	1	2	3	4	5	6	7+
r	1	1	2	3	3	4	5
i	2	2	2	3	4	4	5
s	3	3	3	3	4	4	5
t	4	3	3	3	4	5	6
a	5	4	4	4	5	6	7
r	6	4	4	5	6	6	7
m	7	5	5	6	6	7	7
8+	5	5	5	6	7	7	7




Revision Index

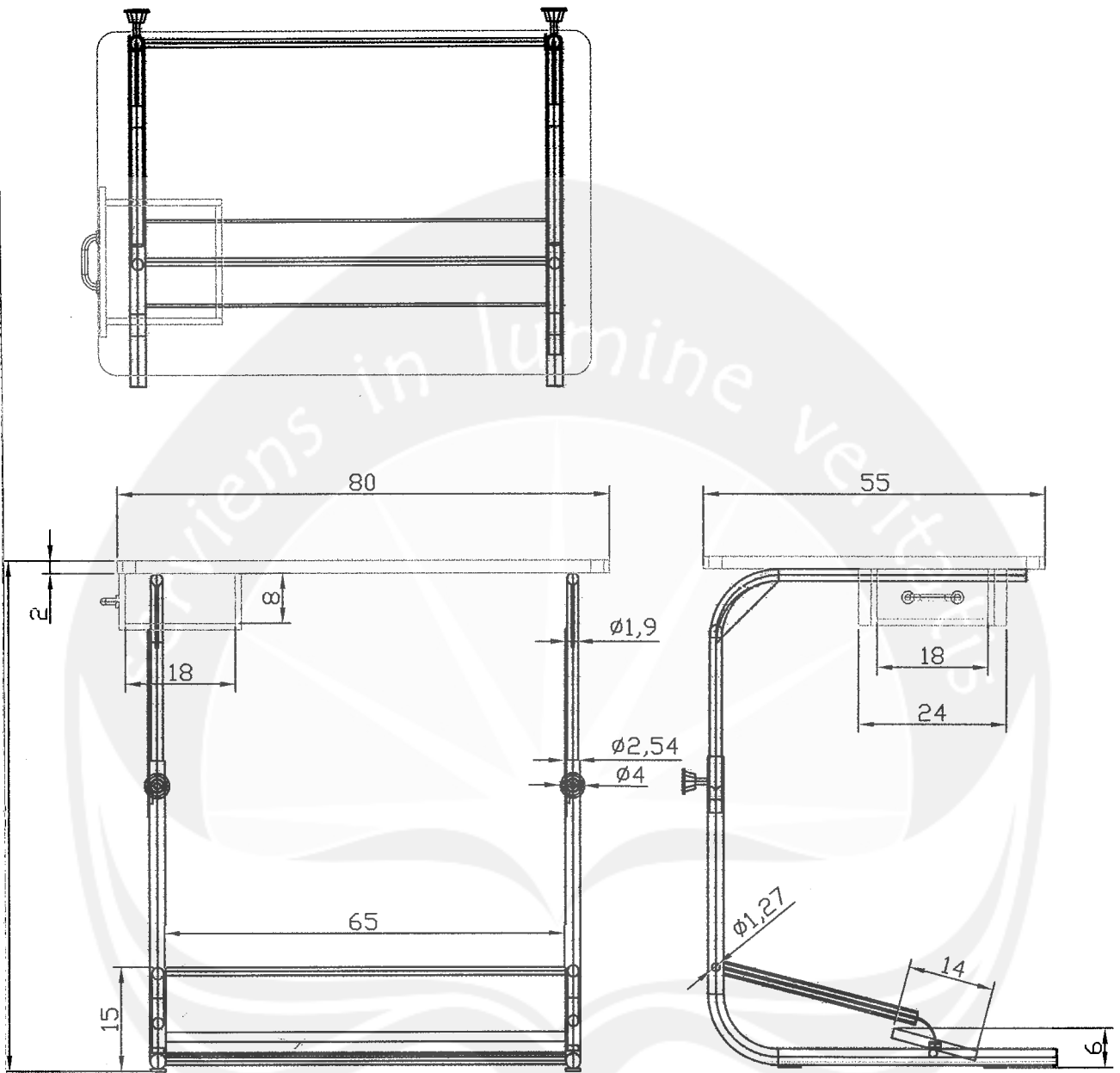
Drawn by : Murni	Scale : 1:10
Reg. Nr : TI	Unit : cm
Date : 21-2-07	Material : Wood
Checked by : Pak Krist	
A4	MEJA PERAKITAN SEKARANG 2D
INDUSTRIAL ENGINEERING UJAY	Operation
Origin.	Rep. by.
	Dwg. Nr.
	SN. NS.



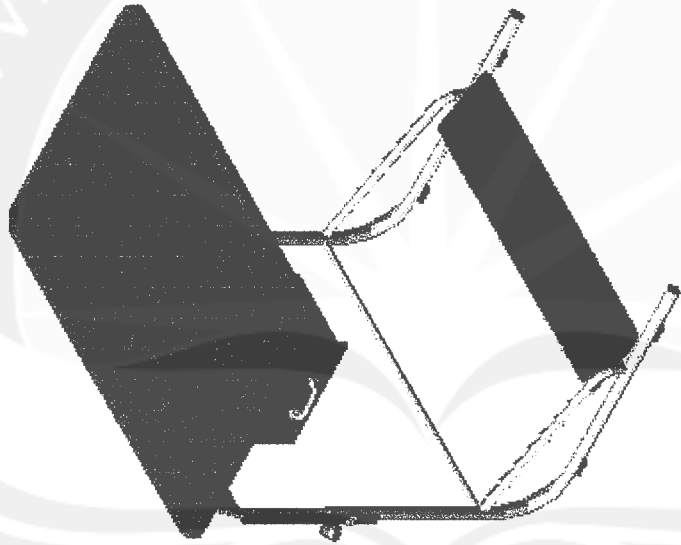
serviens in lumine ver

Revision Index

Drawn by : Murni	Scale : 1:10
Reg. Nr : TI	Unit : cm
Date : 21-2-07	Material : Wood
Checked by : Pak Krist	
A4	MEJA PERAKITAN SEKARANG 3D
	Operation
INDUSTRIAL ENGINEERING UJUY	Dwg. Nr.
Origin.	Rep. by.
	SN. NS.



Revision Index	Drawn by : Murni	Scale : 1:10	
	Reg. Nr : TI	Unit : cm	
	Date : 22-3-07	Material : Wood&MS	
	Checked by : Pak Krist		
A4	MEJA PERAKITAN HASIL RANCANGAN 2D		
INDUSTRIAL ENGINEERING UAJY	Operation	Dwg. Nr.	
Origin.	Rep.	Rep. by.	SN. NS.



Revision Index

Drawn by : Murni Scale : 1:10

Reg. Nr : TI Unit : cm

Date : 22-3-07 Material : Wood

Checked by : Pak Krist

A4 MEJA PERAKITAN HASIL RANCANGAN
3D

INDUSTRIAL ENGINEERING
UJUY



Operation

Dwg. Nr.

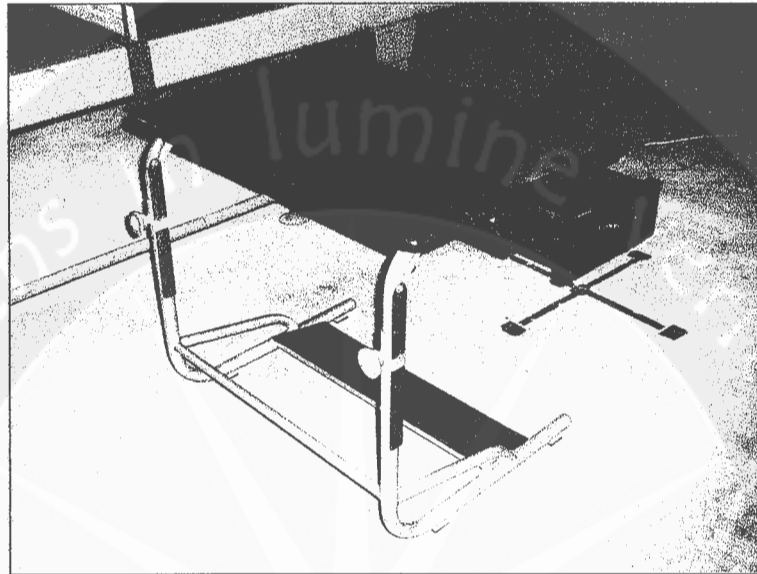
Origin. Rep.

Rep. by.

SN. NS.

LAMPIRAN 13

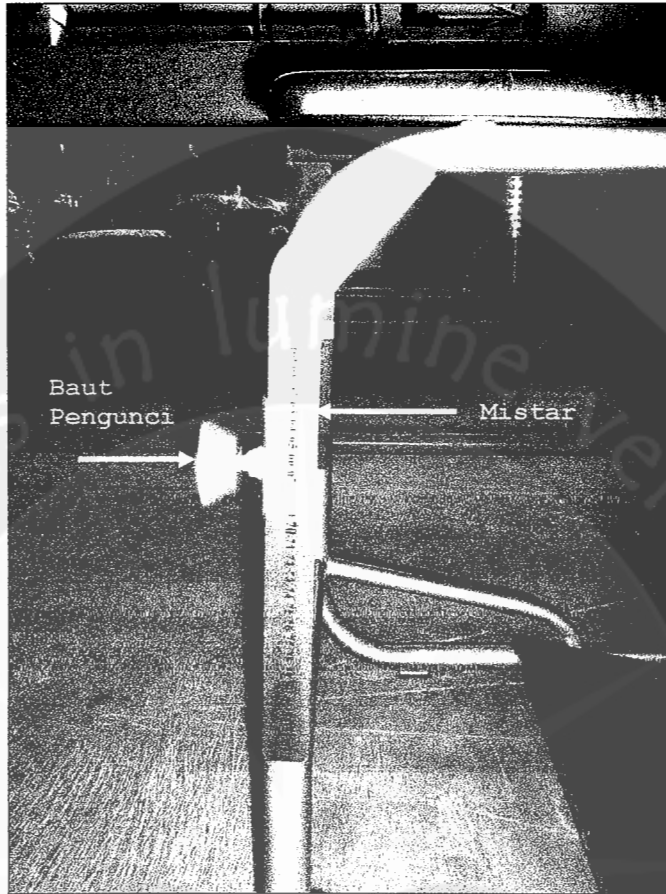
FOTO MEJA PERAKITAN HASIL RANCANGAN



Meja Perakitan Hasil Rancangan



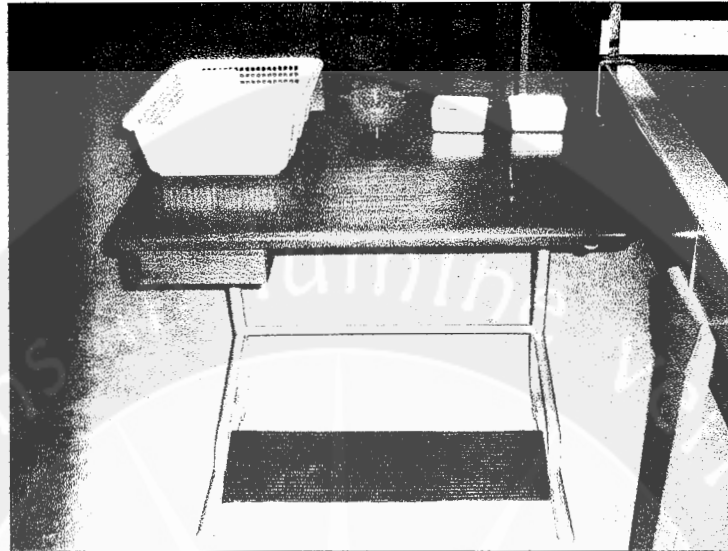
Meja Perakitan Hasil Rancangan Tampak Belakang



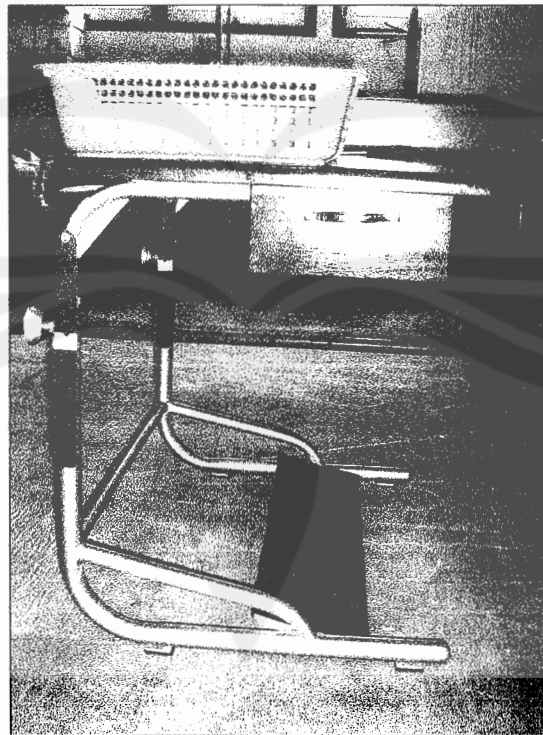
Mistar dan Baut Pengunci pada Meja Perakitan



Meja Perakitan beserta Komponen-komponen dari Tampak Atas



Meja Perakitan beserta Komponen-komponen dari Tampak Depan



Meja Perakitan beserta Komponen-komponen dari Tampak Samping

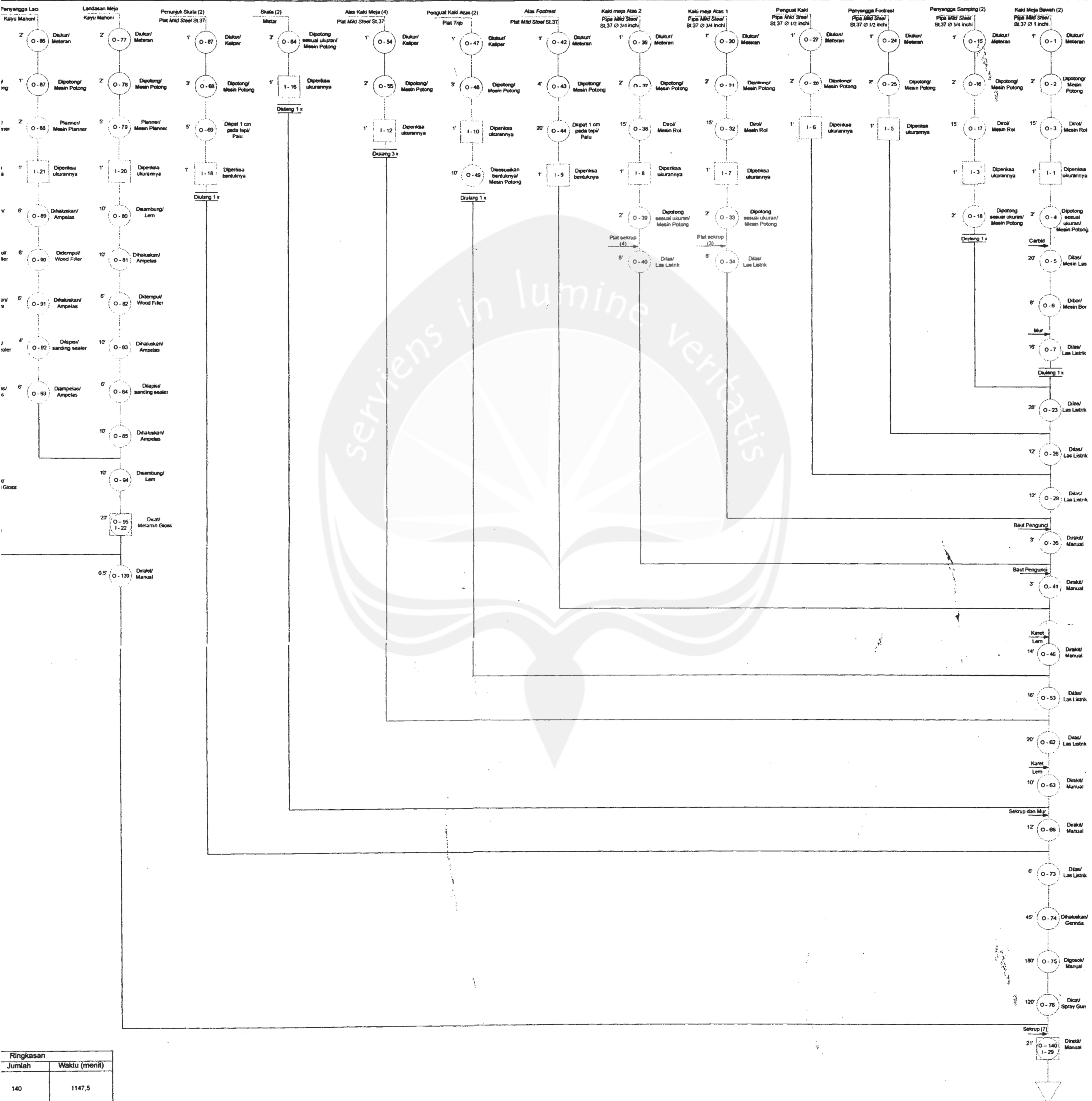
PETA PROSES OPERASI

Nama Obyek : Meja Perakitan

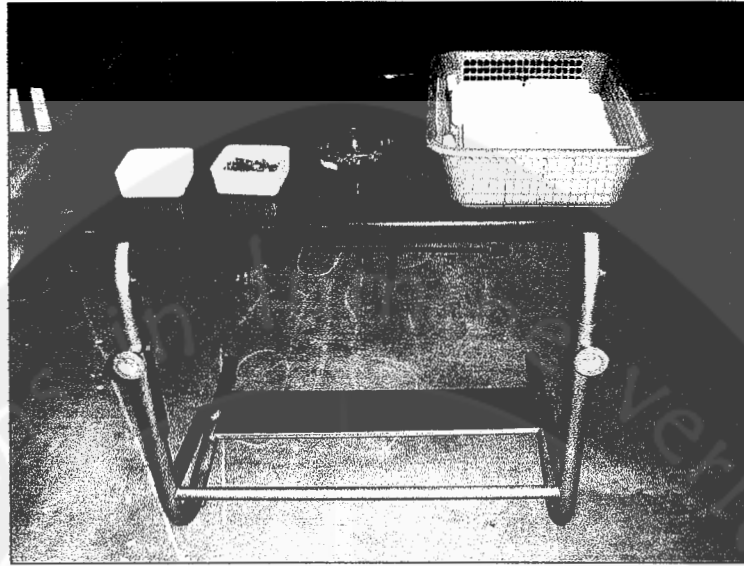
No. Peta : 001

Dipetakan Oleh : Murni

Tanggal Dipetakan : 17 April 2007



Ringkasan	
Jumlah	Waktu (menit)
140	1147,5
29	29
1	
170	1176,5



Meja Perakitan beserta Komponen-komponen dari Tampak Belakang