

Lampiran 1
(Tabel perhitunga elemen mesin)

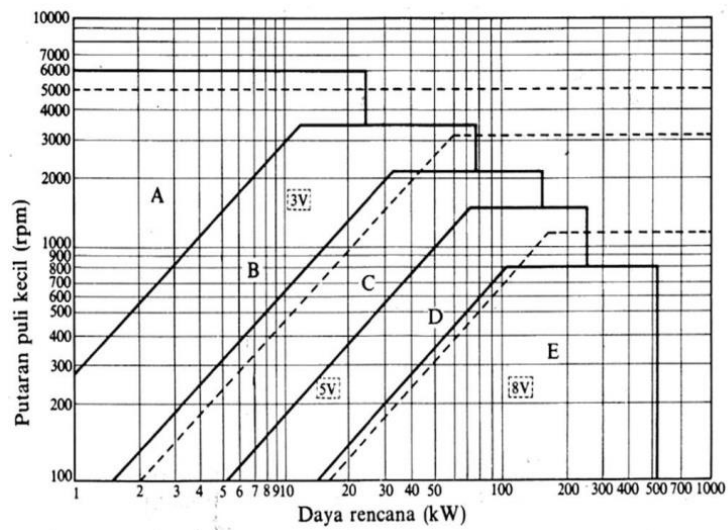
Tabel 1 Faktor koreksi daya [Sularso, 2008]

Mesin yang digerakkan		Penggerak					
		Momen puntir puncak 200%			Momen puntir puncak >200%		
		Motor arus bolak balik (momen normal, sangkar bajing sinkron), motor arus searah (lilitan shunt)			Motor arus bolak balik (momen tinggi, fasa tunggal, lilitan seri), motor arus searah (lilitan kompon, lilitan seri), mesin torak kopling tak tetap.		
		Jumlah jam kerja tiap hari			Jumlah jam kerja tiap hari		
		3-5 jam	8-10 jam	16-24 jam	3-5 jam	8-10 jam	16-24 jam
Variasi beban sangat kecil	Pengaduk zat cair, kipas angin, blower (sampai 7,5 kW) pompa sentrifugal, konveyor tugas ringan	1	1,1	1,2	1,2	1,3	1,4
Variasi beban kecil	Konveyor sabuk (pasir, batu bara), pengaduk, kipas angin (lebih dari 7,5 kW), mesin torak, peluncur, mesin perkakas, mesin percetakan	1,2	1,3	1,4	1,4	1,5	1,6
Variasi beban sedang	Konveyor (ember, sekrup), pompa torak, kompresor, gilingan palu, pengocok, roots-blower, mesin tekstil, mesin kayu	1,3	1,4	1,5	1,6	1,7	1,8
Variasi beban besar	Penghancur, gilingan bola atau batang, pengangkat, mesin pabrik karet (rol, kalender)	1,5	1,6	1,7	1,8	1,9	2

Tabel 2 harga *sf1* dan *sf2* [Sularso, 2008]

Jenis Bahan	<i>sf1</i>	<i>sf2</i>
Bahan SF dengan kekuatan yang dijamin	5,6	1,3-3,0
Bahan S-C dan baja paduan	6,0	1,3-3,0

Tabel 3 Diagram pemilihan sabuk V

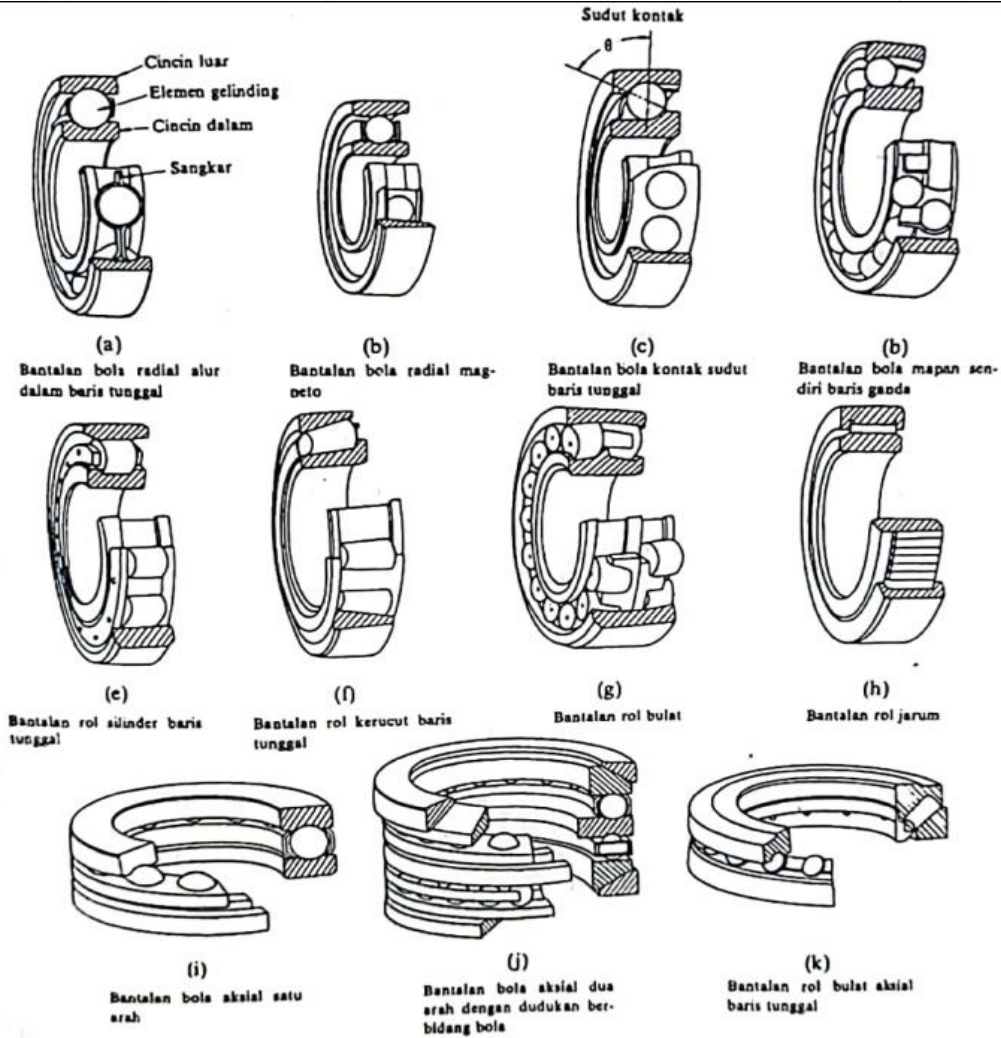


Tabel 4 Panjang sabuk V standar [Sularso, 2008]

Nomor nominal		Nomor nominal		Nomor nominal		Nomor nominal	
(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)
10	254	45	1143	80	2032	115	2921
11	279	46	1168	81	2057	116	2946
12	305	47	1194	82	2083	117	2972
13	330	48	1219	83	2108	118	2997
14	356	49	1245	84	2134	119	3023
15	381	50	1270	85	2159	120	3048
16	406	51	1295	86	2184	121	3073
17	432	52	1321	87	2210	122	3099
18	457	53	1346	88	2235	123	3124
19	483	54	1372	89	2261	124	3150
20	508	55	1397	90	2286	125	3175
21	533	56	1422	91	2311	126	3200
22	559	57	1448	92	2337	127	3226
23	584	58	1473	93	2362	128	3251
24	610	59	1499	94	2388	129	3277
25	635	60	1524	95	2413	130	3302
26	660	61	1549	96	2438	131	3327
27	686	62	1575	97	2464	132	3353
28	711	63	1600	98	2489	133	3378
29	737	64	1626	99	2515	134	3404
30	762	65	1651	100	2540	135	3429
31	787	66	1676	101	2565	136	3454
32	813	67	1702	102	2591	137	3480
33	838	68	1727	103	2616	138	3505
34	864	69	1753	104	2642	139	3531
35	889	70	1778	105	2667	140	3556
36	914	71	1803	106	2692	141	3581
37	940	72	1829	107	2718	142	3607
38	965	73	1854	108	2743	143	3632
39	991	74	1880	109	2769	144	3658
40	1016	75	1905	110	2794	145	3683
41	1041	76	1930	111	2819	146	3708
42	1067	77	1956	112	2845	147	3734
43	1092	78	1981	113	2870	148	3759
44	1118	79	2007	114	2896	149	3785

Tabel 5 Faktor V, X, Y Dan X0, Y0. [Sularso, 2008]

Jenis bantalan	Beban putar pd cincin dalam	Beban putar pada cincin luar	Baris tunggal		Baris ganda				e	Baris tunggal		Baris ganda	
			$F_a/VF_r > e$		$F_a/VF_r \leq e$					X ₀	Y ₀	X ₀	Y ₀
			X	Y	X	Y	X	Y					
Bantalan bola alur dalam	$F_a/C_0 = 0,014$	1	1,2	0,56	1	0	0,56	2,30	0,19	0,6	0,5	0,6	0,5
	$= 0,028$							1,99	0,22				
	$= 0,056$							1,71	0,26				
	$= 0,084$							1,55	0,28				
	$= 0,11$							1,45	0,30				
	$= 0,17$							1,31	0,34				
	$= 0,28$							1,15	0,38				
Bantalan bola sudut	$\alpha = 20^\circ$	1	1,2	0,43	1,00	1,09	0,70	1,63	0,57	0,5	1	0,42	0,84
	$= 25^\circ$			0,41	0,87	0,92	0,67	1,41	0,68			0,38	0,76
	$= 30^\circ$			0,39	0,76	0,78	0,63	1,24	0,80			0,33	0,66
	$= 35^\circ$			0,37	0,66	0,66	0,60	1,07	0,95			0,29	0,58
	$= 40^\circ$			0,35	0,57	0,55	0,57	0,93	1,14			0,26	0,52



Tabel 6 Tegangan tarik dan kecepatan potong

Material	Teg. Tarik (kg/mm ²)	CS (m/mnt)	Material	Teg. Tarik (kg/mm ²)	CS (m/mnt)
Plain carbon steel			Spring Steel (JIS Grade)		
ST37 / MS	37	32	SUP4, 6, 7, 9, 10, 11	125	13
1030 / S30C	48	32	SUS 302, 304, 316 WPA	170	5
1035 / S35C	52	25	SUS 302, 304, WPB	210	5
1040 / S40C	55	25	SUS 631J1 WPC	200	5
1045 / S45C / EMS45 / 1730	58	25	Stainless Steel		
1050 / S50C / ST60	62	25	304, 304L, 316, 316L	70	18
1055 / S55C	66	25	410, 416	77	18
Alloy Steel (JIS Grade)			420, 420F	84	18
SNC2, 3, 21	95	18	440C, 440F	91	18
SNC22	100	13	Copper		
SNCM1, 2, 22	90	18	70		
SNCM7, 8, 23, 25	100	13	Lead Bronze		
SCr3, 4, 21, 22	90	18	50-70		
SCr5	100	13	Phospor Bronze		
SCM2, 3, 21, 22	90	18	40-50		
SCM4, 5, 23	100	13	Pure Aluminum		
Tool Steel (AISI Grade)			200-300		
W Series	70	18	Aluminum Alloy		
O Series	135	5	70-120		
D Series	140	5	Cast Iron		
A Series	140	5	GG20		
H Series	140	5	GG25		
L Series	100	13	GG30, 35, 40		
P Series	100	13	GG45, 50		
S Series	130	5	GG55, 60		
HSS T Series	150	5			
HSS M Series	140	5			

Tabel 7 Faktor koreksi K_m dan K_t [Khurmi & Gupta (2005)]

Nature of load	K_m	K_t
1. Stationary shafts		
(a) Gradually applied load	1.0	1.0
(b) Suddenly applied load	1.5 to 2.0	1.5 to 2.0
2. Rotating shafts		
(a) Gradually applied or steady load	1.5	1.0
(b) Suddenly applied load with minor shocks only	1.5 to 2.0	1.5 to 2.0
(c) Suddenly applied load with heavy shocks	2.0 to 3.0	1.5 to 3.0

LAMPIRAN 2

(Tabel perhitungan proses produksi)

Tabel 1 Jenis pahat, geometri pahat, v, dan f [Widarto, 2008]

Workpiece material	Tensile strength in kp/mm ²	Tool	Cutting angle clearance/top		Feed in mm/rev. cutting speed v m/min				Coolant and Lubricant	
			α°	β°	0,1	0,2	0,4	0,8	Roughing	Finishing
Steel St 34, St 37, St 42	up to 50.	SS	8	14	280	60	45	34	E	E or P.
		S ₁	5	10		236	200	170		
St 50, St 60	50...70	SS	8	14	240	44	32	24	E	E or P
		S ₁	5	10		205	175	145		
St 70	70...85	SS	8	14	200	32	24	18	E	E or P
		S ₁	5	10		170	132	106		
Cast steel	50...70	SS	8	10	118	34	25	19	E	dry
		S ₁	5	6		100	85	71		
Alloyed steel	85...100	SS	8	10	150	24	17	12	E	E or P
		S ₁	5	6		118	95	75		
Mn-Steel, Cr-Ni-steel, Cr-Mo-steel	100...140	SS	8	6	95	16	11	8	E	E or P
		S ₁	5	6		75	60	50		
other alloyed steels	140...180	SS	8	6	60	9,5	8	32	E	E or P
		S ₁	5	6		48	38	32		
Tool steel	150...180	SS	8	6	50	40	32	27	E	Colza oil or P
		S ₁	5	0		32	18	13		
C.1.20, C.1.25	hardness Brinell 200...250	H ₁	5	0	106	90	75	63	dry or E	dry
Copper alloys	hardness Brinell 80...120	SS	8	0	600	125	85	56	dry, E or L	dry
		G ₁	5	6		530	450	400		
Cast bronze		SS	8	0	355	63	53	43	E or L	dry
		G ₁	5	6		280	236	200		
Light alloys aluminium		SS	12	30	400	300	200	118	E or P	E or P
		G ₁	12	30		1320	1120	950		
Aluminium alloys (11...13%Si)		SS	12	18	100	67	45	30	E	Oil S II or P
		G ₁	12	18		224	190	160		
Magnesium alloys*		SS	8	6	1000	900	800	750	dry or with non-combustible oil	dry or with non-combustible oil
		G ₁	5	6		1800	1500	1250		
Plastics and hard rubber		SS	12	10	300	280	250	224	dry	dry
		G ₁	12	10		280	212	170		
Bakelite, Novotext, Pertinax hard plastic		SS	12	14	280	212	170	132	dry	dry
		G ₁	12	14		280	212	170		

Tabel 2 Kecepatan potong proses bubut rata dan proses ulir untuk pahat HSS [Widarto,2008]

MATERIAL	STRAIGHT TURNING SPEED		THREADING SPEED	
	FEET PER MINUTE	METERS PER MINUTE	FEET PER MINUTE	METERS PER MINUTE
LOW-CARBON STEEL	80-100	24.4-30.5	35-40	10.7-12.2
MEDIUM-CARBON STEEL	60-80	18.3-24.4	25-30	7.6-9.1
HIGH-CARBON STEEL	35-40	10.7-12.2	15-20	4.6-6.1
STAINLESS STEEL	40-50	12.2-15.2	15-20	4.6-6.1
ALUMINUM AND ITS ALLOYS	200-300	61.0-91.4	50-60	15.2-18.3
ORDINARY BRASS AND BRONZE	100-200	30.5-61.0	40-50	12.2-15.2
HIGH-TENSILE BRONZE	40-60	12.2-18.3	20-25	6.1-7.6
CAST IRON	50-80	15.2-24.4	20-25	6.1-7.6
COPPER	60-80	18.3-24.4	20-25	6.1-7.6

NOTE: Speeds for carbide-tipped bits can be 2 to 3 times the speed recommended for high-speed steel

Tabel 3 Gerak Makan Pada Mesin Bubut dan Kecepatan Spindel

LONGITUDINAL FEED
 [mm/rev]

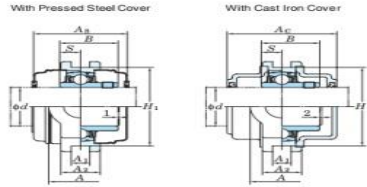
S	M	M				TR
		D	E	F	G	
5	1	0.044	0.088	0.176	0.352	1
4	2	0.050	0.099	0.198	0.396	2
1/2	3	0.052	0.105	0.210	0.420	3
1	4	0.055	0.110	0.220	0.440	4
	5	0.060	0.121	0.242	0.484	5
1/2	6	0.063	0.127	0.254	0.508	6
	7	0.066	0.132	0.264	0.528	7
	8	0.072	0.144	0.287	0.574	8
2	9	0.075	0.149	0.298	0.596	9
	10	0.077	0.154	0.308	0.616	10
	11	0.083	0.166	0.331	0.662	11

	1	2	3
A	60	220	860
B	92	360	1400
C	140	530	2000

LAMPIRAN 3

(Catalogue)

Tabel 1 Bearing catalogue



Variations of tolerance of groove width (Δ_{A12}), variations of tolerance of distance between both grooves (Δ_{A13}), and tolerance of symmetry of both groove sides (X)

Housing No.		Δ_{A12}	Δ_{A13}	X
T204-T210	TX05-TX10	+0.2	0	0.5
T211-T217	TX11-TX17	0	-0.5	0.5
	T315-T318	+0.3	0	0.7
	T319-T322	0	-0.8	0.7
	T324-T328			0.8

Form and dimensions of L_e of T204JE3 and T205JE3 (housing with cast iron cover) are shown below.



Bearing No.	Mass	Basic Load Ratings		Factor	With Pressed Steel Cover			Mass	With Cast Iron Cover			Mass					
		C_r	C_{hr}		f_w	Unit No.	Dimension		mm	inch	Unit No.		Dimension	mm	inch		
UC201	0.81	12.8	6.65	13.2	UCT201C	UCT201CD	44	1 29/32	0.81	-	-	-	-				
UC201-8	0.81				-	-	-	-	-	-	-	-	-	-			
UC202	0.79				-	-	-	UCT202C	UCT202CD	44	1 29/32	0.79	-	-	-		
UC202-10	0.79				-	-	-	-	-	-	-	-	-	-			
UC203	0.78				-	-	-	UCT203C	UCT203CD	44	1 29/32	0.78	-	-	-		
UC204-12	0.78	14.0	7.85	13.9	UCT204C	UCT204CD	44	1 29/32	0.76	UCT204FC	UCT204FGD	62	2 7/16	1.1			
UC204	0.75				-	-	-	-	-	-	-	-	-	-			
UC205-14	0.84				-	-	-	-	-	-	-	-	-	-			
UC205-15	0.84				-	-	-	UCT205C	UCT205CD	48	1 7/8	0.84	UCT205FC	UCT205FGD	66	2 19/32	1.2
UC205	0.84				-	-	-	-	-	-	-	-	-	-			
UC205-16	0.84	-	-	-	-	-	-	-	-	-	-						
UCX05	1.4	19.5	11.3	13.9	UCTX05C	UCTX05CD	52	2 1/16	1.4	-	-	-	-				
UCX05-16	1.4				-	-	-	-	-	-	-	-	-	-			
UC305	1.4				-	-	-	-	-	-	-	UCT305C	UCT305CD	76	3	2.0	
UC305-16	1.4	21.2	10.9	12.6	-	-	-	-	-	-	-	-	-				
UC206-18	1.3				-	-	-	-	-	-	-	-	-	-			
UC206	1.3				-	-	-	UCT206C	UCT206CD	52	2 1/16	1.3	UCT206FC	UCT206FGD	70	2 9/16	1.8
UC206-19	1.3	19.5	11.3	13.9	-	-	-	-	-	-	-	-	-				
UC206-20	1.3				-	-	-	-	-	-	-	-	-	-			
UCX06	1.7				-	-	-	UCTX06C	UCTX06CD	59	2 9/16	1.7	-	-	-		
UCX06-19	1.7	25.7	15.4	13.9	-	-	-	-	-	-	-	-	-				
UCX06-20	1.7				-	-	-	-	-	-	-	-	-	-			
UC306	1.8				-	-	-	-	-	-	-	UCT306C	UCT306CD	82	3 1/16	2.4	
UC207-20	1.6	25.7	15.4	13.9	-	-	-	-	-	-	-	-	-				
UC207-21	1.6				-	-	-	-	-	-	-	-	-	-			
UC207-22	1.6				-	-	-	-	-	-	-	-	-	-			
UC207	1.6				-	-	-	UCT207C	UCT207CD	59	2 9/16	1.6	UCT207FC	UCT207FGD	78	3 1/16	2.3
UC207-23	1.6				-	-	-	-	-	-	-	-	-	-			
UCX07-22	2.7	29.1	17.8	14.0	-	-	-	-	-	-	-	-	-				
UCX07	2.7				-	-	-	UCTX07C	UCTX07CD	68	2 11/16	2.7	-	-	-		
UCX07-23	2.7				-	-	-	-	-	-	-	-	-	-			
UC307	2.3	33.4	19.3	13.2	-	-	-	-	-	UCT307C	UCT307CD	88	3 19/32	3.1			
UC208-24	2.5	29.1	17.8	14.0	-	-	-	-	-	-	-	-	-				
UC208-25	2.5				-	-	-	-	-	-	-	-	-	-			
UC208	2.5				-	-	-	UCT208C	UCT208CD	68	2 11/16	2.5	UCT208FC	UCT208FGD	86	3 3/8	3.3
UCX08-24	2.6	34.1	21.3	14.0	-	-	-	-	-	-	-	-	-				
UCX08	2.6				-	-	-	UCTX08C	UCTX08CD	68	2 11/16	2.6	-	-	-		
UC308-24	3.0				-	-	-	-	-	-	-	-	-	-			
UC308	3.0	40.7	24.0	13.2	-	-	-	-	-	UCT308C	UCT308CD	96	3 29/32	4.0			
UC209-26	2.4	34.1	21.3	14.0	-	-	-	-	-	-	-	-	-				
UC209-27	2.4				-	-	-	-	-	-	-	-	-	-			
UC209-28	2.4				-	-	-	-	-	-	-	-	-	-			
UC209	2.4				-	-	-	UCT209C	UCT209CD	68	2 11/16	2.4	UCT209FC	UCT209FGD	88	3 19/32	3.2
UCX09-28	2.9				-	-	-	-	-	-	-	-	-	-			
UCX09	2.9	35.1	23.3	14.4	UCTX09C	UCTX09CD	73	2 7/8	2.9	-	-	-					

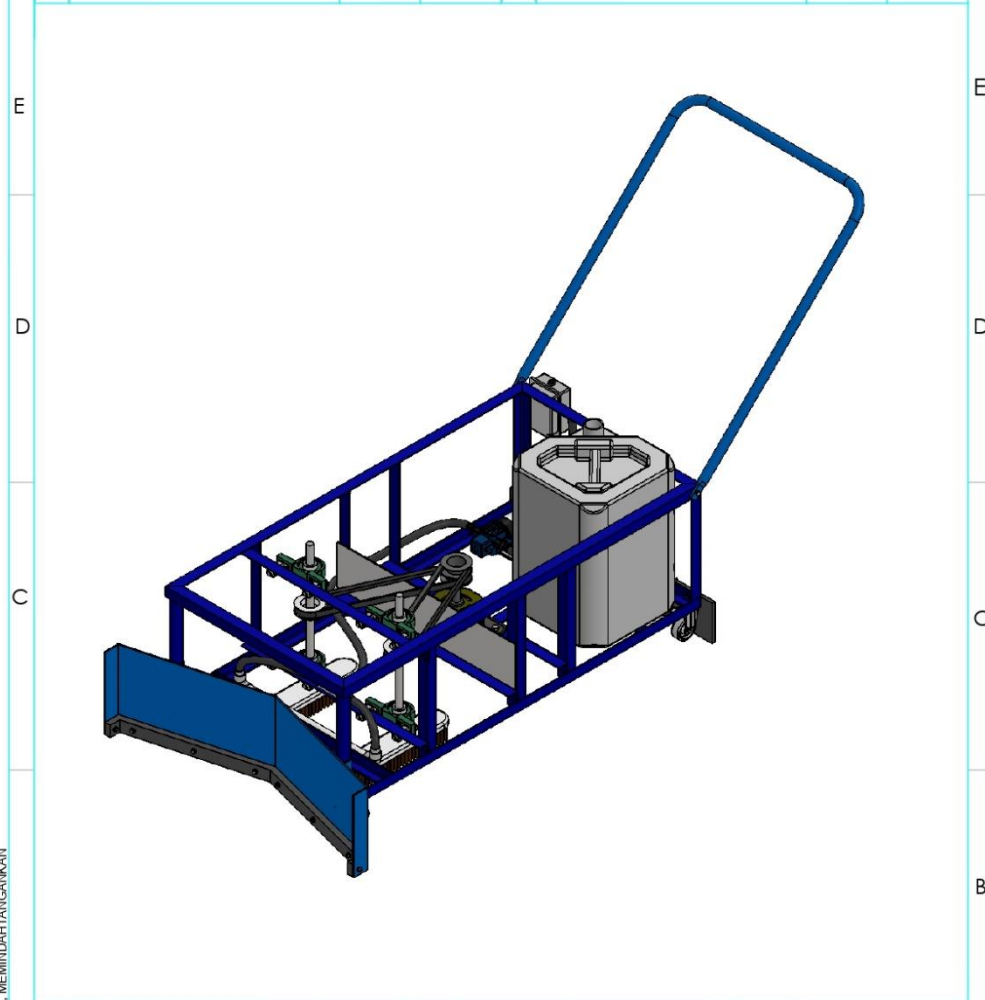
3. As for the triple seal type product (from 201 to 205 are the double seal type products), accessory code L3 (L2) follows the Part No. of unit or bearing. (Example of Part No. : UCT206JL3, UC206L3)

4. As for the dimensions and forms of applicable bearings, see the dimensional tables of ball bearing for unit.

5. Housings of nodular graphite cast iron are also available.

LAMPIRAN 4
(Gambar detail)

5	4	3	2	1			
NO	PERUBAHAN	TANGGAL	NAMA	NO	PERUBAHAN	TANGGAL	NAMA
△				△			

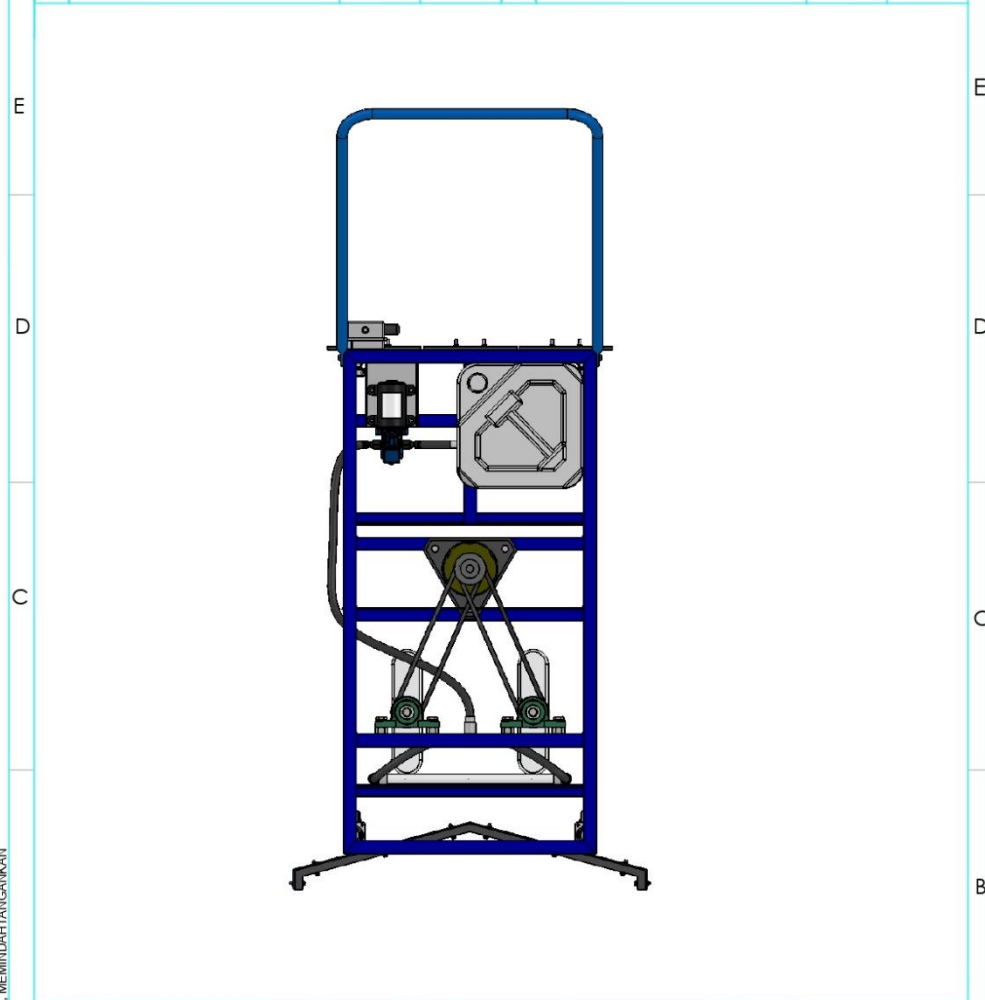


JML	NAMA BAGIAN						BAHAN	UKURAN JADI	UKURAN KASAR	NO. ID	KETERANGAN
>	0	6	30	120	400	1000	PENGKERJAAN LANJUT	NO ORDER	PROYEKSI		
<	6	30	120	400	1000	2000					
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2					
NAMA RANCANG BANGUN MESIN PEBERSIH KANDANG SAPI									SKALA	DIGAMBAR	Fajar B.I
NO . ASSY : POLITEKNIK NEGERI CILACAP TELP. (0282) 533329 EMAIL : sekretariat@pnc.ac.id JL. Dr. SOETOMO, SIDAKAYA, CILACAP, 53212									1 : 5	DIPERIKSA	Pujono
									DISAHKAN	Ipung.K	
									FORMAT	NO GAMBAR :	
									A4	MPKS / 01	

5	4	3	2	1
PENGGANTI DARI	DIGANTI DENGAN	NO LEMBAR	JUMLAH LEMBAR	

GAMBAR INI TAMPILAN TERTULIS DARI POLITEKNIK NEGERI CILACAP
 DILARANG MEMFOTOKOPI, MEMPERBANYAK, MENYALIN, MEMINDAH TANGKANKAN

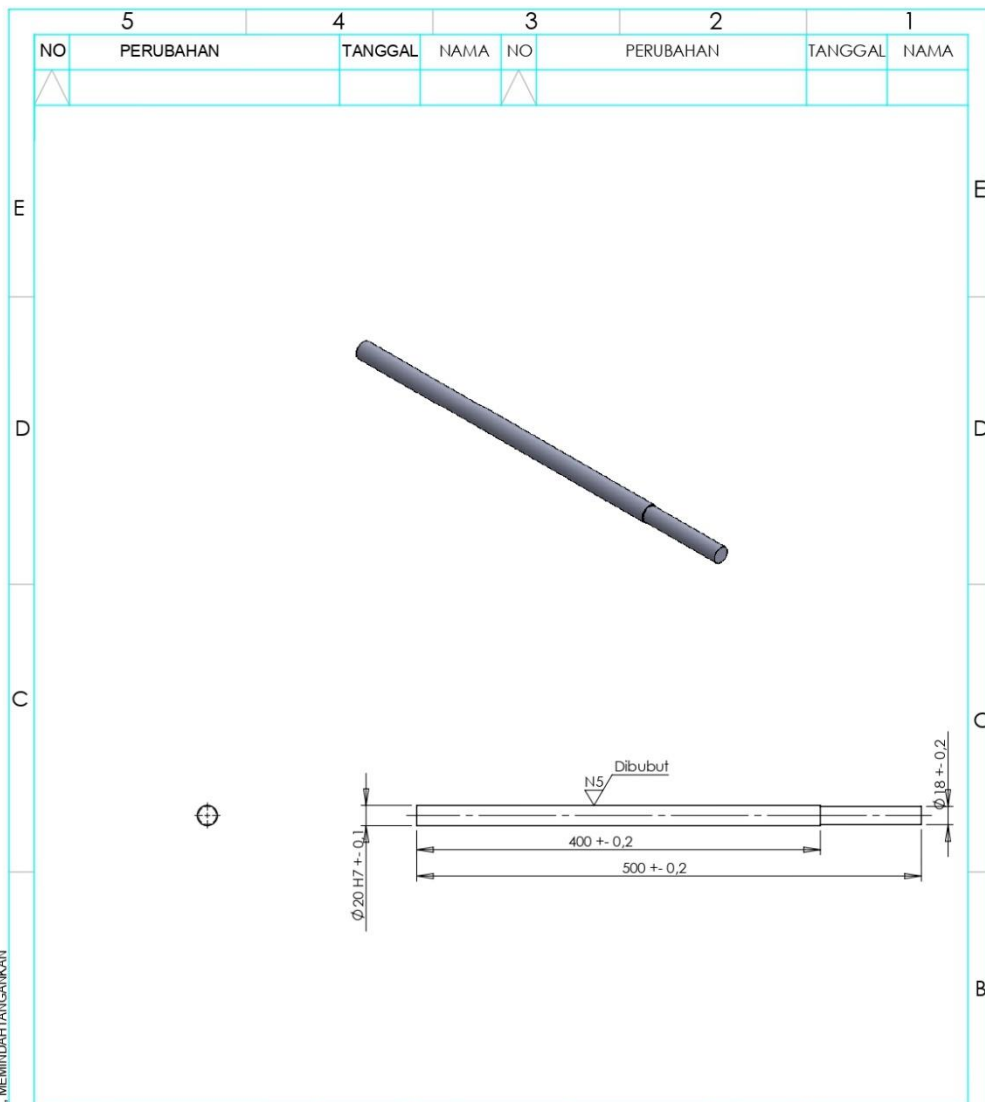
5	4	3	2	1			
NO	PERUBAHAN	TANGGAL	NAMA	NO	PERUBAHAN	TANGGAL	NAMA
△				△			



JML	NAMA BAGIAN						BAHAN	UKURAN JADI	UKURAN KASAR	NO. ID	KETERANGAN
>	0	6	30	120	400	1000	PENGERJAAN LANJUT	NO ORDER	PROYEKSI		
<	6	30	120	400	1000	2000					
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2					
NAMA RANCANG BANGUN MESIN PEMBERSIH KANDANG SAPI									SKALA	DIGAMBAR	Fajar B.I
NO . ASSY : POLITEKNIK NEGERI CILACAP TELP. (0282) 533329 EMAIL : sekretariat@pnc.ac.id JL. Dr. SOETOMO, SIDAKAYA, CILACAP, 53212									1 : 5	DIPERIKSA	Pujono
									DISAHKAN	Ipung.K	
									FORMAT	NO GAMBAR :	
									A4	MPKS / 02	

5	4	3	2	1
PENGGANTI DARI	DIGANTI DENGAN	NO LEMBAR	JUMLAH LEMBAR	

GAMBAR INI TAMPILAN TERTULIS DARI POLITEKNIK NEGERI CILACAP
 DILARANG MEMFOTOKOPI, MEMPERBANYAK, MENYALIN, MEMINDAH TANGKANKAN



JML	NAMA BAGIAN						BAHAN	UKURAN JADI	UKURAN KASAR	NO. ID	KETERANGAN
>	0	6	30	120	400	1000	PENGKERJAAN LANJUT	NO ORDER	PROYEKSI		
<	6	30	120	400	1000	2000					
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2					
NAMA									SKALA	DIGAMBAR	Fajar B.I
GAMBAR DETAIL POROS									1 : 5	DIPERIKSA	Pujono
										DISAHKAN	Ipung.K
NO . ASSY :									FORMAT	NO GAMBAR :	
POLITEKNIK NEGERI CILACAP									A4	MPKS / 04	
TELP. (0282) 533329 EMAIL : sekretariat@pnc.ac.id											
JL. Dr. SOETOMO, SIDAKAYA, CILACAP, 53212											

GAMBAR INI TAMPILAN TERTULIS DARI POLITEKNIK NEGERI CILACAP
DIPERANG MEMFOTOKOPI, MEMPERBANYAK, MENYALIN, MEMINDAH TANGKANKAN

5	4	3	2	1
PENGGANTI DARI	DIGANTI DENGAN	NO LEMBAR	JUMLAH LEMBAR	