

Lampiran 1
Tabel Elemen Mesin

Tabel 1. Faktor Koreksi Daya (Sularso dan Suga, 2008)

Daya yang ditransmisikan	f_c
Daya rata-rata yang diperlukan	1,2-2,0
Daya maksimum yang diperlukan	0,8-1,2
Daya normal	1,0-1,5

Tabel 2. Harga Sf_1 dan Sf_2 (Sularso dan Suga, 2008)

Jenis Bahan	Sf_1	Sf_2
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. Faktor Koreksi Momen Puntir (Sularso dan Suga, 2008)

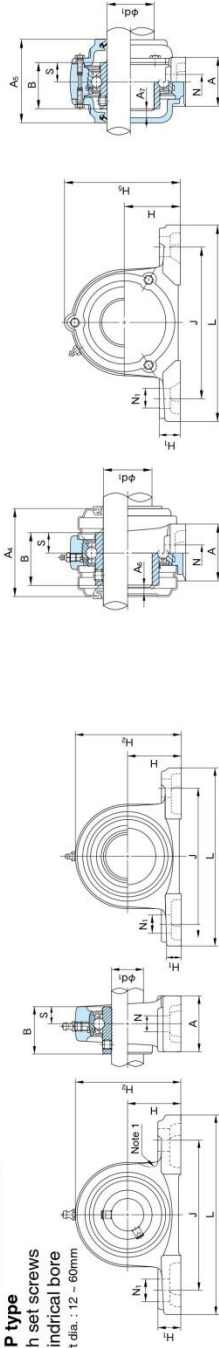
Beban yang dikenakan	K_t
Halus	1,0
Sedikit kejutan atau tumbukan	1,0-1,5
Kejutan atau tumbukan besar	1,5-3,0

Tabel 4. Faktor Koreksi Momen Lentur (Sularso dan Suga, 2008)

Pembebanan momen lentur	K_m
Momen lentur tetap	1,5
Momen lentur tumbukan ringan	1,5-2,0
Momen lentur tumbukan berat	2,3-3,0

NACHI
Pillow Block Units
UCP type
 With set screws
 Cylindrical bore
 Shaft dia. : 12 ~ 60mm

NACHI



Note 1. The line shows figure of UCPX00series

Note 2. Examples of number of units with covers

Shaft dia. d ₁ (mm)	Unit No.	Boundary dimensions (mm)																Bolt size		Bearings		Housing		Unit No. with steel covers		Unit No. with rubber seal cast covers		Mass of Unit (kg)	
		H	L	A	J	N	Ni	H ₁	H ₂	H ₃	H ₄	H ₅	B	S	A ₄	A ₅	A ₆	A ₇	No.	Cr	Cor	No.	No.	Covers with rubber seal (End cover on one side)	Covers with rubber seal cast covers (End cover on one side)	standard	with cast cover	with steel cover	with cast cover
12	UCP201	30.2	127	38	95	13	19	15	62	66	31	12.7	56	62	8	6	M10	UC201	12800	6600	P203	P203	UCP201(CE)	UCP201(CCE)	0.65	0.71	1.1	1.1	
15	UCP202	30.2	127	38	95	13	19	15	62	66	31	12.7	56	62	8	6	M10	UC202	12800	6600	P203	P203	UCP202(CE)	UCP202(CCE)	0.63	0.69	1.1	1.1	
15	UCP203	30.2	127	38	95	13	19	15	62	66	31	12.7	56	62	8	6	M10	UC203	12800	6600	P203	P203	UCP203(CE)	UCP203(CCE)	0.63	0.69	1.1	1.1	
20	UCP204	38.3	127	38	95	13	19	15	65	69	31	12.7	56	62	8	6	M10	UC204	12800	6600	P204	P204	UCP204(CE)	UCP204(CCE)	0.65	0.71	1.1	1.1	
25	UCP205	38.5	140	38	105	13	16	16	70	76	34	14.3	63	70	11	9	M10	UC205	14000	7900	P205	P205	UCP205(CE)	UCP205(CCE)	0.79	0.86	1.4	1.4	
	UCP305	44.4	159	51	119	17	25	18	85	88	38	15.9	65	70	10	10	M14	UC305	19600	11300	P305	P305	UCP305(CE)	UCP305(CCE)	1.5	1.5	2.1	2.1	
	UCP305	45	173	45	132	17	23	16	84	89	38	15	78	84	10	10	M14	UC305	21300	10500	P305	P305	UCP305(CE)	UCP305(CCE)	1.5	1.5	2.1	2.1	
30	UCP206	46.9	165	48	121	17	21	18	83	87	38	15.9	65	74	9	8	M14	UC206	19600	11300	P206	P206	UCP206(CE)	UCP206(CCE)	1.3	1.4	2.0	2.0	
	UCP306	47.6	175	57	127	17	25	20	94	94	42.9	17.5	70	70	8	8	M14	UC306	25800	15400	P306	P306	UCP306(CE)	UCP306(CCE)	1.9	1.9	2.6	2.6	
	UCP306	50	180	50	140	17	20	19	94	99	43	17	84	84	10	10	M14	UC306	26800	15000	P306	P306	UCP306(CE)	UCP306(CCE)	1.9	1.9	2.6	2.6	
35	UCP207	47.6	167	48	127	17	21	19	84	87	42.9	17.5	70	80	8	8	M14	UC207	25900	15400	P207	P207	UCP207(CE)	UCP207(CCE)	1.6	1.7	2.5	2.5	
	UCP307	54	203	57	144	17	30	22	105	110	48	19	83	90	10	10	M14	UC307	33500	19200	P307	P307	UCP307(CE)	UCP307(CCE)	2.7	2.7	3.4	3.4	
	UCP307	56	210	56	160	17	25	21	105	110	48	19	90	90	10	10	M14	UC307	35000	19200	P307	P307	UCP307(CE)	UCP307(CCE)	2.7	2.7	3.4	3.4	
40	UCP208	49.2	184	54	137	17	25	19	100	104	49.2	19	82	90	10	8	M14	UC208	29300	17900	P208	P208	UCP208(CE)	UCP208(CCE)	2.0	2.2	3.0	3.0	
	UCP308	58.7	222	67	156	20	32	26	113	116	52	21	82	90	10	10	M16	UC308	33000	20500	P308	P308	UCP308(CE)	UCP308(CCE)	3.5	3.5	4.4	4.4	
	UCP308	60	220	60	170	17	27	23	116	122	52	19	100	100	11	11	M14	UC308	40500	23900	P308	P308	UCP308(CE)	UCP308(CCE)	3.3	3.3	4.4	4.4	
45	UCP209	54	190	54	146	17	22	20	108	114	49.2	19	82	90	10	8	M14	UC209	33000	20500	P209	P209	UCP209(CE)	UCP209(CCE)	2.3	2.5	3.4	3.4	
	UCP309	57.2	205	60	159	20	33	26	116	116	51.6	19	87	90	10	10	M16	UC309	35500	23200	P309	P309	UCP309(CE)	UCP309(CCE)	3.5	3.6	4.5	4.5	
	UCP309	67	245	67	190	20	30	25	128	136	57	22	106	106	12	12	M16	UC309	51500	29500	P309	P309	UCP309(CE)	UCP309(CCE)	4.5	4.5	5.8	5.8	
50	UCP210	57.2	205	60	159	20	35	23	114	120	51.6	19	87	98	9	10	M16	UC210	35500	23200	P210	P210	UCP210(CE)	UCP210(CCE)	2.7	3.0	4.1	4.1	
	UCP310	63.5	241	73	171	20	36	27	126	126	55.6	22.2	88	88	9	10	M16	UC310	43000	24400	P310	P310	UCP310(CE)	UCP310(CCE)	4.2	4.5	5.6	5.6	
	UCP310	75	275	75	212	20	35	28	143	149	61	22	114	114	12	12	M16	UC310	61500	38200	P310	P310	UCP310(CE)	UCP310(CCE)	6.2	6.2	7.6	7.6	
55	UCP211	58.5	218	65	171	20	35	22	135	133	55.5	22.2	88	100	9	10	M16	UC211	45800	26400	P211	P211	UCP211(CE)	UCP211(CCE)	3.3	3.7	5.0	5.0	
	UCP311	65.3	259	70	184	25	36	31	139	138	65.3	24.4	100	9	10	10	M16	UC311	52000	36100	P311	P311	UCP311(CE)	UCP311(CCE)	5.2	5.2	6.2	6.2	
	UCP311	80	310	80	236	20	38	31	154	159	66	25	120	120	13	13	M16	UC311	71500	44800	P311	P311	UCP311(CE)	UCP311(CCE)	7.7	7.7	9.6	9.6	
60	UCP212	68.8	241	70	184	20	35	25	138	145	65.1	25.4	102	114	10	11	M16	UC212	52500	36100	P212	P212	UCP212(CE)	UCP212(CCE)	4.7	5.1	6.7	6.7	
	UCP312	74.2	275	75	212	20	35	28	151	151	68.8	25.4	104	104	11	11	M16	UC312	61500	38200	P312	P312	UCP312(CE)	UCP312(CCE)	5.2	5.2	6.2	6.2	
	UCP312	85	330	85	260	25	38	33	165	169	71	26	130	130	14	14	M20	UC312	81500	52000	P312	P312	UCP312(CE)	UCP312(CCE)	9.3	9.3	11.0	11.0	

Remarks (1): Grease nipple: 1/4-28UNF

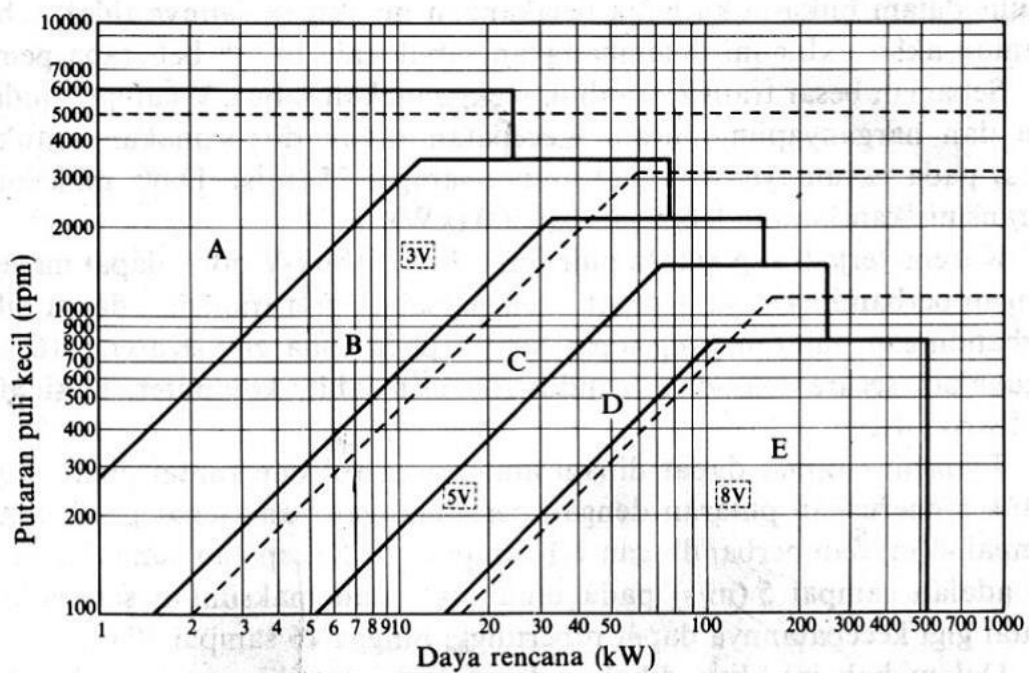
Remarks (2): Examples of number of units with covers:
 With steel cover : UCP210C
 With rubber seal and a cover with rubber seal : UCP210E
 With cast cover : UCP210CCE
 With rubber seal and a cover with rubber seal on both sides : UCP210CE
 With cast cover and a cover with rubber seal on both sides : UCP210ECE

Tabel 6. Faktor-faktor V, X, Y dan X_0, Y_0 (Sularso dan Suga, 2008)

Jenis bantalan		Beban putar pd cincin dalam	Beban putar pada cincin luar	Baris tunggal		Baris ganda				e	Baris tunggal		Baris ganda	
				$F_a/VF_r > e$		$F_a/VF_r \leq e$					$F_a/VF_r > e$			
				X	Y	X	Y	X	Y		X_0	Y_0	X_0	Y_0
Bantalan bola alur dalam	$F_a/C_0 = 0,014$	1	1,2		2,30				2,30	0,19				
	$= 0,028$				1,99				1,90	0,22				
	$= 0,056$				1,71				1,71	0,26				
	$= 0,084$				1,55				1,55	0,28				
	$= 0,11$				1,45	1	0	0,56	1,45	0,30	0,6	0,5	0,6	0,5
	$= 0,17$				1,31				1,31	0,34				
	$= 0,28$				1,15				1,15	0,38				
	$= 0,42$				1,04				1,04	0,42				
	$= 0,56$				1,00				1,00	0,44				
Bantalan bola sudut	$\alpha = 20^\circ$	1	1,2	0,43	1,00	1,09	0,70	1,63	0,57	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	1	0,78	0,63	1,24	0,80	0,5	0,33	1	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			

Untuk bantalan baris tunggal, bila $F_a/VF_r \leq e, X = 1, Y = 0$

Tabel 7. Diagram Pemilihan Sabuk-V (Sularso dan Suga, 2008)



Tabel 8. Panjang Sabuk-V Standar (Sularso dan Suga, 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
39	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 9. Kapasitas daya yang ditransmisikan untuk satu sabuk tunggal, P_0 .

(Sularso dan Suga, 2008)

Putaran puli kecil (rpm)	Penampang-A								Penampang-B							
	Merek merah		Standar		Harga tambahan karena perbandingan putaran				Merek merah		Standar		Harga tambahan karena perbandingan putaran			
	67mm	100mm	67mm	100mm	1,25-1,34	1,35-1,51	1,52-1,99	2,00-	118mm	150mm	118mm	150mm	1,25-1,34	1,35-1,51	1,52-1,99	2,00-
200	0,15	0,31	0,12	0,26	0,01	0,02	0,02	0,02	0,51	0,77	0,43	0,67	0,04	0,05	0,06	0,07
400	0,26	0,55	0,21	0,48	0,04	0,04	0,04	0,05	0,90	1,38	0,74	1,18	0,09	0,10	0,12	0,13
600	0,35	0,77	0,27	0,67	0,05	0,06	0,07	0,07	1,24	1,93	1,00	1,64	0,13	0,15	0,18	0,20
800	0,44	0,98	0,33	0,84	0,07	0,08	0,09	0,10	1,56	2,43	1,25	2,07	0,18	0,20	0,23	0,26
1000	0,52	1,18	0,39	1,00	0,08	0,10	0,11	0,12	1,85	2,91	1,46	2,46	0,22	0,26	0,30	0,33
1200	0,59	1,37	0,43	1,16	0,10	0,12	0,13	0,15	2,11	3,35	1,65	2,82	0,26	0,31	0,35	0,40
1400	0,66	1,54	0,48	1,31	0,12	0,13	0,15	0,18	2,35	3,75	1,83	3,14	0,31	0,36	0,41	0,46
1600	0,72	1,71	0,51	1,43	0,13	0,15	0,18	0,20	2,67	4,12	1,98	3,42	0,35	0,41	0,47	0,53

Tabel 10. Faktor Koreksi, K_θ (Sularso dan Suga, 2008)

$\frac{D_p - d_p}{C}$	Sudut kontak puli kecil $\theta(^{\circ})$	Faktor koreksi K_θ
0,00	180	1,00
0,10	174	0,99
0,20	169	0,97
0,30	163	0,96
0,40	157	0,94
0,50	151	0,93
0,60	145	0,91
0,70	139	0,89
0,80	133	0,87
0,90	127	0,85
1,00	120	0,82
1,10	113	0,80
1,20	106	0,77
1,30	99	0,73
1,40	91	0,70
1,50	83	0,65

Tabel 11. Faktor-faktor V, X, Y dan X_0, Y_0 (Sularso dan Suga, 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	1	1,2	0,56	2,30	1	0	0,56	2,30	0,19	0,6	0,5	0,6	0,5			
				1,99				1,90	0,22							
				1,71				1,71	0,26							
				1,55				1,55	0,28							
				1,45				1,45	0,30							
				1,31				1,31	0,34							
				1,15				1,15	0,38							
				1,04				1,04	0,42							
				1,00				1,00	0,44							
Bantalan bola sudut	1	1,2	0,39	0,43	1	0,78	0,63	1,09	0,57	0,5	0,33	1	0,84			
				0,41				0,87	0,92				0,67	1,41	0,68	0,76
				0,37				0,76	0,66				0,60	1,24	0,80	0,66
				0,37				0,66	0,66				0,60	1,07	0,95	0,58
				0,35				0,57	0,55				0,57	0,93	1,14	0,52

Untuk bantalan baris tunggal, bila $F_a/VF_r \leq e, X = 1, Y = 0$

Tabel 12. Kekuatan Tarik Poros (Sularso dan Suga, 2008)

Standar dan macam	Lambang	Perlakuan panas	Kekuatan tarik (kg/mm ²)	Keterangan
Baja karbon konstruksi mesin (JIS G 4501)	S30C	Penormalan	48	
	S35C	"	52	
	S40C	"	55	
	S45C	"	58	
	S50C	"	62	
	S55C	"	66	
Batang baja yang difinis dingin	S35C-D	-	53	ditarik dingin, digerinda, dibubut, atau gabungan antara hal-hal tersebut
	S45C-D	-	60	
	S55C-D	-	72	

Lampiran 2
Tabel Proses Produksi

Tabel 1. Putaran Mesin Bubut (Dokumentasi : Politeknik Negeri Cilacap, 2020)

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

Tabel 2. Gerak Makan Pada Mesin Bubut (Dokumentasi : Politeknik Negeri Cilacap, 2020)

		M						
G		D	E	F	G		D	
15	1	0.044	0.088	0.176	0.352	1	0.02	
14	2	0.050	0.099	0.198	0.396	2	0.02	
13 1/2	3	0.052	0.105	0.210	0.420	3	0.02	
13	4	0.055	0.110	0.220	0.440	4	0.02	
12	5	0.060	0.121	0.242	0.484	5	0.02	
11 1/2	6	0.063	0.127	0.254	0.508	6	0.02	
11	7	0.066	0.132	0.264	0.528	7	0.02	
10	8	0.072	0.144	0.287	0.574	8	0.03	
9 1/2	9	0.075	0.149	0.298	0.596	9	0.03	
9	10	0.077	0.154	0.308	0.616	10	0.03	
8	11	0.083	0.166	0.331	0.662	11	0.03	

Tabel 3. Data Material, Kecepatan Potong, Sudut Mata Bor HSS, dan Cairan Pendingin Proses Gurdi (Widato,2008)

MATERIAL	CUTTING SPEEDS v_c		POINT ANGLE	LIP CLEARANCE	COOLANTS
	(METERS/MINUTE)	(FEET/MINUTE)			
	MPM	FPM			
Aluminum And Alloys	61.00 - 91.50	200 - 300	90 - 130 deg	12 - 15 deg	Kerosene/Kerosene & Lard Oil/ Soluble Oil
Armor Plate	12.20 - 18.25	40 - 50	135 - 140 deg	6 - 9 deg	Light Machine Oil
Brass	61.00 - 91.50	200 - 300	118 - 118 deg	12 - 15 deg	Dry/ Soluble Oil/Kerosene/Lard Oil
Bronze	61.00 - 91.50	200 - 300	110 - 118 deg	12 - 15 deg	Dry/ Soluble Oil/Mineral Oil/Lard Oil
Bronze, High Tensile	21.35 - 45.75	70 - 150	100 - 110 deg	12 - 15 deg	Dry/ Soluble Oil/Mineral Oil/Lard Oil
Cast Iron, Soft	30.50 - 45.75	100 - 150	90 - 100 deg	12 - 15 deg	Air Jet Dry/ Soluble Oil
Cast Iron, Medium	21.35 - 30.50	70 - 100	100 - 110 deg	12 - 15 deg	Air Jet Dry/ Soluble Oil
Cast Iron, Hard	21.35 - 30.50	70 - 100	100 - 118 deg	8 - 12 deg	Air Jet Dry/ Soluble Oil
Cast Iron, Chilled	9.15 - 12.20	30 - 40	118 - 135 deg	5 - 9 deg	Air Jet Dry/ Soluble Oil
Copper	61.00 - 91.50	200 - 300	100 - 118 deg	12 - 15 deg	Air Jet Dry/ Soluble Oil
Copper Graphite Alloy (Carbon Drills)	18.30 - 21.35	60 - 70	**_**	**_**	Soluble Oil/Dry/Mineral Oil/Kerosene
Glass (Carbon Drills)	6.10 - 9.15	20 - 30	**_**	**_**	Soluble Oil/Dry/Mineral Oil/Kerosene
Iron, Malleable	15.25 - 27.45	50 - 90	90 - 100 deg	12 - 15 deg	Light Machine Oil
Magnesium And Alloys	76.25 - 122.0	250 - 400	70 - 118 deg	12 - 15 deg	Soluble Oil
Monel Nickel	4.15 - 15.28	30 - 50	118 - 125 deg	10 - 12 deg	Compressed Air/Mineral Oil
Nickel Alloys	12.20 - 18.30	40 - 60	135 - 140 deg	5 - 7 deg	Lard Oil/Soluble Oil
Plastic, Hnt Set	30.50 - 91.50	100 - 300	60 - 90 deg	10 - 12 deg	Lard Oil/Soluble Oil
Plastic, Cold Set	30.50 - 91.50	100 - 300	118 - 135 deg	12 - 20 deg	Soap Solution
Steel, Low Carbon, 0.2-0.3ct	24.40 - 33.55	80 - 110	110 - 118 deg	7 - 9 deg	Soap Solution
Steel, Medium Carbon 0.4-0.5c	21.35 - 24.40	70 - 80	118 - 125 deg	7 - 9 deg	Soluble Oil/Mineral Oil/Sulfur Oil/Lard Oil
Steel (High Carbon 1.2c)	15.25 - 18.30	50 - 60	118 - 145 deg	7 - 9 deg	Soluble Oil/Mineral Oil/Sulfur Oil/Lard Oil
Steel, Forged	15.25 - 18.30	50 - 60	118 - 145 deg	7 - 12 deg	Soluble Oil/Mineral Oil/Sulfur Oil/Lard Oil
Steel, Alloy	15.25 - 21.35	50 - 70	118 - 125 deg	10 - 12 deg	Mineral Lard Oil
Steel, Alloy 300 To 400 Brinell	6.10 - 9.15	20 - 30	130 - 140 deg	7 - 10 deg	Soluble Oil
Steel, Stainless, Free Machining	9.15 - 24.40	30 - 80	110 - 118 deg	8 - 12 deg	Soluble Oil
Steel, Stainless, Hard	4.57 - 15.25	15 - 50	118 - 135 deg	6 - 8 deg	Soluble Oil
Steel, Manganese	3.66 - 4.57	12 - 15	140 - 150 deg	7 - 10 deg	Soluble Oil
Stone (Carbide Drills)	7.63 - 9.15	25 - 30	**_**	**_**	Water Solution
Wood	91.50 - 122.2	300 - 400	60 - 70 deg	10 - 15 deg	Dry

Tabel 4. Rumus Empiris Gerakan per Mata Potong Gurdi (Widarto, 2008)

- Untuk baja

$$f = 0,084\sqrt[3]{d}; mm / put \dots \dots \dots (8.2)$$

- Untuk besi tuang

$$f = 0,1\sqrt[3]{d}; mm / put \dots \dots \dots (8.3)$$

Tabel 5. Putaran Mesin Bor (Dokumentasi : Politeknik Negeri Cilacap, 2020)

