

DAFTAR LAMPIRAN

Lampiran Data Layout Gudang

Layout Lama (Existing Layout)									
No	Nama Rak	Item	Titik Awal (Receiving Area)		Titik Tujuan		Rectilinear Distance (dij)		Distance (dij) (m)
			Xi	Yi	Xj	Yj	Xi - Xj	Yi - Yj	
1	RHD-1		1,50	5,60	3,50	11,50	2,00	5,90	7,90
2	RHD-2		1,50	5,60	6,50	11,50	5,00	5,90	10,90
3	RHD-3		1,50	5,60	9,50	11,50	8,00	5,90	13,90
4	RHD-4		1,50	5,60	12,50	11,50	11,00	5,90	16,90
5	RHD-5		1,50	5,60	9,50	9,50	8,00	3,90	11,90
6	RHD-6		1,50	5,60	12,50	9,50	11,00	3,90	14,90
7	RHD-7		1,50	5,60	9,50	7,50	8,00	1,90	9,90
8	RHD-8		1,50	5,60	12,50	7,50	11,00	1,90	12,90
9	RB-1		1,50	5,60	11,75	5,80	10,25	0,20	10,45
10	RB-2		1,50	5,60	11,75	4,20	10,25	1,40	11,65
11	RB-3		1,50	5,60	11,75	2,80	10,25	2,80	13,05
12	RB-4		1,50	5,60	11,75	1,20	10,25	4,40	14,65
Total Jarak Layout Lama									149,00

Layout Lama (Existing Layout)						
No	Alokasi	Kode	Dimensi (m2)	Banyaknya	Susunan	Keterangan

1	Ready to bin	Bin	3x3	1	-	Area pembungan (kardus, wrapping, sampah pengiriman)
2	Receiving	RCV	3x3	1	-	Area penerimaan barang unloading
3	Warehouse room	WHS	4x2	1	-	Kantor gudang
4	Allocate area	AR	3,5x1	1	-	Area lain-lain
5	Rak barang	RB	1x0,6x2	20	4	Rak penyimpanan barang umum
6	Rak heavy duty	RHD	3x1x2	8	7	Rak penyimpanan barang (heavy duty)

[illegible]

Total Jarak Layout Baru	133,45
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Layout Baru (Purposed Layout)						
No	Alokasi	Kode	Dimensi (m2)	Banyaknya	Susunan	Keterangan
1	Ready to bin	Bin	1,5x1	2	-	Area pembungan (kardus, wrapping, sampah pengiriman)
2	QI dan QC	QC	1,5x0,5	2	-	Area inspeksi dan pemeriksaan kualitas
3	Sorting EO	EO	1,5x0,5	2	-	Area sortir order luar negeri
4	Sorting SO	SO	1,5x2	2	-	Area sortir order umum
5	Warehouse room	WHS	4x2	1	-	Kantor gudang
6	Damage area	R	0,5x1	1	-	Area barang rusak
7	SUP material	SUP	1x1	1	-	Area penimbangan barang
8	Packing Area	PCK	2x2	1	-	Area pengemasan
9	Ready to ship	SHP	2x2	1	-	Area barang siap kirim
10	Area P208	P208	3x1	1	-	Area produk khusus
11	Rak P208	P208	0,65x1	1	4	Rak produk khusus
12	Allocate area	AR	3x2	1	-	Area lain-lain
13	Rak allocate	AR	0,65x2	1	4	Rak lain-lain
14	Rak barang	RB	1x0,6x2	15	4	Rak penyimpanan barang umum
15	Rak heavy duty	RHD	3x1x2	8	7	Rak penyimpanan barang (Heavy Duty)

Lampiran Data Barang

Rak Heavy Duty				
No	Suku Cadang	Item	In	Out
1	Fork Lift	Starter Motor	15	12
2	Fork Lift	Alternator	20	14
3	Fork Lift	Hydraulic Cylinder	15	7
4	Fork Lift	Fork (Garpu Angkat)	4	1
5	Fork Lift	Filter Oli	85	53
6	Fork Lift	Filter Udara	55	51
7	Fork Lift	V-Belt	50	47
8	Fork Lift	Selang Hidrolik	25	19
9	Fork Lift	Fuel Filter	70	54
10	Fork Lift	Gasket Kit	55	50
11	Genset	Accu genset 12V	10	4
12	Genset	Accu genset 24V	12	6
13	Genset	Radiator	12	5
14	Genset	Alternator	2	1
15	Genset	AVR	10	8
16	Genset	Filter Oli	35	28
17	Genset	Filter Udara	35	24
18	Traktor	Alternator	25	13
19	Traktor	Starter Motor	20	12
20	Traktor	Hydraulic Pumo	18	6
21	Traktor	Cylinder Kit	15	11
22	Excavator	Gasket Kit	45	37
23	Excavator	Fuel Filter	40	36
24	Excavator	Filter Oli	40	38
25	Excavator	Filter Udara	40	37
26	Excavator	Track Guard	6	2
27	Excavator	Track Roller	4	2
28	Excavator	Sprocket	3	1
29	Excavator	Carrier Roller	9	4

RAK HEAVY DUTY																
No	Rak	Jenis	Item	Stack Allocation	Satuan	Dimensi Box (cm)			Kapasitas Penyimpanan Max (Box)	Volume Item (m2)	Capacity per Rack (m2)	Allocation Space	Dimensi Box (m)			Storage capacity
						p	l	t					p	l	t	
1	RHD-1	Fork Lift	Starter Motor	2	pcs/box	80	20	20	56	0,032	0,9	1,8	0,8	0,2	0,2	56,25
2		Fork Lift	Alternator	3	pcs/box	30	20	20	225	0,012	0,9	2,7	0,3	0,2	0,2	225
3		Fork Lift	Hydraulic Cylinder	2	pcs/box	25	20	20	180	0,01	0,9	1,8	0,25	0,2	0,2	180
4	RHD-2	Fork Lift	Fork (Garpu Angkat)	1	pcs/box	120	15	10	50	0,018	0,9	0,9	1,2	0,15	0,1	50
5		Fork Lift	Filter Oli	2	pcs/box	10	10	15	1200	0,0015	0,9	1,8	0,1	0,1	0,15	1200
6		Fork Lift	Filter Udara	2	pcs/box	20	20	25	180	0,01	0,9	1,8	0,2	0,2	0,25	180
7		Fork Lift	V-Belt	2	pcs/box	25	25	5	576	0,003125	0,9	1,8	0,25	0,25	0,05	576
8	RHD-3	Fork Lift	Selang Hidrolik	2	pcs/box	40	40	10	112	0,016	0,9	1,8	0,4	0,4	0,1	112,5
9		Fork Lift	Fuel Filter	3	pcs/box	8	8	15	2812	0,00096	0,9	2,7	0,08	0,08	0,15	2812,5
10		Fork Lift	Gasket Kit	2	pcs/box	30	25	5	480	0,00375	0,9	1,8	0,3	0,25	0,05	480
11	RHD-4	Genset	Accu genset 12V	3	pcs/box	20	15	15	600	0,0045	0,9	2,7	0,2	0,15	0,15	600
12		Genset	Accu genset 24V	3	pcs/box	20	15	15	600	0,0045	0,9	2,7	0,2	0,15	0,15	600
13		Genset	Radiator	1	pcs/box	60	50	25	12	0,075	0,9	0,9	0,6	0,5	0,25	12

80	80	25	5
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		p	l	Maximum Storage per Item	Stack Allocation	Luasan Box (m2)	Luasan Stack Penyimpanan (m2)	Space Requirement (Sj)	Actual Space Requirement (SJ)
1	Starter Motor	80	20	25	2	0,16	3	1,333	2,000
2	Alternator	30	20	30	3	0,06	3	0,600	1,000
3	Hydraulic Cylinder	25	20	25	2	0,05	3	0,417	1,000
4	Fork (Garpu Angkat)	120	15	14	1	0,18	3	0,840	1,000
5	Filter Oli	10	10	95	2	0,01	3	0,317	1,000
6	Filter Udara	20	20	65	2	0,04	3	0,867	1,000
7	V-Belt	25	25	60	2	0,0625	3	1,250	2,000
8	Selang Hidrolik	40	40	35	2	0,16	3	1,867	2,000
9	Fuel Filter	8	8	80	3	0,0064	3	0,171	1,000
10	Gasket Kit	30	25	65	2	0,075	3	1,625	2,000
11	Accu genset 12V	20	15	20	3	0,03	3	0,200	1,000
12	Accu genset 24V	20	15	22	3	0,03	3	0,220	1,000
13	Radiator	60	50	12	1	0,3	3	1,200	2,000
14	Alternator	80	60	12	1	0,48	3	1,920	2,000
15	AVR	20	15	20	2	0,03	3	0,200	1,000
16	Filter Oli	20	15	45	2	0,03	3	0,450	1,000
17	Filter Udara	20	15	45	2	0,03	3	0,450	1,000
18	Alternator	40	30	35	2	0,12	3	1,400	2,000
19	Starter Motor	40	30	30	2	0,12	3	1,200	2,000
20	Hydraulic Pumo	45	30	28	2	0,135	3	1,260	2,000
21	Cylinder Kit	45	30	25	1	0,135	3	1,125	2,000
22	Gasket Kit	20	15	55	2	0,03	3	0,550	1,000
23	Fuel Filter	20	15	50	2	0,03	3	0,500	1,000
24	Filter Oli	20	15	50	3	0,03	3	0,500	1,000

25	Filter Udara	20	15	50	3	0,03	3	0,500	1,000
26	Track Guard	50	30	10	1	0,15	3	0,500	1,000
27	Track Roller	40	25	10	1	0,1	3	0,333	1,000
28	Sprocket	80	80	15	1	0,64	3	3,200	4,000
29	Carrier Roller	30	20	20	1	0,06	3	0,400	1,000
Total Space Requirement (Stack)								25,394	42,000

No	Jenis	Item	In	Out	Kapasitas Angkut (in)	Kapasitas Angkut (out)	Throughput (Tj)	Actual Throughput (Tj)
1	Fork Lift	Starter Motor	15	12	3	1	17	17
2	Fork Lift	Alternator	20	14	5	1	18	18
3	Fork Lift	Hydraulic Cylinder	15	7	3	1	12	12
4	Fork Lift	Fork (Garpu Angkat)	4	1	2	1	3	3
5	Fork Lift	Filter Oli	85	53	10	1	61,5	62
6	Fork Lift	Filter Udara	55	51	10	1	56,5	57
7	Fork Lift	V-Belt	50	47	20	1	49,5	50
8	Fork Lift	Selang Hidrolik	25	19	5	1	24	24
9	Fork Lift	Fuel Filter	70	54	10	1	61	61
10	Fork Lift	Gasket Kit	55	50	20	1	52,75	53
11	Genset	Accu genset 12V	10	4	5	1	6	6
12	Genset	Accu genset 24V	12	6	5	1	8,4	9
13	Genset	Radiator	12	5	4	1	8	8
14	Genset	Alternator	2	1	1	1	3	3
15	Genset	AVR	10	8	4	1	10,5	11
16	Genset	Filter Oli	35	28	10	1	31,5	32

17	Genset	Filter Udara	35	24	10	1	27,5	28
18	Traktor	Alternator	25	13	5	1	18	18
19	Traktor	Starter Motor	20	12	5	1	16	16
20	Traktor	Hydraulic Pumo	18	6	5	1	9,6	10
21	Traktor	Cylinder Kit	15	11	5	1	14	14
22	Excavator	Gasket Kit	45	37	20	1	39,25	40
23	Excavator	Fuel Filter	40	36	10	1	40	40
24	Excavator	Filter Oli	40	38	10	1	42	42
25	Excavator	Filter Udara	40	37	10	1	41	41
26	Excavator	Track Guard	6	2	2	1	5	5
27	Excavator	Track Roller	4	2	2	1	4	4
28	Excavator	Sprocket	3	1	2	1	2,5	3
29	Excavator	Carrier Roller	9	4	4	1	6,25	7

No	Jenis	Item	Posisi Rak	Dij	Sj	Tj	Tj/Sj	Total Trips (TT)
1	Fork Lift	Starter Motor	RHD-1	7,90	2,000	17	8,50	67,15
2	Fork Lift	Alternator		7,90	1,000	18	18,00	142,2
3	Fork Lift	Hydraulic Cylinder		7,90	1,000	12	12,00	94,8
4	Fork Lift	Fork (Garu Angkat)	RHD-2	10,90	1,000	3	3,00	32,7
5	Fork Lift	Filter Oli		10,90	1,000	62	62,00	675,8
6	Fork Lift	Filter Udara		10,90	1,000	57	57,00	621,3
7	Fork Lift	V-Belt		10,90	2,000	50	25,00	272,5
8	Fork Lift	Selang Hidrolik	RHD-3	13,90	2,000	24	12,00	166,8
9	Fork Lift	Fuel Filter		13,90	1,000	61	61,00	847,9
10	Fork Lift	Gasket Kit		13,90	2,000	53	26,50	368,35

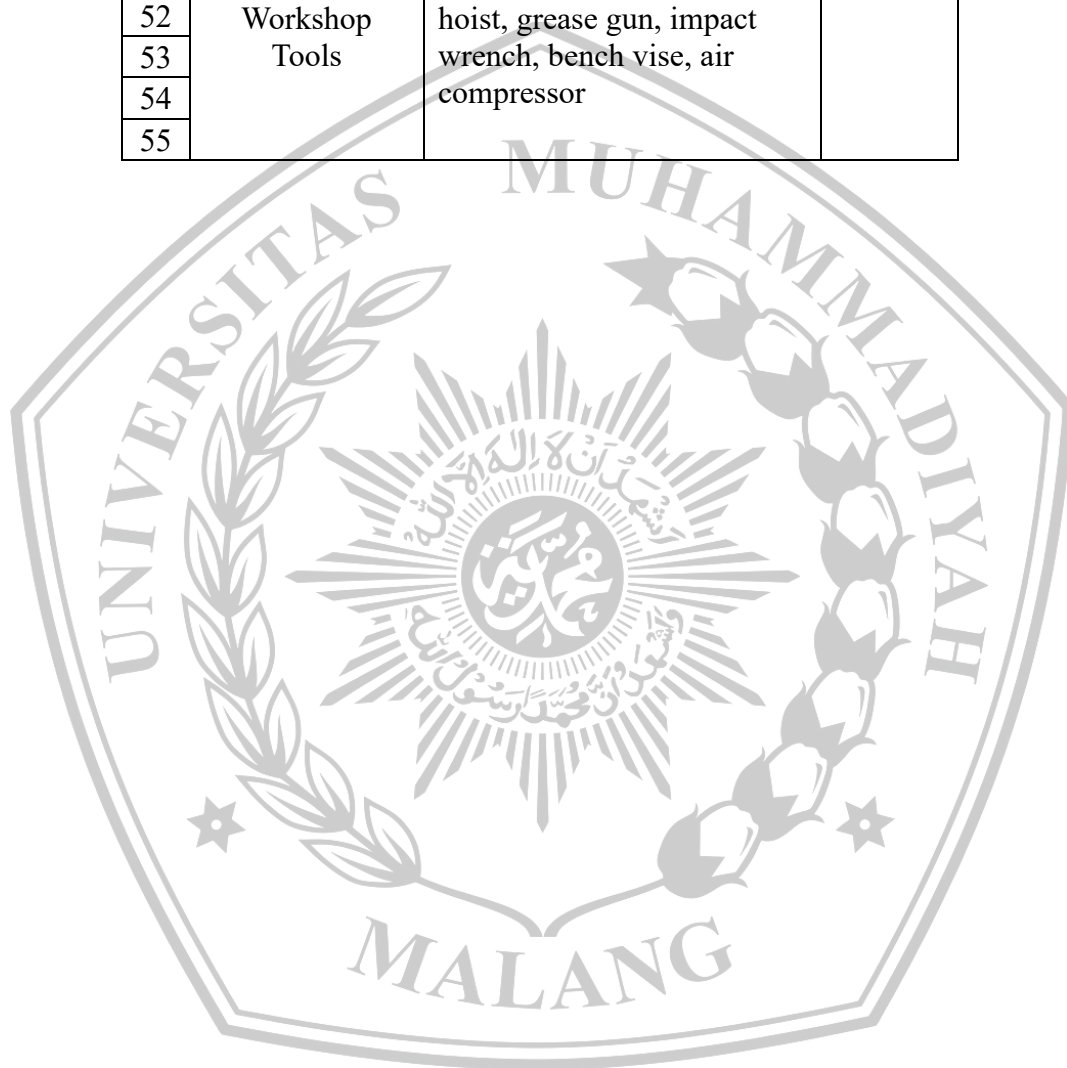
11	Genset	Accu genset 12V	RHD-4	16,90	1,000	6	6,00	101,4
12	Genset	Accu genset 24V		16,90	1,000	9	9,00	152,1
13	Genset	Radiator		16,90	2,000	8	4,00	67,6
14	Genset	Alternator	RHD-5	11,90	2,000	3	1,50	17,85
15	Genset	AVR		11,90	1,000	11	11,00	130,9
16	Genset	Filtero Oli		11,90	1,000	32	32,00	380,8
17	Genset	Filter Udara		11,90	1,000	28	28,00	333,2
18	Traktor	Alternator	RHD-6	14,90	2,000	18	9,00	134,1
19	Traktor	Starter Motor		14,90	2,000	16	8,00	119,2
20	Traktor	Hydraulic Pumo		14,90	2,000	10	5,00	74,5
21	Traktor	Cylinder Kit		14,90	2,000	14	7,00	104,3
22	Excavator	Gasket Kit	RHD-7	9,90	1,000	40	40,00	396
23	Excavator	Fuel Filter		9,90	1,000	40	40,00	396
24	Excavator	Filter Oli		9,90	1,000	42	42,00	415,8
25	Excavator	Filter Udara	RHD-8	12,90	1,000	41	41,00	528,9
26	Excavator	Track Guard		12,90	1,000	5	5,00	64,5
27	Excavator	Track Roller		12,90	1,000	4	4,00	51,6
28	Excavator	Sprocket		12,90	4,000	3	0,75	9,675
29	Excavator	Carrier Roller		12,90	1,000	7	7,00	90,3
Total Trips RHD Existing Layout								6858,225

No	Jenis	Item	Posisi Rak	Dij	Sj	Tj	Tj/Sj	Total Trips (TT)
1	Fork Lift	Starter Motor	RHD-1	7,25	1,000	17	17,00	123,25
2	Fork Lift	Alternator		7,25	1,000	18	18,00	130,5
3	Fork Lift	Hydraulic Cylinder		7,25	1,000	12	12,00	87

4	Fork Lift	Fork (Garpu Angkat)	RHD-2	10,25	1,000	3	3,00	30,75
5	Fork Lift	Filter Oli		10,25	1,000	62	62,00	635,5
6	Fork Lift	Filter Udara		10,25	1,000	57	57,00	584,25
7	Fork Lift	V-Belt		10,25	1,000	50	50,00	512,5
8	Fork Lift	Selang Hidrolik	RHD-3	16,25	1,000	24	24,00	390
9	Fork Lift	Fuel Filter		16,25	1,000	61	61,00	991,25
10	Fork Lift	Gasket Kit		16,25	1,000	53	53,00	861,25
11	Genset	Accu genset 12V	RHD-4	19,25	1,000	6	6,00	115,5
12	Genset	Accu genset 24V		19,25	1,000	9	9,00	173,25
13	Genset	Radiator		19,25	1,000	8	8,00	154
14	Genset	Alternator	RHD-5	13,75	1,000	3	3,00	41,25
15	Genset	AVR		13,75	1,000	11	11,00	151,25
16	Genset	Filtero Oli		13,75	1,000	32	32,00	440
17	Genset	Filter Udara		13,75	1,000	28	28,00	385
18	Traktor	Alternator	RHD-6	16,75	1,000	18	18,00	301,5
19	Traktor	Starter Motor		16,75	1,000	16	16,00	268
20	Traktor	Hydraulic Pumo		16,75	1,000	10	10,00	167,5
21	Traktor	Cylinder Kit		16,75	1,000	14	14,00	234,5
22	Excavator	Gasket Kit	RHD-7	4,75	1,000	40	40,00	190
23	Excavator	Fuel Filter		4,75	1,000	40	40,00	190
24	Excavator	Filter Oli		4,75	1,000	42	42,00	199,5
25	Excavator	Filter Udara	RHD-8	7,75	1,000	41	41,00	317,75
26	Excavator	Track Guard		7,75	1,000	5	5,00	38,75
27	Excavator	Track Roller		7,75	1,000	4	4,00	31
28	Excavator	Sprocket		7,75	1,000	3	3,00	23,25
29	Excavator	Carrier Roller		7,75	1,000	7	7,00	54,25
Total Trips RHD Proposed Layout								7822,5

Rak Barang				
No	Jenis	Item	In	Out
1	Lubricant	Oli Mesin	35	28
2	Lubricant	Oli Gardan	35	27
3	Cooler	Radiator Coolant	15	13
4	Lubricant	Grease	55	32
5	Cooler	Thermostat	25	20
6	Fastener	Bearing	25	12
7	Spare Part	Wiper Blade	34	22
8	Nut	Nut Hex M8 (assort)	10	2
9		Nut Hex M10	10	3
10		Nut Hex M12	12	2
11		Nut Hex M16	4	1
12		Nut Hex M20	4	1
13	Bolt	Bolt Hex M8×25	8	3
14		Bolt Hex M8×40	8	2
15		Bolt Hex M10×30	8	2
16		Bolt Hex M10×50	10	1
17		Bolt Hex M12×40	10	1
18		Bolt Hex M12×60	12	1
19		Bolt Hex M16×60	6	1
20		Bolt Hex M20×80	5	1
21	Washer	Washer M8 (assort)	12	1
22		Washer M10	8	3
23		Washer M12	8	2
24		Washer M16	8	1
25		Washer M20	8	1
26	Hand Tools	Kunci ring/pas/kombinasi, kunci soket, obeng, tang, hammer, allen key, torque wrench	Assets	
27				
28				
29				
30				
31				
32	Services Tools	Injector puller, seal installer, piston ring compressor, valve spring compressor, bearing puller		
33				
34				
35				
36				
37				
38	Measuring Tools	Multimeter, oil pressure gauge, tachometer, micrometer, caliper		
39				
40				
41				
42				

43			
44			
45			
46	Diagnostic Tools	ECU scanner, battery tester, laptop dengan software pabrikan	
47			
48			
49			
50			
51	Workshop Tools	Hydraulic jack, chain block, hoist, grease gun, impact wrench, bench vise, air compressor	
52			
53			
54			
55			



RAK BARANG					4,5			4,5	
No	Rak	Jenis	Item	Rack or Stack Allocation	Satuan	Dimensi Box (cm)			Kapasitas Penyimpanan Max (Box) (Pail) (Tub)
						p	l	t	
1	RB-1	Lubricant	Oli Mesin	8 stack	pail	35	35	40	29
2		Lubricant	Oli Gardan	8 stack	pail	35	35	40	29
3		Cooler	Radiator Coolant	4 stack	btl	35	35	40	14
4	RB-2	Lubricant	Grease	8 stack	tub	30	30	25	64
5		Cooler	Thermostat	4 stack	box	10	10	8	900
6		Fastener	Bearing	4 stack	100 pcs/box	15	10	10	480
7		Spare Part	Wiper Blade	4 stack	box	70	10	5	205
8	RB-3	Nut	Nut Hex M8 (assort)	1 stack	200pcs/box	25	20	10	36
9			Nut Hex M10	1 stack	200pcs/box	25	20	10	36
10			Nut Hex M12	1 stack	100 pcs/box	30	20	12	25
11			Nut Hex M16	1 stack	50 pcs/box	35	25	25	8
12			Nut Hex M20	1 stack	25 pcs/box	40	30	20	7
13		Bolt	Bolt Hex M8×25	1 stack	200 pcs/box	30	10	8	75
14			Bolt Hex M8×40	1 stack	200 pcs/box	30	12	8	62
15			Bolt Hex M10×30	1 stack	200 pcs/box	35	12	10	42
16			Bolt Hex M10×50	1 stack	100 pcs/box	40	15	10	30
17			Bolt Hex M12×40	1 stack	100 pcs/box	40	18	12	20
18			Bolt Hex M12×60	1 stack	50 pcs/box	45	20	12	16

19			Bolt Hex M16×60	1 stack	50 pcs/box	50	25	15	9
20			Bolt Hex M20×80	1 stack	25 pcs/box	60	30	15	6
21			Washer M8 (assort)	1 stack	200 pcs/box	20	15	8	75
22			Washer M10	1 stack	200 pcs/box	20	15	8	75
23			Washer M12	1 stack	100 pcs/box	25	15	10	48
24			Washer M16	1 stack	50 pcs/box	30	20	12	25
25			Washer M20	1 stack	25 pcs/box	35	25	12	17
26	RB-4	Hand Tools	Kunci ring/pas/kombinasi, kunci soket, obeng, tang, hammer, allen key, torque wrench	1 Rack	pcs	Assets			
27					pcs				
28					pcs				
29					pcs				
30					pcs				
31					pcs				
32		Services Tools	Injector puller, seal installer, piston ring compressor, valve spring compressor, bearing puller	1 Rack	pcs				
33					pcs				
34					pcs				
35					pcs				
36					pcs				
37					pcs				
38		Measuring Tools	Multimeter, oil pressure gauge, tachometer, micrometer, caliper	1 Rack	pcs				
39					pcs				
40					pcs				
41					pcs				
42					pcs				
43		Diagnostic Tools		1 Rack	pcs				
44					pcs				

45		ECU scanner, battery tester, laptop dengan software pabrikan		pcs
46				pcs
47				pcs
48				pcs
49				pcs
50	Workshop Tools	Hydraulic jack, chain block, hoist, grease gun, impact wrench, bench vise, air compressor	1 Rack	pcs
51				pcs
52				pcs
53				pcs
54				pcs
55				pcs

No	Item	Dimensi Box (cm)		Maximum Storage per Item	Stack Allocation	Luasan Box (m ²)	Luasan Stack Penyimpanan (m ²)	Space Requirement (Sj)	Actual Space Requirement (SJ)
		p	l						
1	Oli Mesin	35	35	40	8	0,1225	0,6	8,1667	9
2	Oli Gardan	35	35	40	8	0,1225	0,6	8,1667	9
3	Radiator Coolant	35	35	20	4	0,1225	0,6	4,0833	5
4	Grease	30	30	60	8	0,09	0,6	9,0000	9
5	Thermostat	10	10	30	4	0,01	0,6	0,5000	1
6	Bearing	15	10	30	4	0,015	0,6	0,7500	1
7	Wiper Blade	70	10	39	4	0,07	0,6	4,5500	5
8	Nut Hex M8 (assort)	25	20	15	1	0,05	0,6	1,2500	2
9	Nut Hex M10	25	20	15	1	0,05	0,6	1,2500	2
10	Nut Hex M12	30	20	17	1	0,06	0,6	1,7000	2
11	Nut Hex M16	35	25	9	1	0,0875	0,6	1,3125	2
12	Nut Hex M20	40	30	9	1	0,12	0,6	1,8000	2

13	Bolt Hex M8×25	30	10	13	1	0,03	0,6	0,6500	1
14	Bolt Hex M8×40	30	12	13	1	0,036	0,6	0,7800	1
15	Bolt Hex M10×30	35	12	13	1	0,042	0,6	0,9100	1
16	Bolt Hex M10×50	40	15	15	1	0,06	0,6	1,5000	2
17	Bolt Hex M12×40	40	18	15	1	0,072	0,6	1,8000	2
18	Bolt Hex M12×60	45	20	17	1	0,09	0,6	2,5500	3
19	Bolt Hex M16×60	50	25	11	1	0,125	0,6	2,2917	3
20	Bolt Hex M20×80	60	30	10	1	0,18	0,6	3,0000	3
21	Washer M8 (assort)	20	15	17	1	0,03	0,6	0,8500	1
22	Washer M10	20	15	13	1	0,03	0,6	0,6500	1
23	Washer M12	25	15	13	1	0,0375	0,6	0,8125	1
24	Washer M16	30	20	13	1	0,06	0,6	1,3000	2
25	Washer M20	35	25	13	1	0,0875	0,6	1,8958	2
Total Space Requirement (Stack)								61,5192	72

No	Jenis	Item	In	Out	Kapasitas Angkut (in)	Kapasitas Angkut (out)	Throughput (Tj)	Actual Throughput (Tj)
1	Lubricant	Oli Mesin	35	28	5	1	35	35
2	Lubricant	Oli Gardan	35	27	5	1	34	34
3	Cooler	Radiator Coolant	15	13	5	1	16	16
4	Lubricant	Grease	55	32	5	1	43	43
5	Cooler	Thermostat	25	20	5	1	25	25
6	Fastener	Bearing	25	12	5	1	17	17
7	Spare Part	Wiper Blade	34	22	5	1	28,8	29
8	Nut	Nut Hex M8 (assort)	10	2	5	1	4	4
9		Nut Hex M10	10	3	5	1	5	5

10		Nut Hex M12	12	2	5	1	4,4	5
11		Nut Hex M16	4	1	5	1	1,8	2
12		Nut Hex M20	4	1	5	1	1,8	2
13	Bolt	Bolt Hex M8×25	8	3	5	1	4,6	5
14		Bolt Hex M8×40	8	2	5	1	3,6	4
15		Bolt Hex M10×30	8	2	5	1	3,6	4
16		Bolt Hex M10×50	10	1	5	1	3	3
17		Bolt Hex M12×40	10	1	5	1	3	3
18		Bolt Hex M12×60	12	1	5	1	3,4	4
19		Bolt Hex M16×60	6	1	5	1	2,2	3
20		Bolt Hex M20×80	5	1	5	1	2	2
21	Washer	Washer M8 (assort)	12	1	5	1	3,4	4
22		Washer M10	8	3	5	1	4,6	5
23		Washer M12	8	2	5	1	3,6	4
24		Washer M16	8	1	5	1	2,6	3
25		Washer M20	8	1	5	1	2,6	3

No	Jenis	Item	Posisi Rak	Dij	Sj	Tj	Tj/Sj	Total Trips (TT)
1	Lubricant	Oli Mesin	RB-1	10,45	9	35	3,89	40,63889
2	Lubricant	Oli Gardan		10,45	9	34	3,78	39,47778
3	Cooler	Radiator Coolant		10,45	5	16	3,20	33,44
4	Lubricant	Grease	RB-2	11,65	9	43	4,78	55,66111
5	Cooler	Thermostat		11,65	1	25	25,00	291,25
6	Fastener	Bearing		11,65	1	17	17,00	198,05
7	Spare Part	Wiper Blade		11,65	5	29	5,80	67,57

8	Nut	Nut Hex M8 (assort)	RB-3	13,05	2	4	2,00	26,1	
9		Nut Hex M10		13,05	2	5	2,50	32,625	
10		Nut Hex M12		13,05	2	5	2,50	32,625	
11		Nut Hex M16		13,05	2	2	1,00	13,05	
12		Nut Hex M20		13,05	2	2	1,00	13,05	
13	Bolt	Bolt Hex M8×25		13,05	1	5	5,00	65,25	
14		Bolt Hex M8×40		13,05	1	4	4,00	52,2	
15		Bolt Hex M10×30		13,05	1	4	4,00	52,2	
16		Bolt Hex M10×50		13,05	2	3	1,50	19,575	
17		Bolt Hex M12×40		13,05	2	3	1,50	19,575	
18		Bolt Hex M12×60		13,05	3	4	1,33	17,4	
19		Bolt Hex M16×60		13,05	3	3	1,00	13,05	
20		Bolt Hex M20×80		13,05	3	2	0,67	8,7	
21	Washer	Washer M8 (assort)		13,05	1	4	4,00	52,2	
22		Washer M10		13,05	1	5	5,00	65,25	
23		Washer M12		13,05	1	4	4,00	52,2	
24		Washer M16		13,05	2	3	1,50	19,575	
25		Washer M20		13,05	2	3	1,50	19,575	
Total Trips RB Existing Layout								1300,288	

No	Jenis	Item	Posisi Rak	Dij	Sj	Tj	Tj/Sj	Total Trips (TT)
1	Lubricant	Oli Mesin	RB-1	11,05	9	35	3,89	42,97222
2	Lubricant	Oli Gardan		11,05	9	34	3,78	41,74444
3	Cooler	Radiator Coolant		11,05	5	16	3,20	35,36
4	Lubricant	Grease	RB-2	12,45	9	43	4,78	59,48333

5	Cooler	Thermostat		12,45	1	25	25,00	311,25	
6	Fastener	Bearing		12,45	1	17	17,00	211,65	
7	Spare Part	Wiper Blade		12,45	5	29	5,80	72,21	
8	Nut	Nut Hex M8 (assort)	RB-3	13,95	2	4	2,00	27,9	
9		Nut Hex M10		13,95	2	5	2,50	34,875	
10		Nut Hex M12		13,95	2	5	2,50	34,875	
11		Nut Hex M16		13,95	2	2	1,00	13,95	
12		Nut Hex M20		13,95	2	2	1,00	13,95	
13	Bolt	Bolt Hex M8×25		13,95	1	5	5,00	69,75	
14		Bolt Hex M8×40		13,95	1	4	4,00	55,8	
15		Bolt Hex M10×30		13,95	1	4	4,00	55,8	
16		Bolt Hex M10×50		13,95	2	3	1,50	20,925	
17		Bolt Hex M12×40		13,95	2	3	1,50	20,925	
18		Bolt Hex M12×60		13,95	3	4	1,33	18,6	
19		Bolt Hex M16×60		13,95	3	3	1,00	13,95	
20		Bolt Hex M20×80		13,95	3	2	0,67	9,3	
21	Washer	Washer M8 (assort)		13,95	1	4	4,00	55,8	
22		Washer M10		13,95	1	5	5,00	69,75	
23		Washer M12		13,95	1	4	4,00	55,8	
24		Washer M16		13,95	2	3	1,50	20,925	
25		Washer M20		13,95	2	3	1,50	20,925	
Total Trips RB Proposed Layout								1388,47	

Lampiran Raw Data

Genset

Kategori Spare Part	Contoh Item	Dimensi Box Rata-rata (cm)	Rak Penyimpanan
Filter System	Oil filter, fuel filter, air filter	20 × 15 × 15	Rak Barang Biasa
Engine Maintenance	V-belt, gasket, seal, spark plug (genset kecil)	15 × 10 × 10	Rak Barang Biasa
Electrical	AVR (Automatic Voltage Regulator), sensor, kabel	20 × 15 × 10	Rak Barang Biasa
Battery	Accu genset 12V–24V	45 × 30 × 30	Rak Heavy Duty
Radiator & Cooling	Radiator genset kecil–sedang	60 × 50 × 25	Rak Heavy Duty
Alternator (Stator/ Rotor)	Generator core	80 × 60 × 50	Heavy Duty (lantai / special rack)

Forklift

Kategori	Suku Cadang	Estimasi Dimensi Box (P x L x T, cm)	Berat	Rak Ideal
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Filter System	Filter Oli	10 × 10 × 15	±0,5 kg	Rak Barang Biasa	ok
	Filter Udara	20 × 20 × 25	±1,0 kg	Rak Barang Biasa	ok
	Filter Solar (Fuel)	8 × 8 × 15	±0,3 kg	Rak Barang Biasa	ok
	Filter Hidrolik	12 × 12 × 20	±0,8 kg	Rak Barang Biasa	ok
Engine & Maintenance	Busi	5 × 5 × 10	±0,1 kg	Rak Barang Biasa	ok
	V-Belt / Fan Belt	25 × 25 × 5 (flat box)	±0,3 kg	Rak Barang Biasa	ok
	Gasket Kit	30 × 25 × 5 (flat)	±0,5 kg	Rak Barang Biasa	ok
	Bearing Kecil	8 × 8 × 5	±0,2 kg	Rak Barang Biasa	ok
Hydraulic & Transmission	Seal Kit (O-ring)	10 × 10 × 5	±0,1 kg	Rak Barang Biasa	ok
	Selang Hidrolik	40 × 40 × 10 (coil)	±1–2 kg	Rak Barang Biasa	ok
	Master Cylinder	25 × 15 × 15	±1,5 kg	Rak Barang Biasa	ok
	Hydraulic Cylinder (besar)	80 × 20 × 20	±15–25 kg	Rak Heavy Duty	ok
Electrical	Battery Forklift (48V, 400Ah)	100 × 60 × 80	±300–400 kg	Rak Heavy Duty / Floor	ok

	Lampu & Relay	15 × 10 × 10	±0,2 kg	Rak Barang Biasa	
Undercarriage & Heavy Parts	Starter Motor	30 × 20 × 20	±5 kg	Rak Heavy Duty	ok
	Alternator	25 × 20 × 20	±4 kg	Rak Heavy Duty	ok
	Ban Solid Forklift	Ø 60 × 20 (tanpa box)	±40–60 kg	Rak Heavy Duty / Floor	ok
	Fork (Garpu Angkat)	120 × 15 × 10	±80–100 kg	Rak Heavy Duty / Floor	
	Counterweight	Custom (200–500 kg, tanpa box)	Berat sekali	Floor Area (bulk storage)	

Traktor

Kategori Spare Part	Contoh Item	Dimensi Box Rata-rata (cm)	Rak Penyimpanan
Filter System	Filter oli, filter udara, filter solar	25 × 20 × 20	Rak Barang Biasa
Engine Maintenance	V-belt, seal kit, gasket, bearing kecil	20 × 15 × 10	Rak Barang Biasa
Electrical Kecil	Relay, sensor, lampu, switch	15 × 15 × 10	Rak Barang Biasa
Electrical Berat	Alternator, starter motor	40 × 30 × 25	Rak Heavy Duty

Hydraulic Components	Hydraulic pump, cylinder kit kecil	45 × 30 × 25	Rak Heavy Duty
Ban Traktor	Ban belakang (besar) & ban depan (lebih kecil)	Ø 80–150 × 35–50	Heavy Duty (lantai/bulk)

Excavator

Kategori Spare Part	Contoh Item	Dimensi Box Rata-rata (cm)	Rak Penyimpanan
Filter System	Fuel filter, oil filter, air filter	25 × 15 × 15	Rak Barang Biasa
Engine Parts	Gasket set, piston ring, bearing	20 × 15 × 10	Rak Barang Biasa
Hydraulic Parts	Seal kit, O-ring kit	15 × 10 × 10	Rak Barang Biasa
Hydraulic Components	Hydraulic pump, swing motor, travel motor	60 × 50 × 40	Rak Heavy Duty
Undercarriage	Track shoe, roller, idler, sprocket	80 × 60 × 40 (berat)	Heavy Duty (lantai / low rack)
Electrical	Sensor, ECU kecil, solenoid	30 × 20 × 15	Rak Barang Biasa

Komponen

Fungsi

Perkiraan Dimensi (cm)

Penyimpanan

Track Shoe (Sepatu Track)	Alas kaki excavator, menapak ke tanah.	90 × 35 × 15 (per pcs)	Heavy Duty (bulk / pallet rack)
Track Link / Track Chain	Rangkaian penghubung track shoe.	120 × 60 × 40 (set)	Heavy Duty (lantai/pallet)
Track Roller (Bottom Roller)	Menopang beban excavator, berada di bawah.	40 × 25 × 25 (per pcs)	Heavy Duty (rack rendah)
Carrier Roller (Top Roller)	Menopang track chain dari atas.	35 × 20 × 20	Heavy Duty
Idler	Mengatur ketegangan track.	70 × 70 × 30	Heavy Duty (pallet/lantai)
Sprocket	Menggerakkan track dengan tenaga motor travel.	80 × 80 × 25	Heavy Duty
Track Pin & Bushing	Penghubung antar link.	20 × 10 × 10 (set kecil)	Rak Biasa
Track Guard	Pelindung track dari lumpur & kerikil.	50 × 30 × 20	Heavy Duty
Bolt & Nut Undercarriage	Baut pengikat track shoe & roller.	15 × 15 × 10 (box)	Rak Biasa

No	Item	Satuan	Outbound /bln (est)	Inbound /bln (rencana)	Safety stock (1.5×)	Dimensi box / kemasan (P×L×T cm)	Penyimpanan (rak)	Rekomendasi frekuensi pemesanan
1	Engine Oil (pakai pail 20 L)	pail 20 L	80	95	120	35×35×40 (pail)	Pallet / Heavy Duty	Mingguan / 2-mingguan
2	Gardan / Gear Oil (pail 20 L)	pail 20 L	30	36	45	35×35×40 (pail)	Pallet / Heavy Duty	2-mingguan / bulanan

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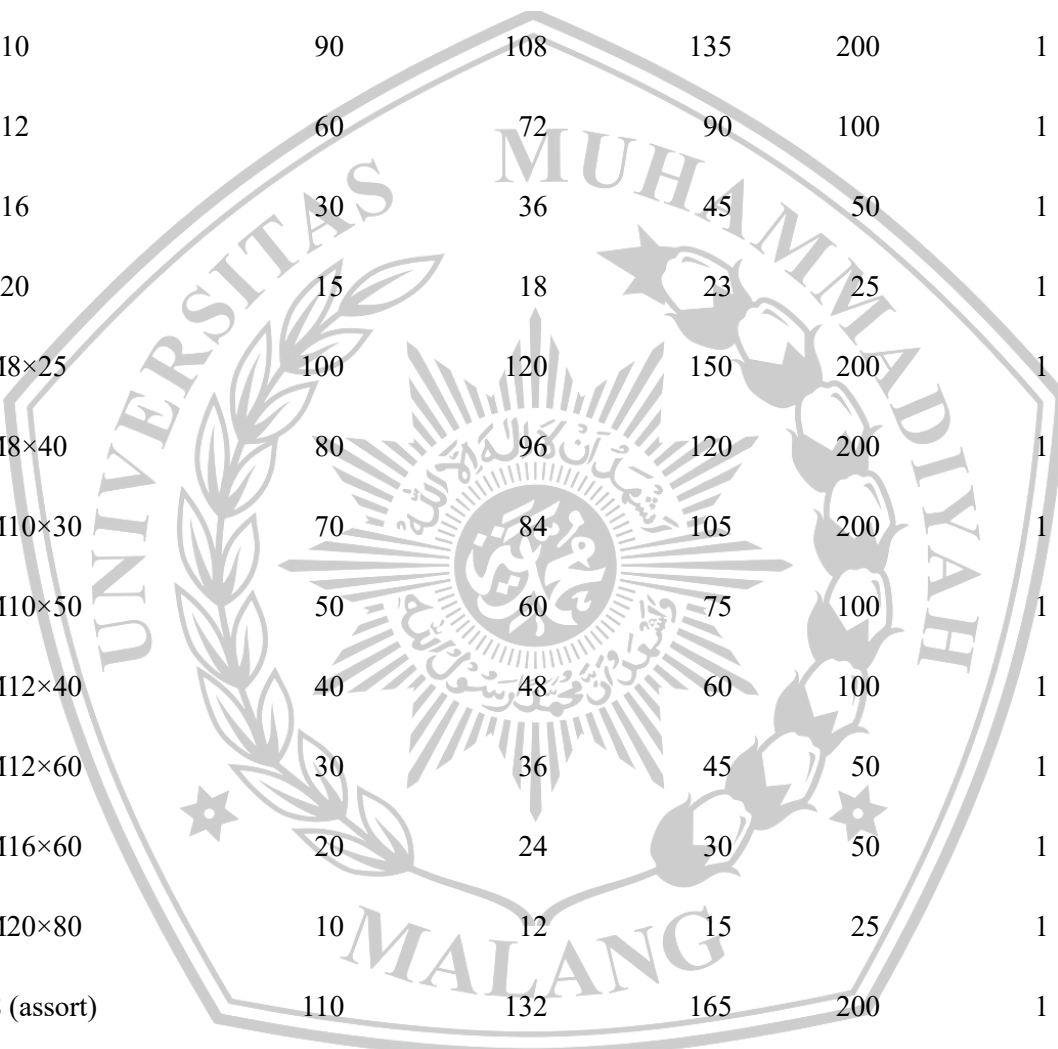
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3	Spark Plug	pcs	120	140	180	10×8×6 (box kecil)	Bin Rack / Rak Biasa	Mingguan
4	Radiator Coolant (pail / 20 L)	pail 20 L	25	30	38	35×35×40 (pail)	Pallet / Heavy Duty	2-mingguan
5	Water Pump (engine/genset/traktor)	unit	5	6	8	40×25×25 (box)	Heavy Duty (middle)	Bulanan / sesuai kebutuhan
6	Thermostat (assembly)	pcs	12	14	18	10×10×8 (box)	Rak Biasa	Mingguan / 2-mingguan
7	Grease (tub 18 kg atau pail 5 kg)	tub / pail	20	24	30	30×30×25 (tub)	Pallet / Heavy Duty	2-mingguan
8	Bearing (various small)	pcs / box	80	95	120	15×10×10 (box)	Bin Rack / Rak Biasa	Mingguan
9	Wiper Blade (per unit)	pcs	40	48	60	70×10×5 (box panjang)	Rak Biasa (shelf)	Mingguan
10	Fastener (box assort/kit)	box	150	180	225	20×15×10 (box)	Bin Rack / Rak Biasa	Mingguan

SKU	Deskripsi	Outbound (pcs/bln)	Inbound rencana (pcs/bln)	Safety stock (pcs)	Pack / box (pcs)	Boxes (outbound)	Boxes (safety)	Dimensi box (P×L×T cm)	Penyimpanan (lokasi)
NUT-M8	Nut Hex M8 (assort)	120	144	180	200	1	1	25×20×10	Bin Rack / Divider bin



NUT-M10	Nut Hex M10	90	108	135	200	1	1	25×20×10	Bin Rack
NUT-M12	Nut Hex M12	60	72	90	100	1	1	30×20×12	Bin Rack
NUT-M16	Nut Hex M16	30	36	45	50	1	1	35×25×15	Bin Rack (slot besar)
NUT-M20	Nut Hex M20	15	18	23	25	1	1	40×30×20	Bin Rack / Low shelf
BLT-M8x25	Bolt Hex M8×25	100	120	150	200	1	1	30×10×8	Long Bin / Long-slot
BLT-M8x40	Bolt Hex M8×40	80	96	120	200	1	1	30×12×8	Long Bin
BLT-M10x30	Bolt Hex M10×30	70	84	105	200	1	1	35×12×10	Long Bin
BLT-M10x50	Bolt Hex M10×50	50	60	75	100	1	1	40×15×10	Long Bin / Bin Rack
BLT-M12x40	Bolt Hex M12×40	40	48	60	100	1	1	40×18×12	Bin Rack
BLT-M12x60	Bolt Hex M12×60	30	36	45	50	1	1	45×20×12	Bin Rack
BLT-M16x60	Bolt Hex M16×60	20	24	30	50	1	1	50×25×15	Bin Rack / Low shelf
BLT-M20x80	Bolt Hex M20×80	10	12	15	25	1	1	60×30×15	Floor / Heavy Duty area
WSR-M8	Washer M8 (assort)	110	132	165	200	1	1	20×15×8	Bin Rack

WSR-M10	Washer M10	85	102	128	200	1	1	20×15×8	Bin Rack
WSR-M12	Washer M12	55	66	83	100	1	1	25×15×10	Bin Rack
WSR-M16	Washer M16	25	30	38	50	1	1	30×20×12	Bin Rack
WSR-M20	Washer M20	12	15	18	25	1	1	35×25×12	Bin Rack / Low slot

Kategori	Nama Tools	Fungsi Utama	Contoh Pemakaian
Hand Tools	Kunci ring/pas/kombinasi, kunci soket, obeng, tang, hammer, allen key, torque wrench	Membuka/pasang baut, mur, komponen ringan dengan presisi	Ganti filter oli, pasang spark plug, set torsi
Special Service Tools	Injector puller, seal installer, piston ring compressor, valve spring compressor, bearing puller	Alat khusus untuk komponen engine & mekanikal yang presisi	Overhaul engine, ganti seal/gasket, lepas bearing
Workshop Tools	Hydraulic jack, chain block, hoist, grease gun, impact wrench, bench vise, air compressor	Membantu pekerjaan berat, pengangkatan, pelumasan, dan bongkar pasang komponen besar	Angkat undercarriage excavator, grease pin, buka baut besar
Measuring Tools	Multimeter, oil pressure gauge, tachometer, micrometer, caliper	Ukur kondisi kelistrikan, tekanan, dimensi, dan performa mesin	Cek aki genset, ukur celah ring piston, ukur RPM forklift
Diagnostic Tools	ECU scanner, battery tester, laptop dengan software pabrikan	Deteksi masalah elektronik & sistem modern pada unit berbasis komputer	Scan forklift modern, cek fault code excavator
Cleaning Tools	Parts washer, steam cleaner, blower gun, cleaning brush	Membersihkan part & area mesin sebelum dipasang kembali	Cuci radiator, bersihkan filter udara, semprot debu

Forklift

Item	Satuan	Outbound rata-rata	Rentang tipikal	Inbound (rencana)	Safety Stock (1,5x)	Kategori Rak
Oil Filter	pcs	60	40–100	70	90	Biasa
Fuel Filter	pcs	50	30–90	55	75	Biasa
Air Filter	pcs	40	25–80	45	60	Biasa
Hydraulic Hose	pcs	25	15–50	28	38	Heavy Duty
Brake Shoe / Pad	set	15	10–25	18	23	Biasa
Fork (Tine)	pcs	4	2–6	5	6	Heavy Duty
Battery (Traction)	unit	2	1–3	2–3	3	Heavy Duty

Excavator

Item	Satuan	Outbound rata-rata	Rentang tipikal	Inbound (rencana)	Safety Stock (1,5x)	Kategori Rak
Track Shoe	pcs	270	180–450	300	405	Heavy Duty
Track Link / Chain	set	3	2–5	3–4	5	Heavy Duty
Bottom Roller	pcs	30	20–50	33–36	45	Heavy Duty
Carrier Roller	pcs	6	4–10	7–8	9	Heavy Duty
Idler	pcs	6	4–10	7–8	9	Heavy Duty
Sprocket Ring	pcs	6	4–10	7–8	9	Heavy Duty
Pin & Bushing Set	set	3	2–5	3–4	5	Heavy Duty
Bolt & Nut Kit	kit	4	3–6	4–5	6	Biasa

Tractor

Item	Satuan	Outbound rata-rata	Rentang tipikal	Inbound (rencana)	Safety Stock (1,5x)	Kategori Rak
Engine Oil Filter	pcs	50	30–80	55	75	Biasa
Fuel Injection Pump	unit	3	2–5	3–4	5	Heavy Duty
Clutch Plate	pcs	10	6–15	11–12	15	Biasa
Transmission Gear	pcs	6	3–8	7	9	Heavy Duty
Hydraulic Pump	unit	4	2–6	4–5	6	Heavy Duty
Radiator Assembly	unit	2	1–3	2–3	3	Heavy Duty
Tire / Rims	pcs	8	6–12	9	12	Heavy Duty

Genset

Item	Satuan	Outbound rata-rata	Rentang tipikal	Inbound (rencana)	Safety Stock (1,5x)	Kategori Rak
Oil Filter	pcs	40	25–70	45	60	Biasa

Fuel Filter	pcs	35	20–60	38	53	Biasa
Air Filter	pcs	30	15–50	33	45	Biasa
AVR (Automatic Voltage Regulator)	unit	5	3–8	6	8	Biasa
Starter Motor	unit	3	2–5	3–4	5	Heavy Duty
Alternator	unit	2	1–3	2–3	3	Heavy Duty
Battery	unit	4	2–6	5	6	Heavy Duty

Tanggal Hari

1 Okt Selasa

2 Okt Rabu

3 Okt Kamis

4 Okt Jumat

Aktivitas & Uraian Kegiatan

Orientasi perusahaan dan pengenalan gudang. Peserta magang diperkenalkan dengan profil PT Traktor Nusantara, aturan kerja, serta diajak berkeliling gudang untuk memahami area penyimpanan dan alur distribusi barang.

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Observasi tata letak gudang lama. Mengamati penempatan rak, receiving area, sorting area, dan jalur pergerakan barang. Mencatat posisi rak dan kondisi aktual alur penyimpanan.

Observasi tata letak gudang baru. Membandingkan posisi rak dengan layout lama, mencatat perubahan jalur material handling, serta mengidentifikasi potensi kelebihan dan kekurangannya.

5–6 Okt	Sabtu– Minggu	-
7 Okt	Senin	Pengumpulan data jenis suku cadang. Mengklasifikasikan spare part ke dalam kategori barang umum dan heavy duty.
8 Okt	Selasa	Pencatatan dimensi box. Mengukur atau mencatat ukuran kemasan spare part untuk kebutuhan analisis space requirement.
9 Okt	Rabu	Pendataan arus barang (in-out). Mencatat volume barang masuk dan keluar untuk setiap kategori suku cadang.
10 Okt	Kamis	Lanjutan pencatatan throughput. Melengkapi data frekuensi pergerakan barang dan mengecek konsistensi pencatatan.
11 Okt	Jumat	Pemetaan koordinat rak (layout lama). Menentukan posisi rak terhadap receiving area dengan metode rectilinear distance.
12–13 Okt	Sabtu– Minggu	-
14 Okt	Senin	Pemetaan koordinat rak (layout baru). Menentukan jarak tiap rak terhadap receiving area pada layout baru.
15 Okt	Selasa	Perhitungan Space Requirement (Sj). Menghitung kebutuhan ruang penyimpanan berdasarkan data dimensi box dan jumlah spare part.
16 Okt	Rabu	Finalisasi perhitungan Sj. Memastikan seluruh data kebutuhan ruang tercatat dan siap digunakan dalam analisis.
17 Okt	Kamis	Perhitungan Throughput (Tj). Menghitung frekuensi pergerakan barang per jenis spare part.
18 Okt	Jumat	Validasi data Tj. Mengecek ulang data throughput dengan supervisor gudang untuk memastikan keakuratan.
19–20 Okt	Sabtu– Minggu	-
21 Okt	Senin	Perhitungan total trips layout lama. Menggunakan Sj, Tj, dan jarak (Dij) layout lama.
22 Okt	Selasa	Analisis hasil total trips layout lama. Menilai efisiensi pergerakan barang dalam layout lama.

23 Okt	Rabu	Perhitungan total trips layout baru. Menggunakan Sj, Tj sama dengan layout lama, hanya mengubah jarak (Dij).
24 Okt	Kamis	Analisis hasil total trips layout baru. Mengevaluasi efisiensi pergerakan pada layout baru.
25 Okt	Jumat	Membandingkan total trips. Menyusun tabel perbandingan antara layout lama dan baru.
26–27 Okt	Sabtu– Minggu	-
28 Okt	Senin	Analisis akhir efisiensi layout. Menarik kesimpulan sementara mengenai layout yang lebih efisien.
29 Okt	Selasa	Penyusunan draft laporan. Menuliskan hasil pengumpulan data dan analisis dalam format laporan magang.
30 Okt	Rabu	Finalisasi laporan dan persiapan presentasi. Melengkapi laporan akhir serta menyiapkan bahan untuk presentasi hasil magang.

