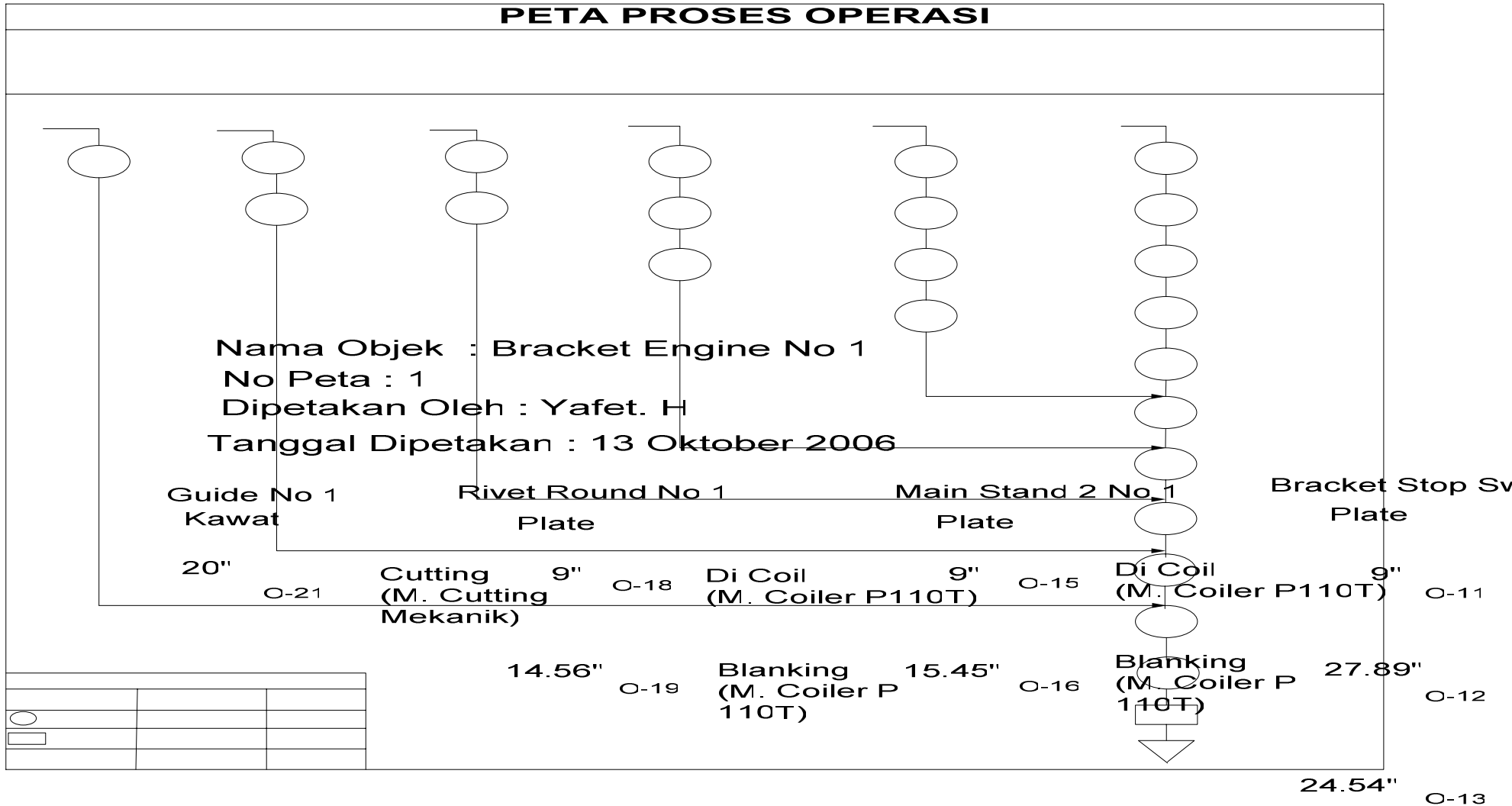


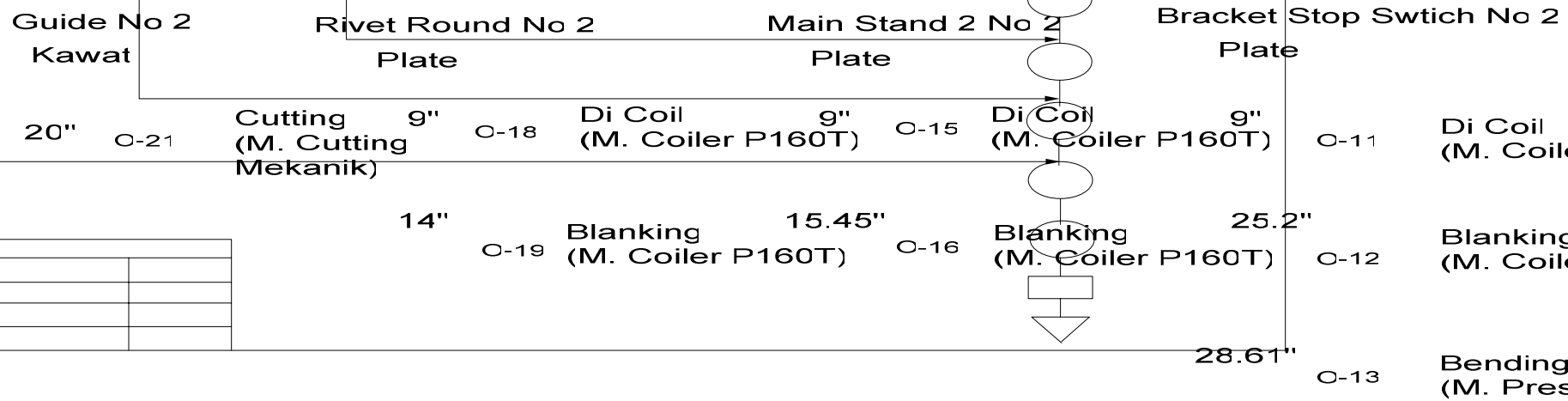
1. PPO Bracket Engine no 1



2. PPO Bracket Engine no 2

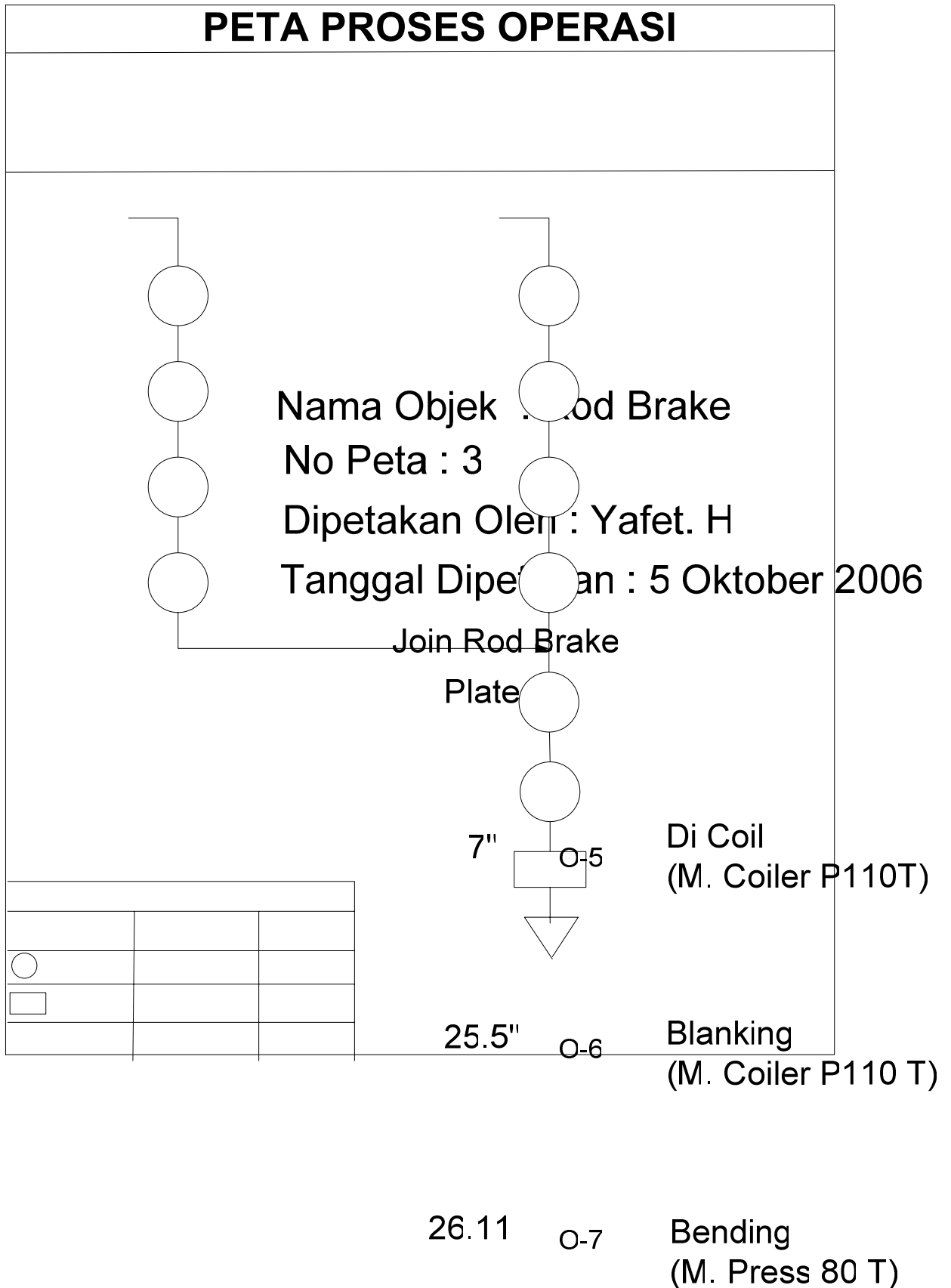
PETA PROSES OPERASI

Nama Objek : Bracket Engine No 2
 No Peta : 2
 Dipetakan Oleh : Yafet. H
 Tanggal Dipetakan : 13 Oktober 2006

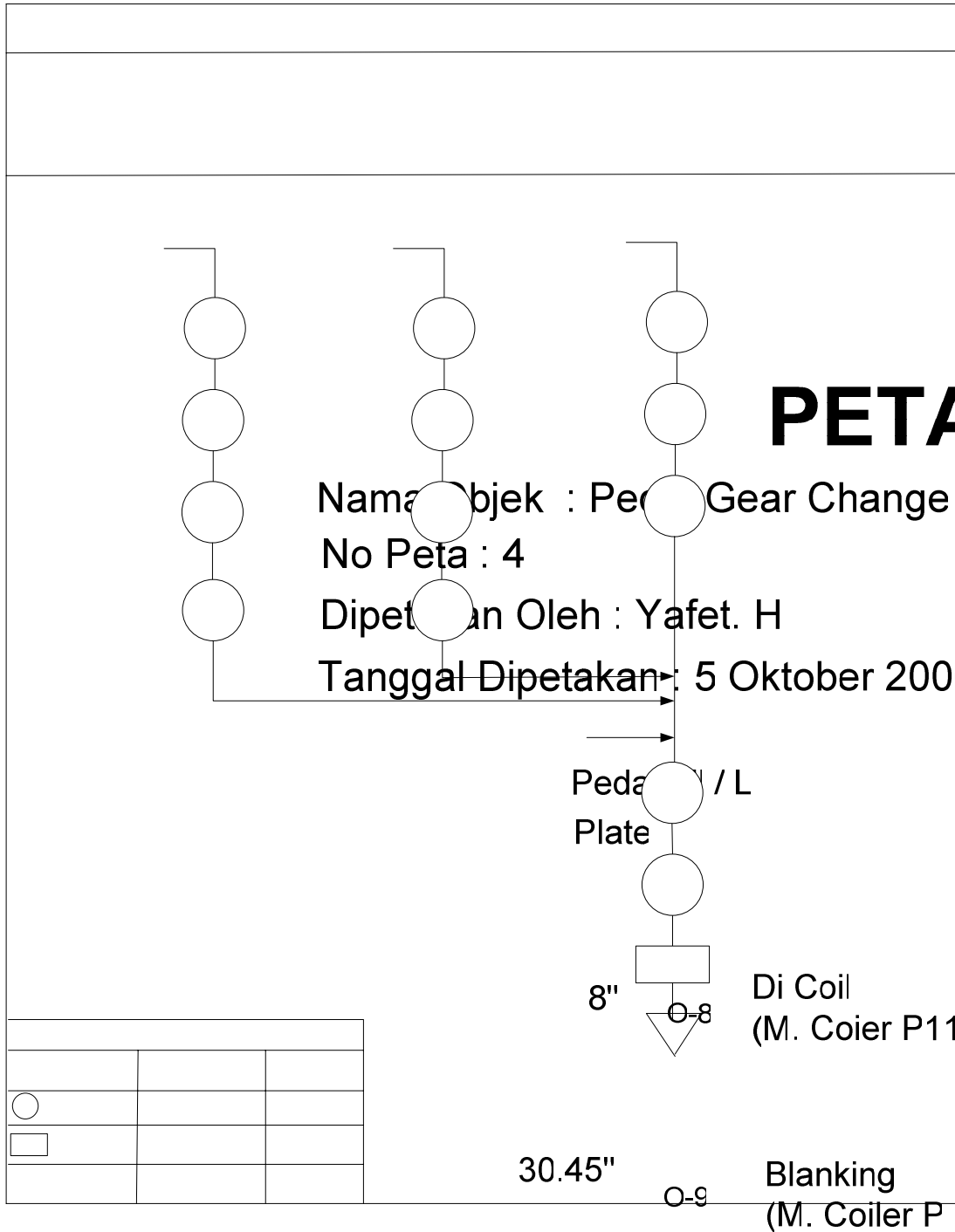


○		
□		
▽		

3. PPO Rod Brake



4. PPO Pedal Gear Change



Pedal All Plate

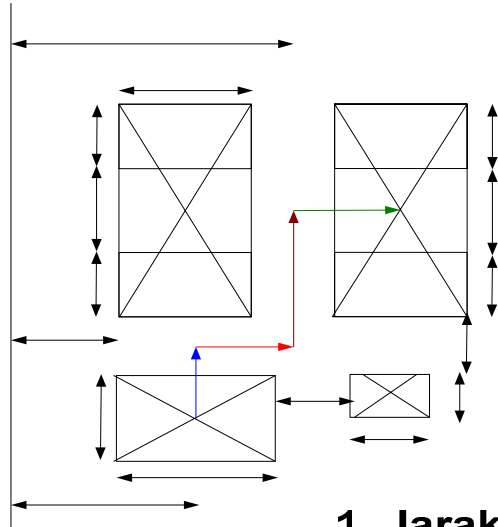
8" O-4

30.45" O-5

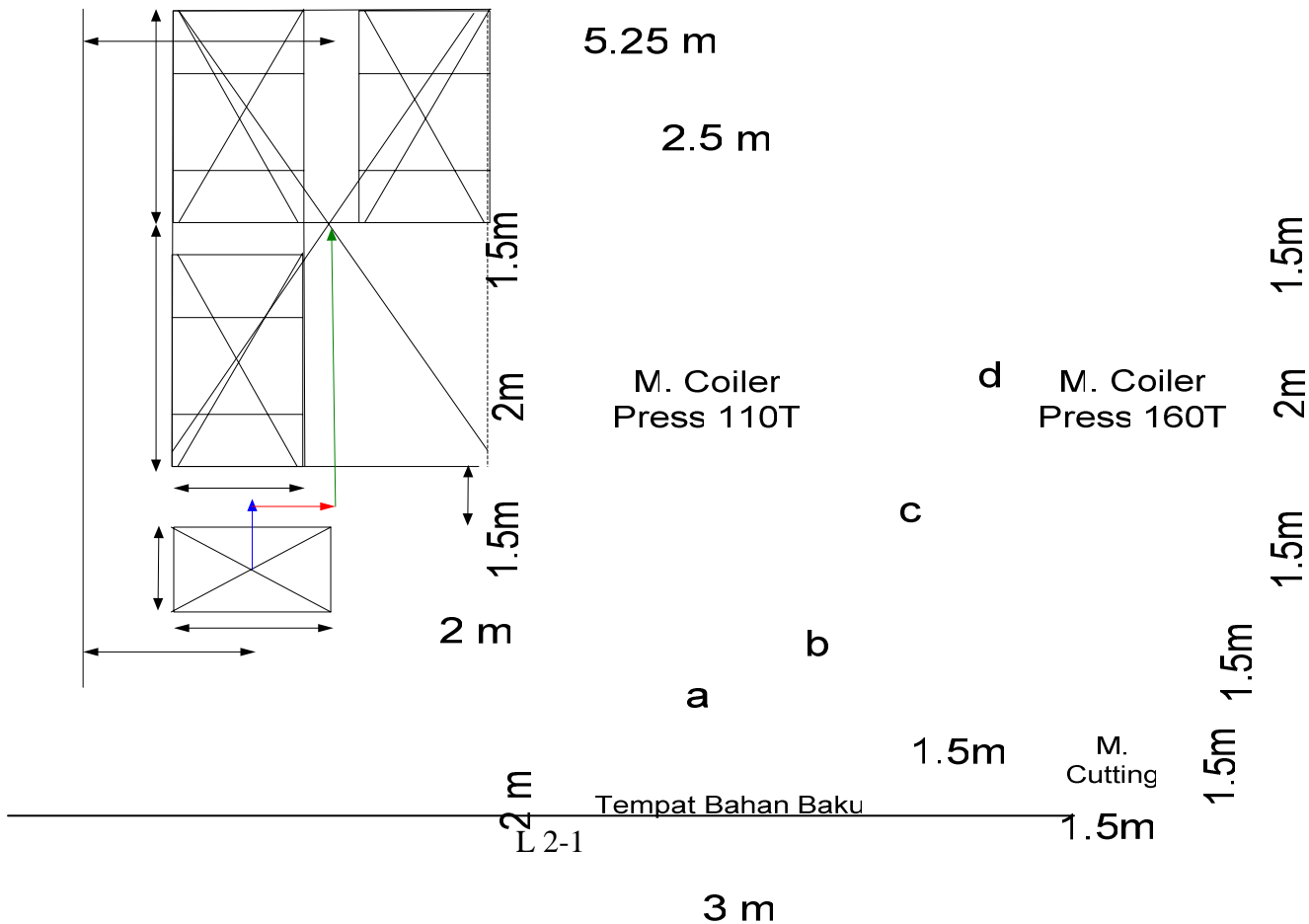
25.6" O-6

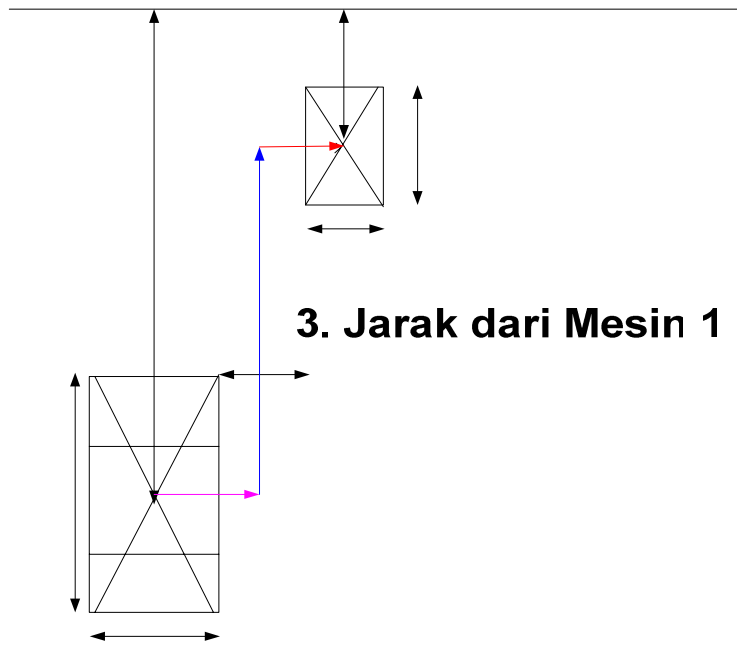
LAMPIRAN 2

PERHITUNGAN JARAK AWAL



1. Jarak dari Tmpt Bhn Baku ke M. Coiler P 160





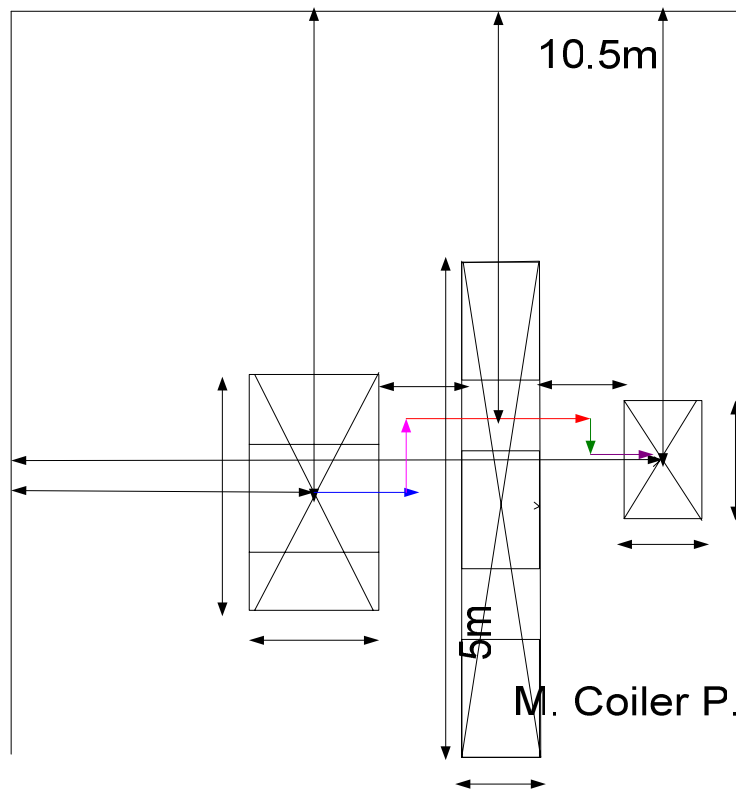
3. Jarak dari Mesin 1 ke Mesin 3 (M. Coiler P 160T)

2.75m

c

M. Press 110T

2.5m



10.5m

1.5m

b

Jadi
a + b + c

1.75 m

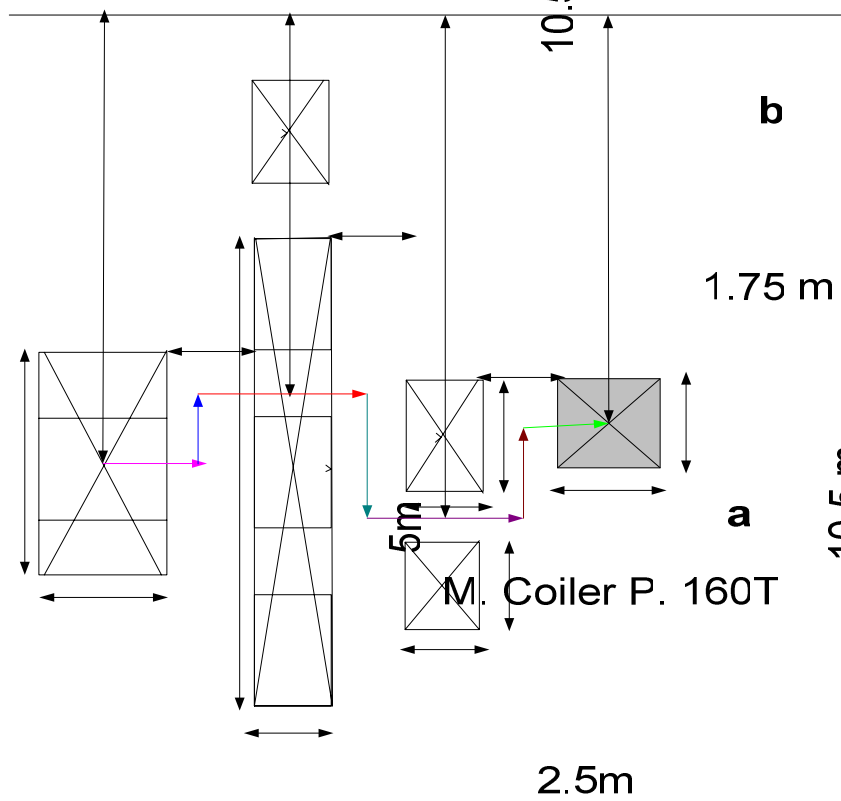
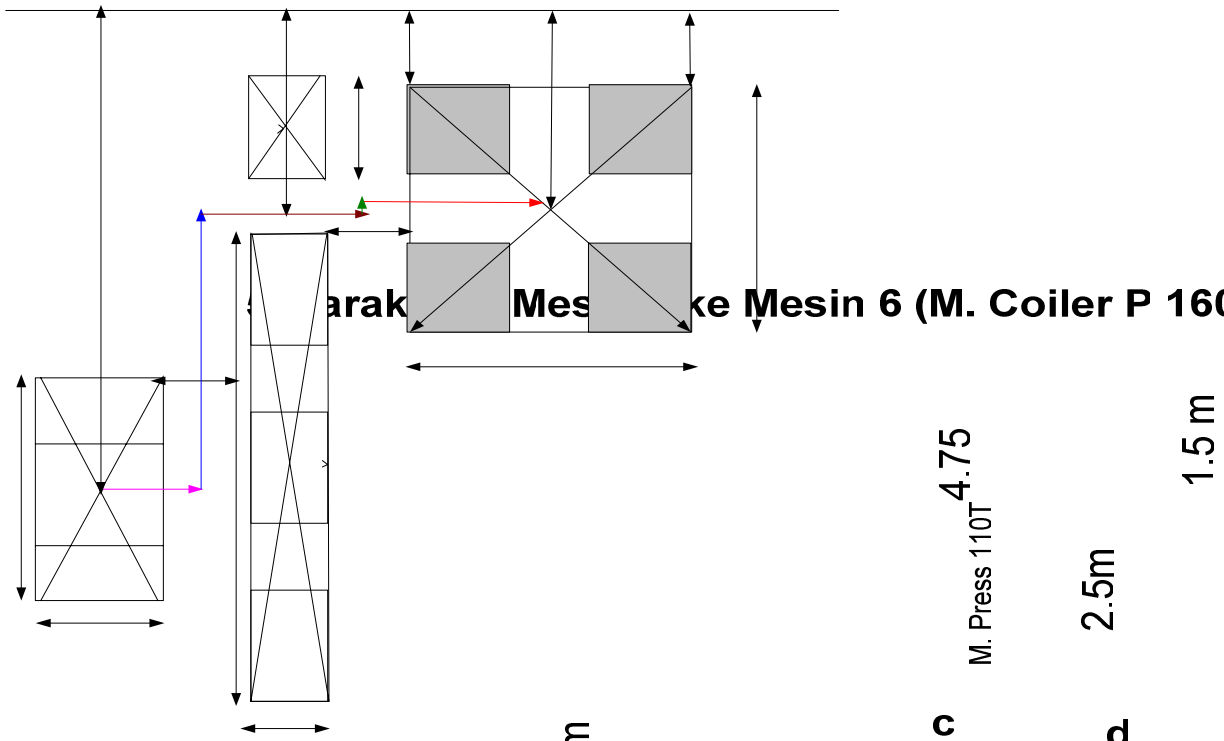
a

M. Coiler P. 160T

5m

2.5m

4. Jarak dari Mesin 1 ke Mesin 5 (M. Coiler P



M. Press 110T 4.75

2.5m

1.5 m

c

d

M. Press 80T

1.75 m

b

1.75 m

M. Press 80T

10.5 m

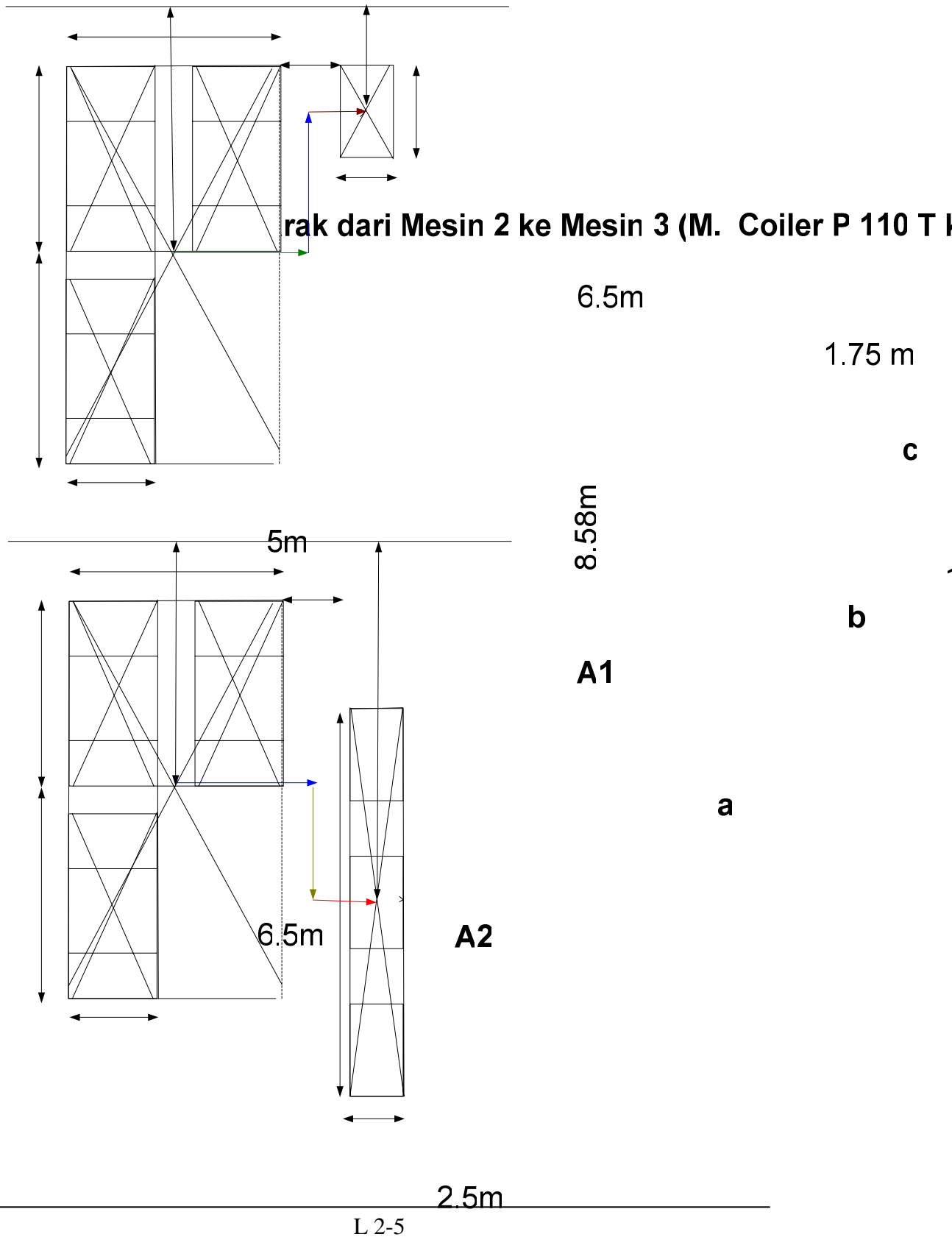
a

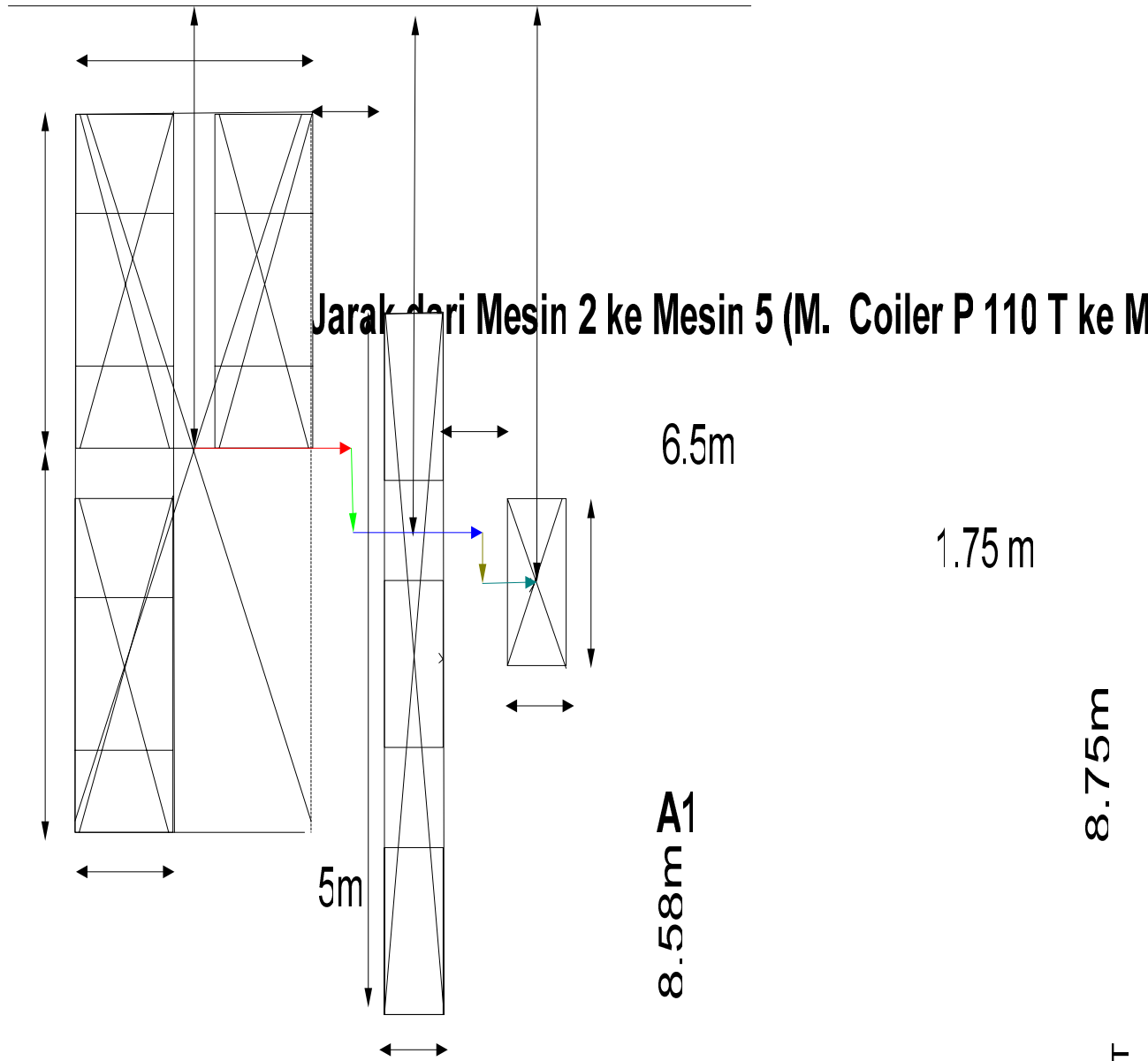
M. Coiler P. 160T

2.5m

M. Press 80T

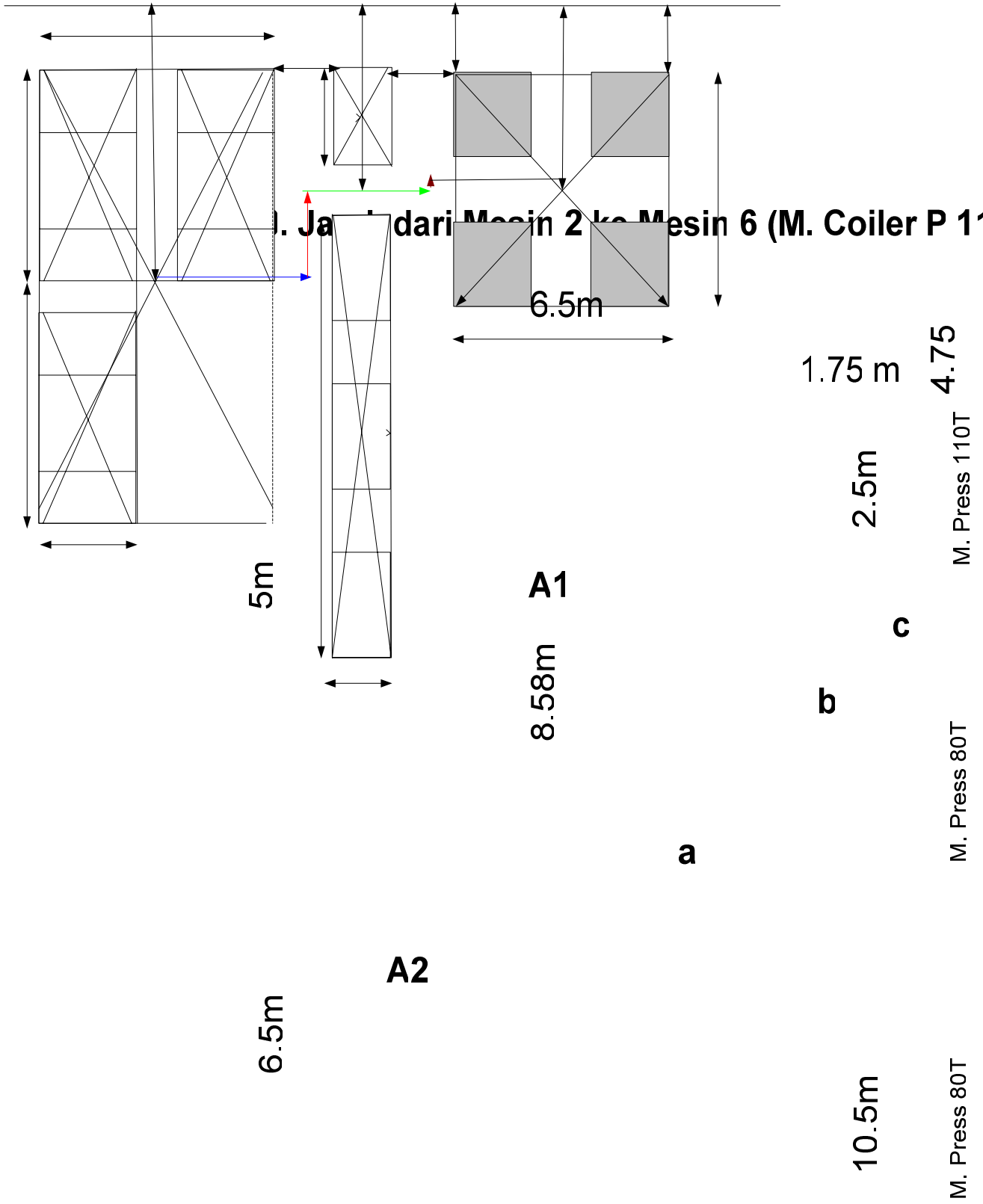
1.5 m

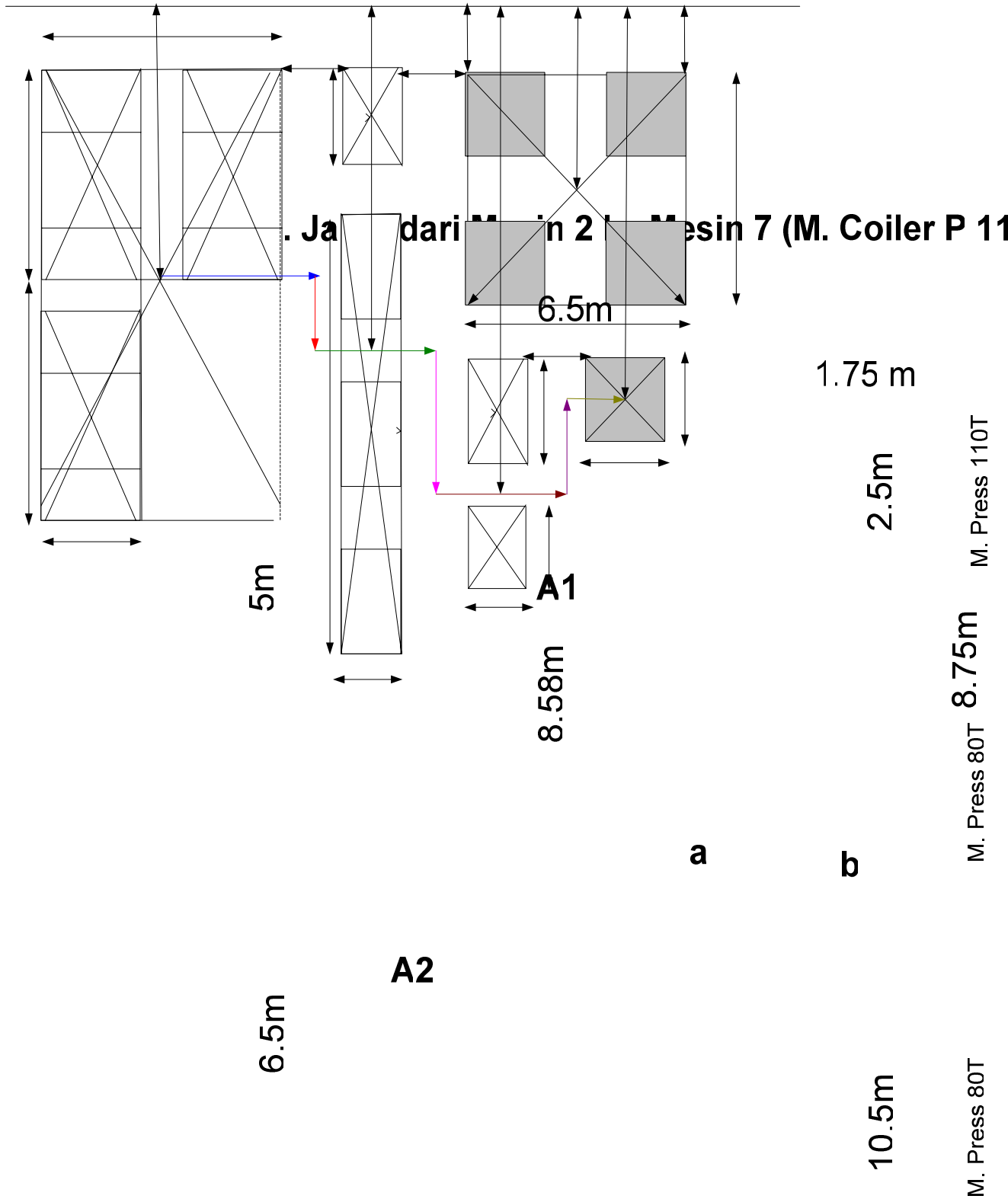


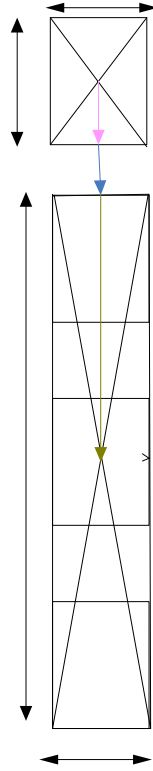


a

b







12. Jarak dari Mesin 3 ke Mesin 4 (I

1.5 m

2.5m

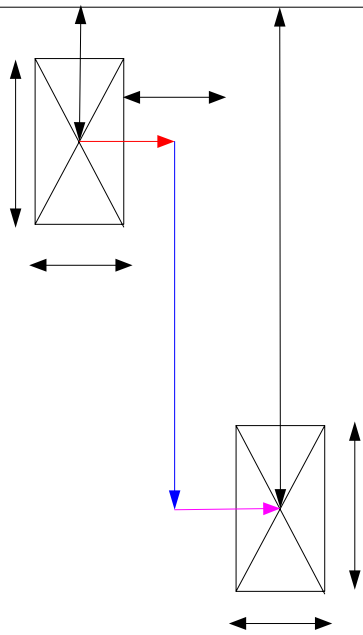
a M. Press 110T

b

M. Press 80T

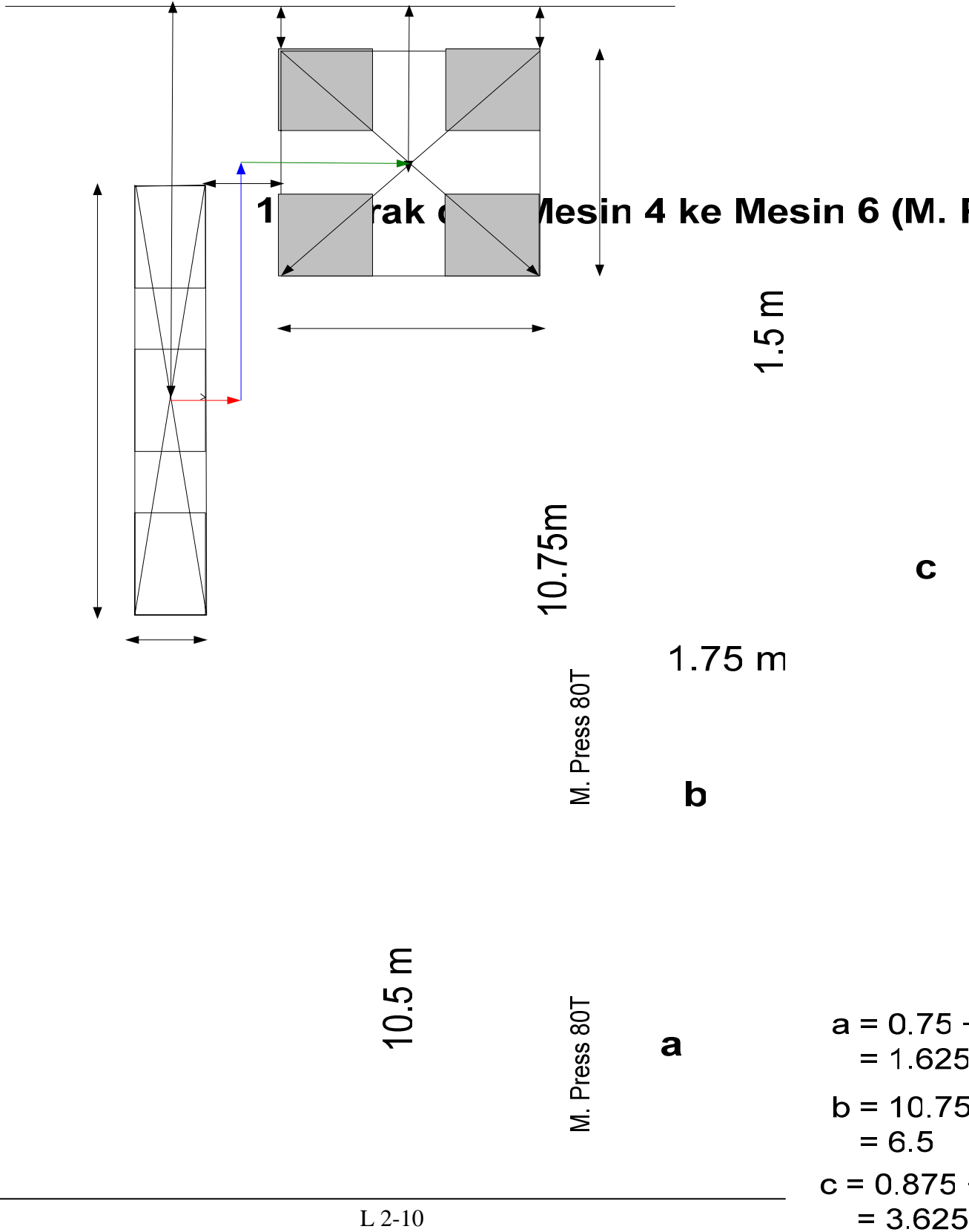
c

M. Press 80T



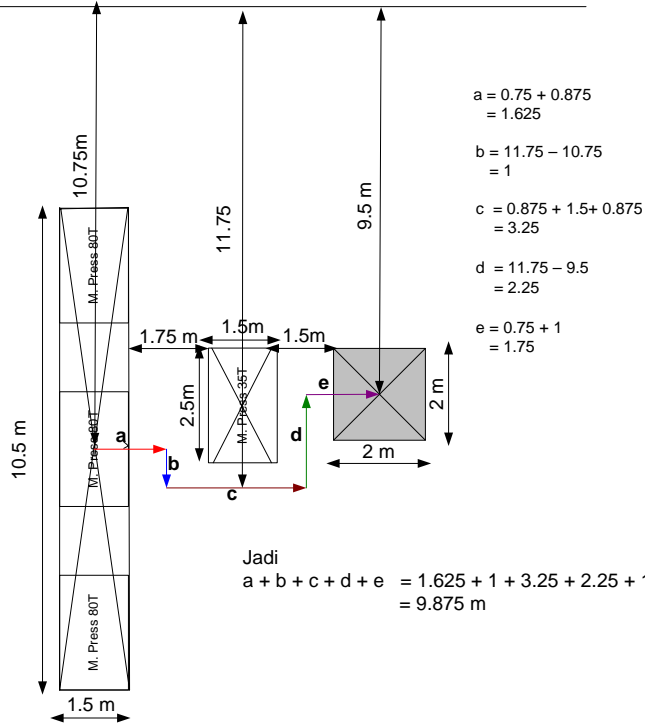
10.5m

a
b
c
J
a



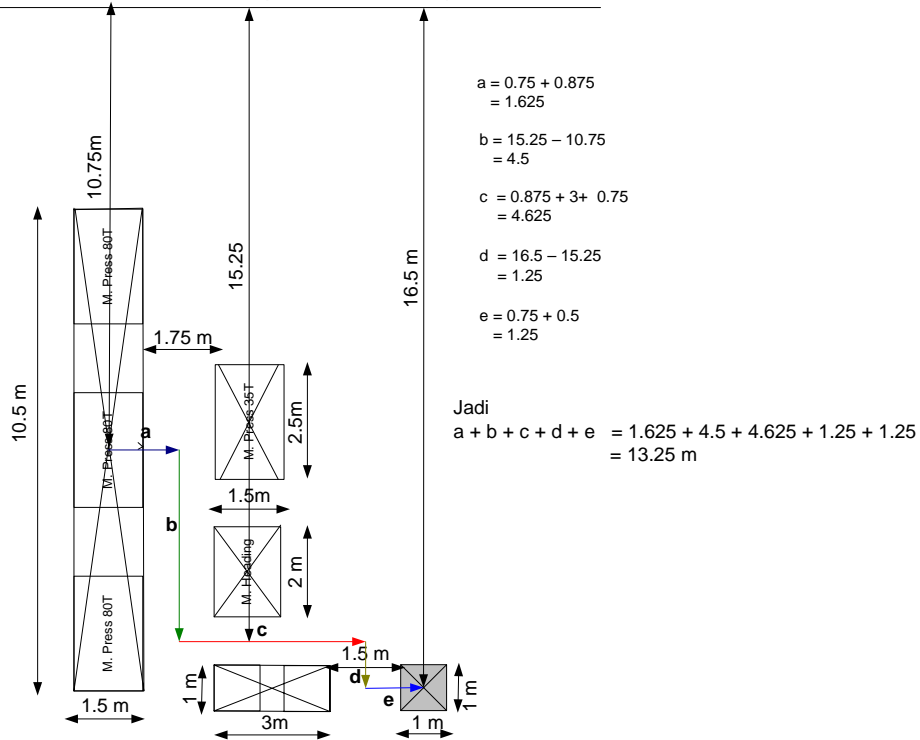
Jadi

15. Jarak dari Mesin 4 ke Mesin 7 (M. P 80 T ke M. Spot Welding)



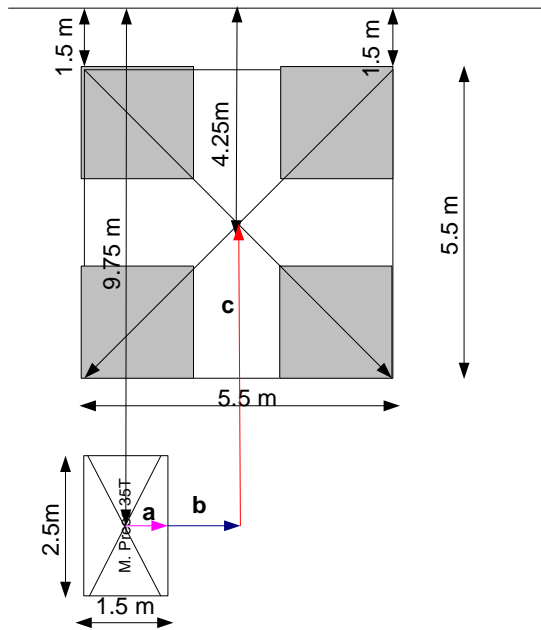
Jadi
 $a + b + c + d + e = 1.625 + 1 + 3.25 + 2.25 + 1.75$
 $= 9.875 \text{ m}$

16. Jarak dari Mesin 4 ke Mesin 8 (M. P 80 T ke M. Bor)



Jadi
 $a + b + c + d + e = 1.625 + 4.5 + 4.625 + 1.25 + 1.25$
 $= 13.25 \text{ m}$

17. Jarak dari Mesin 5 ke Mesin 6 (M. P 35 T ke M. Mig Welding)



$$a = 0.75$$

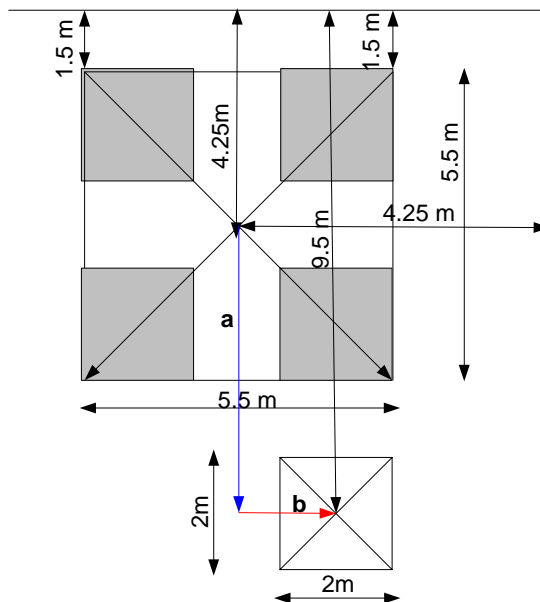
$$b = 2.75 - 1.5 \\ = 1.25$$

$$c = 9.75 - 4.25 \\ = 5.5$$

Jadi

$$a + b + c = 0.75 + 1.25 + 5.5 \\ = 7.5 \text{ m}$$

18. Jarak dari Mesin 6 ke Mesin 7 (M. Mig Welding ke M. Spot Welding)

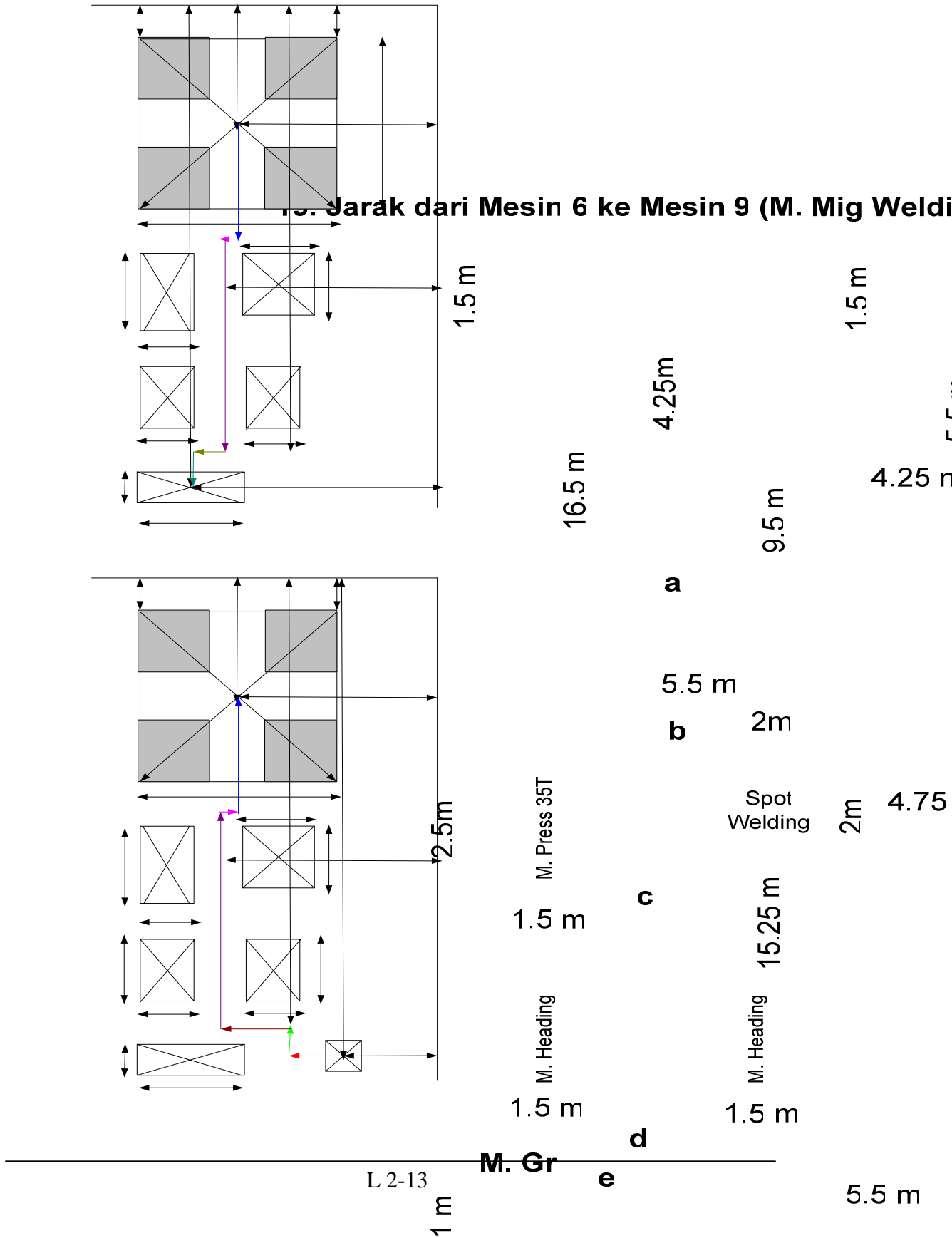


$$a = 9.5 - 4.25 \\ = 5.25$$

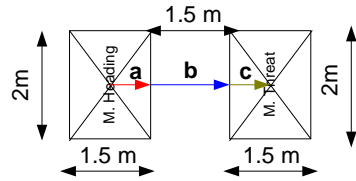
$$b = 0.75 + 1 \\ = 1.75$$

Jadi

$$a + b = 5.25 + 1.75 \\ = 7 \text{ m}$$

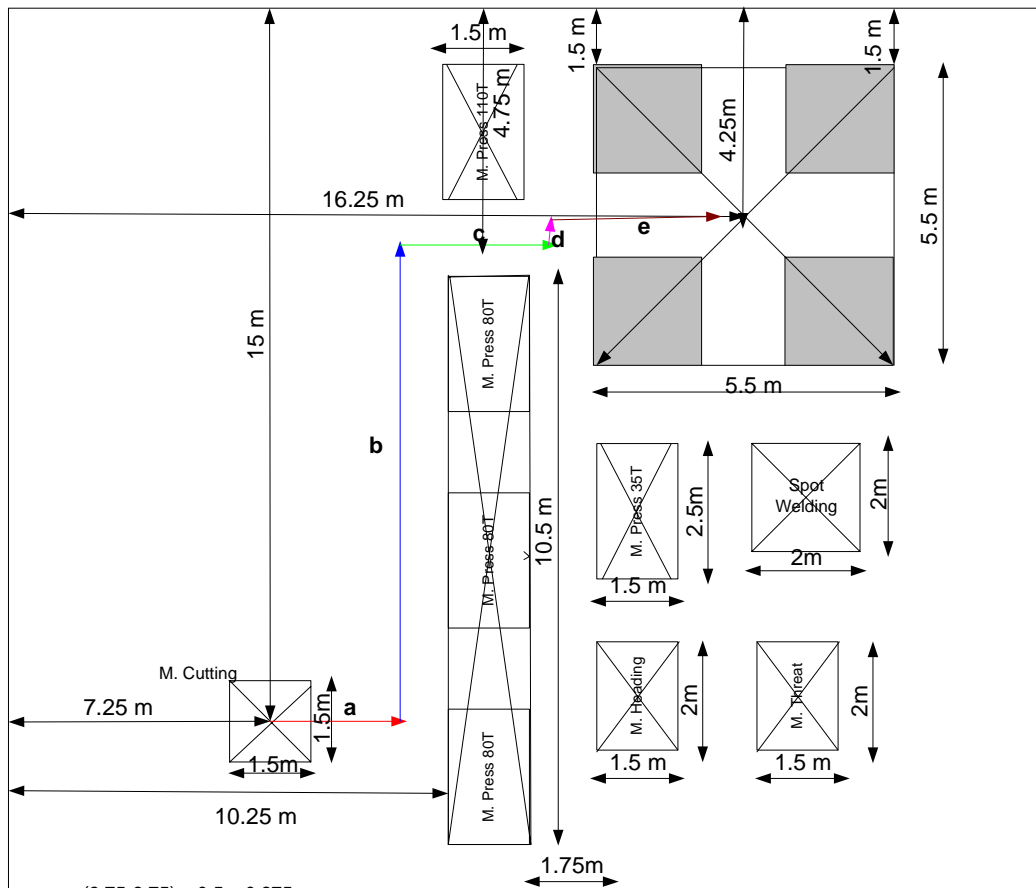


21. Jarak dari Mesin 10 ke Mesin 12 (M. Heading ke M. Throat)



Jadi
 $a + b + c = 1 + 1.5 + 1$
 $= 3.5 \text{ m}$

22. Jarak dari Mesin 11 ke Mesin 6 (M. Cutting Ke M. Mig Welding)



$a = (9.75 - 6.75) - 0.5 - 0.875$
 $= 1.625$

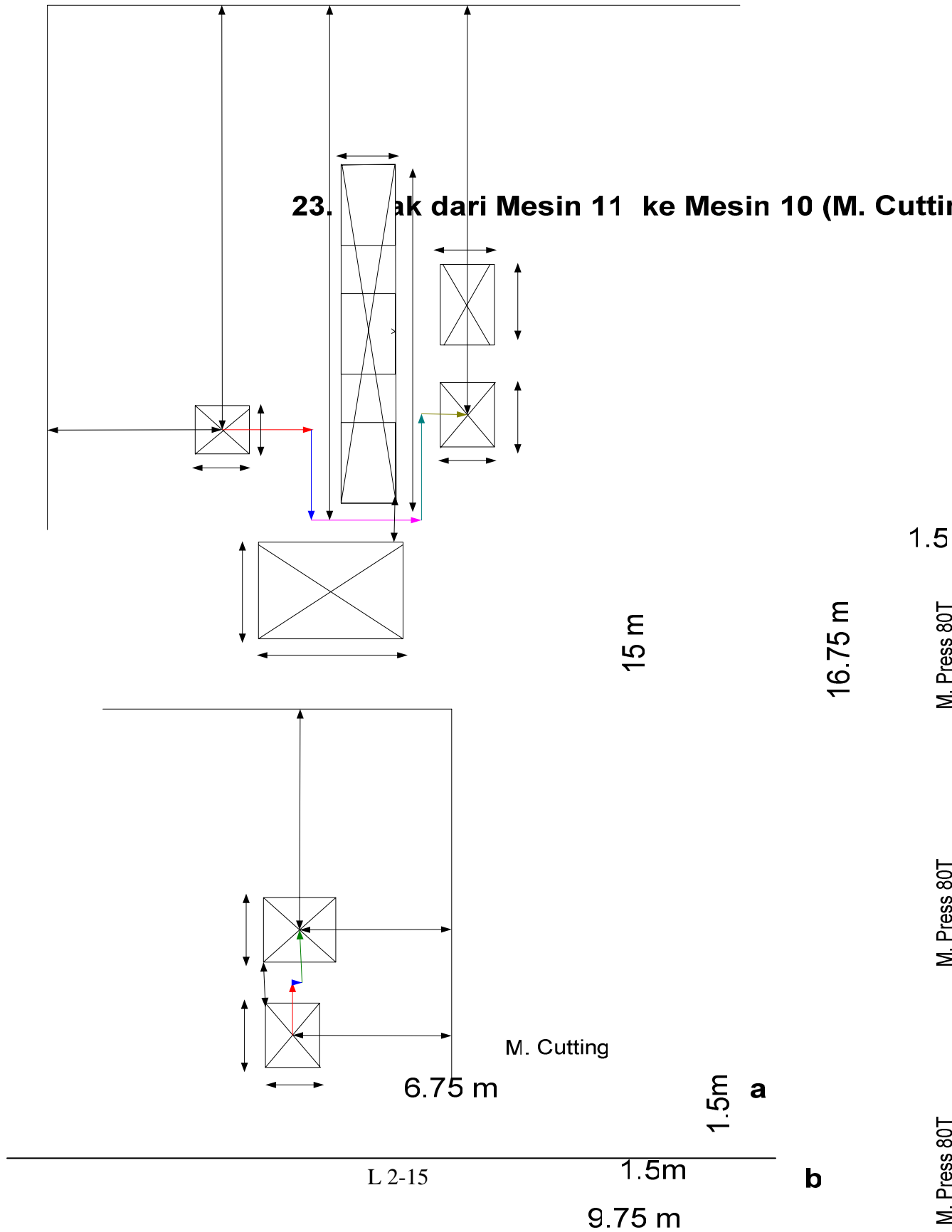
$b = 15 - 4.75$
 $= 10.25$

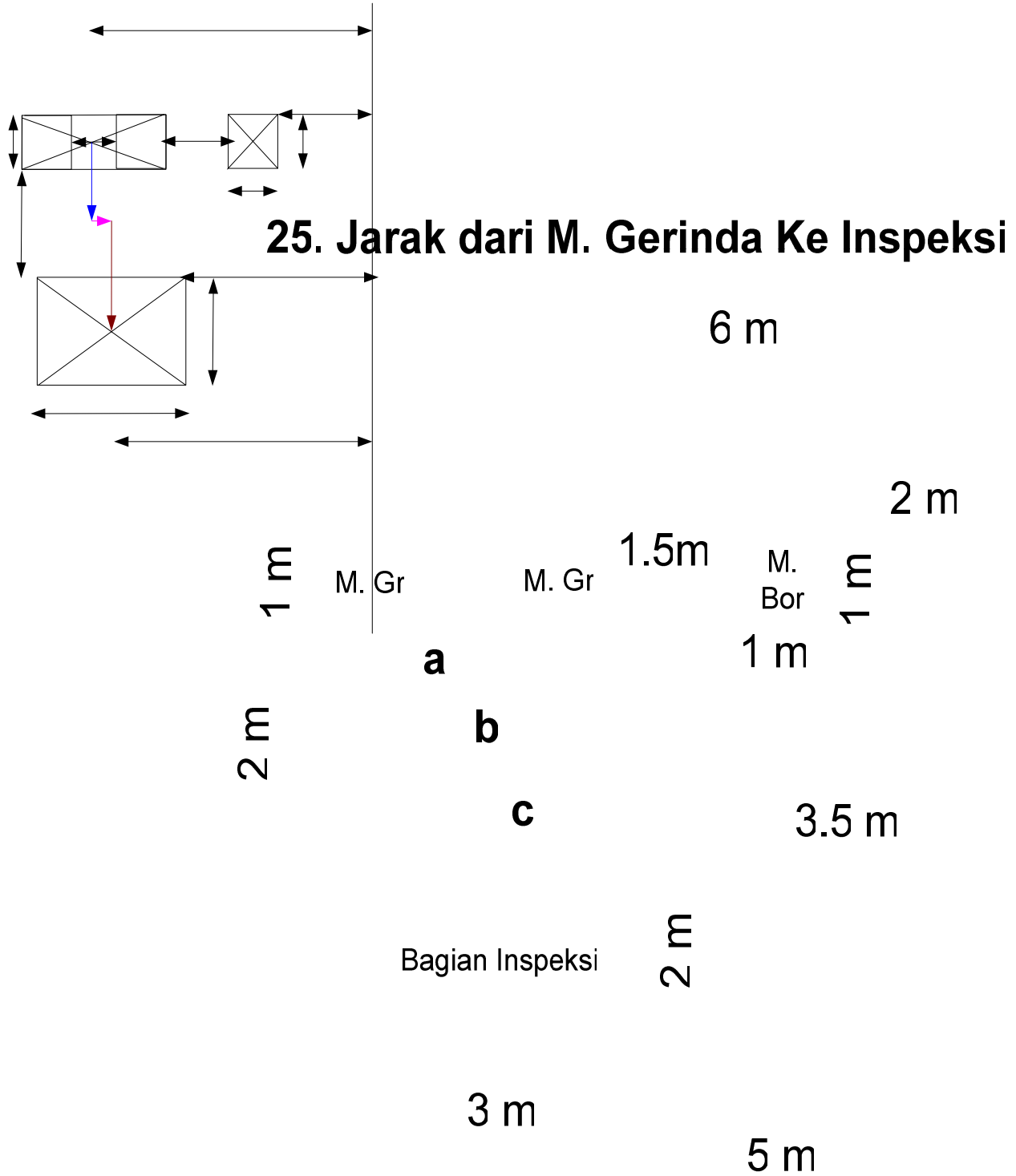
$c = 0.875 + 1.5 + 0.875$
 $= 3.25$

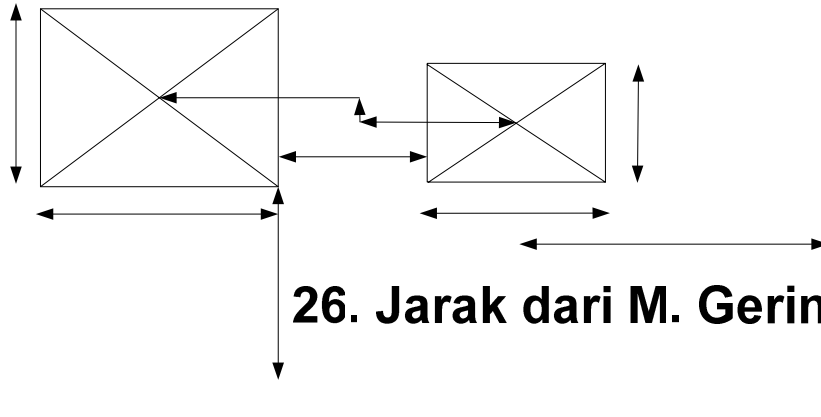
$d = 4.75 - 4.25$
 $= 0.5 \text{ m}$

$e = 0.875 + 2.75$
 $= 3.625$

Jadi
 $a + b + c + d + e = 1.625 + 10.25 + 3.25 + 0.5 + 3.625$
 $= 19.25 \text{ m}$







26. Jarak dari M. Gerinda Ke Inspeksi

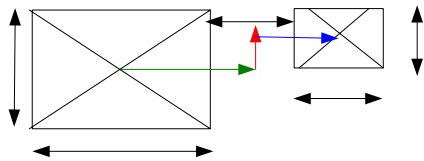
3 m

Tempat Barang Jadi

c

b a

2.5m



4 m

3 m

$$a = 1.5 + 1.25 \\ = 2.75$$

$$b = 3 - 2 \\ = 1$$

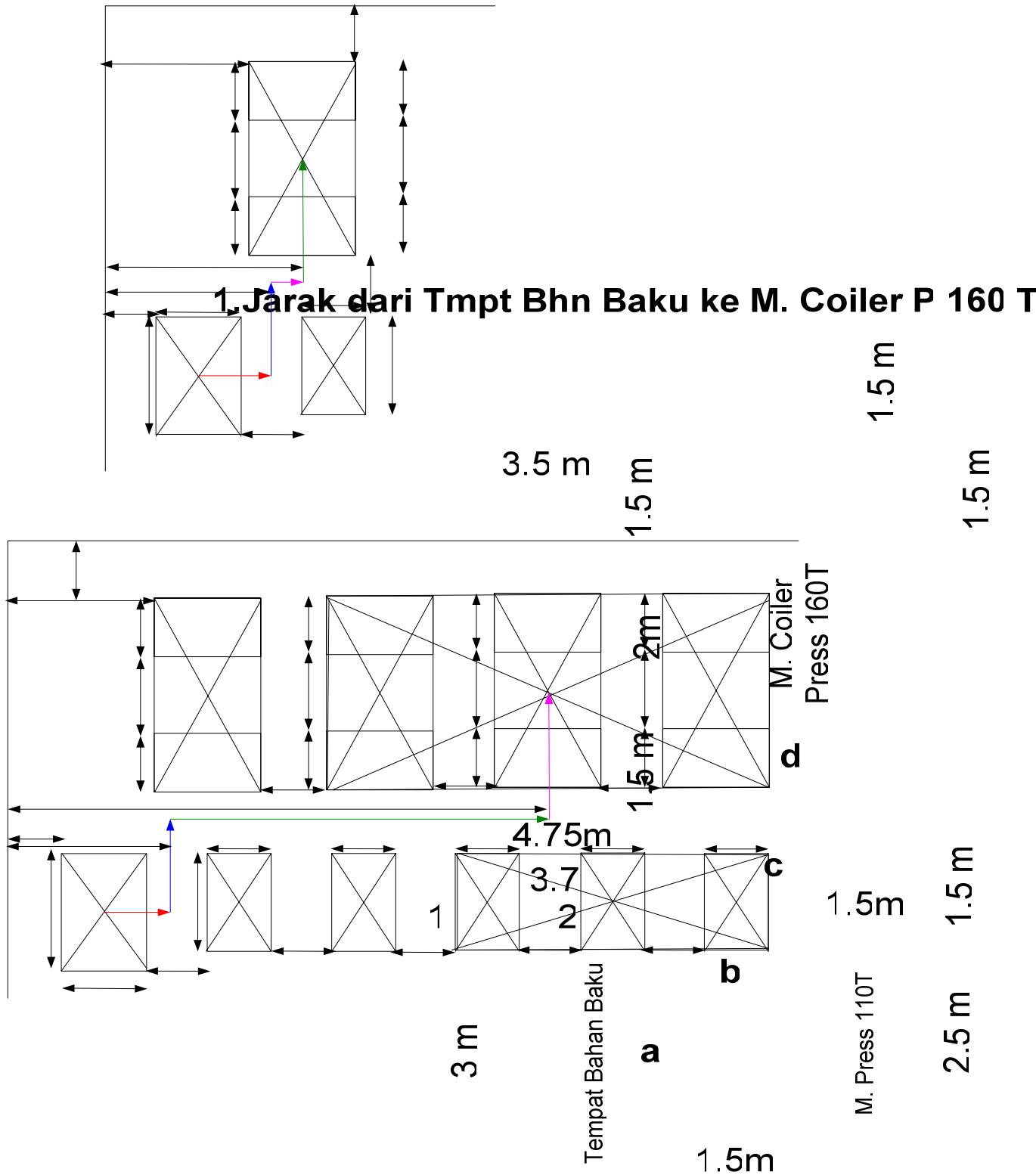
$$c = 1.25 + 2 \\ = 3.25$$

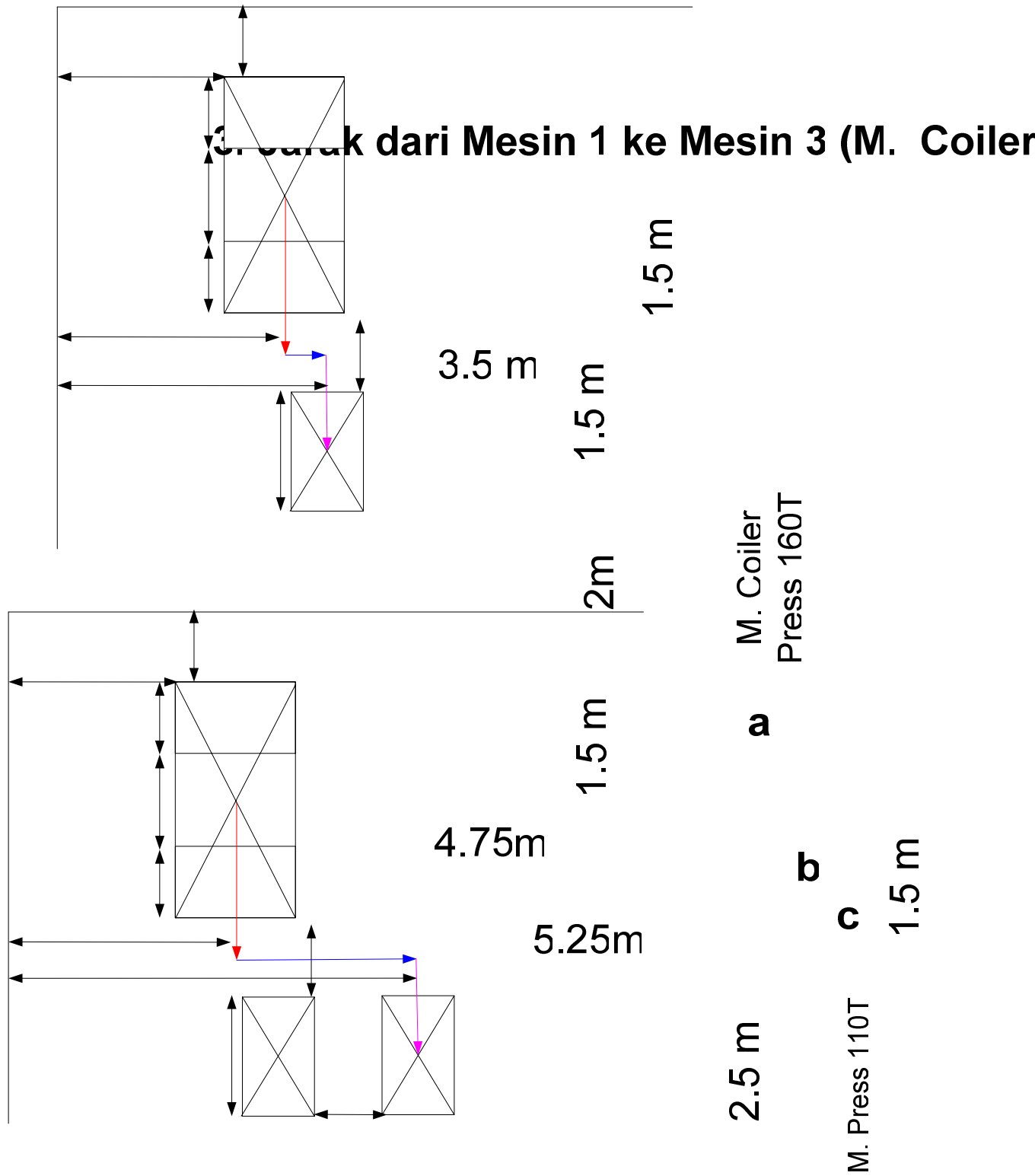
Jadi

$$a + b + c = 2.75 \\ = 7 \text{ m}$$

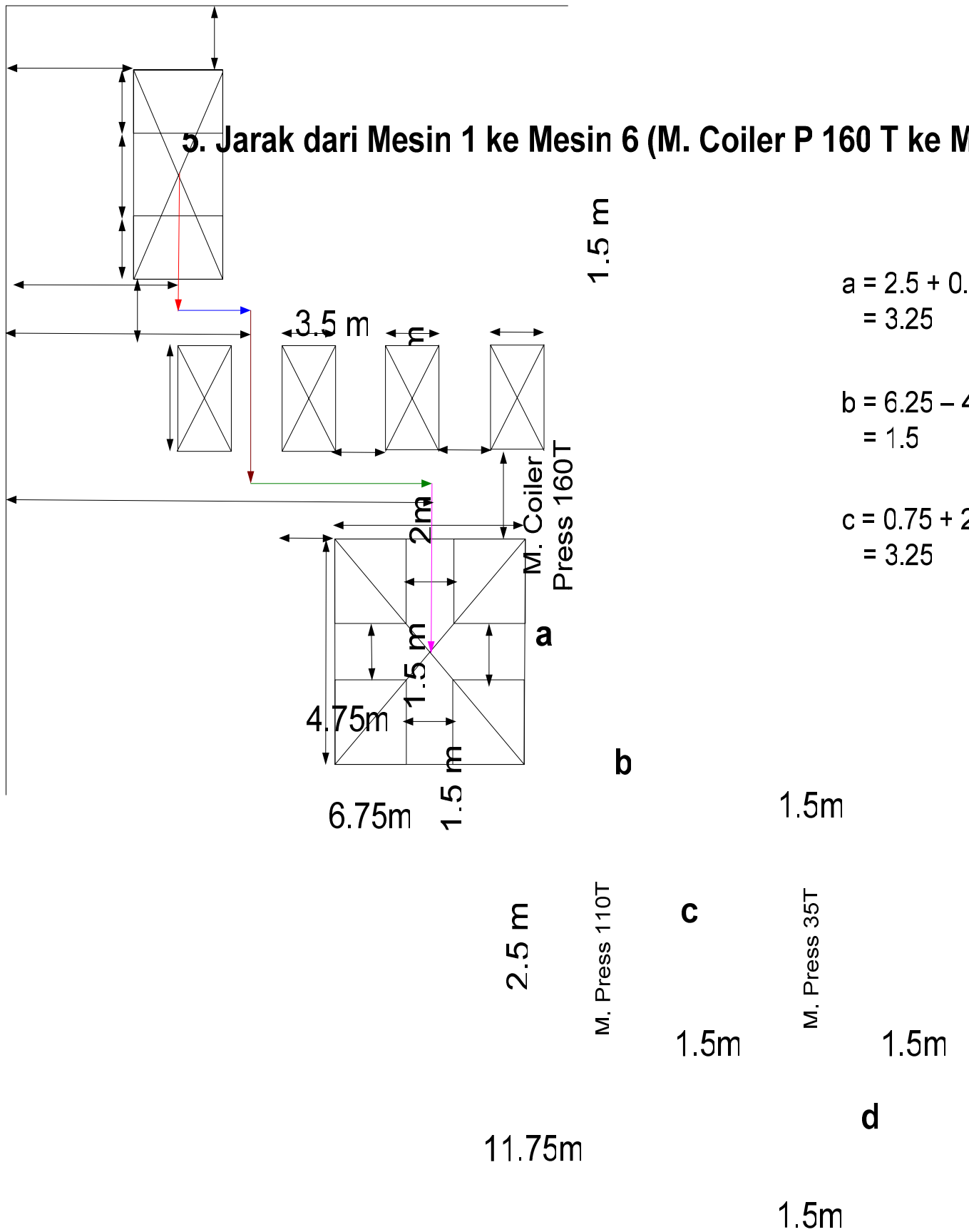
27. Jarak dari Tmpt Bhn Baku Ke M. Cuttir

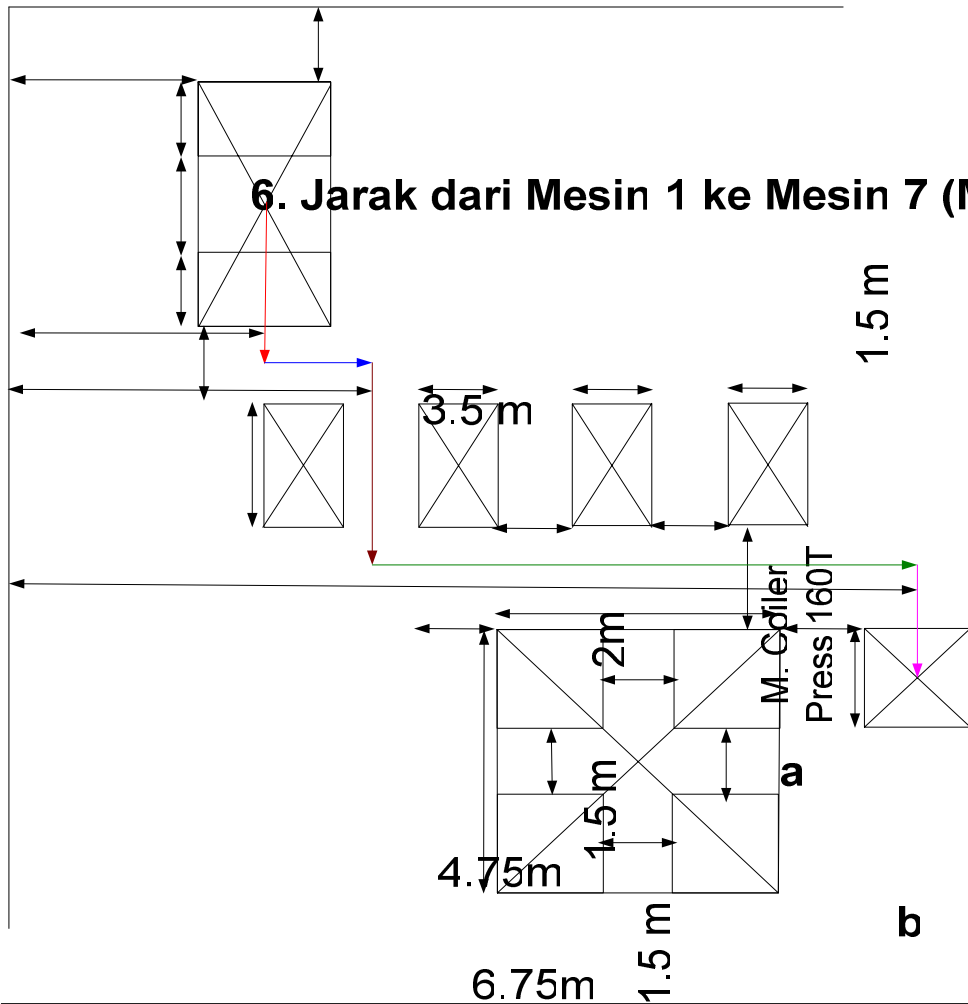
LAMPIRAN 3 PERHITUNGAN JARAK USULAN





4. Jarak dari Mesin 1 ke Mesin 5 (M. Coiler Press 160T)

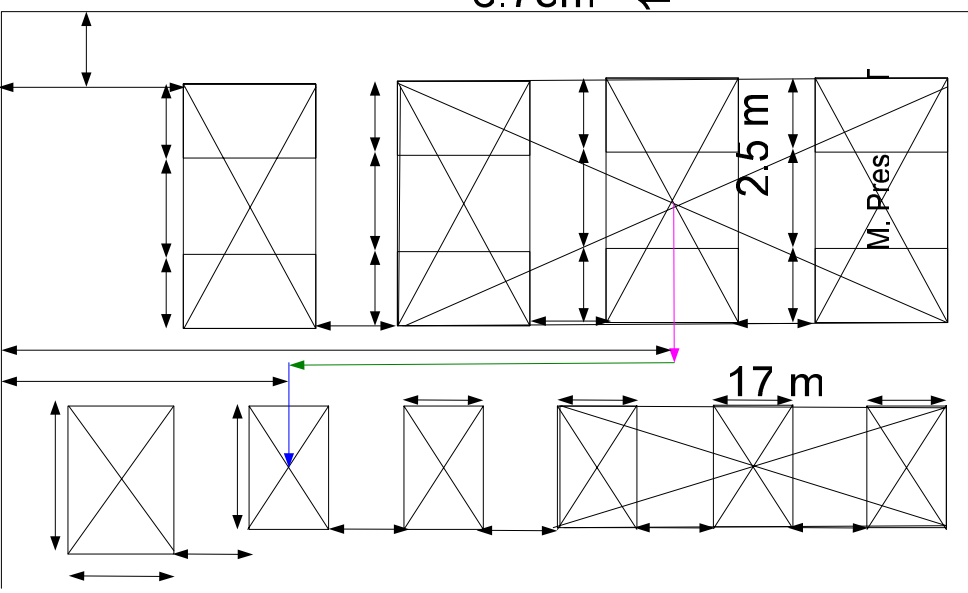




$$a = 2.5 + 0.75 = 3.25$$

$$b = 6.25 - 4.75 = 1.5$$

$$c = 0.75 + 2.5 = 3.25$$



1.5m

M. Press 35T

c
1.5m

1.5m

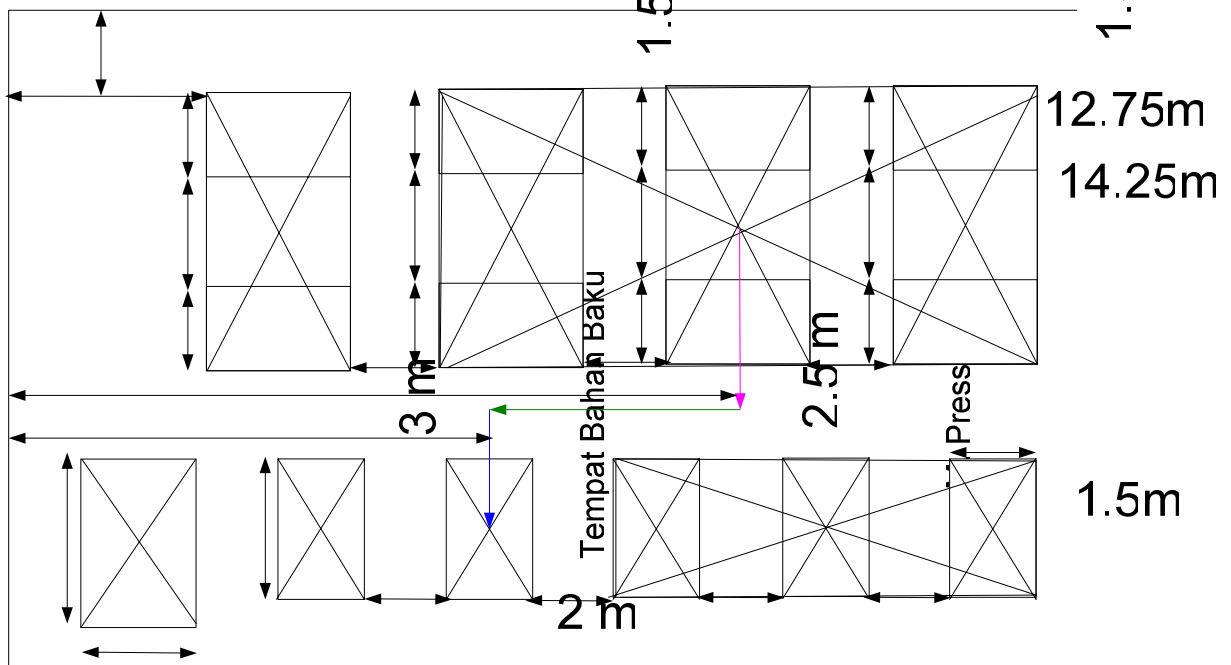
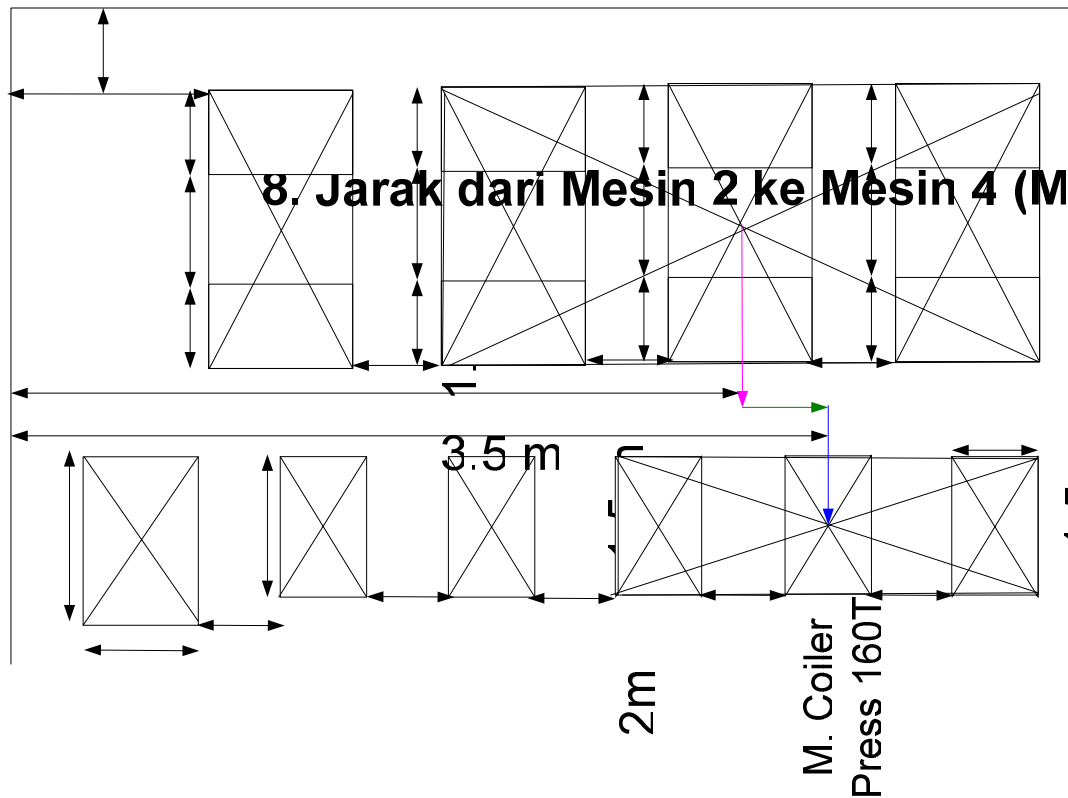
d

1.5m

Mig V

5.5 m

1.5m



$$a = 0.75 + 2.5$$

$$= 3.25$$

$$c = 0.75 + 0.75$$

$$= 1.5$$

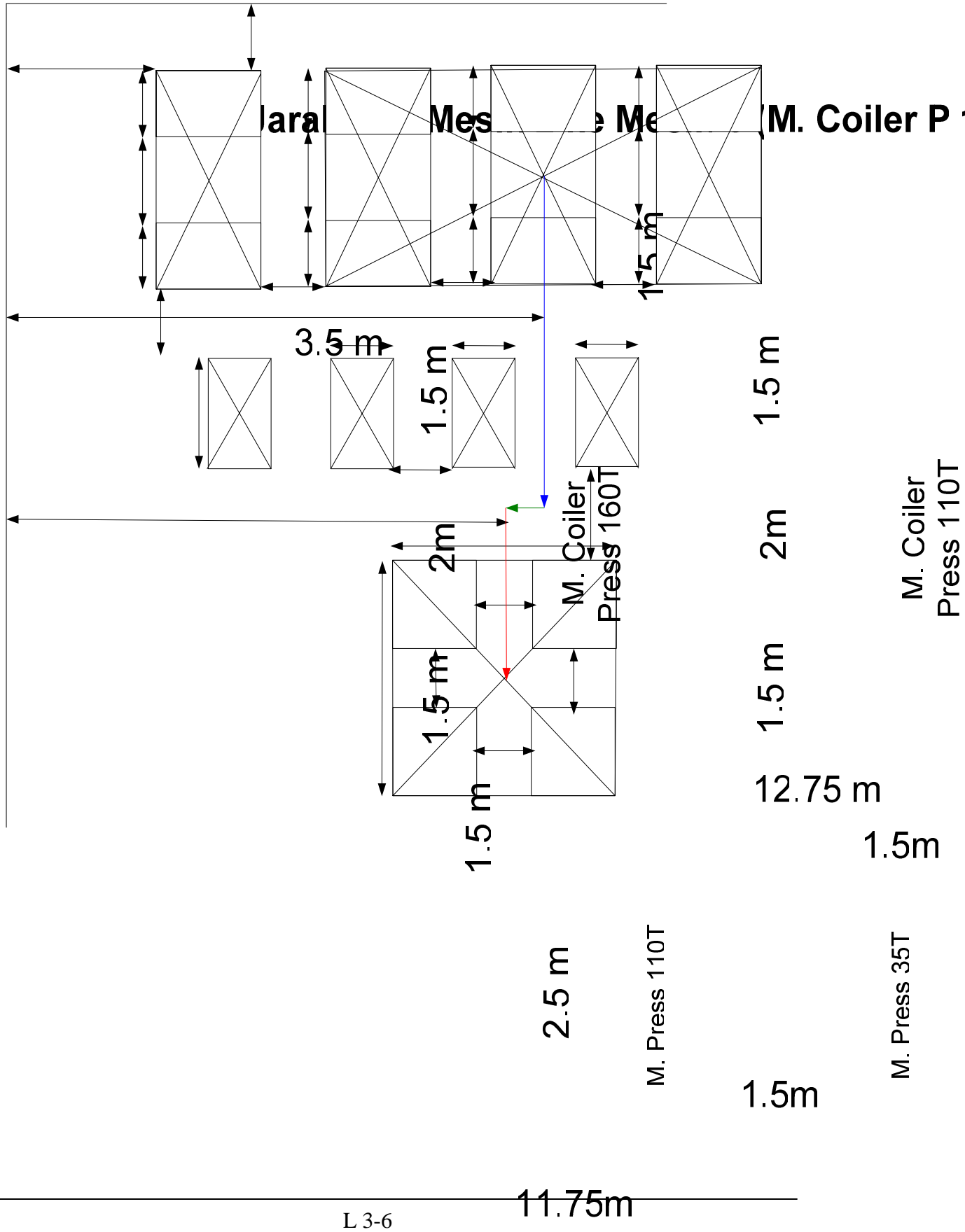
Jadi

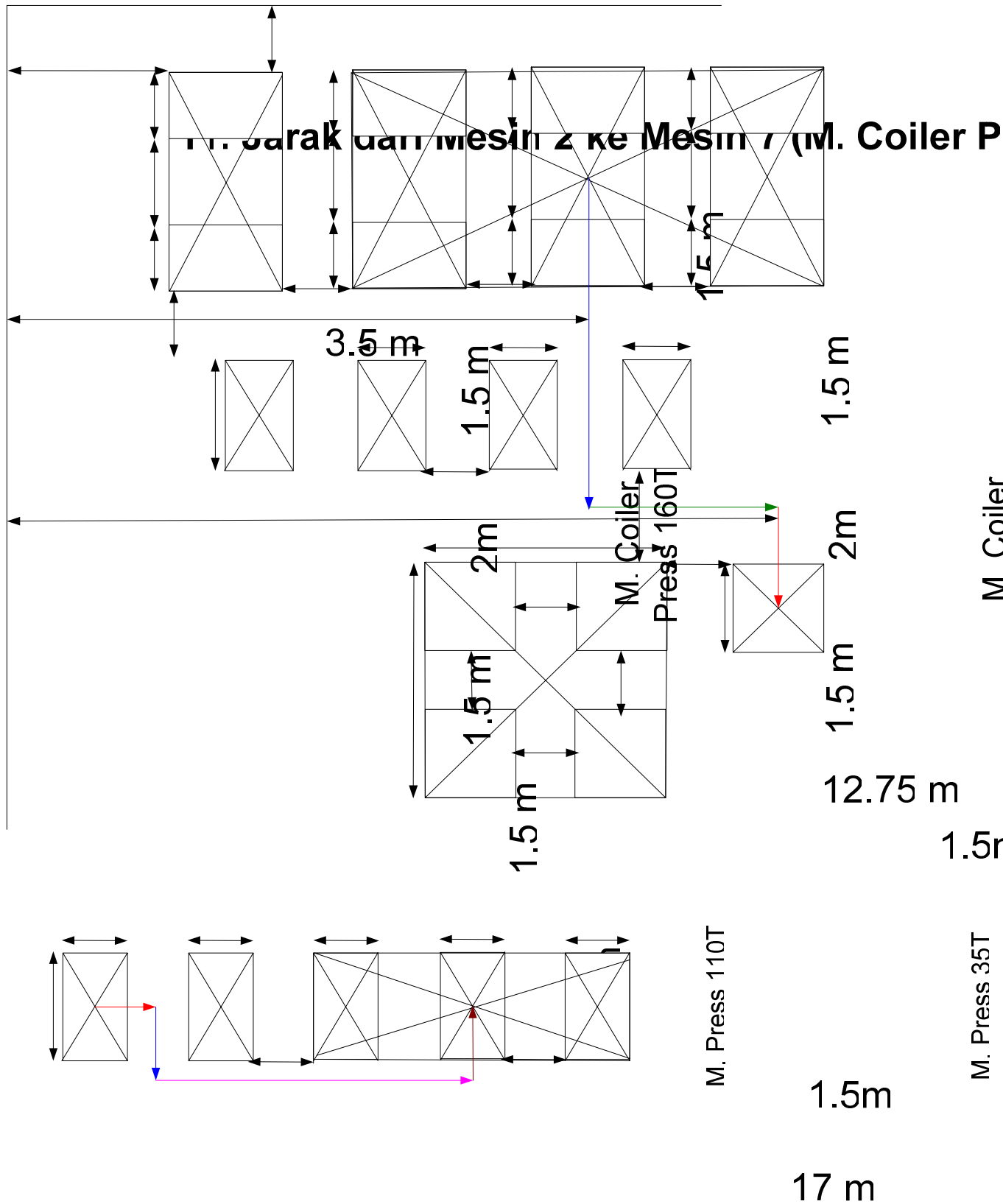
$$b_{3-5} = 14.25 - 12.75$$

$$= 1.5$$

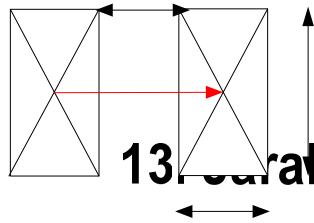
$$a + b + c = 3.25 + 1.5 + 1.5$$

$$= 6.25 \text{ m}$$



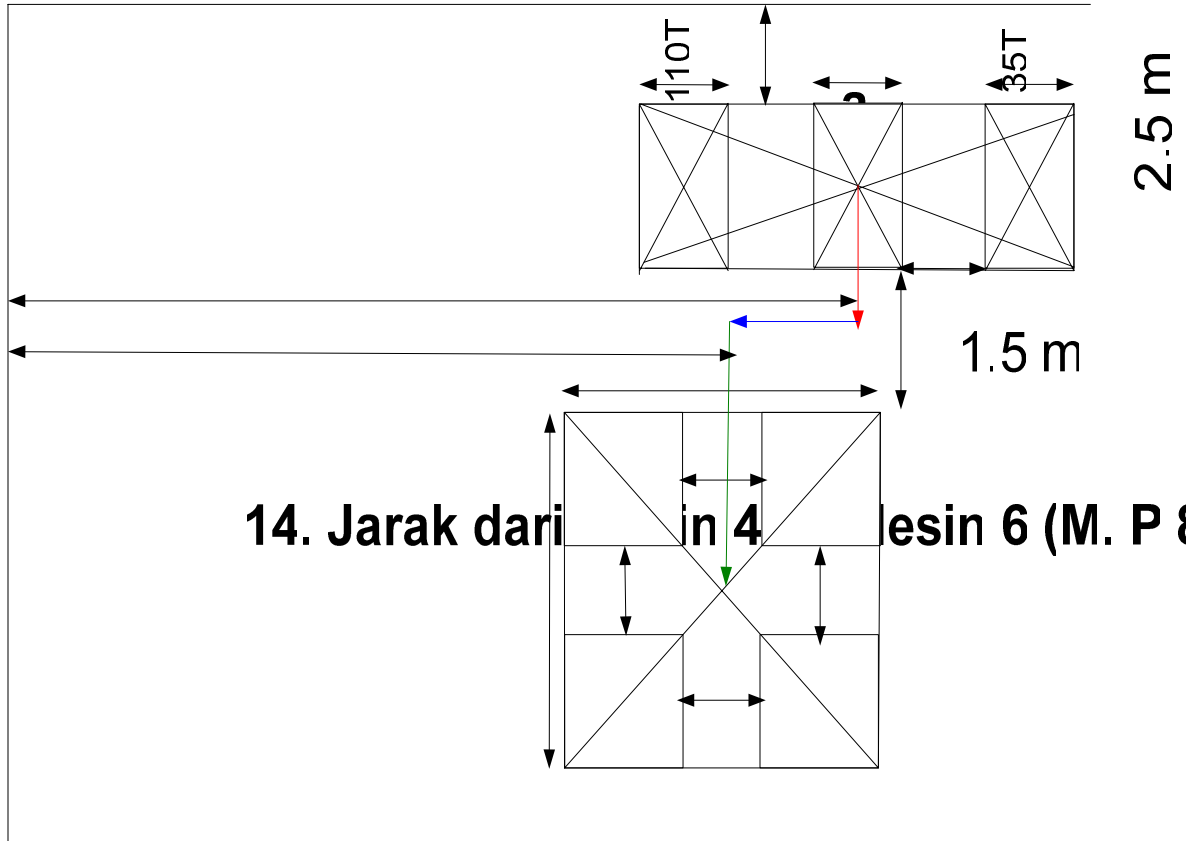


$$\begin{aligned}
 &L_{3-7} \\
 a &= 2.5 + 0.75 + 2.5 + 1 \\
 &= 6.75
 \end{aligned}$$



13. Jarak dari Mesin 3 ke Mesin 5 (M. P 110 T ke M. P 35 T)

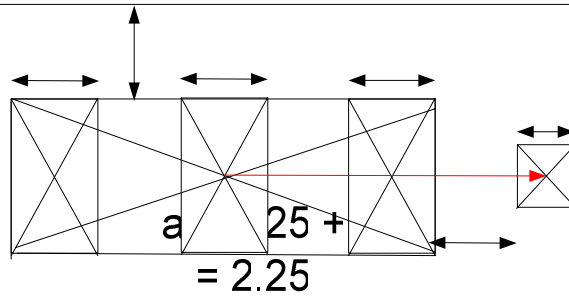
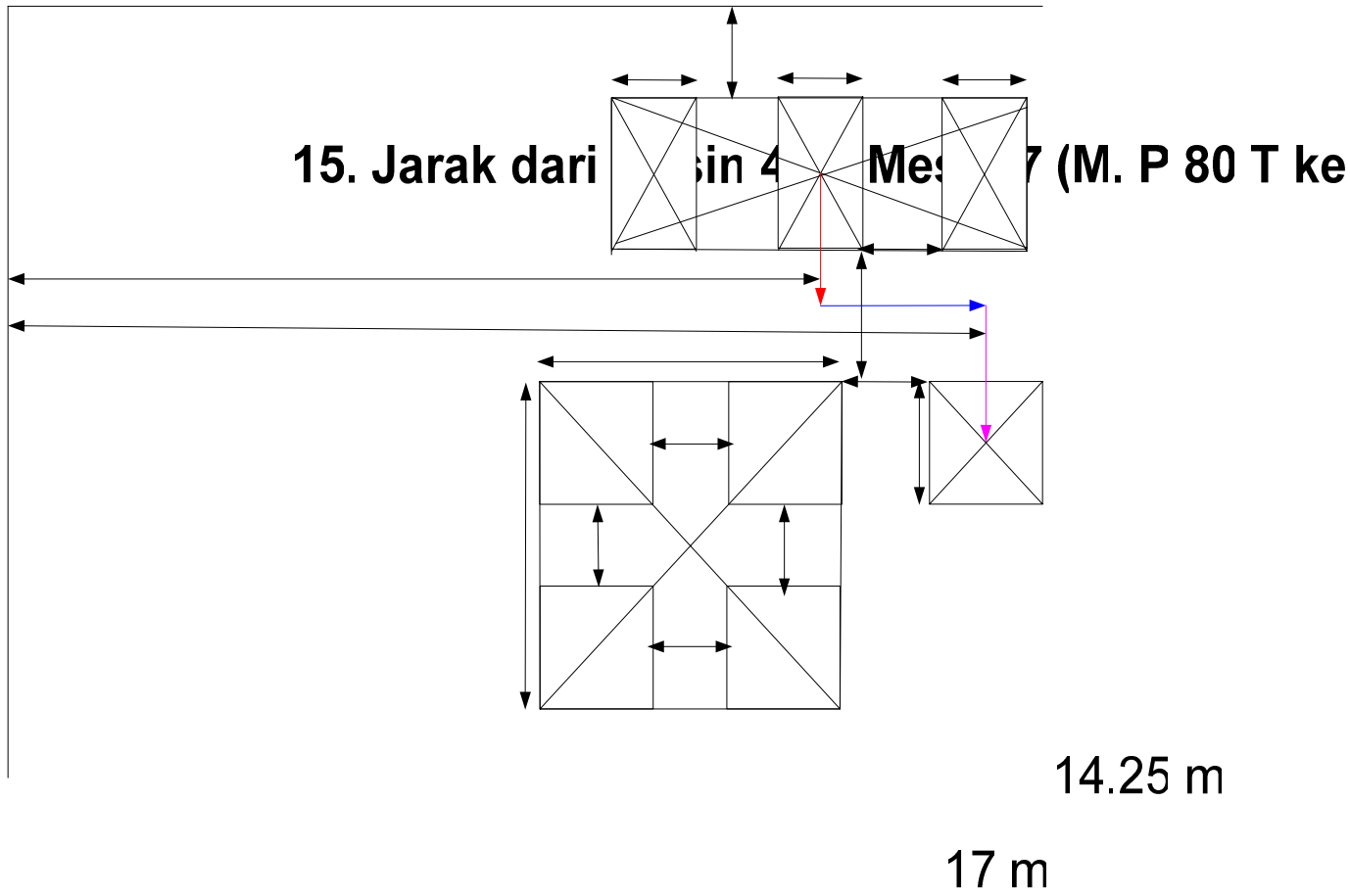
1.5 m



14. Jarak dari Mesin 4 ke Mesin 6 (M. P 80 T ke M. P 110 T)

14.25 m

11.75 m



$$b = 17 - 14.25$$

$$= 2.75$$

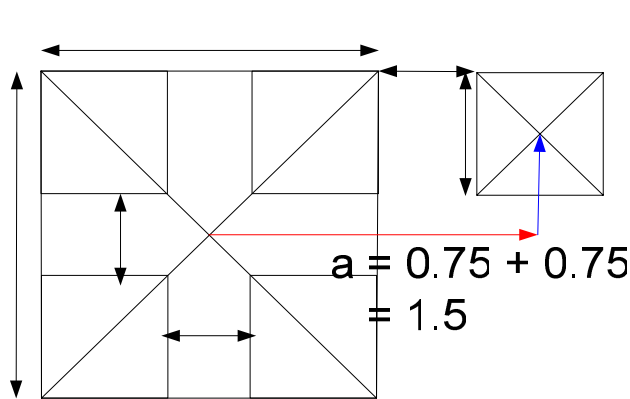
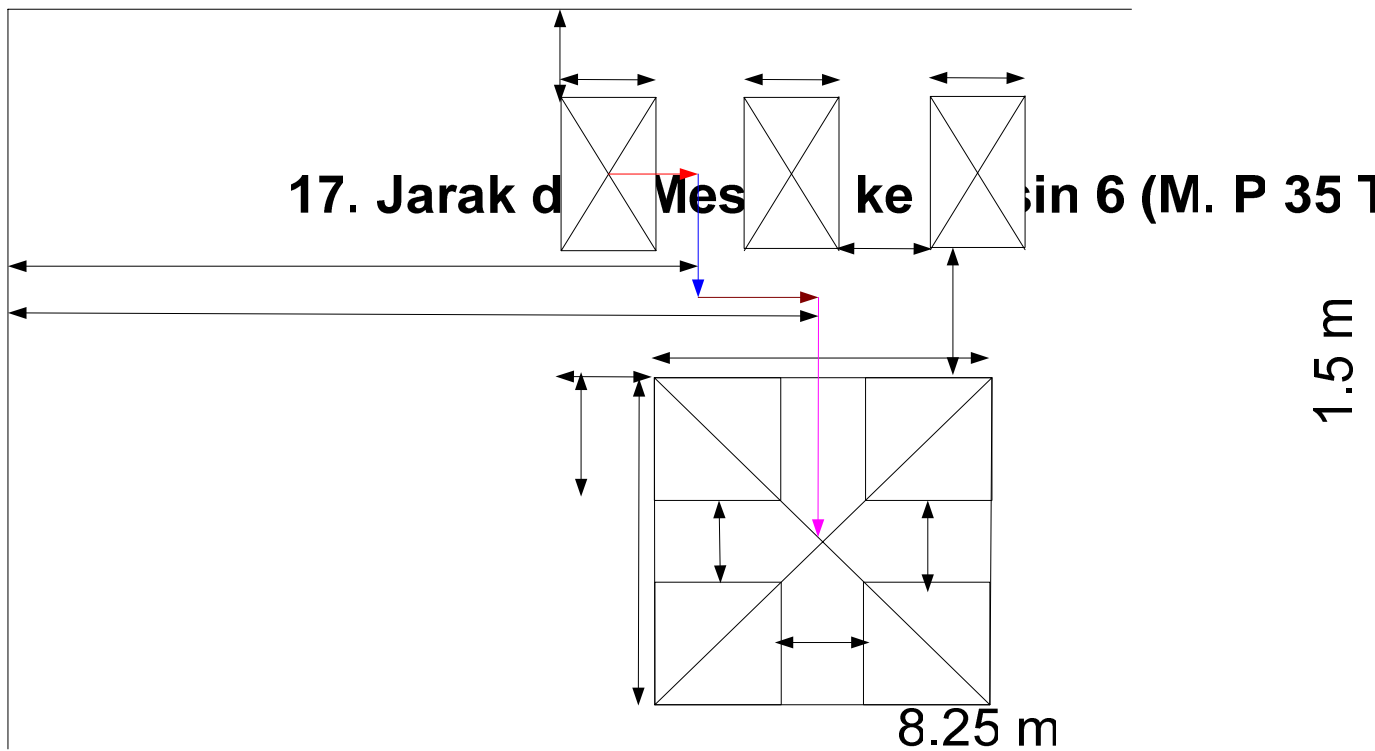
$$c = 1 + 1$$

$$= 2$$

Jadi

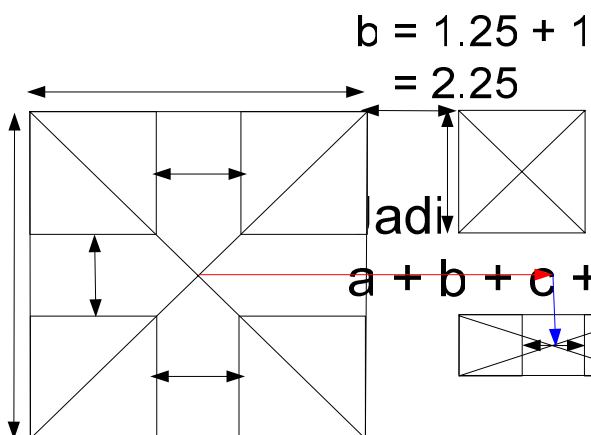
$$a + b + c = 2.25 + 2.75 + 1$$

$$= 6 \text{ m}$$



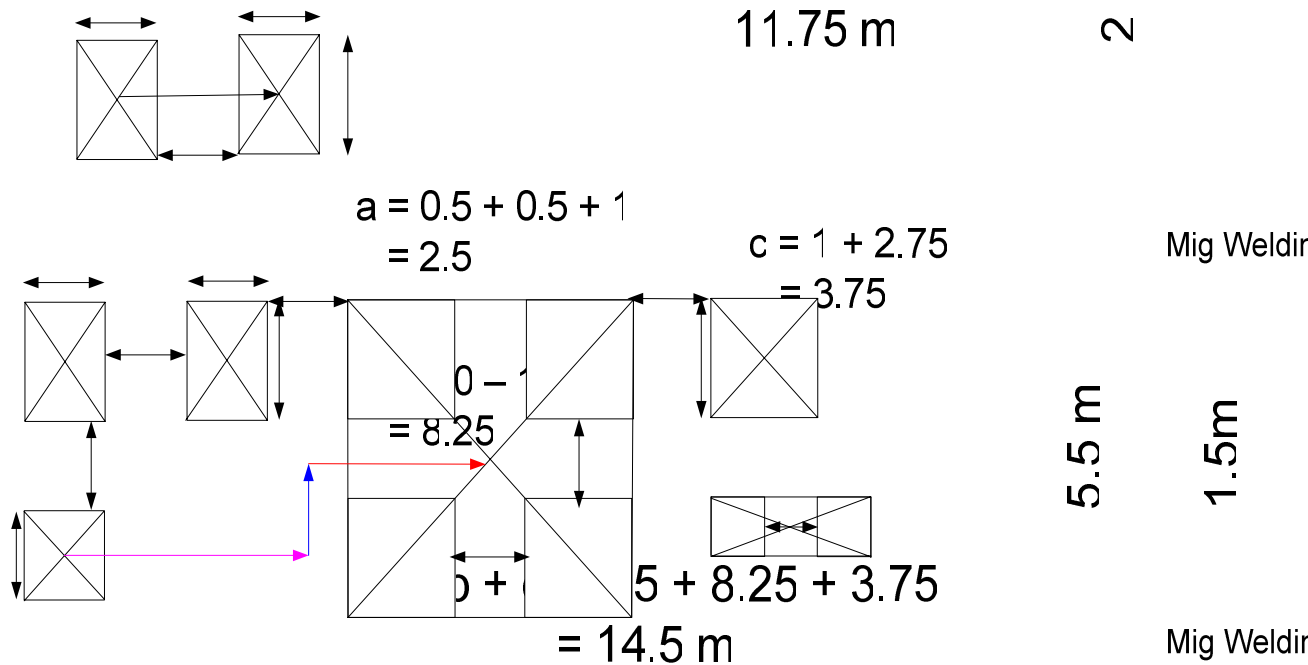
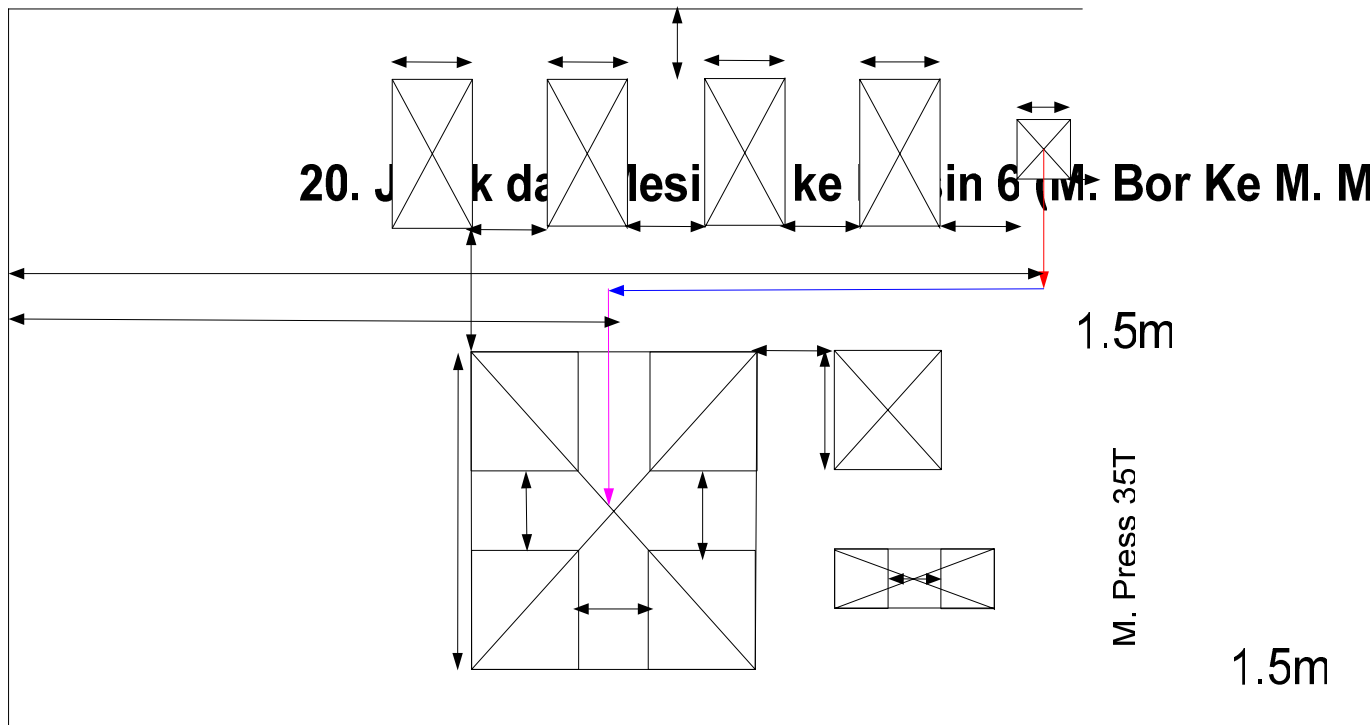
11.75 m

$c = 11.75 - 8.25 = 3.5$



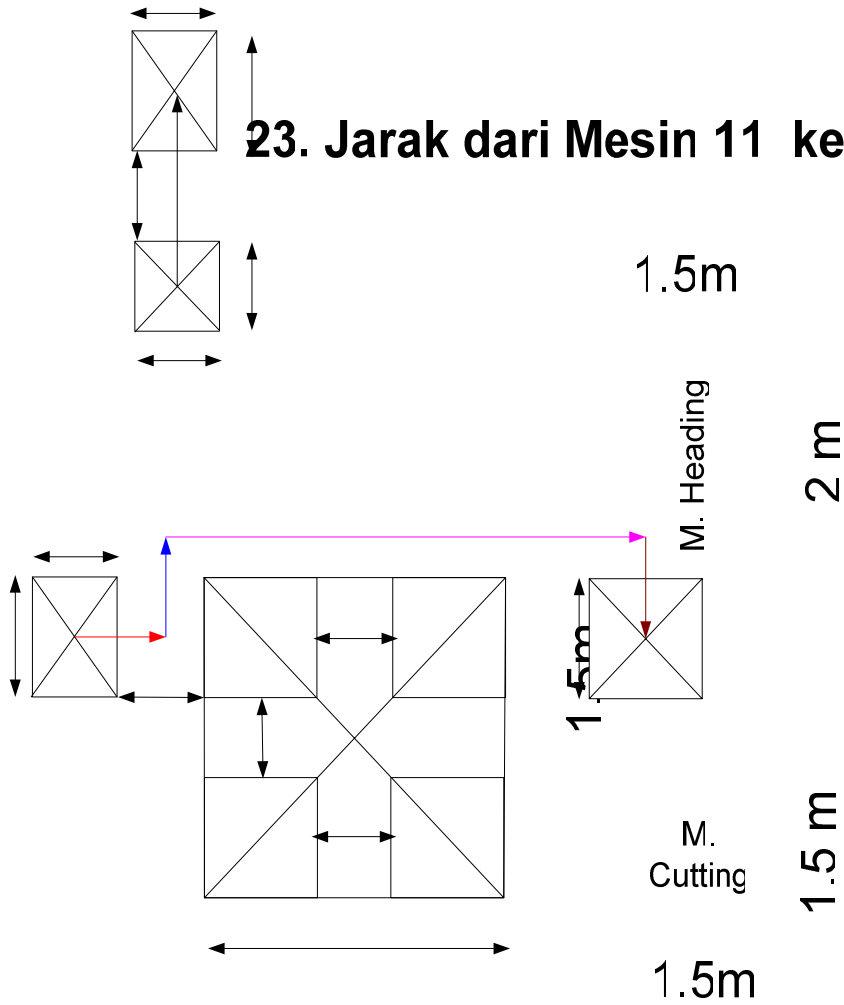
$d = 1 + 2.75 = 3.75$

$a + b + c + d = 1.5 + 2.25 + 3.5 + 3.75 = 11 \text{ m}$



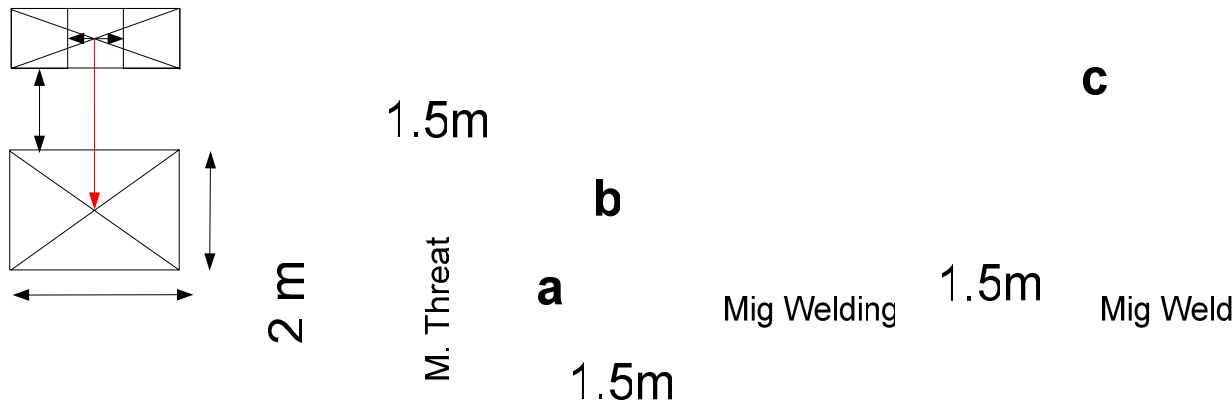
21. Jarak dari Mesin 10 ke Mesin 12 (M. Heading)

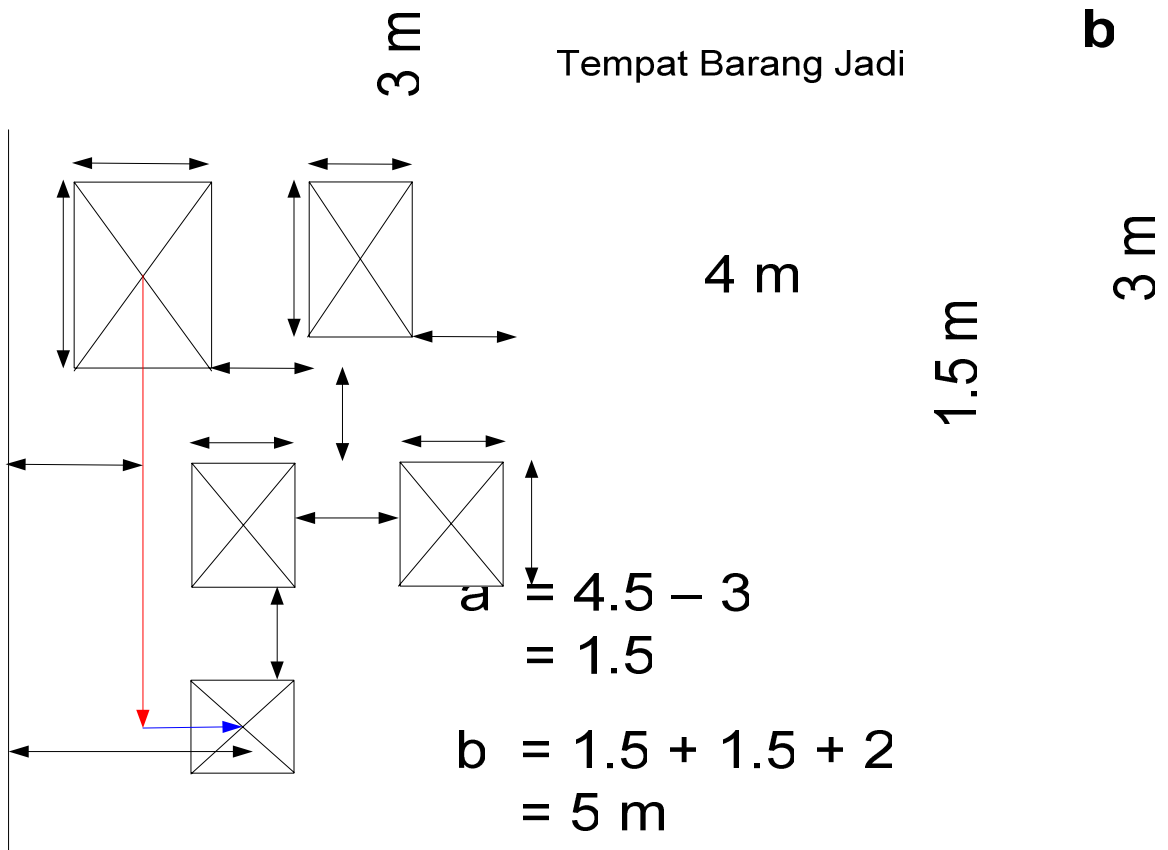
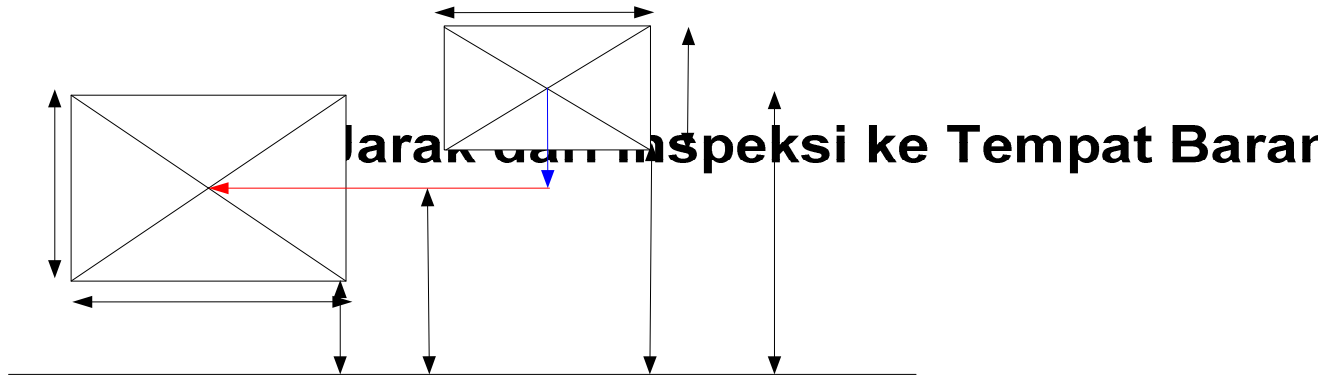
1.5 m 1.5 m



$$a = 0.75 + 1.5 + 1.5 = 3.25 \text{ m}$$

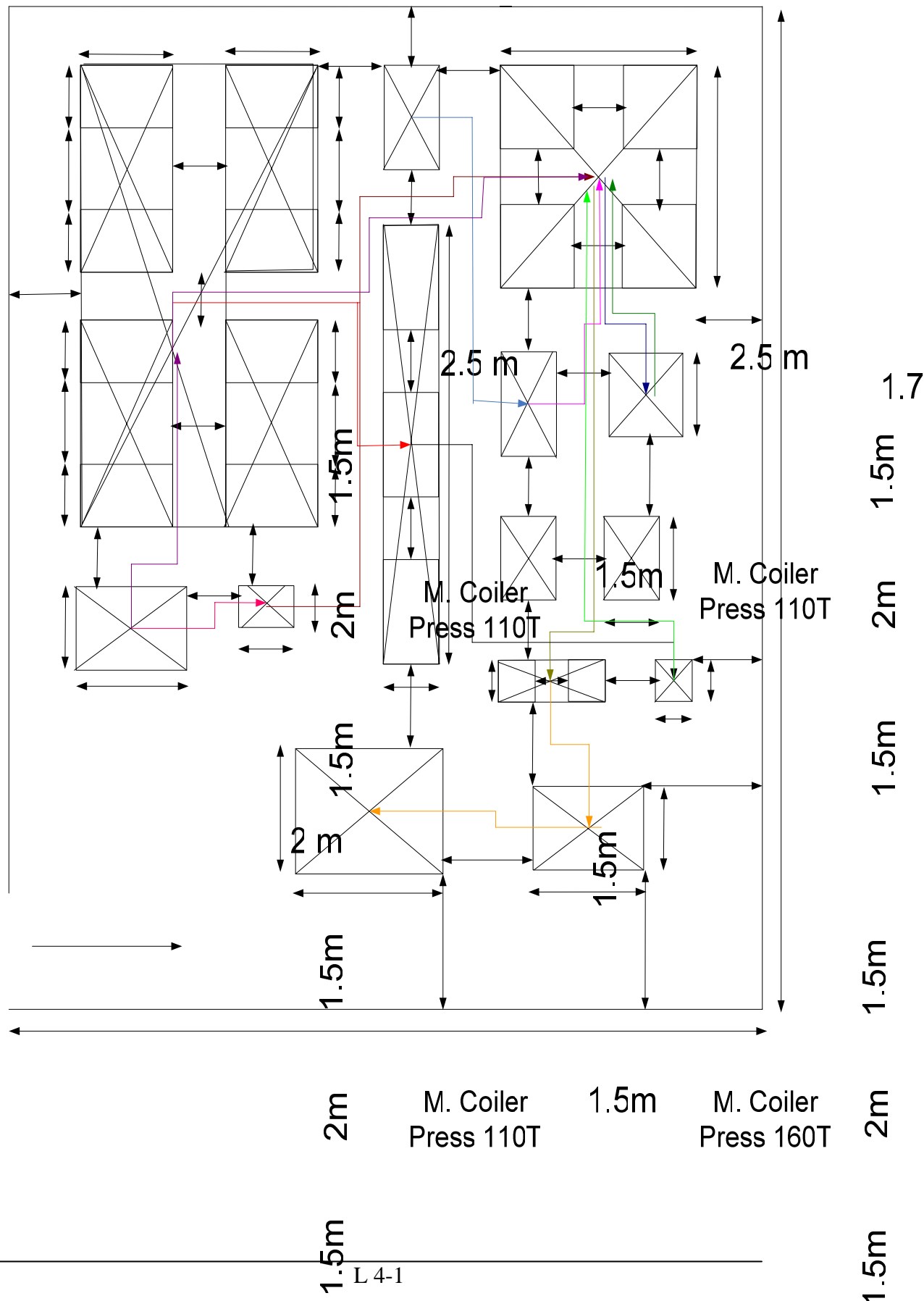
24. Jarak dari Mesin 12 ke Mesin 7 (M. Throat)



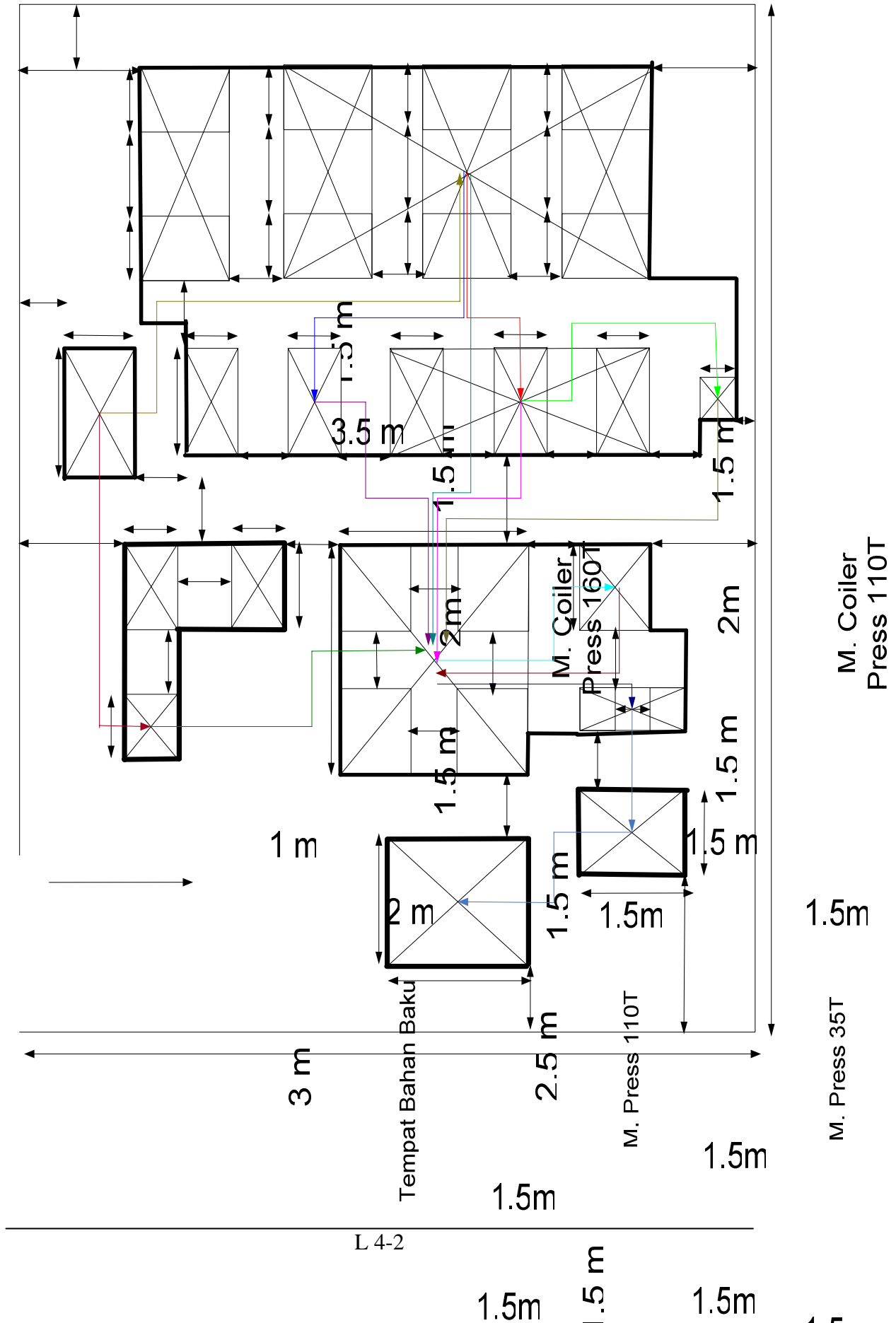


27. Jarak dari Tempat Bahan Baku ke M

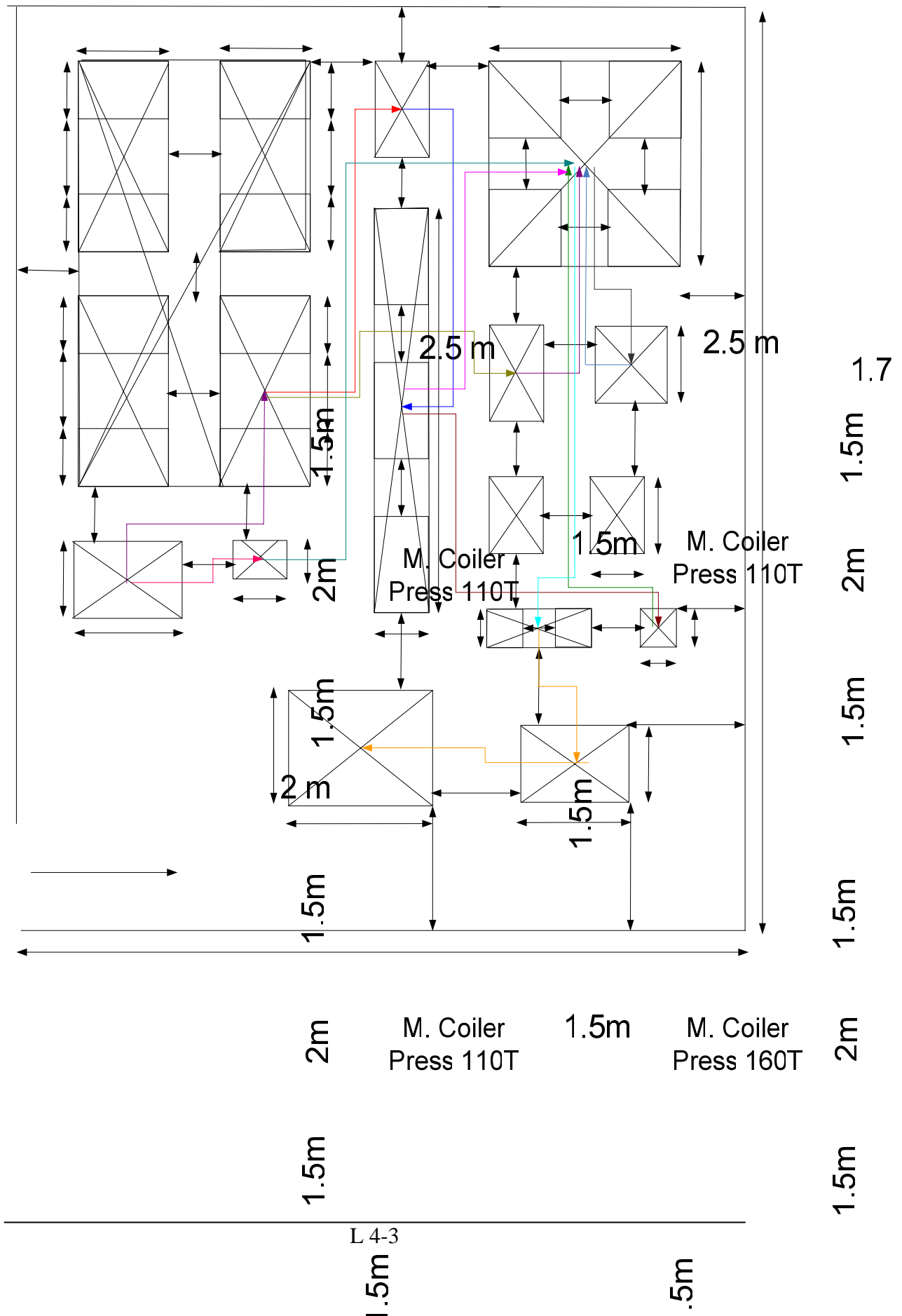
1. Aliran Material Bracket Engine NO 1 Pada Tata Letak Awal



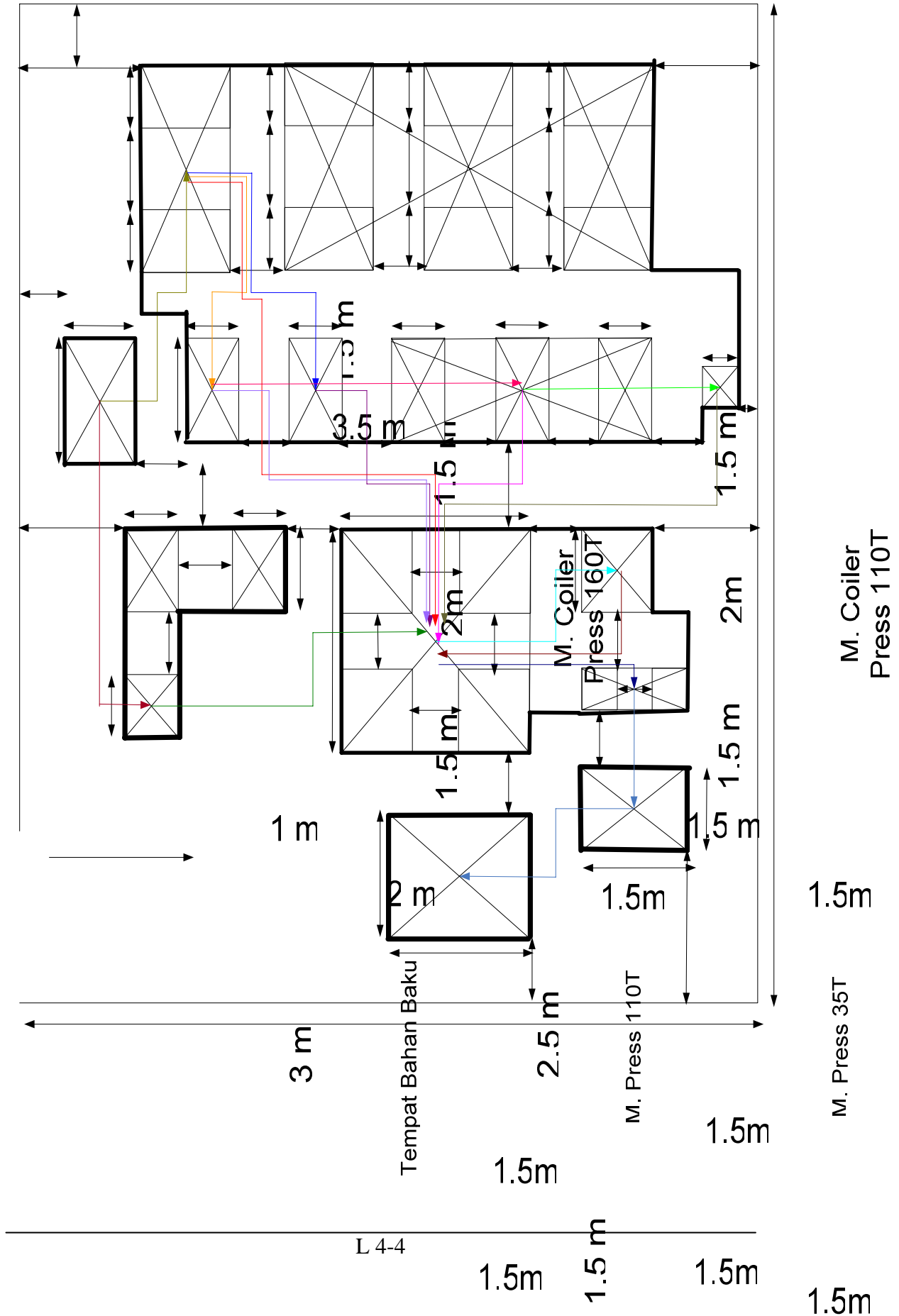
2. Aliran Material Bracket Engine NO 1 Pada Tata Letak Usulan



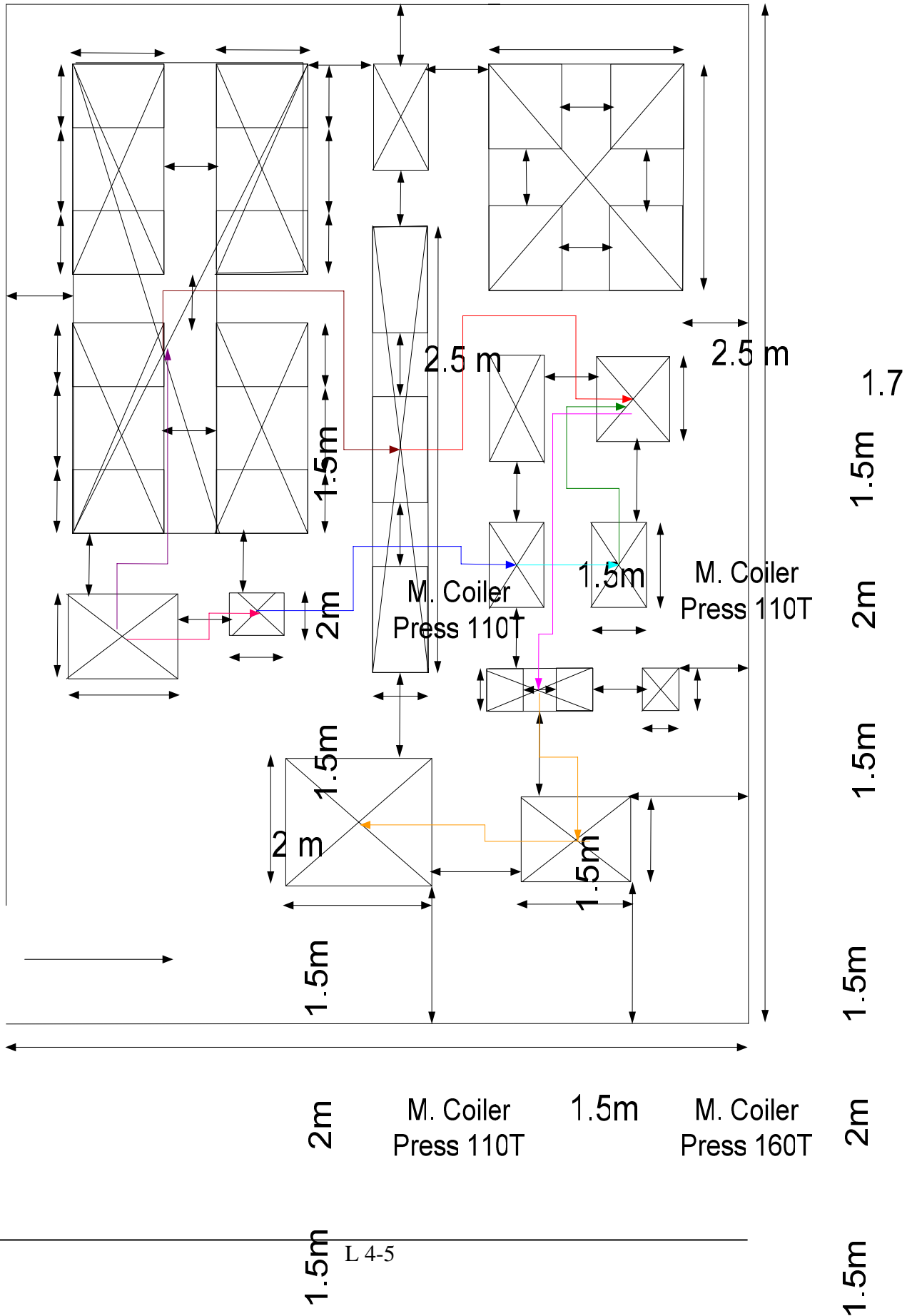
3. Aliran Material *Bracket Engine NO 2* Pada Tata Letak Awal



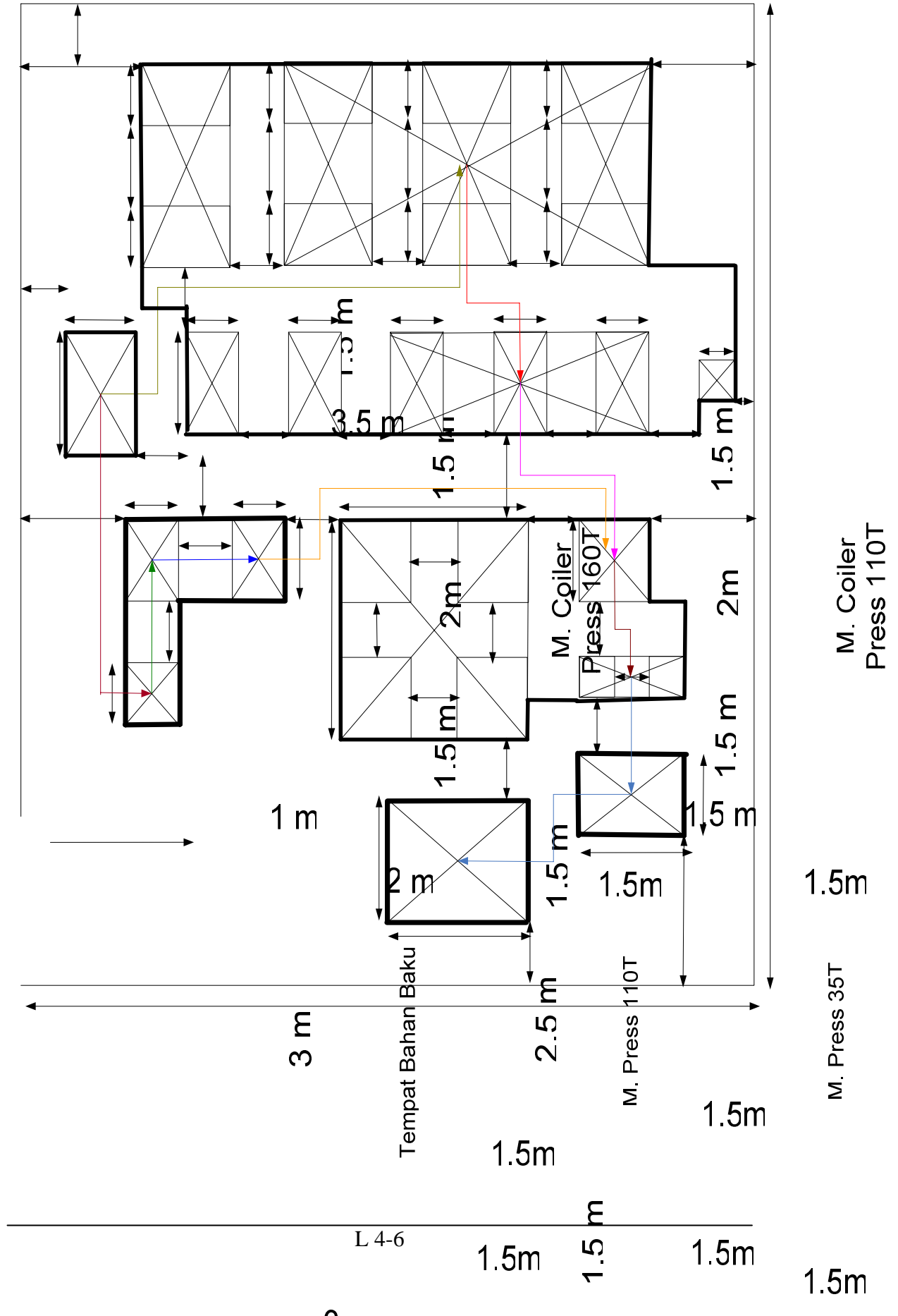
4. Gambar Aliran Material *Bracket Engine No 2* Tata Letak Usulan



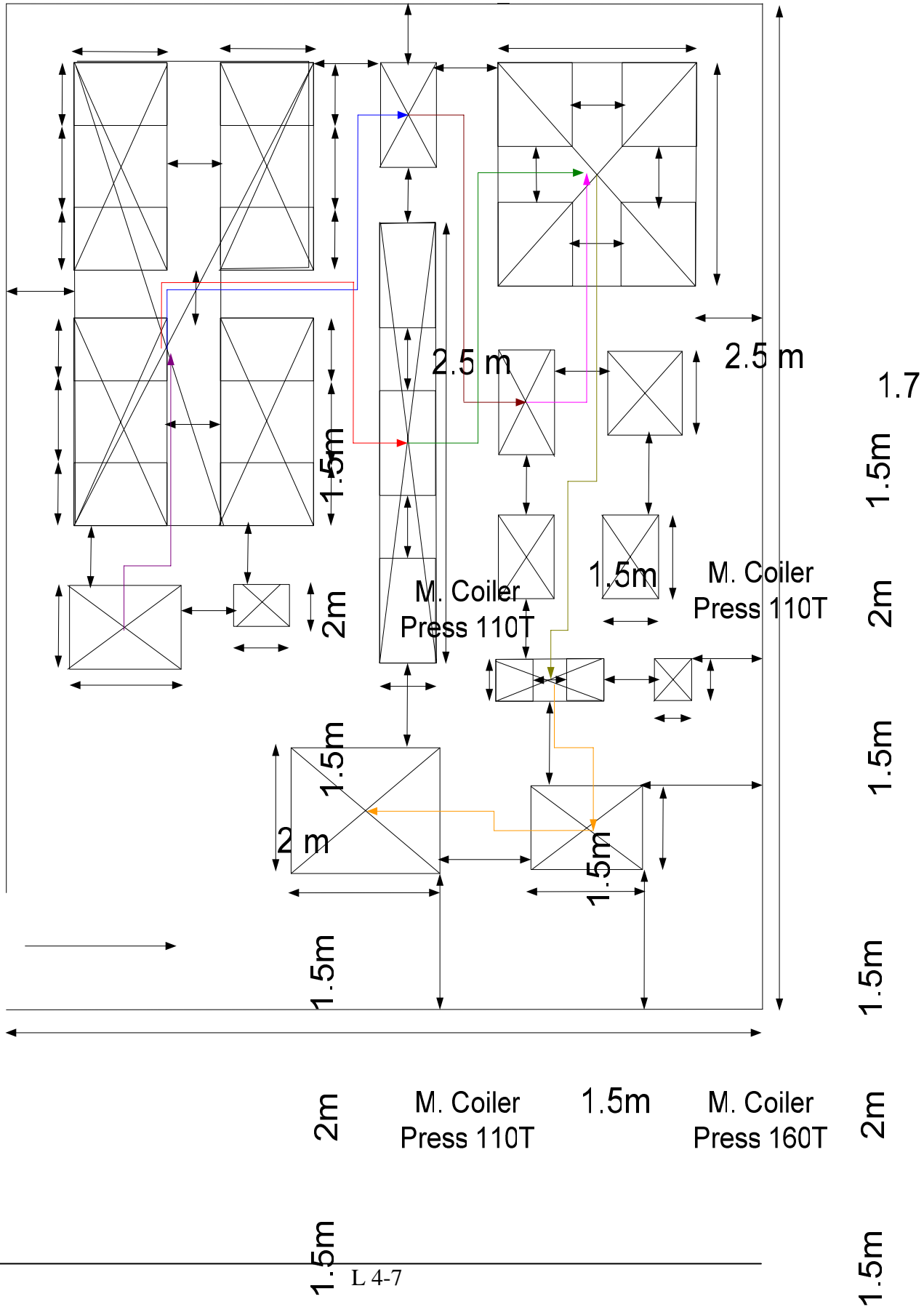
5. Aliran Material *Rod Brake* Pada Tata Letak Awal



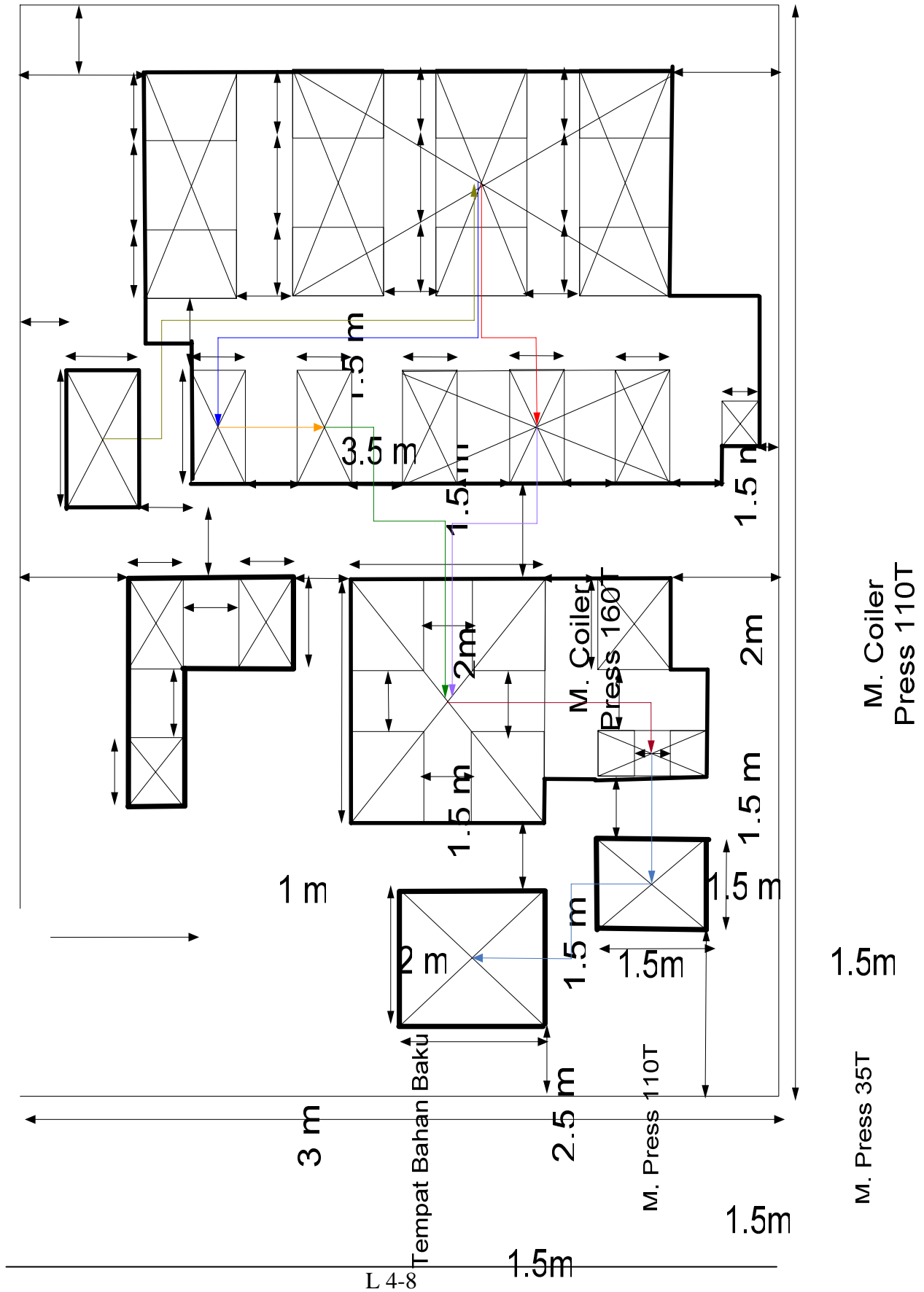
6. Aliran Material Rod Brake Pada Tata Letak Usulan



7. Aliran Material Pedal Gear Change Pada Tata Letak Awal



8. Aliran Material *Pedal Gear Change* Pada Tata Letak Usulan



**LAMPIRAN DATA WAKTU *TRANSPORT* ALAT
*MATERIAL HANDLING***

1. Operator tempat bahan baku

No	Waktu (detik/ m)
1	2.11
2	1.86
3	2
4	1.95
5	1.82
6	1.96
7	1.98
8	1.75
9	1.8
10	2.01
11	1.92
12	1.62
13	2.05
14	1.73
15	1.88
16	1.97
17	2.09
18	1.89
19	1.83
20	2.05
21	2.1
22	1.8
23	1.74
24	1.85
25	1.71
26	1.77
27	1.79
28	1.86
29	1.94
30	2.04
31	1.97
32	1.88
33	1.92
34	2
35	1.95
36	2.03
$\bar{x} =$	1.906

2. Operator M. Coiler P160T

No	Waktu (detik/ m)
1	1.98
2	1.69
3	2.1
4	1.74
5	1.7
6	1.98
7	2
8	2.15
9	1.96
10	1.88
11	1.68
12	1.84
13	1.77
14	2.05
15	1.92
16	1.66
17	1.68
18	1.69
19	1.87
20	1.85
21	1.79
22	1.8
23	1.91
24	1.7
25	2
26	1.98
27	1.87
28	1.81
29	2.1
30	1.79
31	1.88
32	2.19
33	1.67
34	1.85
35	1.68
36	1.91
$\bar{x} =$	1.864

3. Operator ke-1 M. Coiler P110T

No	Waktu (detik/ m)
1	2.2
2	2.05
3	2.01
4	2.12
5	1.99
6	1.87
7	2.09
8	1.88
9	1.98
10	2.19
11	2.11
12	2.23
13	2.17
14	1.87
15	1.96
16	1.85
17	1.88
18	1.79
19	1.8
20	1.92
21	1.81
22	2.06
23	1.97
24	1.89
25	1.86
26	2
27	1.86
28	2.07
29	2.16
30	2.01
31	1.98
32	1.87
33	1.88
34	1.75
35	1.79
36	1.95
- x =	1.969

4. Operator ke-2 M. Coiler P110T

No	Waktu (detik/ m)
1	2.07
2	2.21
3	2
4	2.09
5	2.15
6	1.99
7	1.85
8	1.98
9	2
10	1.97
11	1.79
12	2.05
13	2.12
14	2.15
15	2.03
16	1.9
17	1.79
18	1.88
19	1.86
20	1.99
21	2.02
22	2.04
23	2.1
24	1.85
25	1.89
26	1.92
27	2
28	2.06
29	2.1
30	1.95
31	2.07
32	2.15
33	2.02
34	1.97
35	2.04
36	1.85
- x =	1.997

5. Operator ke-3 M. Coiler P110T

No	Waktu (detik/ m)
1	1.66
2	1.68
3	1.71
4	1.69
5	1.84
6	1.81
7	1.69
8	1.72
9	1.78
10	1.91
11	1.84
12	1.68
13	1.9
14	1.86
15	2.01
16	1.69
17	1.71
18	1.82
19	1.81
20	1.73
21	1.91
22	1.86
23	1.81
24	1.85
25	1.91
26	1.61
27	1.64
28	1.68
29	1.9
30	1.85
31	1.82
32	1.73
33	1.61
34	1.89
35	1.88
36	1.71
$\bar{x} =$	1.783

6. Operator M. P 110T

No	Waktu (detik/ m)
1	1.87
2	1.86
3	1.84
4	1.92
5	1.87
6	1.72
7	1.99
8	2.05
9	1.92
10	2.05
11	1.89
12	1.81
13	1.76
14	1.79
15	1.83
16	1.84
17	1.92
18	1.77
19	1.86
20	1.85
21	1.95
22	2
23	1.78
24	1.91
25	1.87
26	1.88
27	1.91
28	1.84
29	1.67
30	1.79
31	1.77
32	2.12
33	2.03
34	1.97
35	1.68
36	1.91
$\bar{x} =$	1.875

7. Operator ke-1 M. P 80T

No	Waktu (detik/ m)
1	1.76
2	1.86
3	1.91
4	1.84
5	1.97
6	2.06
7	2.12
8	2.2
9	2.09
10	1.79
11	2.04
12	2.06
13	1.99
14	1.95
15	1.86
16	2.06
17	2.05
18	1.98
19	1.87
20	1.86
21	1.97
22	2.05
23	2.04
24	1.88
25	1.75
26	1.86
27	1.84
28	1.91
29	1.73
30	1.76
31	1.84
32	1.79
33	1.78
34	1.96
35	1.81
36	1.67
$\bar{x} =$	1.916

8. Operator ke-2 M. P 80T

No	Waktu (detik/ m)
1	1.65
2	1.71
3	1.59
4	1.84
5	1.68
6	1.58
7	1.71
8	1.7
9	1.69
10	1.68
11	1.67
12	1.8
13	1.77
14	1.72
15	1.73
16	1.68
17	1.69
18	1.81
19	1.73
20	1.79
21	1.65
22	1.62
23	1.72
24	1.71
25	1.77
26	1.82
27	1.62
28	1.67
29	1.81
30	1.83
31	1.62
32	1.81
33	1.77
34	1.76
35	1.87
36	1.76
$\bar{x} =$	1.723

9. Operator ke-3 M. P 80T

No	Waktu (detik/ m)
1	1.69
2	1.79
3	1.86
4	1.84
5	1.85
6	1.91
7	1.87
8	1.69
9	1.67
10	1.92
11	1.8
12	1.84
13	1.85
14	1.82
15	1.69
16	1.72
17	1.81
18	1.73
19	1.84
20	1.75
21	1.84
22	1.86
23	1.78
24	1.89
25	1.68
26	1.67
27	1.88
28	1.65
29	1.69
30	1.87
31	1.75
32	1.79
33	1.68
34	1.75
35	1.72
36	1.9
$\bar{x} =$	1.787

10. Operator M. P 35 T

No	Waktu (detik/ m)
1	1.97
2	1.81
3	1.87
4	1.83
5	1.82
6	1.81
7	1.78
8	1.99
9	1.91
10	1.87
11	1.9
12	2.05
13	1.99
14	1.81
15	1.69
16	1.87
17	1.99
18	1.87
19	1.85
20	1.84
21	1.86
22	1.92
23	2
24	1.87
25	1.82
26	1.78
27	1.86
28	1.84
29	1.92
30	1.81
31	2.06
32	1.67
33	1.73
34	1.75
35	1.82
36	1.81
$\bar{x} =$	1.862

11. Operator ke-1 M. Mig Welding

No	Waktu (detik/ m)
1	1.86
2	1.99
3	2.02
4	2.22
5	2.06
6	2.12
7	2.15
8	2.27
9	2.17
10	2.2
11	2.01
12	1.98
13	1.87
14	2.03
15	2.01
16	1.98
17	1.95
18	1.89
19	2.05
20	2.19
21	2.01
22	2.07
23	2.1
24	1.92
25	2.2
26	2.12
27	1.98
28	1.95
29	1.85
30	1.89
31	1.79
32	2.05
33	1.86
34	1.95
35	1.97
36	1.87
$\bar{x} =$	2.017

12. Operator ke-2 M. Mig Welding

No	Waktu (detik/ m)
1	1.79
2	1.86
3	1.82
4	1.79
5	1.76
6	1.75
7	1.84
8	1.92
9	1.82
10	1.87
11	1.79
12	1.76
13	1.91
14	1.85
15	1.84
16	1.75
17	1.95
18	1.87
19	1.86
20	1.92
21	1.79
22	1.76
23	1.93
24	1.91
25	1.76
26	1.82
27	1.87
28	1.73
29	1.9
30	1.88
31	1.87
32	1.71
33	1.76
34	1.88
35	2
36	1.77
$\bar{x} =$	1.835

13. Operator ke-3 M. Mig Welding

No	Waktu (detik/ m)
1	2.03
2	2.2
3	2.1
4	1.99
5	2.07
6	1.89
7	2.02
8	2.07
9	1.95
10	1.93
11	2.05
12	2.13
13	2.25
14	1.99
15	1.87
16	2.02
17	2.23
18	2.08
19	1.96
20	1.87
21	1.86
22	1.85
23	1.99
24	1.97
25	2.2
26	1.87
27	1.98
28	1.93
29	1.97
30	1.96
31	1.87
32	2.04
33	1.99
34	2.05
35	1.84
36	1.96
$\bar{x} =$	2.001

14. Operator ke-4 M. Mig Welding

No	Waktu (detik/ m)
1	1.7
2	1.87
3	1.71
4	1.68
5	1.1
6	1.64
7	1.65
8	1.8
9	1.54
10	1.56
11	1.89
12	1.58
13	1.7
14	1.65
15	1.69
16	1.82
17	2.06
18	2.04
19	2.08
20	2.07
21	2.12
22	1.7
23	1.68
24	1.67
25	1.82
26	1.73
27	1.82
28	1.91
29	2
30	1.57
31	1.86
32	1.85
33	1.81
34	1.79
35	1.6
36	1.69
$\bar{x} =$	1.763

15. Operator M. Spot Welding

No	Waktu (detik/ m)
1	1.55
2	1.56
3	1.71
4	1.56
5	1.59
6	1.61
7	1.68
8	1.63
9	1.57
10	1.58
11	1.61
12	1.57
13	1.6
14	1.64
15	1.72
16	1.73
17	1.54
18	1.59
19	1.66
20	1.71
21	1.61
22	1.65
23	1.71
24	1.6
25	1.72
26	1.65
27	1.54
28	1.59
29	1.7
30	1.64
31	1.59
32	1.57
33	1.72
34	1.73
35	1.59
36	1.75
$\bar{x} =$	1.633

16. Operator M. Bor

No	Waktu (detik/ m)
1	1.59
2	1.57
3	1.65
4	1.63
5	1.72
6	1.81
7	1.8
8	1.76
9	1.74
10	1.71
11	1.58
12	1.57
13	1.61
14	1.68
15	1.59
16	1.76
17	1.74
18	1.59
19	1.7
20	1.68
21	1.57
22	1.62
23	1.64
24	1.54
25	1.59
26	1.68
27	1.72
28	1.74
29	1.71
30	1.68
31	1.61
32	1.62
33	1.71
34	1.59
35	1.74
36	1.69
$\bar{x} =$	1.665

17. Operator ke-1 M. Gerinda

No	Waktu (detik/ m)
1	1.86
2	1.91
3	1.87
4	1.77
5	1.95
6	2.01
7	2.1
8	1.93
9	1.83
10	2.1
11	1.97
12	2.06
13	1.85
14	1.97
15	1.77
16	2.08
17	2.06
18	1.98
19	1.76
20	1.86
21	1.93
22	2.12
23	2.06
24	1.9
25	1.85
26	2.15
27	2
28	1.93
29	1.86
30	1.9
31	1.93
32	1.73
33	1.86
34	1.89
35	2.09
36	1.97
$\bar{x} =$	1.941

18. Operator ke-2 M. Gerinda

No	Waktu (detik/ m)
1	2.1
2	2.05
3	1.9
4	1.98
5	2.03
6	2.2
7	1.87
8	1.89
9	1.92
10	2.13
11	1.93
12	2.05
13	1.91
14	1.99
15	2.05
16	1.87
17	1.93
18	2.07
19	2.09
20	2.1
21	1.98
22	1.86
23	1.88
24	2.09
25	1.99
26	1.87
27	2.15
28	1.9
29	2.14
30	1.94
31	1.96
32	2.08
33	2.1
34	1.95
35	1.79
36	1.87
$\bar{x} =$	1.989

19. Operator Tempat Inspeksi

No	Waktu (detik/ m)
1	1.65
2	1.55
3	1.57
4	1.49
5	1.58
6	1.63
7	1.68
8	1.59
9	1.53
10	1.57
11	1.68
12	1.71
13	1.48
14	1.63
15	1.67
16	1.58
17	1.49
18	1.55
19	1.67
20	1.75
21	1.43
22	1.65
23	1.59
24	1.67
25	1.69
26	1.68
27	1.55
28	1.59
29	1.7
30	1.55
31	1.53
32	1.61
33	1.52
34	1.6
35	1.71
36	1.57
$\bar{x} =$	1.603

20. Operator M. Heading

No	Waktu (detik/ m)
1	1.55
2	1.71
3	1.65
4	1.54
5	1.62
6	1.49
7	1.48
8	1.57
9	1.62
10	1.57
11	1.62
12	1.45
13	1.56
14	1.65
15	1.7
16	1.58
17	1.53
18	1.59
19	1.63
20	1.7
21	1.65
22	1.55
23	1.54
24	1.68
25	1.61
26	1.49
27	1.65
28	1.7
29	1.47
30	1.5
31	1.66
32	1.71
33	1.65
34	1.46
35	1.55
36	1.49
$\bar{x} =$	1.588

21. Operator M. Cutting

No	Waktu (detik/ m)
1	2.12
2	2.06
3	1.92
4	1.89
5	2.05
6	1.96
7	2.07
8	1.98
9	2.06
10	2.12
11	1.92
12	1.89
13	1.87
14	1.93
15	2.06
16	2.22
17	1.87
18	1.98
19	1.85
20	1.96
21	2.07
22	2.05
23	1.98
24	1.95
25	1.86
26	1.87
27	1.91
28	1.95
29	2
30	2.1
31	1.97
32	1.96
33	2.05
34	2.12
35	1.96
36	1.98
$\bar{x} =$	1.988

22. Operator M. Threat

No	Waktu (detik/ m)
1	2.15
2	2.08
3	2.1
4	1.99
5	1.89
6	2.08
7	2.1
8	1.97
9	1.96
10	1.89
11	2
12	2.09
13	1.78
14	1.88
15	2.11
16	2.14
17	1.94
18	1.84
19	1.89
20	2.07
21	1.95
22	2.2
23	1.92
24	1.89
25	1.86
26	2
27	1.95
28	1.88
29	1.91
30	1.93
31	2.14
32	2
33	2.16
34	1.98
35	2.15
36	2.17
$\bar{x} =$	2.001

**LAMPIRAN PERHITUNGAN PENGHEMATAN WAKTU *TRANSPORT* DAN
PENAMBAHAN PRODUK SEMUA KOMPONEN**

I. Komponen *Bracket Engine NO 1 (BE NO 1)*, terdiri dari :

1. BE 4 no 1, urutan proses : 2 – 4 – 8 – 6

Waktu *transport* awal : 2 – 4 = 21.75 m/hari x 3.046 detik/m= 66.25 detik/hari

4 – 8 = 39.75 m/hari x 2.726 detik/m=108.35 detik/hari

8 – 6 = 45.75 m/hari x 2.539 detik/m=116.15 detik/hari

Waktu *transport* akhir : 2 – 4 = 18.75 m/hari x 3.046 detik/m= 57.12 detik/hari

4 – 8 = 15.75 m/hari x 2.726 detik/m= 42.94 detik/hari

8 – 6 = 43.5 m/hari x 2.539 detik/m=110.45 detik/hari

Waktu *transport* awal BE 4 no 1 = 66.25 + 108.35 + 116.15 detik/ hari

= 290.75 detik/ hari

Waktu *transport* akhir BE 4 no 1 = 57.12 + 42.94 + 110.45 detik/ hari

= 210.51 detik/ hari

Penghematan waktu *transport* untuk komponen BE 4 no 1 = 290.75 – 210.51

= 80.24 detik/ hari

Penambahan produk BE 4 no 1 = $\frac{80.24 \text{ detik/ hari}}{30.32 \text{ detik}}$

= 2.6 produk \approx 2 produk BE 4 no 1.

2. BE 3 no 1, urutan proses : 2 – 4 – 6

Waktu *transport* awal : 2 – 4 = 14.5 m/hari x 3.046 detik/m = 44.17 detik/hari

4 – 6 = 35.25 m/hari x 2.922 detik/m=103 detik/hari

Waktu *transport* akhir : 2 – 4 = 12.5 m/hari x 3.046 detik/m= 38.07 detik/hari

4 – 6 = 25.5 m/hari x 2.922 detik/m= 74.51 detik/hari

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ awal BE 3 no 1} &= 44.17 + 103 \text{ detik/ hari} \\ &= 147.17 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ akhir BE 3 no 1} &= 38.07 + 74.51 \text{ detik/ hari} \\ &= 112.58 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu } \textit{transport} \text{ untuk komponen BE 3 no 1} &= 147.17 - 112.58 \\ &= 34.59 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk BE 3 no 1} &= \frac{34.59 \text{ detik/ hari}}{30.93 \text{ detik}} \\ &= 1.2 \text{ produk} \approx 1 \text{ produk BE 3 no 1.}\end{aligned}$$

3. BSS no 1, urutan proses : 2 – 5 – 6 – 7

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ awal : 2 – 5} &= 9.5 \text{ m/hari} \times 2.719 \text{ detik/m} = 25.83 \text{ detik/hari} \\ 5 – 6 &= 7.5 \text{ m/hari} \times 2.84 \text{ detik/m} = 21.3 \text{ detik/hari} \\ 6 – 7 &= 49 \text{ m/hari} \times 3.076 \text{ detik/m} = 150.72 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ akhir : 2 – 5} &= 9.25 \text{ m/hari} \times 2.719 \text{ detik/m} = 25.15 \text{ detik/hari} \\ 5 – 6 &= 11 \text{ m/hari} \times 2.84 \text{ detik/m} = 31.24 \text{ detik/hari} \\ 6 – 7 &= 36.75 \text{ m/hari} \times 3.076 \text{ detik/m} = 113.04 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ awal BSS no 1} &= 25.83 + 21.3 + 150.72 \text{ detik/ hari} \\ &= 197.85 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ akhir BSS no 1} &= 25.15 + 31.24 + 113.04 \text{ detik/ hari} \\ &= 169.43 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu } \textit{transport} \text{ untuk komponen BSS no 1} &= 197.85 - 169.43 \\ &= 28.42 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk BSS no 1} &= \frac{28.42 \text{ detik/ hari}}{27.89 \text{ detik}} \\ &= 1.02 \text{ produk} \approx 1 \text{ produk BSS no 1.}\end{aligned}$$

4. MS 2 no 1, urutan proses : 2 – 7 – 6

Waktu *transport* awal : 2 – 7 = 17 m/hari x 2.719 detik/m = 46.23 detik/hari

7 – 6 = 49 m/hari x 2.491 detik/m = 122.06 detik/hari

Waktu *transport* akhir : 2 – 7 = 13 m/hari x 2.719 detik/m = 35.35 detik/hari

7–6 = 36.75 m/hari x 2.491 detik/m = 91.54 detik/hari

Waktu *transport* awal MS 2 no 1 = 46.23 + 122.06 detik/ hari

= 168.29 detik/ hari

Waktu *transport* akhir MS 2 no 1 = 35.35 + 91.54 detik/ hari

= 126.89 detik/ hari

Penghematan waktu *transport* untuk komponen MS 2 no 1 = 168.29 – 126.89

= 41.4 detik/ hari

Penambahan produk MS 2 no 1 = $\frac{41.4 \text{ detik/ hari}}{15.45 \text{ detik}}$

= 2.67 produk \approx 2 produk MS 2 no 1.

5. RR no 1, urutan proses : 2 – 6

Waktu *transport* awal : 2 – 6 = 29.32 m/hari x 2.719 detik/m = 79.72 detik/hari

Waktu *transport* akhir : 2 – 6 = 23 m/hari x 2.719 detik/m = 62.53 detik/hari

Penghematan waktu *transport* untuk komponen RR no 1 = 79.72 – 62.53

= 17.19 detik/ hari

Penambahan produk RR no 1 = $\frac{17.79 \text{ detik/ hari}}{14.56 \text{ detik}}$

= 1.18 produk \approx 1 produk RR no 1.

6. *Guide* no 1, urutan proses : 11 – 6

Waktu *transport* awal: 11 – 6 = 19.25 m/hari x 3.032 detik/m = 58.36 detik/hari

Waktu *transport* akhir: 11 – 6 = 9.5 m/hari x 3.032 detik/m = 28.81 detik/hari

$$\begin{aligned}\text{Penghematan waktu } \textit{transport} \text{ untuk komponen } \textit{Guide no 1} &= 58.36 - 28.81 \\ &= 29.55 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk } \textit{Guide no 1} &= \frac{29.55 \text{ detik/ hari}}{20 \text{ detik}} \\ &= 1.47 \text{ produk} \approx 1 \text{ produk } \textit{Guide no 1}.\end{aligned}$$

7. BE NO 1 gabungan, urutan proses : 6 – 7 – 6- 9 – 13 - 14

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ awal : } 6-7 &= 49 \text{ m/hari} \times 3.076 \text{ detik/m} = 150.724 \text{ detik/hari} \\ 7-6 &= 49 \text{ m/hari} \times 3.076 \text{ detik/m} = 150.724 \text{ detik/hari} \\ 6-9 &= 94.5 \text{ m/hari} \times 2.799 \text{ detik/m} = 264.5 \text{ detik/hari} \\ 9-13 &= 38.5 \text{ m/hari} \times 3.034 \text{ detik/m} = 116.81 \text{ detik/hari} \\ 13-14 &= 49 \text{ m/hari} \times 2.445 \text{ detik/m} = 119.81 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ akhir: } 6-7 &= 36.75 \text{ m/hari} \times 3.076 \text{ detik/m} = 113.043 \text{ detik/hari} \\ 7-6 &= 36.75 \text{ m/hari} \times 3.076 \text{ detik/m} = 113.043 \text{ detik/hari} \\ 6-9 &= 36.75 \text{ m/hari} \times 2.799 \text{ detik/m} = 102.86 \text{ detik/hari} \\ 9-13 &= 21 \text{ m/hari} \times 3.034 \text{ detik/m} = 63.71 \text{ detik/hari} \\ 13-14 &= 45.5 \text{ m/hari} \times 2.445 \text{ detik/m} = 111.24 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ awal } \textit{BE NO 1} &= 150.72 + 150.72 + 264.5 + 116.81 + 119.81 \text{ detik/ hari} \\ &= 802.568 \text{ detik/ hari}.\end{aligned}$$

$$\begin{aligned}\text{Waktu } \textit{transport} \text{ akhir } \textit{BE NO 1} &= 113.04 + 113.04 + 102.86 + 63.71 + 111.24 \text{ detik/ hari} \\ &= 503.89 \text{ detik/ hari}.\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu } \textit{transport} \text{ untuk komponen } \textit{BE NO 1} &= 802.568 - 503.89 \\ &= 298.67 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk } \textit{BE NO 1} &= \frac{298.67 \text{ detik/ hari}}{55.13 \text{ detik}} \\ &= 5.41 \text{ produk} \approx 5 \text{ produk } \textit{BE NO 1}.\end{aligned}$$

Tabel kesimpulan penambahan produk setiap komponen *BE NO 1* :

No	Komponen	Penambahan produk
1	BE 4 no1	2
2	BE 3 no1	1
3	BSS no 1	1
4	MS 2 no1	2
5	RR no1	1
6	Guide no1	1
7	BE NO 1	5

Jadi karena penambahan produk yang terkecilnya hanya 1 unit saja, maka penambahan produk untuk komponen *BE NO 1* juga hanya 1 produk saja, karena semua komponen penyusun dari *BE NO 1* tidak bisa berdiri sendiri, sehingga harus lengkap penyusunnya untuk membuat sebuah unit *BE NO 1*.

II. Komponen *Bracket Engine NO 2 (BE NO 2)*, terdiri dari :

1. BE 4 no 2, urutan proses : 1 – 3 – 4 – 8 – 6

Waktu *transport* awal : 1 – 3 = 24 m/hari x 2.843detik/m= 68.23 detik/hari

3 – 4 = 16 m/hari x 2.86 detik/m= 45.76 detik/hari

4 – 8 = 26.5 m/hari x 2.726 detik/m=72.24 detik/hari

8 – 6 = 30.5 m/hari x 2.539 detik/m=77.44 detik/hari

Waktu *transport* akhir : 1 – 3 = 11.5 m/hari x 2.843detik/m= 32.69 detik/hari

3 – 4 = 26 m/hari x 2.86 detik/m= 74.36 detik/hari

4 – 8 = 10.5 m/hari x 2.726 detik/m= 28.62 detik/hari

8 – 6 = 29 m/hari x 2.539 detik/m=73.63 detik/hari

Waktu *transport* awal BE 4 no 2 = 68.23 + 45.76 + 72.24 + 77.44 detik/ hari
= 263.67 detik/ hari

Waktu *transport* akhir BE 4 no 2 = 32.69 + 74.36 + 28.62 + 73.63 detik/ hari
= 209.3 detik/ hari

Penghematan waktu *transport* untuk komponen BE 4 no 2 = 263.67 – 209.3
= 54.37 detik/ hari

$$\begin{aligned}\text{Penambahan produk BE 4 no 2} &= \frac{54.37 \text{ detik/ hari}}{33.98 \text{ detik}} \\ &= 1.6 \text{ produk} \approx 1 \text{ produk BE 4 no 2.}\end{aligned}$$

2. BE 3 no 2, urutan proses : 1 - 3 - 4 - 6

$$\begin{aligned}\text{Waktu transport awal : 1 - 3} &= 24 \text{ m/hari} \times 2.843 \text{ detik/m} = 68.23 \text{ detik/hari} \\ 3 - 4 &= 16 \text{ m/hari} \times 2.86 \text{ detik/m} = 45.76 \text{ detik/hari} \\ 4 - 6 &= 11.75 \text{ m/hari} \times 2.922 \text{ detik/m} = 34.33 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir : 1 - 3} &= 11.5 \text{ m/hari} \times 2.843 \text{ detik/m} = 32.69 \text{ detik/hari} \\ 3 - 4 &= 13 \text{ m/hari} \times 2.86 \text{ detik/m} = 37.18 \text{ detik/hari} \\ 4 - 6 &= 8.5 \text{ m/hari} \times 2.922 \text{ detik/m} = 24.83 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport awal BE 3 no 2} &= 68.23 + 45.76 + 34.33 \text{ detik/ hari} \\ &= 148.32 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir BE 3 no 2} &= 32.69 + 37.18 + 24.83 \text{ detik/ hari} \\ &= 94.7 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu transport untuk komponen BE 3 no 2} &= 148.32 - 94.7 \\ &= 53.62 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk BE 3 no 2} &= \frac{53.62 \text{ detik/ hari}}{33.25 \text{ detik}} \\ &= 1.6 \text{ produk} \approx 1 \text{ produk BE 3 no 2.}\end{aligned}$$

3. BSS no 2, urutan proses : 1 - 5 - 6 - 7

$$\begin{aligned}\text{Waktu transport awal : 1 - 5} &= 9.75 \text{ m/hari} \times 2.843 \text{ detik/m} = 27.72 \text{ detik/hari} \\ 5 - 6 &= 7.5 \text{ m/hari} \times 2.84 \text{ detik/m} = 21.3 \text{ detik/hari} \\ 6 - 7 &= 42 \text{ m/hari} \times 3.076 \text{ detik/m} = 129.19 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir : 1 - 5} &= 8.75 \text{ m/hari} \times 2.843 \text{ detik/m} = 24.87 \text{ detik/hari} \\ 5 - 6 &= 11 \text{ m/hari} \times 2.84 \text{ detik/m} = 30.24 \text{ detik/hari} \\ 6 - 7 &= 31.5 \text{ m/hari} \times 3.076 \text{ detik/m} = 93.89 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport awal BSS no 2} &= 27.72 + 21.3 + 129.19 \text{ detik/ hari} \\ &= 178.4 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir BSS no 2} &= 24.87 + 30.24 + 93.89 \text{ detik/ hari} \\ &= 149.004 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu transport untuk komponen BSS no 2} &= 178.4 - 149.004 \\ &= 29.4 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk BSS no 2} &= \frac{29.4 \text{ detik/ hari}}{28.61 \text{ detik}} \\ &= 1.09 \text{ produk} \approx 1 \text{ produk BSS no 2.}\end{aligned}$$

4. MS 2 no 2, urutan proses : 1 – 7 – 6

$$\begin{aligned}\text{Waktu transport awal : 1 – 7} &= 17.25 \text{ m/hari} \times 2.843 \text{ detik/m} = 49.05 \text{ detik/hari} \\ 7 – 6 &= 42 \text{ m/hari} \times 2.491 \text{ detik/m} = 104.62 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir : 1 – 7} &= 20.25 \text{ m/hari} \times 2.843 \text{ detik/m} = 57.57 \text{ detik/hari} \\ 7 – 6 &= 31.5 \text{ m/hari} \times 2.491 \text{ detik/m} = 78.45 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport awal MS no 2} &= 49.05 + 104.62 \text{ detik/ hari} \\ &= 153.7 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir MS no 2} &= 57.57 + 78.45 \text{ detik/ hari} \\ &= 136.02 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu transport untuk komponen MS no 2} &= 153.7 - 136.02 \\ &= 17.68 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk MS no 2} &= \frac{17.68 \text{ detik/ hari}}{15.45 \text{ detik}} \\ &= 1.14 \text{ produk} \approx 1 \text{ produk MS no 2.}\end{aligned}$$

5. RR no 2, urutan proses : 1 – 6

$$\text{Waktu transport awal : 1 – 6} = 16.75 \text{ m/hari} \times 2.843 \text{ detik/m} = 47.62 \text{ detik/hari}$$

$$\text{Waktu transport akhir : 1 – 6} = 11.75 \text{ m/hari} \times 2.843 \text{ detik/m} = 33.41 \text{ detik/hari}$$

$$\begin{aligned} \text{Penghematan waktu } \textit{transport} \text{ untuk komponen RR no 2} &= 47.62 - 33.41 \\ &= 14.21 \text{ detik/ hari} \end{aligned}$$

$$\begin{aligned} \text{Penambahan produk RR no 2} &= \frac{14.21 \text{ detik/ hari}}{14 \text{ detik}} \\ &= 1.015 \text{ produk} \approx 1 \text{ produk RR no 2.} \end{aligned}$$

6. *Guide* no 2, urutan proses : 11 – 6

$$\text{Waktu } \textit{transport} \text{ awal: } 11 - 6 = 19.25 \text{ m/hari} \times 3.032 \text{ detik/m} = 58.36 \text{ detik/hari}$$

$$\text{Waktu } \textit{transport} \text{ akhir: } 11 - 6 = 9.5 \text{ m/hari} \times 3.032 \text{ detik/m} = 28.81 \text{ detik/hari}$$

$$\begin{aligned} \text{Penghematan waktu } \textit{transport} \text{ untuk komponen } \textit{Guide} \text{ no 2} &= 58.36 - 28.81 \\ &= 29.55 \text{ detik/ hari} \end{aligned}$$

$$\begin{aligned} \text{Penambahan produk } \textit{Guide} \text{ no 2} &= \frac{29.55 \text{ detik/ hari}}{20 \text{ detik}} \\ &= 1.47 \text{ produk} \approx 1 \text{ produk } \textit{Guide} \text{ no 2.} \end{aligned}$$

7. *BE NO 2* gabungan, urutan proses : 6 – 7 – 6 – 9 – 13 - 14

$$\text{Waktu } \textit{transport} \text{ awal : } 6 - 7 = 42 \text{ m/hari} \times 3.076 \text{ detik/m} = 129.19 \text{ detik/hari}$$

$$7 - 6 = 42 \text{ m/hari} \times 3.076 \text{ detik/m} = 129.19 \text{ detik/hari}$$

$$6 - 9 = 81 \text{ m/hari} \times 3.052 \text{ detik/m} = 247.21 \text{ detik/hari}$$

$$9 - 13 = 33 \text{ m/hari} \times 3.034 \text{ detik/m} = 100.12 \text{ detik/hari}$$

$$13 - 14 = 42 \text{ m/hari} \times 2.445 \text{ detik/m} = 102.69 \text{ detik/hari}$$

$$\text{Waktu } \textit{transport} \text{ akhir: } 6 - 7 = 31.5 \text{ m/hari} \times 3.076 \text{ detik/m} = 96.89 \text{ detik/hari}$$

$$7 - 6 = 31.5 \text{ m/hari} \times 3.076 \text{ detik/m} = 96.89 \text{ detik/hari}$$

$$6 - 9 = 31.5 \text{ m/hari} \times 3.052 \text{ detik/m} = 96.38 \text{ detik/hari}$$

$$9 - 13 = 18 \text{ m/hari} \times 3.034 \text{ detik/m} = 54.61 \text{ detik/hari}$$

$$13 - 14 = 39 \text{ m/hari} \times 2.445 \text{ detik/m} = 95.35 \text{ detik/hari}$$

$$\begin{aligned} \text{Waktu } \textit{transport} \text{ awal } \textit{BE NO 2} &= 129.19 + 129.19 + 247.21 + 100.12 + 102.69 \text{ detik/ hari} \\ &= 751.468 \text{ detik/ hari} \end{aligned}$$

$$\begin{aligned} \text{Waktu transport akhir BE NO 2} &= 96.89+96.89+96.38+54.61+95.35 \text{ detik/ hari} \\ &= 439.89 \text{ detik/ hari} \end{aligned}$$

$$\begin{aligned} \text{Penghematan waktu transport untuk komponen BE NO 2} &= 751.468 - 439.89 \\ &= 311.578 \text{ detik/ hari} \end{aligned}$$

$$\begin{aligned} \text{Penambahan produk BE NO 2} &= \frac{311.578 \text{ detik/ hari}}{58.2 \text{ detik}} \\ &= 5.35 \text{ produk} \approx 5 \text{ produk BE NO 2 .} \end{aligned}$$

Tabel kesimpulan penambahan produk setiap komponen *BE NO 2* :

No	Komponen	Penambahan produk
1	BE 4 no2	1
2	BE 3 no2	1
3	BSS no 2	1
4	MS 2 no2	1
5	RR no2	1
6	Guide no2	1
7	BE NO 2	5

Jadi karena penambahan produk yang terkecilnya hanya 1 unit saja, maka penambahan produk untuk komponen *BE NO 2* juga hanya 1 produk saja, karena semua komponen penyusun dari *BE NO 2* tidak bisa berdiri sendiri, sehingga harus lengkap penyusunnya untuk membuat sebuah unit *BE NO 2*.

III. Komponen *ROD BRAKE*, terdiri dari :

1. *Rod*, urutan proses : 11 – 10 – 12 – 7

$$\text{Waktu transport awal : } 11 - 10 = 23.5 \text{ m/hari} \times 3.032 \text{ detik/m} = 71.25 \text{ detik/hari}$$

$$10 - 12 = 7 \text{ m/hari} \times 2.422 \text{ detik/m} = 16.95 \text{ detik/hari}$$

$$12 - 7 = 9 \text{ m/hari} \times 3.052 \text{ detik/m} = 27.47 \text{ detik/hari}$$

$$\text{Waktu transport akhir : } 11 - 10 = 6.5 \text{ m/hari} \times 3.032 \text{ detik/m} = 19.7 \text{ detik/hari}$$

$$10 - 12 = 3 \text{ m/hari} \times 2.422 \text{ detik/m} = 7.26 \text{ detik/hari}$$

$$12 - 7 = 28 \text{ m/hari} \times 3.052 \text{ detik/m} = 85.45 \text{ detik/hari}$$

$$\begin{aligned}\text{Waktu transport awal Rod} &= 71.25 + 16.95 + 27.47 \text{ detik/ hari} \\ &= 115.67 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir Rod} &= 19.7 + 7.26 + 85.45 \text{ detik/ hari} \\ &= 112.41 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu transport untuk komponen Rod} &= 115.67 - 112.41 \\ &= 3.26 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk Rod} &= \frac{3.26 \text{ detik/ hari}}{59.79 \text{ detik}} \\ &= 0.005 \text{ produk} \approx 0 \text{ produk Rod.}\end{aligned}$$

2. *Join Rod Brake*, urutan proses : 2 - 4 - 7

$$\begin{aligned}\text{Waktu transport awal : } 2 - 4 &= 7.25 \text{ m/hari} \times 3.046 \text{ detik/m} = 22.08 \text{ detik/hari} \\ 4 - 7 &= 9.875 \text{ m/hari} \times 2.628 \text{ detik/m} = 25.95 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir : } 2 - 4 &= 6.25 \text{ m/hari} \times 3.046 \text{ detik/m} = 19.03 \text{ detik/hari} \\ 4 - 7 &= 6 \text{ m/hari} \times 2.628 \text{ detik/m} = 15.76 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport awal Join Rod Brake} &= 22.08 + 25.95 \text{ detik/ hari} \\ &= 48.03 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir Join Rod Brake} &= 19.03 + 15.76 \text{ detik/ hari} \\ &= 34.79 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu transport untuk Join Rod Brake} &= 48.03 - 34.79 \\ &= 13.24 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk Join Rod Brake} &= \frac{13.24 \text{ detik/ hari}}{26.8 \text{ detik}} \\ &= 0.49 \text{ produk} \approx 0 \text{ produk Join Rod Brake.}\end{aligned}$$

3. *Rod Brake* gabungan, urutan proses : 7 - 9 - 13 - 14

$$\begin{aligned}\text{Waktu transport awal : } 7 - 9 &= 21 \text{ m/hari} \times 2.491 \text{ detik/m} = 52.31 \text{ detik/hari} \\ 9 - 13 &= 16.5 \text{ m/hari} \times 3.034 \text{ detik/m} = 50.1 \text{ detik/hari} \\ 13 - 14 &= 21 \text{ m/hari} \times 2.445 \text{ detik/m} = 51.35 \text{ detik/hari}\end{aligned}$$

Waktu *transport* akhir : $7 - 9 = 15.75 \text{ m/hari} \times 2.491 \text{ detik/m} = 39.23 \text{ detik/hari}$

$9 - 13 = 9 \text{ m/hari} \times 3.034 \text{ detik/m} = 27.3 \text{ detik/hari}$

$13 - 14 = 19.5 \text{ m/hari} \times 2.445 \text{ detik/m} = 47.67 \text{ detik/hari}$

Waktu *transport* awal *Rod Brake* = $52.31 + 50.1 + 51.35 \text{ detik/ hari}$

= $153.76 \text{ detik/ hari}$

Waktu *transport* akhir *Rod Brake* = $39.23 + 27.3 + 47.67 \text{ detik/ hari}$

= $114.2 \text{ detik/ hari}$

Penghematan waktu *transport* untuk komponen *Rod Brake* = $153.76 - 114.2$

= $39.55 \text{ detik/ hari}$

Penambahan produk *Rod Brake* = $\frac{39.55 \text{ detik/ hari}}{25 \text{ detik}}$

= $1.582 \text{ produk} \approx 1 \text{ produk } \textit{Rod Brake}$.

Tabel kesimpulan penambahan produk setiap komponen *Rod Brake* :

No	Komponen	Penambahan produk
1	Rod	0
2	Join Rod Brake	0
3	Rod Brake	1

Jadi karena penambahan produk yang terkecilnya hanya 0 unit saja, maka penambahan produk untuk komponen *Rod Brake* juga hanya 0 produk saja, karena semua komponen penyusun dari *Rod Brake* tidak bisa berdiri sendiri, sehingga harus lengkap penyusunnya untuk membuat sebuah unit *Rod Brake*. Jadi tidak ada penambahan produk pada komponen *Rod Brake*.

IV. Komponen *PEDAL GEAR CHANGE*, terdiri dari :

1. *Stang*, urutan proses : $2 - 4 - 6$

Waktu *transport* awal : $2 - 4 = 14.5 \text{ m/hari} \times 3.046 \text{ detik/m} = 44.17 \text{ detik/hari}$

$4 - 6 = 23.5 \text{ m/hari} \times 2.922 \text{ detik/m} = 68.67 \text{ detik/hari}$

Waktu *transport* akhir : $2 - 4 = 12.5 \text{ m/hari} \times 3.046 \text{ detik/m} = 38.07 \text{ detik/hari}$

$4 - 6 = 17 \text{ m/hari} \times 2.922 \text{ detik/m} = 49.67 \text{ detik/hari}$

$$\begin{aligned}\text{Waktu transport awal Stang} &= 44.17 + 68.67 \text{ detik/ hari} \\ &= 112.84 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir Stang} &= 38.07 + 49.67 \text{ detik/ hari} \\ &= 87.74 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu transport untuk Stang} &= 112.84 - 87.74 \\ &= 25.1 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk Stang} &= \frac{25.1 \text{ detik/ hari}}{32.98 \text{ detik}} \\ &= 0.76 \text{ produk} \approx 0 \text{ produk Stang.}\end{aligned}$$

2. *Pedal All/ R*, urutan proses : 2 - 3 - 5 - 6

$$\begin{aligned}\text{Waktu transport awal : 2 - 3} &= 10.91 \text{ m/hari} \times 3.003 \text{ detik/m} = 32.76 \text{ detik/hari} \\ 3 - 5 &= 10.25 \text{ m/hari} \times 2.86 \text{ detik/m} = 29.32 \text{ detik/hari} \\ 5 - 6 &= 7.5 \text{ m/hari} \times 2.84 \text{ detik/m} = 21.3 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir : 2 - 3} &= 12.75 \text{ m/hari} \times 3.003 \text{ detik/m} = 38.28 \text{ detik/hari} \\ 3 - 5 &= 3 \text{ m/hari} \times 2.86 \text{ detik/m} = 8.58 \text{ detik/hari} \\ 5 - 6 &= 11 \text{ m/hari} \times 2.84 \text{ detik/m} = 31.24 \text{ detik/hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport awal Pedal All/R} &= 32.76 + 29.32 + 21.3 \text{ detik/ hari} \\ &= 83.38 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Waktu transport akhir Pedal All/R} &= 38.28 + 8.58 + 31.24 \text{ detik/ hari} \\ &= 78.1 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penghematan waktu transport untuk Pedal All/R} &= 83.38 - 78.1 \\ &= 5.28 \text{ detik/ hari}\end{aligned}$$

$$\begin{aligned}\text{Penambahan produk Pedal All/R} &= \frac{5.28 \text{ detik/ hari}}{30.45 \text{ detik}} \\ &= 0.17 \text{ produk} \approx 0 \text{ produk Pedal All/R.}\end{aligned}$$

3. *Pedal All/ L* urutan proses : 2 - 3 - 5 - 6

$$\text{Waktu transport awal : } 2 - 3 = 10.91 \text{ m/hari} \times 3.003 \text{ detik/m} = 32.76 \text{ detik/hari}$$

$$3 - 5 = 10.25 \text{ m/hari} \times 2.86 \text{ detik/m} = 29.32 \text{ detik/hari}$$

$$5 - 6 = 7.5 \text{ m/hari} \times 2.84 \text{ detik/m} = 21.3 \text{ detik/hari}$$

$$\text{Waktu transport akhir : } 2 - 3 = 12.75 \text{ m/hari} \times 3.003 \text{ detik/m} = 38.28 \text{ detik/hari}$$

$$3 - 5 = 3 \text{ m/hari} \times 2.86 \text{ detik/m} = 8.58 \text{ detik/hari}$$

$$5 - 6 = 11 \text{ m/hari} \times 2.84 \text{ detik/m} = 31.24 \text{ detik/hari}$$

$$\text{Waktu transport awal } \textit{Pedal All/L} = 32.76 + 29.32 + 21.3 \text{ detik/ hari}$$

$$= 83.38 \text{ detik/ hari}$$

$$\text{Waktu transport akhir } \textit{Pedal All/L} = 38.28 + 8.58 + 31.24 \text{ detik/ hari}$$

$$= 78.1 \text{ detik/ hari}$$

$$\text{Penghematan waktu transport untuk } \textit{Pedal All/L} = 83.38 - 78.1$$

$$= 5.28 \text{ detik/ hari}$$

$$\text{Penambahan produk } \textit{Pedal All/L} = \frac{5.28 \text{ detik/ hari}}{30.45 \text{ detik}}$$

$$= 0.17 \text{ produk} \approx 0 \text{ produk } \textit{Pedal All/L}.$$

4. *Pedal Gear Change* gabungan, urutan proses : 6 - 9 - 13 - 14

$$\text{Waktu transport awal : } 6 - 9 = 40.5 \text{ m/hari} \times 2.799 \text{ detik/m} = 113.36 \text{ detik/hari}$$

$$9 - 13 = 16.5 \text{ m/hari} \times 3.034 \text{ detik/m} = 50.1 \text{ detik/hari}$$

$$13 - 14 = 21 \text{ m/hari} \times 2.445 \text{ detik/m} = 51.35 \text{ detik/hari}$$

$$\text{Waktu transport akhir: } 6 - 9 = 15.75 \text{ m/hari} \times 2.799 \text{ detik/m} = 44.08 \text{ detik/hari}$$

$$9 - 13 = 9 \text{ m/hari} \times 3.034 \text{ detik/m} = 27.3 \text{ detik/hari}$$

$$13 - 14 = 19.5 \text{ m/hari} \times 2.445 \text{ detik/m} = 47.67 \text{ detik/hari}$$

$$\text{Waktu transport awal } \textit{Pedal Gear Change} = 113.36 + 50.1 + 51.35 \text{ detik/ hari}$$

$$= 214.81 \text{ detik/ hari}$$

$$\text{Waktu transport akhir } \textit{Pedal Gear Change} = 44.08 + 27.3 + 47.67 \text{ detik/ hari}$$

$$= 119.05 \text{ detik/ hari}.$$

$$\begin{aligned} \text{Penghematan waktu } \textit{transport} \text{ untuk } \textit{Pedal Gear Change} &= 214.81 - 119.05 \\ &= 95.76 \text{ detik/ hari} \end{aligned}$$

$$\begin{aligned} \text{Penambahan produk } \textit{Pedal Gear Change} &= \frac{95.76 \text{ detik/ hari}}{65 \text{ detik}} \\ &= 1.47 \text{ produk} \approx 1 \text{ produk } \textit{Pedal Gear Change}. \end{aligned}$$

Tabel kesimpulan penambahan produk setiap komponen *Pedal Gear Change* :

No	Komponen	Penambahan produk
1	Stang	0
2	Pedal All/ R	0
3	Pedal All/ L	0
4	Pedal Gear Change	1

Jadi karena penambahan produk yang terkecilnya hanya 0 unit saja, maka penambahan produk untuk komponen *Pedal Gear Change* juga hanya 0 produk saja, karena semua komponen penyusun dari *Pedal Gear Change* tidak bisa berdiri sendiri, sehingga harus lengkap penyusunnya untuk membuat sebuah unit *Pedal Gear Change*. Jadi tidak ada penambahan produk pada komponen *Pedal Gear Change*.