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FACILITY LAYOUT REDESIGN AT DEPARTMENT OF RAILWAY INFRASTRUCTURE (CASE STUDY AT PT PINDAD BANDUNG)

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Abstract
Every company, both large companies and small companies, will face problems layout.semua facilities for the production of both machines, labor and other facilities should be provided in place of each, so that it can work with baik.setiap array of machines and production equipment at a factory called layout. So layout problems associated with the preparation of machinery and equipment production in pabrik.perosoalanya is how we set up the machines and other production equipment so that it can run production as effectively as possible. The composition of plant equipment. The layout in PT. PINDAD (Persero) shall be designed so that the development of efficient factory area and the production and distribution process can proceed smoothly, so the security, safety, and comfort for employees can be met. In addition to the process equipment, some engine placement should match the flow of the production process e-clip, and so placed on the part that does not interfere with the traffic of goods and processes. Location of the plant will directly affect the survival of plant process includes the successful and smooth production plant.

Keywords: *Facility Layout, Proposed Layout*

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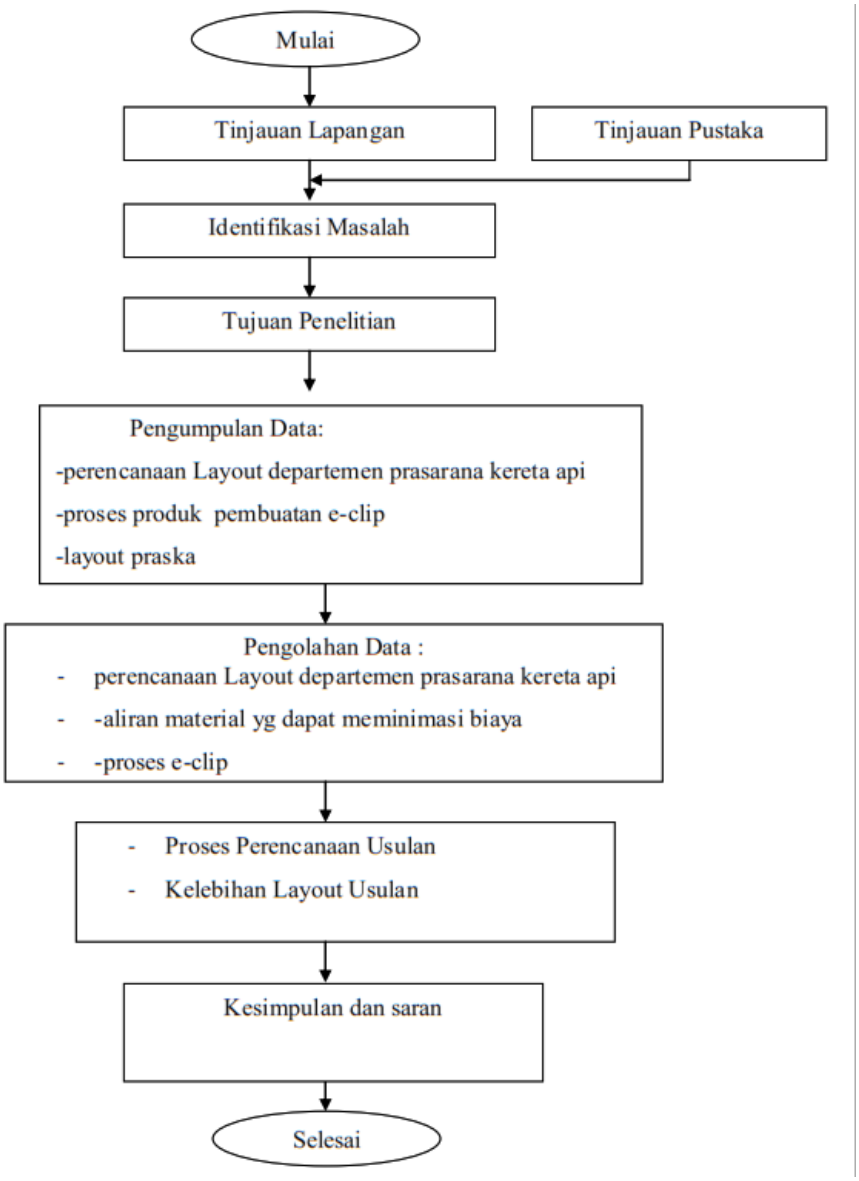
Introduction

The layout or arrangement of existing production facilities and work areas is a problem that is often encountered in the industrial world. We cannot avoid it, even if we only manage equipment or machines in existing buildings and in a small scope. The current industrial development can be said to be very rapid, therefore we want something practical and economical. So that the competition between one industry with another to produce the product that the market wants is very tight. It is advisable to use the elements that support the production process, it is expected to function effectively and efficiently, both in terms of raw materials, humans or the machines used. (Wignosobroto 2011) The plant layout can be defined as a layout how to set up factory facilities to support the smooth production process. Facility design is one of the important terms in the preparation of plant physical elements. Home Industry is one that requires facility design, including the design and arrangement of production layouts. The problem that is often encountered in the layout arrangement is whether the arrangement of all the production facilities has been made as well as possible so that it can achieve a production process that is most efficient and can support the continuity and smooth running of the production process optimally (Irawan, 2012). The layout of the factory machine is a major foundation in the industrial world, so it is no longer necessary to prove that every company/factory definitely needs a machine layout in running and developing its business. Therefore, planning a good engine layout is a fixed price for the continuity of a factory. Because it is too important, the layout of the machine to be used must be well designed, so that workers can work effectively and efficiently. If a factory works without a good machine layout, of course the production process in the factory will be disrupted, resulting in losses for the factory itself. This makes sophisticated and expensive production equipment meaningless if the machine layout planning is done haphazardly. In order to achieve production optimization, a proper arrangement of production machines is needed at the factory.

In this study, the object observed was the layout of the railway infrastructure department. The material handling distance of several factories in the area which is too far causes the activity

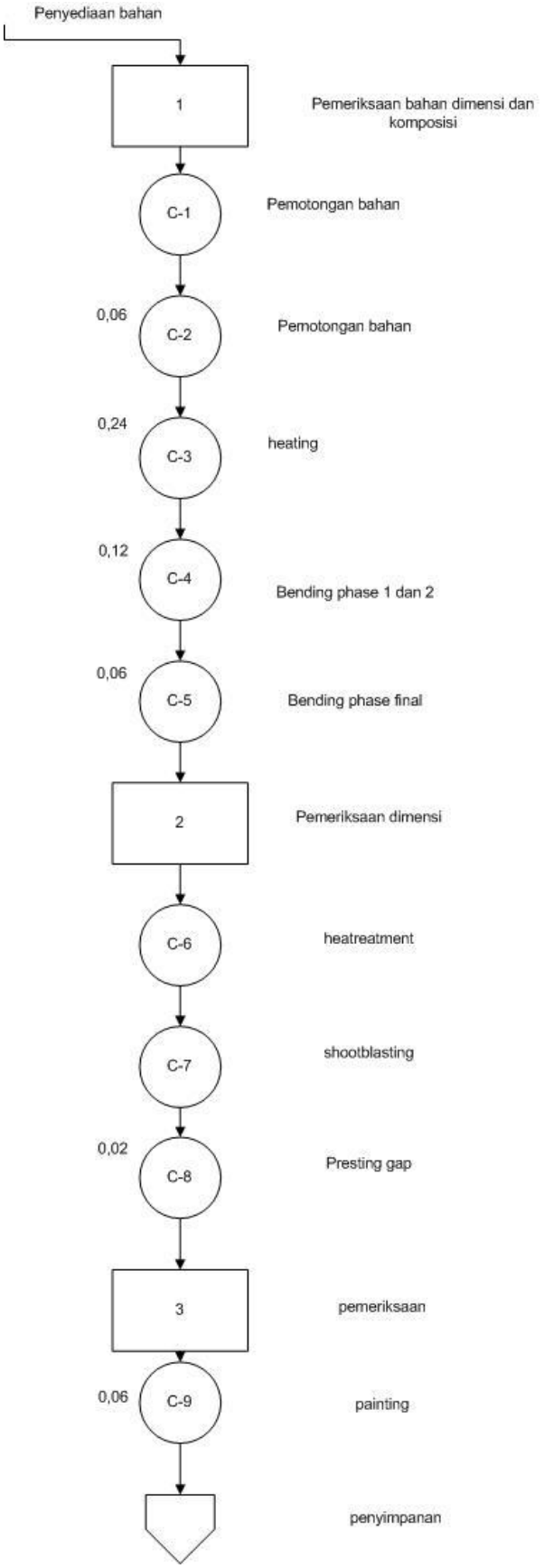
and productivity to decrease, it will also affect other things, for example the high cost of moving materials. Considering the above, it is necessary to re-plan the layout of the object under study. The factory layout factors are adjusted to the current situation in order to create smoothness in the production process, so that the company's targets that have been set can be met. Therefore, a proposed layout is made so that the production process flow can produce products that are on target in the praska department. The current layout is still not in accordance with the existing flow because from the preparation of raw materials to the storage section it takes a long stage because the layout process is still using the old layout so that from the cutting process to the appeal process must be carried by workers using a trolley, the two processes should be side by side In order to minimize costs and in the appeal process to the painting section, workers must also bring the results of the appeal process to the painting process, therefore it is very necessary to have a proposed layout so that the process flow of the e-clip production process can be in accordance with the appropriate workflow.

Research Method



Results and Discussion

E-Clip Making Process



The process of making an E-Clip consists of several stages, the following is the sequence of processes:

production:

1. Provision of Materials The materials for making E-Clips are Spring steel 60 Si2 CrA (Billet), with a size of 20, an initial length of 5600mm and a weight of 0.77kg.

2. Material Inspection After that the billet is checked starting from the diameter, length and size by the QC section.

3. Cut the Material After the billet is checked by QC and is suitable for use, then the material is cut using a cutting machine (Pedding house machine). With size (20 x 310 mm).

4. Slep the Edge of the Material After the billet is cut, the resulting billet is then smoothed at the top and bottom using a belt grinding machine.

5. Heating After that, the workpiece or material is heated using an induction furnace, with a temperature of 950C.

6. Bending phase 1, 2 & Bending phase final shaping After the workpiece has been heated, then it enters the bending/forming E-Clip stage, at this stage the formation consists of three printings according to the predetermined size and image.

7. Shotblasting I After the material or workpiece has been shaped, the E-Clip is then entered in the shotblasting process, which is the cleaning or polishing stage so that the E-Clip does not rust.

8. Check Dimensions and Visuals After the E-Clip has been cleaned and polished, then the E-Clip is checked again by QC manually, in terms of size and shape.

9. Heat treatment The next stage of E-Clip is hardening with a hardness of 4246 Hrc.

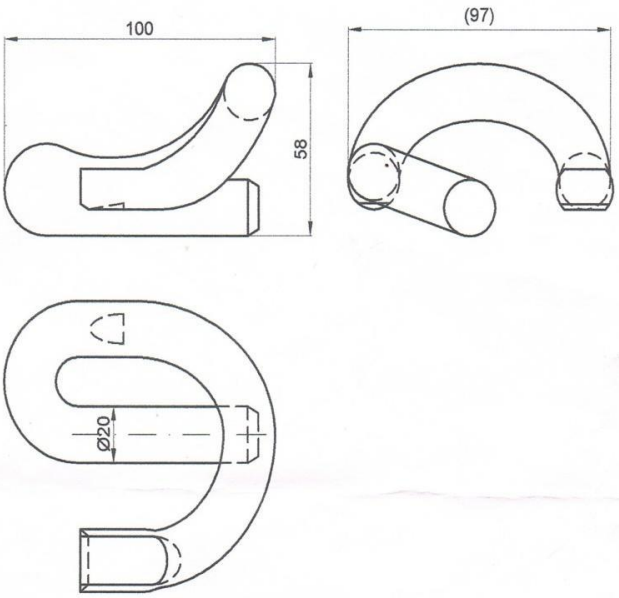
10.Shotblasting II After the heat treatment process is complete, the E-Clip is put back in the shortblasting process to remove scale and rust.

11. Prestressing gap Next, entering the prestressing gap stage, the E-Clip was then tested for hardness with a hardness between 43 Hrc to 46 Hrc.

12. Inspection This stage is the final inspection, namely clamping force test and vibration test, which will be tested for clamping strength and vibration test in the Lab.

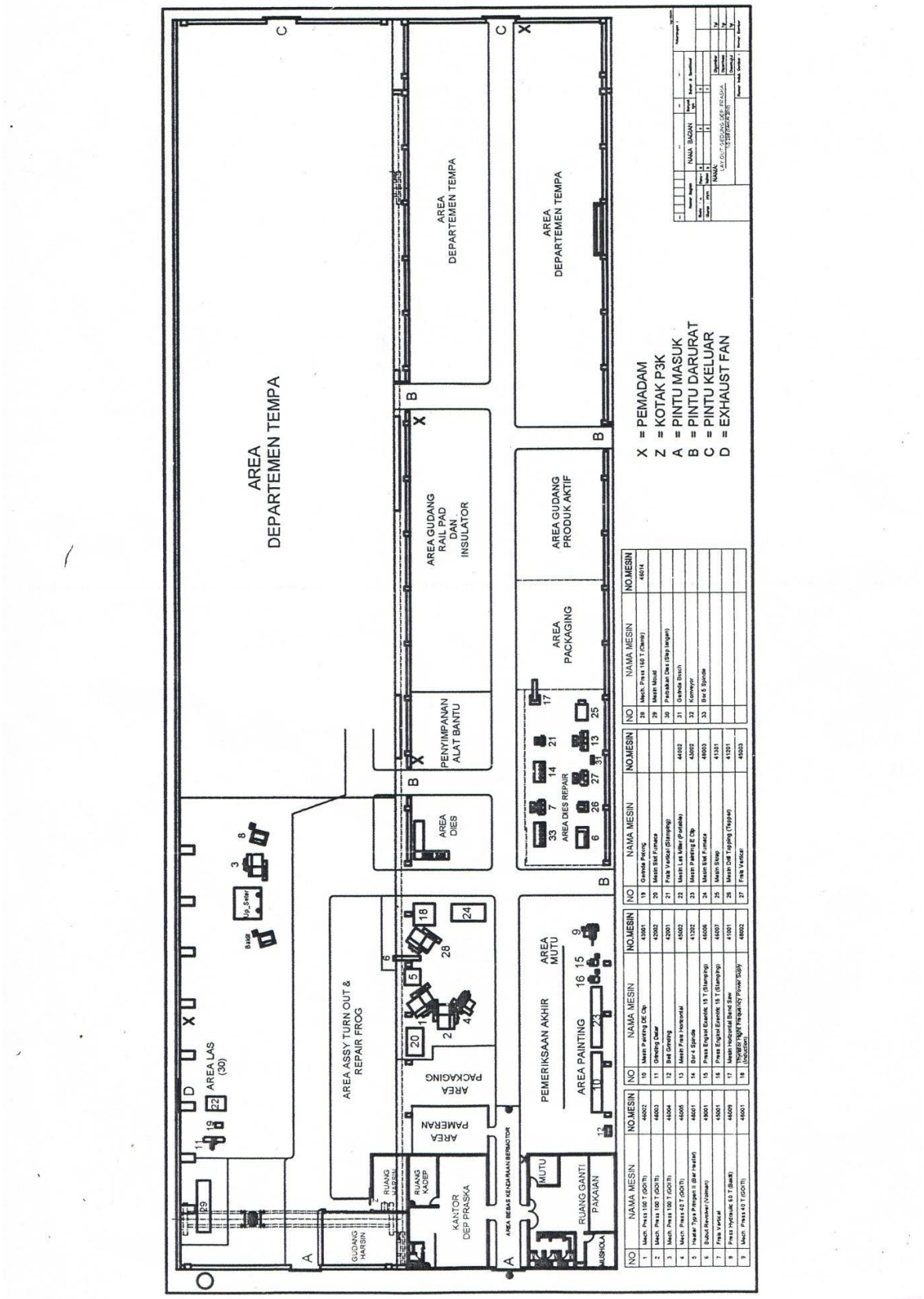
13. Painting After confirming that the E-Clip is categorized as good, then the next step is to enter the E-Clip in the painting process.

14. Packaging After the painting process is complete, the E-Clip is then packed and stored until it is ready to be sent.



-						-		-	Spring Steel		Keterangan :
Nomor Bagian						NAMA BAGIAN		Banyak nya	Bahan & Spesifikasi		
Skala : 1 : 2		Peru-	a		c		e				
Ukuran : mm		bahan	b		d		f				
	NAMA : Spring Clip (E_Clip)								Digambar		Tgl.
									Diperiksa		Tgl.
									Disetujui		Tgl.
									Nomor Induk Gambar :		Nomor Gambar : -

Initial Layout


AREA
DEPARTEMEN TEMPA
AREA
DEPARTEMEN TEMPA
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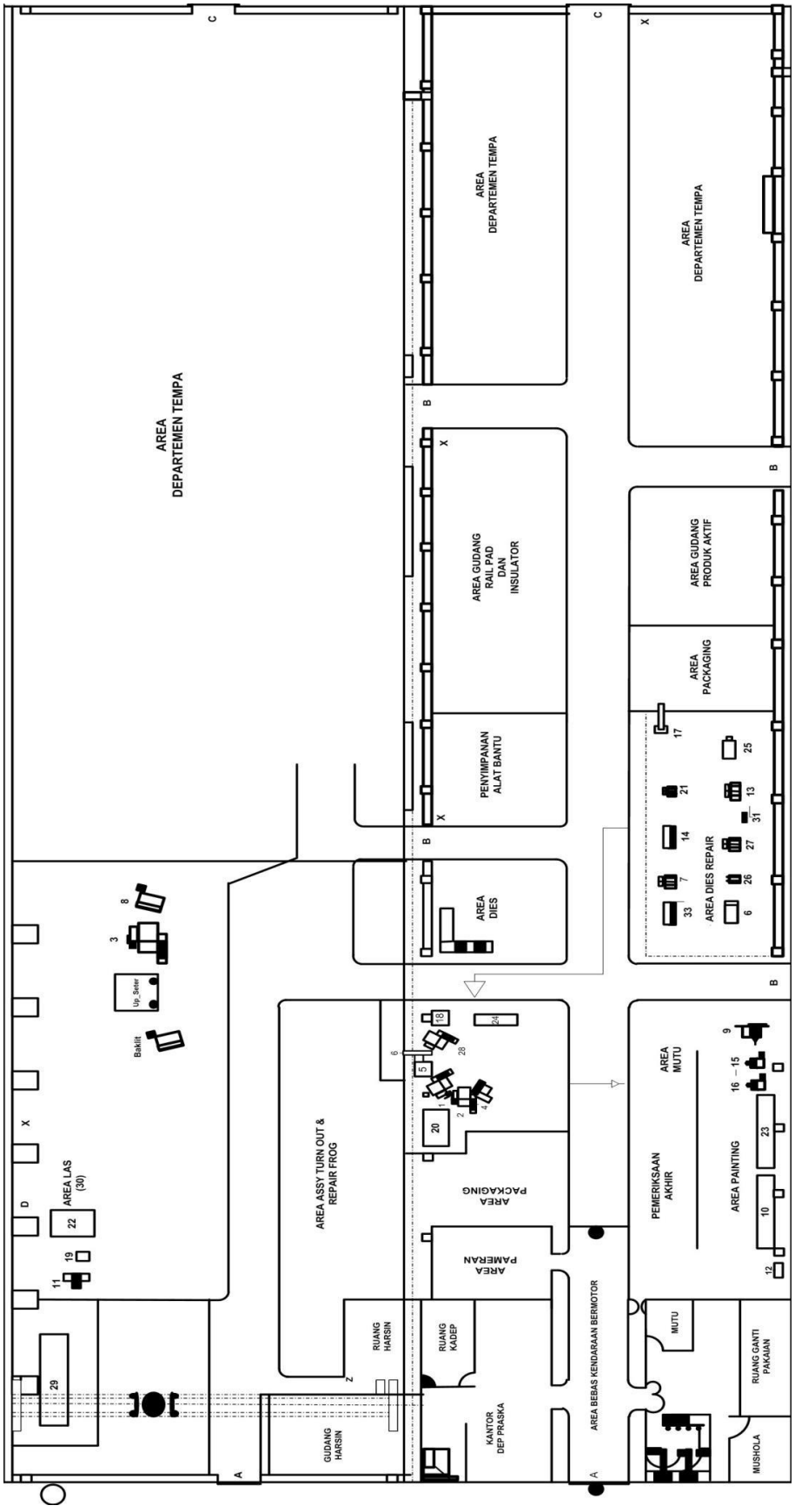
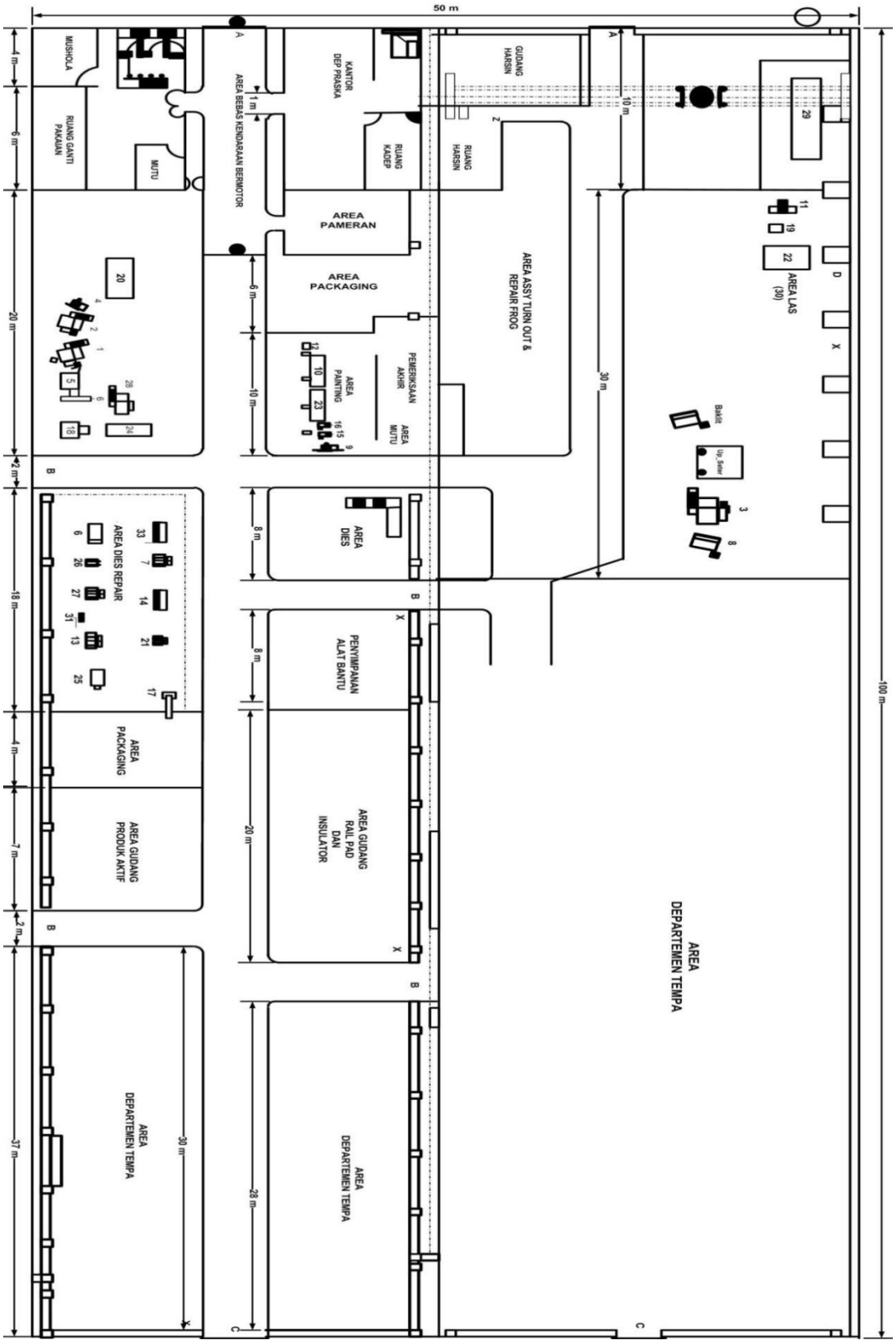
DEPARTEMEN TEMPA
AREA GUDANG
RAIL PAD
DAN
INSULATOR
AREA GUDANG
PRODUK AKTIF
PENYIMPANAN
ALAT BANTU
AREA
PACKAGING
AREA
DIES
AREA DIES REPAIR
AREA ASSY TURN OUT &
REPAIR FROG
AREA LAS
(30)
AREA
PACKAGING
AREA
PAMERAN
AREA
MUTU
PEMERIKSAAN AKHIR
AREA PAINTING
KANTOR
DEP PRASKA
RUANG
KADEP
RUANG GANTI
PAKAIAN
MUSHOLA
MUTU
GUDANG
MATOIN
AREA BEBAS KENDARAAN BERMOTOR
X = PEMADAM
Z = KOTAK P3K
A = PINTU MASUK
B = PINTU DARURAT
C = PINTU KELUAR
D = EXHAUST FAN
NAMA BAGIAN
LAYOUT GEDUNG DEP. PRASKA

Machine Name Description Table

No	NAMA MESIN	NO.MESIN
1	Mech press 100 T (GOITI)	46002
2	Mech press 100 T (GOITI)	46003
3	Mech press 100 T (GOITI)	46004
4	Mech press 40 T (GOITI)	46005
5	Heater type primpen II(bar heater)	46001
6	Bubut revolver (volmart)	49001
7	Frais vertical	45001
8	Press hydraulic 60 T (BAKLL)	46009
9	Mach press 40 T (GOITI)	46001
10	Mesin painting De Clip	43001
11	Grinding datar	42002
12	Bell grinding	42001
13	Mesin frais horizontal	45002
14	Bor 4 spindle	41202
15	Press engkol exentric 15 T (slamping)	46006
16	Press engkol exentric 16 T (slamping)	46007
17	Mesin horizontal band saw	41001
18	Thyristor hight frequency power suply (induction)	48002
19	Gerinda potong	
20	Mesin slot fumace	
21	Frais vertical (slamping)	
22	Mesin las miller (portable)	44002
23	Mesin painting e-clip	43002
24	Mesin slot fumace	48003
25	Mesin skrap	41301
26	Mesin drill traping (tapper)	41201
27	Frais vertical	45003
28	Mech press 160 T (ciamix)	46014
29	Mesin mould	
30	Perbaikan dies (slep lengan)	
31	Gerinda bosch	
32	Konveyor	
33	Bor 5 spindel	

Proposed Layout




50 m
100 m
MUSHOLA
RUANG GANTI PAKAIAN
MUTU
KANTOR DEP PRASKA
RUANG KADEP
AREA BEBAS KENDARAAN BERMOTOR
GUDANG HARSIN
RUANG HARSIN
AREA PAMERAN
AREA PACKAGING
AREA PAINTING
PEMERIKSAAN AKHIR
AREA MUTU
AREA ASSY TURN OUT & REPAIR FROG
AREA LAS (30)
AREA DIES
AREA DIES REPAIR
PENYIMPANAN ALAT BANTU
AREA GUDANG RAIL PAD DAN INSULATOR
AREA PACKAGING
AREA GUDANG PRODUK AKTIF
AREA DEPARTEMEN TEMPA
AREA DEPARTEMEN TEMPA
AREA DEPARTEMEN TEMPA
Bakitt

Proposal Layout Analysis

The dies repair area is an area where the process of providing raw materials and the cutting stage is 18 m where the area is adjacent to the painting stage which is 2 m away in the initial layout in the dies repair area there is a 5 spindle drill, vertical milling, 4 spindle drill, horizontal band saw machine , revolver lathe, drill traping machine, vertical milling, horizontal milling machine, and scrap machine The appeal area is located in the process in front of the painting process. The area has an area of 10 m in the initial layout after the proposed layout for the appeal process has an area of 20 m due to the exchange of divisions with the painting division. in the appeal process there are mech press, fumace slot machine, induction, mech press 100 t. The painting area is adjacent to the dies repair area in the initial layout, after the proposed layout is made, this area changes places with an appeal area which has an area of 10 m from the initial layout, the painting area has an area of 20 m, in the painting area there is a de clip painting machine, e clip painting machine, press crank, mech press, induction.

The total area of the infrastructure and railway departments is 100x50 with each division that has been changed from the previous layout of the bending department and the painting section of the two areas, the position of the process in the e-clip manufacturing stage was previously changed to the bending section having an area of 10m while the flow phase is in the direction of The painting section of the cutting and bending section in the previous position has very less space, while the painting section has more space.

Advantages of Layout

1. Can lead to optimal utilization of machines, specialization of machines and labor

2. Functional parts are flexible and can process various types of products

3. Machines are multipurpose machines which are usually lower in cost when compared to specialized machines

4. Products and services that require a variety of processes can be easily processed

5. Other facilities in the functional layout are not affected by the possibility of one of the machines being damaged

6. Machines and employees are interdependent so that this layout is very suitable for the implementation of a piece rate system.

7. Multipurpose facilities or machines are usually slower in operation when compared to special machines so that the operating costs per unit are higher

8. Determining the course of the process (routing) and determining the schedule (scheduling) as well as cost accounting is difficult because each order must be done separately.

9. Material handling and material transportation costs in the factory are relatively high.

10. The movement of materials in the factory is slow so that the in-process inventory is relatively large, moreover a large storage area is needed.

11. Orders are often lost

12. It is difficult to balance labor and machines

13. There is often a reverse process.

Layout Weaknesses

1. Multipurpose facilities or machines are usually slower in operation when compared to special machines so that operating costs per unit are higher

2. Determining the course of the process (routing) and determining the schedule (scheduling) as well as cost accounting is difficult because each order must be done separately.

3. Material handling and material transportation costs within the factory are relatively high.

4. The movement of materials in the factory is slow so that the in-process inventory is relatively large, and a large storage area is required.

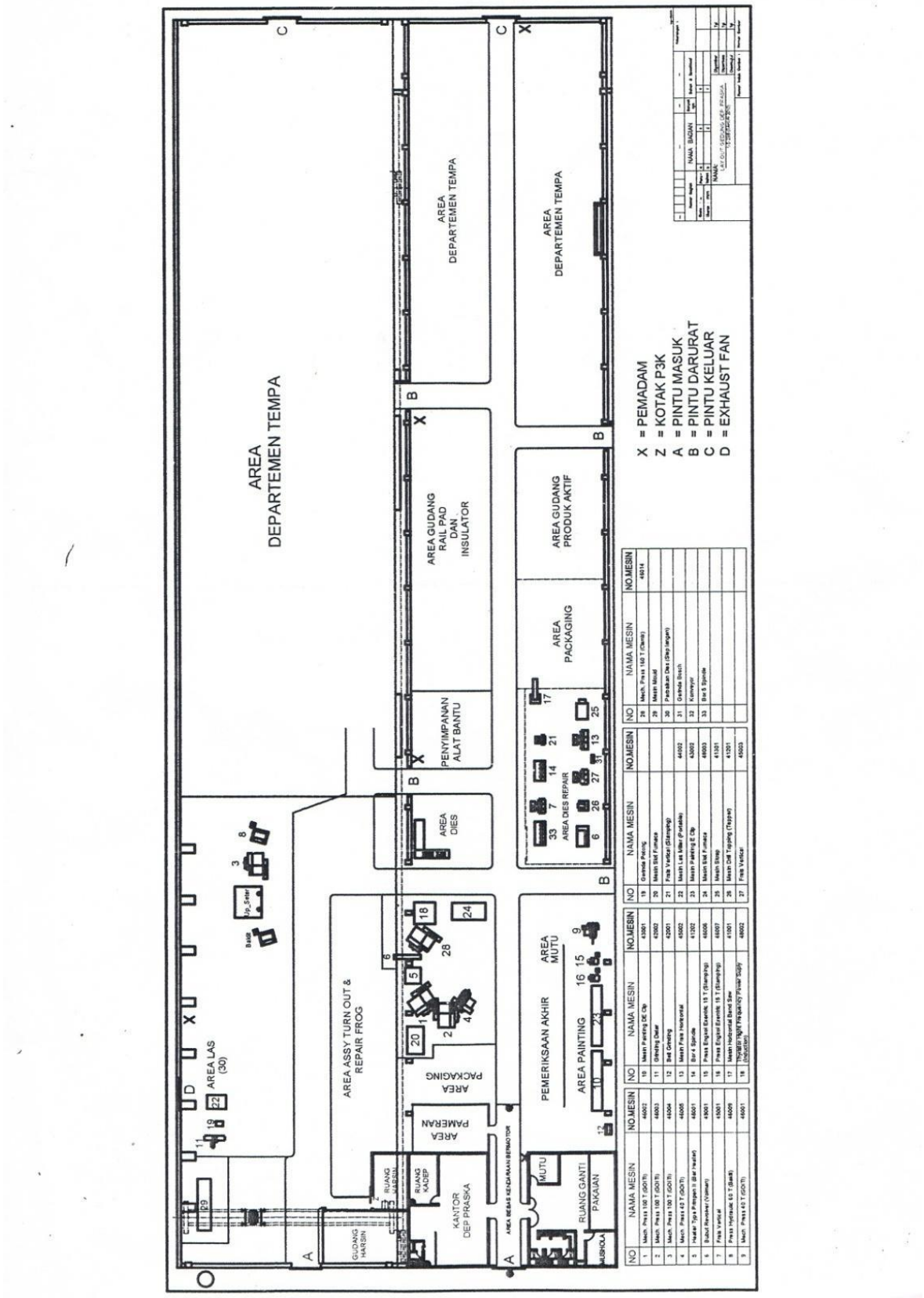
5. Orders are often lost

6. It is difficult to balance labor and machines

7. Often the process of turning over.

PROPOSED LAYOUT RESULTS

From the results of the proposed layout using Microsoft Visio, it is known that from the initial layout,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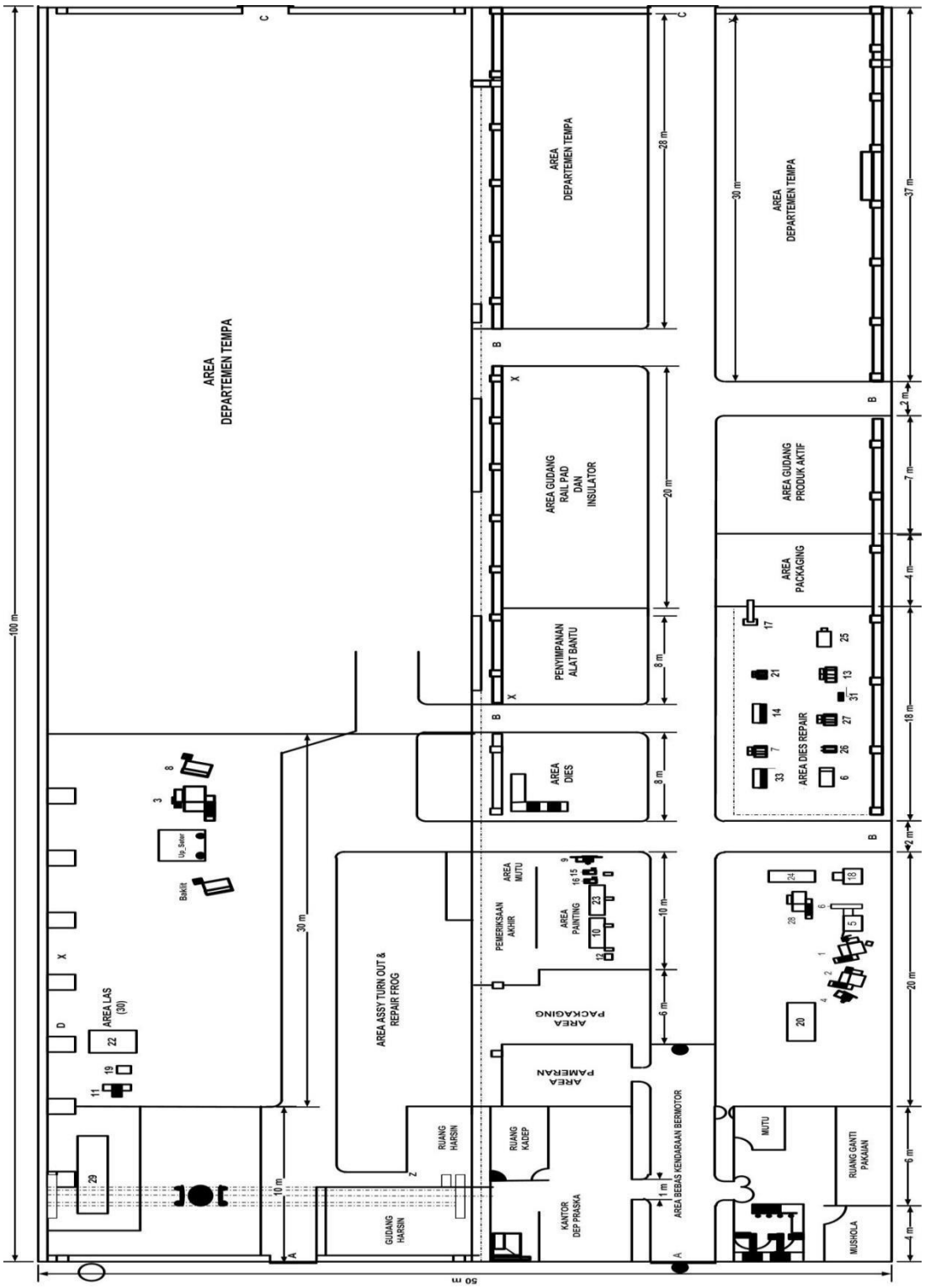
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MUTU
RUANG GANTI PAKAIAN
MUSHOLA
Up_Seker
Bubut
100 m
50 m
30 m
28 m
20 m
8 m
10 m
6 m
1 m
37 m
7 m
4 m
18 m
2 m
9 m

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Proposal layout

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The results of this proposed layout were found in the initial to final process, only changing the appeal process and the painting section process because at the beginning of the layout from the initial process of cutting raw materials to the appeal process they had to cross or not line up on

one side of the pliers in a parallel direction in the raw material cutting process. namely the painting process, therefore the two processes are exchanged

Conclusion

From the research that has been done by the author on the re-planning of the layout of the facilities in the pre-railway department at PT. Pindad (Persero), the authors can draw conclusions, among others:

1. Design that is in the same direction as the workpiece material flow process so that the process of making e-clips from material preparation to the packaging stage can run efficiently.

2. The process flow contained in the infrastructure and railway departments can be minimized costs by moving parts that previously did not match the flow of the e-clip making process such as the appeal and painting processes, both processes had to be moved from the previous layout because the process the appeal must be too far from the withholding process.

3. The process from providing raw materials to getting packing must be in accordance with existing processes from material supply, material inspection, material cutting, material tip slip, heating, bending, shotblasting, dimension checking, heat treatment, prestting gap, inspection, painting, and last in the painting process.

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