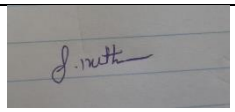
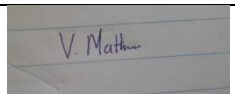
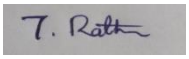
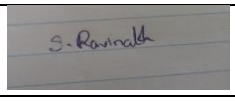
ME3042 Production and Operations Management

Semester 05

FINAL REPORT

Analysis of Production and Operation Management at THAVAM motors

Prepared by

Index Number	Name	Signature	Contribution (%)
190393M	Mithunraaj S.		25%
190387A	Mathiyalagan V.		25%
190512F	Rathees T.		25%
190524T	Ravinath S.		25%

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Contents

Executive summary

Production and operational management will help to manage the facilities and work process efficiently. We can analyse the industry and process using our production and operational management knowledge which will help to use the resources, material, human resources, and cost in a most productive way, and We can create appropriate planning and layout of the process which can produce best result that we can achieve. Cost management inside the industry can create great amount of impact in industry. Forecasting method will help to match the demand that industry have. Overall POM will be useful for an industry in huge way.

1 Introduction

Thavam motor is a small-scale production company of electric motor pump owned by thavatchelvan. It is located in punnalakattuvan. There were several industries in northern and eastern before the war period[MasCan roof ceiling, Belca shorts cloths, glass industry and ext]. But after the war end, we are unable to see those. But thavam is proved that he is a braved entrepreneur. They produce very reliable products. These have long lifetime and able to withstand the conditions in Jaffna.

The company was started by thavatchelvan's father as small scaled home business. With time, it grew up and caught certain market. In 1990's they drop their business due to the war sitiation. and started again in 2000. Now they are at good position.

1.1 Background

Thavam motors is only one company in Northern which used to fabricate electric motor, pump, hand water pump and other complementary products in several scales. They mainly focus on producing electric motor pump. Motor is a prime mover which mainly used in industries and agriculture. It is used to convert electrical energy into mechanical energy form. They produce several course powers motors. They are ¼, ½ , ¾ ,1 and 2 horse power.

Additional to motors, they produce

- Pumps and impellers
- coupling
- Pull valve
- Hand water pump.

Material

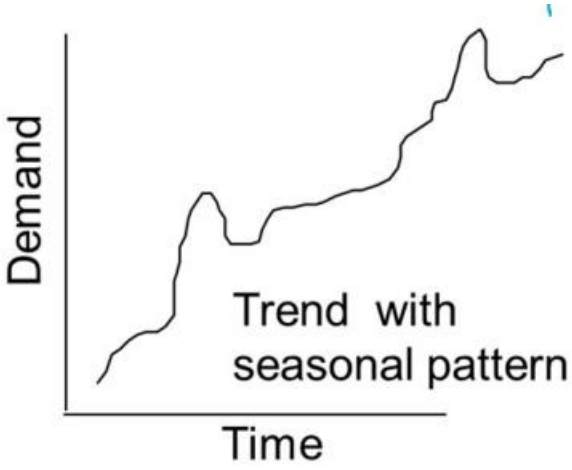
- Steel- to produce motor casing, gap and hand water pump.
- Brass- to produce water pump and impeller to avoid corrosion.
- White cast iron- rotor axis is replace by white cast iron to avoid corrosion.
- Plastic- to contain the condenser and other circuit elements extern to the motor.
- Copper- to produce the core.

Resources

- Labours- getting from the villages where the factory exist
- Electricity- they get electricity from CEB
- Machineries- they have CNC machines, Lathe machines, Hydraulic Press machine, vertical drilling machine, thread cutting machine, 3D printers and grinder.
- Rotors- Import from China
- Coil- They buy from Killinochi based industry
- Metal – They have separated work station for processing old machine parts to usable material

Demand

Their motor pump's demand vary season to season. When it is the summer season demand touches the peak. At the raining season, it come down. Because people are able to get the water pump for home purpose(when constructed building) or agriculture purpose very easily at the raining season. So, they have the peak demand at the summertime.

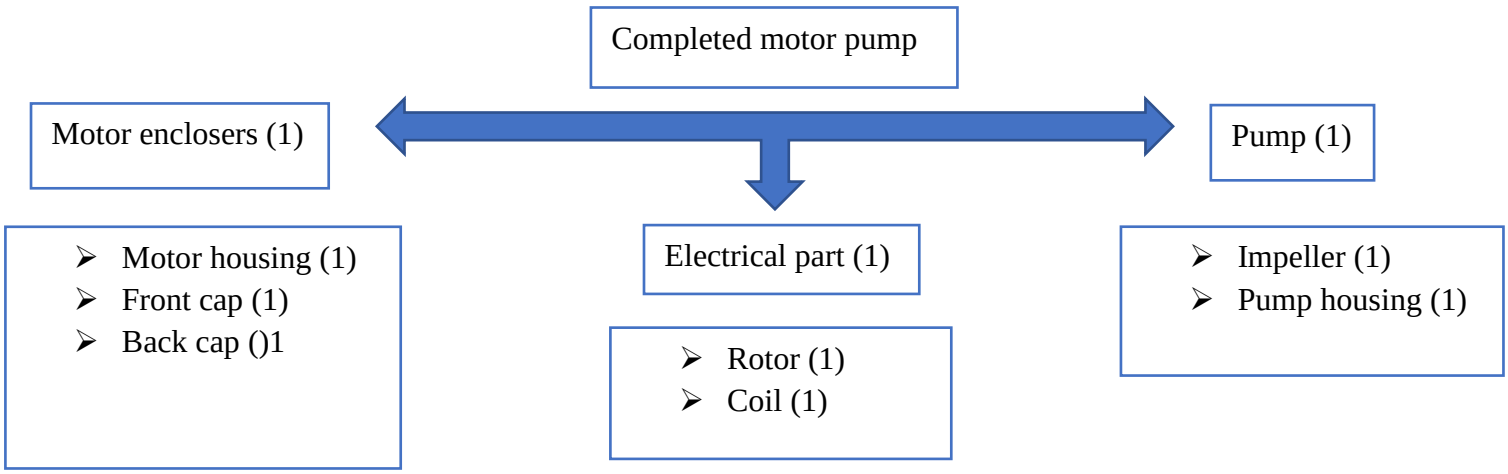


Their actual demand curve is trend with seasonal factor. Their demand is increase for every year due to their quality production.

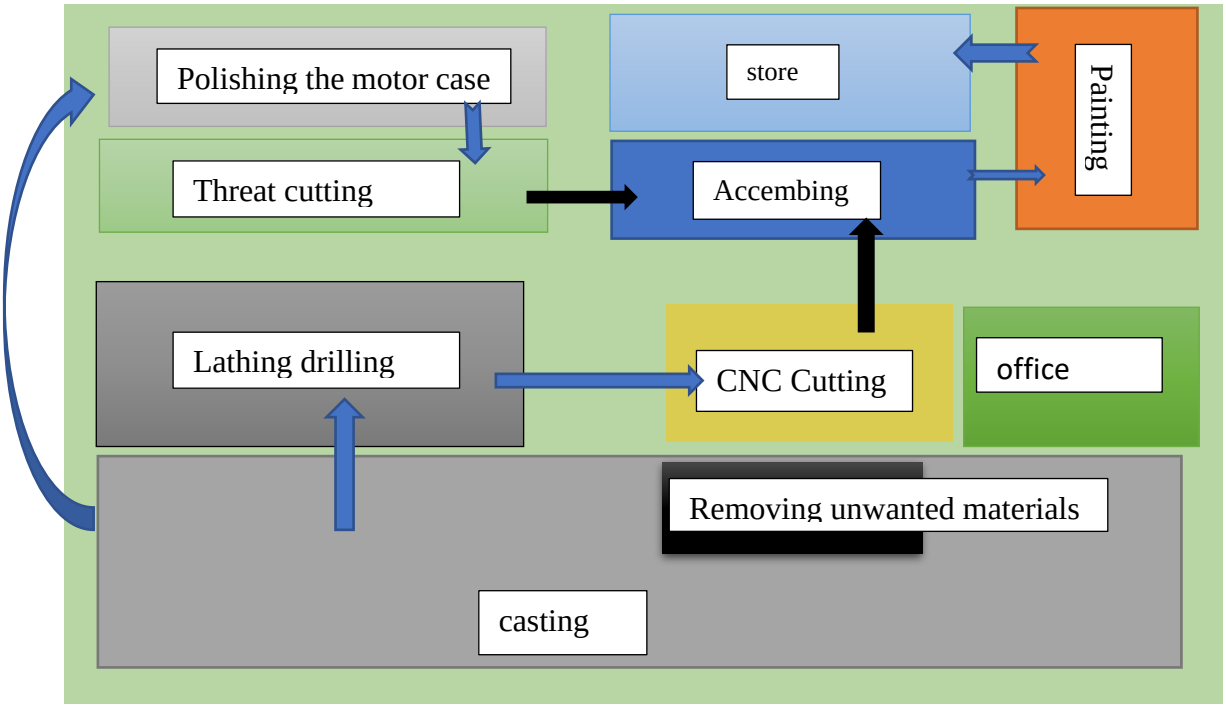
Their current demand management method,

- However, they produce the motors at certain speed. When the demand go down they are keep them in stock and sell when it go up again.
- Addition to that there is another sector which is for part time workers. They call people who are ready to do work in their part time for lower wage.

Structure Tree

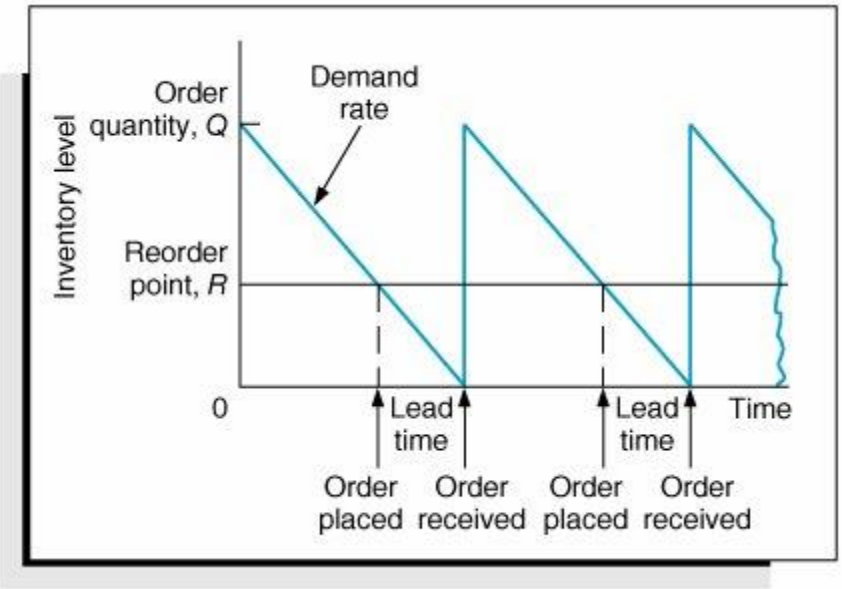


Now Their factory layout,



Inventory management

They do Q-model inventory control system. Its mean they place order when the no of inventory become below to Reorder point.



- organisation, context, activities etc.
- Current work conditions (layout, labour, materials, and required resources, production, scheduling, inventory, demand management etc.)

1.2 Problem definition

1. Their layout is not well planned. They struggle with carrying the working object to each station which are not next to each other. Line balancing need to remodify.
2. They do not use any forecasting methods. They do the job sequence continuously similar manor. So, they must stock more at the training season. Stocking the iron made product is not a clever idea in Sri Lanka due to its environment conditions.
3. Some stations works are temporally stops often due to poor Material requirement planning.
4. High price
5. Limited to northern province- because of unable to give service after sell.
6. Lack of supply at high demand period (summer season).
7. Lack of safety while casting. They do manual casting method. Workers do not flow any safety protocols.

    In these problems we can correct problem number 1,2,3 and 6 with our Module ME3042.

- What are the limitations and issues that you have identified?

    Limited to northern – because of unable to give service after sell

    High price due to high quality
- What can be corrected within the scope of this module?

1.3 Project objectives and scope

Our Project aim is to analyze the industry production and Management system and finding flaws, limitations and problems hence offering solution which can be applied practically to industry by our research and analysis of that industry.

We can proceed by visiting the facility and getting information and analyze based on information coming to solution.

2 Methodology

We can be able to achieve mentioned objectives through series of projects.

First, we field visited and familiarization with the work process

Data collection from mangers or directors regarding financial information and work process from workers and technician

Their working stations

stations	process
Station A	Casting
Station B	Polishing with grander
Station C	CNC operation
Station D	Lathe operation
Station E	Threat cutting operation
Station F	assembly
Station G	testing
Station H	Painting

2.1 Data collection

When we visited, we meet mangers and staff to collect information regarding project, but they don't have enough records to analyze the financial information and product information. They don't have doesn't have enough mangers or operational directors, so it is not a fully organized management, from our visit and information from working staff and workers we able to find lot of information about their operation and work process.

According to the technicians and worker's statement, their demand increased during the summer season and reduce during the training season. As we suggest them to do forecasting method. we are going to give different seasonal factor for each month after hearing their advice.

month	Seasonal factor
December, January, February	0.15
March, April, May	0.20
June, July, August	0.30
September, October, November	0.35

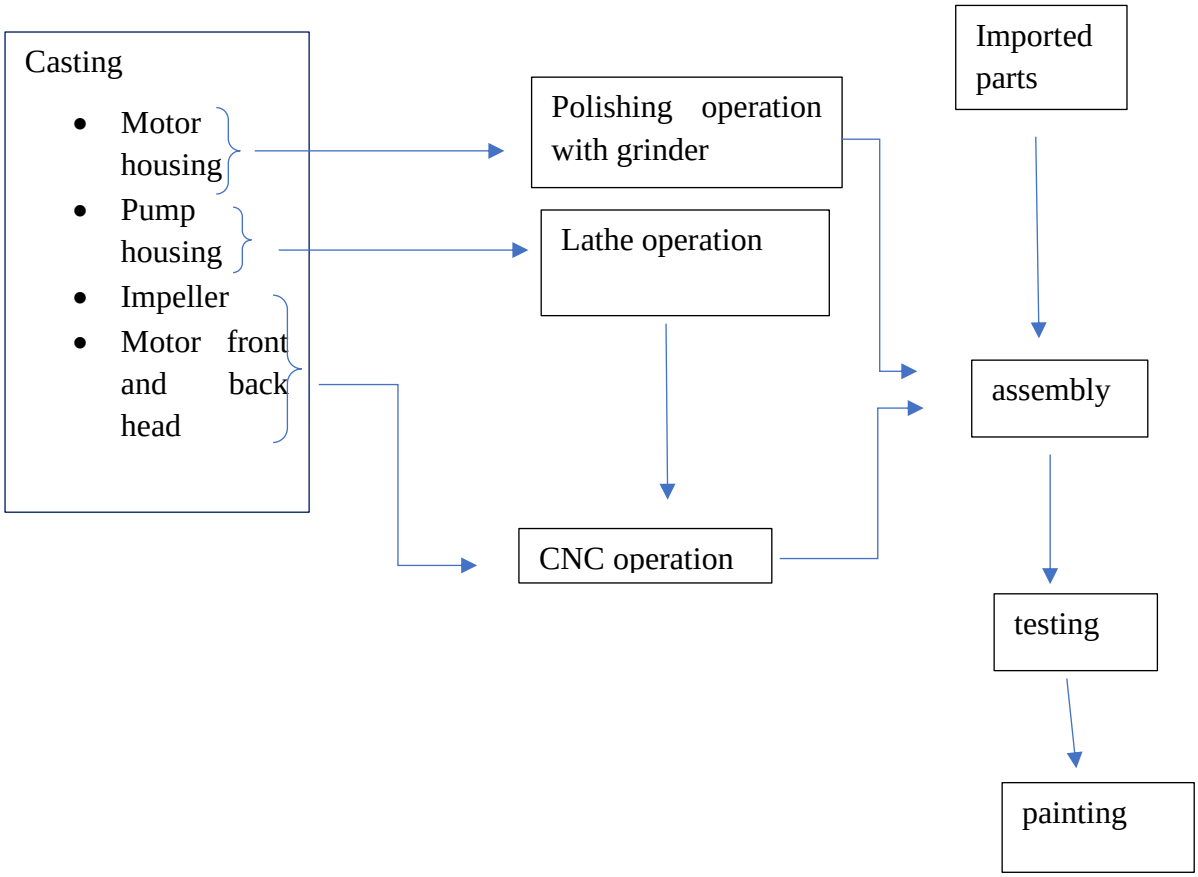
Labour allocation-[presented workers when we visit]

Assembling	3
painting	1
testing	1
CNC maintaining & coding	2
Lathe operating	3
Polishing the housing	2
Removing unwanted part	2
Thread cutting	1
casting	5[casting work done for all parts not only motor parts]
Hand pump fabrication	3
Press machine	1
Service after sell	2
Hand water pump	3
Complement parts	5
marketing	2
management	1

Time taken to some process

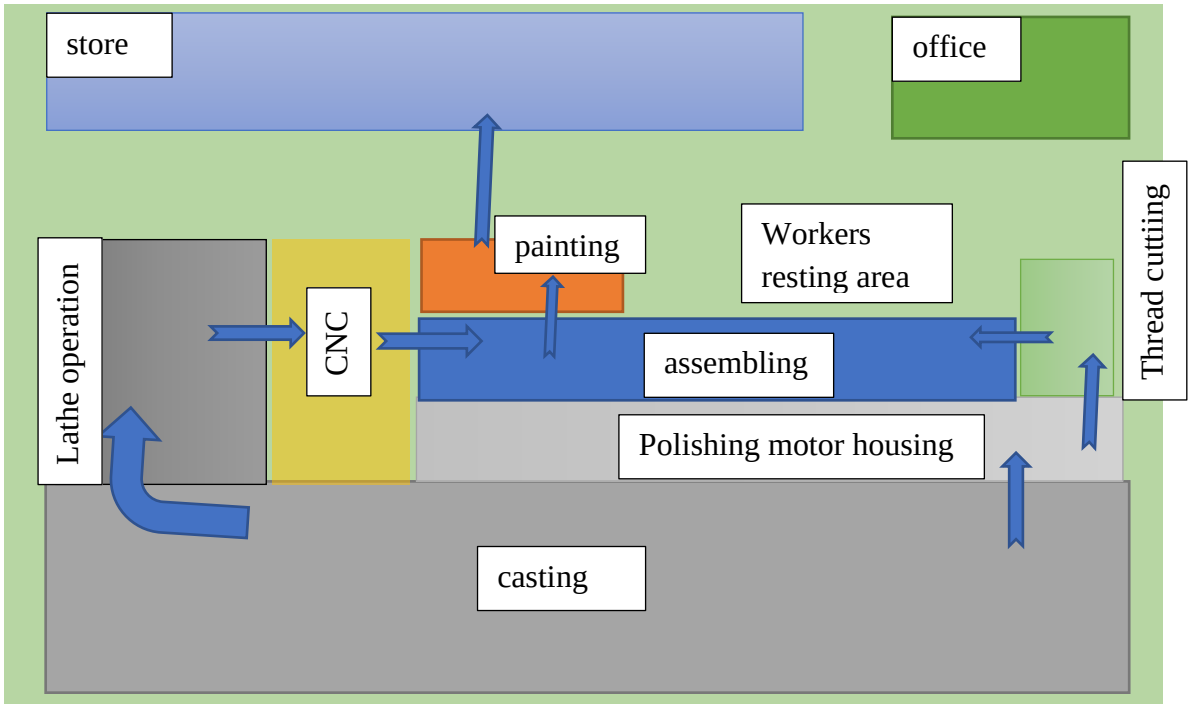
process	Time(min)
Casting process	420
CNC operation for impeller	2
CNC operation for front cap	7
CNC operation for back cap	8
Lathe operation for pump housing	10
Polishing the motor housing with grinder	60

Process diagram



2.2 Proposed modifications

- Replan the factory layout to easier labour carrying stuffs.



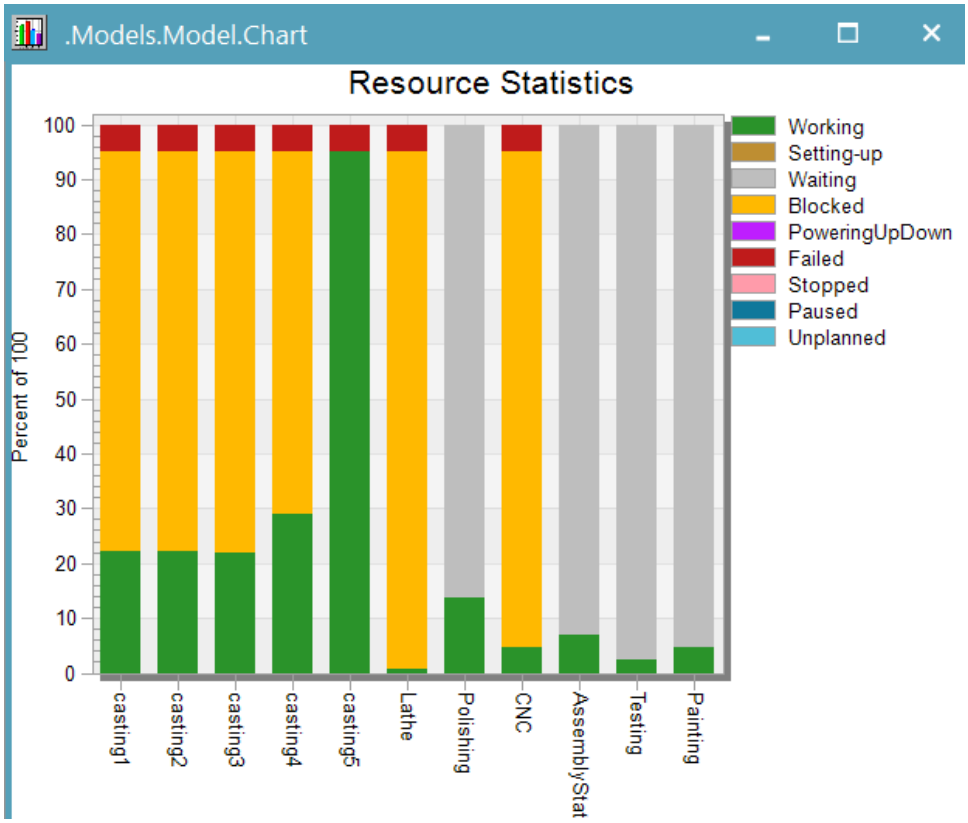
- Suggest the weighted moving average to predict the next month demand.
- With that prediction we can forecast to avoid lack of supply and cost spends for stocking.
-
- Suggest a good material requirement planning.
-
- They do not have enough market to expand their products so first they need to expand market in order create demand.
- Their facilities are small for mass production.
- Available skilled workers also small. So, they need to get qualified workers.
- Since Jaffna is not urban area, they can afford big workstation, or they can make branches to increase products.

2.3 Stimulation and analysis.

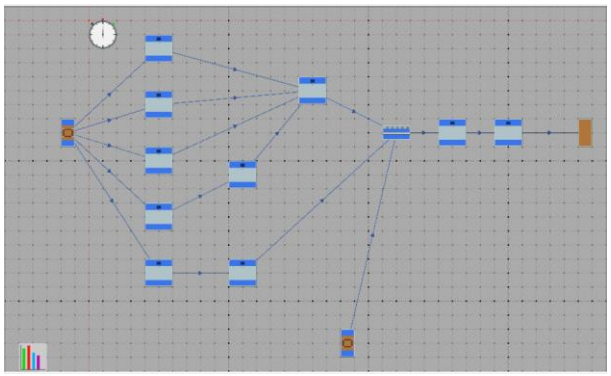
We decided to analysis the productivity of their workstation using the software. Where we can find out the operation time and waiting time layout of their workstation and production line.

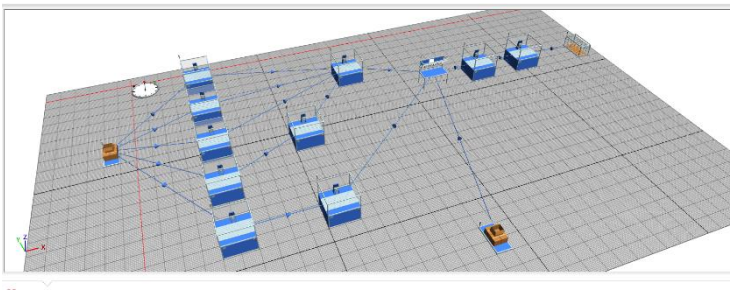
We used Plant simulation software: Tecnomatix to analyze the operation

By using the software and the data we collected, we created a layout to workstations. With the working time and waiting time we created a chart to analyze the productivity of the operation.

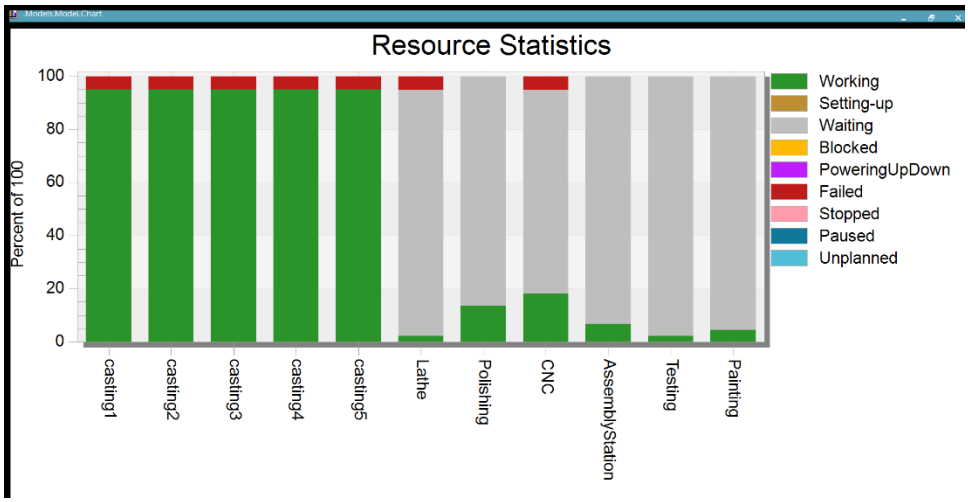


This is the layout they have currently on their process stimualted based on the data collected.

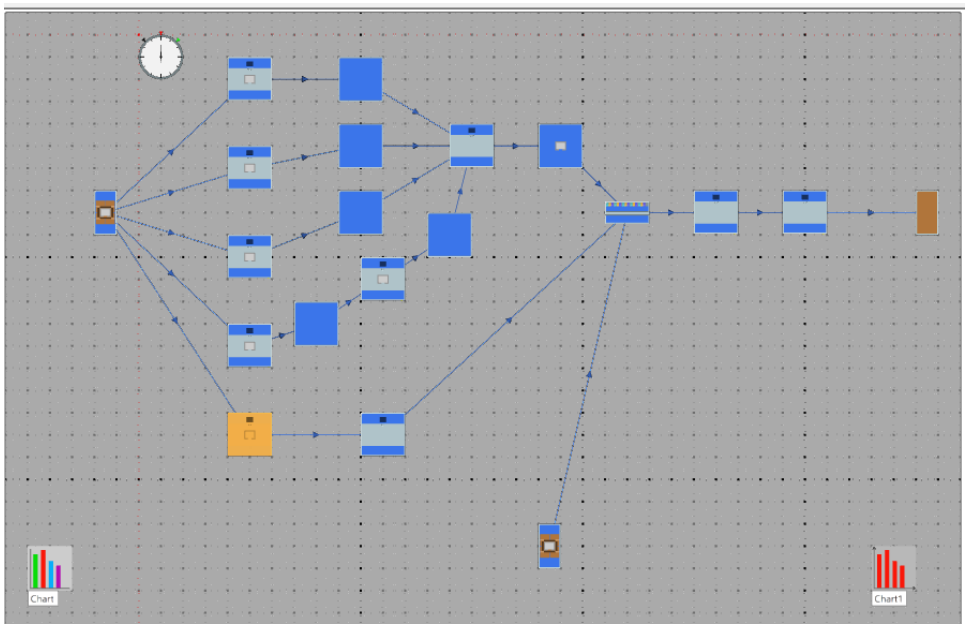




Our proposed modifications are stimulated below. With that we reduce waiting time hence increase the efficiency.



This is new layout we stimulated.



3.Findings

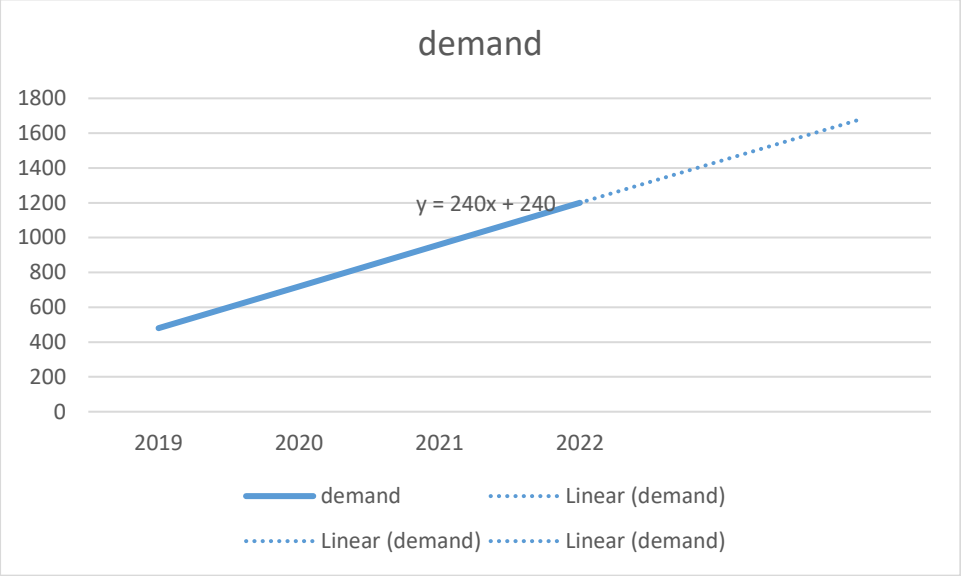
According to the technicians and worker's statement, their demand increased during the summer season and reduce during the training season. As we suggest them to do forecasting method. we are going to give different seasonal factor for each month after hearing their advice.

month	Seasonal factor
December, January, February	0.20
March, April, May	0.25
June, July, August	0.30
September, October, November	0.25

Their demand increased every year. So there will be a trend line for their demand graph.

According to their statement, demand details and year

year	demand
2019	480
2020	720
2021	960
2022	1200



our trend line equation is y=240x+240

So, can predict the 2023 demand.

Demand in 2023 is y= 1440

Demand for each season,

month	Seasonal factor	demand
December, January, February	0.20	288
March, April, May	0.25	360
June, July, August	0.30	432
September, October, November	0.25	360

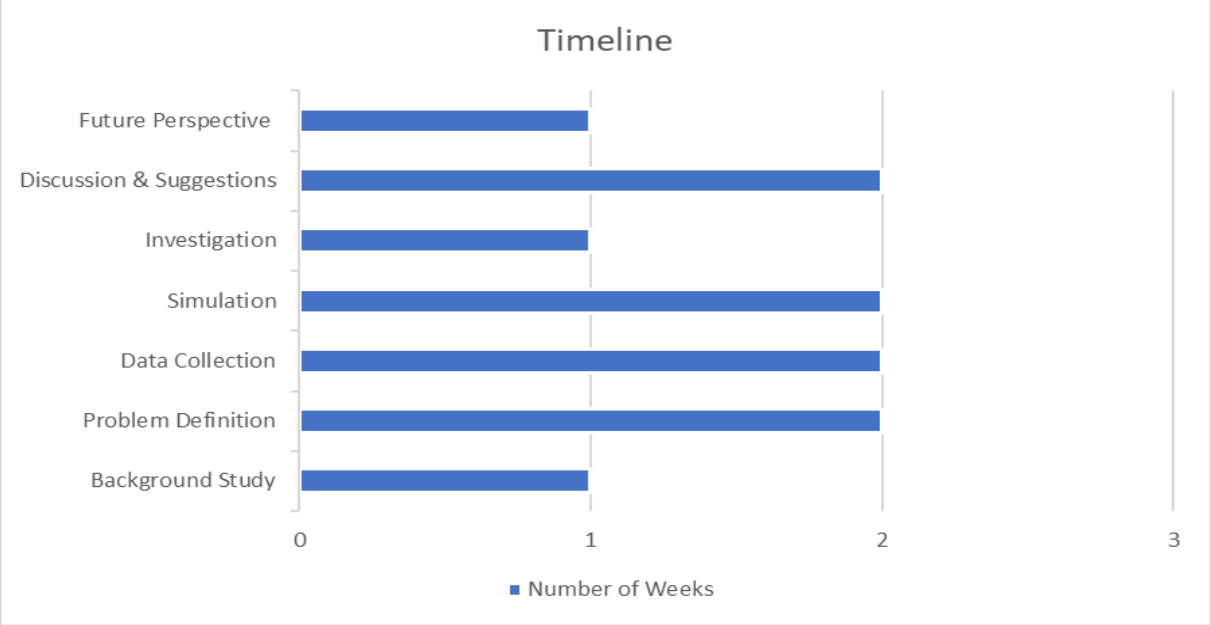
GANTT chart

operations	day1	day2	day3	day4	day5	day6
	8h	16h	24h	32h	40h	48h
casting and cleaning operation for all components						
polishing operation for motor housing						
CNC Operation for motor caps						
assembling motor						
lathe operation for Pump housing						
CNC Operation for Impeller and pump housing						
assembling pump						
final assembling						

3.1 Discussion and Recommendations.

- Bases on forecast we can find that their demand increases year by year.
- In 2023 their demand expected to increase 20 percent from previous year.
- They produce around 30 motor pumps in week.
- They have seasonal demands throughout year.
- In rainy season they have less demand at end of year.
- Their important process is casting it takes around 2 days, then both pumps and motors both sent to separate workstations to further process. Each process takes around 2 days then assembly takes around 2 days.
- So, we recommend producing products according to seasonal demand hence they can reduce stock holding cost.
- Changing the layout of process will increase efficiency.

3 Timeline



- Breakdown of the project timeline by activity

4 Estimated budget

We suggest some changes in layout and management.

For install new layout, we estimate Rs.100 000

For hiring a progress operation manager. We estimate Rs.100 000

These are primarily the changes we recommended. But there are several developments that need to establish to make the business island-wise. Those are

- Install another factory to increase production to manage island-wise demand.
- Start a new sales center island-wise to get customers.
- Do advertising to reach customers.
- Hire more staff and managers
  Those things are very complicated. We are unable to estimate the budget due to the varying prices in this economic crisis situation.

5 Limitations and future work

We took the company from a regional area due to busy semester we could not make many visits to facilities. Since due to diesel shortage their work also reduced so when we visited, we could not see full process.

Due petrol shortage we also affected as its long distance for all members in the group so we unable to travel freely.

Future work

They are thinking of making automation process they already started it needs to grow it bigger and need skill full employees to operate CNC machines.

Carrying molten iron is tough so they look to introduce track where they can carry molten iron through track.

6 References

7 References

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