Central Milk – Facilities improvement, resource allocation and computer aid

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Executive Summary

Central Milk is a factory specializing in the production of stainless milking equipment. They have grown over the past 10 years from producing minor to major equipment and want to continue expanding.

This project is designed to improve the production and quality of all requisite milking equipment as well as increasing the profit margin of the company. Industrial engineering principals and methods would be applied in this environment.

This project therefore concerns:

- A framework for collecting data and applying it to other applications.
- Recommending solutions for different facilities layouts.
- Improvements regarding resource allocation.
- Developing a computer program to aid in the day to day running of the factory.

This project is set within the present boundaries of Central Milk and executed to support the growth of the company.
TABLE OF CONTENTS

Executive Summary ......................................................................................................................................... 2
TABLE OF CONTENTS..................................................................................................................................... 3
1. Figures and List of Tables........................................................................................................................ 4
   1.1 List of figures........................................................................................................................................ 4
   1.2 List of tables ........................................................................................................................................ 5
2. Introduction & Background ......................................................................................................................... 6
   CENTRAL MELK ......................................................................................................................................... 6
3. Project Aim .................................................................................................................................................. 8
4. Project Scope ............................................................................................................................................ 10
5. Literature Review ...................................................................................................................................... 11
   5.1 Data Capturing ..................................................................................................................................... 11
   5.2 Computer aided system ........................................................................................................................ 11
   5.3 Facility Layout ..................................................................................................................................... 16
       5.3.1 Layout types ................................................................................................................................ 16
       5.3.2 Material handling ......................................................................................................................... 17
       5.3.3 Quality control ............................................................................................................................. 19
   5.4 Recourse allocation ............................................................................................................................. 20
6. Data analysis ............................................................................................................................................. 21
7. Design and/ or problem solving .................................................................................................................. 22
   7.1 Resource allocation ............................................................................................................................... 22
       7.1.1 The structure of the business ...................................................................................................... 22
       7.1.2 Proposed changes: ...................................................................................................................... 24
   7.2 Facility layout ...................................................................................................................................... 27
       7.2.1 The four types of activities at the facility are: ......................................................................... 29
       7.2.2 A combination of all the activities that do take place at the facility ......................................... 32
       7.2.3 The proposed layouts .................................................................................................................. 33
       7.2.3.1 Breakdown machines that farmers bring in ............................................................................ 34
       7.2.3.1.1 Small production products ................................................................................................ 34
       7.2.3.1.3 Other Products ................................................................................................................... 35
       7.2.3.1.4 Big machines ...................................................................................................................... 35
       7.2.4 A combination of all the activities that take place at the facility .............................................. 36
1. Figures and List of Tables

1.1 List of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Central Milk</td>
<td>6</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Milk shop cooling tank</td>
<td>7</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Fruit juice tank</td>
<td>7</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Batch pasteurizer</td>
<td>7</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Inline pasteurizer</td>
<td>7</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Milk transport tank</td>
<td>7</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Workshop</td>
<td>9</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Federation of information system</td>
<td>13</td>
</tr>
<tr>
<td>Figure 9</td>
<td>The material handling function</td>
<td>18</td>
</tr>
<tr>
<td>Figure 10</td>
<td>Total quality management</td>
<td>19</td>
</tr>
<tr>
<td>Figure 11</td>
<td>Structure of the business</td>
<td>22</td>
</tr>
<tr>
<td>Figure 12</td>
<td>Central Milk structure</td>
<td>23</td>
</tr>
<tr>
<td>Figure 13</td>
<td>Workflow at present</td>
<td>23</td>
</tr>
<tr>
<td>Figure 14</td>
<td>Solution A: Office section</td>
<td>24</td>
</tr>
<tr>
<td>Figure 15</td>
<td>Solution B: Office section</td>
<td>25</td>
</tr>
</tbody>
</table>
1.2 List of tables

Table 1: Characteristics of resource allocation
2. Introduction & Background

CENTRAL MELK

Zuid str 58, Middelburg, Mpumalanga, South Africa.

Figure 1

The owner J.A. Gilfillan grew up on a dairy farm and after completing his Agricultural Engineering degree at the University of Pretoria he took over the running of the dairy farm from his parents.

In 1990 the farm was bought by a Mining Company and he then started the company. Central Milk, in 1991 situated at Middelburg, Mpumalanga.

The initial operation consisted of the planning, designing and installation of mechanical milking machines, including the overall design of the milking parlour.
When new milking regulations were instituted by the Government in 1994 -1995 he saw the opportunity to start small outlets that sold milk and juice on tap. He developed and manufactured a small cooling tank to sell the milk or juice on tap.

This milk shop cooling tank comes in sizes ranging from 100 to 500 liters. The farmer then installs the tanks in a shop or café and services the milk tank every day. The shop owner sells the milk directly from the tank into the customer’s container at a cheaper price than packed milk.

Central Milk initially started manufacturing stainless steel products like pasteurizers and milk cooling tanks. Since then they have developed and are now also manufacturing stainless steel products in many different categories.

Some of the products that they manufacture is fruit juice and milk shop tanks, batch and inline pasteurizers, egg pasteurizers, trailers, railings, water features, braai’s, biscuit pans, potjieko steamers, egg rings, water bowls etc.
3. Project Aim

The present manufacturing operation is not fully automated due to the fact that they manufacture a wide range of individual products therefore the productivity of the company is low. These individual products require disproportionate factory and storage areas and this in turn is exacerbated by the time taken up in manufacturing individual products.

Production is determined by orders received. The time it takes to make each machine varies according to the parts available, the workers morale and the efficiency of the work being done.

The workers do not have a specific repetitive job and have to wait on the owner for instructions every morning. (If the owner is otherwise occupied the workshop slows down) These instructions may change during the day as the customer requirements come in for example: If during construction of a 800 L pasteurizer intended for stock, they then receive an order for a 600 L pasteurizer that the customer requires by the end of the week. The production on the 800 L pasteurizer is stopped and everybody is now needed to complete the 600 L pasteurizer. This puts a strain on most of the people working there.

Small welding jobs must often be done on an urgent basis for walk-in customers. This stops the production line and usually takes much longer than anticipated as these customers often change the requirements for the job.

In order to address these factors, if may be required to change the flow of work. In this respect the layout of the facility will have to be reconsidered for example the storage area. The raw material should be integrated with the manufacturing line, and the order of the manufacturing should also be considered in order to ensure that is done more efficiently. The size of the workspace may be extended by moving the display area, and rearranging the machines in the work place.
Furthermore the resource allocation is also a problem because the worker’s productivity cannot be measured as it is not possible to ascertain the number of days to finish every machine, because of a lot of variables preventing from doing so.

The machines that are produced are also complex and require a lot of input from the manager Anton. This means that production cannot continue without his supervision. There needs to be a system in place to make sure that production can continue without his presence. This will be possible if there was a computer system in place containing the design of a product and containing a list of all parts needed to complete these jobs.

Another factor to be taken into account is that the workers’ salaries comprise a great percentage of the company’s expenses. There is the possibility that the workers do the wrong work or do small jobs that does not justify their salaries, and this matter will have to be looked at.

The management at Central Milk has made the following list of their problems:

1. Cash flow to buy components
2. Bad communication from office to workshop
3. Bad quality drawings to work from in workshop
4. Equipment old and damaged
5. Low skilled workers with little or no training
6. Final finishing of Stainless steel products below standard
7. Bad Planning
8. Low productivity
9. Not enough space in the workshop
10. Estimation of the cost of products is difficult
4. **Project Scope**

Based on this analysis of the production facility a final business solution can be designed taking into account all components thereof.

The following problems will be addressed and a solution sought:

- A computer program will be developed to assist the workers with their work. Their education is limited and thus the program should be really user friendly. We hope to address the following problems with the program:
  - Access to drawings
  - Step-by-step plan to complete product
  - Lists of materials and components per product
  - Deadline
  - List of stock to be ordered to complete orders
  - Monitoring use of consumables

- The workspace is too small and not structured. The facility layout designs and processes must be clearly outlined. The facility should be designed to improve productivity and product flow. The size of the current facility can be extended by hiring the workshop next door. When developing the new layout we will take this into consideration.

- Improve the quality of the work by improving the equipment and training the personnel.

- Inspect the current allocation of resources (especially how the workers are utilized) and look at possible improvements that can be made. This will entail things like:
  - Amount of people used per product made
  - Worker philosophy used
  - Group dynamics
  - Skilled and unskilled jobs

- The project will be completed before the end of 2009.
5. Literature Review

5.1 Data Capturing

According to Williams, Sweeney and Anderson (2006): “Data are the facts, figures collected, analyzed and summarized for presentation and interpretation”. Data are the relevant raw facts about people, places, events and things that are of importance in an organization. Individual facts by itself is relatively meaningless if taken out of context.

Data capturing is costly and time consuming, thus it should be done as effectively as possible. The quality of information is very important and the source of the data should be reliable and the data accurate. Calculations should be done on the data without corrupting the actual data.

5.2 Computer aided system

Sperotto defines Modern Industrial Engineering as follows:

“…being concerned with the integration of resources and processes into cohesive strategies, structures and systems for the effective and efficient production of quality goods and services”.

Industrial engineers have to be able to work with an information system.

Bentley (2008) gives the following definitions:

An information system (IS) is an arrangement of people, data, processes, and information technology that interact to collect, process, store, and provide as output the information needed to support an organization.
Information technology is a contemporary term that describes the combination of computer technology (hardware and software) with telecommunications technology (data, image, and voice networks).

An expert system is an information system that captures the expertise of workers and then simulates that expertise to the benefit of non-experts.

This is the type of system that we want to implement at Central milk. This will aid the workers to be able to continue their work without an expert being continuously on site to assist them.

The following problem-solving approach will be needed:

1. Identify the problem.
2. Analyze and understand the problem.
3. Identify solution requirements or expectations.
4. Identify alternative solutions and choose the “best” course of action.
5. Design the chosen solution.
6. Implement the chosen solution.
7. Evaluate the results. If the problem is not solved, return to step 1 or 2 as appropriate.

According to Bentley the following information systems must be looked at:

Front-office information systems to support business functions to inform organization’s customers (or constituents) about its services:

- Marketing
- Sales
- Customer management
**Back-office information systems** to support internal business operations of an organization, as well as to reach out to suppliers (of materials, equipment, supplies, and services).

- Human resources
- Financial management
- Manufacturing
- Inventory control

Figure 8
This model provides for an intranet connection between the front-office and back-office. This is where the problem lies in Central Milk. At the moment the owner is the only link between the sales in the front office and the manufacturing in the back office. The manufacturing side cannot proceed without the owner constantly being there. The communication at the management side is also inadequate, which results in a lot of conflict.

The computer program will help assist them to make sure the communication between orders received and manufacturing of products ordered run smoothly.

At the moment Central Milk use the following process in manufacturing:

a) **Existing products**

1. Quotation given to client.
2. Order confirmation and payment of deposit.
4. Order given to workshop.
5. Stock levels checked.
6. Production started.
7. Stock ordered if necessary.
8. Client notified of delivery date.
10. Stainless steel plate cut.
11. Stainless steel plate welded.
12. Stainless steel plate polished.
14. Motors, pumps and electricity added.
16. Serial numbers added.
b) **New products**

1. Discussion with client.
2. Sketches drawn by hand.
3. Calculation of costs and quotation given.
4. Order given to workshop.
5. Stock levels checked.
6. Production started.
5. Stock ordered if necessary.
6. Client notified of delivery date.
7. Product manufactured.

The program that I propose will be able to communicate new orders and deadlines to the workshop. The workers continuously need inputs from the owner/manager which (steps a 7-15) consumes a lot of time. This will make sure that the manager’s input on everything being manufactured isn’t needed all the time. This will give him more time to give quotations and generate work for the workshop. At the moment this aspect is neglected.

This program will also improve the quality of work because the workers will have a detailed step-by-step guide and drawing to work from.

Stock levels will be monitored by everyone and this will improve the stock control. This is because everyone can now see what the stock levels are. At present the stock levels aren’t monitored at all.

The program can be done using Microsoft Access and Visual Basic. This is the preferred program at the moment as Central Milk already has access to it. This program will also make it possible to build a user friendly system.
5.3 Facility Layout

According to Tompkins, White, Bozer & Tanchoco., 2003 facilities planning has shifted away from a science 10 years ago, a science, to being art. There are many factors, limitations and operations to consider when designing facility. The planning process according to Tompkins can be designed as follows:

1. Define the objective of the facility
2. Specify the primary and support activities to be performed in accomplishing the objective.
3. Determine the interrelationships among all activities.
4. Determine the space requirements for all activities.
5. Generate alternative facilities plans.
6. Evaluate alternative facilities plans.
7. Select a facilities plan.
8. Implement the plan.
9. Maintain and adapt the facilities plan.
10. Redefine the objective of the facility.

When designing a facility the following things are important

5.3.1 Layout types

There are different layout types that should also be kept in mind when looking at the layout design. The different types of layouts according to J Tersine are:

1. Process layout
   A process layout is when all of the same type of functional equipment is grouped together in the facility. This is done when a company has to produce a wide variety of products. With this layout the machines are flexible and can be easily used to produce these different products.

2. Product layout
   A product layout is when the equipment is arranged so that a sequence of operations can be performed on the product. This layout ensures that the company can produce
high volumes of products with specialized machines. This however means that the machines are not that flexible.

3. Fixed position layout

This is a more uncommon layout because in this layout the product stays stationary while the rest of the resources are brought to it. This is mostly the case when big machines are manufactured.

At Central Milk a combination of a process and a fixed position layout is used. This makes the planning of the layout a bit more complex. It has big bending and cutting machines with fixed positions in the workshop. They also have smaller equipment that can be moved around. All of this should be kept in mind when designing the layout.

5.3.2 Material handling

Material handling means providing the right amount of the right material, in the right condition at the right place, in the right position, in the right sequence, and for the right cost, by the right method(s) (Tompkins, White, Bozer and Tanchoco).

Material handling is part of any production plant. It is concerned with all aspects of material flow within an organization. Materials handling have the following objectives (Tersine RJ, 1980):

1. Eliminate handling where possible
2. Minimize distance traveled
3. Minimize goods in process
4. Provide uniform flow that is bottleneck free.
5. Minimize losses from waste, theft, spoilage and breakage.
The material handling function (Tersine and Camble, 1977)

The material handling function is characterized by inputs and outputs with restraints and flow factors as indicated in figure 10. Material handling offers an important opportunity for cost control and increasing operational efficiencies. If mishandled, individual functions will be duplicated, resulting in increased cash and inefficiencies.

At Central Milk there is the possibility that products are handled more times than required, this factor gives an opportunity for improvement. The flow of the work in the workshop was adapted as the company grew and was not necessarily planned for optimal efficiency.
5.3.3 Quality control

Quality is a predictable degree of uniformity and dependability, at low cost and suited to the market (Gitlow, Oppenheim, Oppenheim and Livine, 2005)

The purpose of quality control is mainly to (Tersine, 1980):

1. Maintain design standards
2. Meet customer specifications
3. Spotlight and correct process discrepancies
4. Determine department effectiveness.
5. Find and correct defective products.

According to Kolarik WJ, (1995) the three components of total quality management are customer focus, continuous improvement and total involvement as depicted in figure 11

At Central Milk the customers are not always satisfied with the work alone. Customer satisfaction can be improved by training the personnel and incorporating a new computer program to assist the workers.
5.4 Recourse allocation

Characteristics of resource allocation can be shown in the following table (Bower & Gilbert, 2005).

<table>
<thead>
<tr>
<th>Structure</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge is dispersed across levels and units</td>
<td>Processes are dispersed across levels and units</td>
</tr>
<tr>
<td>Power to make commitments is dispersed across levels and units</td>
<td>Activities of all sorts proceed simultaneously</td>
</tr>
<tr>
<td>Roles are narrowly defined and inevitably in conflict</td>
<td>Processes are iterative</td>
</tr>
</tbody>
</table>

Table 1

Resource allocation will be really important with regard to the company’s workforce. The workforce fluctuates a lot because of the variance in demand for products during the year. It will be important to know what the right amount of people would be to be employed by Central Milk.

At Central Milk they have the following people working in the workshop:

- 5 tick welders
- 3 polishers
- 1 cutter
- 1 bender
- 1 spot welder
- 3 preparers
- 2 CO₂ welders
- 2 Artisans: Cooling and electricity
- 1 Workshop manager
- 1 Cleaner
- 1 Painter
For each job a different task force is needed. For example: The workers needed in the manufacture of big equipment are:

- Workshop manager
- Cutter / bender
- Polisher
- Welder
- Cleaner
- Artisan

The workers needed to manufacture small items are:

- Workshop manager
- Cutter / bender
- Cleaner
- Spot welder

The problem is that for most areas of manufacturing the company uses the same type of workers. This means that if an urgent job comes in, the workers are taken off from whatever job they are doing to assist in completing the urgent job.

This is a big problem because the other work is then neglected. The productivity of the workers decreases because they have to move from job to job. The work also gets delayed and deadlines are missed. The productivity of the workers cannot be measured because of this shift between jobs.

By re-assigning the workforce some of these problems may be addressed.

6. **Data analysis**

Most of the data collected has been analysed and incorporated in the above study. However there is still some data that needs to be collected and analysed. Data still to be captured is:

- Time studies of the workers
- Time studies on different machines
- Machine capacities
- Literacy levels of workers
- Thorough investigation of product list.
7. Design and/or problem solving

7.1 Resource allocation

7.1.1 The structure of the business

All these companies operate from the same offices but originated from Central Milk. This means that they have to share floor space. Bouvest buys and sells secondhand milking equipment. Storage of the milking equipment takes up a lot of space in the facility. If a machine is bought and needs to be repaired before reselling the repairs is done by Bouvest (was done by Fixtrade in the past).

Central Gas operates distributes gas bottles and other gas products. This company also operates on its own.

Anton Gilfillan used to be a part of all these businesses but at the moment his main focus is on Central Milk. This project is concerned mostly with Central Milk but the presence of the other two companies in the same facility should be kept in mind when doing this project.
The Central Milk structure at present:

![Central Milk Structure Diagram](image)

The workers are also allocated to specific jobs. The problem with this structure is that in Central Milk alone, 18 people are employed. Central Milk has the store manager and the workshop manager but the workers must still be managed. This is mostly because he has the knowledge and doesn’t have a system in place to help him. This is the result of the Central Milk (Anton) possessing the knowledge of manufacturing processes and the fact that there is not a managerial system in place. Consequently the manager’s presence is required in order to ensure that paid workers do not become idle. Furthermore, the fact that many workers are unskilled means that they have to perform work they are not qualified for.

The workflow system:

A potential customer phones the shop. It’s transferred to Anton. He talks to the person and then works out a quote for whatever the customer wants (this usually includes a sketch of whatever the customer wants). If the customer confirms the order by paying the deposit of 50% of the price he goes to the shelves to check if there is enough stock to produce the machine. He orders new stock. He takes the sketch to the workers and explains to them what he wants to be done. They start production but needs his input every time they have a problem. He is the only skilled person in the workshop that knows how to do the electricity and testing of machines. After machines are tested serial numbers are put on and after final payment the machine is delivered. The red crosses indicate the places where the owners input are needed.
The system can be broken up into two sections. The office (orange) and the workshop (blue).

7.1.2 Proposed changes:

7.1.2.1 The Office section:

Solution A:
When the manager gets a call he can give the quotation to the right hand man. His job is to make a drawing and work out how much the machine will cost. The quote is then discussed with the manager and then given to the customer. When the customer confirms the order the order goes back to the right hand man so that he can go and check the stock levels. The order can then go to the workshop.

Solution B:
There is also the possibility that the manager is taken away from the answering of the phone. This will ensure that he does not get stuck to talking on the phone for up to 30 minutes at a time with a customer that someone else in the workshop could have helped. This will also ensure that if someone in the workshop needs his assistance he doesn’t also need to wait 30 minutes idly for the manager. In this design a store manager will be appointed that makes sure that Anton is not involved with the stock at all. This store manager will make sure that if an order comes in, he checks the stock and orders new stock if needed. He also needs to keep record of the stock.
7.1.2.2 **The workshop section:**

**Solution C:**
There is a workshop manager at the moment but his job description is very vague. He will be required to obtain all the parts that are needed to manufacture the product. He needs to be up to date with the sketch so that the workers who need assistance can ask him for guidance. This is really important because this is the area where a lot of production time is lost. This workshop manager needs to be trained in motors, pumps and electricity so that he can do the work and then test the machines.

The manager will now be cut out of the workshop completely. This ensures that small problems now get handled by the workshop manager. The manager will have more time to do other work. The communication between the manager and workshop manager needs to be good to ensure customer satisfaction, meeting of delivery times etc.
The picture shown above only indicates work done by workers who produce standard machines and not the unplanned work that constantly interrupts the work flow. In this process the performance of workers cannot really be measured. This is mainly because workers get interrupted with more urgent work. This cannot be avoided because deadlines change and unplanned work regularly interrupt their work flow.

KPI’s (Key Performance Indicators) can only be introduced if the work process in the workshop is changed. This is necessary because in a company you want your workers to be as productive as possible. This will ensure that work can be measured and works perform optimally.

**Solution D:**

There is a way that KPI’s can be implemented in the production of standard machines. The workers will have to be divided into two groups. Because unplanned work can’t be eliminated a planned and unplanned worker force will be implemented. The planned workers will know what they need to do for the next two weeks. This gives them enough time to prepare for the work and deadlines will make sure that they finish their work on time. They will not be interrupted for any reason, and therefore can keep their focus on the job at hand. Planned workers will now be productive and can be measured with KPI’s because they work independent of the rest of the workers.

The unplanned workers will be able to move around in the workshop. They will do work were they are needed. They will also be responsible to attend to breakdowns of machines being delivered to the workshop and which need to be repaired urgently. This workforce will not be measured because they don’t have a fixed job. But they will be required to do work that does not always fall under their preferred job.

There is section in the factory that produces small equipment like egg rings, baking trays etc. If the unplanned workers do not have work for the time being then they can help out at this section. It is important to note that the workers that are permanent at this section can also be measured with KPI’s.
7.2 Facility layout

Central Milk makes a wide variety of products. The layout of the facility requires an understanding of what the products they make and how often they are made. The sizes and quantity of the products also vary. This results in an in-depth study of the various products.

The company has a section that makes small products like biscuit cutters, egg rings, braai pans, etc. These products can thus be organized into a production line. At the moment they don’t have fixed workers that work on this production line. Workers that do not have work on any day can go work on this line. This means that if a production line would be introduced fixed workers will have to be assigned. Keep in mind is that these products are a small minority of the products that the company produces.

The major part of the workshop produces milking equipment. This equipment varies between new products (pasteurizers, milk tanks, fruit juice tanks, etc.) and existing products (piping, pumps, etc.) that they modify. The customers are usually farmers or shop owners. They are usually impatient and if they order something they want to come and collect it the same day. Production takes more or less 10 working days. This results in management moving resources to help produce the pasteurizer so that they can keep the customer happy.

The problem with this is that they don’t have fixed people doing fixed work. This also results in big fluctuation in the number of workers needed during the year. If there is a lot of work the space gets crammed and a lot of people are hired in order to complete the work. But as soon as demand falls the workers don’t have work. The management is now forced to make products that they don’t know for certainty will be in demand in the future. This results in over production and also wasted material and space.

Central Milk obtained a license to build trailers but stopped after a while. They now have about 15 trailers already built and the space to build new trailers, but aren’t building any at the moment.

The farmers bring in equipment that broke down; these are also fixed at the facility.

In the current workshop are the following areas:

1. Reception and offices
2. Display area – some of the products are displayed here
   a. The customers walk around in this area
   b. It is very noisy and you can see into the workshop area
   c. Some of the customers walk into the workshop and this disturbs production and safety
   d. The area is never clean of dust
3. Stock and consumables
   a. The area is open to customers and workers
   b. Lots of traffic in this area
   c. No control over stock used
4. Stainless steel sheet  
   a. Sheets get scratched and damaged  
   b. Control on what is used is difficult  
   c. The wrong material is sometimes used - and then WASTED

5. Off cut machine  
   a. Very small area  
   b. Difficult to fit the sheets in the machine  
   c. Off cuts are left in bins behind the machine

6. Bender  
   a. More space around this area is needed  
   b. Extra parts of this machine are left lying around – there is no space to store it in.

7. Welders  
   a. Each welder has his own space and work table  
   b. Each welder has a different colour toolbox and tools
8. Polishers and cleaners
   a. There is little space for them
   b. They sometimes have to work on the floor.
   c. There is no space to keep their tools
   d. Products that have been completed sometimes get scratched again and have to be redone

The flow of work in the workshop changes for each situation (keep in mind the size of products is really big).

7.2.1 The four types of activities at the facility are:

7.2.1.1 Breakdowns - machines that farmers bring in (Usually for same day repairs)

- Farmers bring in vacuum pumps and milking machines
- These need to be fixed in a hour or so
- They go to the testing area to find the problem
- Spare parts get fetched from stock
- Welding of new or broken parts
- Everything is assembled
- Testing takes place again
7.2.1.2 Small production products

- Stainless steel sheets arrive
- The sheets are placed in the back
- The measuring and cutting takes place
- Bending is done next
- The product is now finished by hand at the workstation
- The completed products are moved into the display area

7.2.1.3 Other Products

- Sheets are delivered in and are place in bins
- Measuring, marking and cutting
- Bending
- Welding
- Polishing
- Testing
- Moved to display area
7.2.1.4 Big machines

- Sheets are delivered and are placed in the bin
- Measuring, marking and cutting
- Bending
- Welding
- Polishing
- Electricity
- Pumps
- Testing
- Serial no, stickers added
- Move to display area
7.2.2 A combination of all the activities that do take place at the facility

The congestion areas are shown in the black circles. This is a problem. If a big machine comes in then workers cannot move through that walkway at all. The reason for this congestion is mostly because the stock area is at the back of the workshop. All the material that arrives must go through the whole facility to the stock area for storage. Then stock is pulled from there which means that workers walk up and down every time they need something.

The white area at the bottom of the page is the new area that they hired to expand business. Bouvest moved in there but not all the space is used, so that Bouvest can use the extra space for a display area and move all finished product to that area.
7.2.3 The proposed layouts

7.2.3.1 Proposed layout 1

One of the big changes in the layout is the moving of the stock area moved from the back of the facility to the front. This means that that material handling times will be reduced.

This layout ensures that when raw material arrives at the facility it can be stored immediately. The material is next to the big bender and cutter which were moved with the stock to the front of the facility. The area for producing small products was moved into their own area and separated from the rest of the activities. This opened up free space in the facility to ensure
that polishers will have a permanent place where they can do their work and that the company
can also implement a preparation area in the facility. The testing area is next to the new area.
This ensures that as soon as a machine is in working condition and has been tested, it can go
through to the display area immediately. The old office stays where it was but only Anton
sits there. It is more quite and gives him more quality time to do his work. The new offices
are used by all 3 companies and Central Milk is also operated from there even though Anton,
the manager, sits next door.

7.2.3.1.1 Breakdown machines that farmers bring in.

- Farmers bring in vacuum pumps and milking machines
- These need to be fixed in a hour or so
- They go to the testing area to find the problem
- Spare parts get fetched from stock
- Welding of new or broken parts
- Everything is assembled
- Testing takes place again

7.2.3.1.1 Small production products

- Stainless steel sheets delivered
- They are placed at table outside
- The measuring and cutting takes place
- Bending is done next
- The product is now finished by hand at the work station
- The completed products moved into the display area
7.2.3.1.3 Other Products

- Sheet delivered placed in bins
- Measuring, marking and cutting
- Bending
- Put at the preparation area
- Welding
- Polishing
- Testing
- Display area

Figure 27: Workflow – Products

7.2.3.1.4 Big machines

- Sheet delivered placed in the bin
- Measuring, marking and cutting
- Bending
- Put in the preparation area
- Welding
- Polishing
- Electricity
- Pumps
- Testing
- Serial no, stickers added
- Moved to display area

Figure 28: Workflow – Big Machines
7.2.4 A combination of all the activities that take place at the facility

The flow in the workshop will be improved by moving the stock to the front of the facility. This reduces material handling. It also reduces lost time that workers just stand about and talk to each other, as they will not have the opportunity to talk that much. The small production department is moved to outside. This split up different departments that will help with housekeeping and better productivity. Organization in each department will also be easier.

There is also a preparation area that ensures that work can pile up at the welders and that they can just start with new welding work with completion of the previous tasks.
The display area is on the other side of the facility. This ensures that only products that are completed are moved to the new facility and that dirty equipment and parts laying around will not litter the display area.

Fixed polishing areas will improve the quality of products.

7.2.3.2 Proposed layout 2

In this layout planned and unplanned work areas are created. The planned area will now be able to work as efficient as possible. The planned area work force will know their production schedule in advance and will be able to do work without interruptions.

The unplanned side will do the all unplanned incoming work. They will shift between jobs according to its urgency.
The main reason for this layout is so that the workers can be measured to their performance. This will be done with a KPI (key performance indicator) system. This helps a company to see if their workers are working as productively as they can.

The idea behind this is to move more and more workers from the unplanned side to planned side. All the workers cannot be moved to the planned side but with more planned workers productivity can be measured more accurately.

The workflows look as follows:

### 7.2.3.2.1 Planned work

- Stock delivered
- Work done according to schedule
- Work and workers are fixed
- Job done and send to test area
- Tested
- Sent to display area

### 7.2.3.1.1 Unplanned work

- Stock delivered
- Work arrives in disorderly fashion.
- Work done according to its priority
- Job done and send to test area
- Tested
- Sent to display area
7.3 Computer aided design

The program that designed for Central Milk will work as follows:

7.3.1 Login menu

This is a security function that will protect all Central Milks intellectual data. The program will only go to the main menu if the right username and password is entered. If the data is entered incorrectly nothing will happen.

7.3.2 Main menu

The main menu will now appear. This gives the user the opportunity to open Pastel look at quality processes and look at the products. If the user clicks on the products icon the following menu will appear.
7.3.3 Products

Again the operator of the program can choose between what type of product he wants to see. For the purpose of this example “Machines” is chosen.

7.3.4 Machines

They make a lot of machines at the facility and again “Pasteurizers” are choosen for demonstration purposes.
7.3.5 Pasteurizers

This is the window that the worker wants to get to for extra aid in his work.

This window gives a list of equipment on the side of the screen, where different sizes of pasteurizers can be selected. This will change the image and information on the right hand side of the screen according to the different machine chosen.

At the top of the info box there are different tabs. This will be the place where the worker will get the information required. He picks a machine, confirms it with the picture and then clicks on any of the above tabs. If he wants to know how what the sketch of the machine looks then he just presses on the “Sketch” button. This will take him directly to the skets attachments.
The user can add any attachments and open any file that was attached. The files can be in different formats like MS Word, CAD etc. His options are “Sketch”, “Kits and costs”, “Manufacturing procedures”, “Spot checks” and “Testing”. All these windows will have attachment functions and any info can be added as received.

The “Manufacturing procedure” option will give him a step by step plan of how the equipment is made. This will help the manager to make sure that when the worker produces the machine, he uses the right procedures. Lets say he needs to drill a hole into something. If he looks at the procedure he will see that he has to clamp the metal in the grip before drilling. This ensures that shortcuts are not taken resulting in low quality products. However, workers will not necessarily follow the procedure but this problem can in any case only be addressed by putting the whole process in place and train the workers on using it. With the right training, new workers will also be able to produce machines.

The “Spot checking” option ensures that the worker knows when he has to check his work to ensure that something is not neglected. This helps with quality and to ensure that the product is made 100% to specification.

The “Testing” option happens at the end of the cycle. The finished machine is tested according to different standards and this will be done to the specification that is attached to that product.

One of the main things that this program does is it ensures that files at the company does not disappear in the system. Central Milk has over 14,000 files on their systems but only Anton has a slight idea to find some documents if needed. Every time he has to build a machine he starts to design it from scratch because he cannot find the document or it is outdated. This will ensure that if a document is attached to a specific product that it will easily be traceable and important information will not be lost. This will ensure that old documents can also be seen and used to make updated versions. This database will help tracking files on the Central Milk computer systems.

This program is user friendly and enables the user to add and delete records as he wishes. The program might still evolve as management thinks of more ways to implement this into their workplace.
7 Conclusion

At this stage in Central Milk’s growth as a company there are a few critical areas where improvement can take place.

The aim of this project is to help Central Milk grow further and ensure that its operations can proceed more independent from the continuous attention of Anton (boss). A lot of research and data gathering have been done to help assist with this project. The following improvements will help Central Milk achieve this goal of improvement:

- A computer program will be developed to assist the workers with their work.
  - The program will consist of
    - Drawings
    - Step by step work plan
    - Photos of completed products
    - List of components
    - Things to order
    - Special information

- The new facility layout.
  - To improve the workflow
  - To minimize time lost by walking and talking
  - To improve safety
  - To improve quality of work
  - To improve productivity

- Improve the quality of the work by improving the equipment and training the personnel.
  - Personnel will be trained to use the new program
  - Training courses to improve the quality of work
  - More work space will allow quality to improve

- Better resources allocation.
References


