CASE STUDY

Total MRP based MIS in a Small Manufacturer
TOTAL MRP BASED MIS
IN A SMALL MANUFACTURER

by

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INTRODUCTION

Thermosole is a small plastic component manufacturing company for the automobile industry. The processes are Blow Molding and Injection Molding. It also specializes in in-house mold manufacturing.

During 1997 Thermosole was racing towards achieving ISO 9002 certification. Being a quality parts supplier to international automobile companies, good control over manufacturing, on-time delivery, zero parts failure, and zero returns were essential. To achieve this, the administration of the whole company had to be restructured, and reorganized many times. After certification there were more problems!

A whole new complex documentation system was incorporated, and every person started feeling the pressure of the day-to-day paperwork. As a result, the Company started looking around for an MIS (Management Information System) that would:

1. assist in the management of the mountain of documentation related to ISO
2. block all the failures of an administration heavily dependent on human actions
3. keep pushing all activities and work on the PULL SYSTEM.

Problems due to non-existence of a proper MIS were:

1. Delay in jobs
2. Delay in completion of documentation
3. Leap-frogging of activities resulting in uncompleted filing.
4. Absence of monitoring

Being a small organization, THERMOSOLE could not afford a battery of managers. It needed something to keep it up-to-date on all its activities, including on-line:

1. production of each work center
2. progress of mold manufacturing in relation to the customers' schedules;

and status of the:
3. Raw Material inventory, including semi-finished and finished goods.
4. purchase and billing
5. finances, including cashflow
Off-the-shelf software could address our sales, purchasing, and inventory issues but could not cater for the changes required in the characteristics of the raw materials. The complex demands of a manufacturing environment could not be adequately handled. The required solution had to track and monitor the manufacturing process as well.

The MIS in use from the early eighties, was on main frame computers, affordable only by large multinational companies. A small company could not think of installing or implementing such expensive equipment. However, the personnel computer (PC) with MRP software has now made this possible.

Thermosole contacted a local company and a Total MRP (including MRP 1 (material requirement planning), and MRP 2 (Management Resource Planning)) software was installed. This software tracks and manages the manufacturing production cycle, from the receipt of raw materials, through to the finished goods. These processes require the tracking and managing of inventory, labor, work centers, and in many situations, outside services. It generates work orders, purchase orders, forecast demand, inventory requirements and capacity planning schedule.

MRP 2 has the ability to achieve the following:

**WORK ORDER**
- Define a bill of materials for all subassembly, and finished good items
- Define the routing steps and the procedures that are to be followed in each step
- Generate work orders from the Customers orders
- Back-flush material and costs when a work order is closed
- Record the actual outside labor expenses for every manufacturing step
- Calculate the labor expenses for each work order, including the man-hours and the employee code for each manufacturing step.

**PRODUCTION SCHEDULING**
- Suggest work orders based on the actual and forecasted demands.
- Suggest purchase order based on the actual and projected stocks.
- Approve suggested purchase and work orders, and place them on Production
- Identify excess capacity requirements.

**INVENTORY**
- Inventory usage for each work order
- Determine individual inventory requirements
- Schedule receipt of raw materials when they are required

A reliable Network was established enabling all the inputs that the MRP 2 needed. The older 486’s were also brought into the network and slowly upgraded. Every employee on the shopfloor was trained to input his data directly the computer without the use of any paperwork. This has three advantages:

1. Reduction in wrong inputs,
2. Immediate and accurate outputs
3. No increase in staff
Thermosole Industries Pvt Ltd

Networking

- CEO's Home
- Finance
- Customers
- Accounts
- Admin
- Admin 1
- Production
- Production 1
- Quality
- Store

Connected Accessories

- Camera Capture
- TV Tuner
- NT Server
- Writable CD
- UPS
- Internet Connection
- Fax

Internet Connection

- Canon Bjc 210sp
- HP 1100 Laser Printer
- Epson LX 300
- Canon Printer

Prepared By Sajid Maqsood
Costs / estimates were as follows:

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Head</th>
<th>Rs</th>
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<tbody>
<tr>
<td>1.</td>
<td>Hardware depends on:</td>
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</tr>
<tr>
<td></td>
<td>- organization structure</td>
<td></td>
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<td></td>
<td>- no of departments</td>
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<td></td>
<td>- the amount of data</td>
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<tr>
<td></td>
<td></td>
<td>Rs 650,000/-</td>
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<td>2.</td>
<td>Software depends on:</td>
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<td></td>
<td>- Stock Management (inventory control)</td>
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<td></td>
<td>- Customer Order Processing</td>
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<td></td>
<td>- Production planning</td>
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<tr>
<td></td>
<td>- Purchase Multinet</td>
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<td></td>
<td>- Work order processing</td>
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<td></td>
<td>- Shop floor processing</td>
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<td></td>
<td>- Sales Multinet</td>
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<td></td>
<td>- Payable Multinet</td>
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<td></td>
<td>- Financial Ledgers</td>
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<td></td>
<td></td>
<td>Rs 650,000/-</td>
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<tr>
<td>3.</td>
<td>Staff Training</td>
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<td>Rs 40,000/-</td>
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Total MRP 2 offers the opportunity to schedule present as well as future orders without any actual demand. It generates suggested work orders that can be approved and placed into production so that finished goods are available in a timely manner.

To ensure that materials are ordered in a timely manner, MRP 2 breaks down the material requirements for actual and forecasted demand to generate suggested purchase orders. After these are approved, actual purchase orders are created. These two features, commonly known as MRP and MPS, ensure that materials are available when needed and production is completed when required.

After suggested work orders and suggested purchase orders are approved, all allocations are updated so management knows the status of all inventory items.

The flow is illustrated below:
Total MRP Based Manufacturing

Customer Order Created

Work Order Enabled

Suggested Work Orders are Created and Approved

Material Requirement Planning Issue to requirements are determined for assembly and purchase items

Material Requirement Planning

Production Planning

Suggested Purchase Orders are Approved

Allocations Updated where POs and WOs approved

Purchase Order Created

Manual Work Order Generation

Production Process Begins

Manufacturing Process Begins

Labor Ticket

Material Ticket

Work Order Traveler

Reports sent to Production

Capacity Planning & Utilization

Inventory Updated

Work Order Closed

Shop Floor Data Entry

Production and Labor Reported

Production Complete

Production Reports

WIP Reports

Inventory Reports
The most important aspect of the Thermosole MIS is the integration of ISO documentation with all the administrative, scheduling, financial, purchasing and planning sequences. To bring the total system on-line the company took six months, of which the initial two months were spent in training the employees and inputting sample data. After verifying the quality of operators, trial feeding of actual on-line figures commenced. This included the setting up of the basic raw data that would enable the system to function, including:

- The Chart of accounts, *(customers and vehicles as profit centers.)*
- Budgeting
- Coding of Inventory items
- Payroll data
- Customers
- Suppliers
- Bill of Materials for individual components
- Hard Routings for individual components
- Standardization of Mold bases
- Hard Routings for Mold manufacturing
- Defining Work centers
- Labor Grading
- Defining of Manufacturing Operations

The systems of the MRP 2 is based on the following three systems:

1. Bill of Materials / Work Order
2. Shop floor control
3. Production Planning

**BILL OF MATERIALS / WORK ORDER SYSTEM**

This is the base system. It enables the definition of a bill of materials for a manufactured item, enters work orders, tracks inventory during the manufacturing process, generates work orders automatically from Customers orders, generates *CKD (completely knocked down)* work orders and automatically closes them after the sales are shipped. The Company has complete control of all inventory items. In addition, it can track down one or single type of inventory in multiple locations via track lots, track serial numbers, or track inventory in store/bins.
BILL OF MATERIAL OVERVIEW

The following flowchart is an overview of the process for using the Bill of Materials/work order:

SHOP FLOOR CONTROL SYSTEM

This system allows the Company to post labor data for each work center until the work order is complete. It tracks the actual labor costs, compares them to standards, and monitors the progress of each work order within the system. However, to use Shop Floor Control at its optimum level, routings must be added to the assembly item so that a soft routing is created for each work order.
SHOP FLOOR CONTROL OVERVIEW

The following flowchart is an overview of the process for using the Shop Floor Control system:

Standard costs for labor and material are rolled up into the total assembly cost.

PRODUCTION PLANNING SYSTEM

The Production Planning System includes both Material Requirements Planning (MRP) and Master Production Scheduling (MPS). Production planning looks at actual demand, forecasted demand, and inventory requirements, to generate manufacturing orders, suggested work orders and suggested purchase orders. After approving the suggested orders, actual works order and/or purchase orders are generated.
**PRODUCTION PLANNING OVERVIEW**

The following flowchart is an overview of the process for using the Production Planning system:

![Flowchart](image)

**THE BENEFITS**

MRP greatly reduced the planners' time calculating requirements on a daily basis. MR is powerful enough to process MRP daily, or more frequently, if desired. There is no more waiting till after weekends, or for the next working day. It can be run overnight. By knowing when inventory is required, stocks on hand can be reduced considerably; thus saving money in inventory carrying costs and storage space. These savings alone can pay for an entire manufacturing system within one year.
MRP saved the purchasing department many hours per week in determining what to order, when to order, and how much lead time to allow. Because it automatically generates purchase orders when approved, it saves time entering purchase orders. This allows purchasers more time to find better suppliers and/or better pricing.

Cost estimation of every activity can now be determined; even the typing of a letter. Individual components can be monitored right from the Raw Material stage through manufacturing to sale, and profit generation.

On the ISO side, the Quality council meeting scheduling, set up of agenda, monthly report generations, machinery calibrations, machine maintenance, contract reviews, and document control were automated.

Issuance and closing of Non-conformance Reports (NCRs) are now properly and timely dealt with, as their status is available to everyone. Persons whose NCR's are pending get a flash on their computer screens whenever they log in. Similarly creation of new suppliers, addition of new raw materials without proper specifications, dispatch of supplies without pre-inspections are some of the functions that automatically get blocked if a non-conformance exists.

The CEO’s objective was to have access to every information that he wanted. Since the whole MIS is a complex software, surfing in it is also a complex operation. An On-line status report is updated every 10 seconds and gives me the following information:

1. **Summarized Page** gives consolidated:
   - billing
   - receivables
   - inventory on hand and its value
   - payables
   - approved payables
   - purchase orders
   - on hand customers orders

2. **Stock Page** gives:
   - selected raw materials
   - all finished and semi finished inventory items with minimum level on hand, on order and in production

3. **Customers** with receivable balance, on hand order, and last financial transaction

4. **Suppliers** with payable balance, on hand order, and last financial transaction

5. **ISO status page**
   - Next audit scheduling
   - NCR status
   - Maintenance plan
   - Calibration status
   - Training status
   - Revisions status in the QSP’s

6. **Production**
   - status of work orders
   - status of work centers

7. **Finance** - selected head of accounts monitoring
CONCLUSIONS

The most important data available is the information on each station on whether it has been updated or not. This keeps a good watch on the overall updating of all inputs.

Even though implementation of the MIS put pressure on Thermosole’s Financial and Human resources, the benefits accruing are more than rewarding.

In this system the employees feel more comfortable in carrying out their work as many parameters or decisions are pre-determined or defined. New employees find it easier to settle in, as their job responsibilities as well as information of their predecessors’ work status is available.

The company has taken a bold step forward in achieving its quality objective of Customer satisfaction. The system has enabled it to provide an on-line Stock, Delivery, and a Component Development status to the customers via the Internet.

This is a first in the Autoparts Vending Industry of Pakistan.