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**SHIFTING FROM OLD FASHIONED MANUFACTURING PROCESSES TO  
MECHANIZED MANUFACTURING PROCESSES**

**-A Practical Experience of an Indian SME**

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**ABSTRACT**

*The developments in the auto component industry in India can be traced back to the liberalization during the 1990s. Prior to the liberalization the Indian consumer had limited choice of brands and models to choose from. Trade liberalization policies resulted in an influx of multinational companies into India. The entry of these foreign companies changed quality standards and increased the complexity of the parts required by the OEM firms. The Indian component industry responded to these challenges by adding capacity and modernizing existing plants. This Paper highlights the challenges as well as the limitations of the SME's to shift from the old fashioned manufacturing processes to the mechanized manufacturing processes. The paper concludes that new mechanized manufacturing method increases the quality and reliability and forced the OEM firms to depend. The turnover of the company has also improved from Rs 29.60 lacs [2000-01] to 308.12 lacs [2012-2013].*

**Keywords-** Manufacturing, small scale sector, liberalization, challenges, CNC Machines,

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## 1. INTRODUCTION

The developments in the auto component industry in India can be traced back to the liberalization during the 1990s. Prior to the liberalization the Indian consumer had limited choice of brands and models to choose from. Trade liberalization policies resulted in an influx of multinationals companies into India. The entry of these foreign companies changed quality standards and increased the complexity of the parts required by the OEM firms. The Indian component industry responded to these challenges by adding capacity and modernizing existing plants. India's vast domestic market and availability of low cost worker's with advanced technical skills has been instrumental in attracting the ever expanding number of multinationals who are setting up their manufacturing base in the country. The rapid growth of Indian economy is likely to make India the fifth largest consumer market in the world by 2025 from twelfth in 2005, says a study by Mckinsey Global Institute. Indian manufacturers, with the tremendous expertise gained in the domestic market, are spreading their wings to reach out to global market. Indian corporate has been busy taking aggressive steps through both acquisition and Greenfield investments abroad. All these initiatives are likely to boost Indian growth in the global arena.

## 2. MICRO, SMALL AND MEDIUM ENTERPRISES

In India small scale sector has played a very important role in the socio-economic development of the country. It has significantly contributed to the overall growth in terms of the Gross Domestic Product (GDP), employment generation and exports. The performance of the small scale sector therefore has a direct impact on the growth of the overall economy. On **2<sup>nd</sup> October 2006** Micro, Small and Medium Enterprises Development (MSMED) act came into effect. Accordingly the coverage and investment ceiling have been widened and the sector is now called as Micro, Small and Medium Enterprise Sector ([http://msme.gov.in/MSME\\_Development\\_Gazette.htm](http://msme.gov.in/MSME_Development_Gazette.htm)).

- a) **A MICRO Enterprise** is an enterprise where investment in the plant and machinery (original Cost) excluding land and building does not exceed Rs 25 Lacs.
- b) **A SMALL Enterprise** is an enterprise where investment in the plant and machinery (original Cost) excluding land and building is more than Rs 25 Lacs but does not exceed Rs 5 Crore.
- c) **A Medium Enterprise** is an enterprise where investment in the plant and machinery (original cost) excluding land and building is more than Rs 5 crore but does not exceed Rs 10 crore.

### **3. IMPACT OF LIBERALIZATION & GLOBALIZATION ON SME**

The Indian economy has been witnessing drastic changes since 1991. With the concept of liberalization & globalization economic policy of Govt. of India have directly hit the small scale sector of our country. Competitiveness has become the key to the survival and growth of the business in the post liberalization era.

The enterprise will have to compete not only against other domestic players but also against international players has further complicated the challenge. The enterprises have realized that if they do not adjust to changing customer priorities, they will be out of the business. They are facing a number of strategic challenges mostly related to intense competition, market share, changing technology and more demanding customers. Solving the problems associated with these changes and creating opportunities from this turbulence, requires innovation. Innovation alone can satisfy changing customer priorities. Above all globalization helps in improvement in techniques of production, rise in national income, employment and establish international cooperation & good cultural relations in small scale & medium enterprises. On the other hand, it has also resulted to downgrade; create sickness, retrenchment of employees due to cut-throat competition and use of new technology in SME.

### **4. AN OVERVIEW OF THE INDUSTRY**

M/s Bubber Industries was established in 17<sup>th</sup> July, 1980 as a small scale manufacturing industry. At that time it was a Proprietorship concern. The total investment in plant and machinery was Rs 1 lac of which Rs 65,000/- was Bank loan for machinery and Rs 30,000/- for the working capital. The industry started functioning in rented premises at Chandigarh. In the same year the Haryana Government allotted an industrial plot measuring 1000 sq.meters (2 Kanals) in industrial area, phase-II, Pacnchkula. Finally the industry shifted to its own building in the year 1993.

In the year 1997 the constitution of the company has changed from proprietorship to partnership due to the entry of another technical qualified entrepreneur. The major events of the industry are shown in the Appendix A. Our present valued and esteemed customers are as shown in table 1.

Table 1 List of Major Customer's (OEM's)

S.no	Name of the Buyer	Products
1.	Mahindra & Mahindra (Swaraj Tractor Div)- Plant 1, Mohali	Tractors
2.	Mahindra & Mahindra (Swaraj Tractor Div)- Plant 2, Mohali	Tractors, Harvester Combines, Fork Lift
3.	Swaraj Engines Ltd, Mohali (Punjab)	Tractor Engines
4.	Swaraj Mazda Ltd, Village Ason, Ropar (Punjab)	Light Commercial Vehicles
5.	Indo Farm Equipments Ltd, Baddi (Himachal Pradesh)	Tractors, Engines, Cranes
6.	Swaraj Automotives Ltd, Nabha (Punjab)	Agriculture Equipments (Rice Planter)
7.	Standard Corporation India Ltd, Barnala (Punjab)	Tractors, Cranes, Harvester Combines
8.	Diesel Loco Modernization works, Patiala (Punjab)	Re conditioning of Railway Diesel Engines
9.	Action Construction Equipment Ltd, Palwal (Haryana)	Tractors, Cranes
10.	Preet Tractors Private Limited, Nabha (Punjab)	Tractors, Harvester Combines

#### 4. IMPACT ON THE COMPANY

The industry is facing lot of competition and challenges after the liberalization of the Indian economy. Due to de-licensing policy of India many new international companies entered in the Indian market. The concept of manufacturing has undergone a sea change because they have come with the better products and with competitive prices. Before liberalization, those who were the leaders in tractors, cars and other durables are now facing lot of problem to sell their products in the market because new range of products with better features, most attractive prices are available in the Indian market. The availability of the easy finance increases the purchasing power of the Indian Consumers. The customer today, has a choice to select a better product according to his buying capacity.

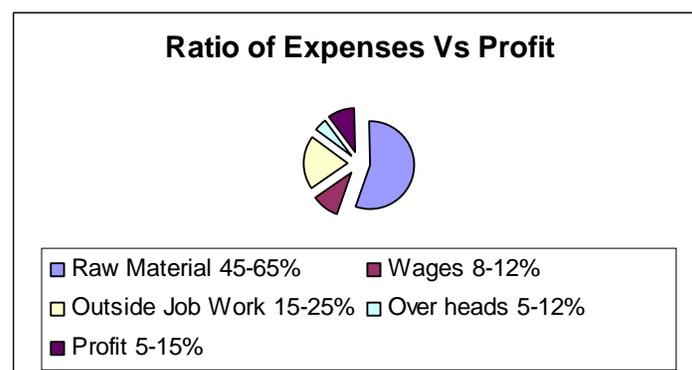
In this process of change, the SME have also faced lot of problems for survival. To meet the competition in the global market our OEM customers have also revised their policies for vendors accordingly. The following are some steps taken by the OEM firms:

1. The rates of the components have been reduced by 7%.
  - 2% reduction for the change in payment terms from 90 days to 45 days.
  - 5% reduction for the increase in volume of the components.
2. The vendors have to get ISO-9000 certification.
3. Better Plant and Machinery along with latest testing and inspection equipments.
4. Implementation of supply chain management system, direct on line (DOL) systems, implementation of Pre Despatch Inspection Report (PDI) policy etc. These steps will reduce the cost of inventory, non value added activities like incoming inspection, storage etc.
5. The adherence of the supply schedules must be 100%. i.e. no excuses for shortage of power, shortage of labour, shortage of raw materials etc

The reduction of 2% rates are acceptable to us because the revised term of payment terms will lead to the saving of bank interest as well as fast rotation of the money i.e. saving in working capital but the reduction up to 5% will have adverse impact on the functioning of the SME like us due to:

1. Increase in raw materials prices.
2. Increase in wages due to inflation.
3. Increase in transportation charges.
4. Increase in electricity bill plus extra cost for using generators due to power cuts.
5. Increase in Overheads like tooling, oils, repairs etc

The ratio of expenses Vs profit is shown in figure 1. They are adverse to each other.



**Figure1. Ratio of Expenses Vs Profit**

## 5. STEPS TAKEN BY THE COMPANY

The total system of working has changed with these new policies of the OEM's. The specification of raw material, heat treatment, surface treatment etc in a component depends upon the customer design and can not be changed or modified. So reduction of material cost etc can not be possible. Whereas the possible area is manufacturing, how the cost of manufacturing can be reduced. Before Year-2005 the company is manufacturing components on conventional machines. list of machinery is shown in table 2.

**Table 2 List of Machinery before Year-2005**

S.no	Description	Year of Purchase	Quantity	Make
1.	Lathe Machine 6'	1980	One	Bilhku Machine Tools, Ludiana
2.	Lathe Machine 5'	1985	One	Bilkhu Machine Tools, Ludiana
3.	Lathe Machine 4'	1983	Two	OM Machine Tools, Ambala
4.	Lathe Machine 3'	1990	Four	Morinda Machine Tools, Morinda
5.	Milling Machine No-1	1990	One	Kalgidhar Industrial Corp, Ludhiana
6.	Milling Machine No-2	1995	One	Sargodha Machine Tools, Ludiana
7.	Milling Machine No-3	1996	One	Kalgidhar Industrial Corp, Ludhiana
8.	Drilling Machines		Five	ITCO, Jalandhar
9.	Thread Milling Machine	1980	One	Paramount Machines, Ludhiana
10.	Thread Milling Machine	1985	One	Kalgidhar Machine, Ludhiana
11.	Thread Rolling Machine 1"	1998	One	Rakofa India, Ludhiana
12.	Power Hacksaw Machine		Two	Prima Machine Tools, Ludhiana

This conventional machining setup is not enough to meet the challenges i.e. the revised requirement of the customers. The processes done on these machines are operators' skilled based and time consuming. The limitation of these machines is the rigidity hence heavy material removal is not possible. Another draw back of these machines is the maintenance. No part drawings are available and for repairs we have to approach the manufacturer every time for the replacement of the worn out parts. It is a time consuming process and machines are waiting for the new parts.

Industry is working 11 hours (One Shift and 3 hours over time) a day and six days a week. Workers' are encouraged with the incentive system. Although all the possible factors are implemented in the industry but still there is a scope for improvement. Our customers are insisting us to increase the capacity because we are the quality vendor in their list, but unable to meet their projected requirements of the coming years with this setup. Finally, it has been observed that there is no way out except to install the CNC MACHINES.

## **6. CHALLENGES**

Like any other entrepreneur, we too had come across many obstacles before embarking on our mission to install the CNC machines. So we undertook and drew a viability report both technically and financially. First we approached to our buyer's and informed that we are planning to install a CNC machine. In the year 2005 company is manufacturing small components ranging from Rs 10 to Rs 55 and the turnover of the year 2003-04 was 31.42 lacs. The following steps were taken for study:

### **6.1. Difficulty Faced in Selecting the CNC Machine**

1. We both are the qualified engineers, but we have very less knowledge of the CNC machine.
2. We have approached to our Industrial friends who have already installed the CNC machines about the variability, brand of the machine, running cost of the machine etc. But no body encourages us.
3. We enquired on the internet to find out the CNC machines manufacturers in India.
4. We short listed some manufacturers and called for the discussion. The discussions are based on the specification of the machine in which our maximum product range can be covered, cost, delivery time, mode of payment, and most important the manufacturing process time of a component etc.
5. Based on the discussion, we decided that initially we will purchase a **CNC Turning Center** because our turning area is the most critical area.

6. CNC Manufacturers demanded components drawing for the time study as well as selection of the tools etc.
7. After receipt the time study and the quotations from the manufacturers. We could not conclude the best possible selection of the machine due to heavy machine cost, tooling cost, consumable cost which includes standard cutting oil, hydraulic oil etc.
8. Most importantly the operation cost of the component (as per time study) is also high as compare to the existing operation cost.
9. Finally we visited the Machine tools Exhibition (IMTAX), Mumbai for some solutions.
10. A Comparison statement is made in which company name, size of the machine (length x Width x height) , weight of the machine, Technical specifications like chuck size, specification of the spindle, bearing size, specification of the turret, specification of the LM guides, Controller and the Cost.
11. At last we finalized the CNC turning center Make Joyti - Rajkot, Model Fortius, cost 20 lacs complete with tooling and accessories.

## 6.2. Difficulty Faced in Arranging the Finance

We approached our banker for the finance of the project but our banker refused to give finance because our industry can not invest the margin money i.e. 25% of the total cost of the project. This is due to unhealthy balance sheet of the industry. In this process our Chartered accountant helped us and we approached the Small Industries Development Bank of India (SIDBI) for the loan. We received a loan of Rs 15 lacs and installed Ist CNC Machine.

(It is very important to quote that to minimize the risk; once we planned to buy a second hand CNC machine. We discussed with a retired CNC design engineer from HMT, but he refused to go for second hand machine. His explanation was that the conditions of the old machines can not be predicted, the availability of spare parts is not known, and most important is the out dated electronic system. He advised us to install **only** a new machine because we are shifting from conventional system to auto system and this shifting will bring some problems like accident etc. whereas the new machines will have a better service backup as well as warranty).

## 7. BENEFITS

We installed the fist CNC Turning Center in Aug, 2005 and initially shifted the final process of the components. The machine is having Electro magnetic Turret of 8 tools. Our aim was

higher productivity because small components. There are many benefits of CNC machining process some are listed below:

1. This machine can process multiple operations in one setting with lowest cycle time. Earlier we could not do that.
2. The variation in dimensions is very less so saving in inspection frequency. Increased life of instruments and gauges.
3. Components like Chuck Nuts, Hydraulic Adopters etc, the face perpendicularity with respect to the thread, surface finish can be achieved.
4. Components can easily perform accurate taper turning as well as taper threading operation which was less accurate and less productive in conventional machining.
5. Components can easily machine after heat treatment so variations due heat treatment can be minimized. This is the most important in the threaded components.
6. No Skill is required except the programming. In our case we programmed the machine our self.

There is no doubt that the cost of tooling, oil, electricity, maintenance etc is high as compare with the conventional machines but if we compare the overall benefits as mentioned above, we find that many indirect costs can be saved and moreover, we can fulfill the requirements of the customer in terms of quality and adherence of the schedule. Our customer can depend upon us. This is the result that year by year we could add more machines. The list of machinery after 2005 are shown in table 2.

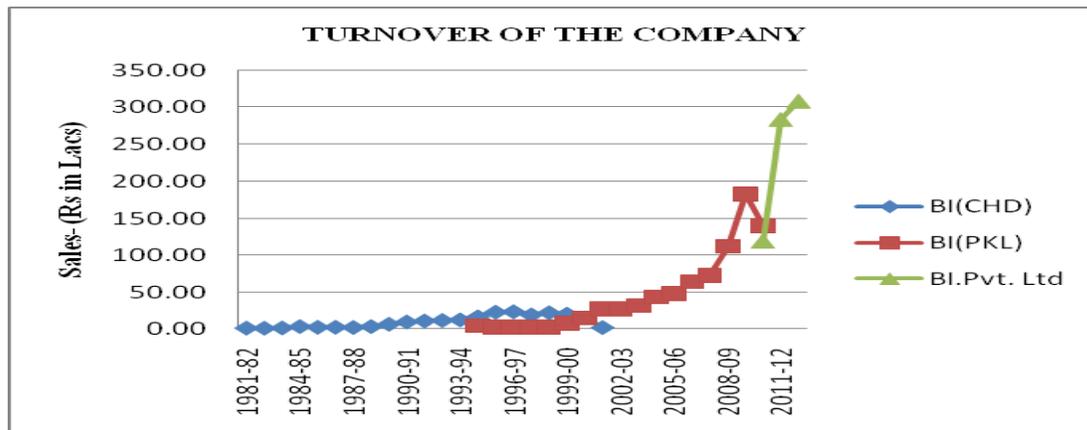
**Table 2 List of Machinery After-2005**

S.no	Description	Year of Purchase	Quantity	Value (Rs in lacs)	Make
1.	CNC Lathe Center Model Fotius	2005	One	20.02	Jyoti CNC Automation, Rajkot, Gujrat
2.	CNC LatheCenter Model Swifter	2007	One	20 .33	Jyoti CNC Automation, Rajkot, Gujrat
3.	Vibro Finishing machine	2007	One	1.35	Dalal Engineering,

	Model FM-90 L				Mumbai, Maharashtra
4.	CNC Lathe Center Model DX100	2009	One	13.70	Jyoti CNC Automation, Rajkot, Gujrat
5.	Twin Column Band Saw Machine	2009	One	1.60	Microtech Machines, Kolhapur, Maharashtra
6.	CNC Dot Pin Marking Machine	2010	One	1.48	Stamp IT , Thana, Maharashtra
7.	CNC Lathe Center Model DX100	2010	One	13.70	Jyoti CNC Automation, Rajkot, Gujrat
8.	CNC Lathe Center Model DX100	2012	One	13.98	Jyoti CNC Automation, Rajkot, Gujrat
9.	Double Column Band Saw Machine Model HB-300A	2013	One	4.32	Microtech Machines, Kolhapur, Maharashtra
10.	CNC Milling Machine Model PX10	2013	One	17.54	Jyoti CNC Automation, Rajkot, Gujrat
11.	CNC Turning Center Model DX100	2013	One	13.98	Jyoti CNC Automation, Rajkot, Gujrat
12.	CNC Lathe Machine Model LX200 Mono	2013	One	15.47	Macpower CNC Machines Pvt. Ltd, Rajkot, Gujrat
13.	Polygon Turning Machine Model TPT-2S	2013	One	15.42	Trishul Machine Tools Pvt. Ltd, Bangalore, Tamil Nadu

## 8. SUMMERY AND CONCLUSION

In the current context of Indian auto component industry, considering that entering multinational OEM firms probably looked to more established (older) firms to enter into vendor contracts. Small industry can be equally competitive in the fast changing global economy provided it exploits economies of scale and scope while locating itself in clusters along with making technological progress endogenous. The figure 2 shows the progress of the industry after 2005.



**Figure.2 Turnover of the company (1980 to 2013)**

A year wise sale of the industry is shown in the table 3.

**Table 3 Sales of the company (Rs in Lacs)**

2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
29.60	28.88	26.68	31.42	43.10	47.25	63.77	72.28	111.80	183.16

2010-11	2011-12	2012-13
258.98	283.31	308.12

**APPENDIX A.****Major events of the industry – a time line**

1980	Bubber Industries established as a small scale manufacturing industry by a technically qualified engineer with a investment of Rs 1 Lakh in a small rented premises at industrial area, chandigarh. It was a proprietorship concern. Same year Haryana govt. allotted an industrial plot measuring 1000 sq. meters at industrial area, phase-II, Panchkula.
1993	<ul style="list-style-type: none"> <li>- Received loan from Haryana Financial Corporation (HFC) amounting Rs 13 lakhs for construction and purchase of more machinery.</li> <li>- After completion the building, total old machinery shifted from Chandigarh to Panchkula.</li> </ul>
1997	<ul style="list-style-type: none"> <li>- Loan repaid to the HFC.</li> <li>- The constitution of the company changed from proprietorship to partnership. The second partner is also a technically qualified engineer.</li> </ul>
1999	The concern faced serious labour problem due to the involvement of an outside union leader. Resulting heavy wage bill, low production, time wastage with the labour department etc.
2005	<ul style="list-style-type: none"> <li>- Received 1<sup>st</sup> loan from Small Industries Development Bank of India amounting Rs 15 Lakhs for the purchase of a CNC Turning Center.</li> <li>- 1<sup>st</sup> CNC Turning Center Installed.</li> </ul>
2007	<ul style="list-style-type: none"> <li>- Received 2<sup>nd</sup> loan from Small Industries Development Bank of India amounting Rs 15 Lakhs for the purchase of a CNC Turning Center.</li> <li>- 2<sup>nd</sup> CNC Turning Center Installed.</li> </ul>
2009	<ul style="list-style-type: none"> <li>- Received 3<sup>rd</sup> loan from Small Industries Development Bank of India amounting Rs 10 Lakhs for the purchase of a CNC Turning Center.</li> <li>- 3<sup>rd</sup> CNC Turning Center Installed.</li> <li>- Installed a Hydraulic Band Saw machine amounting Rs 1.60 lakhs with own funds</li> </ul>
2010	<ul style="list-style-type: none"> <li>- Received 4<sup>th</sup> loan from Small Industries Development Bank of India amounting Rs 10 Lakhs for the purchase of a CNC Turning Center.</li> <li>- 4<sup>th</sup> CNC Turning Center Installed.</li> <li>- Installed a CNC vendor code engraving machine amounting Rs 1.50 lakhs with own funds.</li> </ul>

2011	<b>Received Outstanding Performance Award for the year 2009-10</b>
2012	<ul style="list-style-type: none"><li>- Received 5<sup>th</sup> loan from Small Industries Development Bank of India amounting Rs 10 Lakhs for the purchase of a CNC Lathe Machine.</li><li>- 5<sup>th</sup> CNC Lathe Machine Installed.</li><li>- Repaid SIDBI Loan of Two Machines of Year 2005 &amp; 2007.</li></ul>
2013	<ul style="list-style-type: none"><li>- Received 6<sup>th</sup> loan from Small Industries Development Bank of India amounting Rs 70 Lakhs for the purchase of a 4 CNC Machines.</li><li>- <b>Received Best Supplier Award for the year 2012-13</b></li></ul>