# UNIDO - ACMA Partnership Programme, India Case Study #3:

### Micro Supreme Auto Industries (I) Pvt. Ltd.





Micro Supreme Auto Industries (I) Pvt. Ltd.



"UNIDO has taught us how to think, how to innovate, and how to survive and prosper in the era of globalization".

Satish Joshi, CEO

### **OVERVIEW**

**Company:** Micro Supreme Auto Industries (I) Pvt. Ltd. Location: Pune

Programme period: Sept. 2005 – Feb. 2008 (30 months) Number of employees: 138 (18% women)

Core products and processes: Components and assemblies for engines, gear boxes, power steering, environmental and laboratory testing systems, gauges, fixtures etc. Average annual turnover: INR 72 million (USD 1.6 million) Value of exports: INR 15.75 million (USD 0.35 million)

**Tier:** 1 & 2

### **KEY CHALLENGES FACED**

The greatest challenge the company faced was to meet customer demands on time with no breaks/interruptions in the supply chain. In order to achieve this, a series of hurdles needed to be overcome. Those included:

- » Low labour productivity and high in process rejection
- » Lack of proper planning of work resulting in the non-availability of materials and tools on time, as well as working capital blocked in inventory
- » Poor data collection and reporting system. (Data was not updated regularly leading to distortion and sub-optimal decisions)
- » Manufacturing processes were not followed as per the standard operating procedures.

### **ASPIRATIONS AND AIMS**

The company's aspiration was to enhance its business performance both in the domestic and international markets. MSAI also aimed to be recognized as a leading firm in its industry.

### **BACKGROUND OF THE MSAI**

Two brothers, Mr. Vijay Joshi and Mr. Satish Joshi, aspired to manufacture import substitution products and as a result founded the company Micro Supreme Auto Industries (I) Pvt. Ltd. (MSAI) in 1984. The venture started with precision centre-less grinding machines and within five years, a salt spray corrosion testing system was added. The company became a supplier to TATA Motors in 1991. It began producing power steering components for the Tier 1 supplier ZF (India) and other components for the vehicle manufacturer Mahindra and Mahindra. Starting in 2004, MSAI also started supplying to a TVS group member firm and soon thereafter, two additional manufacturing facilities were established. In 2006, the company began exporting its products to Wartsila/Finland and Italy, and expanded its export markets to Netherland, Australia, Germany, South Africa and China.

The company got accredited to TS 16949 and implemented SAP in its ERP system in 2008. MSAI added Cooper Cummins Tech Ltd as its new customer during 2009, its silver jubilee year.

In 2005, when the company joined the UNIDO-ACMA programme, delivery was a big challenge on account of low labour productivity and high in process rejection. MSAI's exposure to and usage of continuous improvement tools such as 5S, Kaizen, pareto analysis etc., was only sporadic and not systematized. Since there was no continuity in its training programmes, imparting and internalization of training was not successful. Improvement projects were only taken up by some employees in isolation.

In its efforts to overcome those challenges, a customer of MSAI, ZF, referred the company to UNIDO-ACMA programme.

### **VISION STATEMENT**

"Micro" the best organization to work with, and for, in the international arena, and to contribute to the achievement of the "industrial superpower" status for our nation.

### **MISSION STATEMENT**

As a company, to stand for high quality people, process and products to enhance customer delight. To contribute to constant innovation and rapid development to reduce imports, increase exports and raise the business' share in industry, thus enhancing prosperity of business as well as the wider community. To pursue excellence in everything we do as an organization and as individuals.

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### **MSAI'S JOURNEY TROUGH THE PROGRAMME**

Racks removed and components containerized



Dust extraction chamber utilized to make the work environment clean and safe







By utilizing a pneumatic system, production I ncreased from 80 to 120 pieces/hour



The counsellor, Mr. P. D. Kulkarni, started the journey in September 2005 by meeting with the CEO, and all managers for an initial discussion session. This session was instrumental for the development of a roadmap that the company would follow over the duration of the entire programme. As a second step, the counsellor conducted a series of classroom and shop floor trainings on 1S and 2S – the first two steps in the 5S workplace improvement process.

Before the initiation of this programme, employees at MSAI assumed that it was enough to have a group of people who 'did all the thinking' with the rest dependent on them. The counsellor pointed out that this a mentality was in fact an impediment to their progress and that every single person has the ability to contribute effectively to the company's further evolvement. He further pointed out that employees' contributions driven by creative thinking can actually provide satisfaction that is often times more gratifying than financial incentives. In order to create such a culture at MSAI, a suggestion scheme was launched and all employees were encouraged to participate. A suggestion committee was formed and a corresponding suggestion enhancement team created, in order to raise awareness and stimulate action. Incentives were offered to employees for their active contributions. In addition, the company initiated a new concept called "Employee Kaizen Store" where personal belongings or domestic items not required anymore by individual employees were deposited and exhibited at regular intervals in the company. Workers, who needed those items, could take them home free of charge for their private use.

To reduce rejections and machine breakdowns, and to avoid accidents, poka yoke - a method to facilitate 'mistake proofing' - was implemented and checked at each process stage. Poka yoke helps an equipment operator avoid mistakes. Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human errors as they occur. Preventing errors obviously improves quality, but also productivity. And with no rework to be done, and productive teams, delivery gets faster.

The counsellor assisted MSAI to clearly define the role of every operator within each process. Output quality at the process and at subsequent stages was considered and verified at each stage. Regular counselling was provided on customer complaints and breakdowns. Examining the process was the key agenda of every visit by the counsellor. These steps led to further improvements on the workplace such as the transition to multiple-bit-drilling and the containerization of tools and components for easier handling.

The importance of safety at work was emphasized throughout the training programme and every activity, starting with the design stage, is now being evaluated also from a safety perspective. The company's safety policy was documented; a safety committee formed and safety audits were initiated. In order to make employees more aware about the risks on their workplace, safety week celebrations and safety slogan competitions were organized. This helped the company to reduce accident frequency from 28 to zero. Though the accidents were not severe in nature, as the counsellor deemed it crucial to introduce preventive measures and maintain a focus on this issue throughout the entire programme.

With a view to improve daily communication and coordination, a "Daily Work Management" concept was implemented at three levels:

- » Level I: Regular morning meetings between associates and concerned supervisors/engineers
- » Level II: Meetings between engineers and managers
- » Level III: Meetings between managers and the CEO

A "Saptarang Forum" concept was initiated to better understand and internalize the improvements made by each cluster company through visits of associates and supervisors to other cluster firms. The concept implied that one of the companies used to host the get6-togenter for the remaining seven firms – therefore the name "Saptrang", which literally means "seven colours of the rainbow". The idea behind it was to create an open forum for discussion, debate and learning. The agenda was usually scheduled for half a day (other than the full-day MRMs) to focus on extraordinary achievements in the fields of 1S, 2S, Kaizens, innovative tool design ideas, SMED, quality, productivity, or low cost automation, amongst others. The advantage of this initiative was that also employees at lower levels in the hierarchy were involved, which in turn raised enthusiasm across the board.

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By switching from a single to multiple drilling system production increased from 90 to 150 pieces/hour



### Before



Automatic clamping and de-clamping of components



At the same time, a series of other measures were introduced to raise the overall employee engagement morale:

- » Committees were formed for every improvement activity launched with the help of the counsellor (Kaizen, 5S, Poka Yoke, suggestion scheme, safety, My Machine Campaign and the organization of the family day)
- » Small gifts were distributed to increase enthusiasm amongst and participation of employees in the Kaizen activities. The gifts used to be household items like mixers, grinders, thermo-flasks, crockery sets, pens etc. and distributed based on the benefits derived from the implemented Kaizen. In some zones, the level of employee involvement was still quite low. To counter that, a special team of highly involved employees was formed to meet and support the others to do better. Since the workers were getting direct feedback from employees at equal levels (peers), the pace of improvement got faster.
- » "My Machine Campaign" was introduced, which created a sense of operator-ownership for machines and this in turn resulted in enhanced plant maintenance. Before, the operator was dependent on the maintenance department to solve even small technical problems, which he himself could have easily handled through proper training. As a result, a lot of time was wasted while waiting for the engineer to come and have the machine repaired. By introducing "My Machine Campaign", the operator was able to better understand the functioning of the machine he was working on. With the help of a CLIT chart (cleaning, lubricating, inspecting and tightening) the operator could spot any abnormality, which could have caused disruptions in near future. Furthermore, by removing abnormality tags, most of the problems were taken care of immediately and the machine efficiency increased from 60% to 83% throughout the programme.

#### **OVERCOMING THE CHALLENGE OF CUSTOMER RETURNS**

In order to reduce complaints received by customers, following measures were introduced throughout this programme:

- » Review of the "Process Failure Modes and Effective Analysis resulting in additional recommendations and suggestions on how to eliminate customer complaints. Process Failure Modes and Effects Analysis provides a structured qualitative, analytical framework which taps the experience of a team of employees to brainstorm answers to such questions as (-) how can this process, function, facility, or tooling fail?, (-) what effect will process, function, facility, or tooling failures have on the end product (or customer)?, or (-) how can potential failures be eliminated or controlled? This analysis was helpful to identify the main reason of rejection, thus allowing the workers to take necessary corrective action to solve the problem. This usually involved the modification of tools/jigs and fixtures, improved gauging or the revision of operating standards. This method also facilitated the analysis process on a continuous basis and the taking of preventive measures. After daily morning prayers, information about rejection was provided to all employees and the respective 'process owners' suggested solutions by applying tools like Kaizen or Poka Yoke to eliminate future complaints.
- » Quality assurance engineers audited the method of operation and sequence of the process followed. This implies that the engineer has to go to the work station and observe the operation performed by the operator with respect to the work instructions. In MSAI, this was done in regular intervals during the course of production (at least four times a day). In case any variation was detected, the production was stopped and the entire lot was checked again. In order to be able to continue production, necessary counter-measures were taken with the help of 'one point lessons' which were displayed on the work station. "One point lessons' draw from the special knowledge of some person within the plant to develop some specific task. For instance, if a mechanic is very skilled for a task like e.g. to change a filter or to change a belt the counsellor asks him to prepare on a large piece of paper a simple explanation of the process, helped by simple drawings or even photos. Then he explains it to a group of workers who will benefit from that piece of knowledge. In addition to the initiation of such One-Point Lessons, the counsellor gave on-the-job training to operators and additional check points were added
- » The counsellor furthermore suggested dock audits to be carried out by the marketing expert before the finished goods were actually dispatched, which enabled the company to effectively answer customer queries in case of complaints.

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**SCISSOR GRAPH:** Each Poka Yoke should facilitate the elimination of errors within the process. Hence, the trend of increased number of Poka Yoke (shown in blue) usually correspondingly implies a decreasing trend of rejections (shown in red)

$\left( \right)$	CORRECTIVE ACTIONS TAKEN ON SPORADIC CAUSES							
S #	MONTH	COMPONENT	DEFECT	CAUSE / ACTION				
1	APRIL	SPEEDO Adaptor	O8D8 O/S	Cause : 1)Air gauge setting disturbed . Operator product job on wrong setting. Action : OPL is made & displayed on machine to check the setting of Air plug gauge unit after every 50 nos.				
2	JUNE	DRIVER -105	CORNER BROKEN	Cause : 1)7H7 Corner broken due to side chamfer length o/s2) Side chamfer o/s due to Milling machine head was broken. Actions : 1)Milling machine Head repaired. 2) Chamfer angle & length inspection on Profile projector frequency increased from 1 to 3 per Shift.				
3	AUG	SPEEDO ADAPTOR	TOTAL LENGTH U/S	Cause : Problem found in Collet of traub machine . Action : Collet changed & hence total length rejection reduced. Collet inspection frequency introduced in process sheet.				
4	SEP	DRIVER -105	O7H7 Squarene ss w.r.t. width	Cause : - One of the cause is inadequate grip in fixture leading to movement of job during boring operation. Action : Serration provided on clamping faces Further investigation is in progress to eliminate defect completely.				
5	OCT	PCN M&M	Bore 10.0 o/s	Cause : Wrong master was used to set the bore dia. Action : Component wise separate bore inspection fixtures with master will be made . Out of four , two already made.				

» Each customer complaint/return was addressed by involving the concerned operator. Given the fact that the operators had all the relevant first hand information available, they were also encouraged to find adequate solutions for the problems they encountered.

#### **OVERCOMING IN-PROCESS REJECTION ISSUE**

As the company was struggling with customer returns reaching 27000 PPM and in-process rejection of 49000 PPM, a series of sporadic causes was the reason explaining this state of the company. It was difficult to ascertain that the following batch of production would be of the same quality as the previous one. Therefore, the quality engineers' team started taking action on each and every cause and resolved it. Basically, two causes were pertinent: (1) defective input components and (2) process variation.

A team of vendor development engineers worked together with suppliers to improve their component quality. Constant reviews were undertaken for few months to ensure effectiveness of the actions. With a view to reducing in-house rejections, new gauges were introduced to check process quality, more than 300 poka yoke (mistake proofing) were implemented and operating standards reviewed for update. In addition, some low cost automation projects were taken on board to further improve the situation. Finally, the counsellor proposed to use 7 QC tools and Why Why analysis in this context.

#### IMPROVING THE INVENTORY TURNOVER RATIO

The inventory ratio indicates how many times a company's inventory is sold and replaced over a period. A higher ratio implies that less a company requires less working capital.. Since Micro Supreme was working on various initiatives like low cost automation, equipment modernization, capital investments and new product development at the same time, the need for capital was pertinent. A financial analysis revealed that a substantial part of funds was blocked by inventory. The following steps were followed in order to reduce inventory, and hence improve the firm's inventory turnover ratio:

- » Daily monitoring of inventory, based on the stock situation at customer end and customer demand in order to produce and purchase only as per the requirements.
- » Introduction of a one piece flow system in production wherever possible to minimize Work in Progress (WIP) or work that has not been completed but has already incurred a capital investment from the company. This initiative helped management to better control raw material purchase. Furthermore, the single piece flow method led to a reduction in, process lead time and cycle time.
- "Single Minute Exchange of Dies" (SMED) was introduced to increase machine utilization time. SMED is a method for reducing 'waste' in a manufacturing process – in order words reducing the time it takes to change a line or machine from running one product to the next. This rapid changeover is key to reducing production lot sizes and thereby improving flow

Since, bought out components (parts which are sourced from other suppliers) play a very vital role in product quality, Micro Supreme formed the "Supplier Quality Improvement Group" with the objective to increase the quality of those components, reduce rejection levels, and thereby also reduce the need of additional 'safety' stock. As part of this initiative, Kaizen and Poka Yoke were also initiated at vendor site. A team visited the suppliers at regular intervals and performed periodic audits. The team also gave training and helped the supplier implement mistake proofing in all processes, gauge and fixture development. In this way, the lessons learned from the UNIDO-ACMA partnership programme also trickled down to lower tier companies within the same supply chain.

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### **OUTCOMES**

### **KEY RESULTS**

The implementation of 306 Poka yoke resulted in:

- » Reduction of rejections at the customer end from 27,565 PPM to Zero
- » In-process non-conformance reduced from 49,285 to 2,216
- » Productivity increased by 22%
- » Overall Equipment Efficiency (OEE) increased from 60 to 83 percent and the accident severity rate came down from 113 to 0 and its frequency from 56 to 0
- » Inventory turnover ratio increased from 7.6 to 32.35. Approximately 90% (17 racks removed out of 19) of racks were removed from the plant. Containerization was done on all the products.

Due to implementation of low cost automation, the work place showed a remarkable change and the company noticed increased enthusiasm amongst employees across the board.

Customers have increased their demand for products from MSAI as well as encouraged the company to develop new products for them. This has resulted in an increase in sales from US \$1million at the beginning of the programme to US \$1.64 million. Customers can now count on unhindered delivery with minimal quality problems. Due to the increased productivity and improved quality, the MSAI had been able to offer price reductions to most of its customers.

Exports grew to 20.68% of total turnover and the company managed to acquire new customers from Finland, Italy, Netherlands, Australia, South Africa, China, etc. Many customers visited the plant and appreciated the organizational efficiency and quality of work. Companies like Mahindra and Mahindra (Nagpur), KOEL, Piaggio were added to the company's customer base.

Communication and coordination with suppliers also improved. Learning through the programme percolated to MSAI's suppliers via the Supplier Quality Improvement Group (SQIG) As a result of all these initiatives, employees feel that the company has become a better place to work.

IMPROVEMENTS					
	Before	After	Change (%)		
Employee Involvement in 1S, 2S, 3M etc(%age)	22	100	+ 78		
Productivity (Production/ man- hour)	5.95	7.26	+22		
Accident Frequency Ratio	28	0	+ 100		
Accident Severity Ratio	113	0	+ 100		
Customer Returns in PPM	27,567	0	+ 100		
In-process rejection in PPM	49,286	2,216	+ 95		
Inventory turnover ratio	7.6	32.35	+ 450		
OEE %	60	83	+ 38		
WIP in USD	20,000	10,755	+ 46		
Delivery Schedule Adherence in %	78	99	+ 27		
New customers added	42				
New products added			54		
Tangible savings in operating costs (U	130.000				

Note: Positive trend mark will be '+ 'and negative trend mark will be '-'.

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### **FUTURE OUTLOOK**

Front entrance of MSAI



#### THE SUSTAINABILITY CHALLENGE

The company is still working on reducing process scrap, which is expected to lead to further cost reductions. Improvements at supplier end to reduce rejections even further is another area where company aims to display further efforts within the framework of the established supplier quality improvement group. Since the management of MSAI learned that small improvements can actually lead to significant positive results, regular reviews of potential cost reduction projects are organized by the management.

#### **FUTURE TARGETS**

The company has ambitious plans for the future and aims for successful implementation of the environmental management system ISO-14001, as well as the Health and Safety standard OHSAS-18001.

The company is also aiming to achieve the best features of the Volkswagen Excellence Model, by the end of 2010.

Finally, there are plans to enhance its access to global markets and increase exports sales by 60% by 2012.



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