Adoption of lean manufacturing practices: An Indian case study

Background

Realizing the tremendous contribution of microenterprises and SMEs (MSMEs) to industrial production, employment generation, and exports, the Government of India, Ministry of MSMEs, proposed a Lean Manufacturing Competitiveness Scheme (LMCS) under the National Manufacturing Competitiveness Programme (NMCP). Under the scheme, MSMEs are being assisted in reducing their manufacturing costs through proper personnel management, better space utilization, scientific inventory management, improved process flows, and reduced engineering time. The scheme is basically a business initiative to reduce waste in manufacturing in MSMEs and thus enhance their competitiveness. During the pilot phase, 100 mini clusters were formed to implement this scheme.

A detailed study report was prepared for each participating unit to identify the various projects to be taken undertaken and establish a baseline. The following five projects were identified to address manufacturing waste in the participating units.

1) 5S and culture building to prepare for lean interventions, create a culture for identifying waste, and responding to those with a positive attitude.

2) Manufacturing system building to strengthen the basic manufacturing system and initiate a culture of fact-based decision making. Designing formats for collecting data on daily management activities (production reports, quality reports, delivery reports, etc.) and standardizing critical operations were carried out under this project.

3) Institutionalizing kaizen, small group activities, and shopfloor meetings to bring problems to the surface and enable employees to make small improvements. Employees were trained in conducting brainstorming sessions and holding shopfloor meetings to discuss failures and abnormalities. Kaizen was performed in the areas of quick changeovers, mistake proofing, and low-cost automation for reducing quality issues and manufacturing lead times.

4) Reducing manufacturing lead time by eliminating zigzag flows and backtracking and improving delivery compliance.

5) Improving material handling systems to supplement the initiatives to be taken under project 4) so that after making the flow linear, the velocity of material movement can be increased to achieve the overall goal of reducing manufacturing lead times.

Case study

This case study was conducted in Grace Locks Limited, a family-owned producer of modular kitchens within the MIA Beta Light Engineering and Allied Cluster. The business head is Rajen Mohan Varma, and the change leader for the project was Reuben Varma. The Grace Locks project ran from August 2011 to March 2013.

When the assignment started, the company was maintaining large inventories. It was under pressure from customers to shorten lead times and was reeling under a cash-capital crunch. The major areas of concern identified that led to manufacturing waste and increased lead times are listed in Table 1. The areas of concern were grouped based on their correlation with the five projects. The key initiatives taken under each project are also shown in Table 1.

The key practices initiated were creating a billing format for materials purchased, standardizing the kitchen installation and servicing processes, devising checklists for inspection, and introducing low-cost automation in bottlenecks. In terms of upgrading human resources, the concept of multiskilling was introduced and periodic audits and reviews are now conducted including 5S audits, work standard audits, worker performance reviews, and

Table 1. Major areas of concern, correlation with the five projects, and initiatives to overcome them.

Area of concern and effects	Project	Key initiatives
Random storage practices, resulting in accumulation of unnecessary items and long tool search times	5S and culture building	5S training, 5S zones, shadow boards, visual control, 5S audits
Miscommunication of work orders, lack of written work instructions, untrained workers, resulting in overstock of raw materials and insufficient stock of critical components	Manufacturing system building	Redesign of work orders, setting SoPs, training, developing purchasing process, setting limits on work in progress, multiskilling
Frequent rework in carpentry, resulting in long set-up times in frame making, dust in paint shop, compressor breakdowns, and rework at customer sites	Institutionalizing kaizen, small group activities, and shopfloor meetings	Redesign jigs/fixtures, change to modern wood-cutting tools and welding equipment, low-cost automation for frame making, set maintenance schedule, determine spare parts inventory, redesign to simplify manufacturing and assembly
Zigzag material movement, resulting in poor space and manpower utilization	Improving layout and material handling system	Adopt cellular manufacturing and use trolleys

Storage area before the improvement project (proposed area for carpentry shop).

Improved layout of carpentry shop after the improvement project.

after-sales service reviews of kitchens installed. Table 2 shows the tangible results of the LMCS project within Grace Locks.

The initial success was achieved through 5S activities, training SoPs, and establishing procedures for purchasing, storage, and production planning. Breakthrough improvement in reducing lead time was achieved through kaizen for quick changeovers, design simplifications, layout modification, and improved material handling. Further capacity enhancement measures were taken through the adoption of low-cost auotmation where appropriate. The trajectory of productivity improvement is depicted in the Figure.

There were also a number of intangible improvements that have contributed to higher productivity within the company. For example, the workers are motivated to continue the improvements and absenteeism has dropped. Production planning is easier with the new systems in place. Perhaps most important for customers, the potential for customization of Grace Locks modular kitchens has increased significantly, pointing to further growth of this SME in the future.

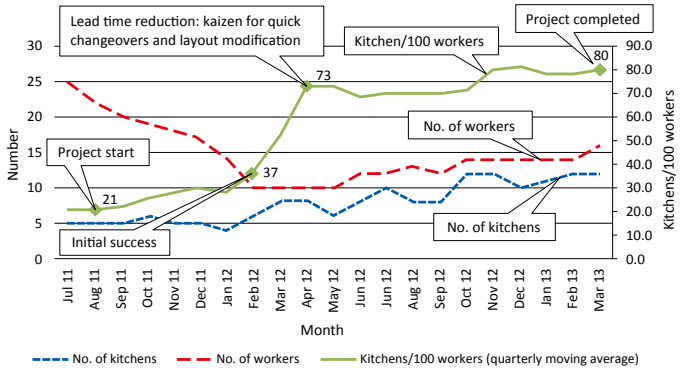

Figure. Timeline of productivity improvement in Grace Locks.

Table 2. Tangible improvements after the LMC project in Grace Locks.

Item	Unit of measurement	Before (Aug 2011)	After (Mar 2013)	% Change
Space	m^2	1300	650	50% ↓
Total inventory (raw material + work in progress)	Days	134	20	85% ↓
Manufacturing lead time	Days	30	12	60% ↓
Manpower deployment	Number	22	16	27% ↓
Production capacity	Kitchens per month	5	12	140% ↑
Productivity index	Kitchen/100 workers (quarterly moving average)	21	80	280% ↑
Savings (per annum)	US$ thousand	–	74	

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