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## **CASE STUDY – LEAN MANUFACTURING**

*In the early seventies the Japanese made us aware of the need for Total Quality. Quality circles sprang up, but they didn't really work in the west until we related them to cross-functional Employee Involvement. Together they gave us the philosophy of Total Quality Management (TQM). These were joined in 1979 (in the US) and 1982 (in Europe) by another philosophy Just-In-Time (JIT), based on the elimination of waste and later by Kaizen, short cycle manufacturing, et al. With these tools, manufacturing took a different route and business had changed forever.*

In the early eighties leading western companies realised that the Japanese success was not just culture-based. The basis was a quite different set of concepts, principles, policies and techniques for managing and operating a manufacturing plant. Once understood, these were not hard to accept and not so difficult to apply. Today, continual and rapid improvement in quality, cost, lead-time, customer service and flexibility are accepted as concurrent (rather than opposing) goals by all companies aspiring to be Lean Manufacturers.

It is their Lean Manufacturing techniques, combined with integration of IT systems that have provided the dramatic, continual and rapid improvements in lead-time, quality, costs, flexibility and service.

The basic principles of employee involvement, working through self-directed teams and total quality that focuses on processes and meeting customer requirements, give us the basis for continual improvement. It is waste elimination (of which JIT is a consequence) that provides the rapid and immediate improvement in manufacturing.

Proven waste elimination methodologies used by manufacturing companies cover:

- Cellular Manufacturing – organisation of the plant into manufacturing cells based on product or part, process type or customer
- Rate Based Scheduling – repetitive or mixed-model production based on the rate of customer demand
- Small Batch Production – the goal is 'one-piece' flow achieved through set-up reduction techniques
- Kanban – a 'pull' system of production linked to actual customer demand
- Close-Coupled Logistics – suppliers delivering to 'point-of-use': reduction in total distribution chain through inventory and lead time reduction



- Design for Manufacturing and Assembly – modular design: reduction in the number of components and bill of material levels; ‘fail-safe’ designs; design in quality
- Total Productive Maintenance – operator responsibility for routine maintenance and housekeeping, with engineers as part of a cell team
- Flexibility – training: multi-skilled workforce; modular capacity; re-engineered support processes and changeover reduction to provide rapid product mix/volume change capability

### Eliminating waste improves efficiency

Over Production	Inventory	Transportation	Waiting	Motion	Over Processing	Correction	Not Utilizing Human Resources
<ul style="list-style-type: none"> <li>• Producing over customer requirements, producing unnecessary materials / products</li> </ul>	<ul style="list-style-type: none"> <li>• Holding or purchasing unnecessary raw supplies, work-in-process, finished goods</li> </ul>	<ul style="list-style-type: none"> <li>• Multiple handling, delay in material handling, unnecessary handling</li> </ul>	<ul style="list-style-type: none"> <li>• Time delays, idle time (not value added time)</li> </ul>	<ul style="list-style-type: none"> <li>• Actions of people or equipment that do not add value to the product</li> </ul>	<ul style="list-style-type: none"> <li>• Unnecessary processing steps or work elements /procedures (non value added work)</li> </ul>	<ul style="list-style-type: none"> <li>• Producing a part that is scrapped or requires rework</li> </ul>	<ul style="list-style-type: none"> <li>• Not following up/implementing ideas/suggestions</li> </ul>
<p>Examples</p> <ul style="list-style-type: none"> <li>• Producing parts on Monday that are not shipped to the customer until Friday</li> <li>• Producing parts because the machines and people are available</li> </ul>	<p>Examples</p> <ul style="list-style-type: none"> <li>• 10 Days of raw material supply</li> <li>• A box containing 1000 parts waiting to be assembled after being machined</li> </ul>	<p>Examples</p> <ul style="list-style-type: none"> <li>• Moving part to and from storage areas</li> <li>• Transporting parts from the sub-assembly area to the final assembly area</li> </ul>	<p>Examples</p> <ul style="list-style-type: none"> <li>• Waiting for raw material to be delivered</li> <li>• Waiting for a machine to complete its cycle</li> </ul>	<p>Examples</p> <ul style="list-style-type: none"> <li>• Turning around to pick up a part</li> <li>• Sorting through a box of parts to find the right one</li> </ul>	<p>Examples</p> <ul style="list-style-type: none"> <li>• Painting an automotive seat frame that is covered in cloth and the customer never sees</li> <li>• Inspection, deburring, washing, etc.</li> </ul>	<p>Examples</p> <ul style="list-style-type: none"> <li>• Scrapping parts that failed final inspection</li> <li>• Repairing a surface that was scratched during assembly</li> </ul>	<p>Examples</p> <ul style="list-style-type: none"> <li>• Scrapping parts that failed final inspection</li> <li>• Repairing a surface that was scratched during assembly</li> </ul>

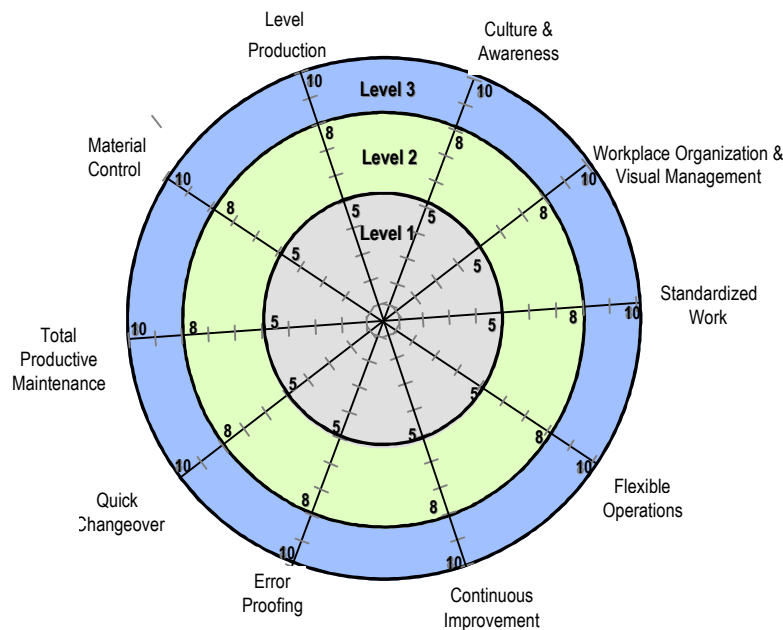
Putting in cellular manufacturing and using Kanban or Rate Based Scheduling for the higher volume items, business and production gets the bulk of items off MRP II (Manufacturing Resource Planning) and reduces the complexity of manufacturing operations. One of the key features in Lean manufacturing is Visible Measurements, where key customer satisfaction measurements are displayed in cells by the operators – like quality, lead time reduction, skills, output and adherence to schedule.





Don't allow routing complexity within the cell and keep safety stocks off-line (so you know when problems occur). Never overlook the importance of good 'housekeeping' and don't expect any substantial benefit just from moving equipment into new layouts. Most importantly, don't allow any loss of momentum once the pilot has begun.

Lean Manufacturing provides the shorter lead times, improved throughput capability, improved process reliability and increased flexibility that give improved service and quality at lower cost. Lean Manufacturing allows this responsiveness to provide a competitive edge through guaranteed availability. One hundred percent quality, competitive costs and fast order replenishment.



## The Lean Assessment: How Lean is Your Business?



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