

Equipment and Process Evaluation for Lean Manufacturing.

“Get better at shorter runs or accept lower operating margins”

Lean Manufacturing Definitions and Strategies:

	Traditional	Lean
Production	Based on forecast	Based on orders
Layout	Based on function	Based on product flow
Batch size	Large	Small
Processing	Batch & queue	Continuous flow
Quality	Lot sampling	Assured during processing

Lean manufacturing is a strategy for remaining competitive by identifying and eliminating wasteful steps in products and processes, using the following practices:

- Improvement of equipment reliability
- Quality at the source
- Continuous flow production
- Pull production
- Continuous improvement

The term “lean” is used because lean manufacturing uses less:

- Human effort in the factory
- Manufacturing space
- Capital investment
- Raw materials
- Time between customer order and the product shipment

The basic goal is to get more done with less by:

- Minimizing inventory at all stages of production
- Shortening product cycle times from raw materials to finished goods
- Eliminating waste

Total Productive Maintenance (TPM):

TPM is the philosophy and practice of preventing the loss of productive machine time due to:

- Breakdowns
- Minor stoppages
- Idling
- Operating at less than planned for cycle times
- Changeovers/setups
- Unacceptable quality

TPM involves everyone in identifying, monitoring and correcting the root causes of each of these losses.

Quality at the Source:

- Machines: intelligence to be self-operating and self-stopping when an error occurs
- People: served by machines, not vice versa
- Quality: built/designed in, not inspected-in
- Efficiency: human work separated from machine work
- Reduces the need to rework and prevents further work (and cost)
- Simplifies prevention and repair of defects by placing responsibility on the operator

Elimination of Waste:

Types of waste	
Overproduction	Producing more, sooner and faster than required by the next process
Transportation	Any movement that does not add value to the product
Inventory	Maintaining excess inventory
Processing	Doing more work than necessary
Waiting	Operator or machine idle time
Correction	All repairs to product to fulfill customer requirements
Motion	Any wasted motion to pick up parts or else stock parts. Also wasted walking.

Implementation of Lean Manufacturing principles:

Services offered by **EAS**:

- In-plant process/equipment evaluation
- New machinery specification and RFQ
- Bid evaluation and purchase recommendation
- Project engineering
- Production and maintenance personnel training

Extrusion line/plant enhancements:

- Improved raw material utilization
- Improved equipment reliability
- Increase line product yield
- Material handling automation and inventory control
- Scrap reduction and improved scrap handling
- Faster product changeover
- Improved production line flexibility
- Higher production rates

Equipment/Processes Implemented for Lean Manufacturing:

- Weight based blending and extrusion control
- Centralized, plant wide resin handling and visual management
- Performance optimized extruder screw design
- Automatic/continuous melt filtration
- Extrusion gear pump systems
- Automatic die control, with online gauging
- ERP software
- Optimized scrap reclaim systems

Additional results:

- JIT resin/material management
- Shorter production runs with minimal waste
- Consistent on-time product delivery
- More flexibility and increased sales
- Make product to order, not for stock
- Real time production information and costing
- Reduces lead times and production space
- Reduction of operating costs