

GLOSSARY of Lean Manufacturing Terms

Lean Terminology	Comments / Definitions	Mazak Application
Lean Manufacturing Lean Production	Continual reduction of waste in all areas and forms	Overall strategy - Drives product development and Mazak's mfg. philosophy
Muda (Waste)	Inefficiencies to be eliminated. Includes over-production, waiting time, transportation, processing, inventory, excess motion and scrap/rework (non-value added)	The enemy - Production on Demand
Value Stream Mapping	Separating production time (value added) from wasted time. Majority of lead time is wasted - therefore it becomes the first target of lean.	Done-In-One
Setup Reduction	Shorten time between value-added processes. Requires analysis and very often, investment. Reduce changeover time or take it off-line	1) Multitasking 2) Palletized systems 3) Tool hive 4) Variaxis
Lead Time Throughput Time	The total elapsed time from customer order to delivery. When the plant is running at or below capacity, lead time and throughput time are the same.	Done-In-One Production on Demand
Takt Time	Production pace based on demand. Key in high volume manufacturing (predictable), but less useful to small volume producers.	Nexus machines
Cycle Time	This is the value-added process. Cycle time must be shorter than Takt time or bottlenecks will occur.	Nexus machines High speed machining
Standard Work	A precise description of each work activity that makes up the cycle time.	Technology Centers
Just-In-Time	A system for producing and delivering the right products at the right time in the right amounts. Key elements are Flow, Pull, Standard Work and Takt Time.	Multitasking
Line Balancing	Spreading the work evenly over multiple operators and machines. Verifies Takt times at three levels of production – mean, slow and fast.	Technology Centers Nexus flow cells
Autonomation (Jidohka)	Self-governing. As in the machine being intelligent enough to detect an error, stop production and notify a person to respond.	Mazatrol - Fusion On-machine probing e-Tower
Pull System	Build to actual customer demand, not forecasts	Production on Demand Multitasking
Flexible Mfg. System (FMS)	Integrated manufacturing capability to produce small lots of multiple parts. Features low setup time and rapid response to change.	Palletech + FMS Robotic cells Gantry load / unload

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Kaizen Point Kaizen Process Kaizen	Continuous incremental improvements to create more value and less waste	
Quick Changeover	The time needed to change from manufacturing one product to another product.	Palletized systems Robotic cells - Variaxis Tool hive - Multitasking
Quality Function Deployment (QFD)	Cross-function decision process ensuring compliance to customer wishes, engineering specs., functionality. Promotes team buy-in.	Fractal concept
Single Piece Flow	A process of manufacturing one complete product at a time with no interruptions, backflows or scrap.	Fractal concept
Batch-And-Queue	Old mass production concept of making large batches of parts, them moving them to wait for the next process. Opposite of Single Piece Flow.	
Total Productive Maintenance (TPM)	Methods to ensure that every machine in a production process is available and able to perform its required task.	e-Tower Optimum Mazatrol Fusion
Visual Control - Transparency	Placement in plain view of tools, parts, processes and schedules so everyone can understand the status at a glance.	Production on Demand Mazatrol Fusion e-Tower
Multi-Machine Working	Cross-training of employees to operate and maintain different types of equipment, usually in cells.	Mazatrol Optimum Production on Demand
Production Smoothing	Creation of a level schedule in a repetitive pattern for smoothing variations corresponding to longer-term demand.	Nexus machine cells
Right-Size	Matching tooling and equipment to the job and space requirements of lean manufacturing.	Technology Centers
Theory of Constraints (TOC)	Lean management philosophy that stresses removal of constraints to increase throughput while decreasing inventory and operating expenses.	
Scalable Factories	Efficient use of capital throughout the product life cycle, from launch through growth and finally, decline.	Fractal concept Multitasking Palletech & other cells