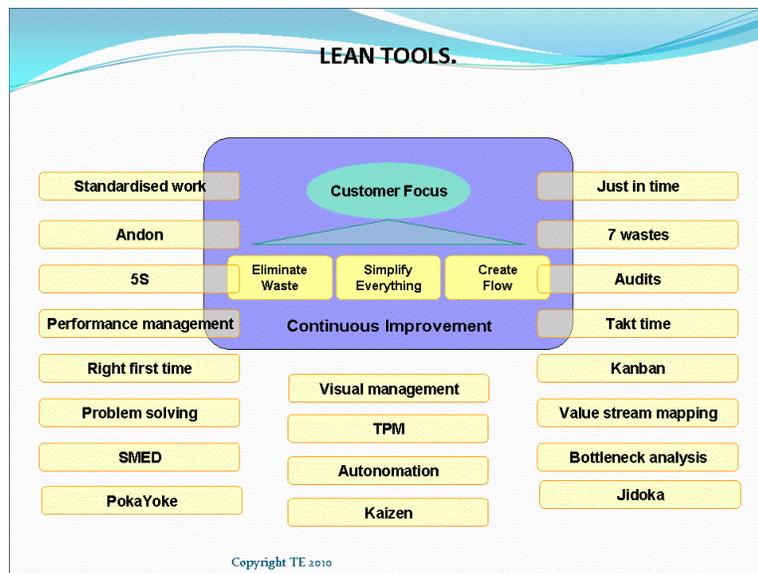*Always Keep Improving!*
Quality Support Group, Inc.
319 Littleton Road, Westford, MA 01886
888-336-1124
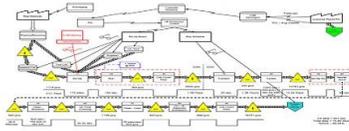

5S

What is 5S?

Organize the work area:

- Sort (eliminate that which is not needed)
- Set In Order (organize remaining items)
- Shine (clean and inspect work area)
- Standardize (write standards for above)
- Sustain (consistently apply the standards)

How does 5S help?

Eliminates waste that results from a poorly organized work area (e.g. wasting time looking for a tool).

Value Stream Mapping

What is Value Stream Mapping?

A tool used to visually map the flow of production. Shows the current and future state of processes in a way that highlights opportunities for improvement.

How does Value Stream Mapping help?

Exposes waste in the current processes and provides a roadmap for improvement through the future state.

Visual Factory

What is Visual Factory?

Visual indicators, displays and controls used throughout manufacturing plants to improve communication of information.

How does Visual Factory help?

Makes the state and condition of manufacturing processes easily accessible and clear – to everyone.

Cellular Manufacturing

What is Cellular Manufacturing?

Cellular manufacturing supports continuous flow by calling on teams to arrange workstations based on the parts they produce to minimize travel time for those parts and allow for rapid feedback across stations about any issues.

How does Cellular Manufacturing help?

Enable teams to produce smaller, more efficient batches. Organizations typically achieve cellular manufacturing by arranging workstations in a "U" formation.

Standardized Work

What is Standardized Work?

Documented procedures for manufacturing that capture best practices (including the time to complete each task). Must be "living" documentation that is easy to change.

How does Standardized Work help?

Eliminates waste by consistently applying best practices. Forms a baseline for future improvement activities.

Root Cause Analysis
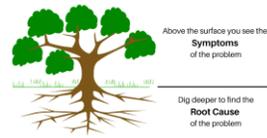
What is Root Cause Analysis?

A problem-solving methodology that focuses on resolving the underlying problem instead of applying quick fixes that only treat immediate symptoms of the problem. A common approach is to ask why five times – each time moving a step closer to discovering the true underlying problem.

How does Root Cause Analysis help?

Helps to ensure that a problem is truly eliminated by applying corrective action to the "root cause" of the problem.

Single-Minute Exchange of Dies (SMED)

What is Single-Minute Exchange of Dies?

Reduce setup (changeover) time to less than 10 minutes. Techniques include:

- Convert setup steps to be external (performed while the process is running)
- Simplify internal setup (e.g. replace bolts with knobs and levers)
- Eliminate non-essential operations
- Create Standardized Work instructions

How does Single-Minute Exchange of Dies help?

Enables manufacturing in smaller lots, reduces inventory, and improves customer responsiveness.
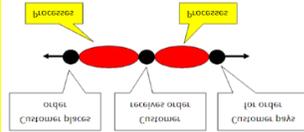
Poka-Yoke (Error Proofing)

What is Poka-Yoke?

Design error detection and prevention into production processes with the goal of achieving zero defects.

How does Poka-Yoke help?

It is difficult (and expensive) to find all defects through inspection, and correcting defects typically gets significantly more expensive at each stage of production.

Continuous Flow

What is Continuous Flow?

Manufacturing where work-in-process smoothly flows through production with minimal (or no) buffers between steps of the manufacturing process.

How does Continuous Flow help?

Eliminates many forms of waste (e.g. inventory, waiting time, and transport).
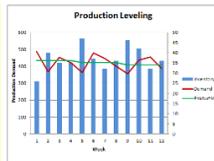
Gemba (The Real Place)

What is Gemba?

A philosophy that reminds us to get out of our offices and spend time on the plant floor – the place where real action occurs.

How does Gemba help?

Promotes a deep and thorough understanding of real-world manufacturing issues – by first-hand observation and by talking with plant floor employees.

Heijunka (Level Scheduling)

What is Heijunka?

A form of production scheduling that purposely manufactures in much smaller batches by sequencing (mixing) product variants within the same process.

How does Heijunka help?

Reduces lead times (since each product or variant is manufactured more frequently) and inventory (since batches are smaller).

Hoshin Kanri (Policy Deployment)
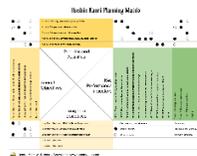
What is Hoshin Kanri?

Align the goals of the company (Strategy), with the plans of middle management (Tactics) and the work performed on the plant floor (Action).

How does Hoshin Kanri help?

Ensures that progress towards strategic goals is consistent and thorough – eliminating the waste that comes from poor communication and inconsistent direction.

Total Productive Maintenance (TPM)

What is Total Productive Maintenance?

A holistic approach to maintenance that focuses on proactive and preventative maintenance to maximize the operational time of equipment. TPM blurs the distinction between maintenance and production by placing a strong emphasis on empowering operators to help maintain their equipment.

How does Total Productive Maintenance help?

Creates a shared responsibility for equipment that encourages greater involvement by plant floor workers. In the right environment this can be highly effective in improving productivity (increasing up time, reducing cycle times, and eliminating defects).

Bottleneck Analysis
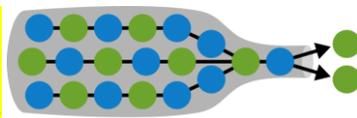
What is Bottleneck Analysis?

Identify which part of the manufacturing process limits the overall throughput and improve the performance of that part of the process.

How does Bottleneck Analysis help?

Improves throughput by strengthening the weakest link in the manufacturing process.

Jidoka (Autonomation)

What is Jidoka?

Design equipment to partially automate the manufacturing process (partial automation is typically much less expensive than full automation) and to automatically stop when defects are detected.

How does Jidoka help?

After Jidoka, workers can frequently monitor multiple stations (reducing labor costs) and many quality issues can be detected immediately (improving quality).

Just-In-Time (JIT)

What is Just-In-Time?

Pull parts through production based on customer demand instead of pushing parts through production based on projected demand. Relies on many lean tools, such as Continuous Flow, Heijunka, Kanban, Standardized Work and Takt Time.

How does Just-In-Time help?

Highly effective in reducing inventory levels. Improves cash flow and reduces space requirements.

Kaizen (Continuous Improvement)

What is Kaizen?

A strategy where employees work together proactively to achieve regular, incremental improvements in the manufacturing process.

How does Kaizen help?

Combines the collective talents of a company to create an engine for continually eliminating waste from manufacturing processes.

Kanban (Pull System)

What is Kanban?

A method of regulating the flow of goods both within the factory and with outside suppliers and customers. Based on automatic replenishment through signal cards that indicate when more goods are needed.

How does Kanban help?

Eliminates waste from inventory and overproduction. Can eliminate the need for physical inventories (instead relying on signal cards to indicate when more goods need to be ordered).

KPIs (Key Performance Indicators)

What are KPIs?

Metrics designed to track and encourage progress towards critical goals of the organization. Strongly promoted KPIs can be extremely powerful drivers of behavior – so it is important to carefully select KPIs that will drive desired behavior.

How do KPIs help?

The best manufacturing KPIs:

- Are aligned with top-level strategic goals (thus helping to achieve those goals)
- Are effective at exposing and quantifying waste (OEE is a good example)
- Are readily influenced by plant floor employees (so they can drive results)

Muda (Waste)

What is Muda?

Anything in the manufacturing process that does not add value from the customer's perspective.
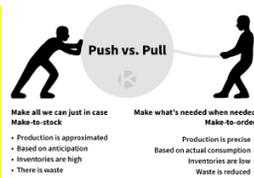
How does Muda help?

Muda means 'waste'. The elimination of muda (waste) is the primary focus of lean manufacturing.

Overall Equipment Effectiveness (OEE)

What is Overall Equipment Effectiveness?

Framework for measuring productivity loss for a given manufacturing process. Three categories of loss are tracked:

- Availability (e.g. downtime)
- Performance (e.g. slow cycles)
- Quality (e.g. rejects)

How does Overall Equipment Effectiveness help?

Provides a benchmark/baseline and a means to track progress in eliminating waste from a manufacturing process. 100% OEE means perfect production (manufacturing only good parts, as fast as possible, with no downtime).

PDCA (Plan, Do, Check, Act)

What is PDCA?

An iterative methodology for implementing improvements:

- Plan (establish plan and expected results)
- Do (implement plan)
- Check (verify expected results achieved)
- Act (review and assess; do it again)

How does PDCA help?

Applies a scientific approach to making improvements:

- Plan (develop a hypothesis)
- Do (run experiment)
- Check (evaluate results)
- Act (refine your experiment; try again)

Six Big Losses

What is Six Big Losses?

Six categories of productivity loss that are almost universally experienced in manufacturing:

- Breakdowns
- Setup/Adjustments

- Small Stops
- Reduced Speed
- Startup Rejects
- Production Rejects

How does Six Big Losses help?

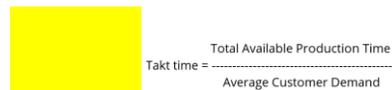Provides a framework for attacking the most common causes of waste in manufacturing.

SMART Goals

What are SMART Goals?

Goals that are: Specific, Measurable, Attainable, Relevant, and Time-Specific.

How do SMART Goals help?

Helps to ensure that goals are effective.

Takt Time

$$Takt\ time = \frac{Total\ Available\ Production\ Time}{Average\ Customer\ Demand}$$

What is Takt Time?

The pace of production (e.g. manufacturing one piece every 34 seconds) that aligns production with customer demand. Calculated as Planned Production Time / Customer Demand.

How does Takt Time help?

Provides a simple, consistent and intuitive method of pacing production. Is easily extended to provide an efficiency goal for the plant floor (Actual Pieces / Target Pieces).

Andon

Color-Code	Condition	Action
(green)	Production is normal	Proceed to the next step
(yellow)	Problem appeared	The problem cannot be identified and will need further investigation
(red)	Production has stopped	An operator needs to have a supervisor check the facility

What is Andon?

Visual feedback system for the plant floor that indicates production status, alerts when assistance is needed, and empowers operators to stop the production process.

How does Andon help?

Acts as a real-time communication tool for the plant floor that brings immediate attention to problems as they occur – so they can be instantly addressed.