

Lean Glossary

A3 Report – A Toyota-pioneered practice of getting the problem, the analysis, the corrective actions, and the action plan down on a single sheet of large (A3) paper, often with the use of graphics. At Toyota, A3 reports have evolved into a standard method for summarizing problem solving exercises, status reports, and planning exercises like value stream mapping. A3 paper is the international term for paper 297 millimeters wide and 420 millimeters long. The closest US paper size is the 11 by 17 inch tabloid sheet.

Andon – A visual control device in a production area, typically a lighted overhead display, giving the current status of the production system and alerting team members to emerging problems.

Batch and queue – The mass production process of making large lots of a part and then sending the batch to wait in the queue ahead of the next operation in the production process.

Cell – The layout of machines of different types performing different operations in a tight sequence, typically in a U-shape, to permit single piece flow and flexible deployment of human effort.

Change Agent – The leader of a lean conversion who has the will power and drive to initiate fundamental change and make it stick.

Changeover – The process of switching from the production of one product or part number to another in a machine (e.g. stamping press or molding machine) or a series of linked machines (e.g. an assembly line or cell) by changing parts, dies, molds, fixtures, etc.

Continuous Flow – Producing and moving one item at a time (or a small and consistent batch of items) through a series of processing steps as continuously as possible, with each step making just what is requested by the next step.

Cycle Time – How often a part or product is completed by a process, as timed by observation. This time includes operating time plus the time required to prepare, load, and unload.

Downtime – Production time lost due to planned or unplanned stoppages. Planned downtime includes scheduled stoppages for such activities as beginning-of-the-shift production meetings, changeovers to produce other products, and scheduled maintenance. Unplanned downtime includes stoppages for breakdowns, machine adjustments, material shortages, and absenteeism.

First In, First Out (FIFO) – The principle and practice of maintaining precise production and conveyance sequence by ensuring that the first part to enter a process or storage location is also the first part to exit. This insures that stored parts do not become obsolete and that quality problems are not buried in inventory.

Five S's (5S) – Five terms beginning with S (Sort, Set-in-order, Shine, Standardize, and Sustain) utilized to create a workplace suited for visual control and lean production.

Five Whys – The practice of asking “why” five times to ensure that the root cause problem is accurately identified so that it can be corrected.

Flow – The progressive achievement of tasks along the value stream so that a product proceeds from design to launch, order to delivery, and raw materials into the hands of the customer with no stoppages, scrap, or rework.

Gemba – Literally means “real place.” Going to the shop floor or place where work is performed, observing and understanding the process issues, and developing actionable improvement ideas.

Kaizen – Literally means “take apart and make new, in a way that helps others.” Never-ending improvement of an activity to create more value with less waste. A “kaizen event” is a 3-5 day focused effort by a cross-functional team aimed at achieving specific improvements in a short time.

Kanban – Any signal such as a card, empty bin, buzzer, etc. that regulates “pull” in a system by authorizing production and/or movement of a product.

Lead Time – The total time a customer must wait to receive a product after placing an order.

Lean - The process of providing perfect value to the customer through the continuous elimination of waste.

Lean Enterprise – A continuing agreement among all the firms sharing the value stream for a product family to correctly specify value from the standpoint of the end customer, remove wasteful actions from the value stream, and make those actions which do create value occur in continuous flow as pulled by the customer. As soon as this task is completed, the cooperating firms must analyze the results and start the process again through the life of the product family.

Muda – waste. Any activity that consumes resources but creates no value.

Non Value-Creating Time – The time spent on activities that add costs but no value to an item from the customer’s perspective. Such activities typically include storage, inspection, and rework.

Overall Equipment Effectiveness (OEE) – A total productive maintenance (TPM) measure of how effectively equipment is being used. OEE is calculated from three elements: The *availability rate* measures downtime losses from equipment failures and adjustments as a percentage of scheduled time. The *performance rate* measures operating speed losses—running at speeds lower than design speed and stoppages lasting a few seconds. The *quality rate* expresses losses due to scrap and rework as a percentage of total parts run.

Perfection – The complete elimination of muda so that all activities along a value stream create value.

Plan, Do, Check, Act (PDCA) – An improvement cycle based on the scientific method of proposing a change in a process, implementing change, measuring the results, and taking appropriate action. It is also known as the Deming Cycle or Deming Wheel after W. Edwards Deming who introduced the concept in Japan in the 1950s.

Point-of-Use Storage – Storing production parts and materials as close as possible to the operations that require them.

Poka-Yoke – A mistake proofing technique used to prevent defects during order taking or manufacturing.

Process – A series of individual operations that must occur in a specific sequence to create a design, complete an order, or produce a product or service.

Process Villages – The practice of grouping machines by type of operation performed, for example a group of grinding machines.

Product Family – A group of related products that pass through similar processing steps and over common equipment in downstream processes.

Production Analysis Board – A display, often a large whiteboard, located beside a process to show actual performance compared with planned performance.

Pull System – A system of cascading production and delivery instructions from downstream to upstream operations. Nothing is produced until the downstream customer signals a need, normally with a kanban signal.

Push System – Processing large batches of items at a maximum rate, based on forecasted demand, then moving them to the next downstream process or into storage, regardless of the actual pace of work in the next process.

Red Tagging – Labeling unneeded items for removal from an area during a 5S exercise.

Sensei – A personal teacher with a mastery of a body of knowledge of lean thinking and techniques.

Seven Wastes – List of the wastes commonly found in physical production. These are *overproduction* ahead of demand, *waiting* for the next processing step, unnecessary *transport* of materials, *overprocessing* of parts due to poor tool and product design, *inventories* more than the absolute minimum, unnecessary *movement* by employees during the course of their work (looking for parts, tools, prints, help) and production of *defective* parts.

Single Minute Exchange of Die (SMED) – A series of techniques for changeovers of production machinery aimed at reducing the time between last good piece to first good piece.

Standard Work – The precise description of each work activity specifying cycle time, takt time, work sequence of specific tasks, and the minimum inventory of parts on hand needed to conduct the activity.

Supermarket – The location where a predetermined standard inventory is kept to supply downstream processes.

Supermarket Pull System – In a supermarket pull system each process has a store; that is a supermarket that holds an amount of each product it produces. Each process simply produces to replenish what is withdrawn from its supermarket. Typically, as material is withdrawn from the supermarket by the downstream customer process, a kanban or other type of information will be sent upstream to the supplying process to withdraw product. This will authorize the upstream process to replace what was withdrawn.

Takt Time – The available production time divided by the rate of customer demand. For example, if customers demand 240 widgets per day and the factory operates 480 minutes per day, takt time is two minutes. Takt time sets the pace of production to match the rate of customer demand.

Total Productive Maintenance (TPM) – A series of methods to ensure that every machine in a production process is always able to perform its required tasks so that production is never interrupted.

Toyota Production System (TPS) – The production system developed by Toyota Motor Corporation to provide best quality, lowest cost, and shortest lead time through the elimination of waste. TPS is maintained and improved through iterations of standardized work, kaizen, and following PDCA.

Value – something that the customer is willing to pay for. Activity that transforms the product by adding features, functions, and value.

Value Stream – All the actions (both value added and non-value added) required to design, order, and provide a specific product, from concept to launch, order to delivery, and raw materials into the hands of the customer.

Value Stream Map (VSM) – Identification of all the specific activities occurring along a value stream for a product or product family. It is a paper and pencil tool, that results in a hand drawn visual representation of every process in the material and information flow.

Visual Management – The placement in plain view of all tools, parts, production activities, and measurements so that the status of the system can be easily understood by everyone involved.

Waste – Any activity that consumes resources but creates no value for the customer.

Work-in-Process (WIP) – Items between processing steps within a facility.