Glossary of Value Stream Mapping Terms

LIST OF TERMS

Batch-and-Queue  p.3
Cell
Changeover
Continuous Flow Production
Cycle Time

EPEI  p.4
Fabrication Process
FIFO
Flow
Heijunka

Just-in-Time  p.5
Kaizen
Kanban
Lean Time
Material Handlers
Material Requirements Planning (MRP)

Milk Run  p.6
Muda
Overproduction
Paced Withdrawal
Pacemaker Process
Pitch
Process Kaizen

Processing Time  p.7
Product Family
Production Smoothing
Pull System
Queue Time
LIST OF TERMS (Continued)

Supermarket p.7
System Kaizen
Takt Time

Value p.8
Value-Added Time
Value Stream
Value Stream Loops
Value Stream Manager
Value Stream Mapping

Waste p.9
WIP
Batch-and-Queue

Producing more than one piece of an item and then moving those items forward to the next operation before they are all actually needed there. Thus items need to wait in a queue. Also called “Batch-and-Push.” Contrast with continuous flow.

Cell

Operating a true continuous flow on machines and workstations placed close together in the order of processing, sometimes in a “U” shape. Cell operators may handle multiple processes, and the number of operators is changed when the customer demand rate changes. The “U” shaped equipment layout is used to allow more alternatives for distributing the work elements among operators, and to permit the leadoff and final operations to be performed by the same operator.

Changeover

When a piece of equipment has to stop producing in order to be fitted for producing a different item. For example, the installation of a different processing tool in a metal working machine, a different color paint in a painting system, a new plastic resin & mold in an injection molding machine, loading different software, and so on.

Continuous Flow Production

Means that items are produced and moved from one processing step to the next one-piece-at-a-time. Each process makes only the one piece that the next process needs, and the transfer batch size is one. Also called “single-piece flow” or “one-piece flow.” Contrast with batch-and-queue.

Cycle Time

How frequently an item or product actually is completed by a process, as timed by direct observation. Also, the time it takes an operator to go through all of his or her work elements before repeating them.
M-F

EPEI

Refers to the “every-product-every interval,” which is a measure of production batch size. For example, if a machine is able to change over and produce the required quantity of all the high-running part types dedicated to it within three days, then the production batch size for each individual part type is about three days worth of parts. Thus this machine is making every part every (EPE) three days.

Fabrication Processes

Segments of the value stream that respond to requirements from internal customers. Fabrication processes are often characterized by general-purpose equipment that changes over to make a variety of components for different downstream processes. Compare to “pacemaker process”.

FIFO

Stands for “first in, first out,” which means that material produced by one process is used up in the same order by the next process. FIFO is one way to regulate a queue between two decoupled processes when a supermarket or continuous flow are impractical. A FIFO queue is filled by the supplying process and emptied by the customer process. When a FIFO queue gets full, the supplying process must stop producing until the customer process has used up some of the inventory.

FIFO is sometimes called “CONWIP”, or “Constant Work In Process”.

Flow

A main objective of the entire lean production effort, and one of the key concepts that passed directly from Henry Ford to Taiichi Ohno (Toyota’s production manager after WWII). Ford recognized that, ideally, production should flow continuously all the way from raw material to the customer and envisioned realizing that ideal through a production system that acted as one long conveyor.

G-L

Heijunka

The act of leveling the variety and/or volume of items produced at a process over a period of time. Used to avoid excessive batching of product types and/or volume fluctuations, especially at a pacemaker process.
**Just-in-Time**

Producing or conveying only the items that are needed by the next process when they are needed and in the quantity needed.

**Kaizen**

Continuously improving in incremental steps.

**Kanban**

A signaling device that gives instruction for production or conveyance of items in a pull system. Can also be used to perform kaizen by reducing the number of kanban in circulation, which highlights line problems.

**Lead Time**

The time required for one piece to move all the way through a process or value stream, from start to finish. Envision timing a marked item as it moves from beginning to end.

**Material Handlers**

Production-support persons who travel repeatedly along scheduled routes within a facility to transfer materials, supplies, and parts in response to pull signals, and to make paced withdrawal of finished goods at pacemaker processes.

**Material Requirements Planning (MRP)**

A computerized system typically used to determine the quantity and timing requirements for delivery and production of items. Using MRP specifically to schedule production at processes in a value stream results in push production, because any predetermined schedule is only an estimate of what the next process will actually need.

Manufacturing Resource Planning—often called MRP II—expands MRP to include capacity planning, a finance interface to translate operations planning into financial terms, and a simulation tool to assess alternative production plans.
Milk Run

Routing a delivery vehicle in a way that allows it to make pickups or drop-offs at multiple locations on a single travel loop, as opposed to making separate trips to each location.

Muda

See Waste

Overproduction

Producing more, sooner or faster than is required by the next process.

P-R

Paced Withdrawal

A timed sequence of withdrawal of finished product from the pacemaker process. Paced withdrawal is a tool for pacing an assembly process and becoming aware of production problems within a pitch increment.

Pacemaker Process

The “pacemaker process” is a series of production steps, frequently at the downstream (customer) end of the value stream in a facility, that are dedicated to a particular product family and respond to orders from external customers. The pacemaker is the most important process in a facility because how you operate here determines how well you can serve the customer, and what the demand pattern is like for upstream fabrication processes.

Pitch

When takt time is too short for a reasonable paced withdrawal it can be adjusted upward to a consistent increment of work called pitch, which becomes the basic unit of your production schedule for a product family. Pitch represents the frequency at which you withdraw finished goods from a pacemaker process as well as the corresponding amount of schedule you release to that process. Pitch is often calculated based on the customer’s ship container quantity.

Process Kaizen

Improvements made at an individual process or in a specific area. Sometimes called “point kaizen”.

Processing Time
The time a product is actually being worked on in a machine or work area.

Product Family
A group of products that go through the same or similar downstream or “assembly” steps and equipment.

Production Smoothing
See heijunka.

Pull System
An alternative to scheduling individual processes, where the customer process withdraws the items it needs from a supermarket, and the supplying process produces to replenish what was withdrawn. Used to avoid push. See also kanban.

Queue Time
The time a product spends waiting in line for the next processing step.

Supermarket
A controlled inventory of items that is used to schedule production at an upstream process.

System Kaizen
Improvement aimed at an entire value stream.

Takt Time
The rate of customer demand. How often the customer requires one finished item. Takt time is used to design assembly and pacemaker processes, to assess production conditions, to calculate pitch, to develop material handling containerization and routes, to determine problem-response requirements, and so on. Takt is the heartbeat of a lean system.
Takt time is calculated by dividing production time by the quantity the customer requires in that time.
Value

A product or service’s capability provided to a customer at the right time, at an appropriate price, as defined in each case by the customer.

Value-Added Time

Time for those work elements that transform the product in a way the customer is willing to pay for.

Value Stream

All activities, both value added and non value added, required to bring a product from raw material into the hands of the customer, a customer requirement from order to delivery, and a design from concept to launch. Value stream improvement usually begins at the door-to-door level within a facility, and then expands outward to eventually encompass the full value stream.

Value Stream Loops

Segments of a value stream whose boundaries are typically marked by supermarkets. Breaking a value stream into loops is a way to divide future state implementation into manageable pieces.

Value Stream Manager

Person responsible for creating a future state map and leading door-to-door implementation of the future state for a particular product family. Makes change happen across departmental and functional boundaries.

Value Stream Mapping

A pencil-and-paper tool used in two stages:

a) Follow a product’s production path from beginning to end and draw a visual representation of every process in the material and information flows.

b) Then draw a future state map of how value should flow. The most important map is the future state map.
Waste

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

WIP

Stands for “work in process.” Any inventory between raw material and finished goods.