



# Lean Thinking Fundamentals

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# Lean Thinking

**Lean Thinking** is precisely specifying *value* by specific product, identifying the *value stream* for each product, making value *flow* without interruptions, letting the customer *pull* value from the producer and pursuing *perfection*.

- Absent from the definition any reference to manufacturing
- Lean Thinking applies to any process
- Lean Manufacturing is Lean Thinking applied to a physical transformation process
- The application of the generalized concept to a particular field results in field-optimized tools and techniques



# What is Lean Manufacturing?

**Lean Manufacturing** is the application of Lean Thinking to "specify *value*, to line up all the value creating activities for a specific product along the *value stream*, and to make value *flow* smoothly at the *pull* of the customer in pursuit of *perfection*."



# Lean Thinking

- Lean is not Mean!
- Lean Thinking is not a way to...
  - Lose weight
  - Eliminate jobs
  - Downsize or reduce spending
- Lean Thinking is a way to...
  - Create value for your customers
  - Enhance financial results
  - Banish waste



# Lean Manufacturing - Objectives

- Fewer delivered defects (and more refinement)
- Shorter product lives & lead times
- Less time for uptake of new technologies
- Less time to respond to market shifts
- Lower levels of effort
- Lower capital investment (space, tools, inventories, etc.)

Less & less & less =.....LEAN!



# Lean Thinking

## The Five Lean Principles

- Value
- Value Stream
- Flow
- Pull
- Perfection



# The Five Lean Principles

## Value

**Value** is the ultimate customer's subjective evaluation, adjusted for cost, of how well a good or service meets or exceeds expectation

- Who defines value?
- Who creates value?
- The elements of value:
  - Performance
  - Speed
  - Flexibility
  - Quality
  - Service
  - Cost



# The Five Lean Principles

## Value Stream

The Value Stream is the flow of all the specific actions required to bring a product through the three critical management tasks of a business

The 3 critical management tasks of a business:

- Problem-solving tasks
- Information management tasks
- Physical transformation tasks



# The Five Lean Principles

## Flow

**Flow** is the progressive achievement of tasks along the value stream so that a product proceeds without stoppages, scrap or backflows

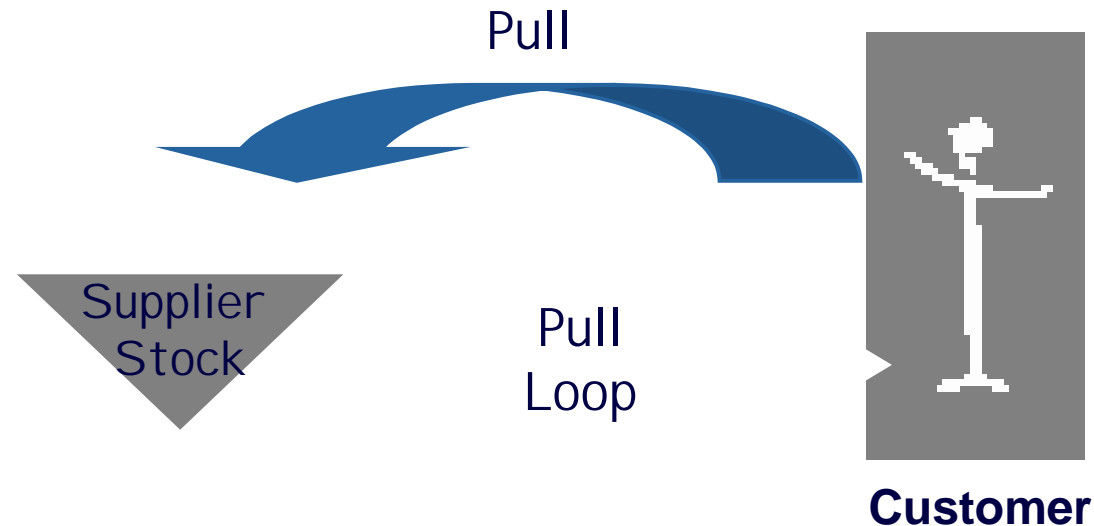
- From design to launch
- From order to delivery
- From raw materials to the hands of the customer



# The Five Lean Principles

## Pull

**Pull** is a system of cascading production and delivery instructions from downstream to upstream activities in which nothing is produced or delivered by the upstream supplier until the downstream customer signals a need





# The Five Lean Principles

## Value Stream

**Perfection** is the endless effort to apply the principles of Lean Thinking to continuously eliminate waste. Value, Value Stream, Flow and Pull interact with each other in a virtuous circle



# Waste

Waste is any activity that consumes resources but creates no value

- Waste is synonymous with non-value added
- Value is defined by the customer
- Waste can take many forms
  - Inventory
  - Time
  - Scrap



# Value versus Waste

- Value Added
  - Value creating activities
  - Those activities that transform something from a raw or less processed state to a more valuable state in the eyes of the customer
- Non-Value Added
  - Type I Waste: Creates no value but is unavoidable with current technologies or tools
  - Type II Waste: Creates no value and is immediately avoidable



# Seven Types of Waste

- **Transportation:** Facility layouts and systems that require material to be transported significant distances
- **Processing:** Some process steps that are excessive, inefficient or simply unnecessary.
- **Motion:** All operator motion is wasteful unless it is absolutely necessary to add value to the product
- **Waiting:** Operators waiting for machines or other operators to finish parts, waiting for material arrive from another area, or idle for lack of parts



# Seven Types of Waste

- **Defective product:** Activities that result in defective products, scrap and rework
- **Overproduction:** Making more than the customer requires, producing sooner or faster than the customer requires.
- **Stocks:** Stocking inventory at any stage of the process



# Five Contributors to Waste

- Current Process
- Local Optimization
- Overburden
- Unevenness
- Dynamic Complexity



# The Lean Leap: Typical Results

- Throughput time in plant (and WIP) down 90%
  - Throughput time in product development down 50-75%
  - Defects in process and reaching customer down 90%
  - Ship-on-time without expediting rises from 50-75 to 90+%
  - Injuries to workers fall by 90%
  - Plant space needed for given level of output falls 50%
  - Capital needed for given level of output falls 50%
- Difference between competitive success and exit!**