Creating a One-Piece Flow and Production cell

Just-in-time Production with Toyota's Single Piece Flow

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CREATING A ONE-PIECE FLOW AND PRODUCTION CELL: JUST-IN-TIME PRODUCTION WITH TOYOTA'S SINGLE PIECE FLOW

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What is Continuous Flow?

Continuous flow has been the aim of innumerable kaizen programmes, and it is the ultimate goal of lean production. A "cell" is essentially any collection of devices that carry out processing operations sequentially, however it is uncommon to see a true continuous flow, which is what actually constitutes a cell.

In a perfect world, the product would go continuously from the raw material to the client across all of your value streams. But that would be too lot to take on at once. We need somewhere to concentrate. That location uses a "pacemaker" system.

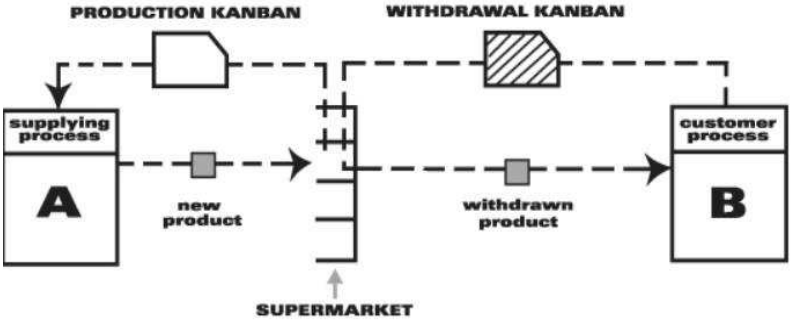
Why focus on pacemaker process?

External customers are involved in this process and may be directly impacted. The following problems can be discovered when

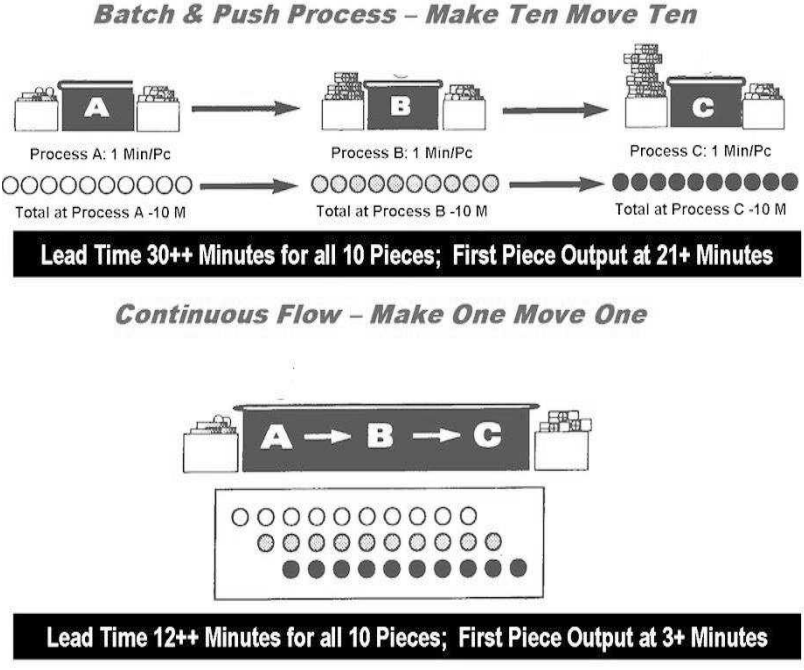
the pacemaker process examined more closely:

- Product flow that is erratic and intermittent, with fluctuating inventory between steps (WIP).
- A lot of batching.
- Variable results.
- Inadequate use of human power (utilization).

Notably, the idea of continuous flow encompasses all production processes and is not limited to pacemaker processes. Each tool mentioned has a range of applications.



Example one-piece flow:



Type of Process	Applicability
Completely manual production	xxx
Operator driven cells and lines incorporating	xxx

automated equipment	
Conveyorized production lines	xx
Partially automated transfer lines (with operator work stations)	xx
Fully automated transfer lines (operators as lines attendants)	
Highly multifunction automated machines	

Definition of a cell:

A set up of people, tools, resources, and techniques where the steps in processing are sequentially positioned next to one another and through with parts are processed in a continuous flow (or in some cases in a consistent, small batch size that is

maintained through the sequence of the process steps).

Team Work Involvement

Value-Stream Manager: Creates a map of the future state and keeps tweaking it to illustrate the pacemaker process and areas where continuous flow is possible.

Area Manager: Lead the endeavor to establish a flow, and ensure daily maintenance and improvement of the flows.

Industrial & Manufacturing Engineers: Using information they physically gather on the facility floor; they design the first layouts and personnel levels of continuous flow cells. They provide substantial implementation and debugging assistance. Additionally, engineers design, specify, and construct the compact, straightforward equipment required to maintain continuous flow.

Production Team: The flow cannot be created, maintained, or improved without the assistance of the operators, team leaders, and supervisors. Production associations also contribute in finding ways to improve it on a regular basis.

Maintenance: De-bug the new cell until it works as intended (with IE and manufacturing engineers).

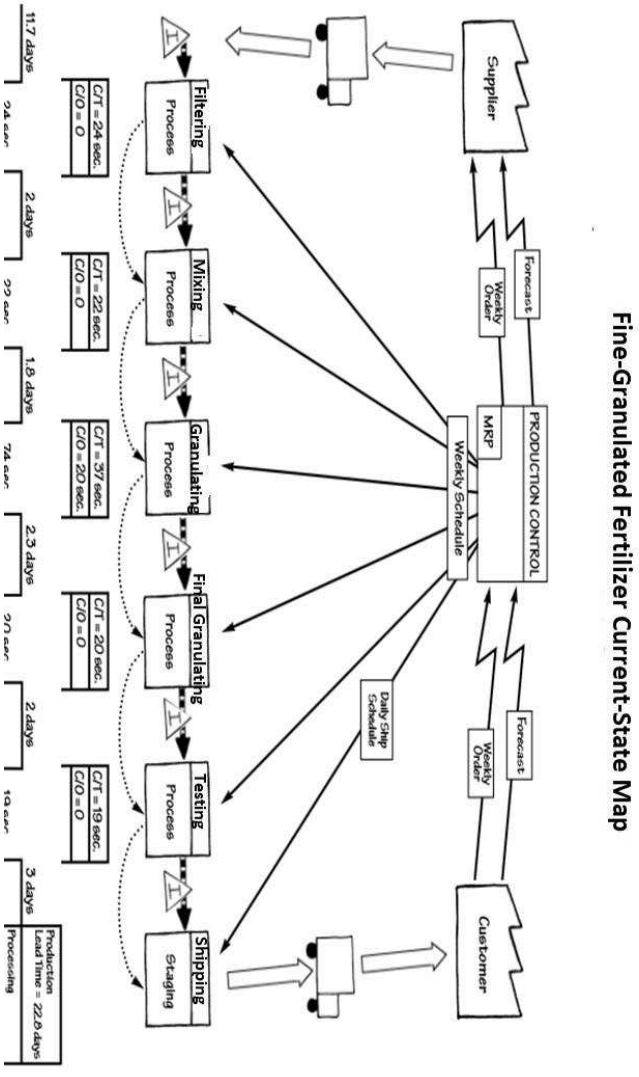
Lean Specialists: Help all of these people.

Getting Started: Creating Continuous Flow

By grouping products based on comparable final processing procedures and machinery, the product family matrix is created.

Products	Assembly Steps and Machines							
	Washing	Grinding	Filtering	Mixing	Granulating	Final-Granulating	Packing	Testing
Automotive	X				X	X	X	X
Fine Granulated Type A	X			X	X	X		X
Fine Granulated Type B	X			X	X	X		X
Fine Granulated Type C	X			X	X	X		X
Hard Granulated		X	X	X				X
Extra Hard Granulated	X	X	X	X		X		X

Product Family Matrix


Fine-Granulated Fertilizer Current-State Map
Supplier
Forecast
Weekly Order
PRODUCTION CONTROL
MRP
Weekly Schedule
Forecast
Weekly Order
Customer
Daily Ship Schedule
Filtering Process
C/T = 24 sec.
C/O = 0
Mixing Process
C/T = 22 sec.
C/O = 0
Granulating Process
C/T = 37 sec.
C/O = 20 sec.
Final Granulating Process
C/T = 20 sec.
C/O = 0
Testing Process
C/T = 19 sec.
C/O = 0
Shipping Staging
11.7 days
2 days
1.8 days
2.3 days
2 days
3 days
Production Lead Time = 22.8 days
Processing

Value Stream Mapping VSM	Process Mapping
Considers the whole value stream	Concentrates on a Single Process
Identifies non-value-added between processes	Identify non-value-added within a process
Big picture	Detailed picture
Improvement to the system is usually huge but tough to implement	Improvement to the process or overall system is small, but easy to implement
Long-term strategy	Short-term tactical plan
Help achieve business excellence	Help achieve operational excellence, but needs to be implemented in every single process

Fertilizer Process Line

	Initial Condition	**Present Situation**
Continuous Flow	NO	NO
Production per shift (actual/target)	622/690	622/690
Space sq. m	1130	580
Assembly Lead time (WIP x takt)	11 days	37 min