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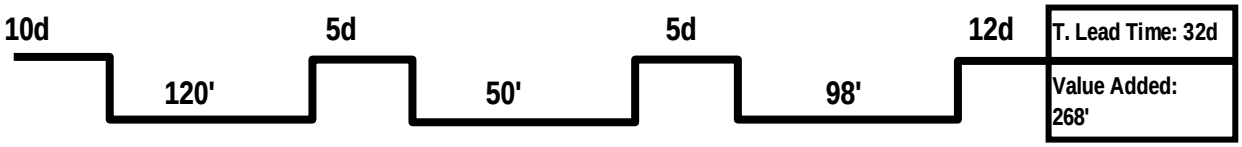
THE MONEY AROUND US

by Bill Belt

The No. 1 financial gain that most companies aim for with Lean is ***the reduction of inventory and work-in-process (WIP).*** That's no surprise, because the average company is swimming in the money represented by its inventory and WIP. Value Stream Mapping with Lean can show the money to be picked up. In the line at the bottom of the map, the value added, or the transformation time, is carefully separated from the rest, which is the total time represented by inventory and WIP observed at each stage in the process:



The above example shows 2% of value-added (32d → 13 440') and 98***% of waste or money to get back, which is fairly typical***. For 1000 parts at $ 150 each, the money to get back amounts to $ 147 000.

From a financial point of view, inventory and WIP are looked at the same way: both represent money invested. But the physical management of the two is completely different. To get the money back, we must ***distinguish between inventory and WIP.***

Last week I visited a shop which wasn't producing enough parts. Top Management was applying pressure, partly by having lots of Work Orders, therefore WIP, into the shop. The result was work in process everywhere. However, in the phrase « work in process », there is « in process »: the parts are supposed to be proceeding quickly from the preceding stockroom (or accounting point) to the next one. They're not supposed to be just sitting there, not moving.

In addition, the production process had five bill-of-material levels, so five Work Orders were required to move the product through it. But several of the production steps represented in the BOM were just operations in the routing: no components being added, no change in lot size, etc. It was just a series of production operations, no reason to go into and out of a stockroom. The bill of material obviously had too many levels.

Also, in the same shop, there was an intermediate stockroom wherein Work Orders and their components were stocked: work in process placed in inventory! What really was WIP and what really was inventory?

A physical trip through the shop is always the decider. ***Parts in WIP which are not moving would be better off in the stockroom,*** beyond the 2 or 3 days of queue necessary to organize production. In the shop mentioned above, everything was backwards. It was apparent from looking at the production process that what was called a BOM level was in reality an operation in the routing. A single Work Order could have covered the entire routing instead of the 5 Work Orders being used.

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Therefore their BOM should have had two levels, not five: one at the beginning and one at the end of the process. For the time being, the intermediate « WIP » stockroom represents a third BOM level, a breakpoint in the process. ***Parts in a stockroom should not be reflected as work in process in the planning system.*** They're not « in process »; they're sleeping. To sum up:

1.	All parts in WIP, covered by a Work Order, should really be « in process », moving quickly from one stockroom or accounting point towards the next; on their arrival, the Work Order is closed..
2.	All parts in a stockroom should be included in the stock balance, not on a Work Order. They're static, not moving, and should be reflected as such.

With less WIP, the shop floor will be less crowded and can better focus on its main mission: producing in conformance to Quality specifications, not managing mountains of WIP.

A corollary is: ***don't release work into a shop which is already overloaded.*** Putting parts « in process » is useless if the WIP is not going to move quickly through the process. This rule is even more strict ***under Lean: nothing is pulled into a process step unless a Kanban square has been emptied by the departure of a product at the other end.***

Finally, ***by lowering WIP, parts move through the process with a shorter lead time for the same demonstrated capacity,*** thanks to the following equation:

$$\frac{WIP}{Demonstrated\ Capacity} = Lead\ \ Time$$

For a demonstrated capacity of 100 pieces per day, 2000 pieces in WIP gives an average lead time of 20 days through the process. WIP of 1000 pieces gives an average lead time of 10 days.

If parts are made in a shorter lead time, Work Orders can be released later, over a shorter horizon and closer to the customer order or signal. ***Inventory can be reduced too, because WIP and the average lead time dependent on WIP, have been reduced.*** Parts go through faster.

What to do for our overloaded shop? After having determined the true level of WIP required in view of its demonstrated capacity and desired lead time, perhaps with the help of Value Stream Mapping, take out of the process all excess Work Orders and put their components back in the stockroom. Reduce the rate of new releases to bring the WIP level down to the objective which has been set.

For the intermediate stockroom, after having cancelled its excess Work Orders, turn the tables: input the remaining Work Orders from the stockroom into the shop, even if the production rate of upstream machines has to be lowered, until all the Work Orders in the stockroom have been absorbed. Then close the intermediate stockroom

The best way to reduce the money around us in the form of inventory and WIP, is to ***make the WIP flow and then reduce the inventory required to support WIP,*** in order to ***get more <u>real</u> money:*** that which the customer gives us. That's the right kind of money to have around us.

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