Innovation Tools for Lean Practices *(Part 2)*

Note: This is the continuation of Part 1 of the feature article published in the February 2011 issue on pages 24 to 26.

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5. STANDARDISED WORK

Standardised work is a method used by an operator to organise his or her tasks in a safe and efficient manner. The main essence of standardised work is the organisation and specification of uniform work steps to be performed in a manufacturing process. These steps are documented in a standardised worksheet that is displayed in a prominent place at the workstation making it easily available for workers to refer and become familiar with the working procedures. The benefits of standardised work:

i) reduces waste by identifying and eliminating unnecessary motion and effort
ii) outlines safe and efficient work methods or steps
iii) maintains quality work and prevent damage to equipment
iv) serves as the foundation or baseline for improvement
v) provides workers a means to define their jobs

A standardised worksheet provides a visual control that ensures consistency. It contains the basic elements of work operation such as:

Work steps – elemental descriptions of the work needed to complete the tasks in each process. They are the basic building blocks of standardised work. There are three basic types of work elements, namely:

a) work which represents actions relating to assembling, machining, processing, *etc*., which are generally value added activities
b) walk which represents movement from one place to another
c) pick which describes motions necessary to reach for an object, gain control of it and withdraw or move object from its surroundings

Safety steps – all safety checks, precaution and emergency handling of equipments and reminder to wear the right personal protective equipment or PPE, such as gloves, respirator, goggle, ear protector, safety helmet, apron, *etc.*

Visual representation – layout of works and processes that take place at the workstation are defined on the standardised worksheet

Timing – time spent at the workstation comprising of walking time, manual work time and automatic work time (machine time). The summation of these categories of times is the task time, which is the time to complete processing one unit of work piece at the workstation. To ensure the continuous flow of work piece along the value stream and the capability to steadily fulfil customer demand, the task time, once set, must remain consistent with little variation among different workers. Therefore, the term standard task time was created, which is the expected time for an average worker to perform a task at a satisfactory level. The standard task time is determined by the following equation:

Standard task time = (Time Observed) x (Performance Rating) x (Allowance Factor)

Takt time – the total available operating time divided by the number of units required by the customer. It represents the customer's consumption rate of the product. If the standard task time is longer than takt time, then delivery of the desired product quantity or amount to customer will not be fulfilled. However, if the standard task time is shorter than takt time, stocks will pile up. Therefore, in the ideal case of achieving leanness, the standard task time must be equal to takt time. There are a few basic requirements that need to be fulfilled when assessing the readiness for standardised work procedures. They are:

i) workplace must be neat, clean and appropriately organised with a specific location for everything. These conditions enable repeatability and predictability which are vital for standardised work elements to begin.
ii) all equipments must be in good condition to safeguard smooth operation and flow. Equipment uptime must be optimised and breakdown must be minimised.
iii) process condition must be stable or optimised to ensure stable product quality. Every time a quality problem occurs or there is a variation in precision, an investigation should be done with appropriate counter-measures put in place.
iv) worker movements must be in the best sequence and provide the least amount of waste, overburden and unevenness. These movements shall become the baseline for standardised work procedures in which all workers are trained to follow.

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According to Thomerson (2001), the responsibility for establishing standardised work procedures is best handled by shopfloor members such as workers (operators) and supervisors who are, of course, firstly trained in operation analysis, time and motion study and related tools. This is based on the belief that the shopfloor members doing the actual task have the best knowledge of how the work should be performed. It can result in standards that are more accurate, up-to-date and more acceptable to workers to follow. Indirectly, it empowers workers to continuously design the best working method that can contribute to higher productivity.

6. KANBAN

Kanban is a material management technique developed in Toyota with the main objective of enforcing the concept of just in time or JIT. It is a kind of visual communication signal that uses a set of cards that travel between upstream and downstream processes while communicating what parts are needed at downstream processes. It is used to move materials in accordance to the usage of parts as well as to control production, work in progress (wip) and inventory flow. There are two types of kanban commonly used, namely, withdrawal kanban (also known as a conveyor kanban) and production kanban.

Withdrawal Kanban

It is a move signal in which a user authorises the transfer of parts or materials from the storage area (also known as market in the kanban system literature) to the downstream (user) process. Each kanban is printed with vital information such as part number, part name, container quantity, delivery route, part usage point and storage location.

If one kanban is assigned for each standard container, then the kanban represents the quantity of one container. Once withdrawal kanban fetches the parts from the storage area and moves them to the downstream process, it remains with them until users start to use the parts. User detaches the withdrawal kanban and drops it into a collection box.

A material handler or line feeder who moves around storage area and downstream process will pick up the deposited kanban. This kanban represents a parts requisition order which the material handler must retrieve from the storage area. The material handler then places the kanban in a specified empty container and waits for the next delivery cycle to fetch another batch of parts required by the downstream process. This cycle continues until the production line fulfils the customer order. The benefits of withdrawal kanban are:

i) minimises the stock of parts at the downstream or user line, thereby reducing inventory.
ii) creates floor space and allowing line of sight management.

Production Kanban

Production kanban is a make signal that releases an order to the upstream process to build parts equal to the lot size as specified on the card. It has information that indicates what the part is, where it is made, where it is stored, container capacity and any other information that may be of importance.

One production kanban represents the need to produce one container's worth of parts. At the storage or market area, each container has a production kanban attached to it. When a withdrawal kanban arrives at the storage area, the material handler removes the production kanban from the filled container and places the production kanban in a collection box. The withdrawal kanban is then attached to the container and the parts are delivered to the requesting downstream (user) process.

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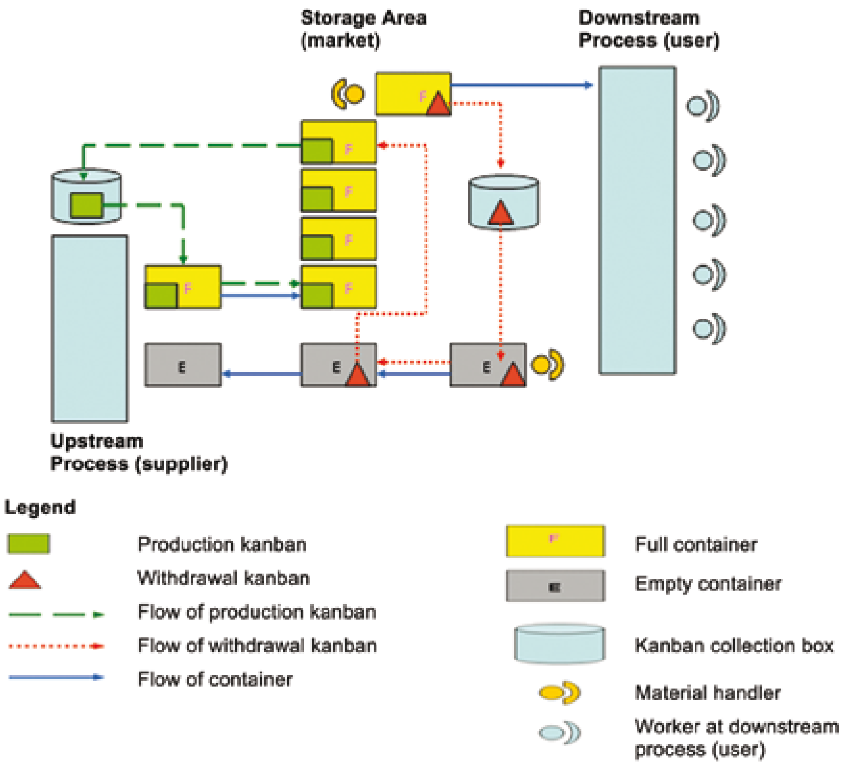

Figure 1: The flow sequence in a Kanban production system

The upstream process or supplier will pick up the deposited production kanban and starts to build parts according to the specified quantity in the kanban. In a way, production kanban is responsible for keeping the storage or market full and ever ready to supply parts whenever requested. It indicates when a predetermined amount of parts or materials have been removed from store and initiates replenishment. The flow of kanban is best illustrated in Figure 1.

The flow of kanban (withdrawal and production) generates a visual signal that permits the entire production system to respond to the needs of customer orders. Only the necessary parts are produced according to the specified amount and at the right time. It is an innovative tool that manifests the pull production, which is one of the principles of lean thinking. Effective application of the kanban system can lead to the effective management of resources particularly in minimising inventory and averting overproduction.

7. CONCLUSION

Every innovation tool has its specific strength for the attainment of the lean production principle either to reduce waste or increase speed or both. Therefore, selecting the appropriate one and systematically implementing it throughout the business organisation can greatly enhance competitiveness. This requires strong and consistent leadership. ■

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