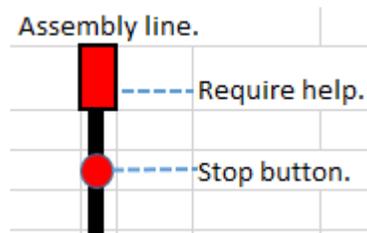


PROCESS REFLECTIONS

Stopping Time

Previous process reflections have discussed various components of time management as used in standard Japanese manufacturing systems as well as the methods that are used to manage or control the way that time is used. This reflection will focus on the question of “stopping time” in the case where standard work is not being performed. How does a production worker call attention to an “out-of-control” production condition or request for help if their work situation seems to be unusual for any reason, and then what happens?

In a previous post, I noted that andon (行灯) signals may have two activation levels. The first push of either a button (or pull of a string) that activates the signal light (or sound), the request for help is signaled. This can be initiated by anybody in the production operation. However, the second push is only allowed by a production supervisor or group leader as this actually stops the full production line. This type of signal is indicated as follows:



Andon signals are placed equal distances across the assembly line. The principal troubles that are detected on the production line are: working delay, working mistake, defect in materials, or troubles with assembly jigs or equipment. Specific activities that occur when a signal is pushed occur as follows:

1. When a line trouble is detected, the line worker pulls a string or pushes a button to inform the production team about its occurrence. This signals the fact of occurrence as well as the location where the trouble was detected.
2. When an ANDON signals a call for help, production manager, line supervisor and the line leader need to come immediately to help in performance of the job of that specific line worker.
3. The line leader is responsible for diagnosing the situation and taking the proper action.
4. The leader needs to help recover the job within the remaining portions of the takt time. For instance, if 30 seconds remains in the takt time, then he needs to recover within 30 seconds.
5. If the problem was not solved in the cycle time and the line stopped, engineers, production planners, the whole gemba support staff gets together at the gemba and decide what is a temporary solution for recovering the line.

6. If the trouble cannot be recovered within the portion takt time portion, (the line still does not stop) there is time to recover within the distance remaining in the work area (for instance the 3 to 5 meters of production line travel within the working cell). If this situation is considered to be a one-off event, then the product may be moved off the line for corrective action and then returned to the line at the end of the day so that production is not lost.
7. If, despite all of these activities, the trouble cannot be recovered, then the line stops. But, the cost of total line stoppage is so high that each option must be pursued before taking the decision to stop the full line.
8. In either circumstance of a diverted product or a full line stoppage, then the supervisor and work team will investigate and discuss the permanent solution in the gemba during that same day. They will also review the work standards to find **kaizen** (改善) points and revise the work standards.

The assembly lines have almost no complete line stops (e.g., the second push of a red button). Most of the working delays and mistakes identified by line workers are recovered by their line associates. In the gemba organization of a Toyota assembly line, there is one team leader (e.g. a line supervisor) for several workers. And one of the jobs of a line leader is to train and help workers when there is any trouble or delay.

Because Toyota does not expect that there is no variation in performing production work and assumes that any human being can make a work mistake, they have designed their production lines to incorporate this belief. Therefore, they permit any worker to signal if they encounter some trouble and Toyota applies the principle of a “second set of eyes” or **jishuken** (自主権) aid in diagnostic of the trouble and its rapid resolution. Colleagues on the production line and the supervisor cooperate to resolve the troubling issue within the takt time of the production line. A **mizusumashi** (漢字) or water spider is an experienced line worker who is in a training path to become a supervisor. They act as a line lead as they have the experience in how to perform the work and understand the quality characteristics of all the parts and production equipment and assembly jigs. Each operator is pursuing a journey in **jishu kanri** (自主管理) to become a highly accomplished specialist in performing their work according to a system of self-mastery of their work standards to the point where they can diagnose problems and gain insights of better ways of working through their personal kaizen activities which applies **hansei** (はんせい) for self-reflection to contemplate and reconsider better ways to operate. Through teamwork the production cell creates **wa** (和), a state of trust and collaboration where balance and peace occurs among workers and thereby and thereby achieves the work discipline that sustains predictable performance which is the 5th S in the 5-S concept or **shitsuke** (躰) where work is performed “without being told what to do” by a supervisor. This occurs because Toyota designs production systems using a principle of **ji kotei kanketsu** (JJK) (自工程完結) or ownership of the production operations where workers are given responsibility for performing

and improving standard work.

I remember visiting a Komatsu factory that was a joint venture with Allison Diesel from the USA and observing a workstation where components were added to an assembled engine block. At this station there was a “novice worker” as identified by a band around their safety helmet and a water spider who was supervising the work. The worker pointed at a task they would perform next and then did the work. The supervising trainer watched each move – what was pointed at the accompanying action. This worker had an extended check list. An experienced worker, who was doing the same task at the adjacent workstation had an abbreviated check list, but they did glance at it intermittently as a reminder of their required actions.

An example of the set-up of this workstation is shown in the figure below:



The next process reflection will deal with improvement responsibility – particularly with the ideas of jishuken, shitsuke, and kaizen and their relationship to standard work and the SDCA cycle.

Reflective Questions:

1. Taiichi Ohno said: “The Toyota style is not to create results by working hard. It is a system that says there is no limit to people's creativity. People don't go to Toyota to 'work' they go there to 'think'.” He also commented that: “Having no problems is the biggest of all problems.” What does this imply about his expectations of the workers in the gemba and their responsibility for kaizen activities?
2. **Taiichi Ohno also commented:** “If you are going to do kaizen continuously, you have got to assume that things are a mess. Too many people just assume that things are all right the way they are. Aren't you guys convinced that the way you are doing things is the right way? That is no way to get anything done. Kaizen is about changing the way things are. If you assume that things are all right the way they are, then you cannot do kaizen. So change

something!” How does this encouragement for constant innovation align with your view of the inherent changeability of standard work?

3. How does the perspective of “operator line shutdown” described in this paper compare to your understanding of this process from reading about lean production?

Lesson to be Learned:

Stopping a production line is an expensive proposition for the company and must be done with the greatest amount of thoughtful consideration. This is a problem that requires two immediate decisions: (1) the worker must decide that things are not following the standard; and (2) a work supervisor must determine that the cause of the irregularity is not workmanship by workers, or random quality errors but that its cause is systematic and will be more comprehensive than just a single incident. There is therefore, a “two-person rule” in deciding to halt a production line.

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