IMPROVEMENT OF LABOR PRODUCTIVITY BY VISUALIZING EXISTING INFORMATION

Yukio Kakiuchi
Kaizen consultants Inc.
(University of Electro-Communications)
Tokyo, Japan

Abstract

In order to improve labor productivity in plants, it is important to grasp the existing problems there. But it is not easy for all the people in charge to have the same level understanding to those.

This article suggests an approach to tackle with this situation by using various visualization techniques.

1. Introduction

Recently a lot of the companies in manufacturing industry is in great difficulty. The total volume of production is decreasing because of the world-wide recession and together with it the market price is going down. And quality requirement is going up because of various new condition e.g. PL act. In addition to those to keep global condition good, new action items like saving energy and recycling materials are being added.

Resulting from those, manufacturing industry is facing the condition that the cost-up factors are increasing although market price is going down.

In order to survive under these severe condition, manufacturing industry has to

achieve additional cost-down. But for many companies it seems very difficult.

Therefore to overcome this situation, they need some powerful technique to achieve higher labor productivity improvement.

The author believes that "visualization" is very helpful for these request, and in this article some useful techniques based upon actual experiences will be introduced.

2. Purpose of visualization

In plants, when they start improvement of Q,D,C and S (Quality, Delivery, Cost and Safety), the first step is grasping the phenomena . Generally the collected data are summarized to be numerical data. The typical pattern of the information made are "ratio" and "frequency of occurrence". They are very efficient information for those who are going to improve the present situation in plants, but they also have some defects as follows.

(1) The information shows the result and it is difficult to imagine the process and the details of the occurrence.

(2) The timing and sequence of occurrence are important to analyze the root causes, but it is difficult to read them from the numerical data.

(3) Numerical data is not sufficient to get clear understanding for the people who are not familiar with the actual situation in plant, although the unique idea from outsiders are important to achieve revolutionary change.

In order to achieve higher targets, it is very important to give as much clear understandable information as possible to those who are in charge. But the information composed of numerical data has a limit to this requirement. For helping this situation, additional methods to do easier transfer of information is required and visualization may be one of them.

3. Visualization of process design

3.1 Troubles with process design

When production line is newly designed, all the factors should be discussed before the construction of the line starts. But often the case the prior discussion is focused mostly on the production capacity, especially the mechanical speed of production, but the subsidiary functions are not discussed enough e.g. the layout of chutes, conveyers, switches and indicators etc. which are directly related to the labor productivity. As the result, in many cases they have to spend months to add a lot of design changes after the first construction is finished because the new production line needs much tuning to achieve the targets of labor productivity.

The biggest reason for this waste of time is based on the difficulty for the people in charge to imagine the details how the operators work with the new production line at the stage of the design. They discuss the plan using the layout printed on paper which is two dimensions. The possible discussion with these information is the total capacity of the production and the way the materials move.

But the movement of operators is three dimensions and time series factor is also added in actual situation. If the perfect debugging is required before they start construction, these invisible factors should be discussed at this stage.

3.2 Human simulation

In order to discuss these invisible factors at the stage of design, the author always suggests to implement "Human simulation". That is doing gesture based on the line design as follows.

Step 1 Get the area as wide as the layout design.

Step 2 Get big sized paper (e.g. news paper) and cut it to the size of all the facilities, and make the real size layout on the ground.

Step 3 Choose the planned number of people who act as if they are in real production. The motion should be as real as possible. If you can get the real materials, it is recommended to use them.

By implementing this gesture, those who are observing this trial can find out lot of improvement ideas. If you can select members from all relating sections, you may get more concrete ideas to improve. By doing this "Human simulation", the level of the process design will be much higher, because the invisible factors are now visible and they can be improved there and then

4. Visualization of team work

Shortening press die change time is very important these days because of the strong request to shorten production lead time. If the press machine is a big one like a series of four or five tandem press machines, having good team work is very important. But it is not easy to achieve it, because total system of these machines is very big and the die change people can not see each other at a time.

In this case we need to see all of them at the same time wherever they are around the press machines. Then video talking is very useful. The same number of video cameras as the number of the die change people are prepared and each people is video taken at the same time while they are die-changing.

After die change is over, all the videos are observed at the same time using the same number of video decks and TV screens.

Observing all the die change people together at a glance, the co-operation between them are easily seen and it is very easy to find out how to improve it. It is recommended that the operators should be included into the members who study the videos.

5. Visualization of production lead time

Those days, delivery lead time is becoming very short because reduction of inventory is very important for sales. If a company tries to shorten delivery lead time by having more inventory, they can not achieve their cost target. Therefore they should try to reduce actual production lead time. But usually to shorten production lead time is difficult because production lead time is invisible. Therefore we need something which makes production lead time visible.

5.1 A data taking method which makes production flow visible (Figure 1)

Step 1 Analyze the present process following the route of the production and put it on the vertical axis on the left.

Step 2 Fix sampling time and put it on the horizontal axis.

Step 3 Repeat collecting data about the status of each process by sampling.

Step 4 Using process symbols and others, visualize the whole status.

(1)The volume of inventory staying in process are shown by the number of ▼ marks.

(2)Using the bottle-neck cycle time in the process, estimate the flow of the work pieces and connect them by lines to visualize the flow and production lead time.

6. Summary

Production industry needs to improve their way of production to reduce cost without spending much money. In order to do it efficiently, visualizing approach plays important rolls for it very much. The author would like to survey more about this theme and to prepare more of them for production industry.

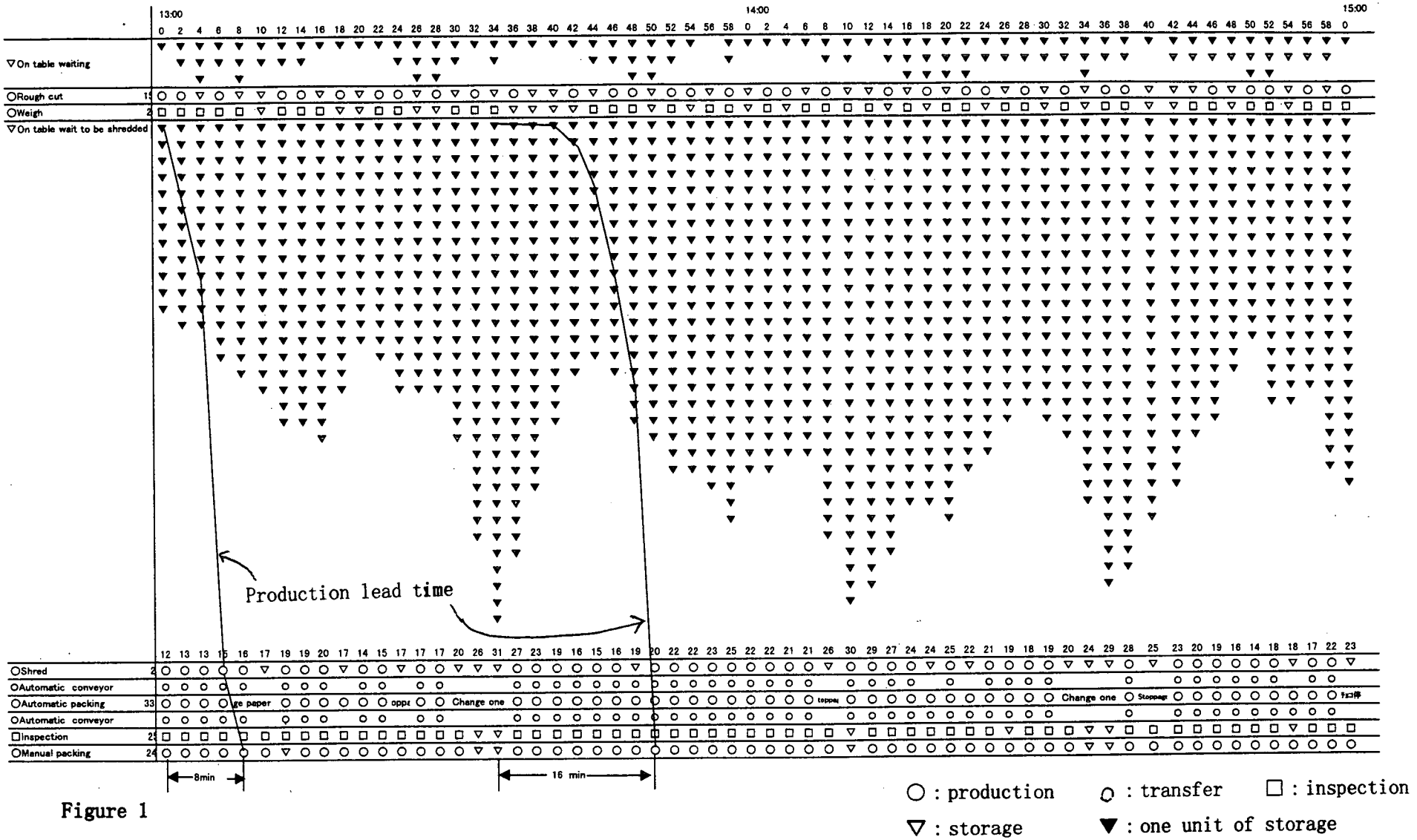
13:00
14:00
15:00
▽On table waiting
○Rough cut
○Weigh
▽On table wait to be shredded
Production lead time
○Shred
○Automatic conveyor
○Automatic packing
○Automatic conveyor
□Inspection
○Manual packing
Change one
Change one
8min
16 min
○ : production
▽ : storage
▷ : transfer
▼ : one unit of storage
□ : inspection

Figure 1