STANDARD WORK AND STANDARD PROCESSES FOR LEAN MANUFACTURING

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Abstract: *Any company that is a leader in today's marketplace understands the importance of basic standards – rules for what is acceptable and what is not – in practices, processes, product quality, and so on. Standard work characterizes such an organization, in both its management and manufacturing activities. Moreover, the company practices standardization – it has processes for creating standards and standard work, for communicating them clearly, for maintaining and adhering to them, and for encouraging their continual examination and improvement. In manufacturing operations, standard work is a key element in eliminating process waste and excess inventory and in achieving balanced and synchronous production.*

Key words: *Standard, standardization, standard work, lean manufacturing, waste*

1. STANDARDS, FIRST STEP TO UNDERSTAND STANDARD PROCESEES

A standard is a rule or example that provides clear expectations. Continuous improving methods depend on identifying, setting and improving standards. In manufacturing, standards are applied to two aspects of production:

- Production specifications and quality, to eliminate defects in products.
- Production process analysis and improvement, to eliminate all processes waste.

Wasting in a factory can be described very easily – it is everything that does not add value and increases the production costs.

Fig.1. Eight types of wasting

There are three characteristics of standards. Standards must be specific and scientific – meaning that they are based on facts and analysis, no on custom, guessing, or memory. Standards must be adhered to – they are useless if no one follows them. For a standard to be a standard, it will be consistently followed and respected. Standard must be documented and communicated so that people will know what they are and can follow them.

2. STANDARDIZATION

Standardization is the practices of setting, communicating, following and improving standards. Manufacturing processes depend on standardization. First we improve a process, than we standardize it. We define the process so that everyone knows what it is and can follow it.

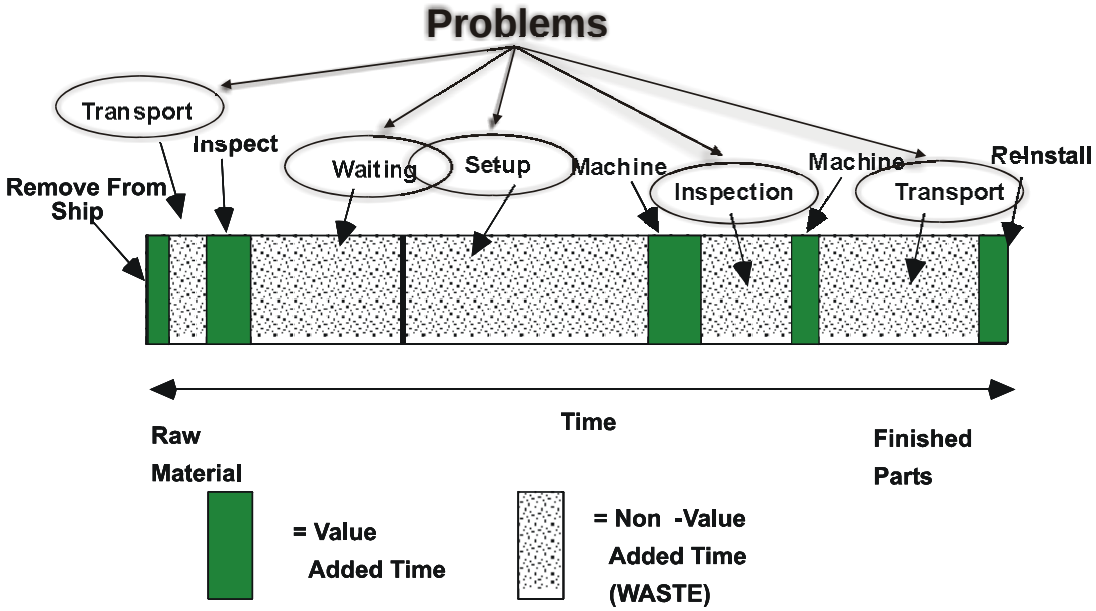

Fig. 2. Where we can find the chances which are our problems?

In continuous improvement we measure the effects of our improvements in relation to the results of the initial standard. If we get better results with the improved process, then the standard can be changed. If the results are not better, the standard should remain. In this way, standards require we to prove, with facts, that the changes we make actually improve the process. Without the standard to measure against, there would be no process we could depend on, and no way to know how to improve it or whether or not we had improved it.

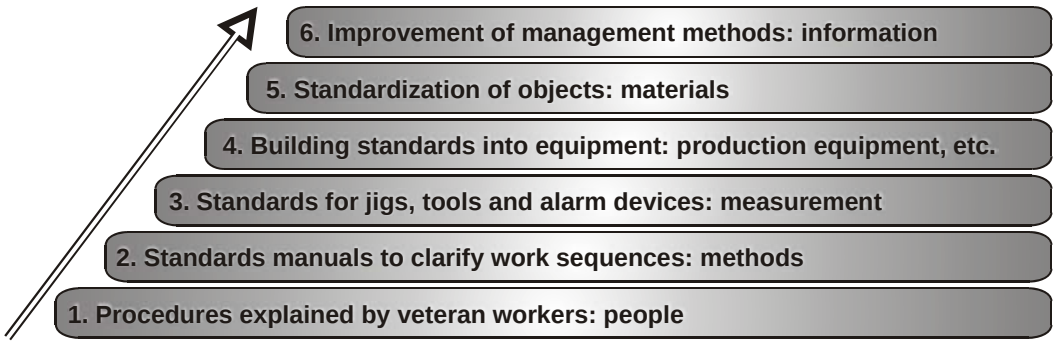

Fig. 3. The implementation of standardization

Everyone must practice the standards consistently before standardization truly exists. Consequently, standardization depends on user-friendly language, pictures, or symbols to communicate the standard. It must be easy to see and understand what the standard is so that everyone can learn to practice it. When 100 percent adherence to reliable methods occurs, we have standardization.

3. STANDARD WORK AND LEAN MANUFACTURING

Standard work is an agreed-upon set of work procedures that establish the best and most reliable methods and sequences for each process and each worker. It is also a method that helps determine those methods and sequences. Standard work aims to maximize performance while minimizing waste in each person's operation and workload. Standard work is not a rigid "work standard" that never changes, standard work is the fluctuating level of optimum work to be done by people and machines each day to meet customer demand. It is determined precisely, through a series of calculations, so that tact time can be adhered to by each operator and every line or cell. Optimum work in process and inventory levels, cycle time, and cell layouts are all considered in the standard work method.

Lean manufacturing methods are standard processes and reliable methods. Standard work is a tool used in cellular manufacturing and pull production to best utilize people and machines while keeping the rhythm of production tied to the flow of customer orders.

Standard work is the culmination of lean production. Standard work follows the implementation of cellular manufacturing and the initiation of pull production. Once these lean production methods are place in a factory, standard work can be used to maintain them. Standard work, in other words, is the final stage of implementation lean production.

Standardization and standard work benefit for the company by enabling:

- Reduced variability.
- Reduced waste.

- Reduced costs.
- Improved quality and shorter, more predictable lead-time.

Standardization and standard work benefit for the operator by making it:

- Easier for the operator to learn new operations.

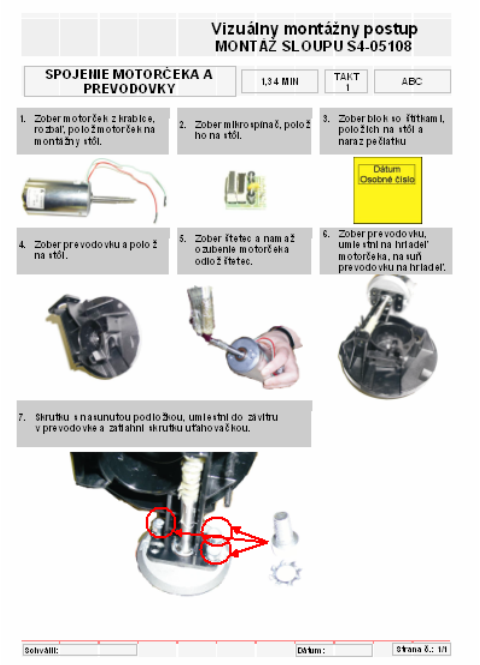

Fig. 4. The assembly procedure

- Easier for the operator to shift to different operations within a cell or to shift to operations in other cells, lines or work areas.
- Easier for the operator to see problems and contribute improvement ideas.

4. APPLICATIONS IN SLOVAK COMPANIES

The project of creating the standards or standard work is different for each factory. There have not been two similar implementations. The project is necessary to adapt to the level of the corporate culture, to the type of the production, to the implementation of used methods and so on.

In many Slovak factories workplaces which are not standardized are found, the floor space is not used efficiently, workers are not sufficiently informed, workers are looking for equipment and workers are doing many unneeded motions. Right now many Slovak factories but also foreign enterprises are creating the standards or standard work and it is the first step to reduce wasting and to lean processes in the production.

Each project is adapted to the team expectations. For example the team expectations from one company were:

- To improve work conditions.
- To improve the information flow at the workplace.
- To reduce handling time.
- To reduce search time.

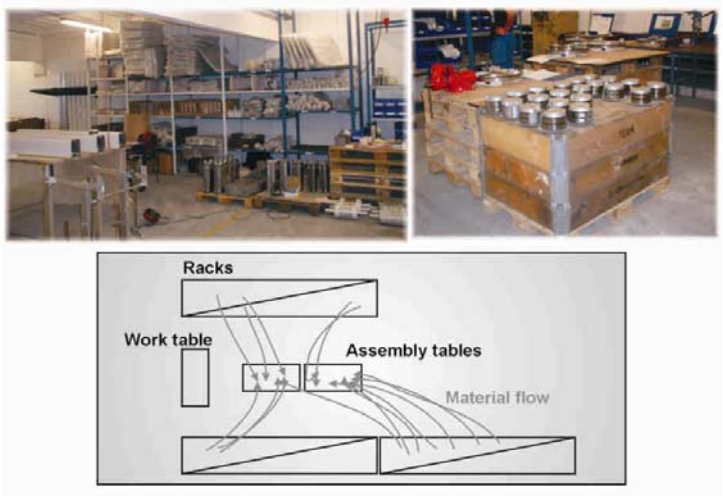

Fig. 5. Before implementing

At the beginning the workers sorted objects at the workplace and left only those objects, which were important for their workplace – the assembly workplace. After this step, the workers rearranged the workplace with these goals – to minimize the handling time, to minimize the search time. This step was ended with drawing a line on the floor.

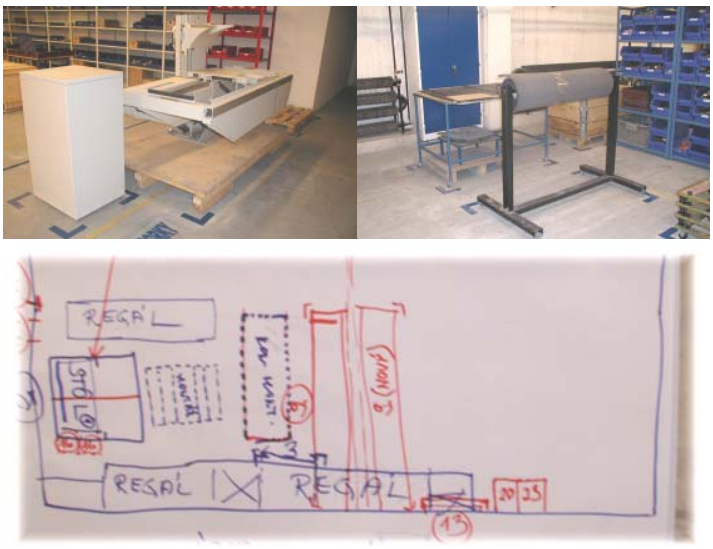

Fig. 6. Layout results

The first standard that we prepared was the standard of the clean workplace. This standard described activities, which are helping to keep the order at the workplace. Then we defined the following standards:

- Organizing objects in racks.
- Assembly procedures.
- Inspection cards of products.
- Cards of input and output control.

When we ended these steps, we started a continual improvement program. At the end of this project the workers evaluated the project positively, and it:

- Improved workplace layout.
- Simplified and overviewed the material flows.
- Improved rack capacity.
- Reduced inventories at the workplace.

Fig.7. After implementing

5. CONCLUSION

Like all the lean production methods, standard work maximizes performance and minimizes waste. At present the standards represents an efficient tool for to “fight” against wasting. If we want to control, inform and teach the operators or team at the workplace efficiently, we will choose the standards, standard work and it will be a good way.

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