



ARROW Andon highlights the errors

# ASSEMBLAGE IS CONSIDERED AS AN ENTITY

*The production of an assembly line, for instance, is usually kept continuous. In the Andon philosophy, when an error occurs, the line is stopped and the reason for the problem is investigated. When the downtime is recorded into the information system, it is possible to systematically deal with the causes.*

The Wärtsilä factories in Vaasa manufacture big diesel engines for ships and power plants. The type number of engine sets indicates the piston diameter in centimetres. The same way of sizing the piston, cylinder and combustion chamber is applied so that the number of cylinders varies. The manufacturing range of the big W32/34 engine is from the 6 cylinder-in-line to the 20V construction.

During the years 2006 – 2007, a new assembly plant was built in Vaasa to manufacture W32/34 engines. It was built on the principle of an assembly line where the engine moves forward as the assembling proceeds. Earlier, large engines were assembled in immovable production cells.

An engine that weighs tens of tons cannot be placed on an assembly line, so the arrangement is that the engine proceeds on the line with steps that can be measured in days. The morning and evening shifts install components into engine blocks and the night shift moves the parts forward to the next assembly area.

## THE NEW PHILOSOPHY

The production control applies the Andon production philosophy that originates in Japan and the Toyota car factory. The principle is not to keep the production going no matter what but to systematically investigate the occurring errors.

The role of the assembler has changed from how it was earlier when the assembler tried to solve the problems inside the assembly cell. Nowadays, the assembler simply sends a report and it is someone else's job to worry about finding the cause and a solution to the error. Problems are not swept under the carpet but instead, they are brought to the daylight and their causes are rooted out.

"In each assembly cell, there is an error button that activates further measures. The error message is sent as a text message to three units: production, logistics and quality control. Each department sends to the assembly area a representative that has been assigned to this 'fire brigade' ", says development manager of production planning, **Mikko Ketonen.**

When the group is together, the message is signed for and the cause of the problem is determined. The reasons are various: sometimes a wrong component has found its way to the assembly area or then the component is missing altogether. The cause can also be found in the quality of the components, in which case changing the material will be considered.

Ultimately, when both the cause and the solution to prevent such an error in the future have been determined, the incident is recorded into the system. This information is collected into the database and summed up basically by applying methods familiar from Machine Track.

## BREAKING THE PATH

The Wärtsilä factory in Vaasa is not the first in Finland to implement the Andon philosophy, even though it is among the first. This is also the first project for ARROW Engineering Oy, where Machine Track has been adapted to the needs of the assemblage and the Andon philosophy.

"When the new assembly plant was being planned, we had the advantage of decades of experience in assembly line production at the smaller factory manufacturing W20 engine sets. There was a definite consensus on applying the Andon concept but no one had



*Petri Kivelä*



a clear idea of the implementation in practice”, says project manager **Petri Kivelä**.

In his opinion, the installation of the new information system simultaneously with the construction work was challenging, to put it mildly. The working atmosphere was hectic but still flexible, which meant the job could be finished within the schedule. ARROW also eagerly participated in the creation of the new application. The functionality of the solutions was tested and the coding was done either on-the-spot or through remote connection.

In connection with the construction work, a separate logistics department was created. One of the benefits from this arrangement is that the delivery of components to the assembly areas has become more transparent. As a result, the key figures of these operations became visible and it is now easier to develop the operations.

#### **ANDON POSSIBLY TO CHINA AND KOREA**

The ARROW Andon system has clearly revealed the earlier deficiencies. For example, the collecting and delivery of components to assembly areas did not run very smoothly during the first weeks of operation at the factory. However, the system pointed out the problems, and it was therefore easy to deal with them.

“After some time, periods of downtime in production decreased radically. As the errors were visible, factors such as component collecting routines could be changed to prevent the same problems from reoccurring in the future. In other words, the system worked as expected. Earlier, similar problems in the production cells remained hidden, and no improvement measures could be taken”, says Kivelä.

He also says that Wärtsilä has globally introduced the ARROW Machine Track control that was introduced at the Wärtsilä plant in Vaasa in the mid-90’s. Furthermore, it is possible that the Andon system will be introduced at the assembly plants in Italy, China and Korea.

“After getting to know our new method, the development manager at our Italy unit was convinced. The manager’s opinion is that it should be considered to make the system a standard at all our assembly units.”