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Entire Foundry Production "Management" to achieve "Quality Castings"

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Foundries constantly have been improving to achieve "high quality", "high productivity", "saving energy", "near net shape casting", and "manpower saving". However, there has been little unitary data management system for entire foundry production. The authors have developed the entire foundry production "management" system to support the total operation.

The developed management system enables to grasp casting conditions by monitoring production data. For this system, various measuring devices are equipped in each process, and the production data is digitized, monitored and stored as integrated database. Then, the database is utilized unitary. In order to realize "quality castings", it is very important to grasp and feedback the operation condition data such as pouring, molding and green sand properties.

Moreover, this system is also able to cover many other purposes; for example to save consumption of electric power, water, and compressed air. The digitization of the energy consumption contributes to reduce total energy consumption. In addition, it also enables immediate response towards abnormal energy consumption.

The developed foundry production management system enable to build strong management foundation and produce high quality castings.

Keywords: *production management, digitization, quality casting, high productivity, saving energy and manpower*

1. Introduction

In recent years, foundry companies have required the advanced production management system with the decline in the labor force population and the aging of skilled engineer .

This presentation explains a developmed production management system to contribute the future foundry management.

2. The Contents of development

This development consists of two fields.

1) Management Support Software

- Production Management System

-Traceability Device / Monitoring System

2) Utility Total Monitor

- Electricity, water, compressed air

"Management Support Software" monitors information gotten individually such as cooling condition, molding line and sand properties and utilizes them as a database of production trace data in addition to the operation rate or production order.

"Utility Total Monitor" is the system to manage energy such as electric, water and compressed air. It contributes to reduce the total energy with digitizing the consumption at the points to be measured. Moreover, this system monitors the abnormality such as sand properties causing the casting defect. From the above, it realizes the preventive maintenance towards the abnormal energy consumption or the casting defect.

3. Utilization in foundry

3.1 Quality of casting

The efficient production of quality casting is one of the most important task for the foundry.

Production Management System, one of management support software, is able to support making high quality casting. Using Production Management System, various information of each mold is monitored and digitized such as pouring, cooling, molding condition, sand properties and so on.

An example is shown in Fig. 1.

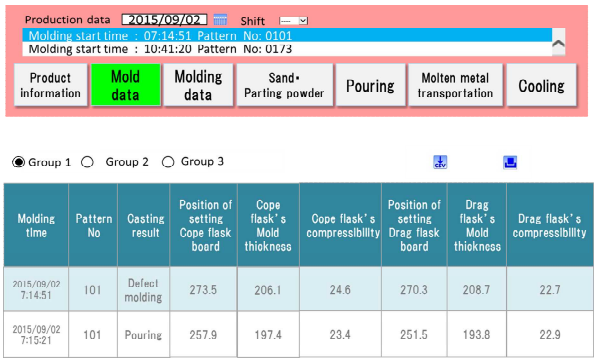

Fig. 1 Production Management System

It is integrated and utilized unitary as a database. The monitored data is used in various applications, for example, linking with data to eliminate casting defect. In addition, this system alerts the inspection department to the casting defect produced by the abnormal property sand, etc.

As mentioned above, this system provides the production system with fewer casting defects.

3.2 High productivity

The productivity is also important factor for foundry as much as the quality.

Production Management System also contributes to improve the productivity.

Figure 2 shows molding machine operation rate.

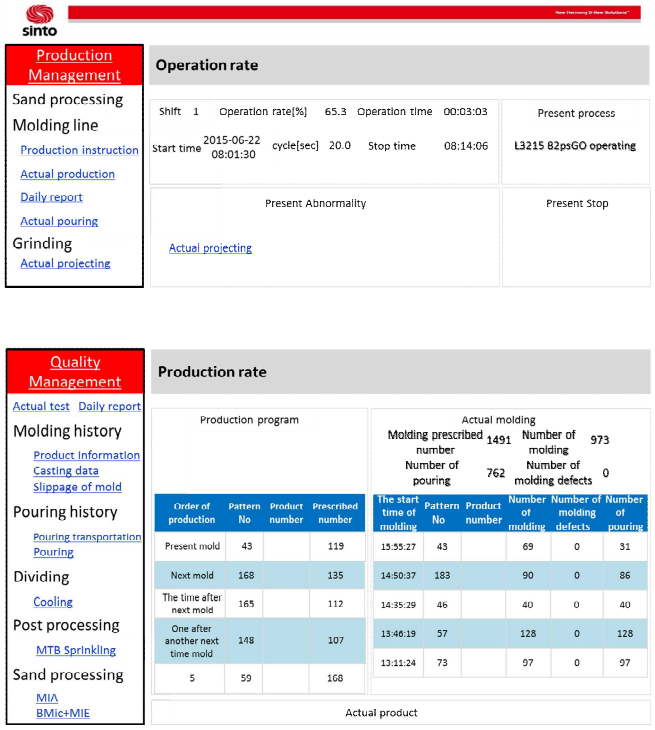

Fig. 2 Molding machine operation rate

Operator can grasp the current production condition with checking molding machine operation rate.

In addition, "Remote Monitor" is utilized for the management of entire foundry production system.

An example is shown in Fig. 3.

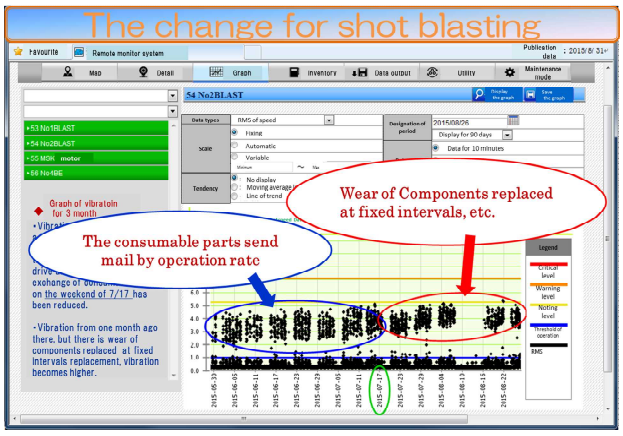

Fig. 3 Remote Monitor

This figure shows the monitoring of vibration at shot blasting. When the value of vibration exceeds the certain value, this monitor system shows a warning.

Therefore, foundry can continue stable operation with Remote Monitor which continuously monitors the operation condition to react immediately for the abnormality.

3.3 Energy saving

In foundry, large quantity of energy has been consumed. Digitization of energy consumption contributes to save total energy consumption.

Figure 4. shows digitized electric power consumption in foundry.

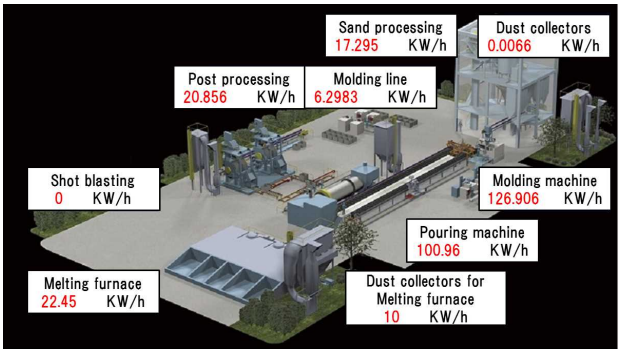

Fig. 4 Electric power consumption

In addition, it also enables immediate response towards abnormal energy consumption.

4. Conclusion

The developed foundry total management system is first step for "Industry 4.0". The developed system would contribute to reduce a casting defect dramatically and produce high quality castings with low energy.