



Industry: Metal Products

Alcoa Inc.

www.alcoa.com

“If I had to summarise all the benefits into one it would be that of migrating from a paper-based manual system to a mechanised, computer one.”

Róbert Németh,
OTC & MES Application Manager, Alcoa

Alcoa automates plant process control using Wonderware solutions in the foundry section of Amorebieta facilities

by Wonderware Spain

Goals:

- To customize Comprehensive MES solution included in Alcoa Global Order to Cash initiative;
- Schedule and work order management, Specifications and actual values management;
- Downtime and OEE analysis, Traceability and Genealogy, ERP integration and Customized user interface, business rules, graphical analysis and customized reporting.

Challenges:

- Need to improve the efficiency;
- Complete tracking of shop-floor operations and inventory;
- Replace legacy shop-floor system;
- Part of global Order-to-Cash initiative, involving the implementation of new ERP and shop-floor operation interface.

Wonderware Solution:

- Wonderware Operations Software;
- Wonderware Performance Software.

Results:

- Complete tracking of the work orders on the shop-floor and inventory;
- Ease of use regarding scheduling and work order management on the shop-floor;
- Efficiency visibility, showing opportunities for process improvement;
- Seamless integration with current systems (ERP, Control systems, Chemical Analysis systems);
- Improvement of Quality management operations.

Amorebieta (Vizcaya), Spain - Thanks to Wonderware technology, Alcoa has managed to align the commercial objectives of its Order-To-Cash platform with its manufacturing operations by deploying a Manufacturing Execution System (MES) in one key part of its production line.

World Leader in the Aluminium Sector

Alcoa is one of the world leaders in aluminium production and technology, with a presence in 35 countries and over 200 offices. It currently has eight production centres located in various Spanish regions from where it serves innovative solutions for its clients in major international markets.

In particular, its plant in Amorebieta (Vizcaya) is Alcoa's largest rolling plant in Europe and one of Alcoa's largest in the world. It supplies both finished products to third party customers as well as semi-finished products to other Alcoa rolling plants in Europe.

It manufactures sheets, levelled coils and trimmed coils for building & construction and industry applications and a great variety of other products to the European market.

It also produces high-quality aluminium coils for the high value-added products manufactured by other Alcoa plants in Europe. i.e. foil, litho, closures and bright products.



Figure 1: Production tab where the operator can see the work order's production planning and respective attributes.

With the aim of optimizing all its aforementioned activities and facilities, Alcoa decided to implement a system to control in real time all factory processes.

Although the aim at the beginning was to implement a MES throughout the plant, it has only been implemented in one of the factory's two main sections: the foundry, where the blocks or ingots are produced as raw material for sheet operations, which is the second basic division of the plant.

The company chose Wonderware software to automate and monitor all plant processes, thereby obtaining absolute control of all operations being carried out.

Integrated Solution into the Owned Global Platform

As Alcoa OTC & MES Application Manager Róbert Németh explains: "We were looking for a solution that could be integrated into our global platform to manage Order-To-Cash (OTC) processes based on Oracle applications."

Given that the OTC platform encompasses all production activities, the company decided to deploy a Manufacturing Execution System (MES) solution that was able to respond to all manufacturing and plant quality requirements and could be integrated in a transparent manner with the Oracle system that will be implemented in the near future.

Alcoa already had a MES system deployed as standard in some of its facilities in the USA. "This was how we chose the Wonderware software as a global MES solution and began to work immediately on first covering the needs of the Amorebieta production plant and then later implementing the more global OTC project, a stage that has not yet been completed." In order to carry out deployment in the Amorebieta plant, the aluminium manufacturer required the experience of Wonderware for the functioning and development of the application to manage the project, as well as dedicating its own resources at the development stage and relying on Sysmaker as Wonderware ArchestrA-certified system integrator.



Figure 2: Downtime tab showing the list of latest working status of the machine and its duration, depending on the filter chosen.

Global Project Challenges

Sysmaker is a Wonderware ArchestrA-certified system integrator and has wide-ranging experience in the implementation of Wonderware's HMI/SCADA, MES, EMI and SPC solutions.

"We have been working with Wonderware MES software since 2004 and this was one of our main reasons for participating in this project to help the end-client achieving operational excellence," says Carla Costa from Sysmaker's Technical Department.

As part of the Oracle-based OTC global strategy, the project required the design of a new interface to integrate ERP processes and manufacturing operations, with the final aim of optimizing efficiency, completing the monitoring of operations and inventory and replacing the management system of the inherited plant.

After defining these parameters, the entire team, comprising Wonderware professionals, Alcoa developers and Sysmaker specialists, found themselves faced with certain challenges.

The project included optimizing the MES solution, which was already operational in other Alcoa plants, and implementing it in the other facilities destined to have the same activity.

"But there were differences between the factories in terms of work methods," continues Costa. *"And so one of the main challenges involved reconciling criteria to obtain a satisfactory solution for local managers at Amorebieta."*

This difference in terms of process operations and methodologies triggered the need to resolve certain system control interface parameters *"specifically relating to communication with the machines via OPC and obtaining information relating to inactivity times, the Overall Equipment Effectiveness (OEE) system and the carrying out of work,"* points out Costa.

Stages and Personalization

Nonetheless, thanks to the great flexibility and personalization capabilities of Wonderware software, the challenges could be overcome as the different stages of the project progressed.

Implementation was divided into various stages. The first comprised defining the specific requirements relating to plant operations, then the software specifications were established and next development and the different test processes began. After obtaining final approval from the plant manager and providing some training for the system users, the process moved on to the production and execution phase, encompassing a brief adaptation stage.

The implemented MES solution includes the Wonderware Operations software and Wonderware Performance software, both based on ArchestrA technology.

While the former provides consistent execution of operations by unit and line, Wonderware Performance software is a component of Wonderware MES and includes functions that make possible OEE (Overall Equipment Effectiveness) control via plant monitoring, encompassing an unlimited number of causes for equipment downtimes and calculations of their global effectiveness.

As already mentioned, Wonderware's MES platform was personalized to respond to the specific demands of the Amorebieta factory: *"Covering agenda management and job orders, control of already existing specifications and values, OEE and inactivity times analysis, as well as process traceability and genealogy and future integration with the Oracle system,"* stresses Németh, OTC & MES Application Manager at Alcoa.

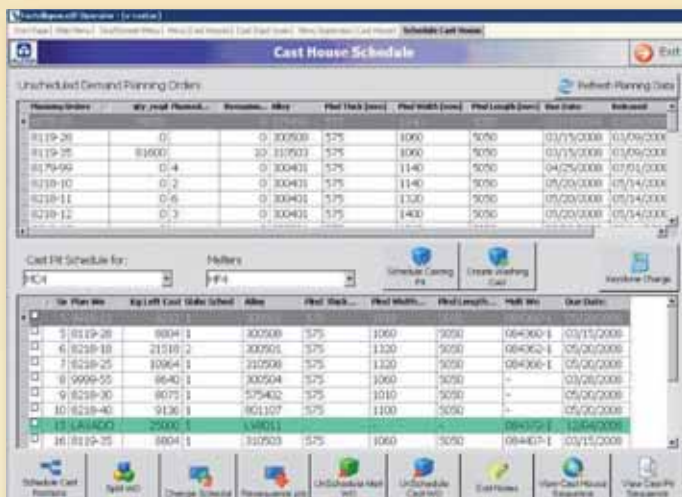


Figure 3: Screen to schedule the slabs that are ordered by the clients.

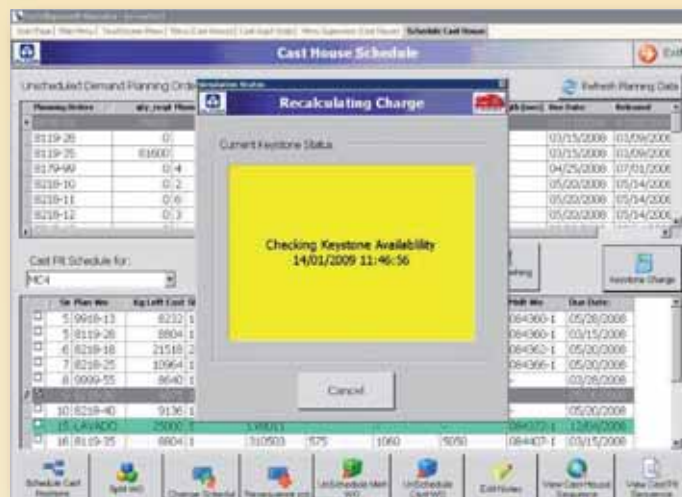


Figure 4: Screen showing how the operator can check which components are going to be used and the material's availability for the specific alloy's work order production.

Therefore, the possibility of personalizing Wonderware Operations software and Wonderware Performance software not only affects user interface, but has also been extended to obtaining graphic analyses and reports on the basis of business guidelines.

Main Benefits

As Németh points out: *"If I had to summarize all the benefits into one, it would be that of migrating from a paper-based manual system to an automated one."* This automation of MES processes affects different areas, encompassing major efficiency and easiness of use when it comes to schedule production tasks and calculating production needs, greater visibility and traceability and outstanding precision in inventory management and integration with control processes. Consequently, the Alcoa factory in Amorebieta has managed to achieve:

- Full monitoring of job orders and inventory in the plant;

- Greater ease in terms of task distribution and organization;
- Visibility relating to efficiency, displaying the opportunities for process optimization;
- Transparent integration with already existing systems (ERP, control systems, chemical analysis systems);
- Improvement in the quality of management operations.

Wonderware provided functional consulting at anytime and contributed to application development and integration with the remaining process control systems, working hand in hand with Alcoa professionals and Sysmaker experts.

Speaking on behalf of Sysmaker's Technical Department, Costa concludes by adding: *"Global performance has been very good, especially because we have been able to deploy a highly personalized solution to respond to the specific demands of the Alcoa factory, with smooth integration and without any major incidents."*

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