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Industrial Application Server improves traceability and process control on the zinc production lines

by FACTORY systemes

Umicore, the world's leading zinc producer took advantage of the investment in a new production line to put in place an information system based on Industrial Application Server and thereby meet its customers' requirements in terms of traceability and process control.

The international group Umicore focuses its business activities on four broad domains: advanced materials, precious metals / services, precious metals / products and catalysts and zinc. Leader on the domestic markets in France, Belgium and many other European markets, Umicore has four production sites in France. It is on one of these sites that the group decided to invest in a new production line.

The need for a global vision of production

The site already had production lines equipped with specifically developed and independent supervision systems, but they were difficult to maintain. This situation naturally led the group to reflect upon the implementing of a unified standard and open-ended solution.
When drawing up the specifications, consideration of the requirements associated with improving production and guaranteeing quality rapidly led to the including of different functions:

Process monitoring
This is the only function already available on the existing lines.
Monitoring was ensured by a conventional supervision system comprising the alarms mimic diagram, the trends, data archiving and the operator aid. Examination of the existing situation revealed that a more efficient archiving system open to standard analysis tools was necessary.

Company Overview
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Order tracking
Integration of the management system, by taking into account the orders from SAP, allows automatic tracking of the orders, the marking and label printing functions and feedback of production information to the ERP (Enterprise Resource Planning) system (finished goods, scrap, production times, etc.).

Process control
This integration with the ERP system makes the link with the products and ensures automatic management of the production parameters (integration of process engineering data).
The installed system allows the transfer of the parameters relating to the products into the PLCs (Programmable Logic Controllers) and the regulators.
Thanks to the data recording, the control tracking (setpoints, operators, acceptance tests, etc.) provides for total control of the process. It is thus easy to make a comparative study between the theoretical model and the operational reality.

Quality
Quality management is ensured by a tool that ensures full traceability, linked to the archiving and the real-time analysis of data and divergences. The analysis is done by camera, taking into account the parameters specific to each product, with the generation of a report (summary statements).

Overall Equipment Efficiency (OEE)
The OEE takes into account machine stoppages, micro-stoppages, production changes, and the analysis of line production and availability ratios (performance analysis).

Without calling into question the architecture, the system should be able to evolve rapidly through the integration of complementary functions

Maintenance Management
This function ensures the tracking of interventions, preventive maintenance management, and storeroom and re-supply management.

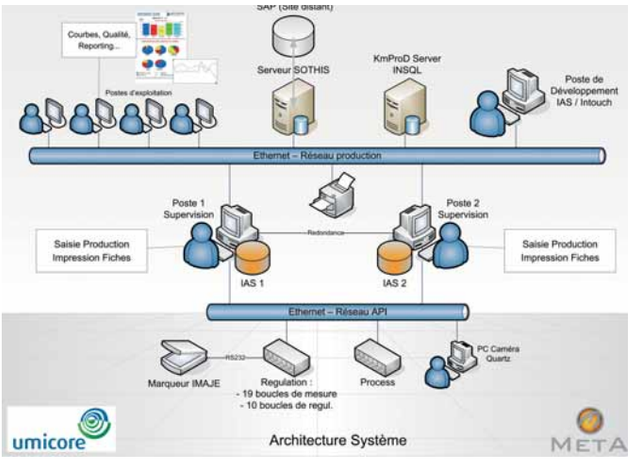
Scheduling
The site's SAP application delivers a daily or even a weekly schedule. The operators must nevertheless take production contingencies into account rapidly in order to keep the schedule on track.

Documentary Management
The aim is to provide the operators and the maintenance service with all the necessary and up-to-date information that can help them in their tasks, at their disposal near the machine.

The reasons for choosing Industrial Application Server

In addition to the support functions described above, the system should take additional requirements into account:

- Based on a standard open-ended and durable architecture, it should enable the developments to be extended to other production lines without calling into question the existing equipment.
- Guarantee short development and integration times, and fast entry into service.
- Build an application that provides redundancy functions to ensure maximum availability.



System architecture

The choice very rapidly went towards the Wonderware solutions because of their long-term durability, ease of use and the personnel's mastery of the acquired tools thanks to the references already in service in the factory.
What remained was to choose the architecture, which had to include:

- Simple and independent supervisors, coupled with multiple and heterogeneous application developments (specific developments in VB or L4G).
- A complete MES (Manufacturing Execution System) platform (from management through to automatic control) allowing the structuring of developments, the creation of reusable libraries of activity functions associated with the process.

The choice was finally settled on Industrial Application Server and the new development platform ArchestrA. The very existence of the notion of platform allows all the developments relating to the different production lines to be consolidated and centralized. It also provides the possibility of extending these developments to other lines or workstations without calling into question the chosen solutions, and of adding functional blocks as and when required and providing the possibility of reusing them.

The simplicity of redundancy management and the transparent integration of IndustrialSQL Server were both criteria that contributed towards the choice of this solution.

The developments were contracted to the integrator Meta Productique based in Saint Etienne which, as well as ensuring the integration and putting into service, also defined the architecture from the PLCs through to the supervision platform.

A 3-tier architecture and activity-based components

- The first tier is ensured by the real-time database IndustrialSQL Server. This database is fully integrated in the Industrial Application Server development platform that ensures all the recording functions of the application real-time data. It is linked to the SQL 2000 database that manages the data baseline associated with SAP and the product parameters.
- Industrial Application Server acts as the application baseline and supports all the activity components of the application. These include the control components (brush slaving, level and temperature control) and components associated with the laser markers of the lines or specific actuators.

  The object-oriented structure of the development means that these components can be rapidly enriched or derived so that they can be reused through multiple instantiations within identical production lines.

  The script language used is Vbnet, which is based on all the classes of the .NET Framework, and thus allows the simplest to the most complex developments. This object-oriented development technique is the sole guarantee of a reliable and easily maintained structured application.
- The last tier is the man-machine interface, based on the InTouch operator workstations. These workstations only ensure the graphic aspect, relieving the operators of any management of tags, data acquisitions or alarms, which are transferred to the application server. It does however effectively extend the notion of object/activity component through the use of SmartSymbols, true graphic objects whose instances are directly associated with those of the platform components.

A total success

Installed in just one week after 4 months of development, the application successfully covers all the initial needs. Since then, new production lines and additional functions have been integrated, widely reusing the previously deployed elementary components without calling into question what already exists. The final outcome is that in addition to the technical quality of developments guaranteed by the very structure of the platform, the way the production data can be exploited meets up with the initial expectations.