

Industry:Automotive

Schaeffler KG

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“The extensive preparation work done by the team in first understanding the requirements and harsh nature of the environment, together with the use of the most sensible tools resulted in an excellent working solution, fulfilling our requirements completely.”

Gwilym Wilkins,
IT manager, Schaeffler Automotive.

End-to-end batch mixing and tracking at Schaeffler’s Port Elizabeth plant

by Wonderware Southern Africa

Goals:

- An automated warehouse inventory control system;
- A batch tracking system that would track raw material batch numbers through to final product and vice versa;
- Reporting facility.

Challenges:

- System to operate in adverse and dirty conditions.

Wonderware Solution:

- InTouch HMI;
- Wonderware Manufacturing Execution Module;
- Wonderware System Platform.

Results:

- Automated process – Greatly reduced operator error while providing the necessary guidance for optimal smooth running of processes;
- Accurate warehouse management system;
- Easier, more reliable operation;
- Mixing benefits with strict recipe management and scrap reduction;
- Traceability – It is now possible to trace raw material batch numbers from the suppliers to the end product and vice versa
- Reports – Using the company’s intranet, reports such as stock levels, batch tracking, raw material tracking, batch details (e.g. weights per material) and exception errors such as process problems can be viewed.
- Computer failure recovery.

Port Elizabeth, South Africa - With its three strong brands - INA, LuK and FAG - the Schaeffler Group is involved in the automotive, industrial and aerospace industries and stands for a pronounced customer focus, innovative power and the highest possible product quality. In 2008, approximately 66,000 employees at over 180 locations worldwide achieved sales totalling nearly 9 billion Euros. The group belongs to the leading suppliers of the rolling bearings industry worldwide and is a valuable partner of nearly all automobile manufacturers.

With the LuK brand, the Schaeffler Group is one of the world's leading clutch and transmission component manufacturers. Today, one in four cars worldwide has a LuK clutch and customers include several renowned automotive manufacturers.

Schaeffler's Port Elizabeth manufacturing facility consists of a 15,000 m² production area and 3700 m² warehouse all on a 36,000 m² site with 450 employees, 15 of whom are involved with research and development and 27 in the tool room. Annual turnover is 40 million Euros and 2007 production achieved 2.5 million facings and 1.1 million clutch sets. The plant has the capacity to produce 1.7 million clutch sets and more than half its production is targeted for export.

No matter how exotic the car, vehicles not using 'wet' clutches (automatic transmission) rely on a relatively thin layer of special material to interface engine power with the driven wheels – the clutch facing.

In order to live up to Schaeffler's (LuK's) exacting quality standards while meeting large demands, the production process of these facings at the



Figure 1: Not the best environment for electronic equipment.

company's Port Elizabeth facility needed to be revised to incorporate the latest batch mixing and tracking technologies in a difficult manufacturing environment.

Project Requirements

The business objectives called for an automated warehouse inventory control system, a batch tracking system and a reporting facility. Material would be picked according to its expiry date while provision would have to be made for stock levels and the location of all stock to be readily available to qualified personnel.

The batch tracking system would need to track raw material batch numbers through to final product and vice versa. There was also a need to interface to a laboratory testing facility.

While the need for reliable operation goes without saying in a real-time production environment, the conditions at the plant proved to be somewhat challenging with an atmosphere thick with carbon black (figure 1).

To overcome this, a simple and robust operator interface was required as the standard keyboard/mouse combination had proved useless and even touch panels were prone to failure.

Solution Selection

Both the hardware and software needed upgrading and a fresh approach was necessary.

"Since the existing SCADA facility was based on Wonderware's InTouch HMI (Human Machine Interface) and Wonderware Manufacturing Execution Module (previously known as Wonderware InTrack software) solutions which had served the company well since 1997, it made sense to continue using products from the Wonderware stable," says Barry Clemence, software engineer at DC Industrial Scanning, the system integrator chosen by LuK. DCI Scanning chose the Wonderware System Platform based on ArchestrA technology as well as the Wonderware Information Server.

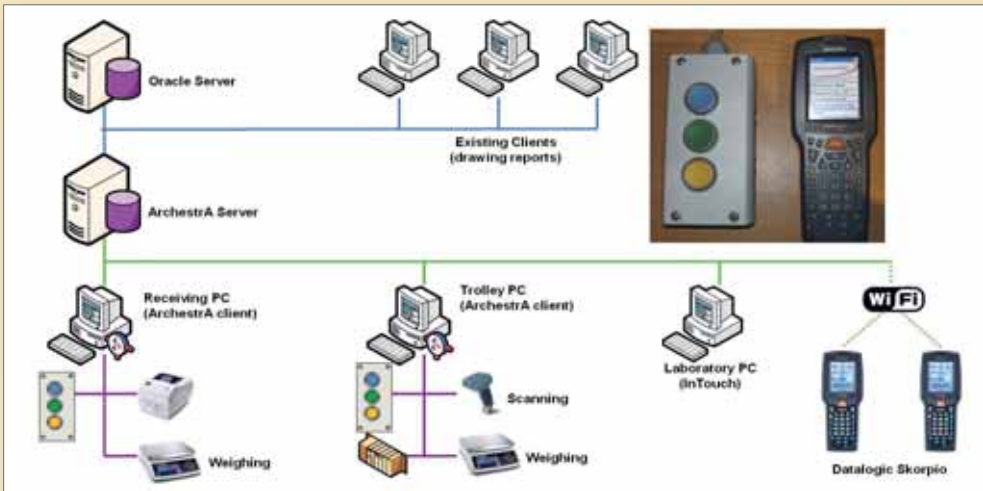


Figure 2: System topology.

Solution Architecture

The system topology is shown in figure 2, which also illustrates the three-button operator interface and hand-held wireless computer.

The buttons allow for easy navigation between screens, function selection, SQL grid selection and executing the stepping sequence while being easily replaceable at very low cost. The mouse and keyboard are now only used for administrator functions. *“The buttons are connected to a standard serial port and a .NET object was written inside Arcestra to do the interfacing,”* says Clemence. *“The result is a robust unit made from readily-available components.”*

The hand-held wireless computer is used to guide the operators via screen prompts while allowing them to scan barcodes or key in information on the move throughout the plant. This was also integrated directly into Wonderware System Platform with another .NET object. The new Wonderware System Platform SQL object provided a reliable way to interface to the SQL database. The new SQL Grid proved to be very flexible and was a great way to display database information.

“One place we used the grid was to display the various recipes thereby enabling the operator to select and start the required recipe using the button interface,” adds Clemence.

The Wonderware System Platform application is interfaced with LuK’s Oracle system to retrieve the information for the material received and the system had to be developed, tested and implemented live. *“We did dry*

runs where possible,” says Clemence, *“but with implementation came the normal teething issues and specification changes.”*

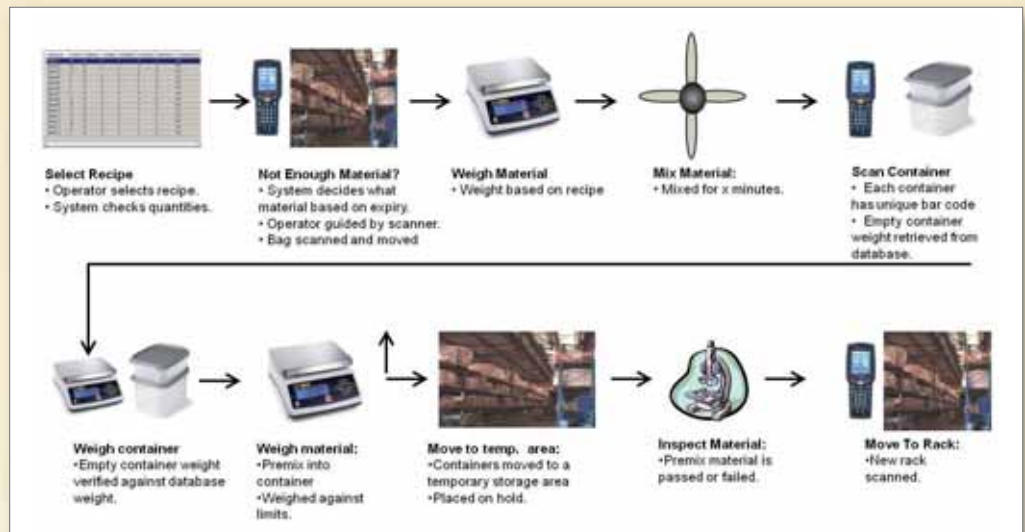


Figure 3: The pre-mix process.

Realised Benefits

- **Automated process** – The level of automation and checks and balances incorporated into the system has greatly reduced operator error while providing the necessary guidance for optimal smooth running processes;
- **Accurate warehouse management system** – This now provides current stock levels immediately on request and knows where each bag of material is stored and how much is left. This has led to less material loss due to material expiry;



Figure 3: Aerial view.

- **Easier, more reliable operation** – Wireless scanner and screen prompts as well as the robust button user interface allow operators to do a better job;
- **Mixing benefits** – Strict recipe management now prevents the wrong materials being added to the

mixture or added in the wrong amounts which all contributes to reducing scrap;

- **Traceability** – It is now possible to trace raw material batch numbers from the suppliers to the end product and vice versa;
- **Reports** – Using the company's intranet, reports such as stock levels, batch tracking, raw material tracking, batch details (e.g. weights per material) and exception errors such as process problems can be viewed. The back end is

powered using a combination of Microsoft SQL Reporting Services and Wonderware Reporting Services;

- **Computer failure recovery** – It is now easy to recover from a computer failure whereas this wasn't previously possible.

*This document was realised thanks to the support of:
Gwilym Wilkins, Schaeffler Group, and
Barry Clemence, DC Industrial Scanning.*