Gleaming Software Solution for the Central Process Control Technology in Primer Paintshops

by Wonderware GmbH

It has always been a symbol of high value and quality when automobiles roll off the line gleaming immaculately and stand shining in the dealer’s showroom. The road that leads to this stage today involves a highly sophisticated technological production process.

Requirements
To satisfy the high quality requirements of the new Golf V, two new pretreatment and primer paintshops have been installed at the Wolfsburg plant of Volkswagen AG. In addition to an on-site visualization facility, which has been devised by the plant supplier Eisenmann using InTouch, a higher-level central process control system for displaying the complete plant was required. The central process control system includes the entire conveyor technology and the industrial plant installations. It provides information about waiting fault and status messages, monitors the locations of the vehicle bodies and skids and is used for monitoring the fault diagnosis of the complete plant. Faults with high priority and faults outside production hours were to be communicated with the aid of the SCADAalarm radio paging system by means of a voice message to the relevant maintenance engineer. At the same time, the vehicle operation cards in paper form used for documenting any corrections to the vehicle bodies were to be replaced by an electronic system (QuaDEr) in the areas of the checking and refinishing stations. Volkswagen also requested a facility for evaluating and depicting plant-specific data (fault times, piece numbers, plant capacity utilization and availability rates) on the visualization system and in the plant-wide intranet (ProDis).

Project realization
The Central Process Control Technology was first devised by Volkswagen employees on their own authority, who were supported in the process...
Automotive Industrial Application Server, IndustrialSQL Server, InTouch, SCADAAlarm

by the Wonderware system integrator G&O Automatisierungsgesellschaft mbH. Employees from Volkswagen used InTouch to design the visualization images of the plants, whilst the company G&O used the development environment (IDE) of the industrial application server to devise the entire logic of the application.

For the project realization, a clear division of responsibilities was agreed. The employees of the plant operator used the knowledge gleaned from their daily work for depicting the plant within the application and for connecting the plant images with the automation objects.

G&O was responsible for drafting the specifications, the logic on the basis of automation objects with the industrial application server (within the IDE), the implementation and parameterization of the IndustrialSQL database (within the IDE), the status and fault message system (SQL-DB), the vehicle body and skid tracking system (DB), the web application ProDis (production data information system) and the programming and implementation of the quality data acquisition (QuaDeR) on the basis of Pocket PCs with WLAN.

Automation concept

The IDE (integrated development environment) of the industrial application server was used to generate area and assembly templates as master documents for the subsequent modeling of the plant visualization system. All the templates comprise their specific functional logic in accordance with the depicted assembly, along with the following fundamental logics for the visualization process:

- Parameterization (addressing of the SPS registers);
- Initialization (dynamic referencing to network objects);
- Communication (I/O connection, database connection and transactions).

With this system, none of the automation objects generated require permanent addressing to the SPS, but generate this independently on the basis of the tree structure within the model view.

By means of simple parameterization within the application object, process objects are qualified to store their process values without additional script functions in the IndustrialSQL server database. The requested historical evaluation had thus been created.

The special requirement of the database structure of the fault and status message system and that of the vehicle body tracking system was generated by means of a special template for the database communication. Process data were written in accordance with the requirement via the DB object into an SQL database, where they are available for web clients. This allows the ProDis web clients to access the SQL database and to display the necessary plant-specific data (fault times, piece numbers, etc.). Any additional data that may be required can be incorporated via the communication object within the industrial
application server very quickly into the status and fault database and made available to the users.

The templates generated for operational assemblies such as conveyors, pumps etc. serve as a basis for other object master documents or, derived from these, are directly available as an “instance” for modeling the plant. The structure of the templates and instances and the structure within the “model view” of the IDE permit the automatic generation of the SPS addresses within the automation object. The entire project was generated automatically by inserting the objects in the model view of the IDE. Accordingly, the model view is also used for storing the entire real plant structure of both plants and simplifies the task of searching for objects and assemblies also for employees who do not have any practice in using it.

It was of great value to all the persons involved that the project could be generated irrespective of the status of the graphic development and the SPS programming by the plant builder in advance within the IDE. When generating the graphic images, the developers were able to create links to the available automation objects within the industrial application server (conveyors, pumps, etc.) and check the SPS programming instantly for its proper functioning.

It was possible to adapt the distribution of the automation objects over the available hardware topology at any time in line with the current stage of the project.

In order to communicate faults with high priority and group faults to the maintenance department and standby service crews, the SCADAlarm radio paging system from Wonderware is used, which transmits the alarms in the form of language statements. By browsing on the IDE, SCADAlarm “declares” the alarms, assigns a time scheme to them and stores them with the call numbers of the maintenance department or standby service crew.

**Communication**

The communication of the automation objects with the plant control systems ensues via the new Wonderware Data-Access-Server (DAServer). This is available within the IDE in the form of a DI object, which has also been distributed over the application servers. It is here that the I/O connection via Ethernet to the SPSs evolved and to which the automation objects refer within the project.

The Microsoft SQL database is filled and/or queried by the ArchestrA automation objects and is used by the web application (ProDis) and the quality data acquisition system (Pocket PCs) as a data storage facility and as a supplier of data for its evaluation routines.
Benefits
The multi-user development environment proved advantageous, as it allowed differing levels of progress in the graphics and logic areas and multiple developers to work on the project at the same time. As a rule, working on an object-oriented basis is ideal for projects or requirements that change quickly and, accordingly, the ability to inherit new functions and scripts helped to improve and speed up the progress of the project. Even during the commissioning process, it was possible to make better use of the hardware topology thanks to the ability to simply move the objects within the deployment view. As such, depending on the load on the computers, a further distribution was carried out. It was possible to integrate the experiences gained during the course of the project thanks to the object-based nature of the industrial application server.

Why Wonderware?
In conjunction with the fact that Volkswagen has realized a central process control system for the first time under its steam, the good experiences with InTouch to date have without doubt played a major. The decision to use the industrial application server is primarily due to the readiness to innovate on the part of the VW corporation. The advantages of the industrial application server, which have been more than just confirmed even during the course of the project thus far, are highlighted as being extremely convincing by planning engineers and operators alike.

Using the new analysis facilities of the industrial application server platform, it was possible to analyze and resolve the problems encountered during the commissioning phase very quickly. This in turn made it possible to centrally analyze SPS programming errors and to rectify these in real time.

Quality data are entered via Pocket PCs

This document was realized thanks to the support of:
G&O Automatisierungsgesellschaft mbH and Volkswagen AG