

A P P L I C A T I O N   N O T E

MES SYSTEMS

SGL CARBON



Tracing & Tracking System

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## Production monitoring and material flow tracking system

In 2006, ASKOM implemented the complex tracing & tracking system for the carbon block production line at RZ Department of SGL CARBON S.A in Racibórz, based on the SCADA ASIX system, SQL database and SIMATIC S7 controllers.

According to the Investor's assumptions, the system was to perform the following functions:

- presetting recipes in the existing weighing system and taking over the control of this system,
- presetting manufacturing orders from the foreman's PC and, at a later stage, accepting orders from the production management system,
- tracking the material flow and archiving the essential technological parameters on every stage of the manufacturing process, beginning from weighing the components up to the quality control of the finished product,
- balancing the mass of raw materials and finished products,
- quality control of finished products ended with label printing and assignment of fault status and codes,
- monitoring of the remaining manufacturing processes of the Department with visualisation and archiving of their parameters,
- control of work times and number of switch-ons of the motors and devices,
- making data available in the factory network in the form of manufacturing process visualization and tables of finished products containing the manufacturing parameters for the given order and transferring selected parameters to the supervisory systems,
- management of PLC and SCADA software by means of a single uniform industrial network, along with diagnostics of operation of the PLC's and computer applications.

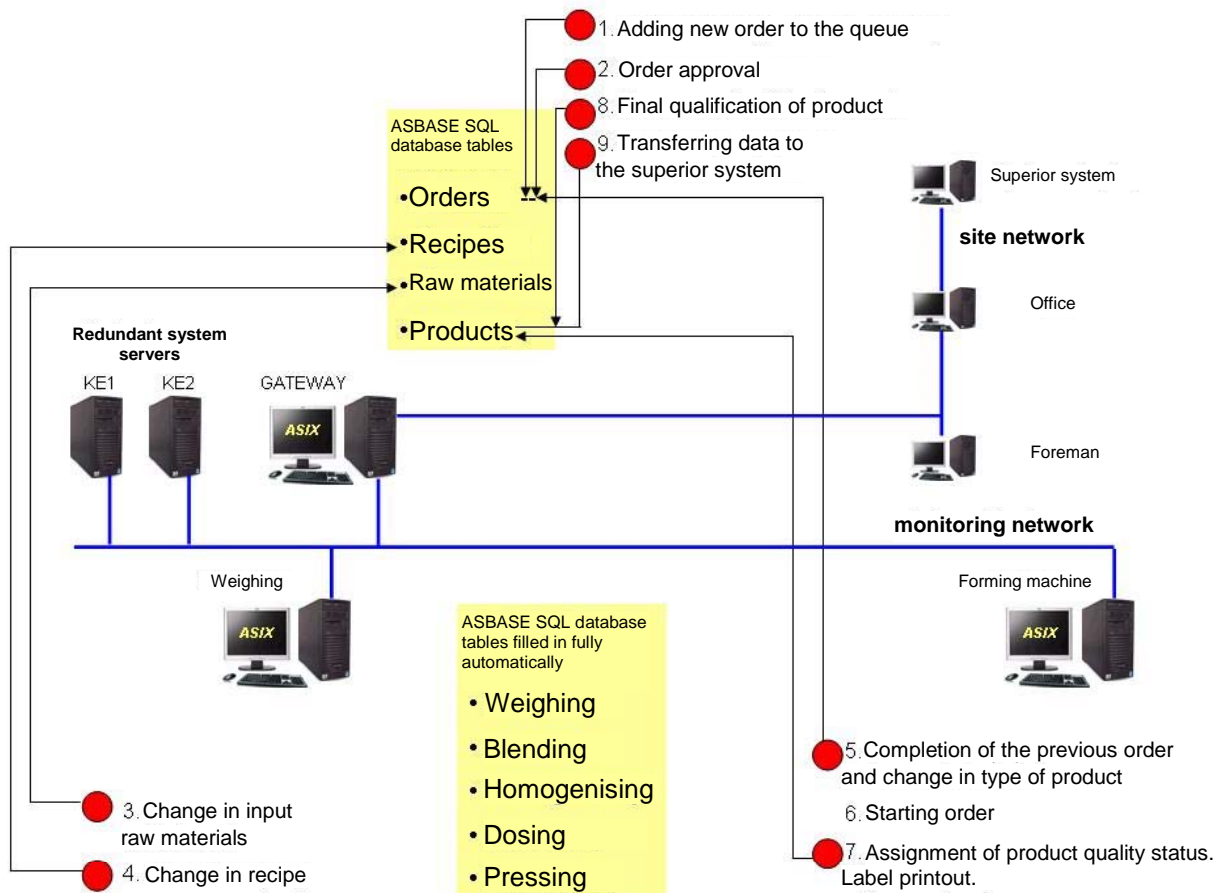


Figure 1. Production order realisation cycle.

From the hardware point of view, the objective of the material flow tracking and production parameters monitoring system was to integrate the existing independent control and visualisation stations (SIMATIC S5/S7 PLC's with their own control panels or computer stations from various suppliers), which realise the control of individual sections of the production line, into a single uniform platform.

Taking into account the existing configurations of SIMATIC controllers, the existing structure of local MPI/PROFIBUS DP/IE industrial networks and wanting to realise the task with minimised production downtimes and interference in the existing machinery control algorithms, ASKOM proposed a solution based on the modern SIEMENS PROFINET CBA communication protocol using the Industrial Ethernet hardware and cabling.

The following hardware and software was used:

- SIMATIC S7-300 PN/DP + ET200S controller that functions as a concentrator for the data being monitored, tracks the material flow and transfers the parameters of individual manufacturing processes at the RZ department to the SQL database, ensuring that data is queued during the communication breaks,
- CP SIMATIC S7-300 communication processors operating the PROFINET CBA protocol, installed to the existing production line controllers,
- Industrial Ethernet PHOENIX CONTACT switches, modular and compact, and Ethernet optical waveguide and copper cabling,
- Fujitsu-Siemens Workstations suitable for continuous operation under the industrial conditions,
- SIEMENS SIMATIC STEP7 and iMap engineering software,
- ASKOM visualisation and database software : asix4 and AsBase, containing, as a part of their licenses, the MSDE SQL database for local gathering of production parameters, setting recipes and orders,
- software providing SQL database redundancy and transferring the selected data to the supervisory systems within the factory network.

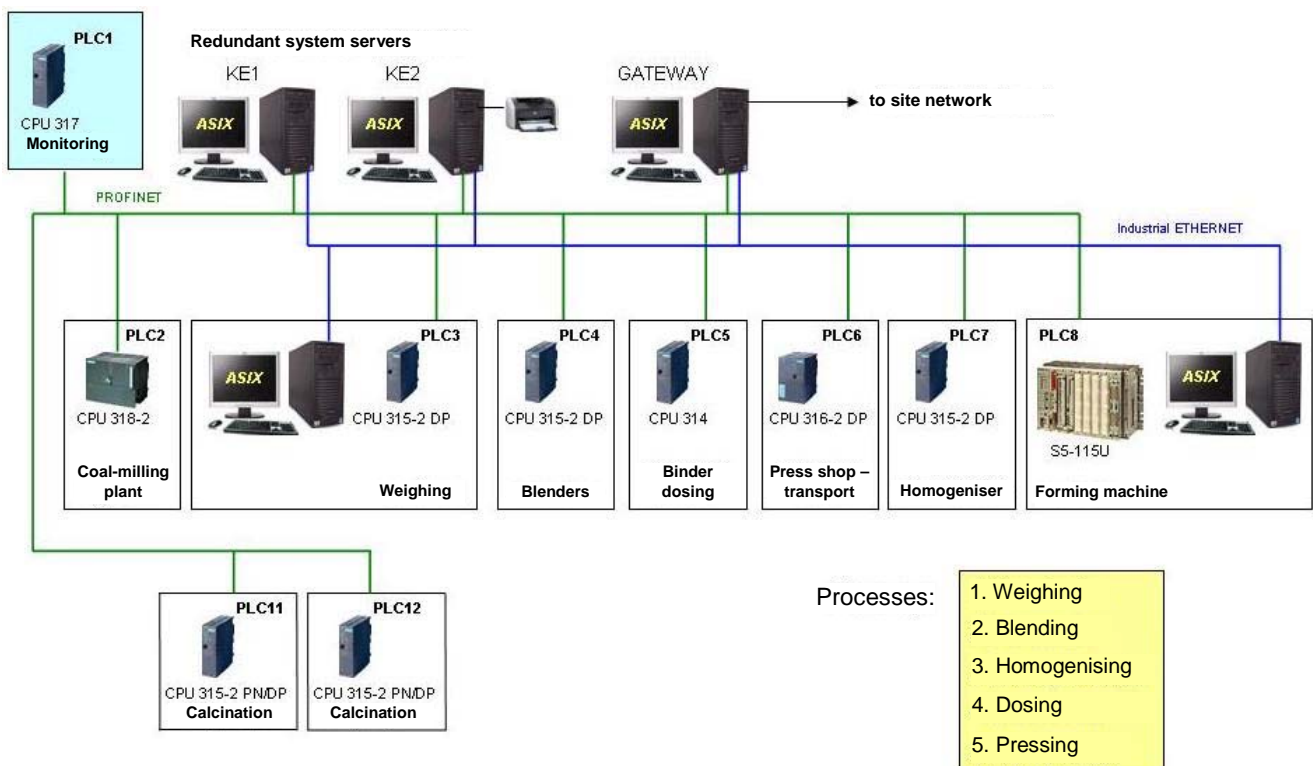


Figure 2. Diagram of system configuration.

## Major advantages of designed and implemented system configuration

- Ensures that the task is realised in a fast and safe way for the maintenance of production continuity.
- Provides the integrated and rich diagnostics of any controllers with possibility of changing programs ON-LINE.
- Ensures safe and undisturbed data transfer between the existing production line controllers, without decreasing their efficiency, and the system controller and computer stations.
- Ensures data continuity during the failure of one of the PCs by applying redundancy to the monitored and archived data for the asix visualisation system as well as the tracked parameters saved to the SQL database.
- Fully uses the structure of the Ethernet factory network, providing both the visualisation on asix network stations installed on any office PCs as a part of the same site-licence or HTML visualisation on normal web browsers, and also allows the production orders to be prepared and preset, the parameters of the manufactured batch of products saved in the SQL database to be analysed and necessarily edited using the user-friendly AsBase software on selected PCs, e.g. of the foreman, as well as it transfers the selected production-related data to the supervisory systems.
- Ensures much freedom and easy extension of the system to include new technological nodes from other departments, at minimum costs.

Czas	ident produktu	id partii	ident receptury	poprawność prasow	kod_usterki	gęstość	waga wypr	wysokość	status dos
2006-11-19 14:33:30	0661234	060116	XBB64-KKK	Przed badaniem		0	0	0.0	Udostępniony
2006-11-19 14:44:30	0661233	060116	XBB64-KKK	Zawrót		221	0	0.0	Udostępniony
2006-11-19 14:57:00	0661232	060116	XBB64-KKK	Poprawna		0	0	0.0	Udostępniony
2006-11-19 15:07:30	0661231	060116	XBB64-KKK	Wybrak	355				Udostępniony
2006-11-19 15:18:30	0661230	060116	XBB64-KKK	Poprawna		0	0	0.0	Udostępniony
2006-11-19 15:31:30	0661229	060116	XBB64-KKK	Poprawna		0	0	0.0	Udostępniony
2006-11-19 15:42:00	0661228	060116	XBB64-KKK	Laboratorium		0	0	0.0	Udostępniony
2006-11-19 15:55:00	0661227	060116	XBB64-KKK	Poprawna		0	0	0.0	Udostępniony
2006-11-19 16:05:30	0661226	060116	XBB64-KKK	Poprawna		0	0	0.0	Udostępniony
2006-11-19 16:17:30	0661225	060116	XBB64-KKK	Poprawna		0	0	0.0	Udostępniony
2006-11-19 16:39:00	0661224	060116	XBB64-KKK	Poprawna		0	0	0.0	Udostępniony
2006-11-19 16:59:30	0661223	060116	XBB64-KKK	Niezakończona kontrola		0	0	0.0	Udostępniony
2006-11-19 17:10:00	0661222	060114	XAAA-41H			0	0	0.0	Udostępniony
2006-11-19 17:25:30	0661221	060114	XAAA-41H	Poprawna		0	0	0.0	Udostępniony
2006-11-19 17:31:00	0661220	060114	XAAA-41H	Poprawna		0	0	0.0	Udostępniony

Figure 3. Table of technological and production parameters in asix4 system.

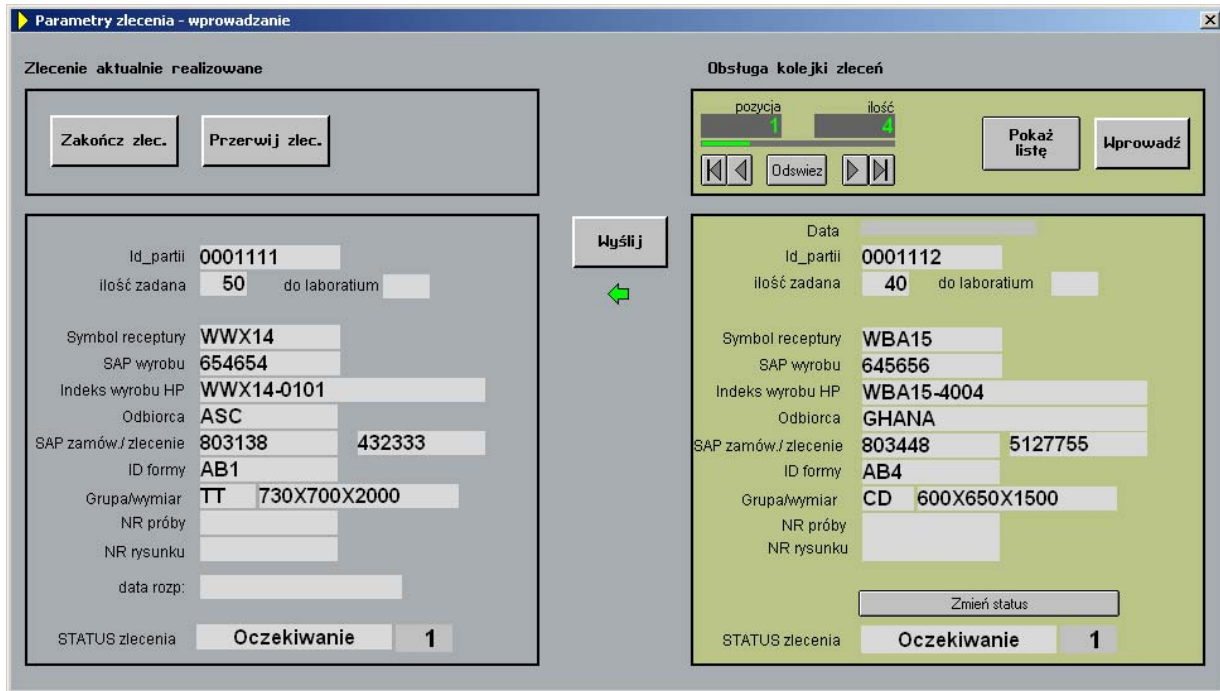


Figure 4. Screen for putting a queued order into production

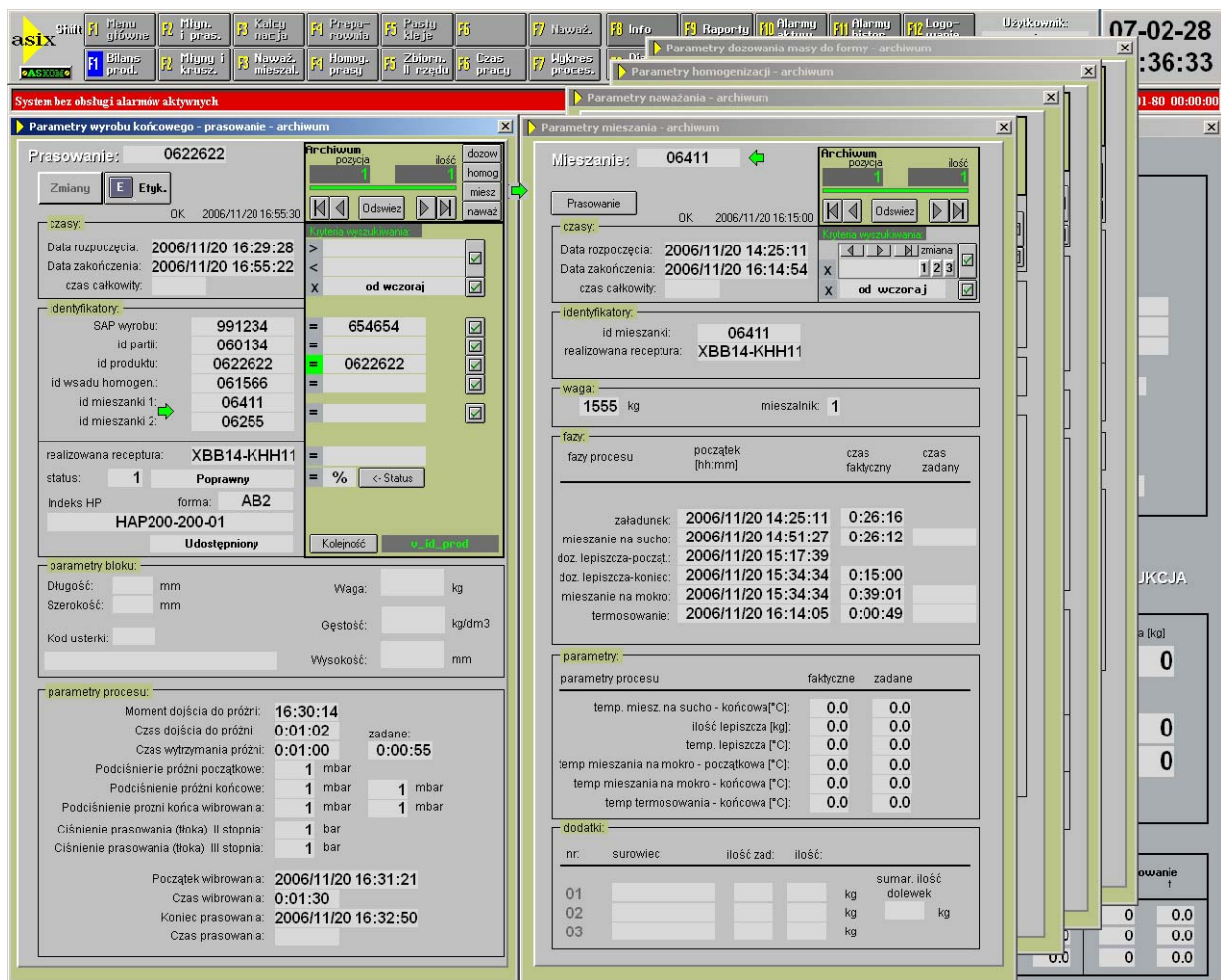


Figure 5. Screens for previewing technological parameters of sub-processes from SQL database archive.