



## **Modernisation of a dosing and mixing control system in the refractory materials industry**

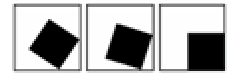
**The choice of a suitable control and automation concept plays a crucial role for manufacturers and operators of systems and components for the weighing, dosing and mixing of bulk goods and liquids. This is because the reliability and effectiveness of a plant quite considerably depend on the scope of the functionality of the automation technology used. Thus, quality assurance and quality records can be provided increasingly effectively by means of modern software for process visualisation and logging. And, ultimately, complete integration of the control system in higher-level production control and management systems optimises the cost-effectiveness of plant operation.**

### System expansion: the opportunity to modernise

In the German town of Marktredwitz, RHI - Refractories Didier Werke AG operates a mass conditioning plant for the production of refractory compressed masses, which are processed further in the subsequent presses and furnaces of the plant to arrive at high-grade refractory elements.

In view of high capacity utilisation and growing production forecasts for the coming years at the Marktredwitz location, it was decided to extend the plant. Along with the enlargement, the control components and the master control system were also to be modernised and standardised. On the one hand, the aim was to boost the capacity and productivity of the plant. On the other hand, the prerequisites for more effective and more extensive quality assurance were to be created in the automation technology hardware and software.

In the plant, which will feature five mixer lines after modernisation and expansion, approximately 100 solids and liquids are dosed automatically via eighteen gravimetric scales and forty flow rate measuring facilities. On ten platform scales, it is possible to manually dose small components and make additions by hand, but with computer prompting.



A complete solution with a proven dosing and mixing control system

RHI - Refractories placed the modernisation order with Maschinenfabrik Gustav Eirich, Hardheim, who handled the project together with their automation and control partner ECKELMANN from Wiesbaden. This choice was crucially influenced not only by both companies' many years of joint experience in the area of weighing, dosing and mixing systems, but also the broad automation engineering spectrum of ECKELMANN as a system integrator.

With the E•MIC-NT system, ECKELMANN offers a complete hardware and software programme which, on the basis of standard platforms (IPC, WINDOWS-NT/2000, Oracle 8i), offers a broad range of functions for the flexible and freely parameter-definable realisation of weighing and mixing specifications. Thanks to use of the WINDOWS-NT/2000 operating system, all the features of a modern network architecture are at the user's disposal. Thus, E•MIC-NT is fully multi-user enabled and it supports decentralised expansion, for example via a modem. The basic scope already includes all system prerequisites for remote maintenance. Any chosen external applications such as production planning systems can be interfaced via standard interfaces.

In the past years, E•MIC-NT and its predecessors have been used successfully in more than 700 new and modernisation projects worldwide in a large number of sectors such as the construction materials industry and in fodder and foodstuffs production.

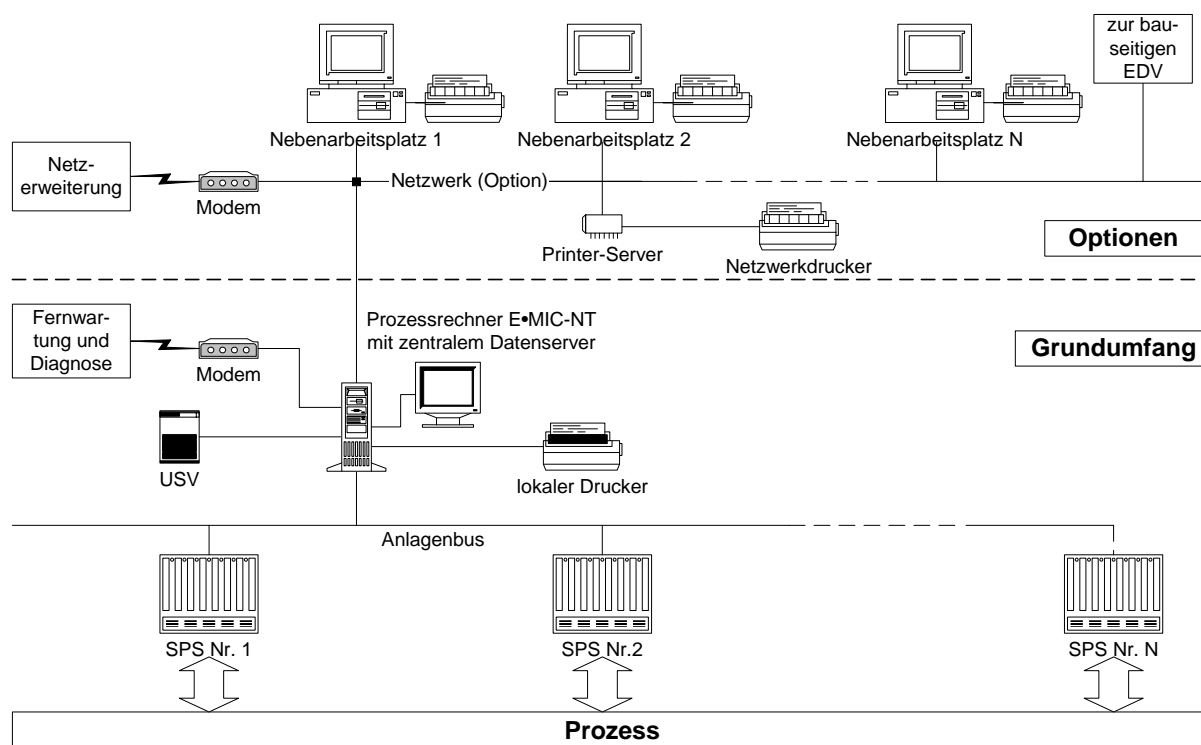


Fig.: System structure of the E•MIC-NT

### System integration on the basis of industrial standards

The subordinate level of the modernised control system consists of nine SIMATIC S7-300 type PLCs. Dosing is realised with the aid of SIWAREX M modules. Distributed throughout the system, twelve operator panels for operator prompting, three barcode readers for material identification and seven large displays to inform forklift truck drivers about mass transport are in use. As early as the concept stage, attention was paid in the modernisation project to maximum possible protection of existing investments.

Central control is assumed by the ECKELMANN dosing and mixing control system E•MIC-NT, implemented here as a client/server solution under WINDOWS NT 4.0 with two workstations. A high-end PC (IBM Netfinity) is used as the central process computer and database server. To ensure optimum failsafe operation, it features RAID 5 hard disk mirroring and a redundant power supply. The process and control



programs of the E MIC-NT run on this server PC. Among other things, they serve the following functions:

- Order processing
- Control of the dosing processes and the mixing sequence
- Data acquisition and balancing
- Communication with external systems such as PLCS, son-site IT, etc.

Both the E MIC-NT user interface and also graphical system visualisation via the InTouch software package are available on both workstations in the system control room. Overall networking of the control system is realised with Industrial Ethernet (SINEC H1).

#### MES and batch tracking included

Via the E•MIC-NT, all datasets are entered and maintained and the entire dosing and mixing process of the plant is controlled, including silo feeding, sampling, optimisation of formulas, and printing of accompanying batch and sample slips with barcodes. The program also encompasses administration of the pre-product store and manages all necessary balances and statistics. This function can be configured to suit the customer's needs. The system is linked to an on-site SAP R3 system for importing of formulations. Batch-related forwarding of operation and production data to a shop-floor system is implemented via a further interface.

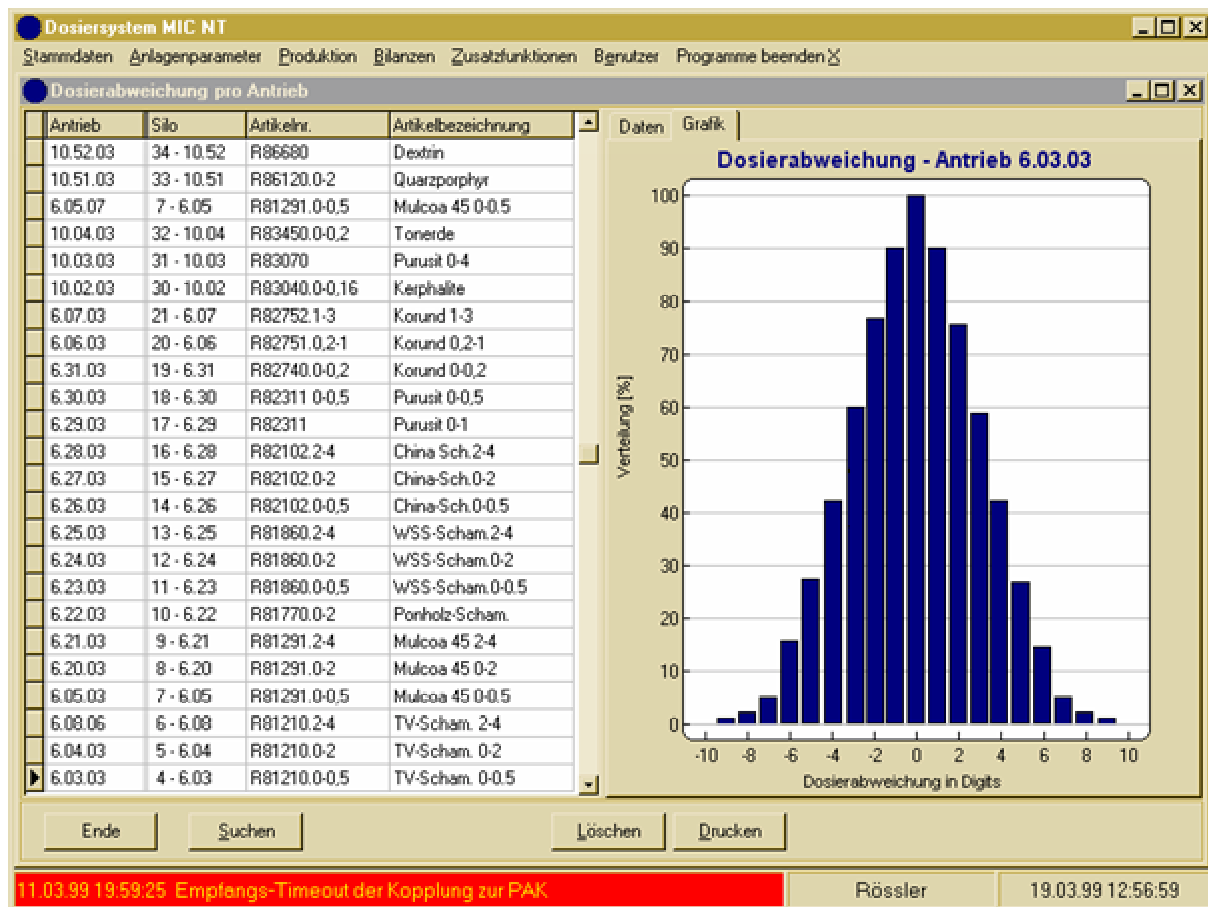


Fig.: Visualisation interface of the E•MIC-NT

### System with protection of investments and fast amortisation

All applications of the E•MIC-NT dosing and mixing control system are economically optimised automation solutions that conform to the principle of system integration. They offer the system operator a series of valuable advantages:

- Protection of existing investments
- Use of industrial hardware and software standards
- Flexible automation solutions that support later modification and expansion of a system
- Integration of all processing area under one master control system
- Standardisation of the automation components
- Interfacing to parallel or higher-level IT systems



- Technically matured commissioning strategies with minimised standstill times

The modernised plant in Marktredwitz was commissioned successfully in February 2001 with minimum standstill times. Even after the first months of operation, this modernisation process can be assessed as being highly positive. As in comparable projects, in the case of the mass conditioning plant in Marktredwitz, the productivity boost attributable to modernisation of the master control system technology is about 20%. In view of this performance increase, the operator can expect to amortise the investment costs in only a few years. Also, thanks to the improvement in quality assurance, numerous strategic advantages that cannot be directly quantified are also achieved.

#### Use in diverse sectors

In the past years, the E•MIC system has been used not only in the construction and basic materials industry, but also in projects for the modernisation of mills, mixed fodder plants and large bakeries.

Particularly extensive modernisation was implemented for the Rendsburg mixed fodder plant of Raiffeisen HaGe Nord AG. At this plant, where up to 1,000 t of cattle and pig fodder are produced every day, ECKELMANN modernised and extended the master control system while retaining the subordinate control level. The new system comprises sixteen operator control stations and one central server designed redundantly with two IPCs. The system integrates all operational and logistics processes from goods receipt through the raw goods warehouse, the mixing and pressing shops to the four-lane truck loading facility. The great degree of automation permits temporarily unmanned 24-hour loading operation, involving automatic creation of all loading and delivery notes.

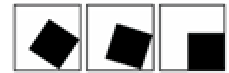


Fig.: Mixer in a conditioning plant

Regardless of the sector, it can be said that modernisation of the master control system presents considerable improvement potentials in relation to cost-effectiveness and product quality in many production plants with tasks in the areas of weighing, dosing and mixing of bulk goods and liquids.