



Karl Casper GmbH & Co. KG, producer of high-quality industrial and ornamental cast parts from individual pieces to small series, uses modern production technology and a new real-time monitoring and control system for the most varied of production processes (Photos: Claus Rudolph, Graphics: Karl Casper Guss)

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“No more groping around in a fog”

What has, up to now, mostly only been technically standard in aeronautics, nuclear power stations or automotive assembly lines, is now to be found in foundries too: remote monitoring in combination with an intelligent production monitoring system, with which the plant can be monitored and managed in real time. This helps the Karl Casper Guss foundry to control and supervise machines, furnaces and the most varied of production processes, right up to the evaluation of production and consumption data for economic analysis purposes. And maintenance also profits from this: any problems can be analyzed from a central location – via notebook, iPad or even a smart phone from anywhere in the world

Uwe Wilhelm likes the color green a lot because, when he switches on his visualization computer in the mornings when work starts at the Karl Casper Guss foundry, it signals to him, on his operator panel, that everything is in order. Like in a control room, the maintenance personnel have the main plants of the foundry operation in sight on the overview screen: any problems, such as

those involving the electric furnace or the sand reclamation plant, are highlighted in red and are immediately noticed (Figure 1). Then Wilhelm can get more details with a few mouse clicks, e.g. the cause of the trouble, furnace parameters, filling levels of the sand silos or process temperatures, and can send his staff to the plant with the information they need to correct the problem

(Figure 2). If necessary, he can directly call up the permanently up-to-date circuit diagrams and documentation on the screen, or obtain component details and, if desired, print them out straight away.

White foundry in the green

Despite the modernity of the state-of-the-art computer technology at the

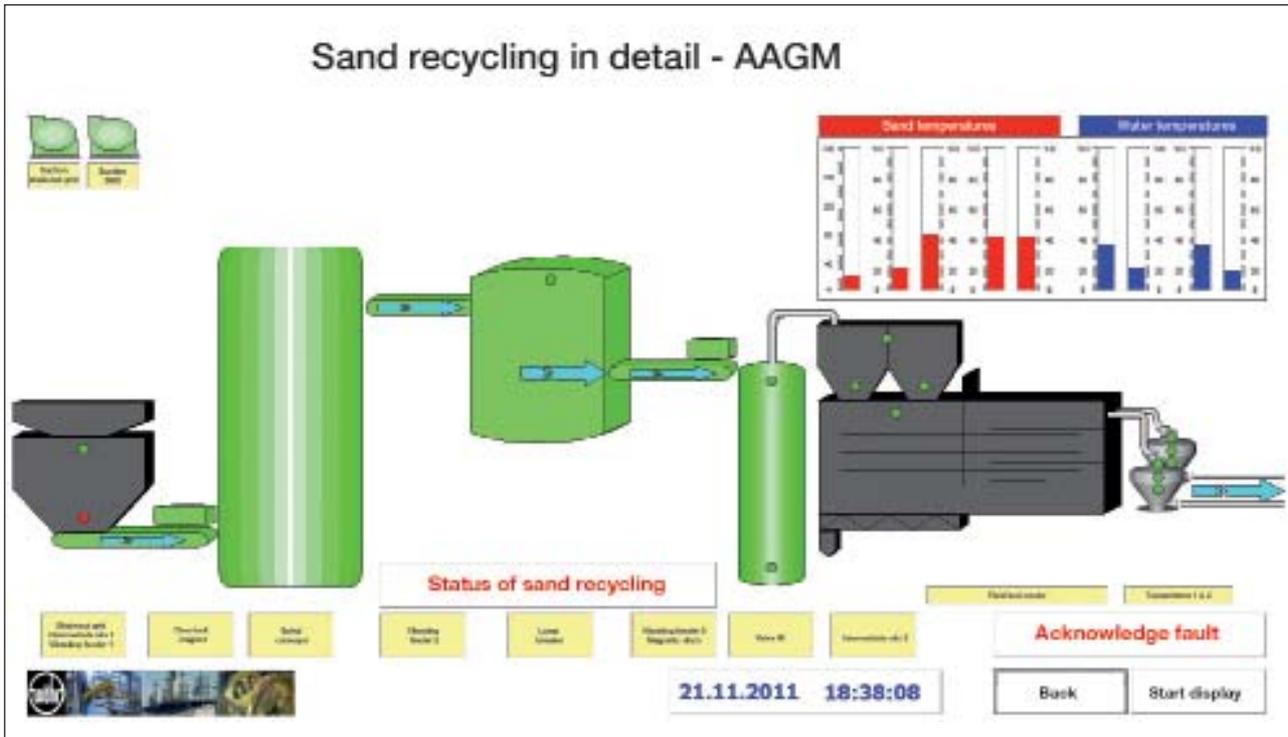


Figure 1: All process parameters are kept in view thanks to the intelligent production monitoring system: the filling levels of the sand silos or process temperatures of the sand mixers and sand recycling plant are transparent. All faults are highlighted in red and are immediately noticed. Service personnel can access the plant with the information they need to correct the problem

foundry Karl Casper GmbH & Co. KG in Remchingen-Nottingen in the German federal state Baden-Württemberg, the company still sees itself as a traditional firm whose roots reach back to 1877. Karl Casper Guss thus not only wants to produce high-quality industrial products and art castings, but also combine the effects of innovation and lasting values as a driving force.

The company makes hand-molded castings in flake and spheroidal graphite cast iron with unit weights of up to nine or six tonnes respectively in contract manufacturing of individual pieces up to small series of 1,000 units, principally for machine tool, special machine and rail-borne vehicle construction, as well as for plastic injection molding machines. Castings include pressure-tight precision parts as well as model-making and art castings. The roughly 100 employees of the “white foundry in the green”, as Karl Casper Guss calls itself, consider themselves to be reliable partners for customers – from the idea

to the finished product. The management, consisting not only of Senior Director Till Casper but also his son Felix Casper, in the fifth generation, as Commercial Director and engineer Malte Lücking, the Technical Director, are always ready to give of their best and provide the right structure for future development.

For this purpose, Casper and Lücking have employed machines from the company AAGM (Aalener Giessereimaschinen GmbH, Bopfingen/Germany) which, under the familiar Wohnr label, designs, produces and assembles environmentally friendly foundry technology exploiting their decades-long experience. The AAGM program includes Wohnr continuous rotary mixers for producing the mold material from 1 to 100 t/h, cold resin molding lines, recycling plants for cold resin-bound molding sand which fully automatically recycle quartz sand from a variety of compounds at up to 50 t/h. As a result of the gentle handling of the sand, up to 96% of the old



Figure 2: Just like in a control room, Maintenance Manager Uwe Wilhelm can see the main plants of the foundry operation on the overview screen

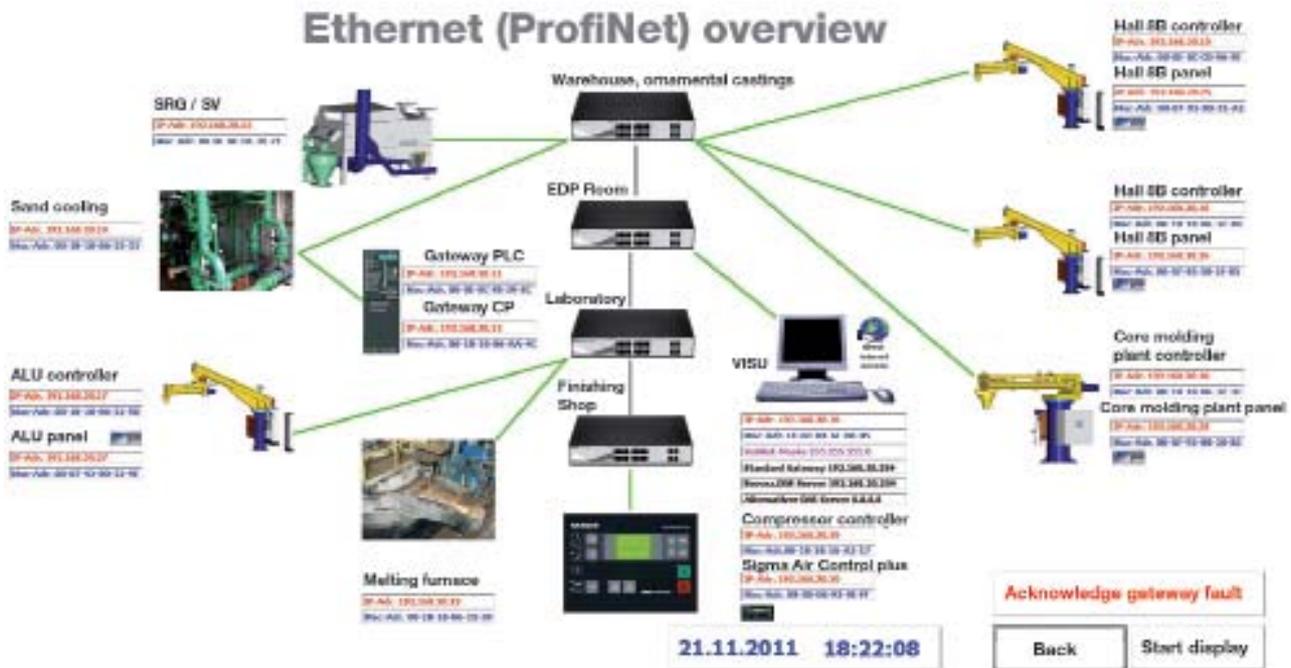


Figure 3: All important foundry plant parts are networked via LAN (Ethernet). The appropriate signal parameters are directly picked up by the Siemens Simatic S7 controller and centrally passed on to the DCAS system. The visualization computer (VISU) prepares the data and provides them to operators and maintenance staff in a comprehensible form

material can be returned to the production cycle – with a low proportion of residual dust and low noise pollution.

Always one step ahead technologically

“The numerous Woehr machines used at Karl Casper Guss are also equipped with state-of-the art Simatic control systems,” explains Josef Preis, Managing Director of AAGM. The resultant advanced networking possibilities, and last year’s expansion of the production plants resulting in a larger number of machines, led to a greater desire for automation at Karl Casper Guss, intended to minimize downtimes and further improve quality. “The customers that trust us do so mainly because of our high quality, delivery reliability and flexibility – this forces us to stay one step ahead,” says Felix Casper.

In order to achieve this aim it was decided to equip the production facilities with the production monitoring system DCAS (Data by Concentration and Analysis System) from SSSoft. This software partner of AAGM – also from Bopfingen – specializes in the automation of foundry technology, among

other things, and always individually adapts the monitoring system to the purchaser’s operational needs. Thus the DCAS system at Karl Casper Guss now monitors four continuous rotary mixers, the sand regeneration system, sand transport, the sand cooling system, the electric furnaces and the compressed air compressors. In technical terms, all signal parameters necessary for these systems are directly picked up by the Siemens Simatic S7 PN-CPU’s (PLCs) via Profinet (Ethernet) and/or communication processors (CPs) and centrally passed on to the DCAS system. The corresponding visualization computer, VISU in short, prepares the data and provides them to operators and maintenance staff in a comprehensible form (Figure 3).

Worldwide access to operational data

Thus the important foundry plants can now be monitored, and controlled, via the VISU in real time whenever desired. If a fault occurs, a message is sent to the internal Service Department and the maintenance personnel localize the problem using the VISU by analyzing

the fault messages received. Then the fault is corrected directly by the maintenance staff at the central site, or the producer is informed and can click on the particular plant via the Internet and the central access point and thus provide support to the maintenance staff to correct the fault. Centralized internal works service access to all networked plant components is possible from all PCs. “Basically, however, a fault message can be passed on and data access via Internet is possible from anywhere worldwide via notebook, iPad or even via an enabled smart phone, as long as at least a 3G connection exists for wireless transmission, explains Siegfried Schlaak, Managing Director of SSSoft.

If, for example, one of the furnaces signals a fault because the sinter process is not running properly but no operator is present, a message with all operation-critical plant states is initially sent to an external security service that then contacts the responsible stand-by staff. This employee can then also remotely observe the furnace parameters in detail during the start-up phase of the furnace. “In the past, the head melter often had to come back to the works in

the evening,” says Malte Lücking. Nevertheless, deviations during the heating-up process or interruptions of the sand supply still occasionally led to expensive loss of production because fault messages were not so transparent and omnipresent. Thanks to the DCAS system this now only occurs very rarely – and if so, the problems can mostly be rapidly brought under control. Overall, the DCAS system contributes towards stabilizing the production process and, above all, short-term and rapid changes of production parameters are possible. This is probably a technical novelty in the sector: “Such a monitoring system has up to now been very rare in medium-sized foundries, Schlaak supposes.

Problem areas in view via camera

A special highlight at Karl Casper Guss is the support of service personnel through the use of mobile CCTV cameras. This allows the in situ situation to be transmitted visually to a remote display. In certain situations, the technician can recognize the problem remotely and can provide tips. Karl Casper Guss is also planning to monitor the sand transport lines on the company’s roof with fixed-mounted CCTV cameras: just in case a sand transport pipe suddenly springs a leak and damage is about to occur, three cameras on the roof will observe whether and where sand is escaping. An intelligent motion control system detects visual changes and raises the alarm – this prevents the need for time-consuming inspection rounds. And the DCAS system certainly saves those on stand-by from having to undertake many journeys, says Maintenance Manager Uwe Wilhelm.

“We are very pleased with the new solution. We now have a comprehensible view of all the important operational parameters,” Technical Director Malte Lücking is delighted (Figure 4): “We are no longer groping about in the fog and always know exactly what is happening in the works regarding the processes, what is needed and how much is being cast. This also ultimately simplifies our costings.” The more accurately the plants can be run thanks to the data transparency of the DCAS system, the lower the mainte-



Figure 4: Maintenance Manager Uwe Wilhelm (right) in conversation with Directors Malte Lücking (center) and Felix Casper (left)

nance costs and thus ultimately the lower the costs for plant operating materials. A pleasant side-effect of the new IT solution: the family-run company can now far easier determine whether, where and how processes can be optimized, plant runtimes improved and input materials reduced. And, as a result of the analysis of the plant data obtained, it is also possible to achieve a highly precise determination of more economical production processes. “Thanks to the DCAS data totally new business models would be conceivable in the future,” Preis suspects, and gives as an example the invoicing of external works service providers “per tonne of sand”. “With costs for one lost day of production in the upper five-digit range in euros, the investment in the DCAS system would already be amortized if we could prevent the loss of a few days’ production. This is particularly the case for

companies that produce high-quality parts, Casper junior is convinced. He is also pleased about the costs saved by doing away with the travel times involved in on-site service activities. Because everything has worked out so well, further plants are to be connected to the DCAS system at Karl Casper Guss in the near future, and the existing W-LAN network in the works even further expanded so that all data, fault messages and operational parameters will also be available in portable form anywhere in the works. The foundry is thus maintaining its proven course: combining innovation and high-tech with tradition.

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