

# A moulding sand management system catches on

BUDERUS Kanalguss GMBH, Limburg, modernises its existing moulding sand conditioning plant, incorporating the MICHENFELDER Moulding Sand Management System

## Initial condition

A few years ago, the BUDERUS Kanalguss moulding sand preparation shop was completely rebuilt. The shop was equipped with a new moulding line, including a new sand mixer, sand cooler, a Siemens S5-based plant control system and various MICHENFELDER Elektrotechnik GmbH & Co. KG moisture-measuring and automatic control systems. Indeed, at that time, the moulding sand preparation shop was technologically state-of-the-art. Then, the measuring and

control systems fully complied with the requirements for accuracy and reliability, but because of their stand-alone design, they were still considerably far from a modern fully networked system and the today's accuracy.

## Decision for modernisation

The installed control components did good and reliable job for many years. During those years, however, all fields of automation, control and network technology gained from the rapid progress in the field of IT technology, a

process that promised numerous advantages, but at the same time put all actors under pressure to act. After various discontinuation announcements by Siemens (plant control S5), followed later by MICHENFELDER (water metering-out device MICOMP 1), and after several tests had been performed using different control systems, BUDERUS Kanalguss finally opted for modernisation of its moulding sand preparation shop.



Fig. 1 Measuring and control system components installed in the sand preparation shop: moisture measuring and control system Micomp UNI type G-MC mounted on the cooler (above left), self-cleaning electrode and temperature sensor in the mixer (above right), moisture measuring and control system MICOMP UNI type G-CH mounted on the mixer (below left), sand-testing system VEDIMAT (below right).

## Requirements with new approaches

The moulding sand preparation shop was to be modernised on the basis of well-planned investment in a new automatic control system. BUDERUS Kanalguss did not want to simply replace discontinued products following the principle of "new for old"; BUDERUS Kanalguss asked for more with regard to the automatic control system, including the measuring and controlling features. This called for a new, long-term integral approach, allowing for the requirements to be fulfilled by the measuring and control system. A large number of the cost-intensive plant components, such as the mixer, cooler, sand bunker etc., were fortunately in good condition and could still be used, calling additionally for a suitable integration strategy.

Furthermore, modernisation was to take place in the shortest time without impairing running production. The performance profile was well defined by BUDERUS Kanalguss: the plant control was to be standardised for the whole site, and moulding sand quality was to be improved and made repeatable, so that the scrap rate and inaccurate batches were minimised.

## Implementation

The MICHENFELDER Moulding Sand Management System concept convinced BUDERUS Kanalguss as early as in the planning stage. The idea was to equip the plant with a process management and control system that makes it possible to control all the parameters of significance for moulding sand quality, from the knock-out grid to the moulding line, from a central processing unit. Thanks to modern data-processing technology it is possible to network all measuring and control sub-systems via Interbus interfaces. Thus, both the fully automatic moisture measuring and control system MICOMP UNI (installed in the ready-to-use sand mixer and in both of the coolers) and the fully automatic sand testing system VEDIMAT were integrated in the network.



Fig. 2 MiPro overview with individually displayed plant components (mixer with primary moisture measurement, two coolers, one mechanical sand-testing system)

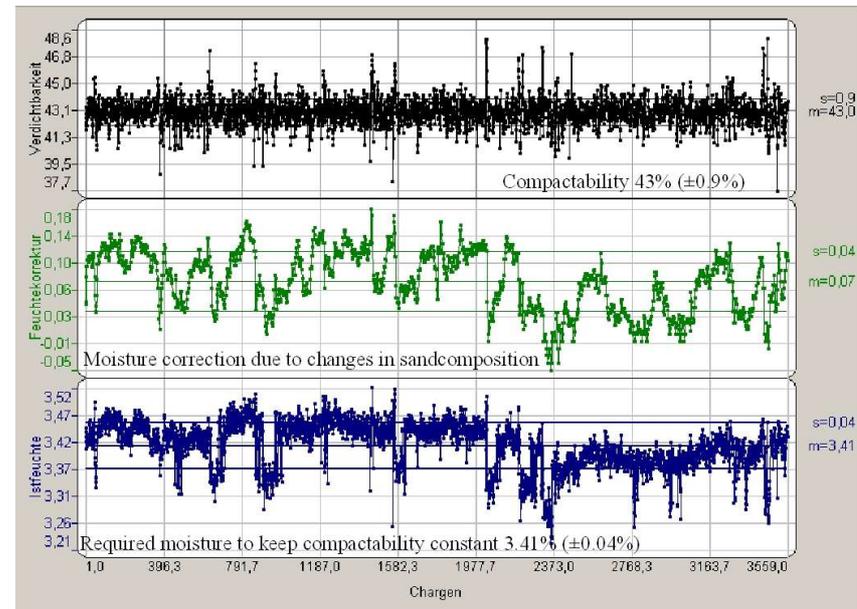


Fig. 3 MiPro database based moulding sand production evaluation within the time window 05/04/29 - 05/06/03.

In addition, BUDERUS Kanalguss decided to follow a new avenue, abandoning the concept of CLP-based control systems in favour of a PC-based plant control. On the basis of their past good experience with systems from SAUTER GmbH, Wutöschingen, BUDERUS Kanalguss again trusted in SAUTER GmbH.

From the beginning, BUDERUS Kanalguss, MICHENFELDER and SAUTER worked hand-in-hand. From ordering to commissioning, the sand preparation shop modernisation took less than 3

months. Most of the assembly work ran parallel to production and existing systems. Thus, most of the requirements were already satisfied.

## Moulding sand management system

MiPro, the process control system ensuring central moulding sand quality management and control, is the central system module. All process data sent by the measuring and control elements incorporated into the plant come in here, where they can be analysed,

archived and, if necessary exported. Because of the customised design of the MiPro user interface, visualisation is not only user-friendly, but makes it possible for the user to find his way intuitively. All sub-systems can be operated from a remote central control desk as if the operator was placed in front of the respective measuring and control element in the plant because of the one-to-one display.

### **MiPro integrated sub-systems**

The most important element is the accurate moisture measuring and control system MICOMP UNI, type G-CH, incorporated in the ready-to-use Künkel-Wagner mixer. This measuring and control system is linked to the automatic sand testing system VEDIMAT, installed upstream of the moulding line. The interaction of the two linked control systems makes it possible to keep pre-set compactability values within very close limits. Additionally, the sand testing system carries out an on-line check for compression strength and assesses the bulk density so that the bentonite content may be determined. Production reliability is improved, and well-aimed primary water addition is possible through the additional evaluation of the measured value for the initial moisture, which takes place upstream of the used sand weighing device, and through integration of the measurement results in the moisture measuring and control system. Furthermore, the two new moisture-measuring and control systems, MICOMP UNI, type G-91, incorporated into the two used sand cooler (ASK 100 and MC75), have been integrated in MiPro. These systems make it

possible to reliably and accurately manage the minimum initial moisture content that constitutes a crucial parameter for the subsequent sand conditioning process.

### **Efficiency control**

Thanks to the MICHENFELDER Moulding Sand Management System it is now possible to keep moulding sand quality constant with an accuracy that is probably currently unique, world-wide. The data below have been assessed on the basis of a full, representative production month at BUDERUS Kanalguss with two-shift operation. Within this time window, compactability, measured right before the moulding line, varied by only  $\pm 0,9\%$ \* from the setpoint. Such an accuracy is only possible because of the moisture control system of the mixer networked with the sand testing system so that the moisture content can be kept accurately within hundredth percent limits\*. This compactability consistency encountered on a moulding line is also due to the measuring and control systems incorporated in the two coolers, ensuring that the variances of the sand discharged with a user adjustable moisture content between 2% and 3% H<sub>2</sub>O are kept in the limits of  $\pm 0.05-0.2\%$ \*. This is crucial in view of the subsequent conditioning process within the sand system.

### **What are the advantages of such an accuracy for BUDERUS Kanalguss?**

After a very short time, BUDERUS Kanalguss noted a considerable reduction in cope mould ruptures and a considerable improvement in moulding sand quality, and in particular in its flowability.

This allows the conclusion that the investment made with respect to cost efficiency requirements, has been successful.

### **Conclusion**

Without simply replacing existing measuring and control systems with stand-alone design following the principle of "new for old", BUDERUS Kanalguss succeeded in optimising the moulding sand quality through intelligent investment in a modern moulding sand management system, keeping a great part of the cost-intensive sand conditioning equipment (mixer, cooler, sand bunker etc.). Very soon BUDERUS Kanalguss became certain that the chosen approach was the right one on then basis of the positive effects for the production becoming apparent after a very short time and after realising that a relatively low investment paid for itself rapidly. Not a bad result, especially in times in which foundries have to cope with decreasing margins, increasingly shorter pattern change intervals and high quality requirements on the part of their customers.

*(\*in the first standard deviation)*