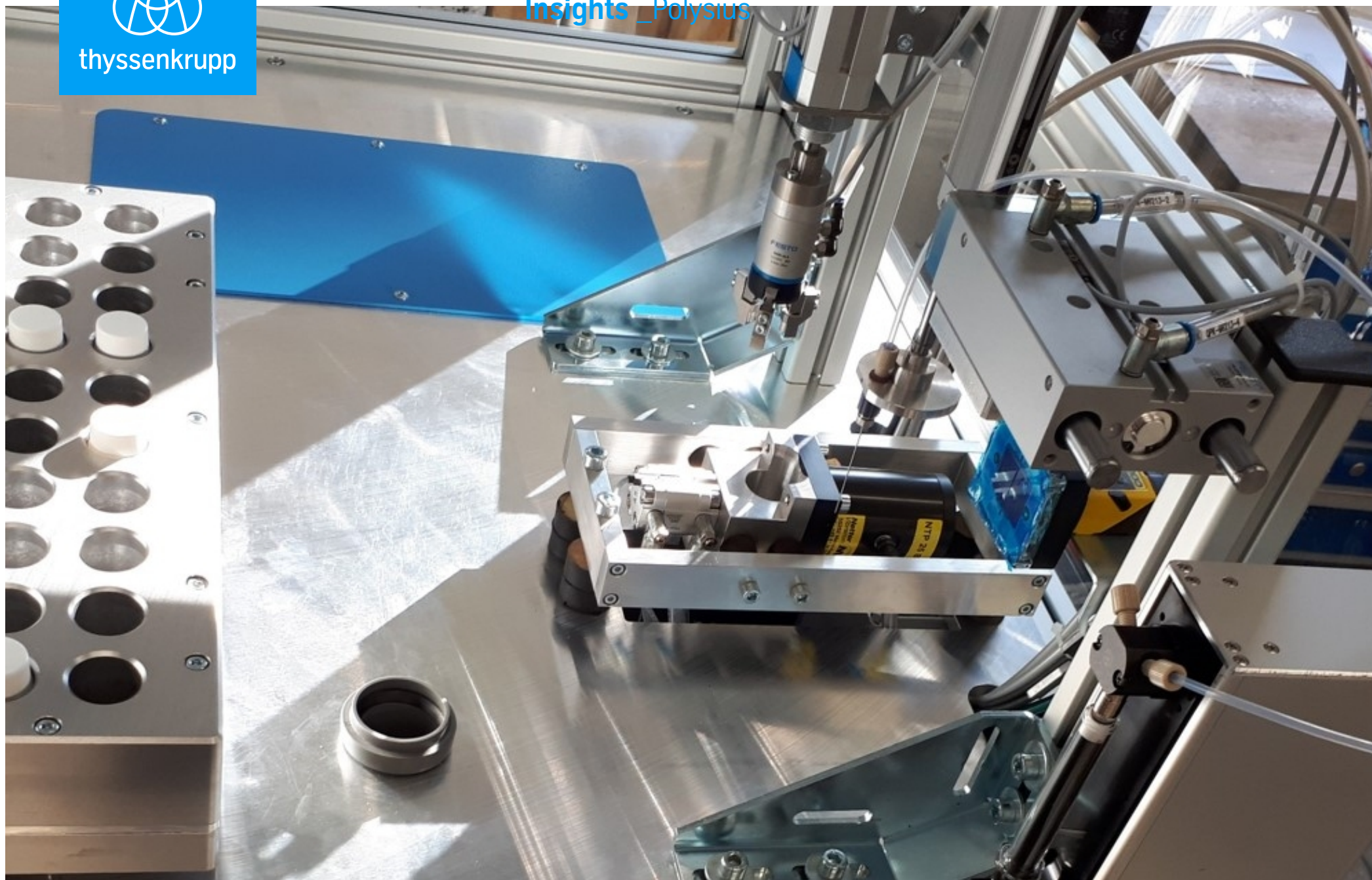




thyssenkrupp

Insights \_ Polysius



## polab® Cal – The first fully automatic isothermal calorimeter

World premiere in the cement industry: For the first time, the reactivity of clinker and cement can be determined with a fully automatic, isothermal calorimeter that can be integrated into the laboratory automation system. polab® Cal represents a quantum leap in quality control and process control in a cement plant. The previous analysis of the reactivity of clinker and cement used to take at least 24 hours. Now, the results are available in less than 60 minutes. Together with the experts from Calmetrix®, thyssenkrupp Industrial Solutions has achieved a breakthrough in digital

process control and building-material development. At its plant in Lengerich, Germany, Dyckerhoff AG is the first cement manufacturer in the world to decide to use polab® Cal.

The basis for this first sale were the results that polab® Cal achieved in a pilot test at the Karlstadt cement plant of Schwenk GmbH & Co KG. In the pilot test, all the forecast characteristic values of polab® Cal were achieved. The data and analyses jointly collected with Schwenk in the process are a key component for future control loops based on artificial intelligence (AI).

### **Measurement of the reactivity of cement**

Determination of reactivity – i.e. the ability of a material to enter into a chemical reaction – can be measured by means of the heat transfer per unit of time and is of the utmost significance for the quality and utilisability of numerous materials. One of these products is cement! Heat development is a direct measure of reactivity and thus of the performance of a cement. Reactivity is important for the speed of strength development and for durability. For example, in massive concrete components, excessive heat development may lead to large temperature differences between the core and the concrete surface. Stresses, or even cracks, may arise as a result. For the cement industry, it is therefore important to be able to measure the reactivity of the cement as quickly as possible, and continuously.

### **Research and product development: Laboratory automation system or standalone device**

polab® Cal is the first automated calorimetry system that can be fully integrated into polab® laboratory automation systems or used as an independent unit in the fields of research & development or product development. The system prepares cement samples fully automatically and analyses them on the basis of parameters specified by the owner. This includes weighing of the sample, setting the water/cement ratio, blending of the samples, loading the samples into the calorimeter, and automatic data evaluation. polab® Cal is of modular design and can operate one or several calorimeters.

### **polab® Cal – The advantages at a glance**

- Highly reproducible automated blending procedures
- Very rapid and precise sample preparation with proven visibility of the first peak
- The reactivity data are available in less than 60 minutes (previously at least 24–48 hours), and the measurements can be extended as required
- All materials and the calorimeter are kept at an ideal temperature in an air-conditioned enclosure
- 24/7-operation, for throughput increase and plant capacity utilisation
- Integrated data evaluation package with predefined mathematical routines

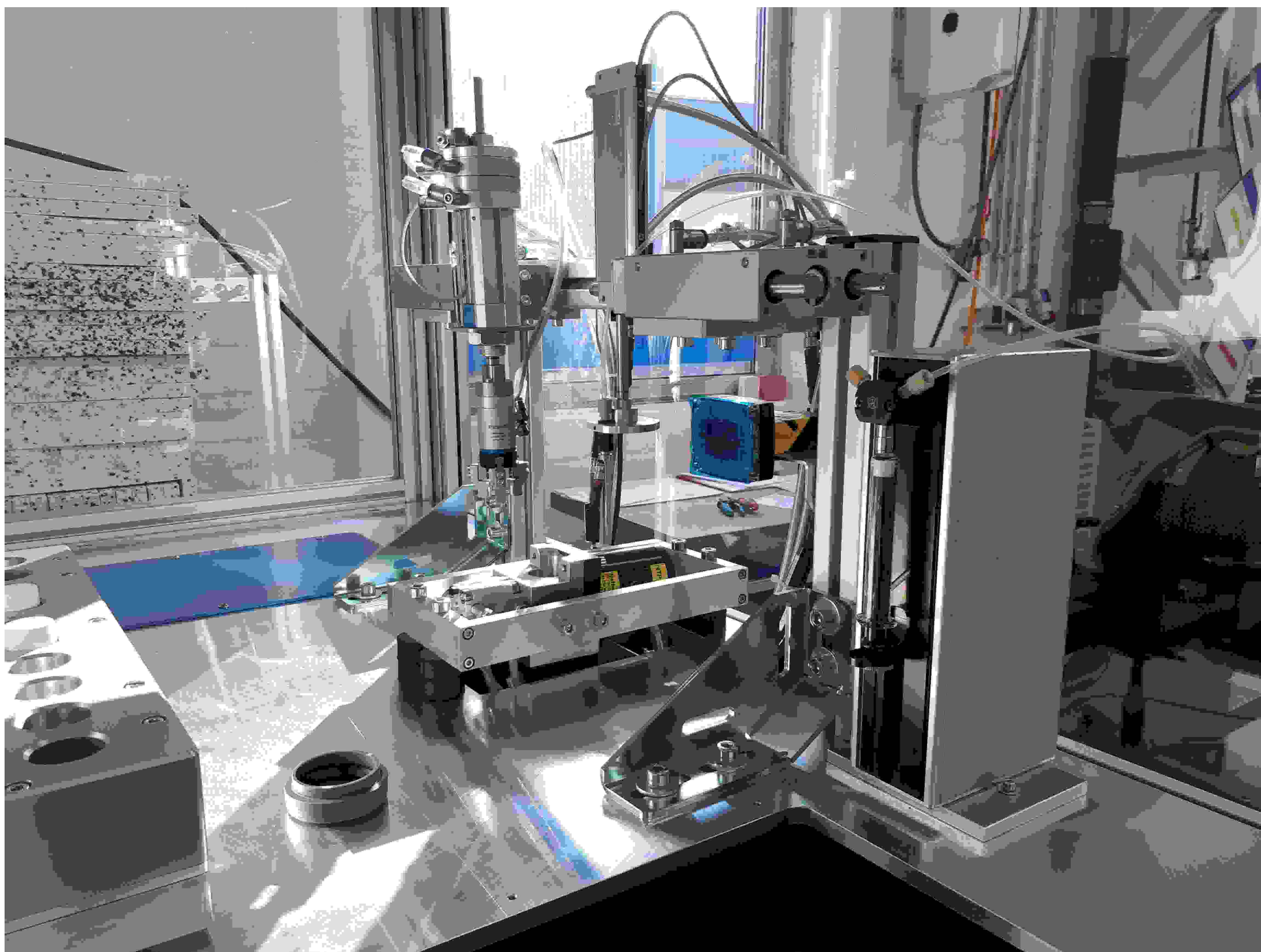
- At the kiln, polab® Cal improves the maintenance of constant clinker quality. At the cement mill, polab® Cal allows optimised separator operation and a reduced level of clinker in the cement. All in all, optimised specific costs for clinker and cement.

“For users in the cement industry, polab® Cal offers data for product and process control at a hitherto unachieved level of precision, accuracy, repeatability and time resolution. In addition to the cement industry, polab® Cal can be used for quality control in the food industry, the pharmaceutical industry and the binding agent industry, as well as in other sectors of the basic materials industry.”

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Dr. Florian Huthmann, Head of Process & Quotation Service for polab® Laboratory Automation





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**The bottom line:** polab® Cal is a milestone in the field of the automated quality analysis of cement. Integration of the calorimeter closes the gap between process and product quality control. The particular strength of polab® Cal is its speed: Instead of a day, the owner of a cement plant now just has to wait less than an hour for the analysis results. This is a huge time advantage and, therefore, an enormous cost advantage. With the reactivity analyses of polab® Cal, cement manufacturers are more easily able to improve the consistency of their clinker and cement, and to adjust it to the respective market requirements.

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