

Industry: Steel / quality assurance

**Products Used: Industrial robots / RV-3SB series
articulated-arm robots**

Versatile tools for laboratory automation

The production of steel from molten raw iron requires stringent in-process quality controls because the composition of the molten metal determines the quality and properties of the resulting steel. Pfaff aqs, a mechanical engineering company based in Wuppertal, Germany, has developed a fully-automated and self-contained quality control testing system for the steel industry. The automated laboratory system is installed in a sealed steel container and its key component is an articulated-arm robot from Mitsubishi Electric.



The Nucleus container laboratory is a fully-automated quality control system for small and medium-sized steelworks that do not have their own central testing laboratories. It is delivered as a turnkey system ready for connection and it can be installed in the direct vicinity of the production facilities. The automated testing lab process includes all necessary quality control steps from transportation and preparation of the samples to analysis of the alloy components of the steel material. The sample handling, robot control and status monitoring are handled by a computerised control system.

The steel sample is registered at a control terminal and then inserted through a hatch onto a transport carriage in the contain-

er. The interior of the container is maintained at a constant temperature of 20°C by an air conditioning system to ensure standardised and accurate quality control results. All the handling of the steel samples inside the container is performed by a six-axis RV-3SB articulated-arm robot. The compact dimensions and workspace of this agile little robot make it an ideal choice for this application.

In a series of steps the robot transports the sample from the transport carriage on the rail system to a milling machine, an image processing station, an analysis instrument, a label printer and finally to the collection bins. The image processing system automatically identifies suitable areas for the metallurgical analysis on the freshly-milled bright surface of the sample and passes this information to the robot via the control system. The sample is then transported to the spark spectrometer in the analysis station and positioned precisely in the spark stand. The analysis is complete when the results of at least two measurements match within the permitted tolerances.



The compact design and reliability of the six-axis robot from Mitsubishi Electric were the main criteria for our choice, but the good value for money and competent technical support were also important factors.

Reinhard Kamphoff
works manager at Pfaff aqs GmbH, Wuppertal



A label is applied to each sample with the time, the source of the sample and its identification code so that it can always be traced if necessary. Each container lab can process up to 500 samples every day at a steel or aluminium works. The entire testing cycle only takes around two minutes to complete and produce the analysis; this speed makes it possible to perform reliable quality control of the melting process during production.

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