SHORT COURSE

SENSOR-BASED ORE SORTING AND SAMPLING

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MISTY HILLS CONFERENCE CENTRE
MULDERSDRIFT, JOHANNESBURG
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SAIMM
THE SOUTHERN AFRICAN INSTITUTE OF MINING AND METALLURGY

Course provider: Dr Christopher Robben, SIX-S Consulting, Germany

This short course introduces the physical separation process of sensor-based sorting with focus on applications in mining. Sorting is experiencing growing attention in the mining industry as it offers the potential of significantly increased productivity, while decreasing energy use and environmental impact. With a physical separation process applied predominantly in coarser particle sizes between 10 mm and 100 mm, sorting demands and imposes special attention to sampling in project development and production.

The course is structured:

1. INTRODUCTION TO SENSOR-BASED ORE SORTING TECHNOLOGY

Sensor-based ore sorting uses sensor systems to determine particle properties and position in real time. Sensor data is then used to classify the particles into ore and waste and a pneumatic system is applied for physical separation into two fractions.
This first session introduces the basic working principle of the equipment, sensors employed and flow sheet configurations. Sensing technology is in fact performing *virtual sampling*, so a focus point will be how the Theory of Sampling (TOS) assists in understanding and improving the sensor-based sorting/sampling process. Specifics on particle ore sorting and bulk ore sorting will be discussed.

2. SENSOR-BASED SORTING PROJECT DEVELOPMENT

Sensor-based sorting processes are exploiting heterogeneity at different levels. While colleagues in other avenues of sampling claim heterogeneity to be the source of all evil, it is here appreciated as a potential business opportunity. The first step in project development assessing the business potential is a proper heterogeneity characterization which defines the theoretical limits for a beneficial separation process. After this, acquiring physical samples for calibration and validation activities and process test work comes to the fore.

3. SENSOR-BASED SORTING PROCESS SAMPLING

Sensor-based ore sorting is not a simple plug-and-play endeavor. It requires supervision and optimization by means of careful process monitoring and control. The control variable(s) is closely related to the ability to acquire representative samples extracted from the process stream. Sensor-based ore sorting processes are mainly addressing low grade ores with coarse particle sizes, for which reason it requires appropriate design of sampling procedures and equipment (Theory of Sampling, TOS). The ultimate benefit of due diligence is an optimal balance between the General Estimation Error and investment costs and benefits.

This short course is held in a workshop atmosphere with participants encouraged to bring their own examples and data. Examples from mining, or from related process industries, such as slag processing, waste recycling, or from food processing. The course may include small elements of group work depending on attendees and their affiliations.

About the Presenter

Dr Christopher Robben, the founder of SIX-S Consulting, has two decades experience in the field of preconcentration and sensor-based ore sorting. He has worked globally in sensor-, process-, and project development and is one of the world leading experts in this field. His focus lies on overall business improvement, sound engineering, mineral economics and financial modelling and he has extensive hands-on experience in process development, project development, pilot operations and production. He has received the Peruvian Prize for Innovation in Mining for the San Rafael Tin Ore Sorting Project which he developed on behalf of the equipment supplier.

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