Sensor-Based Ore Sorting Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Sensor-Based Ore Sorting (SBOS) is revolutionizing modern mining by enabling real-time mineral discrimination, pre-concentration, waste rejection, and ore upgrading using advanced sensing technologies. Sensor-Based Ore Sorting Training Course provides a comprehensive foundation in XRT (X-ray Transmission), NIR (Near-Infrared), Laser, RGB, and Electromagnetic sorting systems, empowering mining professionals to optimize ore recovery and reduce processing costs. With increasing pressure on the mining industry to improve efficiency, sustainability, ESG compliance, and energy reduction, sensor-based sorting has become a critical component of the future digital mine and smart mineral processing plants.

The course bridges theory and industrial application, focusing on ore characterization, sensor calibration, data analytics, machine learning integration, and plant optimization strategies. Participants will gain hands-on understanding of how SBOS systems enhance cut-off grade control, comminution reduction, metallurgical efficiency, and waste minimization. Real-world mining case studies demonstrate how leading operations are leveraging SBOS to achieve higher throughput, reduced energy consumption, improved grade control, and increased profitability in both surface and underground mining environments.

Programme Curriculum

Sensor-Based Ore Sorting Training Course

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Course Duration

5 days

Course Objectives

1. Master sensor-based ore sorting principles and technologies
2. Understand XRT, NIR, laser, and AI-driven sorting systems
3. Apply real-time ore characterization and mineral identification techniques
4. Improve ore pre-concentration and waste rejection efficiency
5. Optimize cut-off grade strategies using sorting data analytics
6. Enhance mineral recovery and metallurgical performance
7. Integrate machine learning in mineral sorting systems
8. Reduce energy consumption in comminution circuits
9. Implement digital mining and smart processing solutions
10. Strengthen plant throughput optimization and bottleneck reduction
11. Develop sensor calibration and system validation skills
12. Apply sustainable mining and ESG compliance frameworks
13. Evaluate economic feasibility and ROI of ore sorting plants

Target Audience

1. Mining Engineers
2. Mineral Processing Engineers
3. Geologists and Resource Modelers
4. Metallurgists
5. Plant Operators and Supervisors
6. Mine Managers and Production Leads
7. Technical Consultants in Mining Technology
8. Equipment Manufacturers and OEM Specialists

Course Modules

Module 1: Fundamentals of Sensor-Based Ore Sorting

- Principles of ore sorting and mineral discrimination
- Types of sorting technologies and applications
- Feed preparation and particle size control
- Sensor signal interpretation basics
- Sorting circuit design overview
- **Case Study:** Gold pre-concentration using XRT sorting in hard rock deposits

Module 2: Sensor Technologies in Mining

- X-ray transmission (XRT) system operation
- Near-Infrared (NIR) mineral detection
- Laser and optical sorting systems
- Electromagnetic conductivity sensors
- Multi-sensor hybrid integration
- **Case Study:** Lithium pegmatite upgrading using NIR sorting

Module 3: Ore Characterization & Geometallurgy

- Mineralogical variability assessment
- Ore hardness and liberation analysis
- Geometallurgical modeling techniques
- Sensor response calibration to ore types
- Lithology-based sorting strategies
- **Case Study:** Iron ore grade control using geometallurgical mapping

Module 4: Sorting Circuit Design & Plant Integration

- Pre-crushing and screening integration
- Conveyor-based sorting system design
- Throughput optimization strategies
- Reject handling and waste stream design
- Plant layout considerations
- **Case Study:** Diamond mine waste reduction using conveyor XRT systems

Module 5: Data Analytics & Machine Learning in Ore Sorting

- Sensor data acquisition systems
- Pattern recognition in ore classification
- AI-based sorting decision models
- Predictive maintenance for sorting machines
- Big data integration in mining operations
- **Case Study:** AI-enhanced copper sorting optimization in Chilean mines

Module 6: Operational Control & Performance Optimization

- Real-time monitoring systems
- Sorting efficiency KPIs
- Grade control and dilution reduction
- Feed variability management
- Process stability techniques
- **Case Study:** Platinum group metals (PGM) recovery optimization in South Africa

Module 7: Economic Evaluation & ESG Impact

- Capital and operating cost analysis
- ROI and payback period calculations
- Carbon footprint reduction through sorting
- Water and energy savings assessment
- ESG reporting integration
- **Case Study:** Green mining initiative using ore sorting in European tungsten operations

Module 8: Advanced Innovations in Sensor-Based Sorting

- Autonomous sorting systems
- Robotics and smart ore handling
- Digital twin applications in sorting plants
- Real-time adaptive control systems
- Future trends in mining automation
- **Case Study:** Autonomous ore sorting system in Australian gold mining operations

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com