Grinding Circuit Design 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

The Grinding Circuit Design Training Course is tailored for professionals aiming to master modern comminution circuit design, optimization, and simulation techniques. This course emphasizes cutting-edge tools and methodologies used in SAG mills, ball mills, HPGR systems, classification circuits, and energy-efficient grinding strategies. Participants will gain deep technical expertise in process design, throughput optimization, power modelling, liberation analysis, and flowsheet development, aligned with global mining standards and digital transformation trends in mineral processing.

With increasing demand for energy-efficient mining, ESG compliance, smart plant design, and digital twins in mineral processing, this training integrates both theoretical foundations and real-world applications. Learners will engage in advanced grinding circuit modeling, case-based plant design studies, and simulation-driven optimization techniques using industry-relevant software and datasets. The course prepares professionals to design and troubleshoot high-performance grinding circuits for copper, gold, iron ore, and polymetallic ore bodies, ensuring improved recovery, reduced energy consumption, and maximized plant profitability in modern mining operations.

Programme Curriculum

Grinding Circuit Design Training Course

Introduction

The Grinding Circuit Design Training Course is tailored for professionals aiming to master modern comminution circuit design, optimization, and simulation techniques. This course emphasizes cutting-edge tools and methodologies used in SAG mills, ball mills, HPGR systems, classification circuits, and energy-efficient grinding strategies. Participants will gain deep technical expertise in process design, throughput optimization, power modelling, liberation analysis, and flowsheet development, aligned with global mining standards and digital transformation trends in mineral processing.

With increasing demand for energy-efficient mining, ESG compliance, smart plant design, and digital twins in mineral processing, this training integrates both theoretical foundations and real-world applications. Learners will engage in advanced grinding circuit modeling, case-based plant design studies, and simulation-driven optimization techniques using industry-relevant software and datasets. The course prepares professionals to design and troubleshoot high-performance grinding circuits for copper, gold, iron ore, and polymetallic ore bodies, ensuring improved recovery, reduced energy consumption, and maximized plant profitability in modern mining operations.

Course Duration

5 days

Course Objectives

1. Master Grinding Circuit Design Optimization for modern mineral processing plants
2. Understand SAG Mill and Ball Mill Circuit Configuration and Design Principles
3. Apply Comminution Energy Efficiency and Power Modeling Techniques
4. Develop expertise in HPGR Circuit Design
5. Analyze and improve Mineral Liberation and Particle Size Distribution (PSD)
6. Implement Advanced Flowsheet Design for Crushing and Grinding Systems
7. Use Simulation Software for Grinding Circuit Modelling and Validation
8. Optimize Throughput Maximization and Operational Efficiency in Grinding Plants
9. Evaluate Ore Hardness for Circuit Selection
10. Integrate Sustainable Mining and ESG-Based Energy Reduction Strategies
11. Perform Circuit Balancing, Classification Efficiency, and Hydrocyclone Design
12. Apply Data-Driven Process Control and Digital Twin Technologies in Grinding
13. Solve real-world Plant Troubleshooting and Performance Bottleneck Analysis

Target Audience

1. Mineral Processing Engineers
2. Metallurgical Engineers
3. Mining Project Design Engineers
4. Plant Operations Supervisors
5. Process Consultants in Mining Industry
6. Graduate Engineers in Mining/Metallurgy
7. Equipment Suppliers and OEM Engineers
8. Technical Managers in Comminution Plants

Course Modules

Module 1: Fundamentals of Comminution & Grinding Theory

- Crushing vs grinding energy principles
- Ore hardness characterization
- Particle size reduction mechanisms
- Grinding media selection fundamentals
- Case Study: Optimization of gold ore comminution in a West African plant

Module 2: SAG & Ball Mill Circuit Design

- SAG mill sizing and selection criteria

- Ball mill circuit configuration
- Power draw and load behavior analysis
- Mill liner and grinding media optimization
- Case Study: Copper concentrator SAG-Ball circuit redesign for throughput increase

Module 3: HPGR and Advanced Comminution Systems

- HPGR operating principles and design variables
- Energy savings vs conventional grinding
- Feed preparation requirements
- Circuit integration with ball mills
- Case Study: Iron ore plant energy reduction using HPGR retrofit

Module 4: Classification Systems & Hydrocyclone Design

- Hydrocyclone efficiency and cut size control
- Classification sharpness and bypass issues
- Circulating load optimization
- Instrumentation and control strategies
- Case Study: Gold plant cyclone efficiency improvement and recovery increase

Module 5: Grinding Circuit Simulation & Modeling

- Use of simulation tools
- Population balance modeling
- Calibration with plant data
- Scenario testing and optimization
- Case Study: Simulation-based debottlenecking of a polymetallic plant

Module 6: Energy Efficiency & Sustainable Grinding

- Energy benchmarking in comminution
- Carbon footprint reduction strategies
- Grinding media wear optimization
- ESG compliance in plant design
- Case Study: Green grinding circuit redesign for ESG compliance in copper operations

Module 7: Process Control & Digital Optimization

- Advanced process control (APC) strategies
- Real-time grinding monitoring systems
- AI and machine learning in comminution
- Digital twin implementation
- Case Study: AI-based mill control system improving throughput stability

Module 8: Plant Design Integration & Troubleshooting

- Full grinding circuit flowsheet integration
- Bottleneck identification techniques
- Failure modes in grinding circuits
- Commissioning and ramp-up strategies
- Case Study: Ramp-up optimization of a new gold concentrator plant

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

Start Date	End Date	Location	Price
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