Advanced Solid Handling and Particle Technology Training Course

30 Nov - 04 Dec 2026

Cape town

4600 € (Per Person)

Ref: #ACE4852_296567

Course Introduction / Overview:

This course provides a comprehensive exploration of the principles and practices governing bulk solids handling, conveying, and particle technology. In industries ranging from pharmaceuticals to mining, the efficient and safe movement of particulate materials is critical for operational success, product quality, and plant safety. This program delves into the fundamental science of particle characterization, exploring how properties like size, shape, and flowability directly impact system design and performance. Drawing on foundational concepts detailed by experts like Dr. David Mills in his seminal work, "Pneumatic Conveying of Solids," participants will bridge the gap between theory and real-world application. BIG BEN Training Center has designed this intensive training to equip professionals with the skills to analyze, design, troubleshoot, and optimize solids handling systems. The curriculum covers everything from mechanical and pneumatic conveying to silo design and dust explosion prevention, ensuring a holistic understanding of the challenges and solutions in modern solids processing.

Target Audience / This training course is suitable for:

- Process Engineers.
- Chemical Engineers.
- Mechanical Engineers.
- Plant and Operations Managers.
- Maintenance Supervisors and Technicians.
- Research and Development Scientists.
- Quality Assurance and Control Personnel.
- Project Engineers involved in plant design and upgrades.
- Safety and Environmental Professionals.
- Equipment Design and Sales Engineers.

Target Sectors and Industries:

- Pharmaceuticals and Biotechnology.
- Food and Beverage Processing.
- Chemical and Petrochemical Manufacturing.
- Plastics and Polymer Industries.
- Mining and Minerals Processing.
- Cement and Construction Materials.
- Agriculture and Feed Production.
- Pulp and Paper Industry.
- Power Generation and Utilities.
- Governmental regulatory and environmental agencies.

Target Organizations Departments:

- Engineering and Design.
- Operations and Production.
- Plant Maintenance and Reliability.
- Research and Development (R&D).
- Quality Assurance and Quality Control (QA/QC).
- Health, Safety, and Environment (HSE).
- Project Management.
- Logistics and Supply Chain.
- Process Improvement and Optimization.
- Procurement and Technical Sourcing.

Course Offerings:

By the end of this course, the participants will have able to:

- Analyze key particle properties and their direct impact on handling and flow behavior.
- Select the appropriate mechanical conveying equipment for specific applications.
- Design fundamental components of pneumatic conveying systems for efficiency.
- Diagnose and troubleshoot common problems in both mechanical and pneumatic systems.
- Apply principles of hopper and silo design to prevent common flow problems.
- Identify and mitigate risks associated with dust explosions and material segregation.
- Optimize existing solids handling systems to improve throughput and reduce energy consumption.
- Implement effective strategies for controlling particle attrition and degradation.

Course Methodology:

The training methodology at BIG BEN Training Center is built on a foundation of active and applied learning to ensure participants can translate knowledge into practical skills. This course moves beyond traditional lectures by integrating a dynamic mix of interactive sessions, expert-led presentations, and collaborative group workshops. A significant portion of the training is dedicated to analyzing real-world case studies, allowing participants to dissect complex solids handling challenges and develop robust solutions. Problem-solving exercises will simulate common operational issues, from pipeline blockages in pneumatic conveyors to flow obstructions in silos. Through facilitated discussions and peer-to-peer knowledge sharing, attendees will explore diverse perspectives and best practices. The methodology emphasizes a hands-on approach, providing a stimulating learning environment where theoretical concepts are immediately reinforced with practical application, ensuring a deep and lasting understanding of the subject matter.

Course Agenda (Course Units):

Unit One: Fundamentals of Particle Technology and Solids Characterization

- Introduction to bulk solids and particle technology.
- Measurement and analysis of particle size and distribution.
- Understanding particle shape, density, and surface area.
- Principles of powder flowability and cohesion.
- Using the Jenike shear cell for flow property testing.
- Determining the angle of repose and its significance.
- Concepts of fluidization and its applications.

Unit Two: Mechanical Conveying Systems

- Overview of mechanical conveying technologies.
- Design, selection, and operation of belt conveyors.
- Principles and applications of screw conveyors and feeders.
- Bucket elevators for vertical material transport.
- Vibratory conveyors and feeders for controlled flow.
- Troubleshooting common mechanical conveyor problems.
- Maintenance strategies for mechanical handling equipment.

Unit Three: Pneumatic Conveying Systems

- Introduction to pneumatic conveying principles.
- Dilute phase versus dense phase conveying systems.
- Key components including air movers, feeders, and pipelines.
- Basic principles of pipeline design and sizing.
- Troubleshooting common issues like blockages and wear.
- Selecting the right system for different materials.
- Energy efficiency considerations in pneumatic transport.

Unit Four: Storage and Feeding of Bulk Solids

- Principles of silo, bin, and hopper design for mass flow.
- Diagnosing and preventing flow problems like arching and ratholing.
- The impact of material properties on storage design.
- Application of flow aid devices like vibrators and air cannons.
- Technologies for accurate solids feeding and metering.
- Understanding and preventing particle segregation in storage.
- Load calculations and structural considerations for silos.

Unit Five: Process Safety and System Optimization

- Fundamentals of dust explosions and fire hazards.
- Hazard identification and risk assessment for combustible dusts.
- Strategies for dust explosion prevention and mitigation.
- Controlling particle attrition and product degradation during handling.
- Techniques for system-wide troubleshooting and debottlenecking.
- Optimizing energy consumption in conveying systems.
- Future trends and innovations in solids handling technology.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

Considering the principles of particle segregation, how might the design of a storage silo inadvertently compromise the quality of a blended product, and what proactive design measures could prevent this?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself by focusing on the integrated science of particle behavior and its direct application to industrial handling systems. Unlike programs that treat conveying, storage, and particle science as separate subjects, this curriculum weaves them together, demonstrating how a material's fundamental properties dictate the success or failure of an entire process. The emphasis is less on memorizing equipment specifications and more on developing a diagnostic mindset to solve complex, real-world problems. Participants will learn not just what equipment to use, but why a specific choice is optimal based on scientific principles of flow, attrition, and segregation. The training moves beyond theory by incorporating extensive case studies drawn from diverse industries, providing a practical framework for troubleshooting and optimization. It bridges the critical gap between the laboratory characterization of powders and the operational realities of a full-scale processing plant, equipping attendees with a holistic and deeply practical expertise that is immediately applicable in their professional roles.