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Transport of Solids: Hydraulic & Pneumatic Conveying

8 - 19 July 2024

Rome (Italy)

Transport of Solids: Hydraulic & Pneumatic Conveying

course code: E6045 From: 8 - 19 July 2024 Venue: Rome (Italy) - course Fees: 4500 Euro

The Course

Transport of solids in the form of hydraulic and pneumatic conveying has progressed enormously since its beginning over a century ago. Industries concerned with the processing of particulate solids, have employed hydraulic or pneumatic transport of solids in almost all plants: the examples of catalyst, polymer particles, china, clay, pigments, paints, foodstuffs, etc. In these process industries, the greatest bulk is in the solid state and almost always in particulate form. In the chemical industry alone, the value of product formed as particles is greater than 30% of the whole. The handling of particles is very important and often done wastefully from an engineering point of view. Improvements could lead to considerable savings over wide range of industries.

Because of the complex nature of interaction between solid particles and intervening, the subject of transport solids in the form of hydraulic transport and pneumatic conveying is difficult and multi-faceted. The entire system is difficult to design and it is even more important to be operated and maintained properly. In order to decide whether hydraulic or pneumatic transport is viable solution, it is necessary to know the costs of the entire process including solids preparation, pumping or compressing, pipeline and solids post-processing. The course is very practical and provides information on materials, equipment, design, operation, maintenance and troubleshooting. The practical numerical examples and workshops are designed to facilitate and solidify the understanding of the material.

Highlights of the course include:

- Principles of selecting the most appropriate means of transport of solids for the given application
- Guidance for optimum performance and in trouble-free operation
- Practical real-life examples of how to calculate slurry pipeline or pneumatic piping system
- Interplay of various influencing design parameters
- Economical issues: cost and benefit analysis

The Goals

This course will enable the participants to achieve the following:

- Familiarity with different systems for hydraulic transport and pneumatic conveying and their advantages and disadvantages
- Appreciation of methods of hydraulic and mechanical design of systems for transport of solids according to existing world standards and codes
- Knowledge on how to make optimal selection and sizing of elements of a system for a given industrial application
- Application of methods of estimating the efficiency of transport systems and the ways to improve the reliability of operation
- Guidelines for accepted maintenance and protection techniques regarding problems in operation, such as corrosion, erosion, abrasion, wear, etc

The Process

The course is a combination of lectures with active delegate participation. The emphasis will be on physical principles and technical reasoning with justification and clarification. There will be comprehensive workshops where case studies of different types of solids transports will be presented along with calculation procedures and results. An open forum discussion will be held each day to reinforce the knowledge gained and inspire delegates to exchange views and professional experiences.

The Benefits

This course will benefit the delegates through:

- Greater familiarity with hydraulic transport and pneumatic conveying systems as encountered in every-day industrial practice in process and chemical industry
- Better knowledge of methods to assess the main design parameters of systems for transport of solids
- Understanding of guidelines for selection and sizing of main components of these systems
- Modern methods of transport of solids industry regarding continuous demands for better overall efficiency and long and trouble-free life
- Appreciation of the accepted best practices for their efficient operation and maintenance and potential alterations

The Results

- Problem-free operation of solid transport systems will result in reducing of downtime for repairs and alterations and reducing the operation costs in the technological process;
- Performance of the company in the long run will be improved by an adequate selection and sizing of transport systems that have the best overall efficiency;
- Efficiently operated system of hydraulic transport and pneumatic conveying by skilled personnel will result in energy saving and in the reduction of overall costs of the plant operation;
- Well maintained system of transport of solids will prolong the life of the plant and significantly reduce overall costs, and in the same time reduce the risks and impact on the environmental;
- Personnel in the maintenance department will be able to follow the best practices for inspection, maintenance, repair and alteration.

The Programme Content

Day One

Main Characteristics of Systems for Transport of Solids

- System for hydraulic transport of solids: main features, elements and components
- Basics of flow of liquids in pipes: velocity and pressure drop of flow of mixtures
- Classification of flow characteristics of common slurries
- Review of main elements of slurry preparation equipment
- Other vital components of the hydraulic transport

Day Two

Pipeline Design Considerations

- Selection of pipes, material and diameter based on maximum fluid velocity
- Detailed calculation of pressure losses in pipeline
- Selection and sizing of pumps for hydraulic transport system
- Handling of difficult slurries
- After-treatment of transported material
- Case study on selected projects of hydraulic transport

Day Three

Practical Aspects of System Safe Operation

- System design environmental considerations
- Guidelines for adequate pipeline installation and maintenance
- Hydraulic system inspection, control and performance testing
- Problems with system starting and stopping
- Methods of pipeline vibration reduction
- Economic analysis: capital costs and operating costs

Day Four

Characteristics of Different Types of Pneumatic Conveying Systems

- Systems for pneumatic conveying of solids
- Basics of flow of gases in pipes
- Sizing of blowers and piping connections
- Review of main elements of material preparation equipment
- Selection of pipe material and diameter and design of piping systems

Day Five

Survey of Equipment and Methods for After Treatment of Transported Material

- Material - gas separation
- After-installation inspection and check up
- Receiving and unloading of material, start-up of operation
- Operational problems and troubleshooting
- Control and monitoring the system
- Optimizing and upgrading the existing systems: issue of changing the material