



**KASA Redberg**

*Engineers & Technical Trainers*

# **Slurry Pumping & Piping Fundamentals**

*A practical and interactive 3 day course*

# Slurry Pumping & Piping Fundamentals

## Introduction

This three day course is an amalgamation of the slurry-related material found in our “Pump Fundamentals” and “Liquid Piping Systems Fundamentals” courses combined with the fundamentals-level material found in our “Advanced Slurry Pumping & Piping” course.

## Who Should Attend

Consulting Engineers, Process Engineers, Design Engineers, Project Engineers, Slurry Pump & Piping Sales Representatives and anyone who needs to select, specify, commission, install and/or troubleshoot slurry pumping equipment and slurry piping.

It is a requirement that each delegate has an understanding of mechanical components. Experience with diploma or degree level engineering maths would also be advantageous.

## Delegate Pre-Requisites

For the maximum benefit to be obtained, it is recommended that each delegate:

- Has an understanding of mechanical components.
- Has had some previous exposure to slurry systems.
- Is degree or diploma qualified in a relevant technical discipline (e.g. mechanical, chemical or mining engineering).

## In-House (Customised) Training

This training course is only delivered as an in-house course.

The content of the course can be customised to suit the specific equipment makes/models that you use at your facilities. Additional material can also be included or non-relevant material can be excluded. In this way, this course can be completely customised to suit your needs.

As this is an in-house course, please contact us via phone or email to arrange a detailed proposal.

## Seminar Objectives

At the completion of this seminar, each delegate should be able to:

- Have a greater understanding of hydraulics theory such as pressure-head relationships, cavitation, NPSH, hydraulic grade lines, motor and engine power, and pipe head loss calculations.
- Read and understand pump curves for all pump types.
- Understand how to determine the required pipe wall thickness and flange rating for a given application.
- Understand how the relevant slurry properties are determined in a laboratory environment.
- Understand the principles of determining head loss in both settling and non-settling slurries.
- Be aware of the effects of particle size and solids concentration with respect to de-rating of pump performance for a particular slurry.
- Appreciate the advantages and disadvantages of the more commonly used slurry piping materials so that material selection can be carried out in a more informed manner.
- Be aware of the more common piping operational issues.
- Determine whether a centrifugal slurry pump or a positive displacement pump is a better choice for a particular application.
- Have a greater understanding of the more commonly available centrifugal and positive displacement pumps used for slurries.
- Be aware of various slurry pump operational issues, recommended piping configurations and component choices.

## Training Seminar Materials

All delegates receive:

- A Detailed Seminar Manual** – Which provides a reference text of all of the material presented during the seminar. Note: This manual is written as a textbook which allows it to be more useful as a future design reference.
- Certificate of Attendance** – Which states the number of hours of training and serves as documentary proof of attendance.



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## Seminar Synopsis

### DAY 1

#### BACKGROUND INFORMATION

- Specific Gravity, solids concentration, particle size analysis, rheograms (aka "flow curves"), viscosity.
- Newtonian and Non-Newtonian slurries
- Non-Newtonian Flow Models
- Homogeneous, heterogeneous, stratified and sliding bed flow profiles.
- Classifications – Settling and Non-Settling slurries.
- Slurry Pump Performance Basics.
- Worked Example Problems.

#### CENTRIFUGAL SLURRY PUMPS

- Components, types, examples, design features.
- Selecting materials of construction based on wear classes and service classes.
- Envelopes of operation.
- Series and parallel pumping, design & operational Issues.
- A review of the commonly available types of seals and packing.
- Focus on submersible slurry pumps
- Focus on horizontal end-suction slurry pumps.
- Drive Arrangements.
- Maintenance considerations.
- Gland water setups.
- Worked example problems

### DAY 2

#### THE DE-RATING OF SLURRY PUMPS

- Recommended methods of determining the de-rating effects (i.e. Head Ratio, Efficiency Ratio etc) on centrifugal slurry pumps when dealing with settling slurries.
- Dealing with non-settling, non-Newtonian slurries.
- Dealing with frothing slurries.
- NPSHR corrections.
- Worked example problems.

#### POSITIVE DISPLACEMENT PUMPS

- A review rotary and reciprocating PD pumps for slurry.
- Selection criteria, relative advantages and disadvantages, envelopes of operation.

### DAY 2 CONTINUED

#### POSITIVE DISPLACEMENT PUMPS (CONTINUED)

- Operation and maintenance considerations.
- Recommended suction and discharge piping arrangements.

#### A FOCUS ON FROTH PUMPING

- Froth pumps
- Centrifugal slurry pumps for froth
- Recommended suction and discharge piping
- Calculations and worked examples for froth pumping

### DAY 3

#### SLURRY PIPING – MATERIALS, EXAMPLES & ISSUES

- A review of common slurry piping materials of construction including: rubber lined steel, ceramic lined steel, plastic lined steel, polyethylene, fibreglass etc.
- Selection criteria, advantages/disadvantages etc of the above-mentioned materials.
- Pipe wear and wear testing methods.
- Valves and instruments for slurries.

#### PIPING DESIGN FOR NON-SETTLING SLURRIES

- Recommended methods for determining head loss for laminar and turbulent flow from viscosity measurements and/or small-scale pipe flow data.
- Recommended method for determining head loss for Newtonian Non-Settling Slurries.
- Worked example problems.

#### PIPING DESIGN FOR SETTLING SLURRIES

- Recommended methods for determining head loss.
- Recommended methods for determining the Deposit Velocity.
- Recommendations for pipe diameter and flow velocity.
- Flow in inclined pipes.
- Worked example problems.



## About KASA Redberg

KASA Redberg is a technical training and engineering consulting group.

We have core competencies in pumping systems, piping systems, pipelines, pressure vessels and slurry handling systems. We also act as independent HAZOP workshop facilitators and Safety-in-Design workshop facilitators.

Our portfolio of services includes:

- Tank and vessel design.
- Chemicals plant design.
- Water treatment plant design.
- Pumping and piping systems design.
- Pump station and pipeline design
- Mine dewatering and water supply systems design.
- Pipe stress analysis
- Pipeline hydraulic modelling
- Water hammer analysis
- Slurry piping systems design and slurry pump selection.
- On-site troubleshooting of pumps and piping systems.
- Operator training courses
- HAZOP workshop facilitation
- Safety-in-Design workshop facilitation

## Contact Details

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