

Open Pit Dewatering – Pump & Piping Fundamentals

A practical and interactive two day seminar



KASA Redberg
Engineers & Technical Trainers

KASA Redberg Pty Ltd ABN 35 107 585 375
PO Box 459, Balgowlah, NSW, 2093, Australia
Ph: +61 (0)2 9949 9795 Fax: +61 (2) 8246 6387
Web: www.kasa.com.au Email: info@kasa.com.au

Open Pit Dewatering – Pump & Piping Fundamentals

Introduction

Open pit dewatering typically encompasses a combination of diesel and/or electric driven pump-sets located “in-pit”, and, in some cases, located in groundwater bores either “in-pit” or “ex-pit”. Many kilometres of pipelines are also employed to convey the raw water pumped from the pits to the bores to dedicated dams where centrifugal pump-sets are employed to transfer the contained water to process plants, water treatment plants, beneficial use systems or to creek/river discharge points.

The purpose of this two day course is to provide knowledge relating to the sizing, selection, operation, troubleshooting and maintenance of pit dewatering systems which are described by the above-mentioned elements.

Who Should Attend

Dewatering team members, site maintenance personnel, engineers, technicians, operators and hydrogeologists involved in the design, upgrade, operation, installation, testing and maintenance of pit dewatering systems, managed aquifer recharge systems and below water table mining operations.

Delegate Pre-Requisites

There are no academic pre-requisites. This course has been designed to take people with a minimal level of knowledge of pumping equipment and pipelines and teach them pump/piping basics as well as tips and traps relating to operation and troubleshooting.

Ideally, attendees should have had some previous exposure to a working mine or, depending upon the attendee’s job function, some exposure to pumps and pipes. However, we have previously run this course for hydrogeologists with minimal previous pump and piping knowledge and had excellent feedback on the learning outcomes and how the knowledge gained has helped to improve existing dewatering operations.

In-House (Customised) Training

This training course is only delivered as an in-house course. We have presented this course at mine sites and mining company head offices since 2011.

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

Seminar Objectives

This course places a great emphasis on the ongoing operation, maintenance and improvement of existing dewatering systems. Case studies are used to highlight issues at existing sites around Australia and the methods used to fix such issues.

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

- Read pump curves for sizing, selection and troubleshooting purposes.
- Gain familiarity with the common types of pumps used on open-pit mine sites and managed aquifer recharge systems such as: submersible pumps (located in sumps), borehole pumps (located in bores) and end-suction centrifugal pumps (for general water transfer on site).
- Appreciate the advantages and disadvantages of different “headworks” designs for borehole pumps used for lowering the water table.
- Understand that dewatering and transfer pumps only have a safe working range and that continued operation outside this range will lead to ongoing pump failures and maintenance cost increases.
- Perform basic calculations relating to pressure, head, pump duty point, motor power, engine power, diesel fuel consumption and power costs.
- Understand the limitations and benefits of the most common types of pipe materials, end connections, valves and fittings used for dewatering systems and water transfer systems on mine sites.
- Be better placed to troubleshoot pumping and piping problems on site as well as look at ways of improving an existing site’s operation and reliability.

Training Seminar Materials

All delegates receive:

- A Detailed Seminar Manual** – Which provides a reference text of all of the material presented during the seminar.
- 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

- Fluid properties
- Pressure and head
- Hydraulic Grade Lines, velocity and flowrate
- Static Head, Total Dynamic Head and Friction Head
- Cavitation
- Head losses in pipe, fittings and valves
- Basic pipe sizing checks and calculations

CENTRIFUGAL PUMPS

- Principle of operation
- Classifications and components
- The different types of centrifugal pumps
- Impellers, Affinity Laws and Characteristic Curves
- How to read pump curves
- Pumps in parallel
- Pumps In series
- Testing, priming, starting and stopping
- Troubleshooting centrifugal pumps
- Motor sizing and tips/traps
- Diesel engine sizing and tips/traps

CASE STUDY – IN-PIT DEWATERING

- A detailed look at an existing in-pit dewatering system comprising diesel-driven pump-sets and slurry-grade submersible sump pumps for pit in-flows of 1500 litres per second.

CENTRIFUGAL SLURRY PUMPS & PIPELINES

- Components, types, examples, design features.
- Selecting materials of construction based on wear classes and service classes.
- Envelopes of operation.
- Focus on submersible slurry pumps
- Focus on horizontal end-suction slurry pumps.
- Maintenance considerations
- Pipelines for low-solids concentration settling slurries
- Troubleshooting of pipelines

DAY 2

SELF-PRIMING PUMPS

- Dry prime and wet prime
- Maintenance considerations
- Troubleshooting
- Advantages and disadvantages of self-priming pumps

CASE STUDY – GROUND WATER LOWERING

- A detailed look at an existing “ex-pit” dewatering system for the lowering of ground water levels for below water table mining for a peak total combined capacity of 120 megalitres per day. This case study focuses on borehole pumps, their design, operation, maintenance, use of shrouds and headworks designs employed.

MOTOR STARTERS & PUMP INSTALLATION TIPS

- Electric motor basics
- DOL starting, soft starters and variable speed drives
- Pump installation tips
- Suction and discharge piping tips

SEALS & PACKING

- Gland packing
- Dynamic (centrifugal) seals
- Basic mechanical seals and seal setups found in dewatering, submersible and transfer pumps.

CASE STUDY – TRANSFER PIPELINE

- A detailed look at the upgrade of a water transfer pipeline at an existing site and the constraints faced in increasing its capacity.

MISCELLANEOUS PIPING TOPICS

- Pressure ratings
- Water hammer
- Typical valves used in dewatering systems
- Polyethylene piping and pipelines
- Steel piping and pipelines
- Flanges and flange ratings
- Basic pressure piping calculations and checks
- Hydrostatic testing

