



## ROOT CAUSE ANALYSIS: CENTRIFUGAL PUMPS, MECHANICAL SEALS & BEARINGS

*An Intermediate-level class for maintenance personnel, reliability engineers, rotating equipment engineers and specialists. This course is taught in partnership with SKF. Participants will learn how to identify, analyze and reduce mechanisms that lead to premature failures in pumps, mechanical seals and rolling element bearings. They will also be taught the requisite skills and knowledge necessary to correctly select, accurately analyze and obtain resolution to undesirable events. Also included is methodology for analyzing failed and damaged mechanical seals and bearings. Students will learn to uncover the root causes of the identified component damage and failures that result in reduced service life.*



### Audience

Participants should have direct involvement or responsibility for pump installation, operation, troubleshooting or maintenance.

This course is intended for personnel requiring knowledge of identifying the causes of centrifugal pump, mechanical seal and rolling element bearing failures.

### Course Objectives

Upon completion of the course, participants will have learned the skills to:

- Evaluate and analyze the problem symptoms and information to arrive at the root cause of a problem
- Explain how the interrelationship of centrifugal pump components and process systems affect equipment reliability
- Evaluate symptoms to determine causes of failures associated with centrifugal pumps, mechanical seals and rolling element bearings
- Understand the reaction of moisture, contamination and other environmental effects on bearing components
- Evaluate the effects of poor installation, maintenance and lubrication practices on bearing life
- Identify practical corrective procedures that can improve pump, seal and bearing reliability
- See examples, identify and interpret actual pump, seal and bearing failures

Bearing damage and failure analysis is taught to ISO Standard 15243.

### Prerequisites

There are no prerequisites for this class; however, students new to centrifugal pumps will benefit from *Pump and Mechanical Seal Basics* or *Pump and Mechanical Seal Principals*.

SKF is a leading provider of bearings and lubrication systems, and offers these online courses for further study:

#### Pre-study

- GRB001 Bearing Basics
- GRB003 Angular Contact Ball Bearings
- WE104 Bearing Damage Analysis

#### Post-study

- WE140 Shaft Alignment Basics
- WE150 Balancing Basics
- WE170 Basics of Seals for Rotating Motion

**For more information, visit:**  
[www.skf.com/group/index.html](http://www.skf.com/group/index.html)

**Course Length:** 4 days



### Course Registration

For registrations, please visit:  
[www.pumptraining.com](http://www.pumptraining.com)

- 1 Click on the **register** button.
- 2 Log on to the system or register if it is your first time.
- 3 Click **classroom courses** and choose your region.
- 4 Select which class date(s) you would like by using the drop-down list on the desired course. Enter number of attendees.
- 5 Click **buy** and proceed to checkout for payment.

Email assistance: [esg@flowserve.com](mailto:esg@flowserve.com)



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