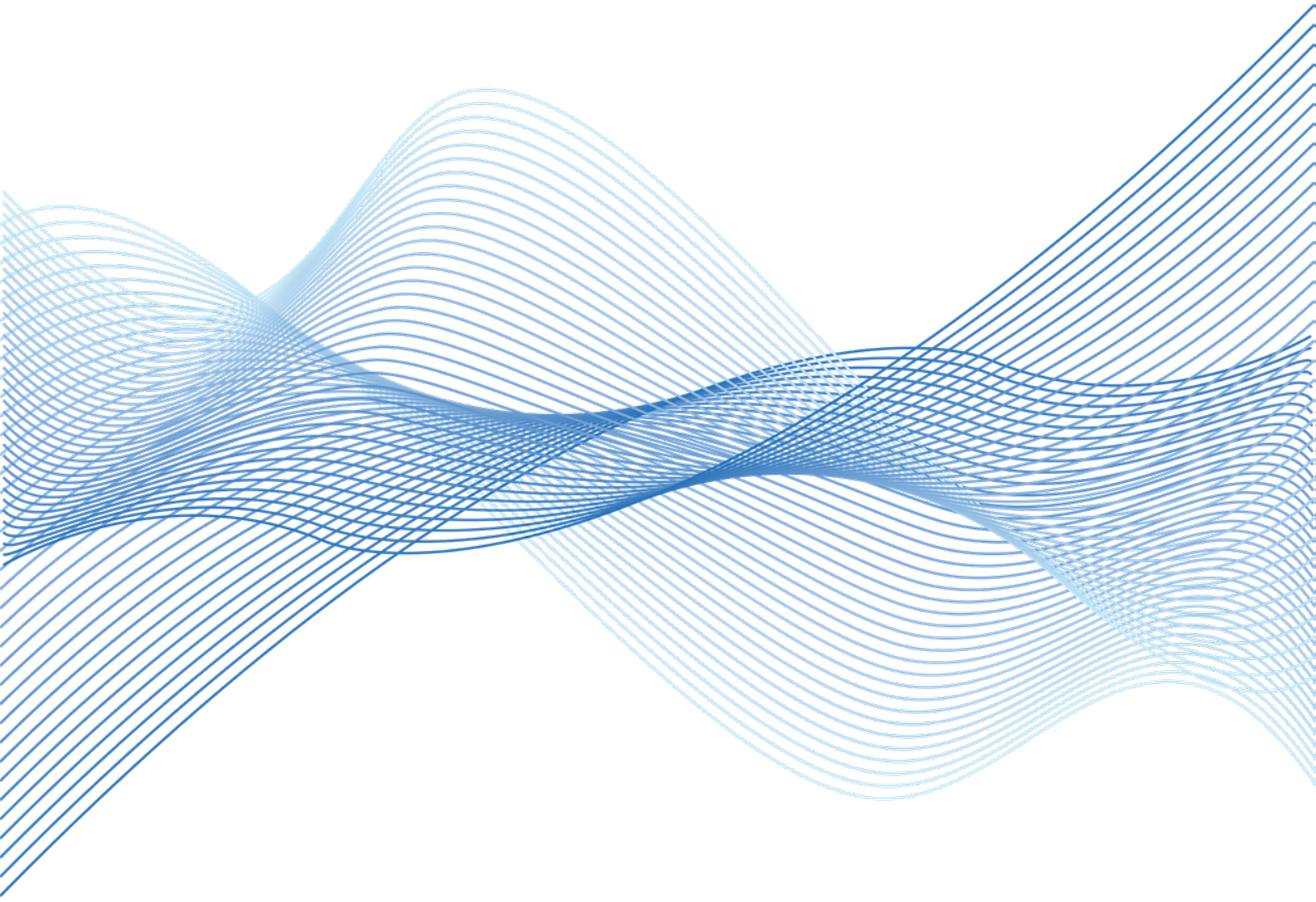
FUGLESANGS
Experts in flow optimization

Training modules

PLANT AND EQUIPMENT RELIABILITY



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Fuglesangs Reliability Academy

Fuglesangs Reliability Academy has been developed to help plants improve their overall reliability through training of their personnel.

Plant personnel are at the core of reliability and investment into training to enhance their understanding and knowledge will lead to significant dividends including an overall improvement in plant reliability as well as reduced costs.

These training modules have been developed to give plant personnel knowledge they can take back to the plant and applied immediately.

Duration of each module is for orientation only and the content may vary depending needs. Both full, multi-day and customized programs are available and can be offered to meet the plant`s specific needs.

Training sessions can be held at our training facility, the plant or at an offsite location to further enhance the learning experience.

For more information, please contact us +47 22 54 20 00.

Note: Training will be hold in English with our technical manager (see last page)

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Reliability Knowledge Modules

RM1 Plant Reliability – First Principles — 2 hours 2500kr/pers.

This module is intended for plant managers, engineers and staff responsible for the improvement of the plant`s reliability. A basic understanding of reliability is developed and then an improvement framework is introduced to help begin developing a "reliability centred culture". Content includes:

- A Case for Reliability Improvement – Asset Management
- Reliability Defined
- Cost associated with poor reliability and the savings to be realized.
- Identifying reliability issues.
- "Systems" approach to reliability improvement
- Key to Reliability Improvement – Understanding Failure
- Reliability Improvement Process

RM2 Pump and Sealing System Reliability — 3 hours 2800kr/pers.

This module is intended for plant personnel responsible for the site`s pumps including operations, maintenance, engineering and other staff working with pumps. The causes of poor reliability are identified and methods to make overall improvement are introduced. Content includes:

- Introduction to Pump and Sealing System Reliability
- Understanding and Identifying the Pumping System.
- The 6 Areas of focus to improve pump reliability.
- Pump Reliability Improvement Program - Overview

Pump and Sealing Systems Knowledge Modules

PS1 Pump Technology – First Principles — 3.5 hours 3200kr/pers.

This module creates the foundation from which plant personnel can begin developing a comprehensive understanding of the various pumps used in the plant including both centrifugal and positive displacement types and how they work. This module is intended for anyone working with pumps that needs a basic understanding of pumping technology. Content includes:

- Introduction to pump types and how they work.
- Pump Hydraulics
- Understanding pump curves
- How much will the pump, "pump" – Introduction to system curves
- Pump and System Interactions
- Sealing technologies for pumps – an overview
- Pump reliability – an introduction

PS2 Pump Technology – Advanced — 3.5 hours 3200kr/pers.

This module builds on from PS1 to take plant personnel deeper into an understanding of pumps, how they work and interact within the system as well as developing an understanding of the 6 areas of focus to reduce pump failure in various applications. Contents includes:

- Pump Systems – Developing a comprehensive understanding.
- The 6 areas of focus to improve performance and reduce failures.
- Special topics:
- Cavitation/Recirculation
- Materials/corrosion/Wear
- Variable Speed Pumping/VFD`s
- Series and Parallel pumping systems
- Structural Supports
- Applications

MS1 Mechanical Seals – First Principles — 3.5 hours 3200kr/pers.

This module develops a foundation in the understanding of mechanical seal technology and their application to rotating equipment, specifically focused on pumps. This module is intended for anyone working with or responsible for the mechanical seals used at the plant. Content includes:

- Introduction to mechanical seal technology – What is a Mechanical Seal?
- Functionality – How mechanical seals, "seal"?
- Mechanical seal generations, types and configurations
- Management of the sealing environment and Seal Support Systems
- Mechanical Seal Reliability – An Introduction

Stationary Equipment Sealing Knowledge Modules

SE1 Valve Sealing – First Principles — 3 Hours 3800kr/pers.

Valves are one of the major leak sources in a process plant. This module has been developed to give plant personnel responsible for the plant`s valves a solid understanding of valve leakage and how to reduce or eliminate it while enhancing reliability, operability and reducing overall costs associated with leakage management. Content includes:

- Systems approach to Valve Sealing
- Valve Types and Sealing Challenges – Reliability and Operability
- Valve Sealing Technologies
- Live Loading and its function in valve reliability
- Valve Sealing Challenges
- Valve Packing Installation – Keys to life and Operability

SE2 Gasketing Technologies and the Sealing of Flanges and Process Vessels — 3 hours 3800kr/pers.

Flanges and process equipment, like valves also have the potential to be a major leak source in the plant. History has shown that leakage from process vessels and pipelines can have a catastrophic impact on the plant, personnel and the environment. This module has been developed to help plant personnel understand how to assure joint integrity is maintained on components typically not given much attention.
Content includes:

- How do gasket seal and the 3 myths of gasket sealing?
- Gasket technologies – Sheets, Semi-Metal and Specials
- Gasket Joint Integrity and Reliability
- Sealing Hot Processes – Special Considerations
- Live Loading – Functionality and Application
- Gasket Installation

Composite Technologies Knowledge Modules

CTI **Composite Coating and Wrapping Systems for Plant and Equipment** **3 hours**
3800kr/pers.

Composite technologies offer the ability to protect, restore and even enhance plant and equipment functionality. As well, with today`s composite wrapping technologies, structural integrity can be returned to worn and weakened pipes and other structural components meeting both ISO and ASME requirements. This module will introduce these technologies and help plant personnel understand their value and use.
Content includes:

- Understanding corrosion and wear in plants and equipment
- Introduction to Composite Coating Technologies
- Composite Coatings for Metal and Concrete
- Structural Wrappings to return design integrity
- Emergency Repairs
- Project Reliability and Success

Our instructor
Alan Evans, Technical Manager at Fuglesangs AS

Originally from USA, Alan has 35+ years of Process Industry and Utilities (Power Generation / Water / Wastewater) experience. He is a real asset to Fuglesangs, a knowledge provider that can go deep in your plant processes and help you to optimize your assets.

- 35+ years of Process Industry and Utilities (Power Generation/Water/Wastewater):
  - 3 years – Fuglesangs Group
  - 23 years – A. W. Chesterton Company
    - Mechanical Seal Engineering Manager
    - Director of Advanced Technology Development
  - 13 years – Maintenance/Reliability Engineer

- Experience and focus:
  - Pumps & Systems
  - Sealing Systems
  - Plant & Equipment Reliability Improvement, Energy Optimization and Asset Management

- Education:
  - MBA in Technology Management
  - BSME in Mechanical Engineering
  - Classically Training and Certified Reliability Engineer
  - ASME Certified in Joint Integrity Design

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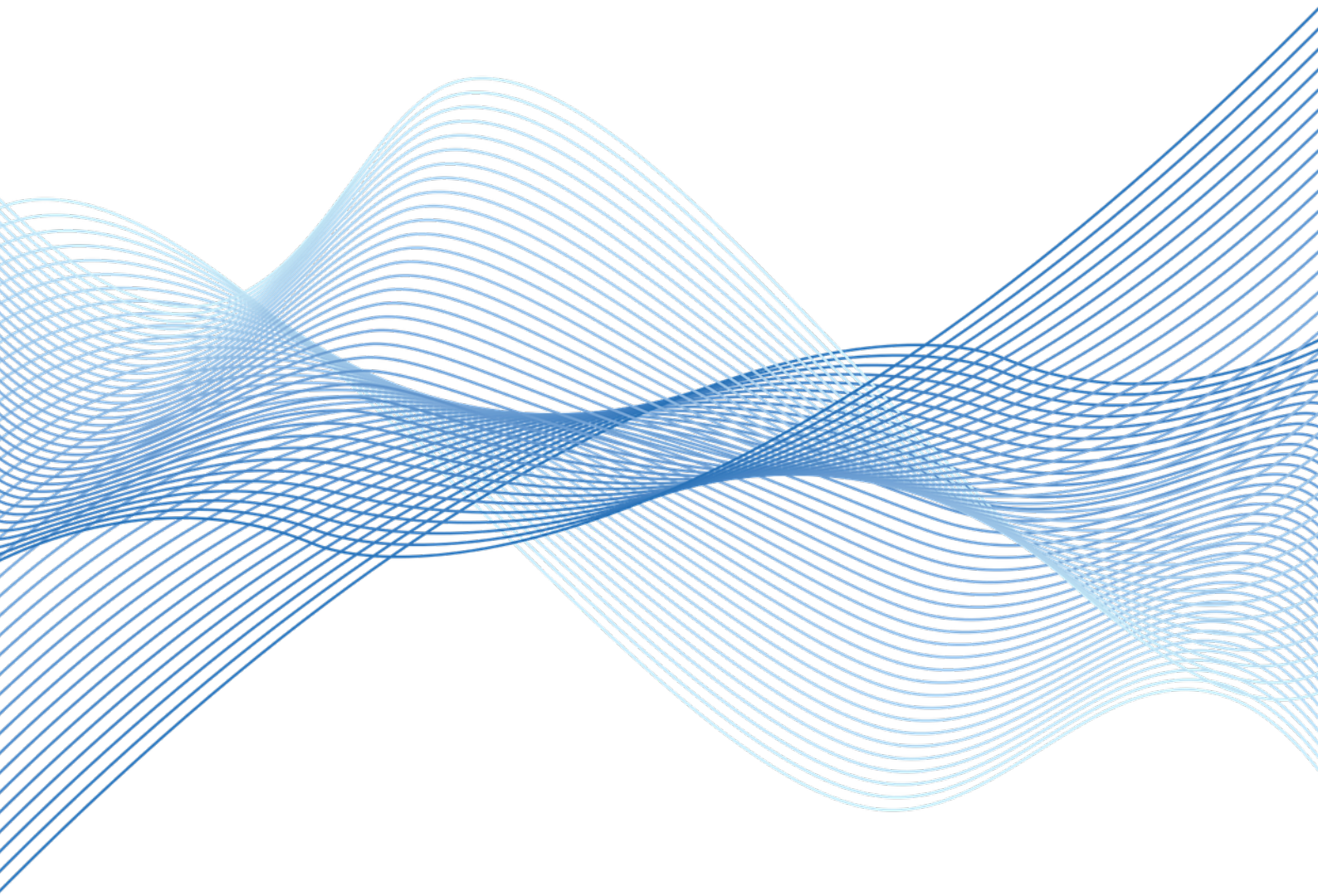

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