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Differences in Piping System Design for Reciprocating and Centrifugal Pumps

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Abstract

Reciprocating pump systems require particular design considerations which are much different from centrifugal pumps. An incomplete design basis for reciprocating pump installations can lead to costly remedial actions, significant downtime or more serious problems resulting in failures of pump components.

The goal of this course is to provide insight into the design considerations and industry best practices for centrifugal and reciprocating pump installations. The focus of the course is on reciprocating pumps due to their higher risk of fatigue failures.



Presenter Biography

Kelly Eberle, Wood

Kelly is a Principal Consultant with Wood's **vibration, dynamics and noise** team (formerly **BETA Machinery Analysis**) since 1988. Kelly graduated from the University of Saskatchewan with a Bachelor of Science in Mechanical Engineering in 1986. He has been a professional member of APEGA since 1991.

Kelly has accumulated a wide range of design and field experience, particularly in the area of pressure pulsation analysis and mechanical analysis of reciprocating compressor and pump installations. The scope of his design experience includes acoustical simulations, thermal flexibility studies, dynamic finite element analysis, structural analysis and foundation analysis.



Presenter Biography

Michelle Witkowski, Wood

Michelle graduated from Texas A&M University with a Bachelor of Science in Mechanical Engineering in 2008.

Michelle is a team lead with Wood's **vibration, dynamics & noise** team (formerly **BETA Machinery Analysis**) where she has been working since 2012. Her experience includes acoustical simulations, dynamic finite element analysis and torsional analysis. Prior to her time at Wood Group, Michelle worked as a technical analysis engineer with a compressor packager, where she provided technical solutions for performance, pulsation, vibration, and torsional issues surrounding reciprocating equipment. During this time, Michelle also gained experience in application engineering, field troubleshooting, and package design.



Presenter Biography

Tom Newman, SPXFlow

Tom is the Aftermarket Engineering Manager, Americas with SPXFLOW, Inc. Tom has two Bachelor of Science degrees from Louisiana State University, including a BS in Mechanical Engineering.

Tom has been with SPXFlow for over 32 years beginning with the Union Pump legacy products. In those years, Tom has held a number of positions including North American Aftermarket Engineering Manager, Operations Manager of the Baton Rouge Service Center, Southeastern Regional Sales Manager, and Southern Regional Aftermarket Sales Manager. Tom has an extensive background with Centrifugal and Reciprocating pumps in API and nuclear applications. Tom currently serves as a member of the API 688 task force, and previously worked with the Hydraulic Institute Variable Speed Pumping Sub-Committee, and Hydraulic Institute Positive Displacement Pump Roundtable.



Objective of this course

The purpose of this course is to improve the understanding of common vibration problems of pumping systems.

Key takeaways

- A working knowledge of pumping systems
- An understanding of vibration and pulsation fundamentals
- Steps to mitigate vibration issues on pump installations



Course Contents

Morning session:

1. Introduction
2. Pump basics
3. Reciprocating and centrifugal pumps
4. The Vibration Equation
5. Pulsations and dynamic forces

Afternoon session:

6. Reciprocating and centrifugal pump design for vibration control
7. Small-bore piping and connections
8. Project management and planning
9. Closing comments

