Endress+Hauser
People for Process Automation

Pump Guy Seminar

Topic outline

DAY ONE

1. **Basic Pump Principles**
   - How pumps work
   - Head vs. Pressure
   - Pressure Measurement
   - Absolute and Gauge Pressures
   - Vacuum

2. **NPSH**
   - NPSH required
   - NPSH available

3. **Cavitation**
   - Vapor Pressure
   - Types of Cavitation
   - Effects & Prevention

DAY TWO

4. **Affinity Laws**
   - The Laws
   - Speed & Diameter
   - Practical Applications

5. **Work & Efficiency**
   - Flow & Head
   - Efficiency formula / application
   - Energy & Work
   - Power formula / application

6. **Pump Classification**
   - PD Types
   - Centrifugal Types
   - Impellers
   - Specific Speed
   - Suction Specific Speed

7. **Pump Curves**
   - H-Q. Eff., BHp & NPSHr
   - Curve Types
   - Curve Interpretation

DAY THREE

8. **System Curves**
   - TDH
   - Elevation, Pressure & Losses
   - Dynamic systems & pump behavior
   - System changes
   - Pumps in Series & Parallel

9. **Shaft Deflection**
   - Interpreting the Evidence
   - Maintenance Operation & Design

10. **Pump-Motor Alignment**
    - Types of Misalignment
    - Alignment Techniques

DAY FOUR

11. **Bearings**
    - Types & Services
    - Lubrication
    - Maintenance & Seals
    - Failure Interpretation
    - Failure Prevention

12. **Pump Packing**
    - Components
    - Packing Procedures
    - Failure & Leakage

13. **Mechanical Seals**
    - Components
    - Single & Double Seals
    - Support Systems

14. **Seal Failure Analysis**
    - Cause & Prevention
    - Environmental Controls

15. **Pump Piping**
    - Draining Tanks & Vessels
    - Suction pipe arrangement
    - Discharge pipe arrangement

16. **Pump Demo**
    - Dynamic operation on a Process Training Unit
    - Instruction on pump monitoring with D/P instruments

More info at www.us.endress.com/pumpguy