



## TURBOMACHINERY FLOWS

Training in Turbomachinery flows is vital for those responsible for performance of pumps, compressors, and turbines. These courses will provide the fundamental understanding required to design, select, witness, audit, maintain, and operate a wide variety of turbomachines. Specific courses are tailored to the interest and depth requested by the participants.

### TRAINING TOPICS

- Historical Perspective
- Basic Turbomachine Types and Geometries
- Axial and Centrifugal Flow Machines
- Flow Analysis using Velocity Polygons
- Governing Fluid Mechanic, Gas Dynamic and Thermodynamic Equations
- Single Stage Energy Exchange
- Geometric Design Parameters
- Performance Predictions
- Performance Maps
- Similarity
- System Matching
- Applications to Pumping, Power Generation and Jet Propulsion

### BASIC LEVEL COURSE OBJECTIVES

- Be conversant with terms such as velocity triangle, head, flow, efficiency, streamline.
- Understand the basic governing equations.
- Review and understand performance data and make qualitative decisions about a particular design.
- Understand common performance problems such as surge, choke, and stall.
- Be familiar with performance maps and similarity for a variety of machines.

### ADVANCED LEVEL COURSE OBJECTIVES

- Audit the design of compressors, pumps, and turbines.
- Troubleshoot complex performance problems.
- Better understand the effects of multi-directional flows in pump, compressor, and turbine stages.

### WHO SHOULD ATTEND

Courses in basic turbomachinery flows are intended to supplement limited exposure to these topics in most undergraduate engineering fluid mechanics courses. These courses are also intended to provide training in fundamentals for operations engineers and machinery engineers.