



SOUTHWEST RESEARCH INSTITUTE®

# Turbomachinery Design Training Week

Southwest Research Institute  
Building 189  
6220 Culebra Road • San Antonio, TX

February 6 – 10, 2017  
8:30 a.m. – 5:00 p.m. (Monday – Thursday)  
8:30 a.m. – 12:00 p.m. (Friday)

## Course Overview

SwRI's week-long training course covers the key topics to consider when designing turbomachinery. The course details the design process starting from cycle analysis and progressing to machine modeling and component design. The class will include a case study exercise to design a radial compressor, testing of the compressor in impeller test rig and data analysis. This class is intended for engineers and designers who already have some turbomachinery experience. Instruction will be provided by experienced SwRI Machinery Program staff with firsthand experience designing turbomachinery.

## Cost

The short course cost is \$1,750 USD per registrant. [Registration](#) includes four and one-half days of course instruction, training materials on flash drive, class exercises, and lunch each day.

## Day 1–Thermodynamics and Cycles

- Basic thermodynamics of heat engines and power cycles including PV diagrams, TS diagrams, Carnot Cycle, Brayton Cycle
- Cycle Analysis and Optimization
- NPSS
- Component overview:
  - Compressors and Expanders
  - Heat Exchangers
  - Basics of combustors and sizing

## Day 2–Aerothermal Design of Compressors and Expanders

- Overview of the design process
- Radial and axial machines (specific speeds, non-dimensional performance parameters)
- 1-D design process
- CFD analysis
- Case study of expander design
- Case study of compressor design

## Day 3–Rotordynamics, Blade Dynamics, and Casing Integration

- Rotordynamic Analysis
- Blade Dynamic Analysis

## Day 4–Machine Integration and Design Exercise

- Casing Integration (including case design, bearing/seal placement, balance pistons)
- Driver/generator matching (speed, power, gearbox)
- Packaging
- Design exercise of centrifugal compressor
- Include basic concept, aero 1-D, rotordynamics, and blade dynamics

## Day 5 (half day) –Testing of compressor in impeller test rig and data analysis

- Perform testing of impeller in STTR
  - Aero Performance
  - Vibration Dynamics
- Analyze test data

For more information, please contact:

**Klaus Brun**  
(210) 522-5449  
[klaus.brun@swri.org](mailto:klaus.brun@swri.org)

**Jeff Moore,**  
(210) 522-5812  
[jeff.moore@swri.org](mailto:jeff.moore@swri.org)

