Turbomachinery Design Training Week

March 25-29, 2024

Agenda

All times in CDT*

Day 1: Monday, March 25, 2024 – Thermodynamics and Cycles	
8:15 – 8:30 a.m.	Registration / Coffee / Breakfast Reception
8:30 – 8:35 a.m.	A. Introductions and Welcome (*Dr. Tim Allison)*
8:35 – 9:30 a.m.	B. Basic Thermodynamics of Heat Engines and Power Cycles Including PV Diagrams, TS Diagrams, Carnot Cycle, and Brayton Cycle (*Dr. Jeff Moore*)
9:30 – 10:00 a.m.	Break
10:00 –11:30 a.m.	C. Component Overview: Compressors and Expanders (*Dr. Jeff Moore*)
11:30 – 12:00 p.m.	Aero Design Considerations of Seals and Secondary Flow (*Dr. Jeff Moore*)
12:00 – 1:00 p.m.	Lunch
1:00 – 2:00 p.m.	D. Component Overview: Heat Exchangers *(Mrs. Kelsi Katcher)*
2:00 – 3:00 p.m.	E. Component Overview: Basics of Combustors and Sizing (*Mr. Seth Cunningham)*
3:00 – 3:15 p.m.	Break
3:15 – 4:15 p.m.	F. Cycle Analysis and Optimization / NPSS Teaser (*Mr. George Khawly*)
Day 2: Tuesday, March 26, 2024 – Aerothermal Design of Compressors and Expanders	
8:15 – 8:30 a.m.	Registration / Coffee / Breakfast Reception
8:30 – 9:30 a.m.	A. Overview of the Design Process (*Dr. Natalie Smith*) B. Selection of Machine Type: Radial / Axial / PD (*Dr. Natalie Smith*)
9:30 – 9:45 a.m.	Break
9:45 – 10:45 a.m.	C. 1-D Design Process (*Mr. Cole Replogle*)
10:45 – 12:00 p.m.	D. Blade Definition and Flow Distribution a. Axial *(Mr. Michael Marshall)* b. Radial *(Mr. Michael Marshall)*
12:00 – 1:00 p.m.	Lunch
1:00 – 1:30 p.m.	E. Additive Manufacturing for Turbomachinery Components (*Mr. Nathan Andrews*)
1:30 – 2:00 p.m.	F. a. CFD Analysis *(Mr. Michael Marshall)*
2:00 – 3:00 p.m.	Facility Tour of 278 (*Dr. Jeff Moore / Mr. Aaron Rimpel*)
3:00 – 3:15 p.m.	Break
3:15 – 4:15 p.m.	G. Case Studies a. SunShot Dyno – Clean-Sheet Design (*Dr. Natalie Smith*) b. kW-scale sCO_2 – Conceptual Sizing (*Dr. Natalie Smith*) c. IR&D Impeller – Design by Scaling (*Dr. Natalie Smith*)
4:15 – 5:00 p.m.	H. Operate Solar T62 Gas Turbine (*Dr. Jeff Moore / Mr. Aaron Rimpel*)
5:30 – 6:30 p.m.	Drinks and Appetizers at Saltgrass Steak House

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Day 3: Wednesday, March 27, 2024 – Rotordynamics and Blade Dynamics	
8:15 – 8:30 a.m.	Registration / Coffee / Breakfast Reception
8:30 – 10:00 a.m.	A. Rotordynamic Analysis (*Mr. Aaron Rimpel)*
10:00 – 10:15 a.m.	Break
10:15 – 11:15 a.m.	B. Rotordynamic Instrumentation and Case Studies (*Dr. Tommy Kerr*)
11:15 – 12:00 p.m.	C. Live Demo of Rotor Rig (*Mr. Aaron Rimpel*)
12:00 – 1:00 p.m.	Lunch
1:00 – 2:00 p.m.	D. Introduction to Blade Dynamics (*Mr. Cole Replogle*)
2:00 – 2:45 p.m.	E. Aeromechanical Design (*Mr. John Klaerner*)
2:45 – 3:00 p.m.	Break
3:00 – 3:30 p.m.	F. LCF Life Estimation (*Mr. Cole Replogle)*
3:30 – 4:15 p.m.	G. Modal Testing Introduction and Demonstration (*Mr. Seth Cunningham)*
4:15 – 5:00 p.m.	H. Materials Lab Tour (*Dr. Mirella Vargas)*
Day 4: Thursday, March 28, 2024 – Machine Integration and Design Exercise	
8:15 – 8:30 a.m.	Registration / Coffee / Breakfast Reception
8:30 – 9:00 a.m.	A. Machine Design Introduction (Conceptual / Detail Design) (*Dr. Jeff Moore*)
9:00 – 9:45 a.m.	B. 2-D Layout (*Mr. Jonathan Wade*)
9:45 – 10:00 a.m.	Break
10:00 – 11:00 a.m.	C. Case and Internal Component Design and Pressure Containment (*Mr. Jason Bensmiller*)
11:00 – 12:00 p.m.	D. Detail Design Topics (*Mr. Aaron Rimpel*)
12:00 – 1:00 p.m.	Lunch
1:00 – 2:00 p.m.	E. Detail Design Topics (*Mr. Aaron Rimpel*)
2:00 – 2:30 p.m.	F. Materials (*Mr. Aaron Rimpel*)
2:30 – 3:00 p.m.	G. Packaging (*Mr. Jonathan Wade*)
3:00 – 3:15 p.m.	Break
3:15 – 5:00 p.m.	H. Design Exercise of Centrifugal Compressor Impeller (*Mr. Jonathan Wade*)
Day 5: Friday, March 29, 2024 – Turbomachinery Testing and Data Analysis	
8:15 – 8:30 a.m.	Registration / Coffee / Breakfast Reception
8:30 – 9:45 a.m.	A. Turbomachinery Performance Testing (*Dr. Natalie Smith*) a. Aero Performance & PTC-10 b. Overview of Process Instrumentation
9:45 – 10:00 a.m.	Break
10:00 – 11:15 a.m.	B. Tour (*Dr. Natalie Smith*) a. DR – Apollo closed loop facility b. SSTR – open loop facility
11:15 – 12:00 p.m.	C. Detailed Instrumentation Considerations for Turbomachinery (*Dr. Natalie Smith*)