

Notre Dame Power & Propulsion

[Advanced Test Cells]

- 10MW Fan/Compressor
- 5.2MW Compressor/Turbine
- 3MW Fan/Compressor
- 1.5MW Compressor
- 0.5MW Compressor
- 0.4MW Turbine
- 0.3MW Compressor
- Hypersonic Propulsion



Supercritical CO₂ Test Loop (10MW Electric Drive)

ND Power and Propulsion's sCO₂ component test loop is utilized to develop high efficiency turbomachinery for power and thermal management systems.



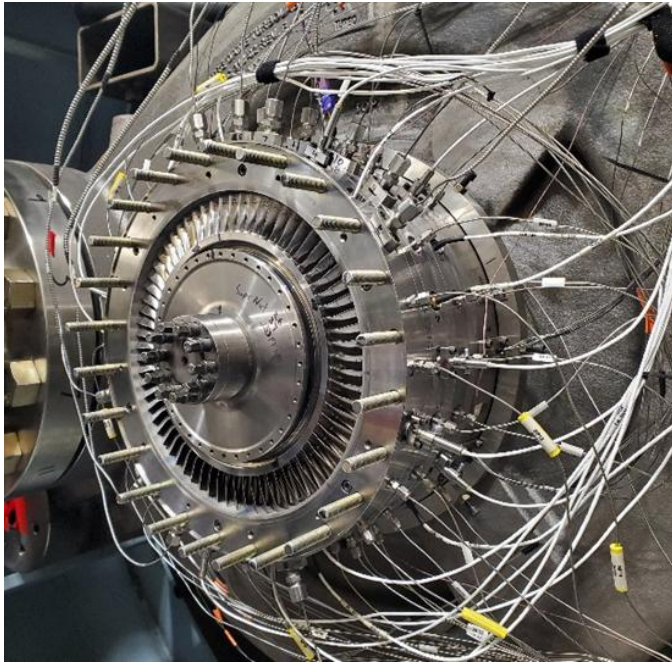
sCO₂ Compressor (Closed Loop)



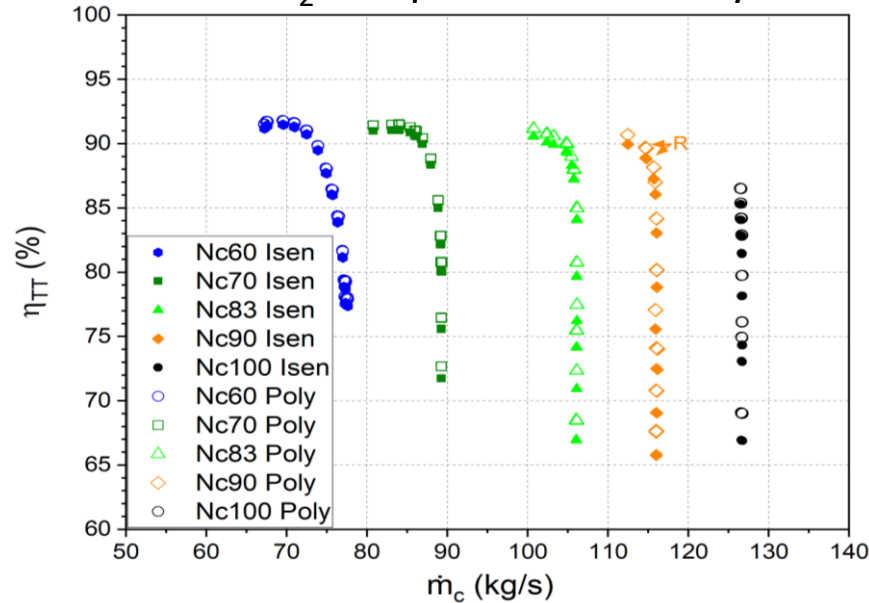
Air Compressor

Three Stage CO₂ Compressor Test Completed

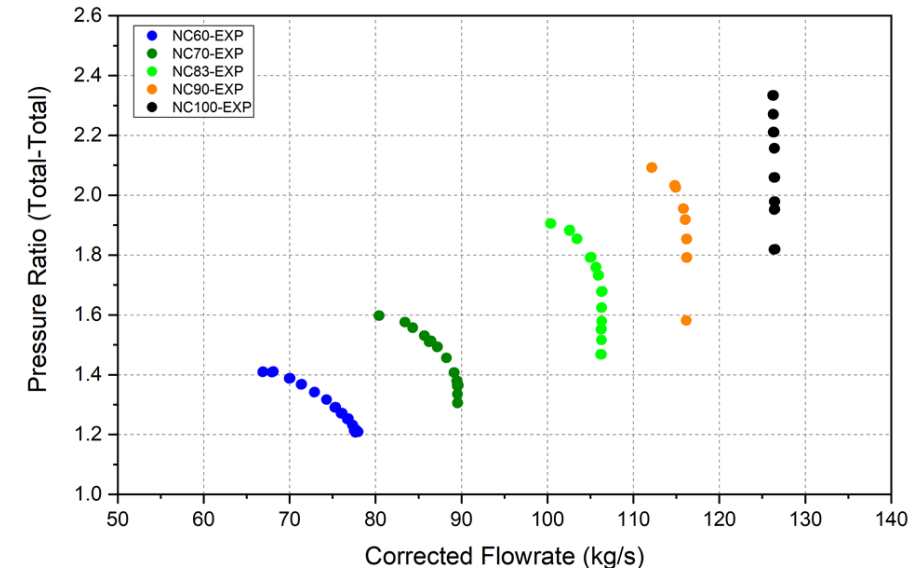
ND Power and Propulsion successfully completed single-stage and 3-stage testing of a 10 MW CO₂ axial compressor from rotating stall to choking points



Demonstrated the **highest (90%+)** CO₂ compressor efficiency



Demonstrated the **largest flowrate (>125kg/s)** capacity for grid-scale application



[Reference]

- Jeongseek Kang et al., 2026, "PERFORMANCE TEST OF A 9MW-CLASS 3-STAGE AXIAL CO₂ COMPRESSOR," *ASME J. Eng. Gas Turbines Power*, **148**(6), p. 061014.

- * Jeongseek Kang, et al., 2025, "Experimental Study of the Real Gas Effects of CO₂ on the Aerodynamic Performance Characteristics of A 1.5-Stage Axial Compressor," *ASME J. Eng. Gas Turbines Power*, **147**(8), p. 081012. (ASME 2024 Best Paper Award in sCO₂ Power Cycles)



ASME Journal of Engineering for Gas Turbines and Power
Online Journal at:
<https://asmedigitalcollection.asme.org/gasturbinespower>



Jeongseek Kang
Notre Dame Power & Propulsion,
University of Notre Dame,
South Bend, IN 46601

Alexander Vorobiev
Notre Dame Power & Propulsion,
University of Notre Dame,
South Bend, IN 46601

James Sutton
Notre Dame Power & Propulsion,
University of Notre Dame,
South Bend, IN 55112

William Stewart

Performance Test of a 9 MW-Class Three-Stage Axial CO₂ Compressor

Performance testing of a three-stage 9 MW axial CO₂ compressor has been successfully



ASME Journal of Engineering for Gas Turbines and Power
Online Journal at:
<https://asmedigitalcollection.asme.org/gasturbinespower>



Jeongseek Kang
University of Notre Dame,
South Bend, IN 46601

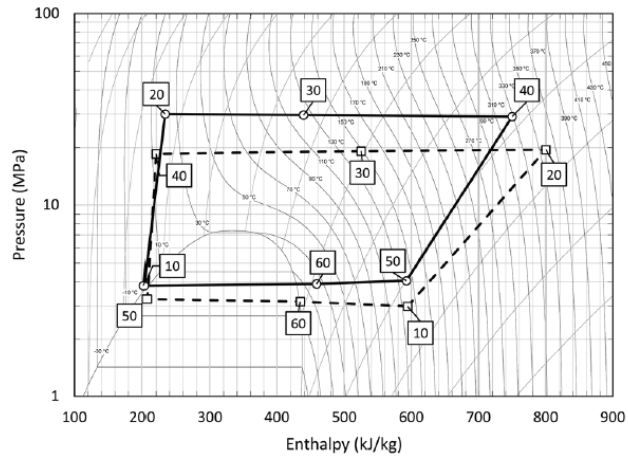
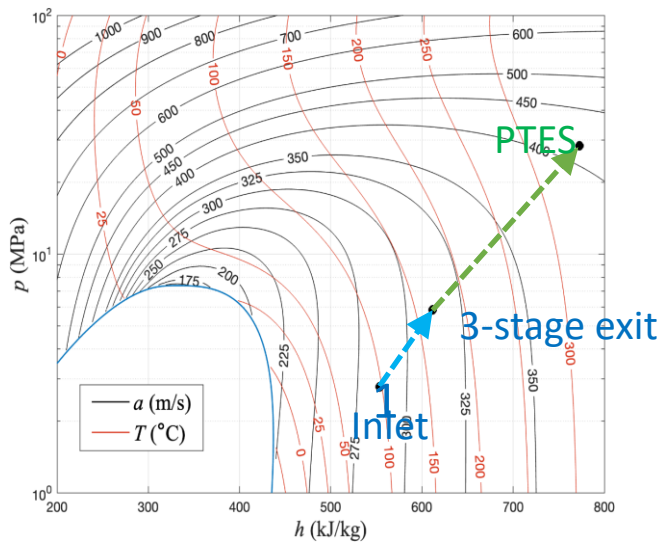
Alexander Vorobiev
University of Notre Dame,
South Bend, IN 46601

Joshua D. Cameron
University of Notre Dame,
South Bend, IN 46601

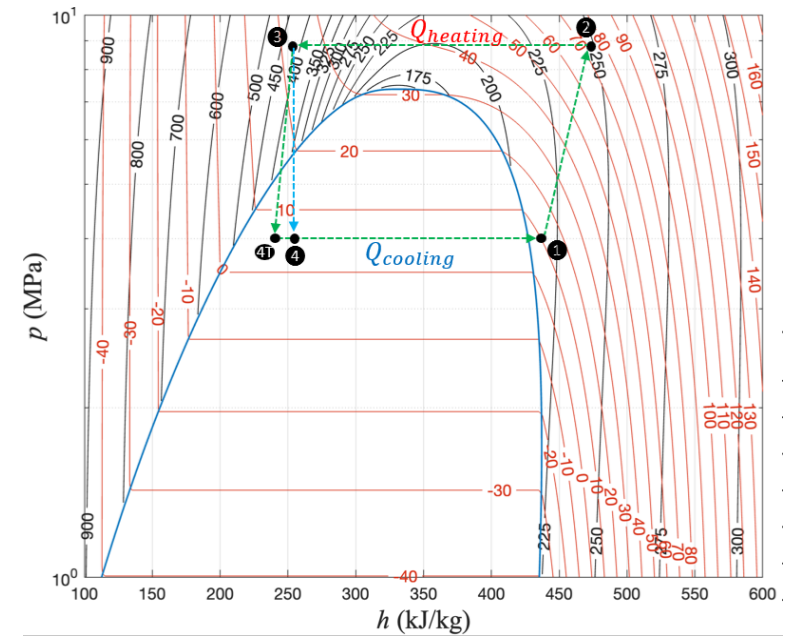
Scott C. Morris
University of Notre Dame

Experimental Study of the Real Gas Effects of CO₂ on the Aerodynamic Performance Characteristics of a 1.5-Stage Axial Compressor

The thermodynamic properties of CO₂ do not obey the ideal gas law and the simplified equation of state. The enthalpy and sonic speed depend on both temperature and pressure whereas the



(Reference : Held et al., 2025, ASME J. Eng. Gas Turbines Power, 091014)



A Full PTES System Demo

What's Next?

Gigantic efficient heat pump?