SDSU
San Diego State University

Rotational Sintering Furnace

SinterSpin

Project Overview

Design and construct a rotational sintering furnace to support SDSU Powder Technology Laboratory research on mitigating gravity-induced distortion in sintered components. Team SinterSpin solved this problem by developing a system capable of reaching internal temperatures up to 1700°C, rotating at speeds up to 1 RPM, and operating under low-pressure conditions. The design features a PID-controlled heating system, a rotating ceramic tube, and integrated sensors to enable precise thermal regulation and real-time monitoring throughout the sintering process.

Meet the Team

Alex Shedd
Team Lead
Fluid Subsystem

Jesus Vargas
Thermal Subsystem

Nicholas Kettoola
Structure Lead

Alex Price
Drive Subsystem

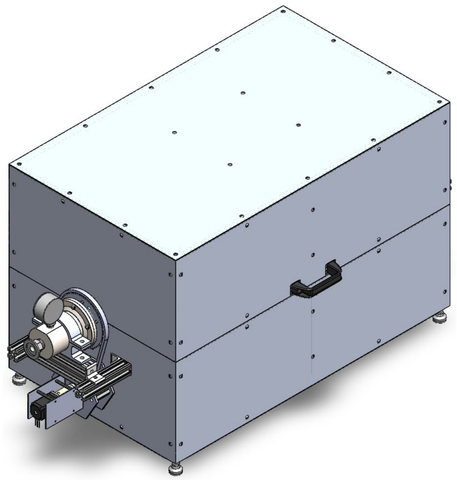
Jacob Espinosa
Electrical Subsystem

Acknowledgements

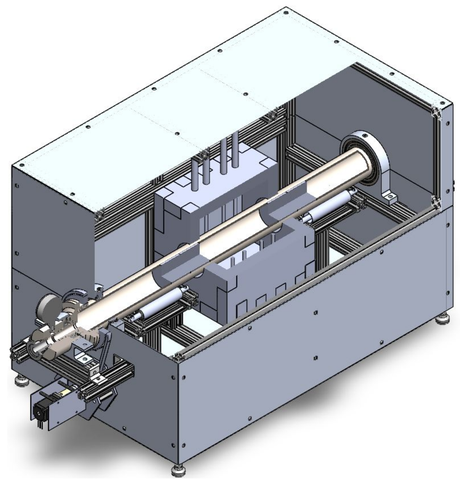
Team SinterSpin would like to thank:

- Dr. Elisa Torresani and Dr. Thomas Grippi for their diligent guidance and support as project sponsors
- Dr. Scott Shaffar for instruction during the engineering capstone course
- Mike Lester for manufacturing assistance and overall machining mentorship

Full Assembly CAD

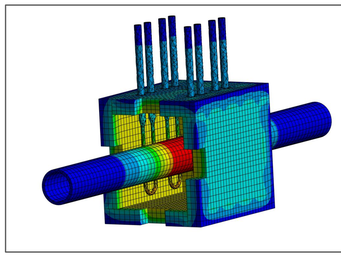


Rotational Sintering Furnace CAD

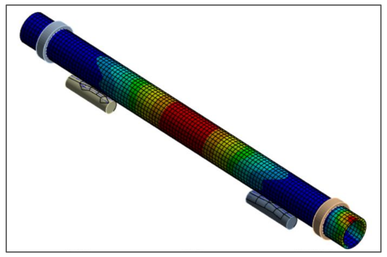


Rotational Sintering Furnace CAD Section View

Analysis and Testing



ANSYS Thermal FEA of Heated Zone

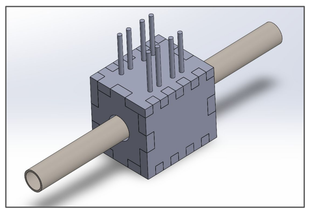


ANSYS Structural FEA of Furnace Tube

Pressure Testing of Seal Component

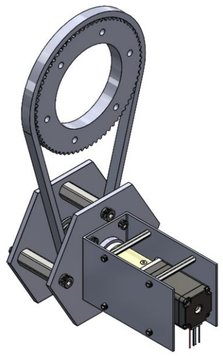
Heating and Insulation

- 4 x MoSi2 heating elements
- Alumina foam primary insulation
- Ceramic fiber blanket secondary insulation



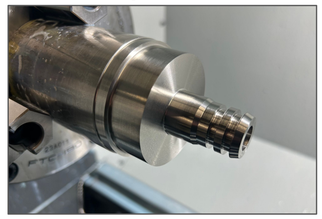
Rotation Drive

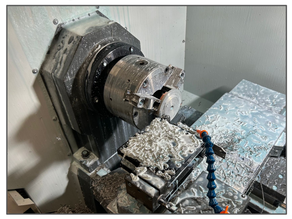
- Stepper motor with 100:1 planetary gearbox
- Timing pulley system with 3.3:1 gear ratio
- 35.4 in-lb max. torque about furnace tube
- 6061-T6 pulleys

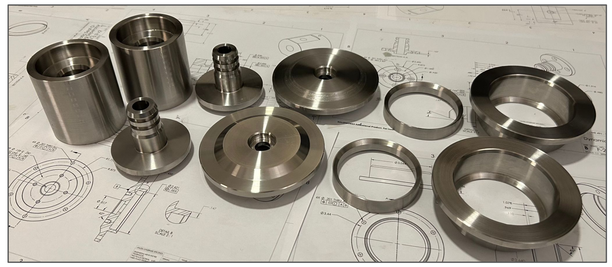


Manufacturing

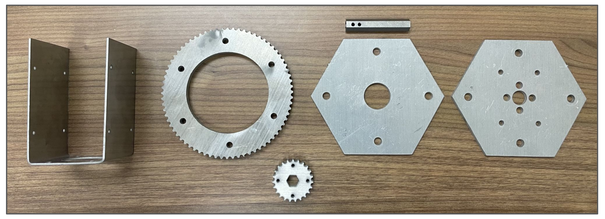
Fluid Subsystem Seal Assembly:





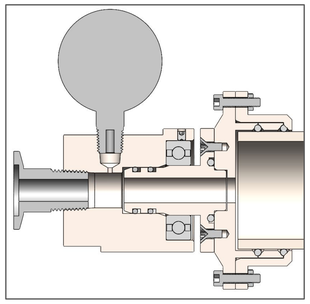


Drive Subsystem:



Vacuum Seal Assembly

- Static and dynamic elements
- 304 stainless steel
- Viton o-rings
- < ±.003" on all critical features
- Student designed, manufactured, and tested



Spring 2025