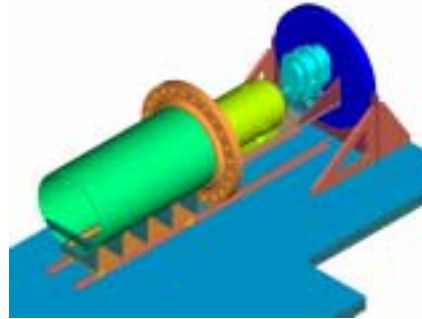


NCSX Helium Bakeout System

M. Kalish 3/25/02

Outline



- ◆ NCSX Helium System Requirements
- ◆ System Description
- ◆ P&ID
- ◆ Operational Parameters
- ◆ Calculations
- ◆ Cost and Schedule

NCSX Helium System Requirements

- ◆ System will provide heating to hold vessel at 150C
 - Inlet Helium gas temperature will be at 165C and outlet gas temperature will be 150C
- ◆ 12 kW nominally required to make up vessel losses
 - Per “non conservative inputs” provided by Paul Goranson
- ◆ No heating provided at this time for PFCs
- ◆ Vessel will accommodate use of ½” tubing to carry helium
 - 30 parallel paths
 - Each path approximately 13 meters long encompassing two complete revolutions around the vessel
 - Design will require iterations with ORNL
- ◆ Job scope includes skid and supply and return piping up to vessel. Does NOT include manifolds or tubing on vessel.

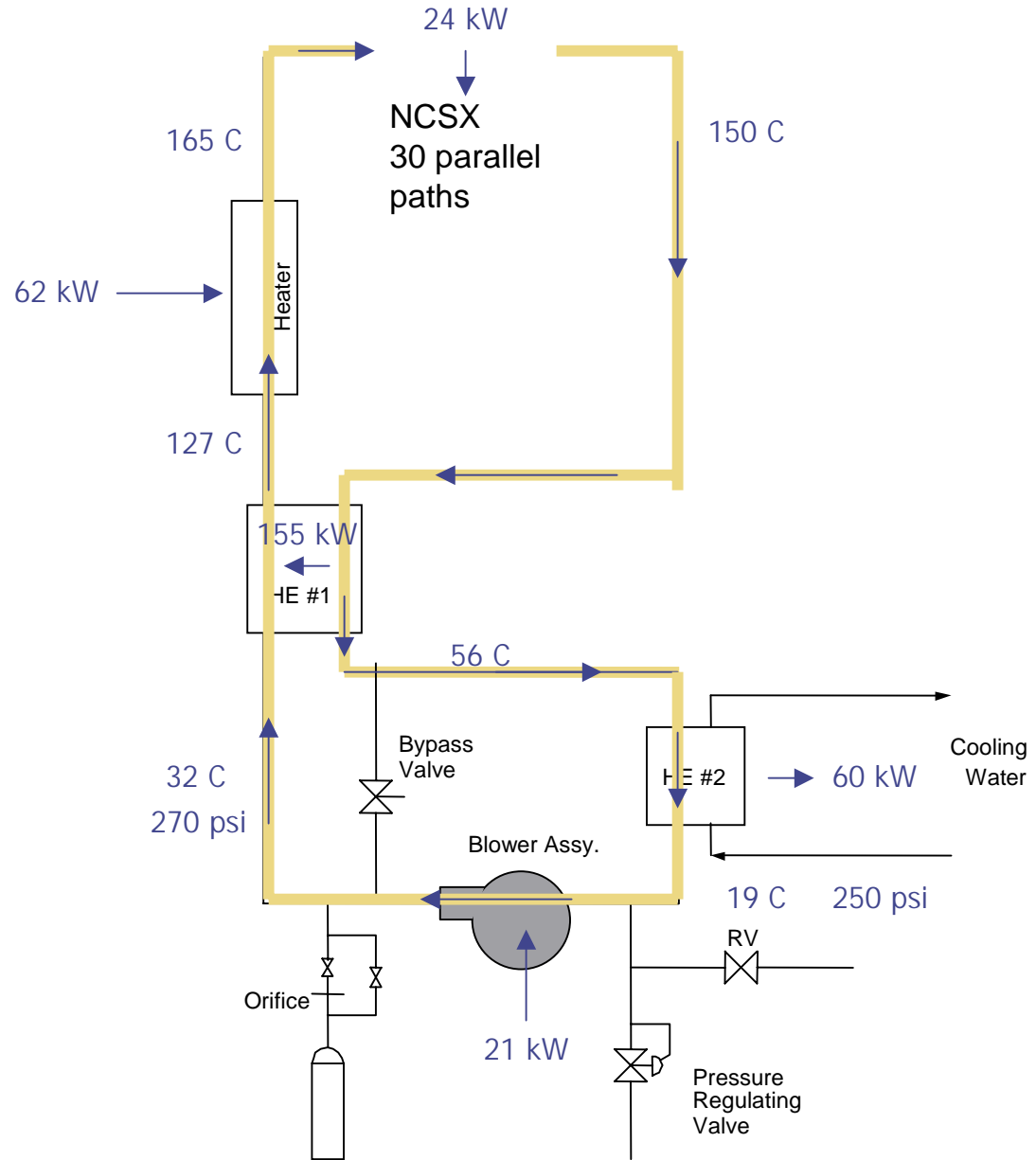
System Description

- ◆ Compressed Helium
 - Inert Gas provides heating with low consequence from leaks
 - High Cp (high pressure makes up for low density)
- ◆ Blower used in lieu of compressor
- ◆ Recuperative Heat Exchanger makes energy balance feasible
- ◆ Control
 - Temperature control via heater controller
 - Pressure control via gas regulator
 - More elaborate PLC and VFD control of NSTX system eliminated as cost savings
- ◆ Instrumentation
 - Temperature and Pressure measurement provide safety interlocks via simple mechanical relays
- ◆ Costs reflect installation in NCSX Test Cell.

Operational Parameters

- ◆ 12 KW required to make up vessel losses
- ◆ 24 KW available to allow for an acceptable ramp rate
- ◆ 165 C to 150 C drop across NSTX
- ◆ 270 psig helium at 207 icfm (at blower)
- ◆ 313 cfm through vessel
- ◆ 172 ft/sec in vessel

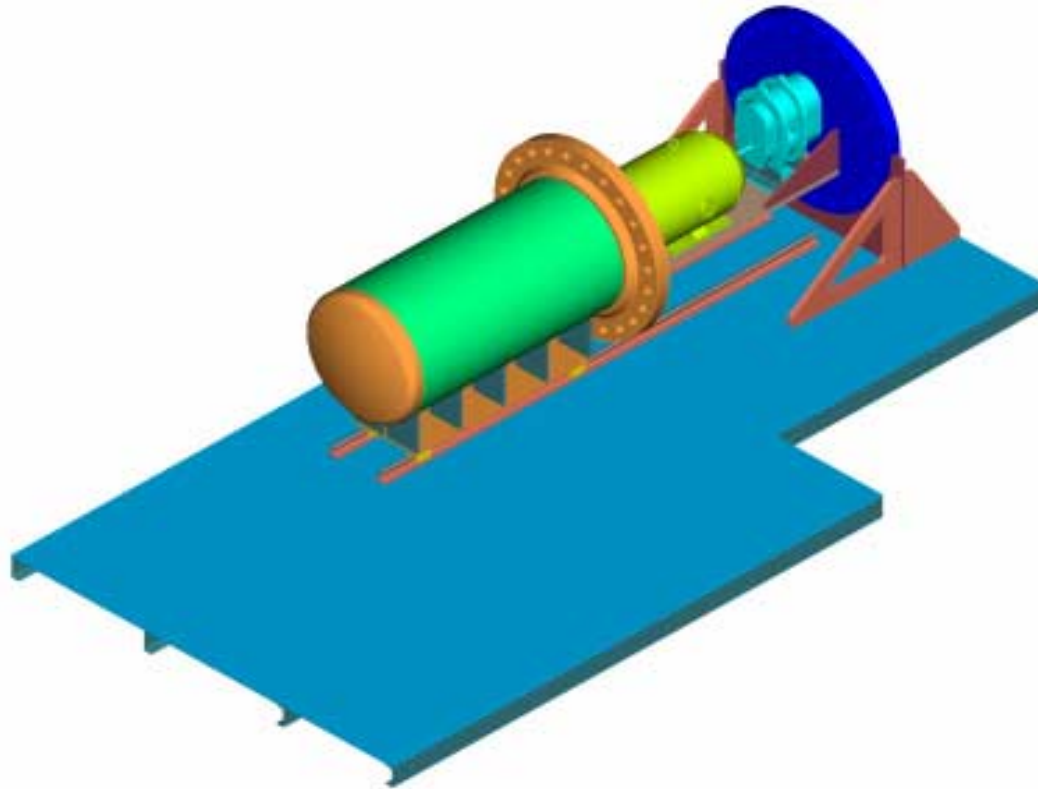
Helium Heating P&ID

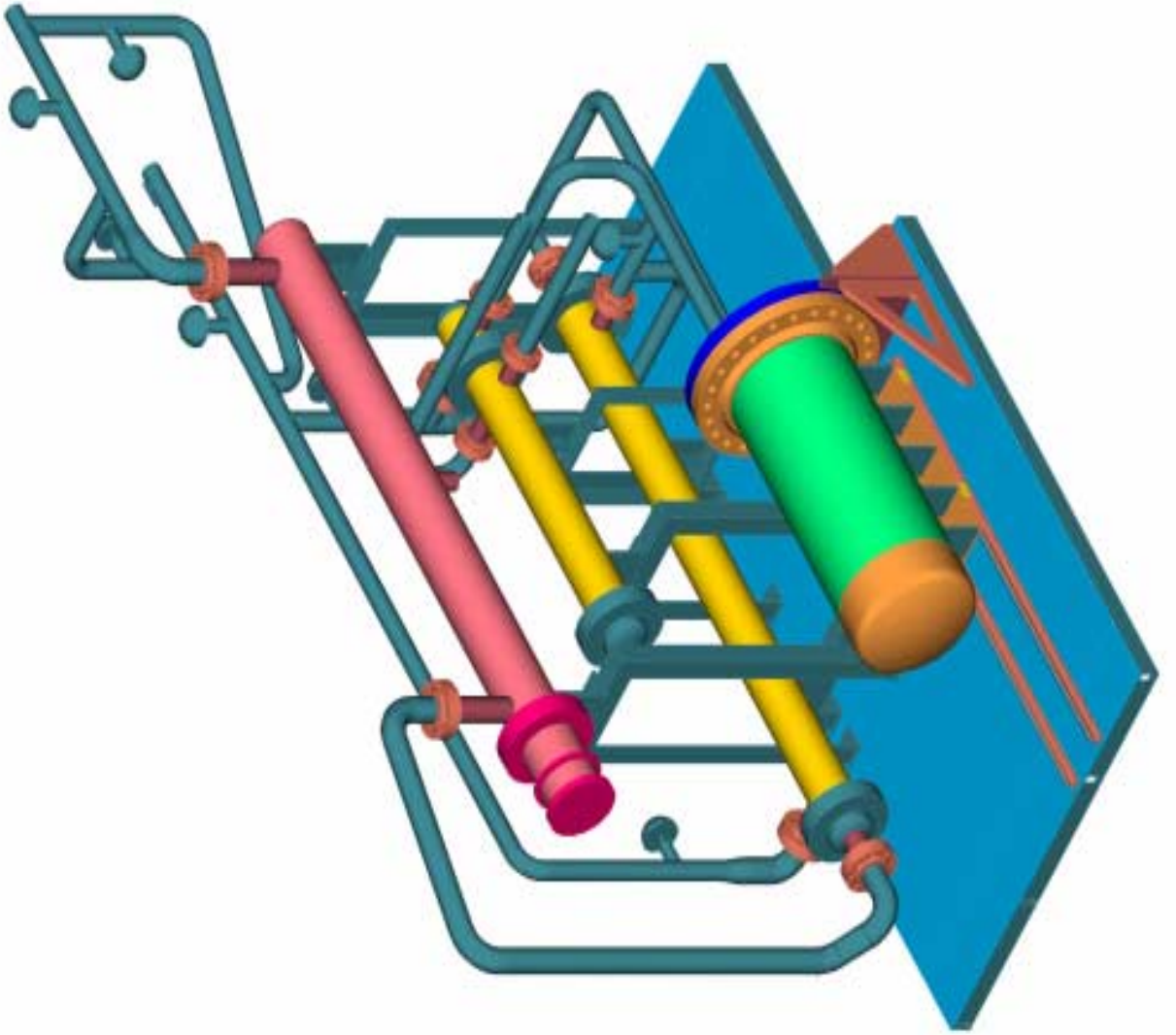


Kalish 3/25/02

Blower With Casing Assembly Retracted

Placing the blower in a pressure vessel allows the helium system to be operated at an elevated pressure without the expense of a sophisticated helium compressor. The elevated pressure is necessary to achieve the mass flow rate required to impart enough heat to NCSX.





Blower and Motor with housing retracted (NSTX Skid)



Front View of Similar NSTX Helium Skid

