

Improvements on the Cold Source Vacuum System

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Overview

Introduction:

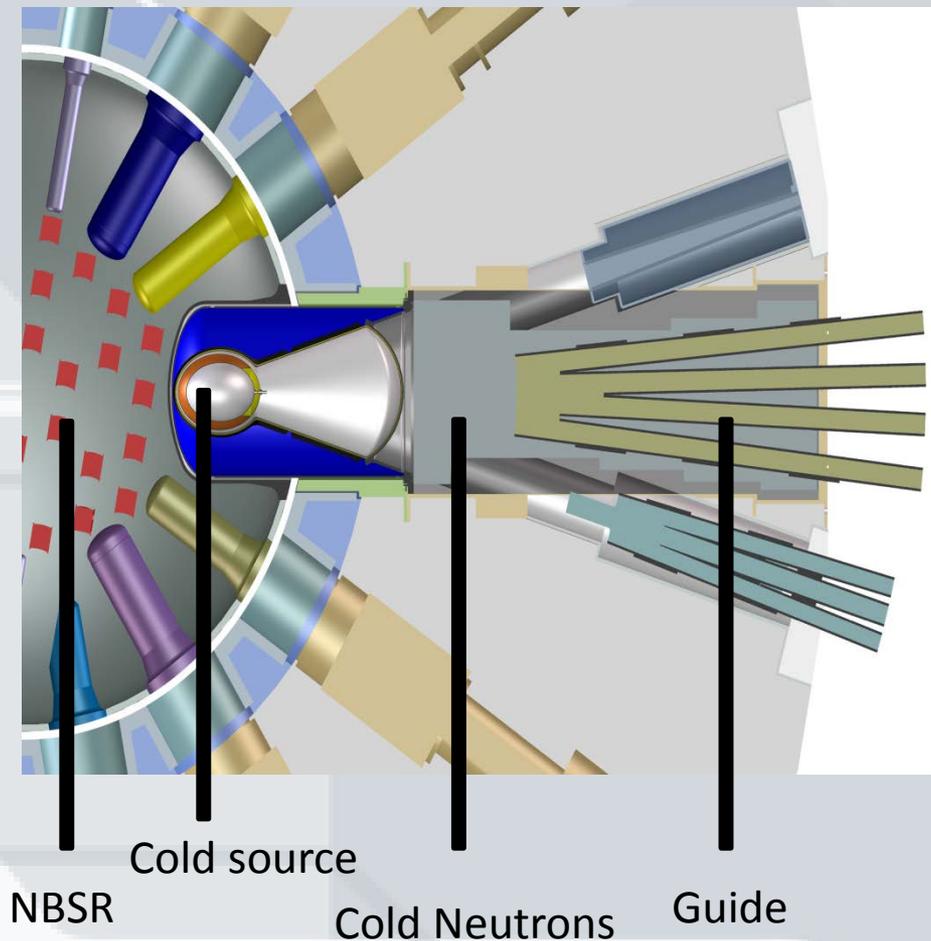
- NBSR
- Cold Source System

Project:

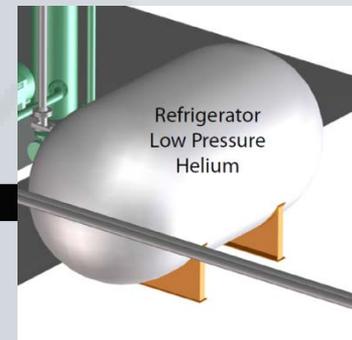
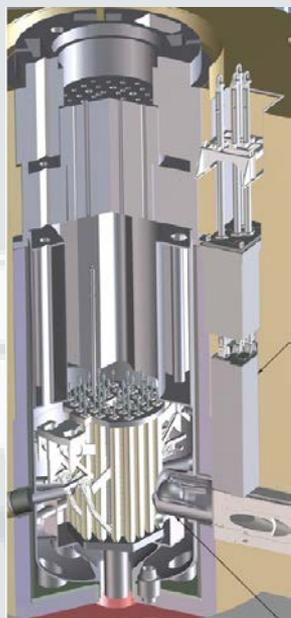
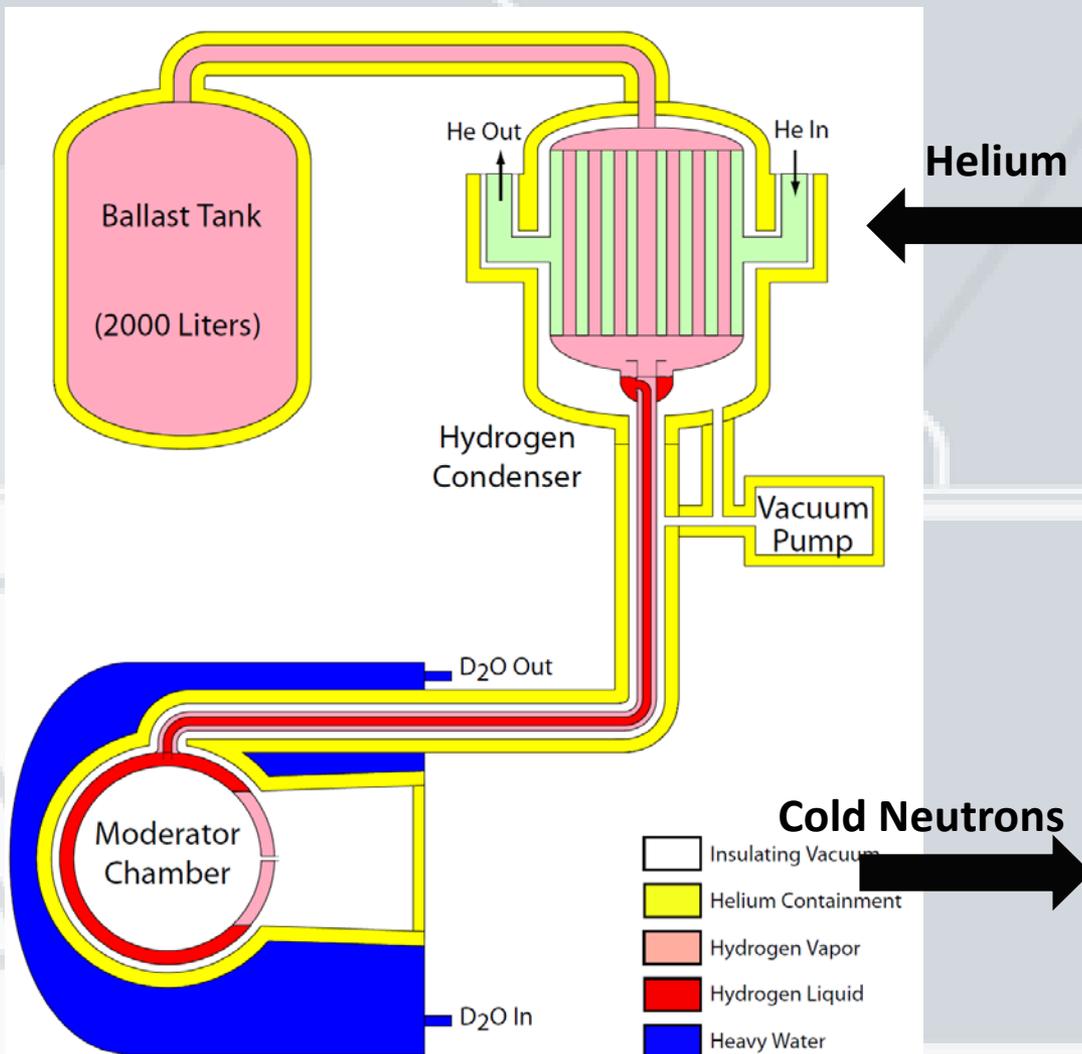
- Remote Controlled Vacuum System
- New Vacuum Skid

NBSR

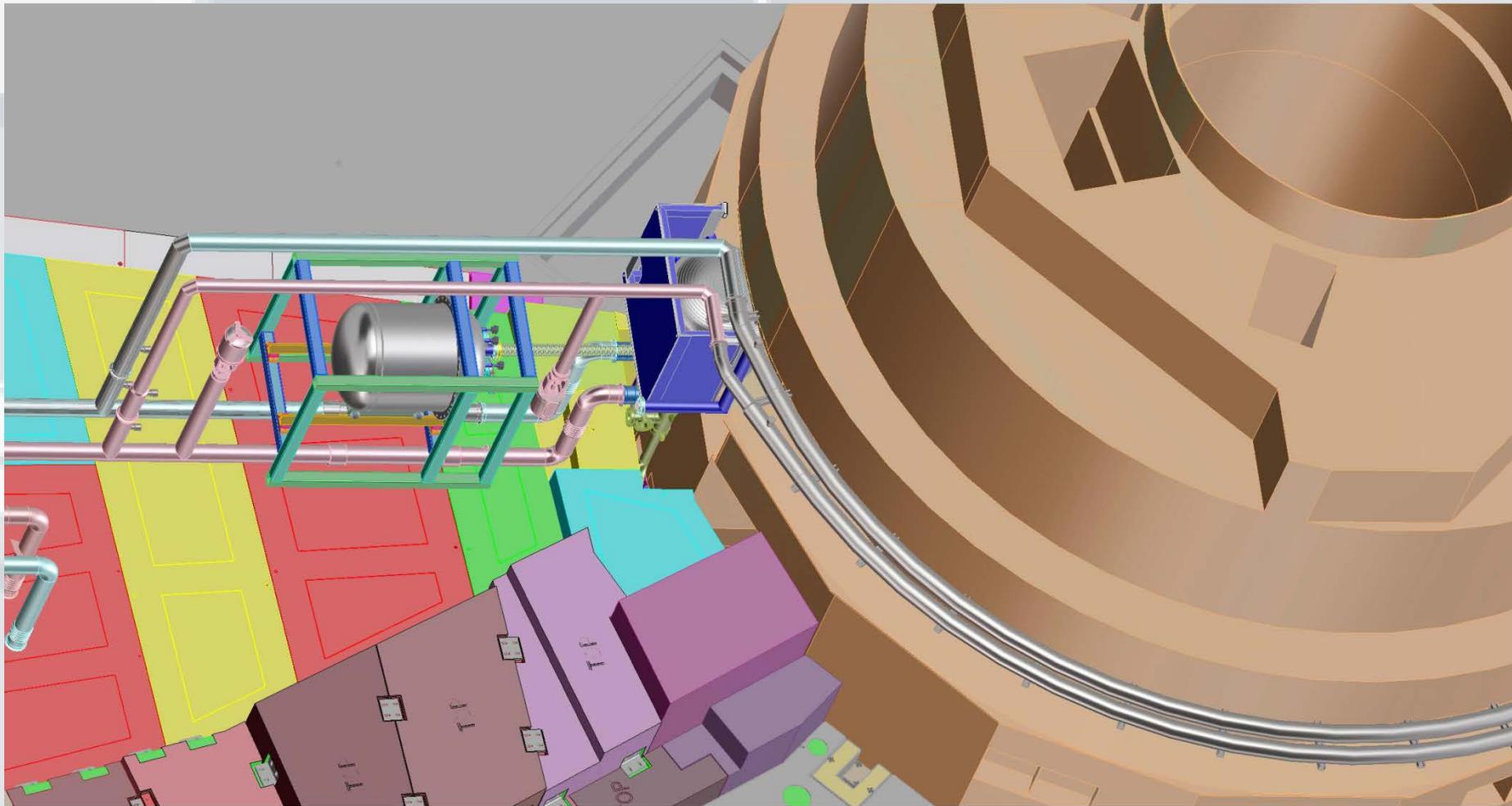
- ❑ National Bureau of Standards Reactor
- ❑ 20 MW research reactor
- ❑ Supplies Neutrons
- ❑ Supplies cold neutrons to Guide Hall



Cold Source



CNS Vacuum System



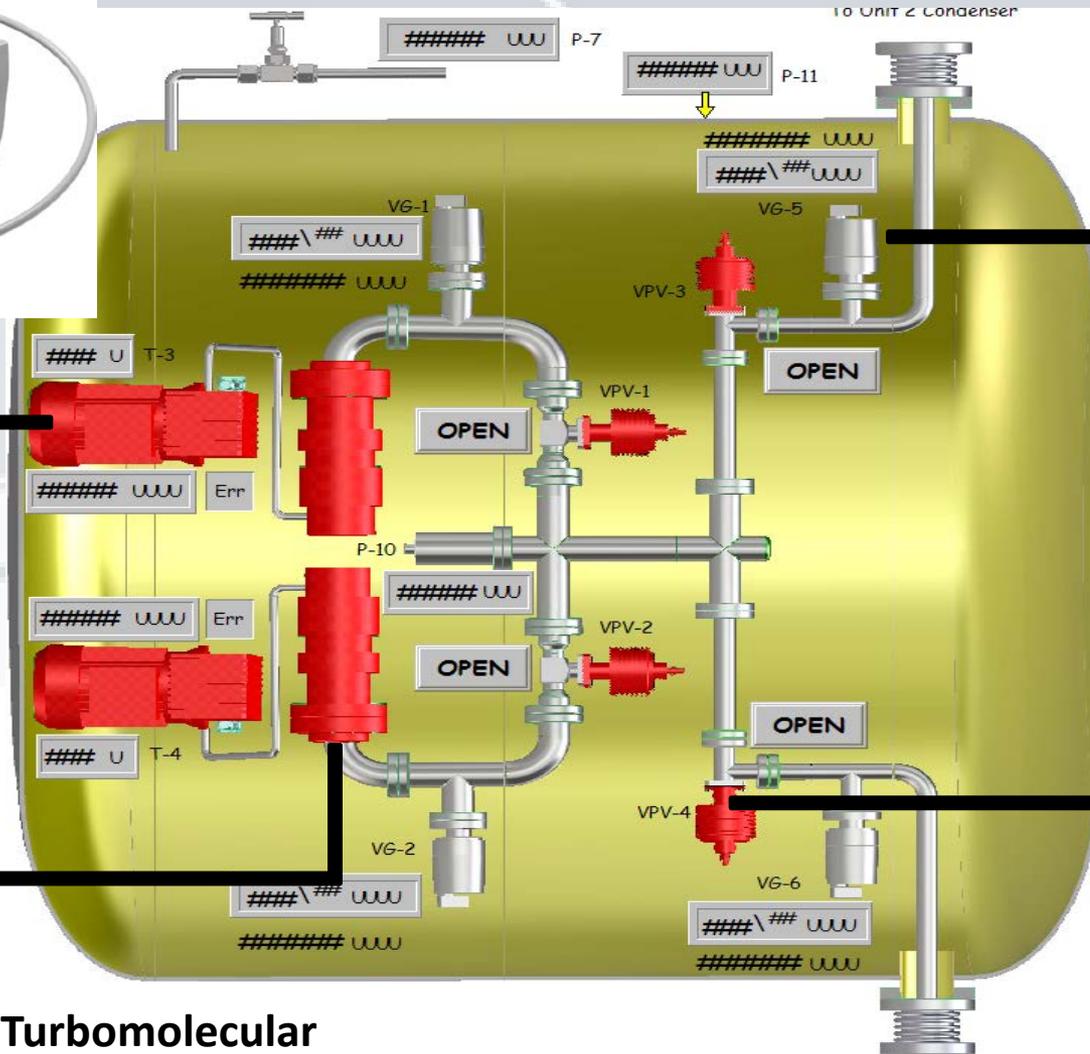
CNS Vacuum System



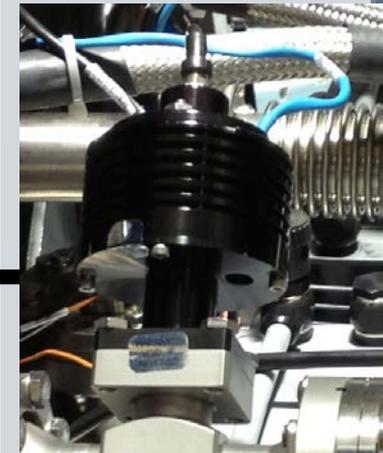
Diaphragm Pump



Turbomolecular Pump



Gauge



Valve

Problem



Reactor Rundown



Loss of Insulating Vacuum



Identifying the problem



Malfunctioning pump(s)



Vacuum System: Recovery

Open vacuum skid



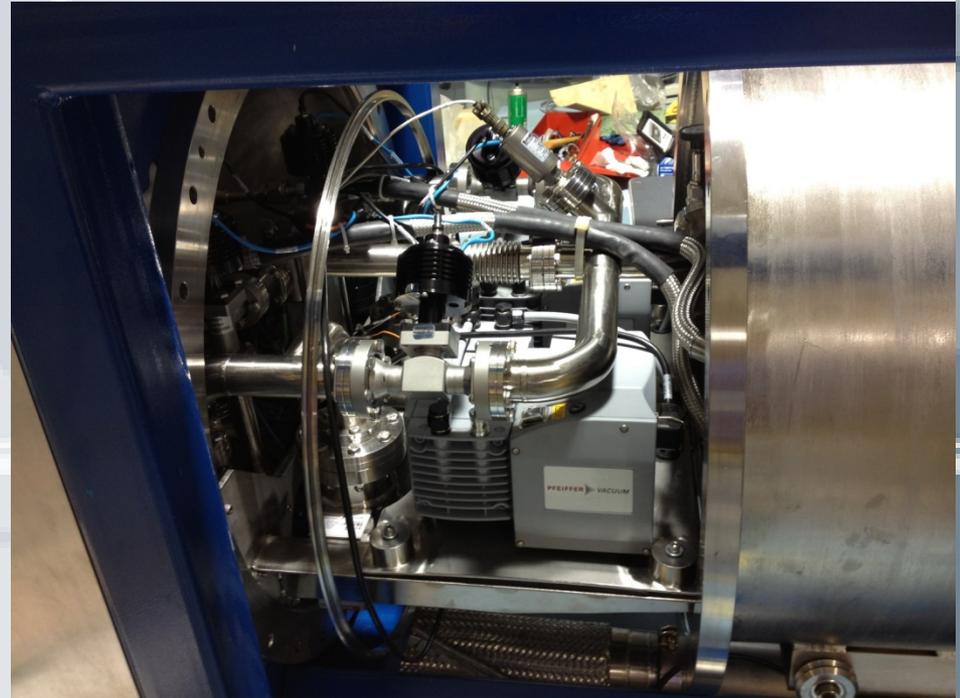
Pump down



Purge and refill with helium



Cold Source Restored



However...

~~Beam time~~

Increase the reliability of the cold source system

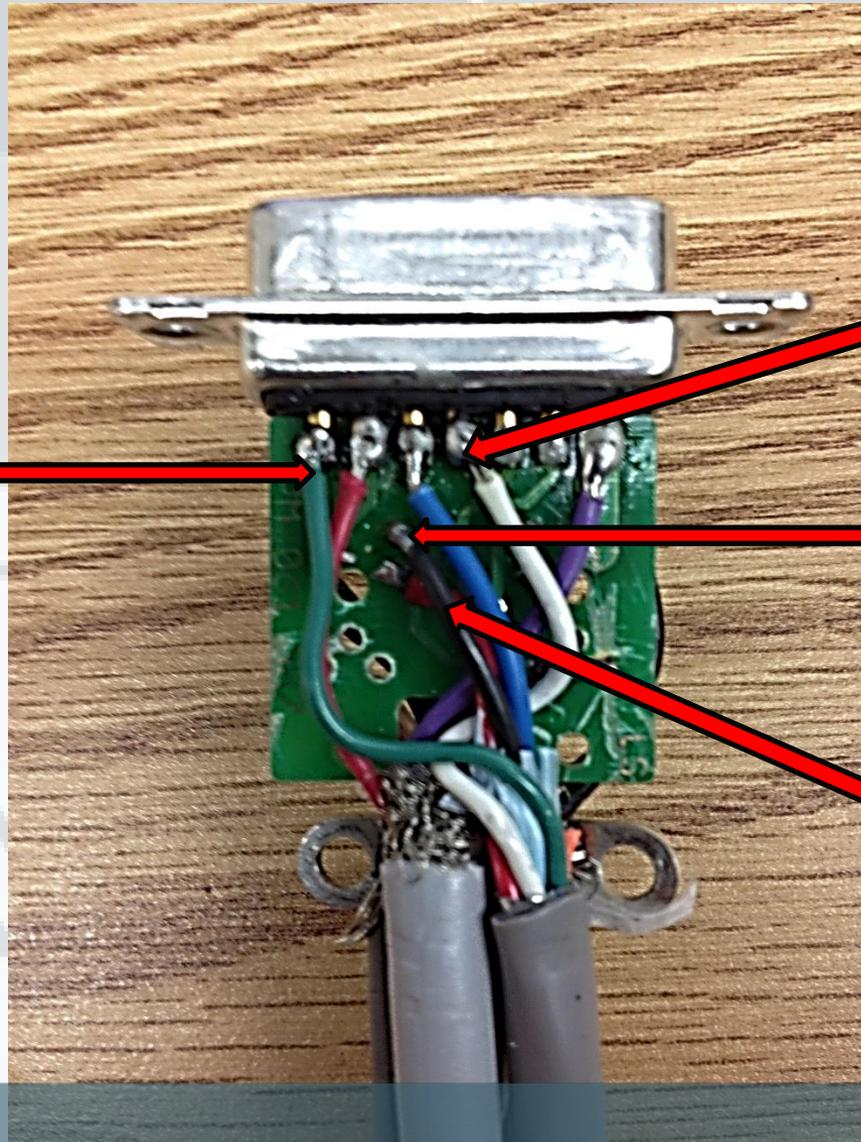
New Features

Remote Control:

1. Pump Control
2. Pump On
3. Turbo Speed
4. Error



Connector Modifications



Green – Error
Analog output

White – Speed
Analog output

Black - Pump On
Digital input

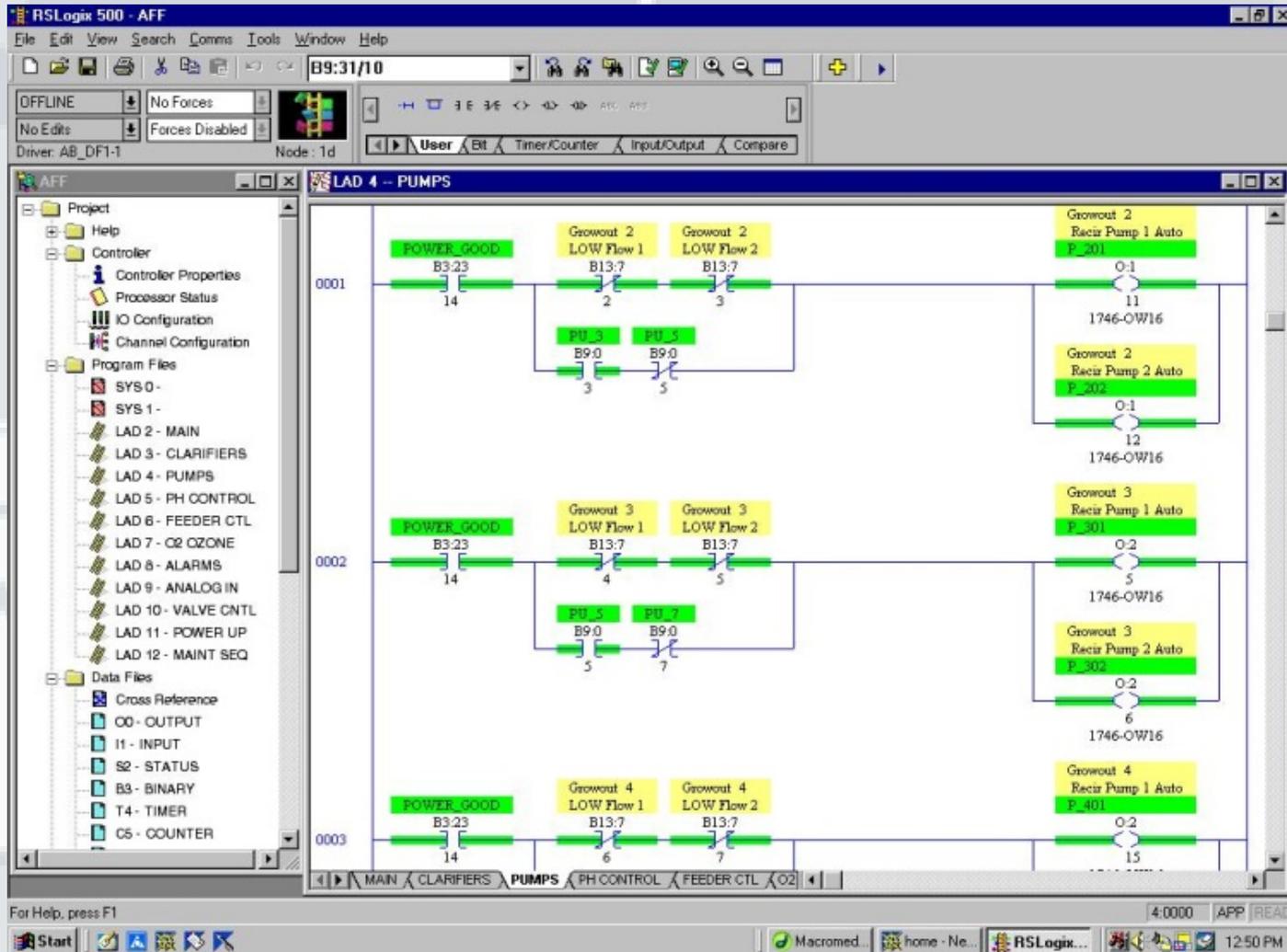
Red - Pump Control
Digital input

Adding Remote Controls

- Programmable Logic Controller (PLC)



Ladder Logic



Preventing a Rundown

Recognize the failing pump



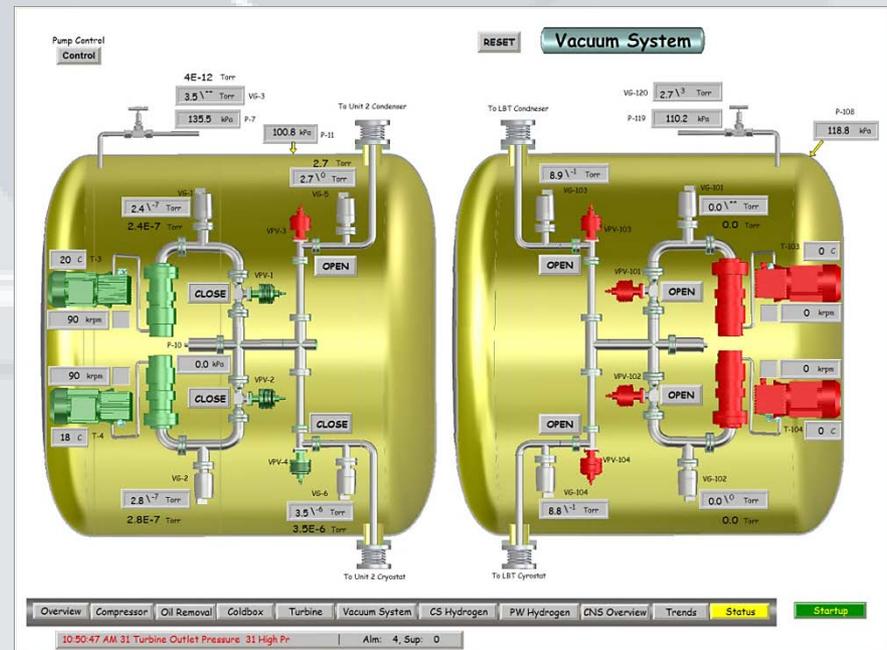
Isolating the pump



Vacuum is restored

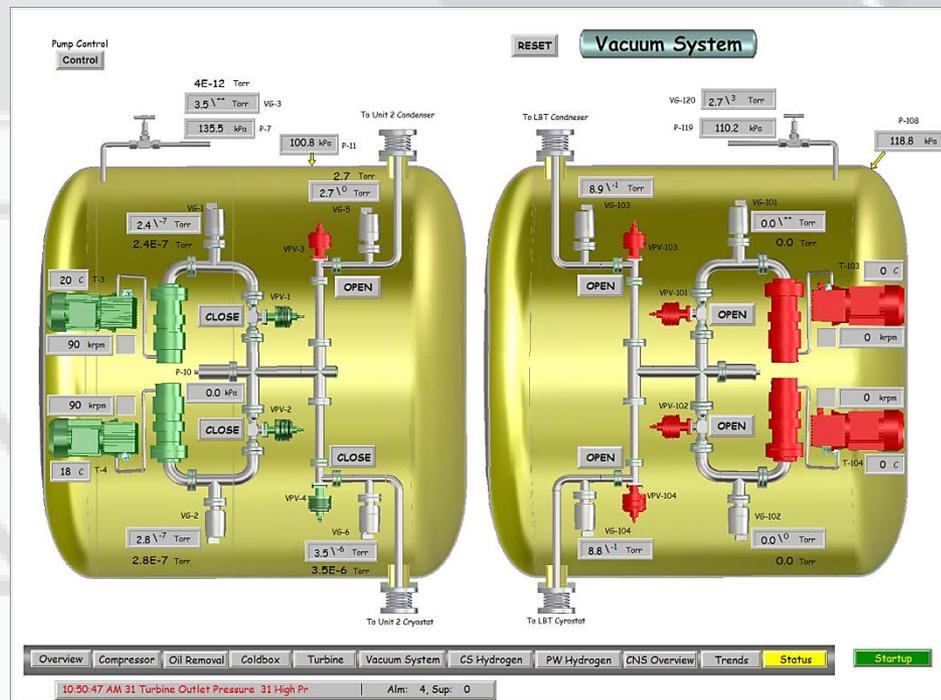


Cold Source Continues



Future Goals

- ❑ Programming and testing of new alarms
- ❑ Automatic Isolation of Failed Pump



New Vacuum Skid



Vacuum Gauge Calibration

Dual Gauge
system:

- ❑ Pirani Gauge -
10² torr to
10⁻² torr
- ❑ Cold Cathode -
down to 10⁻⁹
torr



Potting



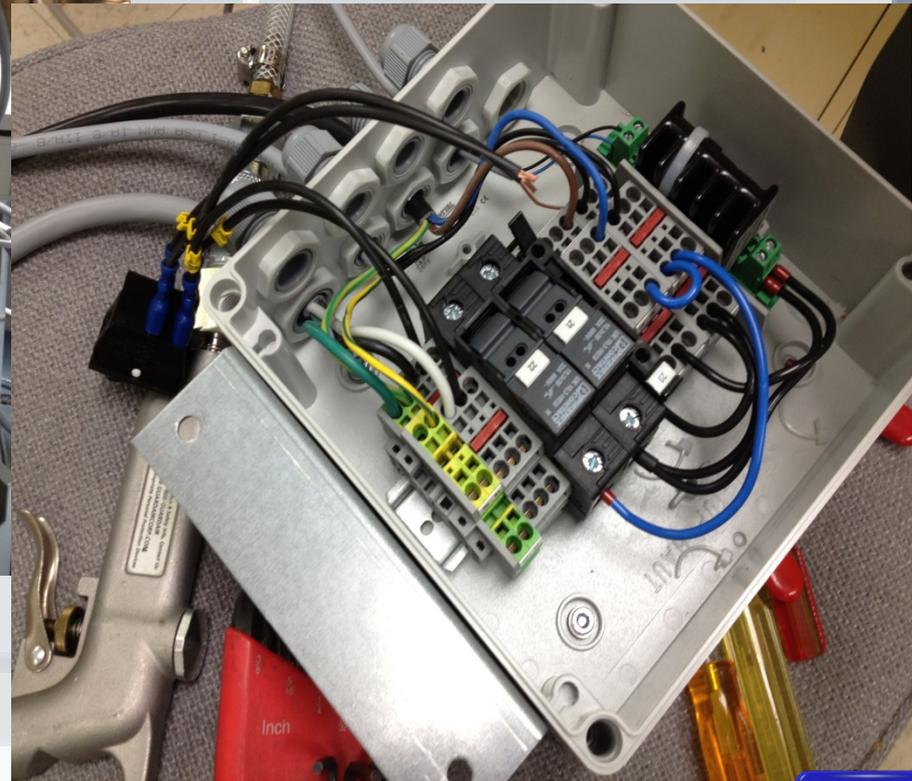
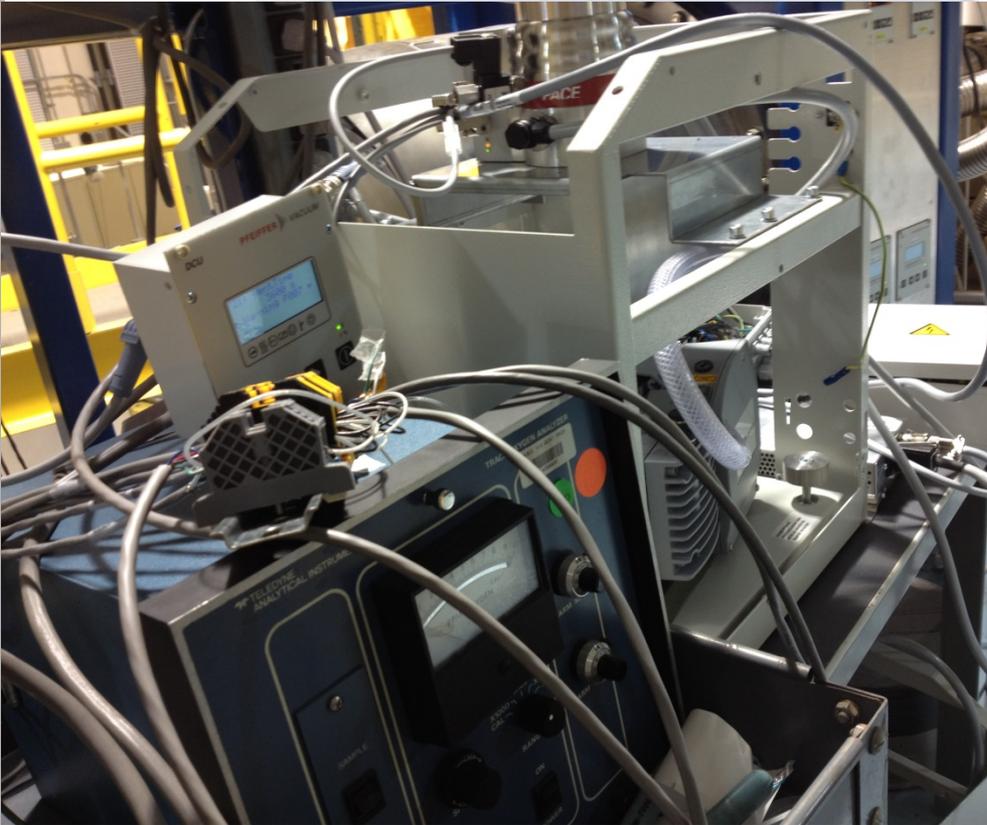
- ❑ Silicone Elastomer – displaces air from electronics



Potted Gauge for New Vacuum Skid

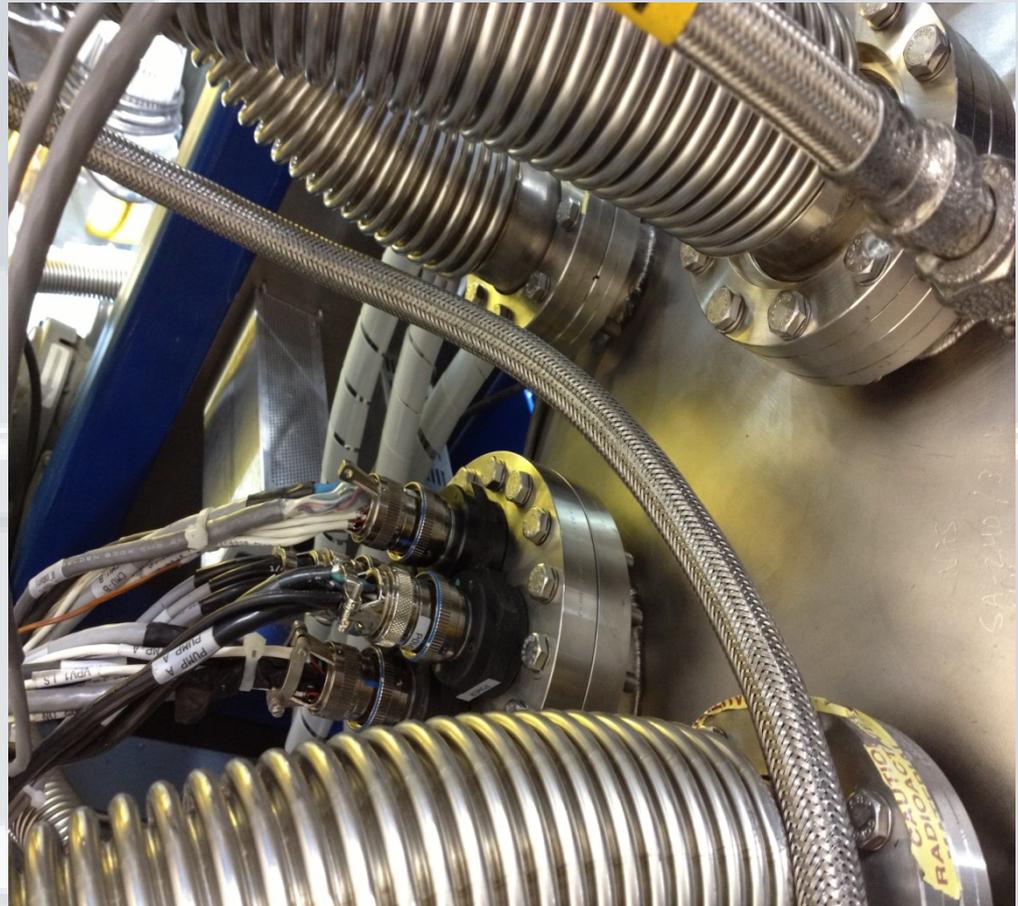


Testing and Installing Remote Control



Amphenol

- ❑ Connection to the instrumentation and PLC



Next Steps

- Wire the solenoid valves
- Welding of the Vacuum
- Helium Containment

Acknowledgements

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Questions??