805 MHz Low Level RF Resonance Control Water System Upgrade

Los Alamos Neutron Science Center

LLRF Workshop 2023

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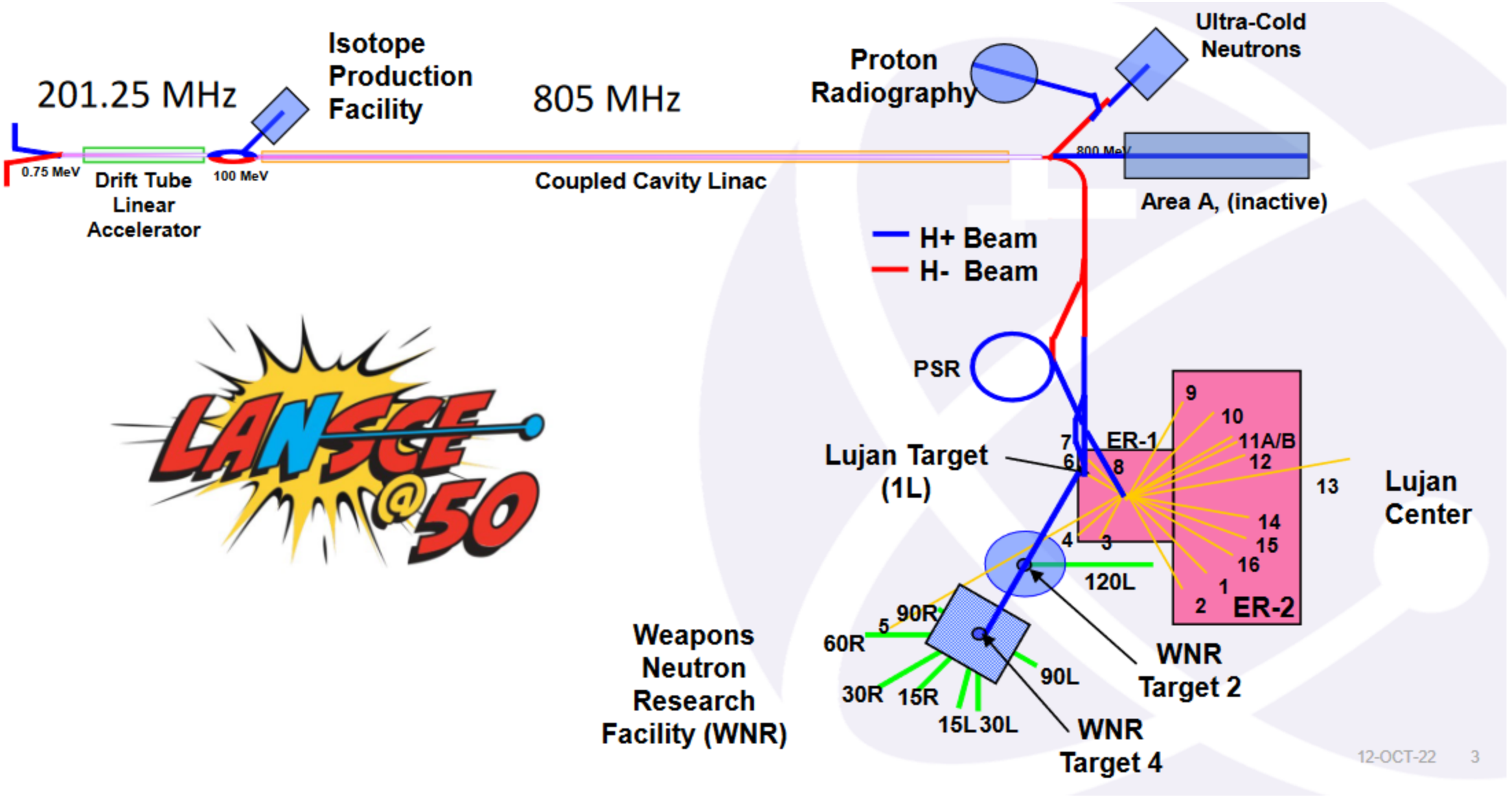
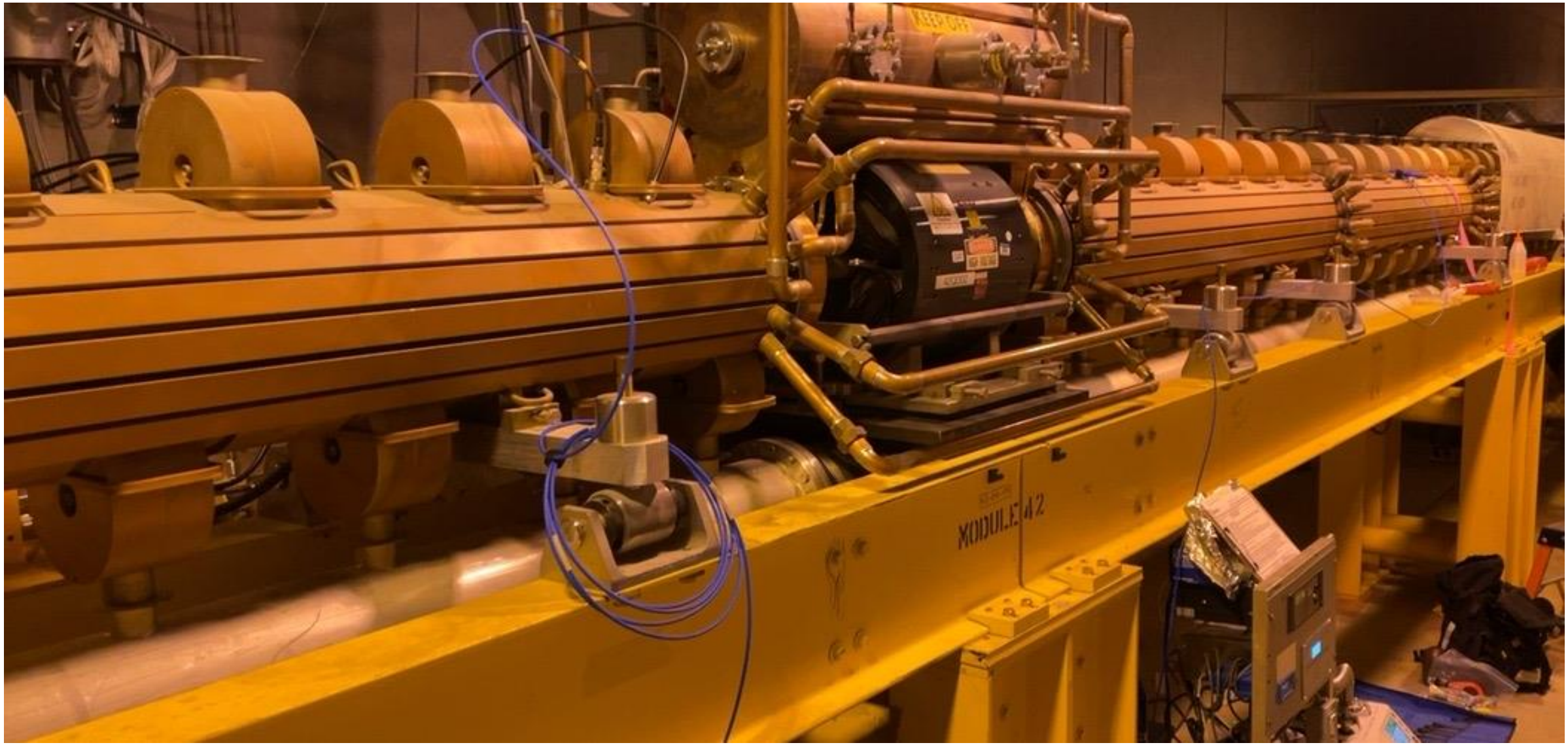
H+ and H- Beam Delivery at LANSCE



LANSCE 805 MHz Coupled-Cavity LINAC (CCL)

805 MHz LLRF Resonance Control (RC) System



805 MHz LLRF Resonance Control Water System (RCWS)

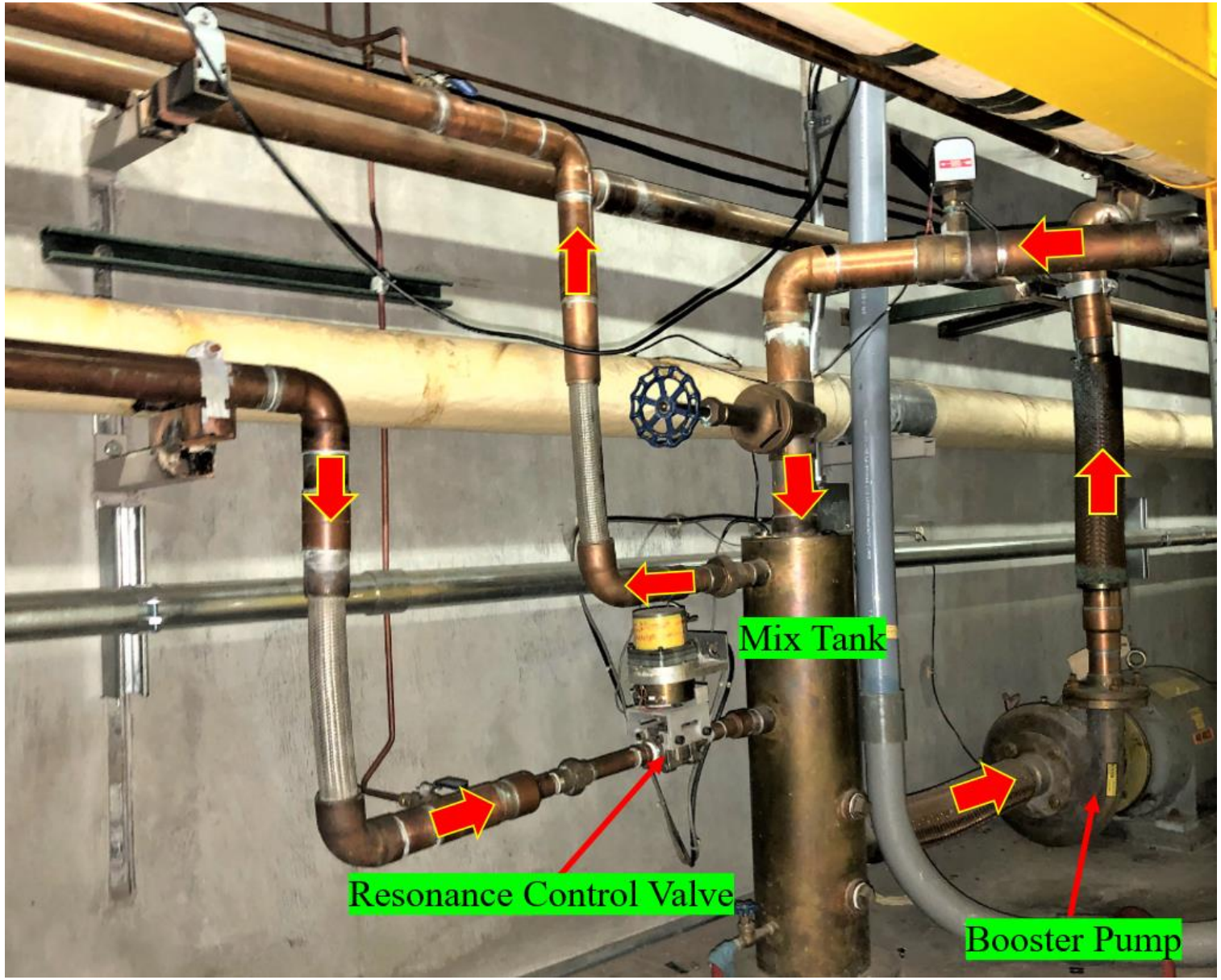
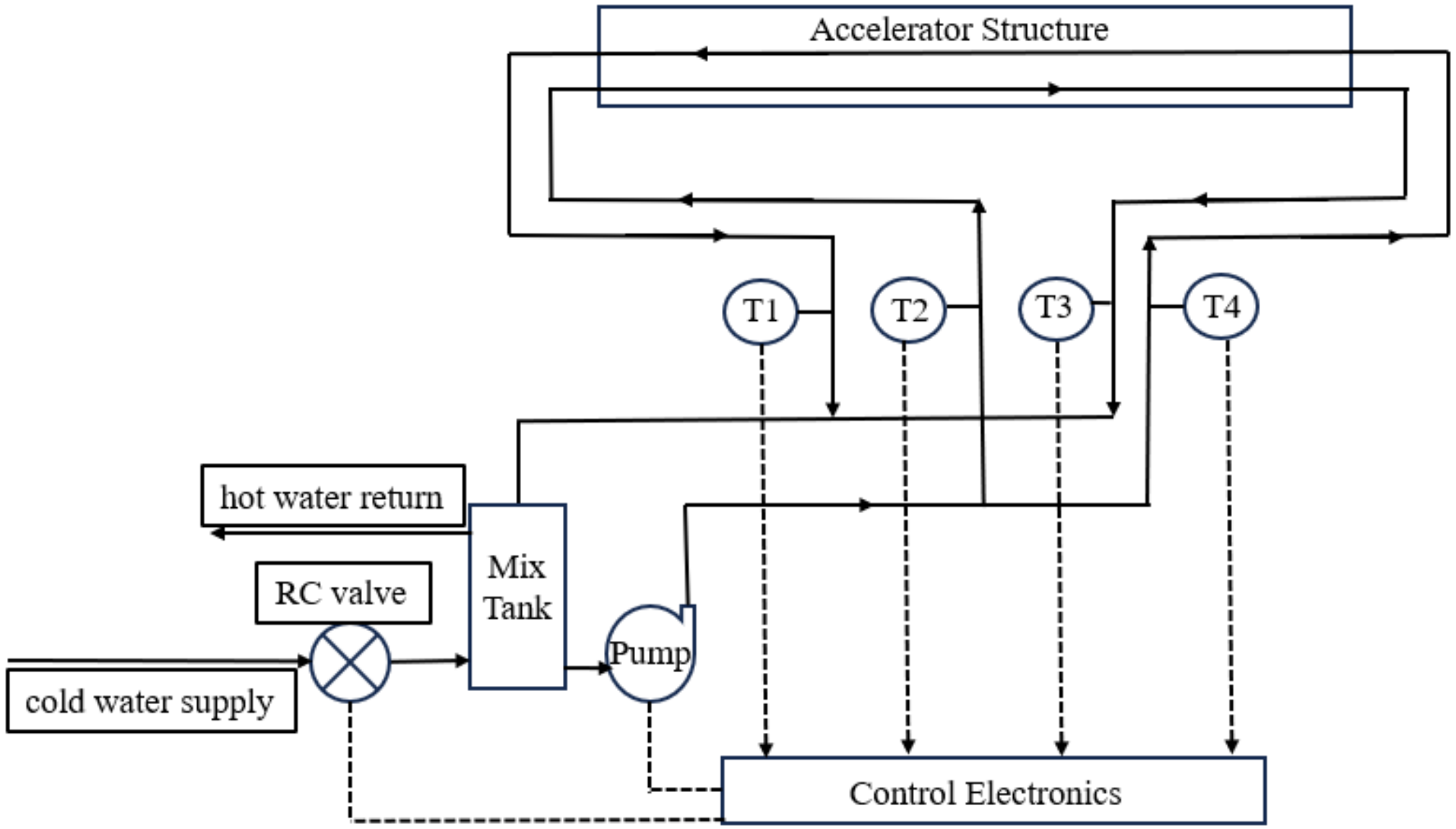


Table 1: Characteristics of 805 MHz LLRF RCWS

Characteristics	Values
Inlet Water Temperature (°C/°F)	20/68
Outlet Water Temperature (°C/°F)	37/98
Mix Tank Water Temperature (°C/°F)	27/80
Inlet Water Pressure (kPa/psi)	690/100
Outlet Water Pressure (kPa/psi)	138-207/20-30
Coolant	De-ionized water
De-ionization level/resistivity (Mohm*cm)	7-10

805 MHz LLRF RCWS Temperature Control System



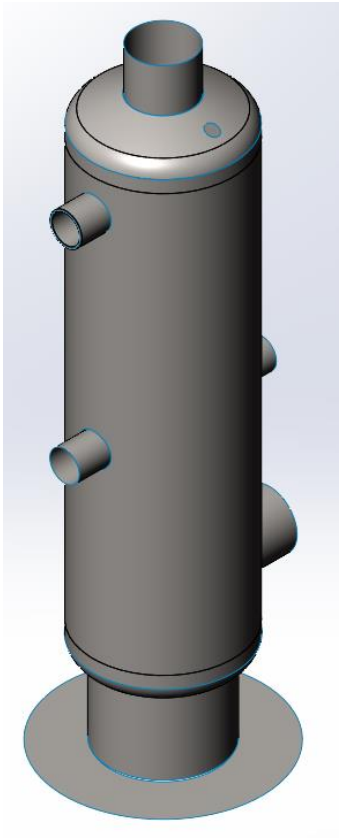
Why the UPGRADE?

1. Age and wear
2. Leaks
3. Obsolete isolation and balancing valves and pumps
4. Corrosion due to DI water
5. Extended maintenance time

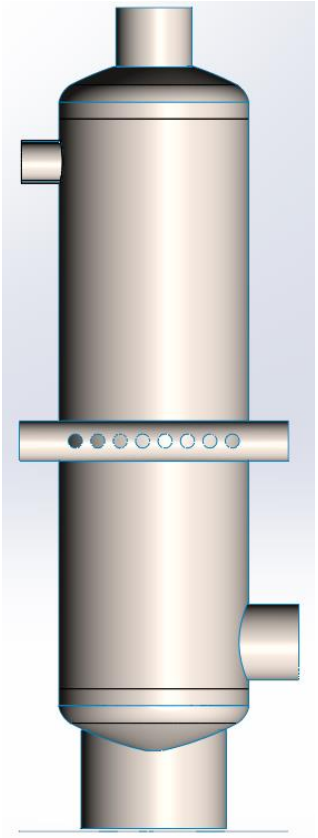
Goal – Piping Upgrade Project

1. Minimal change in design, layout and specifications
2. New parts and equipment
3. Standardized design
4. Improved system performance
5. Easier maintainability

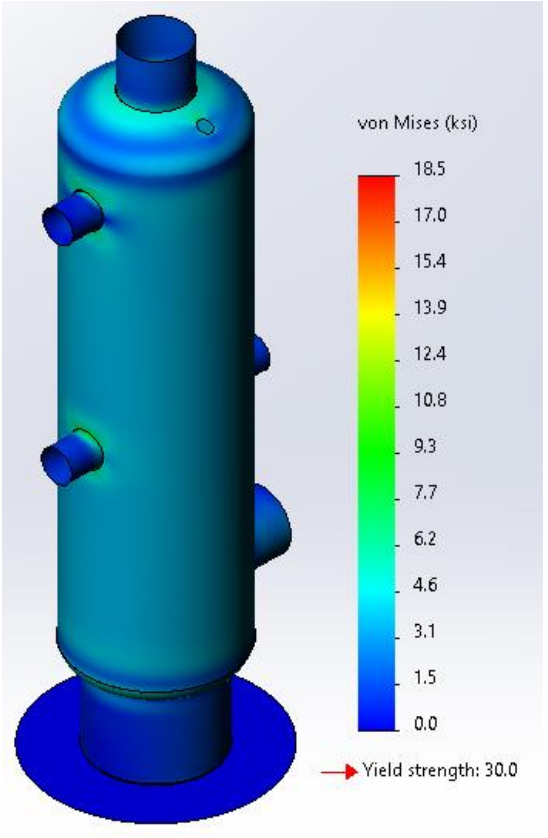
Mix Tank Design



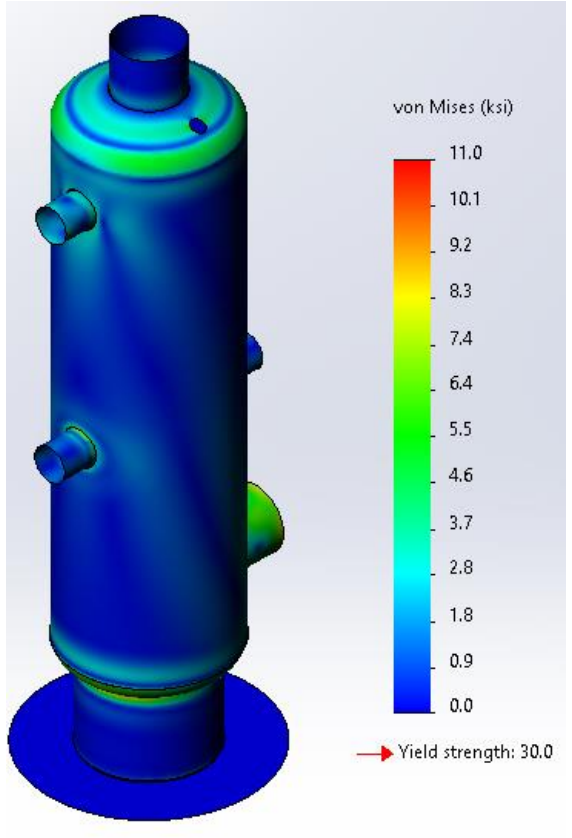
3D Model of a Mix Tank



Section View



General Primary Membrane Stress

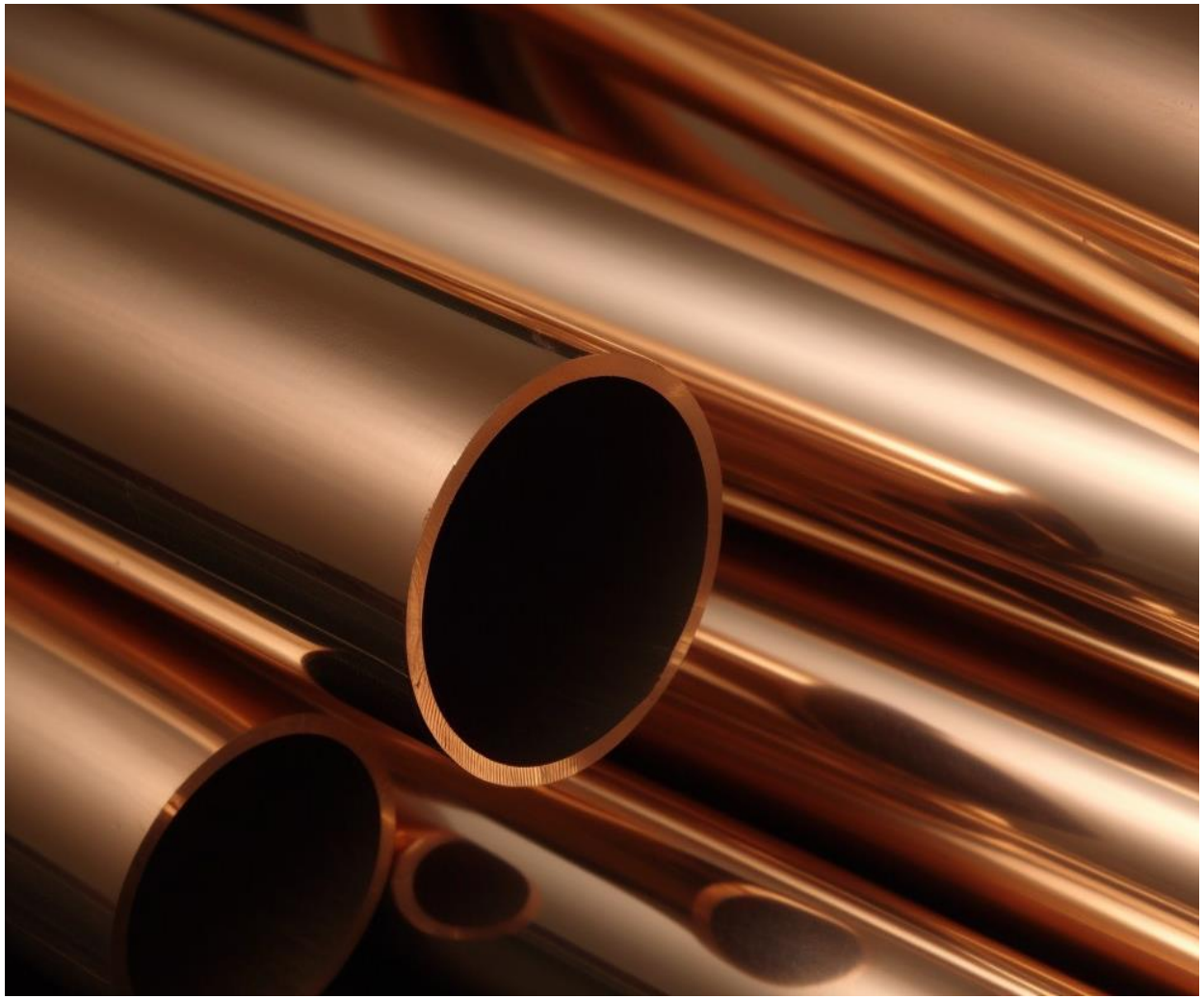


General Primary Bending Stress

Allowable Stress per ASME Code. Section VIII. Division 1 at design temperature

Material Selection

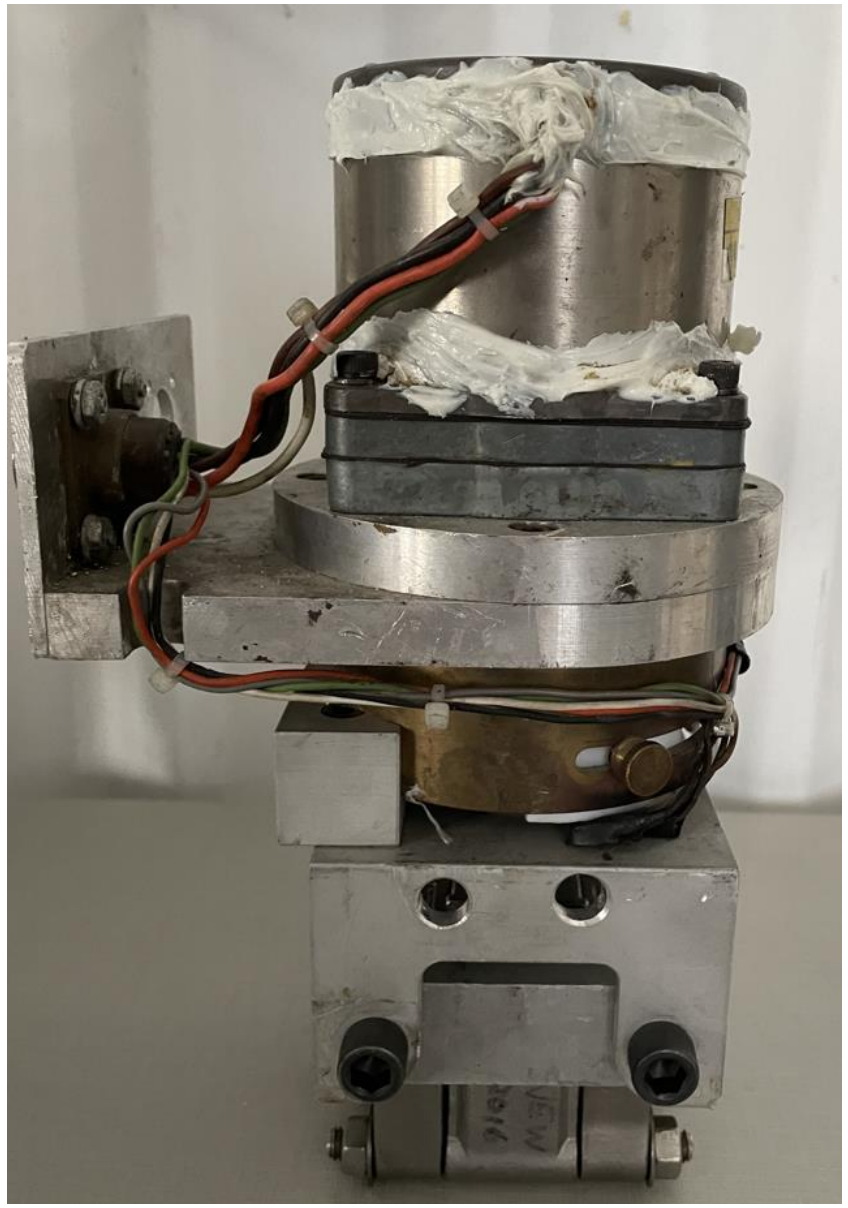
Copper to Stainless Steel



Material Selection

Victaulic fittings

Material Selection



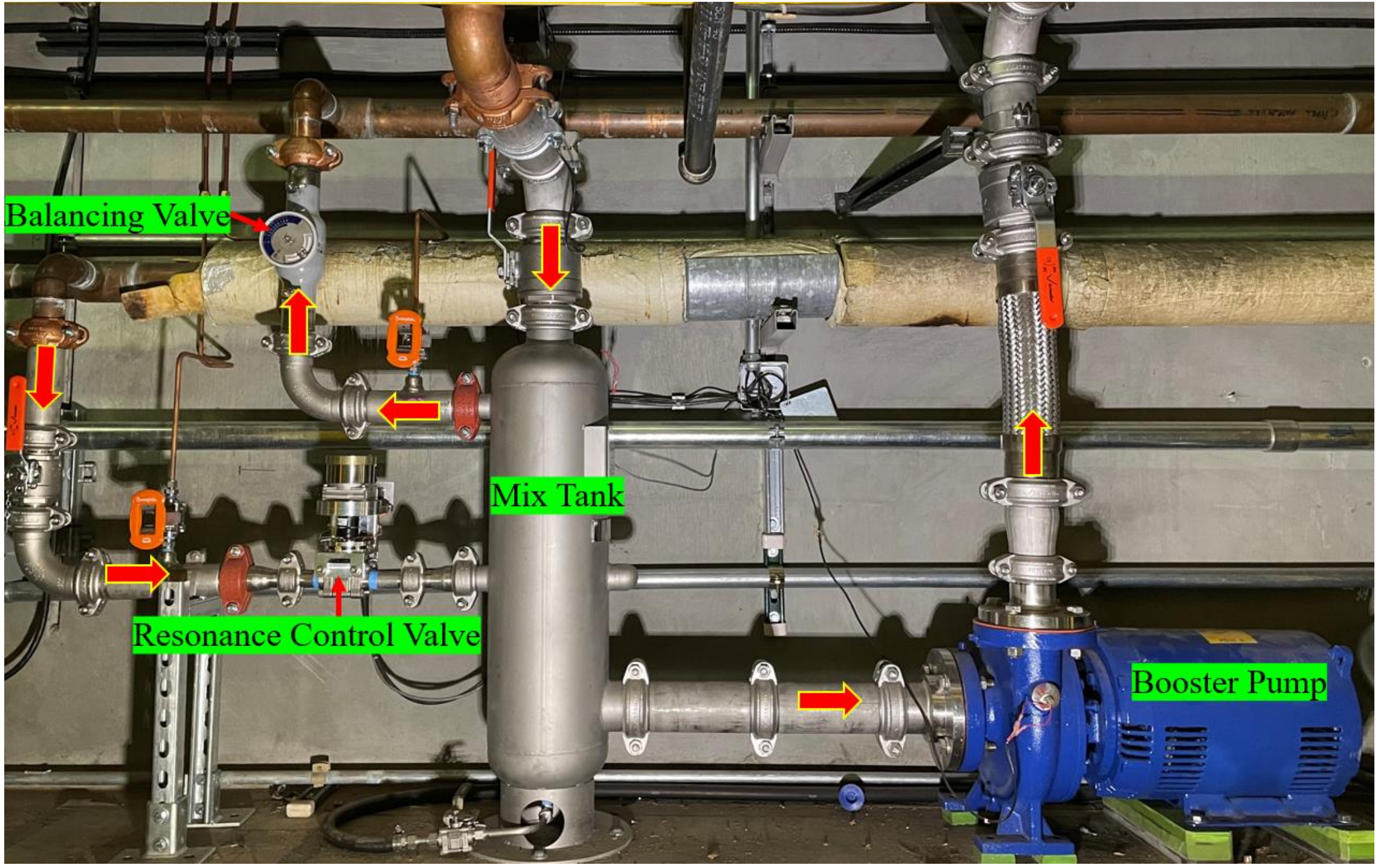
Old resonance control valve

New resonance control valve

Material Selection

Improved Isolation Pads

Improved Balancing Valves


Balancing Valve
Mix Tank
Resonance Control Valve
Booster Pump

Conclusion & Future Work

- Upgraded 20/44 RCWS.
- 8/24 planned for 2024 extended outage.
- Seeking funds to upgrade 16 remaining.
- Plans to redesign and improve pump motor electrical system.