Spacecraft Cooling Loop

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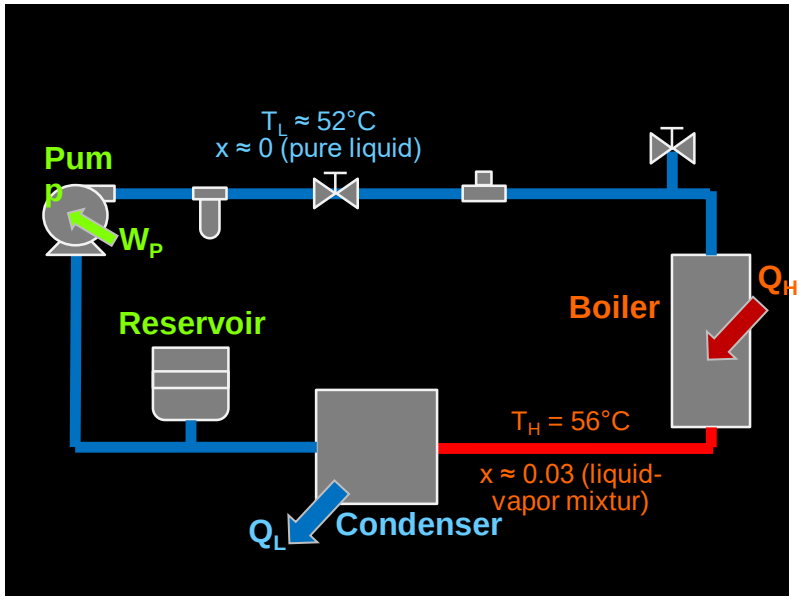
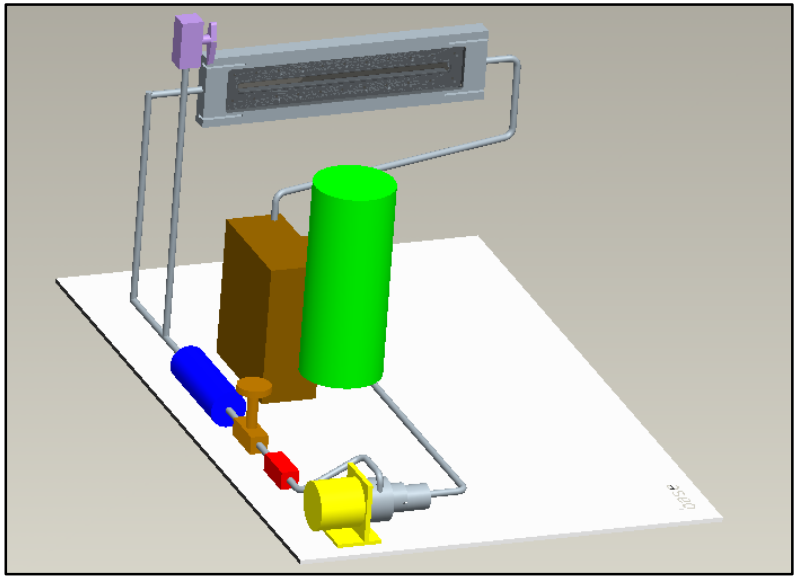
Objective:

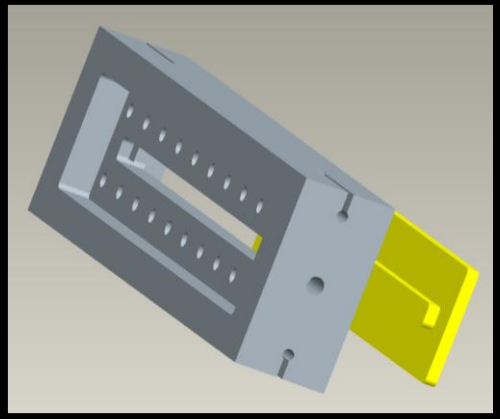
Design a two-phase cooling loop for implementation in future space missions

Motivation:

- Future space missions will increase heat dissipation
- This will increase cooling demands for the spacecraft's Thermal Control System (TCS)
- There is also pressing need to reduce size and weight of all spacecraft's subsystems
- Current TCS employs predominantly single phase liquid heat exchange components
- Two-phase heat exchange can greatly increase performance by utilizing the coolant's both sensible and latent heat

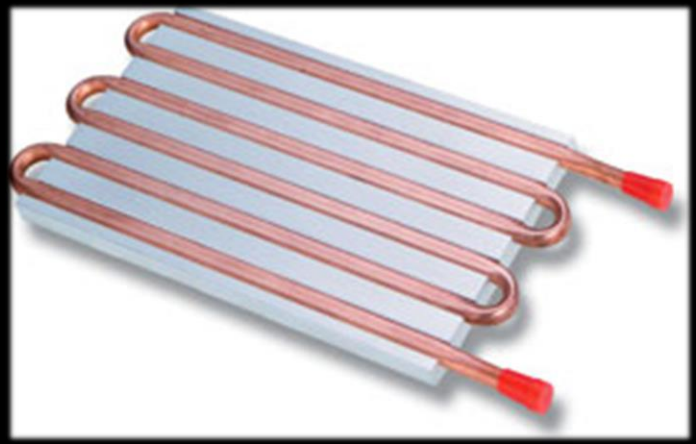






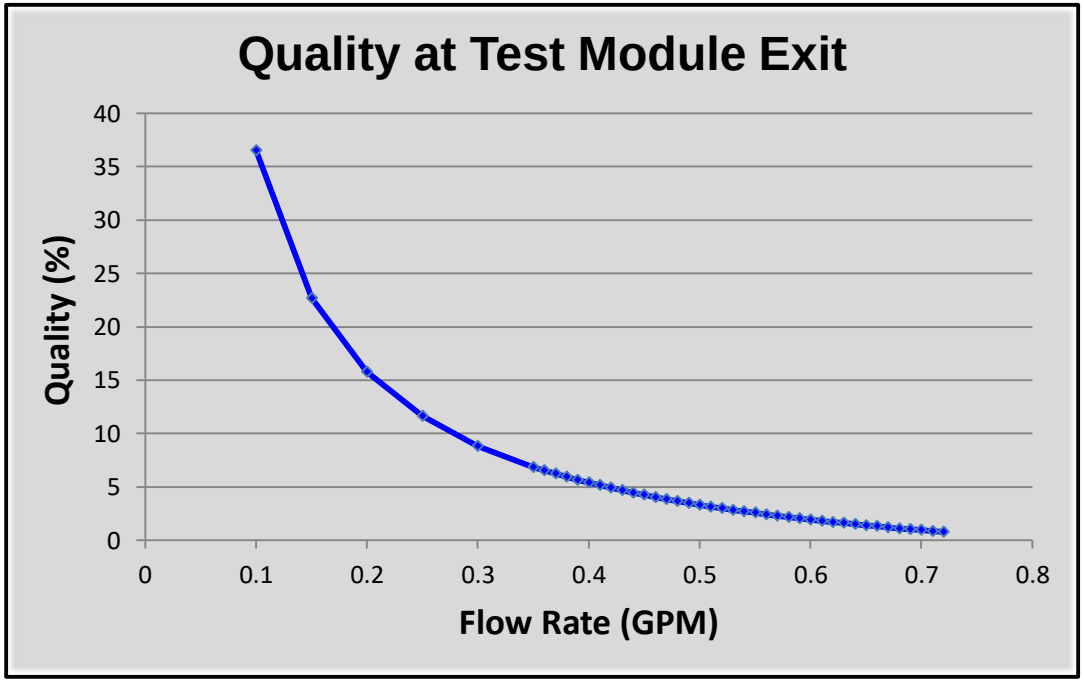
Boiler:

- Aluminum frame
- Lexan viewing window
- Machined using CNC
- Sealed with o-rings
- Channel size: 12” x 0.5” x 0.125”
- Accommodates 4 cartridge heaters
- Fitted with fluid connectors at inlet, outlet



Condenser:

Lytron 6000 Series w/ Nuline Fan



Study yielded detailed capture of vapor bubble formation and growth along the boiler’s channel