



Controls and Operational Strategy for Gen 3 Particle Pilot Plant

Concentrating Solar Technologies

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Contributors: G3P3 Team



Presentation Overview

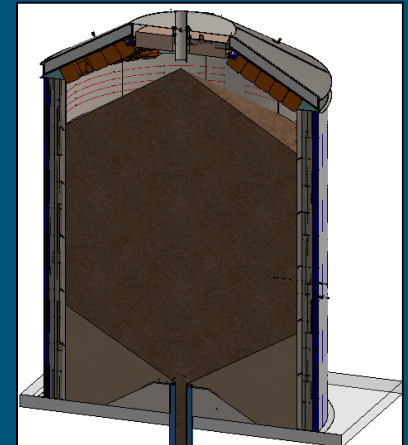
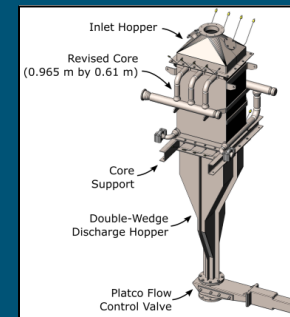
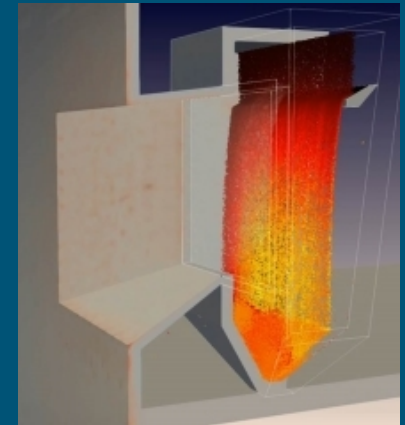
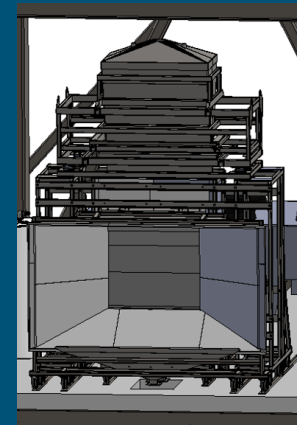
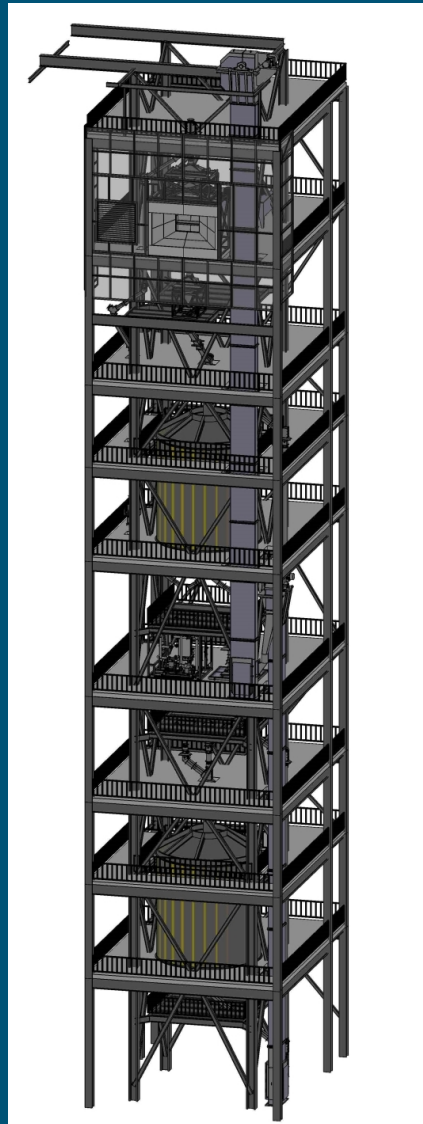


- General Introduction
- Software and Controls
- Safety Interlocks
- Operational Philosophy
- Summary and Conclusion

General Introduction



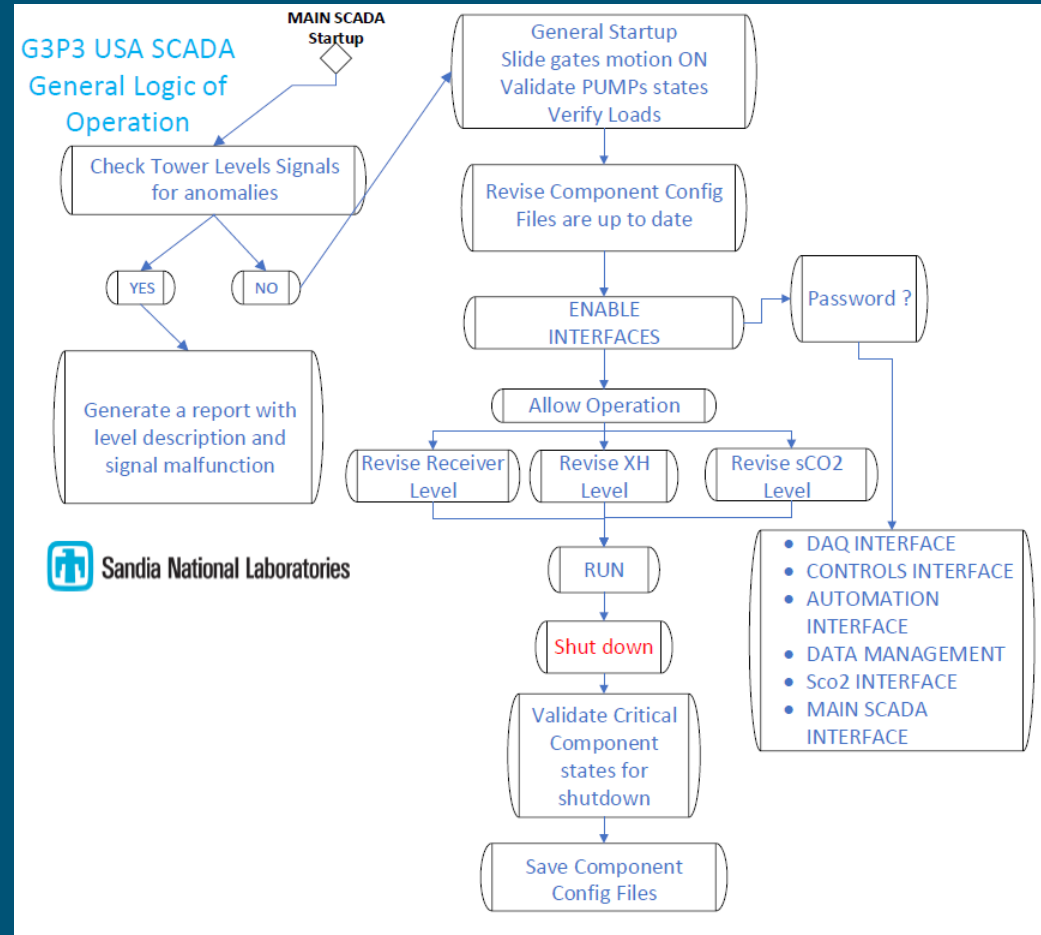
- G3P3 Introduction
- Tower Construction
- Receiver
- TES
- Heat Exchanger
- On-sun testing



Software and Controls



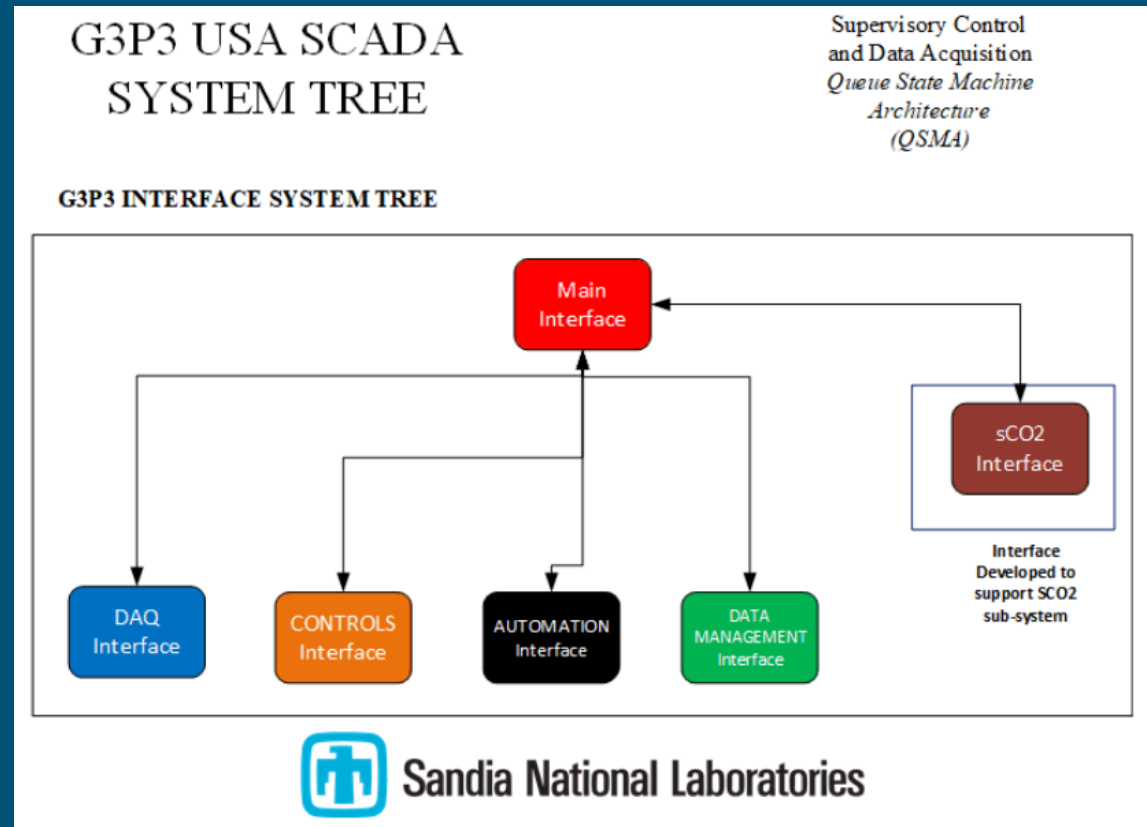
- Control Architecture
- Data logging
- Archiving
- User Interface



Software and Controls (SCADA)



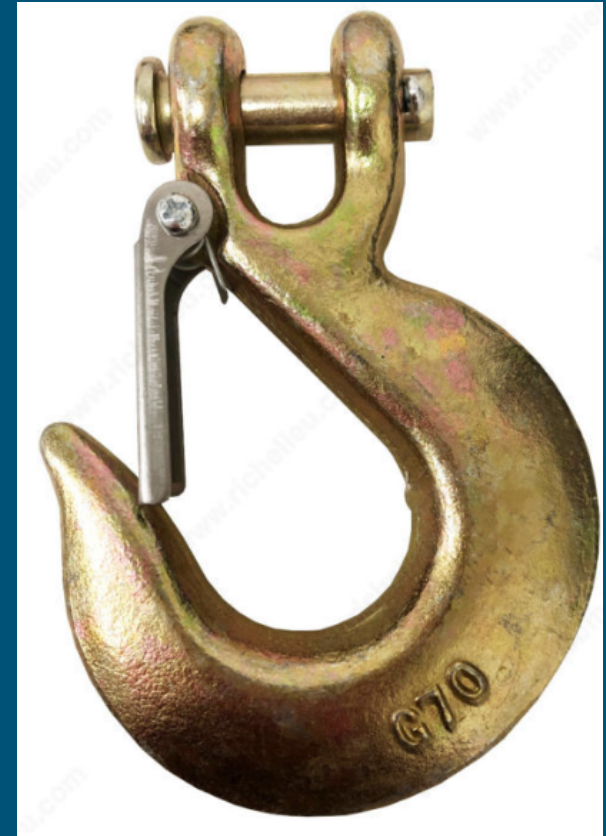
- Start-up
- Commissioning
- Safety Features
- Interlocks
- Automation
- Supervisory controls
- Parallel system model



Safety Interlocks



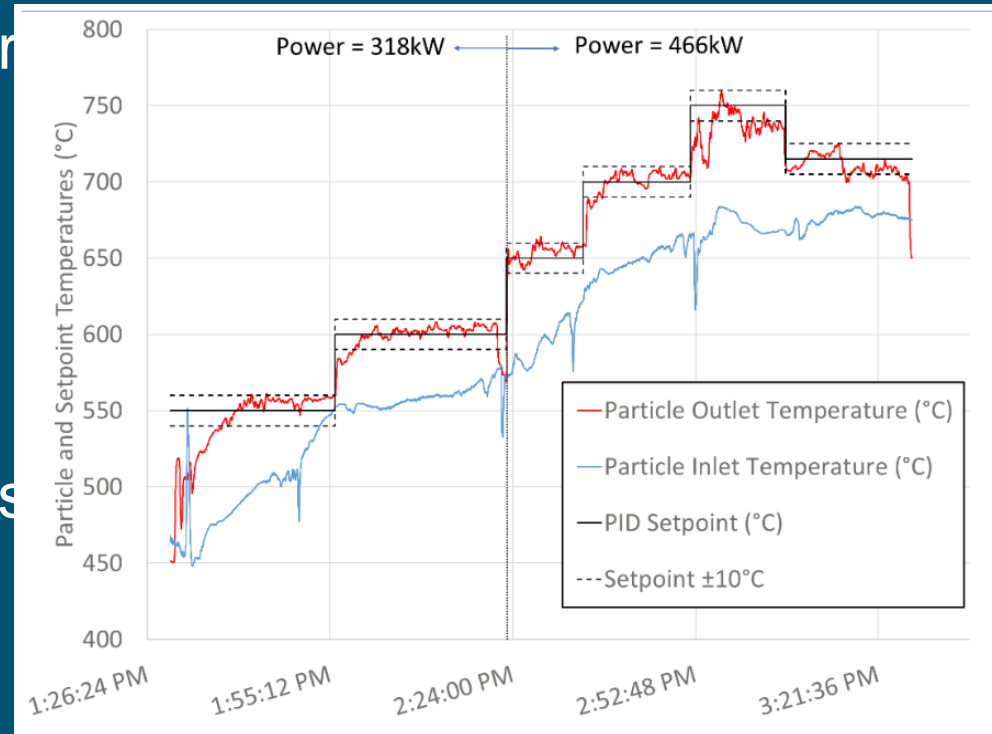
- Equipment Protection
 - Sensitive equipment
 - Expensive components
 - Custom components
- User Protection
 - Commissioning
 - Inspections
 - Troubleshooting
 - Maintenance



Operational Philosophy (Receiver)



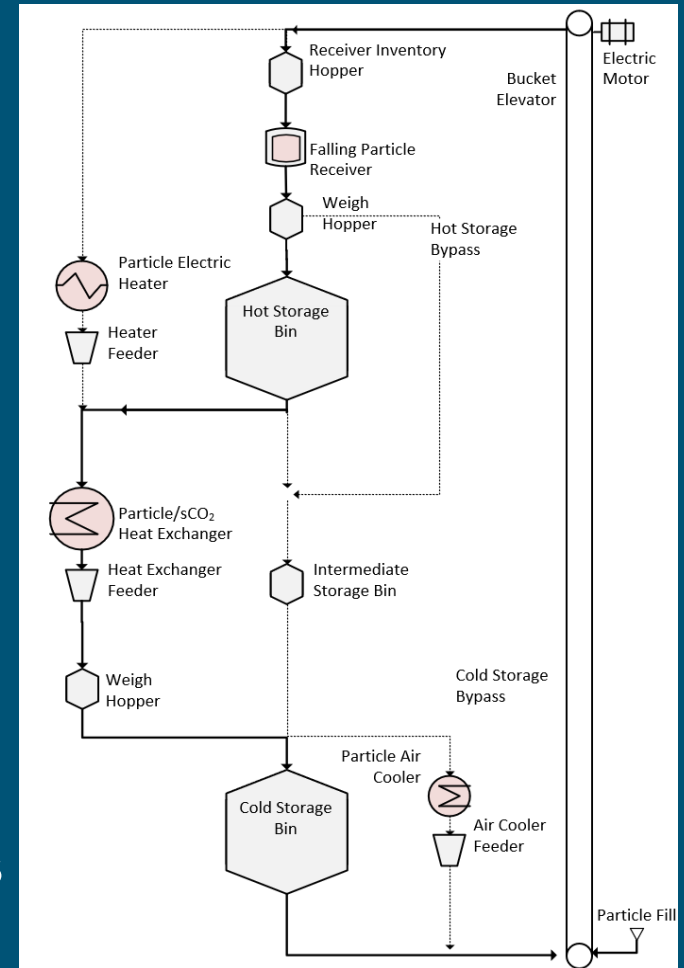
- Particle outlet temperature
- Back wall temperature
- Temperature controls
 - Mass flow
 - Solar Flux
- Automation - PID controls



Operational Philosophy (Particles)



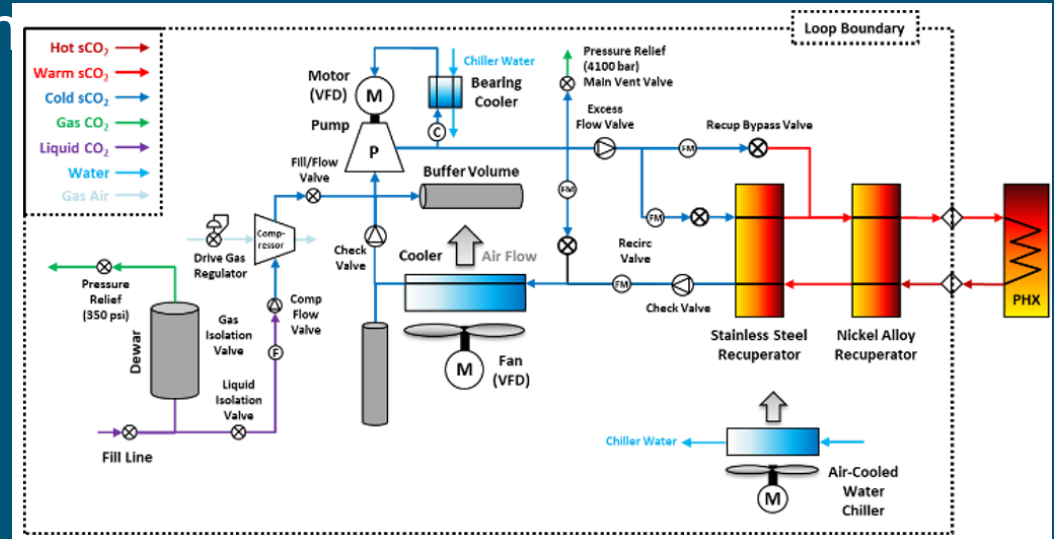
- Mass flow measurement
- Mass flow control
- Automation
- Operational modes
 - Hot start
 - Cold Start
 - Standby
 - Etc.
- Thermal management
 - Component temperature ramp rates



Operational Philosophy (sCO₂ Loop)



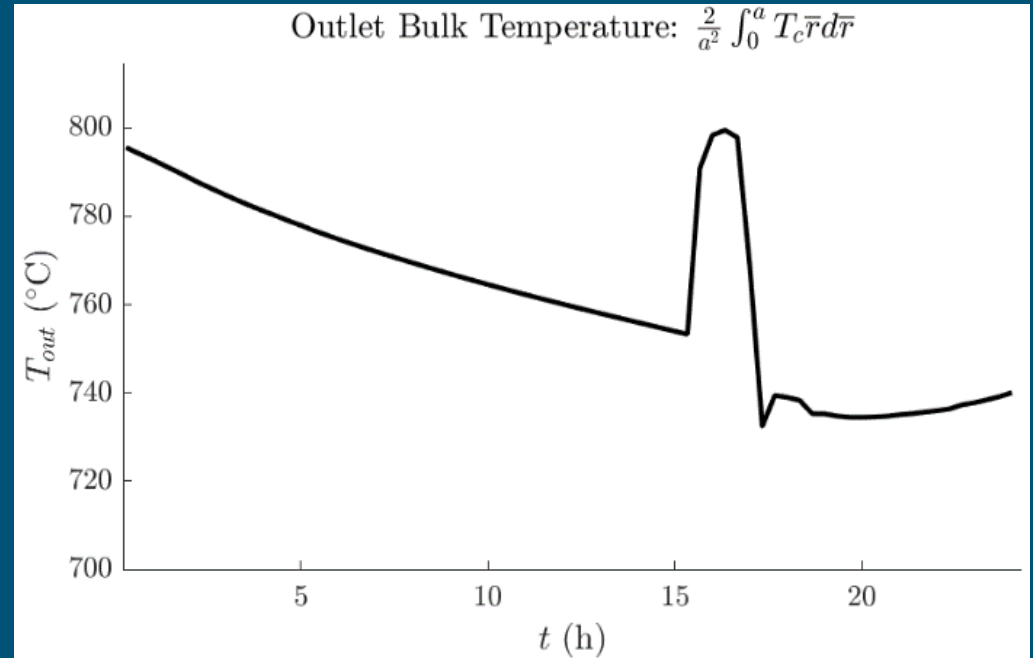
- Mass flow measurement
- Mass flow control
- Pressure controls
- Operational modes
 - Hot start
 - Cold Start
 - Standby
- Thermal management - temperature ramp rates
- Pressure management



Operational Philosophy (TES)



- Charging
- Discharging
- Temperature controls
- Energy Management



Summary and Conclusion



- Operational philosophy is based on the previous on-sun experiments and lessons learnt
- Receiver operation demonstrated in partial automated control strategy
- On-sun PHX operational experience is limited
- Commissioning process to implement additional safety interlocks
- High pressure and high temperature systems have rigorous safety features

Thank you.

