Microreactor Program Review: Demonstration Support Area - MAGNET

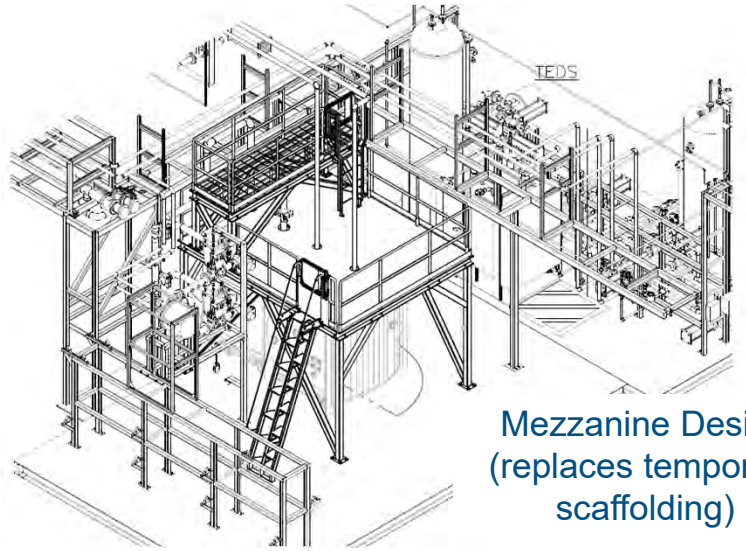
INL: T.J. Morton, Jeremy Hartvigsen, Zack Sellers, Piyush Sabharwall

LANL: Bob Reid and Katrina Sweetland

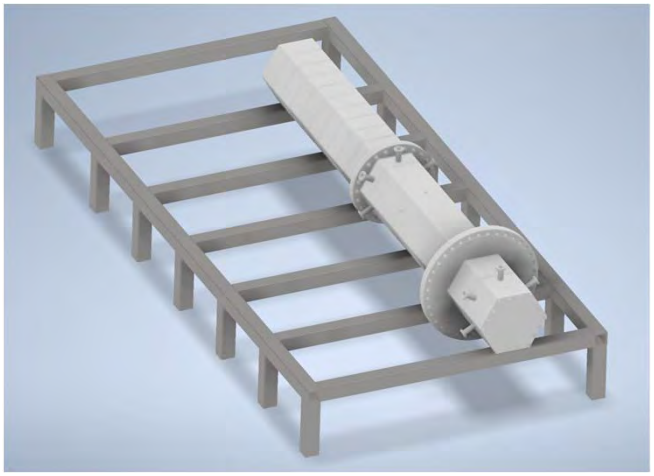
INL Idaho National Laboratory | Oak Ridge National Laboratory | MRP Microreactor Program | Los Alamos National Laboratory | Argonne National Laboratory

MAGNET Status

- Preparing for arrival of e37 test article from LANL in May
  - Heaters and controller ordered
  - Working on procurement for low-pressure blower
  - Collaborating with LANL and Westinghouse on instrumentation and controls
- Mezzanine design complete – working towards April construction
- PCU design in progress



Mezzanine Design (replaces temporary scaffolding)

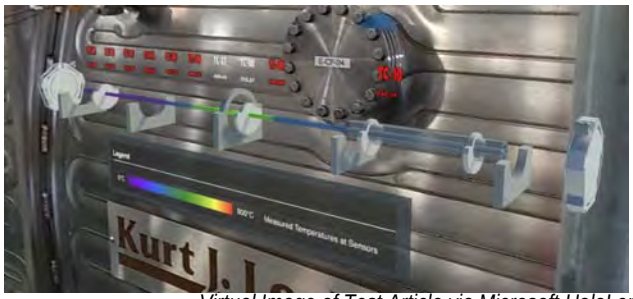


Support Structure for e37

MRP Microreactor Program

Single Heat Pipe Test Digital Twin Collaboration

MAGNET Control Station



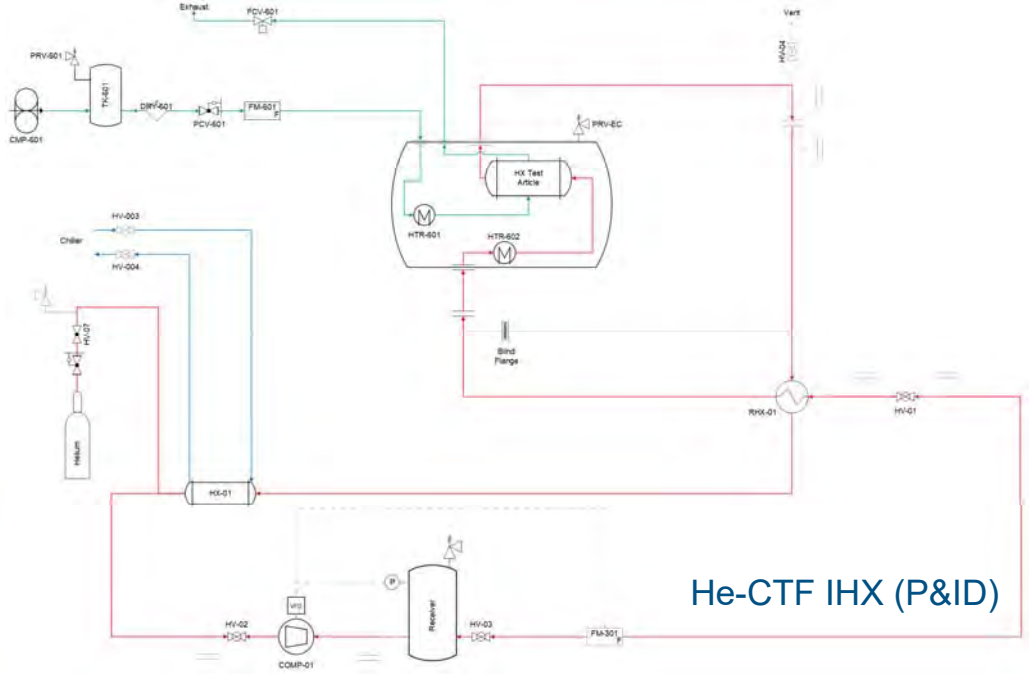
Virtual Image of Test Article via Microsoft HoloLens for Digital Twin Effort

- Single heat pipe testing in MAGNET to demonstrate MAGNET's operation (heater control, instrumentation, and gas cooling flow rate control were all validated)
- Collaborated with researchers from across INL to demonstrate a small-scale digital twin using machine learning to maintain steady state.

MRP Microreactor Program

MAGNET / He-CTF
Commercial Developer HX Testing

- Successfully tested proprietary HX design for commercial microreactor developer
- Ran helium at 70 g/s at design temperature and pressure (650°C and 22 bar)
- Air at 220 g/s at 3 bar and 350°C (air out of HX at 630°C)



He-CTF IHX (P&ID)

MRP Microreactor Program

e37 Testing

- Slow start up to 550°C with no cooling flow – measure strain
- Slow isothermal start up to 600°C with no cooling flow – measure cool down rate to ambient
- Slow isothermal start up to 600°C with low cooling gas flow
- Slow isothermal start up to 600°C with intermediate cooling gas flow
- Slow isothermal start up to 650°C with intermediate cooling gas flow
- Simulation of failed heat pipes
- Additional testing as permitted by schedule, funding, and operations management

E37 with Shipping Cart

MRP Microreactor Program

Power Conversion Unit Integration with MAGNET

- Original equipment - Capstone C30 (obsolete unit no longer in production)
- Modified by Barber-Nichols to run on N_2
- Working with both companies to obtain design information (drawings, ASME calculations, etc)
- CTD-IES is willing to augment funding for procurements and construction of PCU integration
- Construction drawings in progress
  - Awaiting piping/component design info for piping design
  - Awaiting electrical info for electrical design

MRP Microreactor Program

MAGNET Timeline

- Mezzanine construction – April to May 2023
- e37 installation – May to July 2023
- Complete installation of e37 – August 2023
- e37 testing – August to October (potentially open ended)
- PCU integration – October 2023 ?
- Complete phase II construction for He-CTF – July 30
- External manufacturer testing in support of SCO microreactor program (one test article) – August to September

MRP Microreactor Program


MRP
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Program