

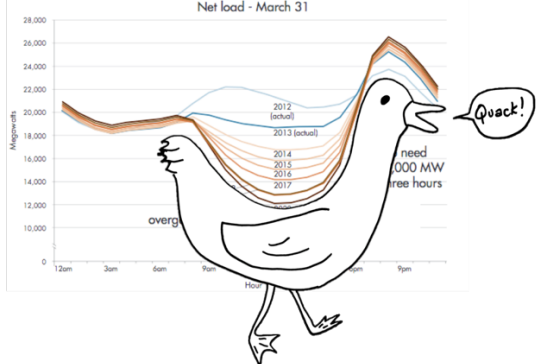
# Rancor Hybrid Energy System Microworld

(How to design and evaluate HMI for Nuclear Power)

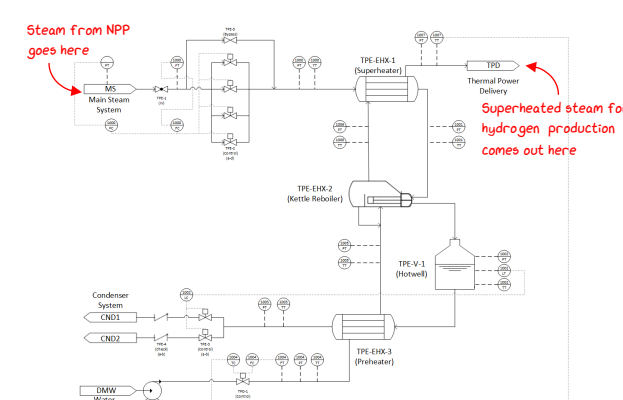
Roger Leu: University of Idaho  
Thomas A. Ulrich: Idaho National Laboratory  
Ronald L. Borring: Idaho National Laboratory

Acronyms: (order of appearance)  
HMI: Human-Machine Interface  
HPL: Human Power Load  
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1. Understand the Problem  
Proliferation of renewables results in too much electricity being generated during the day. Nuclear Power Plants (NPPs) can't load follow and need alternative revenue streams to remain competitive.

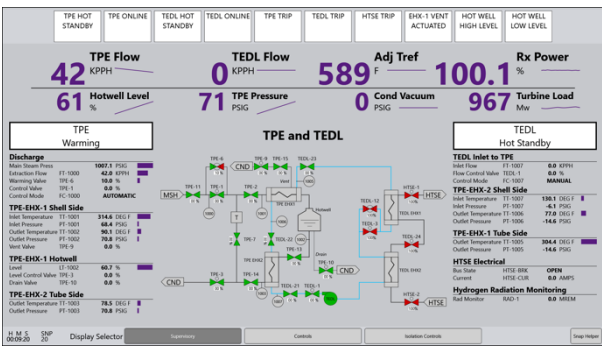


2. Design Hybrid Energy System for NPP.  
Easy, just hire some nuclear engineers.



3. Specify ConOps and HMI requirements.  
4. Survive Pandemic.

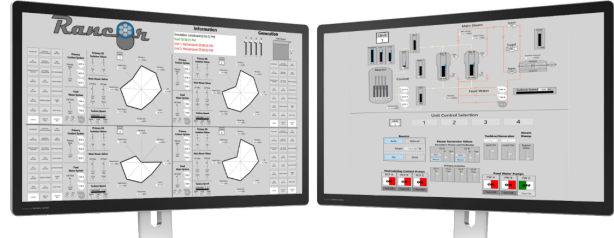
5. Design Quasi-Dynamic Prototype HMI and Procedures



2020 Supervisory HMI

6. Remote User Evaluation w/ Operators  
Operators walked through scenarios with a quasi-dynamic HMI over teleconferencing. We validated the basic ConOps and received lots of feedback regarding the interface and engineering design.

7. Utilize Rancor Microworld for Iterative Interface Design and Evaluation with Student Operators  
The Rancor Microworld is a dynamic simplified nuclear reactor simulator developed by the UI and INEL. We implemented a simplified model of the hybrid energy system allowing us to iterate the design with students.

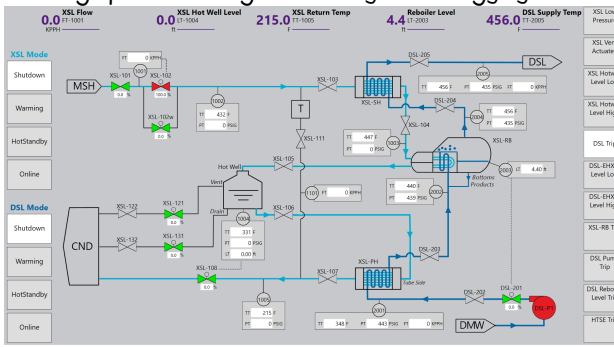


8. Implement Refined HMI in INEL's H55L's Full-scope, Full-scale, Reconfigurable Simulator.



HFEs (your truly) pretending to discuss something important during a photo shoot in the H55L circa 2005.

9. Conduct Dynamic Scenario Testing w/ Operators  
Operators were able to complete normal and abnormal operating procedures but desired increased automation for starting up and shutting down the hybrid energy system.



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