Electro-Thermal Test System for Heater Control Panels

FARNAM CUSTOM PRODUCTS

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Western Carolina University

PROBLEM STATEMENT

Farnam has recently ventured into manufacturing its own electric control panels. With this being a new product line for Farnam, the Engineers who design these panels must test them. The goal of this project is to produce a control panel testing station to allow for a designated operator at Farnam to test any given control panel through a series of standardized procedures while keeping the process as safe and efficient as possible.

REQUIREMENTS

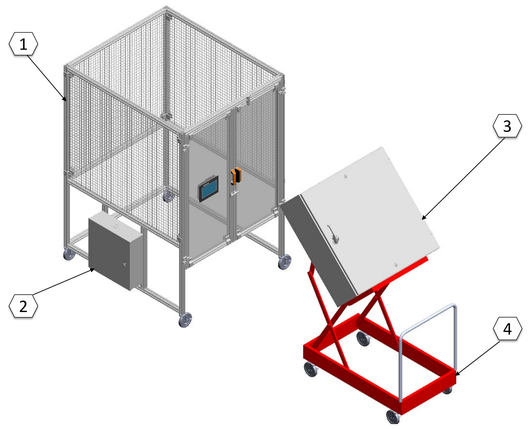
#	Description
1	Must operate on 480V and 240V input power
2	Must have a safety cage during testing
3	Must be thermally safe at any point
4	Must be electrically safe at any point
5	Must include a door safety interlock system
6	Must be able to test all standard control panels
7	Must be able to perform multiple test programs
8	Must display pass/fail
9	Keep track of pass/fail per product being tested
10	Max build area (LWH): 49"x42"x72"

CONCEPTS

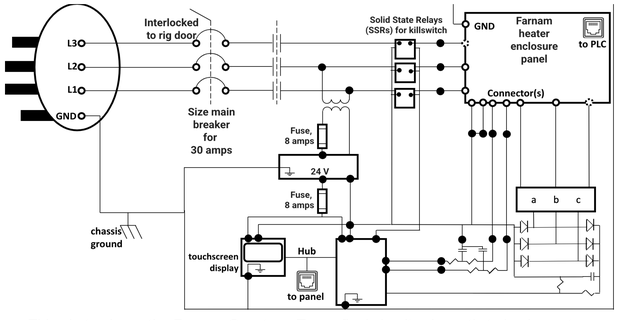
- Left - An enclosed fixture where the Control Panel is loaded by hand. Electrical components located on the top of the fixture with fans for cooling. Fixture is one casters for mobility around work area.
- Right – Control panel is on a sheet metal cart allowing for movement around the facility. The fixture acts as a housing for the testing procedure.

FINAL DESIGN, APPROACH, PLAN

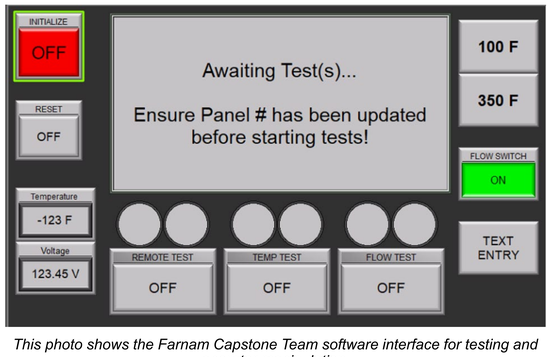
The final design features a fixture (1) to house the testing procedure enclosed by wire mesh and polycarbonate, a control panel (2) attached to the fixture to allow for safe housing of all electrical components, and a separate tilting workstation (3) for better mobility and access to the control panel (4) for hooking up to the test station.



This photo shows the Farnam Capstone Team final design. This design allows for optimization of safety, ease of use, and versatility in terms of various types of control panels to be tested.

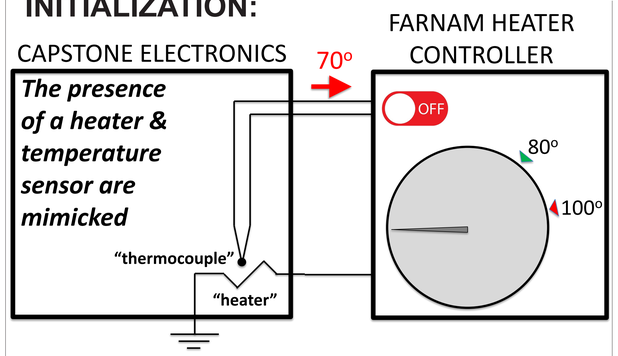


This photo shows the Farnam Capstone Team final circuit schematic to implement test requirements.

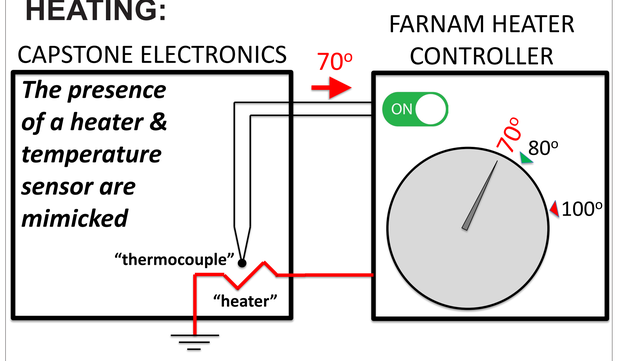


This photo shows the Farnam Capstone Team software interface for testing and operator manipulation.

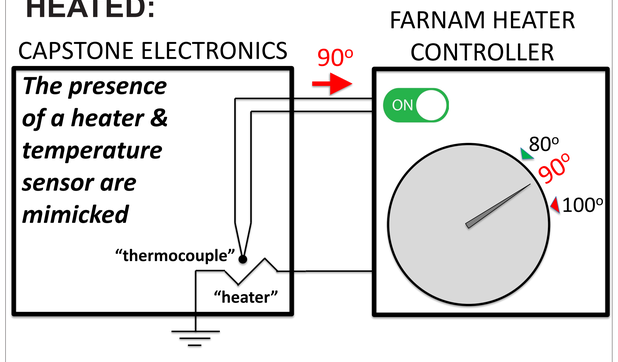
INITIALIZATION:



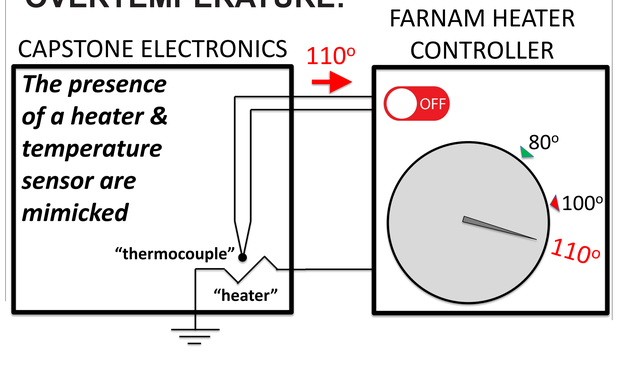
HEATING:



HEATED:



OVERTEMPERATURE:



SUMMARY AND CONCLUSIONS

Upon testing at Farnam's facility, the test station proved to successfully communicate with Farnam's manufactured Control Panels. This test involved several connections made from the fixture-mounted panel to the panel being tested. During the testing procedure, many safety precautions were taken to ensure no person was in harm's way. Going forward the individual testing modules should be tuned to allow the embedded timers of the test code to have more time to perform the tests, and the output voltage needs to be adjusted to reflect proper functionality of the Control Panel.

FUTURE WORK

Moving forward, Farnam intends to implement this into their Control Panel manufacturing assembly line as their testing procedure for standard control panels. Future work would include cutting down on process time by including quick connectors for the panel-to-panel for connections, as well as possibly cutting down on overall connections by modifying the coding behind the test procedure.

TEAM & ACKNOWLEDGEMENTS

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- Gage Kosnik (Engineering Technology)
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