Design Document Part 1

Problem Statement:

Sukup is developing a device to measure the temperature inside grain dryers using resistive temperature devices (RTDs); they need a way to test the functionality of their device. The testing device for their temperature device must be able to test the accuracy of the chip used to calculate the temperature from the RTDs, test fault conditions of the device, such as over/under voltage and open/short circuit conditions, as well as confirm the board communicates with the outside world correctly through Modbus communication.

This test device will help ensure that no temperature measuring device that isn’t working properly makes it into the field where it could allow a grain dryer to get too hot, potentially to the point of combustion, before alerting someone of the temperature. The test device can also be used to help improve the temperature device throughout its development.

The main issue is with the test device's own accuracy. If this is not properly accounted for, temperature devices that are not suitable to be installed into a dryer could pass all the tests from the testing device, resulting in a faulty temperature device in the field. The accuracy of the test device will be accounted for by considering the tolerance the components used to make it. The test device will show a failed test in the event that its own error carries outside the acceptable bounds for a given test.

Intended Users:

* Sukup Electrical Engineer
  + Persona
    - Designs, programs, and creates circuit boards for Sukup
    - Does not like programming
  + Needs
    - Needs developmental tool for testing prototypes
  + Benefits
    - Testing prototypes much easier and faster
    - Can see what went wrong and why it went wrong
* Technician
  + Persona
    - Builds circuit boards
    - Tests circuit boards after building
  + Needs
    - Test circuit boards as to not sell malfunctioning equipment
  + Benefits
    - Makes testing much faster
    - Increased production rates