

## 12. Frost Growth Dynamics Testbed

Purpose: This setup is used to frost growth dynamics between the fins of a heat exchanger during condensation and frosting. The layout of the setup (as shown above) allows us to record high resolution and high-speed images of frost growth or condensate interaction in the volume between two simulated fins. This setup is placed on a humidity controlled canopied test bench. We use a DSLR camera to visualize and measure frost growth rates. A high-speed camera can also be mounted to record jumping droplets on superhydrophobic surface. Different surfaces may be attached to the cold plates.

- Imaging: DSLR camera (Canon EOS7D and Pentax K-50), high-speed camera (Phantom A655sc).
- Data Acquisition: National Instruments cDAQ systems.
- Temperature measurements: 6 K-type thermocouples calibrated to 0.1°C.
- Ambient measurements: Ambient temperature and humidity are measured using an Omega HX93b hygrometer.
- Chiller: Polyscience 6160 circulating 50% ethylene glycol mixture. Temperature range (-20°C to 30°C).
- Actual image of the setup is shown below.

