

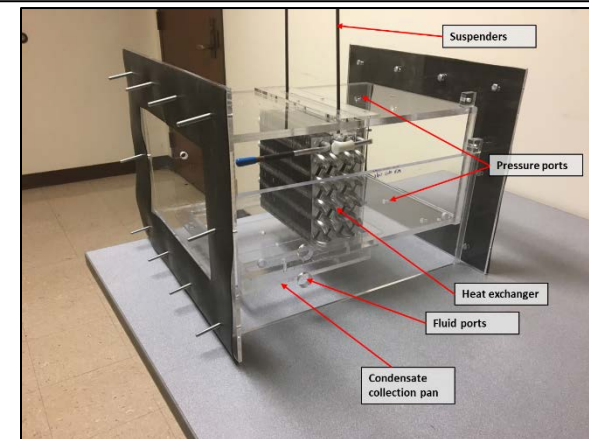
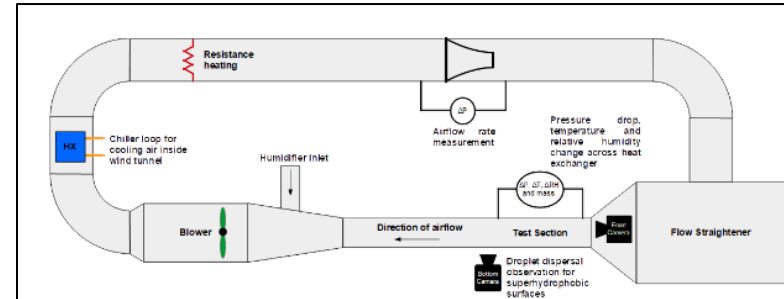
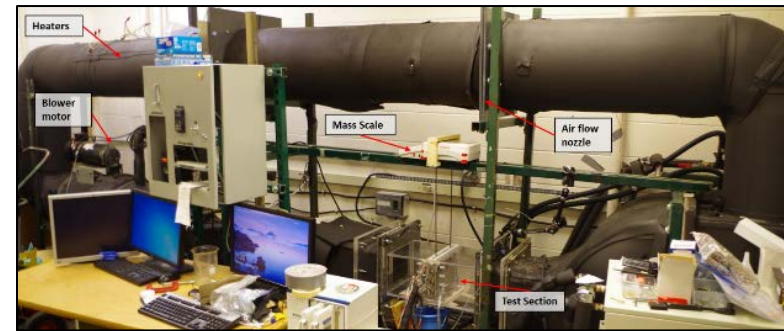
16. Climate Controlled Wind Tunnel Setup for Heat Exchanger Testing

Purpose:

- Closed loop windtunnel used to test condensation, frosting, and defrosting characteristics of heat exchangers.
- Records, temperatures, pressure drop, relative humidity, and mass of heat exchanger continuously.
- Frost formation can be monitored using DSLR or IR cameras.

Specifications:

- **Heat exchanger dimensions : 27 cm x 18 cm x variable depth (2 – 10 cm)**
- Imaging: Pentax K-50, FLIR A655sc (IR).
- Data Acquisition: National Instruments NI PXIe systems.
- Temperature measurements:
 - PT100 RTD for cooling fluid measurements.
 - Two thermocouples grids (each containing 24 K-type thermocouples) for air temperature.
 - Adhesive thermocouples for surface temperatures.
- Relative humidity: Omega HX94a hygrometers at the inlet and outlet of the test section.
- Flowmeter: Micromotion flowmeter to measure the flow rate of the cooling fluid.
- Air flowrate: Setra model 234 pressure transducer is used to measure the pressure drop across an air flow nozzle.
- Pressure drop: Setra 234.
- Mass scale: Ohaus explorer 10200 with data transfer ability.
- Heaters: PID controlled resistance heating.
- Chiller:
 - In-house chiller circulating 50% ethylene glycol mixture to the test section. This chiller has wide range of temperature and flowrate settings.



- Thermo Scientific Merlin M150 circulating 50% ethylene glycol mixture to the air-cooling heat exchanger. Temperature range (-20°C to 30°C).
- Polyscience AP07 hot water bath supplies hot ethylene glycol mixture for defrosting. (-20° to 200°C).

Figure1: Windtunnel.

Figure 2: Schematic showing instrumentation.

Figure 3: Test section