Objective:
- Demonstrate the **feasibility** and **reliability** of the proposed **automated performance mapping** hardware and methodology based on **machine learning**

Problem
- Understand and optimize the **minimum data set** required to **train an ANN model**

Expected Results / Impact:
- **Generalized compressor mapping** methodology that **overcomes shortcomings of existing standards**
- **Reduce** expensive time spent in the laboratory
- **Automated identification** of compressor operating envelopes
- **High accuracy** performance mapping

Approach:
- Gather a diversified data set for different compressor types from previous experimental studies
- Utilize PDSim to further extend the data set
- Develop, train, and validate different deep-learning models with focus on MIMO ANN models
- Utilize PDSim as the “virtual calorimeter“ to develop the mapping algorithm

Schedule

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Automated Compressor Performance Mapping (Equipment)

Figure 1: ANN model development and validation: single- and two-phase Injected hermetic scroll compressor

Figure 2: Automated mapping procedure

Define testing envelope boundaries

Run test setup with minimum number of steady-state points

Add test point

Train and test ANN model

NO

$MAPE < \epsilon$?

YES

Compressor map completed