Predicting the health of a commercial engine.

For the aerospace industry, especially for the commercial airplane one measuring the health of their engines is a vital task. This driven by many factors, the most important one the safety of the passengers, followed by saving money to the company by ensuring efficient engines (savings given by reduction in maintenance and fuel consumption). Even though the health of the engine can be divided into many fields, in this particular example we will focus on the thermodynamic part of it.

The turfan/turbojet engine follows a thermodynamic cycle called Joule-Bryton. This cycle states that are the systems are interconnected one to another. By this assumption and by having data from certain sections of the engine it is possible to infer the status on all the other components, all with all this information and some models (and experts looking at this) an assessment on the thermodynamic health of the engine can be provided. This assessment leads to repairs and/or certification of the engine to come back to service again.

This process is costly and time consuming given that every analysis is done by an expert in thermodynamics, plus the many unique tools that this can be using. I would like to provide a data flow structure to diagnose and certify a commercial engine:

Information
about the engine

**Engine arrives at a
Test Cell Facility**

Test Cell Diagnostics
DB

Data

Previous data

Information
about the engine

On Wing Historical
Data

Engine is put
test under
specific
conditions

Data

Test Cell DB

Assessment
of rework
needed for
the engine

Instructions to Test
Cell Personnel

**Modifications/repairs
to engine and Final
Acceptance**

Engine thermodynamic data
(Pressure, Temp, etc)

Previous data

Initial Health
Assessment

Results

Ideal
Thermodynamic
Model

Non ideal
thermodynamic model
(Personalized model)

Results

Results

Diagnostic analysis