**av\_manufacturing\_supply\_chain**

| **Column** | **Description** | **Units** |
| --- | --- | --- |
| sn | Unique serial number for a given part | Unique numeric value |
| pn | part number (3 parts represented in this dataset: 54321P01, 65421P11, and 44321P02) | Alphanumeric value |
| op | Manufacturing operation for the particular part | opXXX |
| part\_desc | description of the part type (3 represented: shroud, disk and blade) | -- |
| kc | Key characteristic number. For each operation there may be multiple key characteristic measurements taken, with each measurement given a numeric value | integer value |
| msmts | measurement value for the key characteristic. Each kc must be within tolerances (min and max) for the part to be acceptable | real number representing a measurement |
| max | max value for a kc measurement. Each pn-op-kc combination should have a shared max value | real number representing a measurement |
| min | min value for a kc measurement. Each pn-op-kc combination should have a shared max value | real number representing a measurement |

**av\_bom\_manufacturing**

|  |  |  |
| --- | --- | --- |
| desc | description of the part type (3 represented: shroud, disk and blade) | -- |
| esn | Engine Serial Number - unique number given for a specific engine | Unique 6-digit number per engine |
| pn | part number (3 parts represented in this dataset: 54321P01, 65421P11, and 44321P02) | Alphanumeric value |
| sn | Unique serial number for a given part | Unique numeric value |
| vstream | Supply chain value stream for the part (3 represented in this dataset: cmc's, machine\_airfoils, and rotating\_parts) | integer value |

**av\_esn\_rul**

| **Column** | **Description** | **Units** |
| --- | --- | --- |
| esn | Engine Serial Number - unique identifier for a specific engine | -- |
| rul | Remaining Useful Life. Within this case study, RUL is depicted as the number of cycles remaining until the engine needs to be overhauled. It can be determined algorithmically based on assumed wear of life limiting parts (which is what we will be doing) or via inspection  IMPORTANT: The RUL assigned to the ESN is the number of operational cycles after the last cycle that the engine will continue to operate | cycles (remaining until overhaul following the last cycle depicted for a specific ESN) |

**Flight Data (4 tables, all with prefix 'av\_engine\_data\_...')**

|  |  |  |
| --- | --- | --- |
| **Column** | **Description** | **Units** |
| dataset | Master data set for the case study | -- |
| esn | Engine Serial Number - unique number given for a specific engine | Unique 6-digit number per engine |
| unit | Engine unit number assigned to a given ESN | Unique number assigned to a given ESN |
| flight cycle | Several flight cycles are recorded for a given ESN. The 'flight cycle' column reflects each cycle sequentially. **The goal of the exercise is to predict the RUL for the LAST flight cycle for a given ESN** | Sequential integer that starts at 1 and ends at the last recorded cycle for a given ESN |
| datetime | Date and time when the engine measurements were taken. All measurements are taken in zulu time (corrected for time zones to the time zone at the prime meridian) | YYYY-MM-DDTHH:MM:SS.SSS Z |
| operator | 3-4 letter unique code for a specific airline | 4 airlines represented (AIC, FRON, PGS, AXM) |
| depart\_icao | 4 letter code for the departure airport. | For a full list of ICAO codes see <http://airportsbase.org/ICAO.php> |
| destination\_icao | 4 letter code for the destination airport | For a full list of ICAO codes see <http://airportsbase.org/ICAO.php> |
| hpc\_eff\_mod | High Pressure Compressor (HPC) efficiency modifier. An operational profile for HPC efficiency set by the airframe operator (In actuality, this was a modifier variable to simulate degradation within the simulation modeling software) | -- |
| hpc\_flow\_mod | High Pressure Compressor (HPC) flow modifier. An operational profile for HPC flow set by the airframe operator (In actuality, this was a modifier variable to simulate degradation within the simulation modeling software) | -- |
| tra | Throttle Resolver Angle | Degrees |
| t2 | Total temperature at fan inlet | Degrees Rankine (<https://en.wikipedia.org/wiki/Rankine_scale>) |
| t24 | Total temperature at Low Pressure Compressor (LPC) outlet | Degrees Rankine (at least this is what it should be...) |
| t30 | Total temperature at High Pressure Compressor (HPC) outlet | Degrees Rankine |
| t50 | Total temperature at Low Pressure Turbine (LPT) outlet | Degrees Rankine |
| p2 | Pressure at fan inlet | pounds per square inch absolute (psia) - pressure relative to vacuum |
| p15 | Total pressure in bypass-duct | pounds per square inch absolute (psia) - pressure relative to vacuum |
| p30 | Total pressure at High Pressure Compressor (HPC) outlet | pounds per square inch absolute (psia) - pressure relative to vacuum |
| nf | Physical fan speed | rpm |
| nc | Physical core speed | rpm |
| epr | Engine pressure ratio (p30/p2) | -- |
| ps30 | Static pressure at HPC outlet | pounds per square inch absolute (psia) - pressure relative to vacuum |
| phi | Ratio of fuel flow to ps30 | [pounds per second (pps)] / [pounds per square inch absolute (psia)] |
| nrf | Corrected fan speed | rpm |
| nrc | Corrected core speed | rpm |
| bpr | Bypass Ratio | -- |
| farb | Burner fuel-air ratio | -- |
| htbleed | Bleed Enthalpy | -- |
| nf\_dmd | Demanded fan speed | rpm |
| pcnfr\_dmd | Demanded corrected fan speed | rpm |
| w31 | HPT coolant bleed | lbm/s (pound-mass per second) |
| w32 | LPT coolant bleed | lbm/s (pound-mass per second) |

**av\_lkp\_airport\_codes\_t**

|  |  |  |
| --- | --- | --- |
| **Column** | **Description** | **Units** |
| airport \_icao | Unique 4-letter identifier for a given airport. icao = International Civil Aviation Organization | -- |
| latitude | The angular distance of a place north or south of the earth's equator, expressed in signed degrees format (positive values are north of the equator) | DDDD.ddd |
| longitude | The angular distance of a place east or west of the meridian at Greenwich, England (positive values are east of the Prime Meridian) | DDD.ddd |