HAW HAMBURG

DEPARTMENT OF AUTOMOTIVE AND AERONAUTICAL ENGINEERING

Oil Leakage Paths within Compressors of Jet Engines and Oil Concentration in Aircraft Cabin Air

Task for a *Project*

Background

Cabin Air Contamination (details here: http://CabinAir.ProfScholz.de) is caused by leakage through the seals of jet engines. Jet engines have heavy shafts supported by bearings. They are lubricated and sealed. These seals leak small amounts of oil by design. The leakage related concentration of hydrocarbons in the cabin depends not only on the amount of oil leaving the seals, but also on a set of engine and aircraft parameters, because not all the oil can reach the cabin. The parameters are combined in one simple equation. We look at several dominant jet aircraft and their engines in order to calculate the cabin air contamination potential. A comparison may reveal aircraft-engine-combinations more prone to cabin air contamination than others based already on external design parameters. Furthermore, we look at the jet engine design in more detail to understand, how the oil finds its way from leaking seals into the main gas path of the jet engine compressor and finally via the bleed port into the cabin.

Task

Task of this project is to study and analyze details of engine oil leakages in jet engines and their consequences to oil concentration in aircraft cabin air. The subtasks are:

- Collect design drawings of jet engines.
- Study one or more possible paths for the oil to reach the cabin from leaking seals.
- Collect data on oil consumption of jet engines.
- Collect aircraft and engine parameters as required to calculate the concentration of the oil in aircraft cabin air.
- Calculate and analyze concentration of the oil in the aircraft cabin air of various aircraft and engine combinations and draw general conclusions.

The report has to be written in English based on German or international standards on report writing.