

Public Workshop: ENOVAL reports promising interim results

Munich, Germany, March 2, 2018 – Things have been going very well so far: After four years of research activities, the partners in the EU's ENOVAL (**EN**gine **mO**dule **VAL**idators) technology programme met in Munich for a Public Workshop gathering. The results presented were good news indeed: To date, more than 70 percent of the objectives have been accomplished, and so ENOVAL is on track to be successfully completed this summer. "We have clearly shown what additional potential is still waiting to be tapped with turbofans," said Dr. Edgar Merkl from MTU Aero Engines, who is the ENOVAL coordinator. The technology is slated to fly starting in 2025.

Late last year, some 60 representatives from the 35 ENOVAL partners in industry, research and academe met at the Municon Conference Centre at Munich Airport for three days to present the results of their work and agree on the course of action to follow next. The managers heading up the five sub-projects reported that 60 of the 70 milestones had been achieved, 11 out of 18 rig tests successfully completed, and as many as 62 publications released.

New technologies for geared turbofan engines

As part of ENOVAL, new technologies for low-pressure components to go into medium-sized, large and very large turbofans incorporating geared turbofan technology are being developed. The objective is to achieve a reduction in CO₂ emission by up to five percent and in noise of up to 1.3 decibels. These goals will be accomplished with a higher overall pressure ratio of between 50:1 and 70:1, as well as higher bypass ratios of between 12:1 and 20:1 combined with increased overall pressure ratios of up to 70:1. Said Merkl: "The bypass ratio achieved in the ENOVAL programme is in the range of 14:1 to 16:1," adding that this improves propulsion efficiency, thus reducing fuel burn and pollutant emissions. "And, on top of that, this will bring the noise emitted by emerging engines down further, even below the noise level of the geared turbofan, which is already very quiet as it is now."

"Taking a year-2000 engine as the baseline, we've managed to cut noise by as much as nine decibels and reduce CO₂ emission by around 28 percent by combining ENOVAL technologies with those resulting from predecessor projects, such as LEMCOTEC and E-BREAK," explained ENOVAL Chief Engineer Dr. Jörg Sieber, who likewise works at MTU. According to Sieber, these values already meet ACARE's targets for 2020 in terms of CO₂ emissions. Whereas the aim of LEMCOTEC and E-BREAK was, on the one hand, to develop technologies that increase the overall pressure ratio, and hence thermal efficiency, and, on the other hand, to adapt materials and subsystems so that they are capable of withstanding the pressures and temperatures that will increase in future, ENOVAL is focusing on the development of the low-pressure system for ultra-high bypass ratio aero engines. At the Municon, the LEMCOTEC and E-BREAK results were likewise presented to the audience.

The ENOVAL partners have cooperated so successfully that several patent applications have already been filed. According to Merkl, the output of the “excellent interdisciplinary cooperation” also includes ten learning modules, which have been made available on the ENOVAL website. Jean-François Brouckaert, Clean Sky Project Officer of the Engine ITDs, found these learning modules and the ENOVAL website very informative and useful, saying that both were very important tools for a knowledge transfer.

The results presented again underlined the advantages of the geared turbofan technology. “Given the benefits of a geared configuration in terms of overall efficiency, all competitors now tend towards this type of construction,” said Merkl.

About ENOVAL

ENOVAL, which is set up within the Seventh Framework Programme, will run for 58 months and has a gross budget of more than € 45 million, co-funded by the European Commission with € 26.5 million. Led by MTU Aero Engines, 35 partners from ten European countries are developing new low-pressure spool technologies for turbofans, with bypass ratios of between 12:1 and 20:1 and overall pressure ratios of between 50:1 and 70:1. The focus is on engines incorporating geared turbofan technology. Major players from the European aero engine industry – including Avio Aero, GKN Aerospace, ITP, MTU, Rolls-Royce, Safran Aircraft Engines, Safran Aero Boosters and Safran Helicopter Engines – cooperate in ENOVAL with SMEs from the aeronautics sector and academic and research organizations.

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