

NEWAC – Technology for environmentally friendly aero engines



Global air traffic is forecast to grow at an average annual rate of around 5% in the next 20 years. This high level of growth makes the need to address the environmental penalties of air traffic all the more urgent. Consequently, Europe's aviation industry faces a massive challenge to satisfy the demand whilst ensuring economic, safe and environmentally friendly air travel. Alternative engine configurations consequently need to be researched in order to find a more significant and durable reduction of pollution.

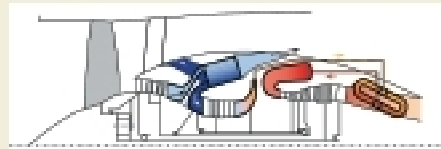
The Challenge

The Advisory Council of Aeronautical Research in Europe ACARE identified the research needs for the aeronautics industry for 2020; regarding the engine a 20% reduction in CO₂ emissions per passenger-kilometre and a significant reduction of the NO_x emissions in order to achieve the 80% reduction.

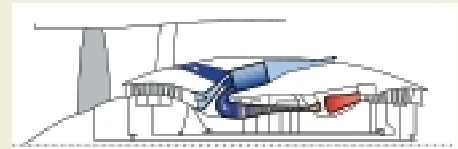
The existing programmes have already identified concepts and technologies to meet these goals; NEWAC (New aero engines core concepts) is a new European-level program on which – under the leadership of MTU Aero Engines – major European engine manufacturers, assisted by universities and research institutes – 40 partner in all - focus on new core engine concepts. It will close the gap in the enabling technologies and will develop fully validated novel core engine technologies based on the results of past EC project.

NEWAC, a 71 Mio. Euro program of which 40 Mio. Euro are funded by the EC, will provide through its research programme, technological breakthroughs for the field of aero engines efficiency and emissions. These innovations will include:

- **Intercooled Recuperative Aero Engine (IRA)** which includes optimisation of the recuperator arrangement, innovative duct design and a radial compressor in a new design area.



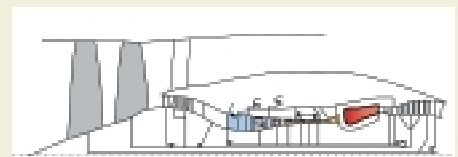
Intercooled Recuperative Core Configuration



Intercooled Core Configuration



Active Core Configuration



Flow Controlled Core

- **Intercooled core** with compact and efficient intercoolers, aggressive ducting and advanced compressor capable of performing at the extremely demanding conditions of the intercooled cycle and with improved transient behaviour for intercooler integration. The intercooler is also a critical technology for the IRA concept.
- **Active core** with active heat management systems like active cooling air cooling, active rotor venting system, smart compressor casing and active compressor flow control
- **Flow controlled core** with outer flow-path control technology from casing air aspiration applied on blades and vanes, new advanced 3D aerodynamic compressor design and robust rotor/stator tight clearance management.
- **Innovative combustors** with Lean Premixed Prevaporized technology applied for low OPR (Overall Pressure Ratio) engines (intercooled recuperative core) with Partially Evaporated Rapid Mixing technology for low to medium OPR engines (active and flow controlled core) and Lean Direct Injection technology for medium to high OPR engines (intercooled core).

Expected results

NEWAC main result will be fully validated novel technologies enabling a 6% reduction in CO₂ emissions and a further 16% reduction in NO_x. Most importantly, the project will address the particular challenges involved in delivering these benefits simultaneously contributing to the attainment of the ACARE targets.

All new configurations investigated in NEWAC will be compared, assessed and ranked regarding their benefits and contributions to the global project targets. Detailed specifications will be provided for all innovative core configurations. As a result, NEWAC will identify the technology routes to environmentally friendly and economic propulsion solutions. The developed components will further result in optimised engine designs based on the NEWAC technologies but also in combination with the results of the EEFAE, SILENCER and VITAL programmes.

If you want to read more about the program go to www.newac.eu.

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