

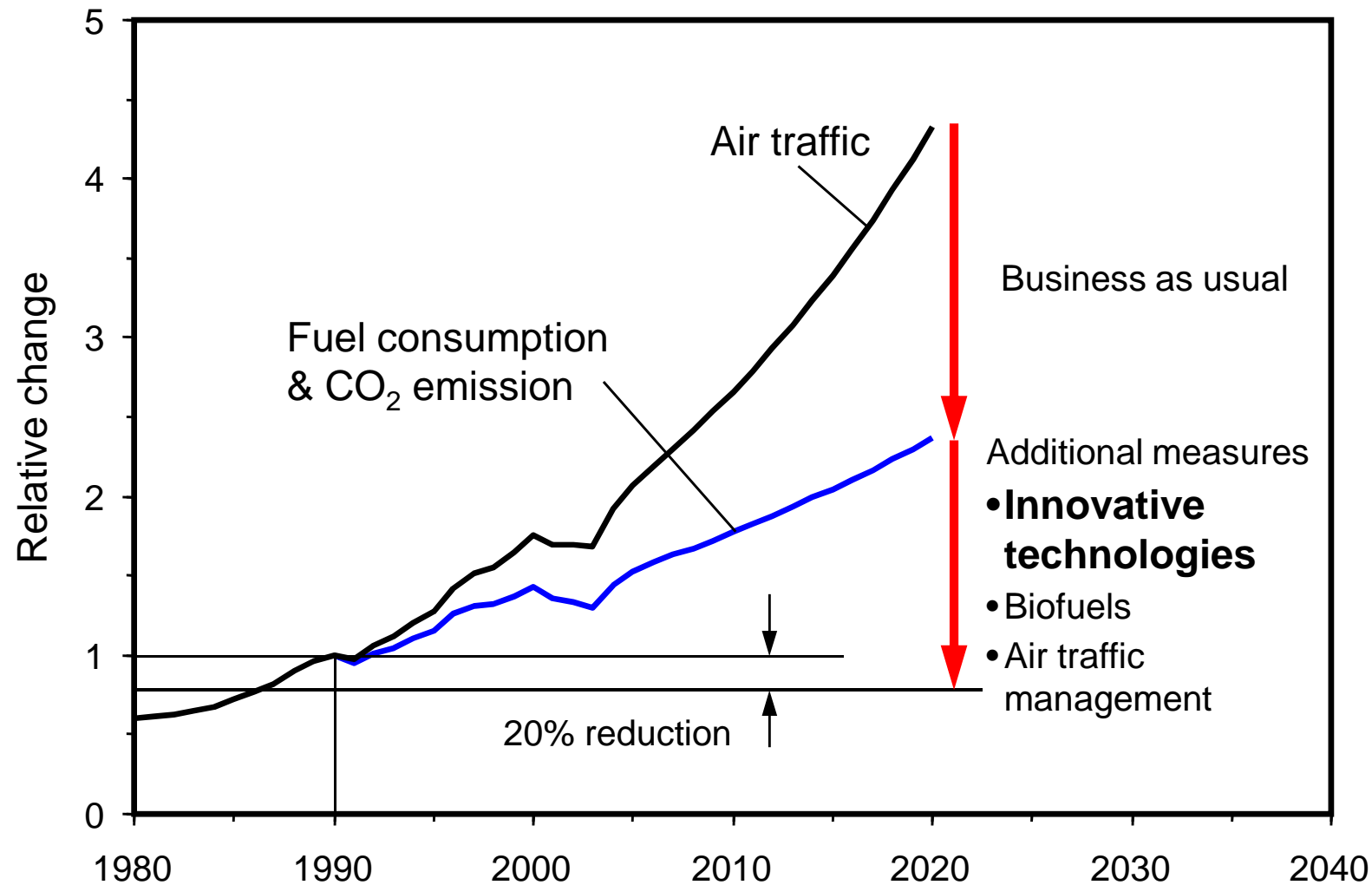
NEWAC Project Overview

Joerg Sieber, MTU Aero Engines

European Engine Technology Workshop

Warsaw, 2-3 June 2009

Air Traffic and CO₂-Emissions



VISION 2020 Targets

ACARE (Advisory Council of Aeronautical Research in Europe)

Safety & Security

- Reduce accident rate by 80%
- Zero successful hijack

Quality & Affordability

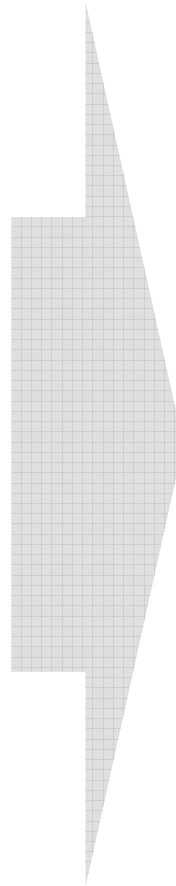
- Halve time to market
- Fall in travel charges

Air Transport System Efficiency

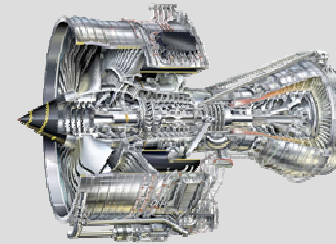
- On time arrival/departure 99% within 15 minutes
- Increase movements of aircraft x3

Environment

- Reduce CO₂ by 50%
- Reduce NO_x by 80%
- Reduce perceived noise by half



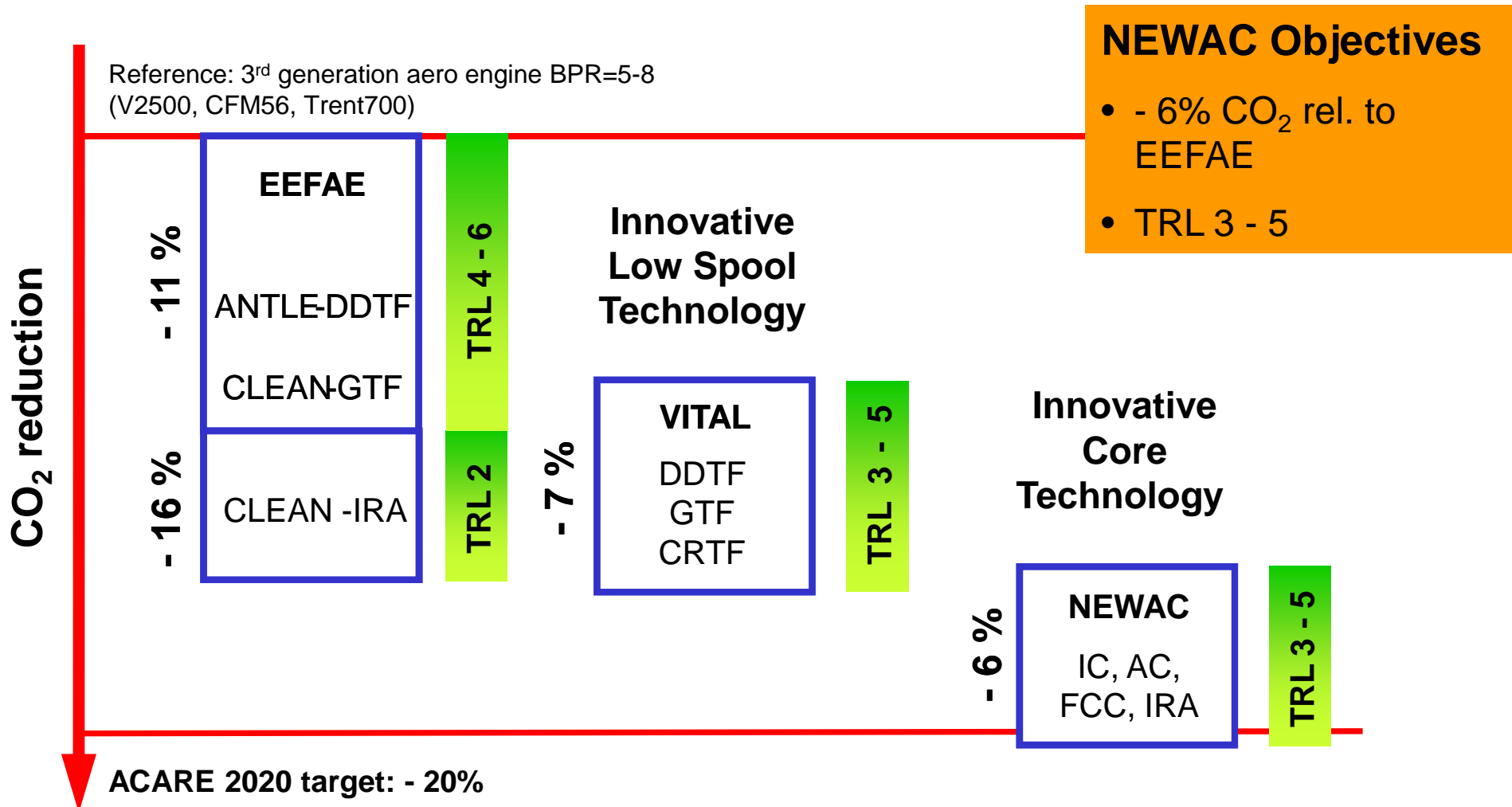
Engine Contribution



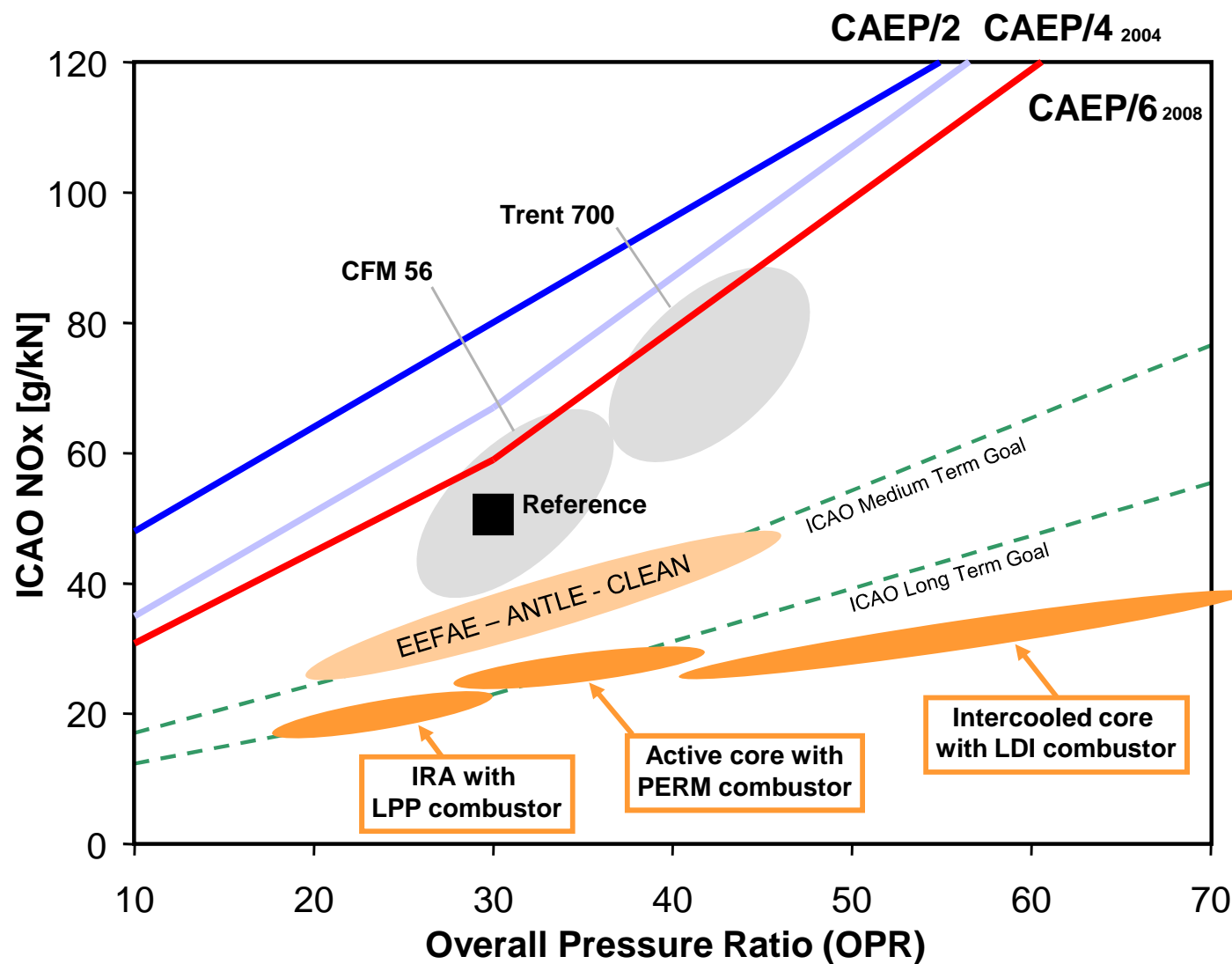
- Reduce specific fuel consumption by 20%
- Reduce NO_x by 60 to 80%
- Reduce noise by 10 dB per operation
- Reduce accident rate by x5
- Reduce operational costs
- Half time to market

Reference: year 2000 in service engine

CO₂ Improvements



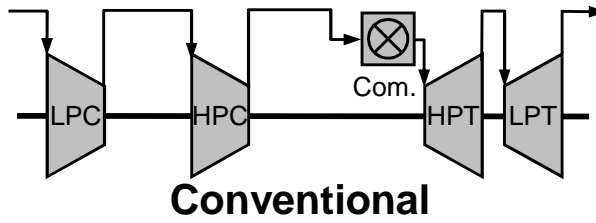
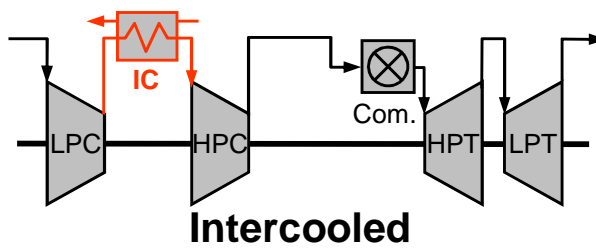
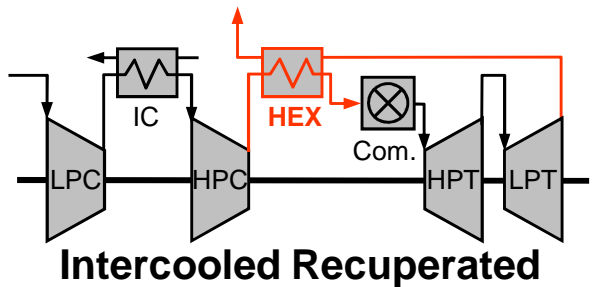
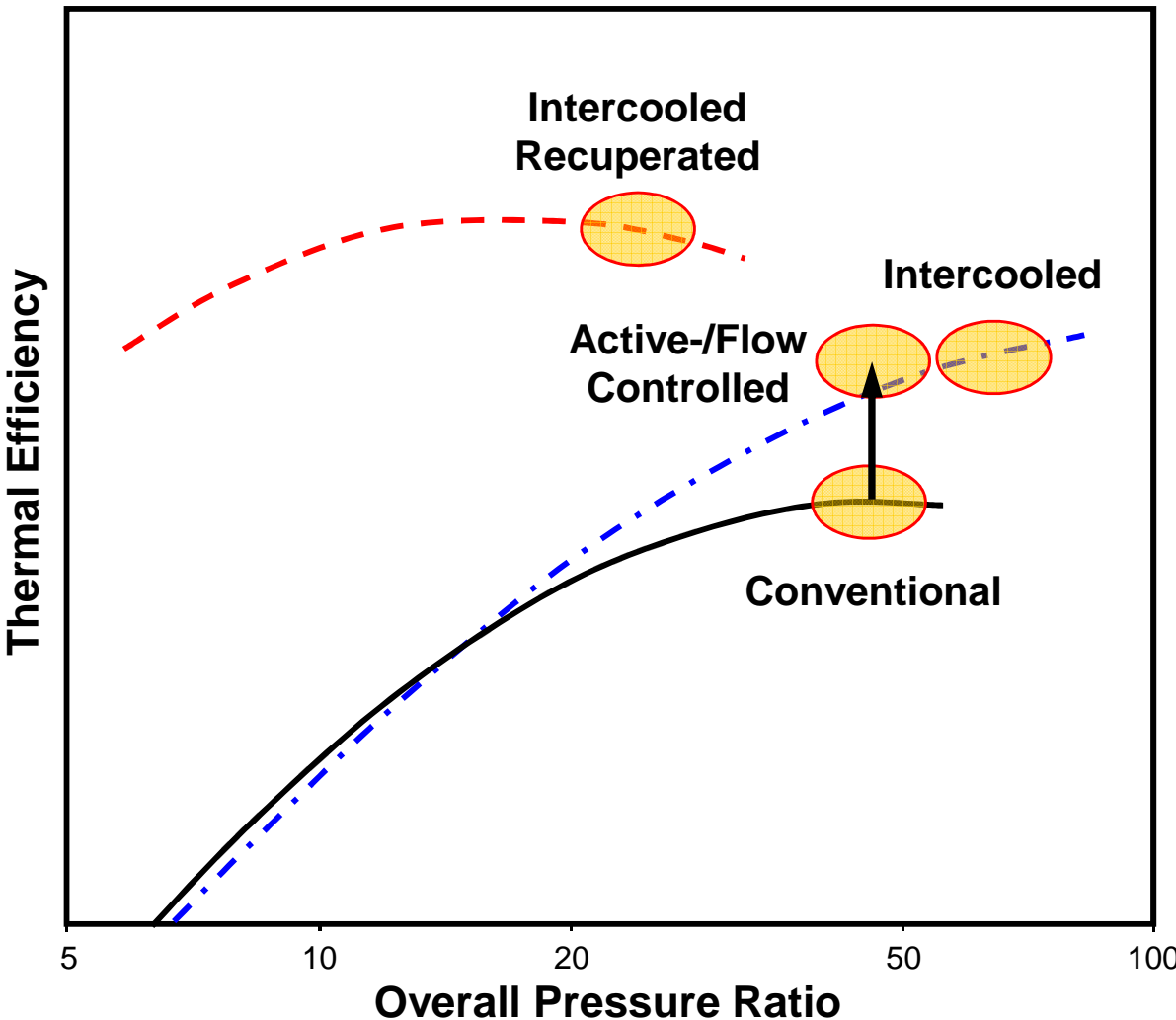
NO_x Improvements



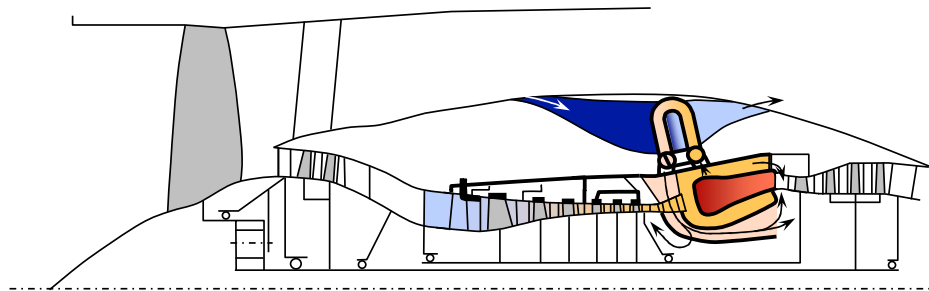
NEWAC Objectives

- - 60% to - 70% NO_x in the LTO cycle versus CAEP/2 limit
- - 16% NO_x rel. to EEFAE
- TRL 5 - 6

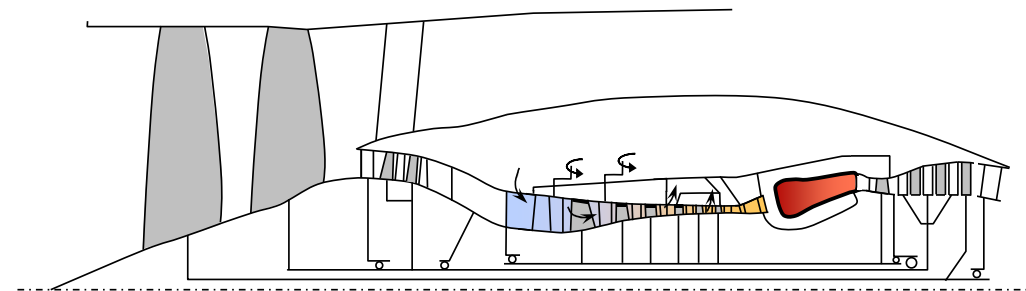
Thermal Efficiency for Different Engine Cycles



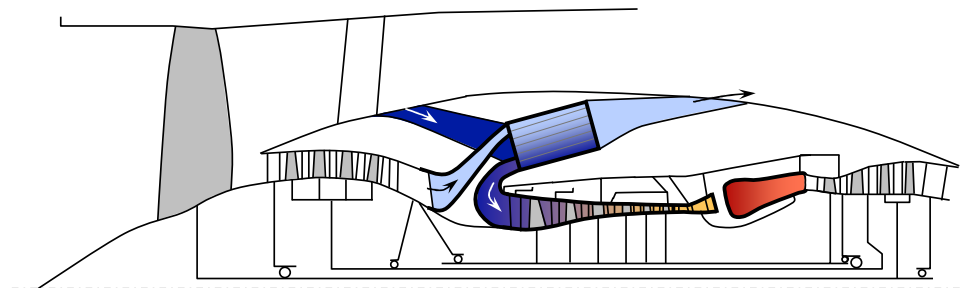
NEWAC Core Concepts



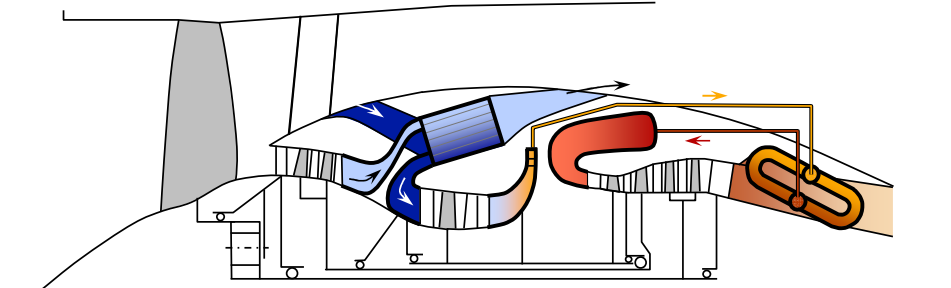
Active Core



Flow Controlled Core

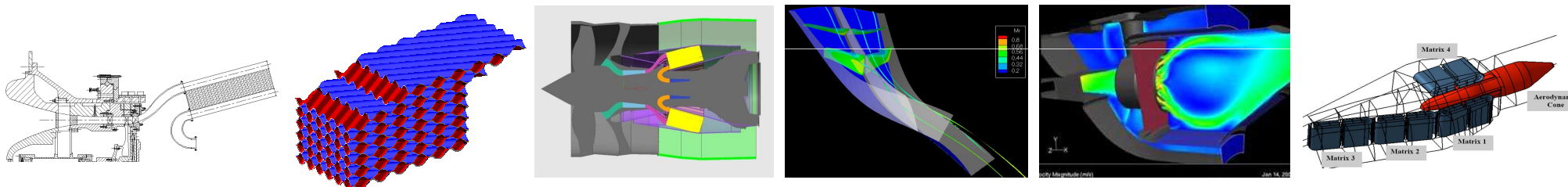


Intercooled Core



Intercooled Recuperative Core

NEWAC Key Technologies for New Engine Cycles



Ducting

- Low pressure loss ducts
- Advanced IPC outlet guide vane/diffuser

Intercooler

Cross-corrugated plate heat exchanger

Engine Integration

Radial compressor

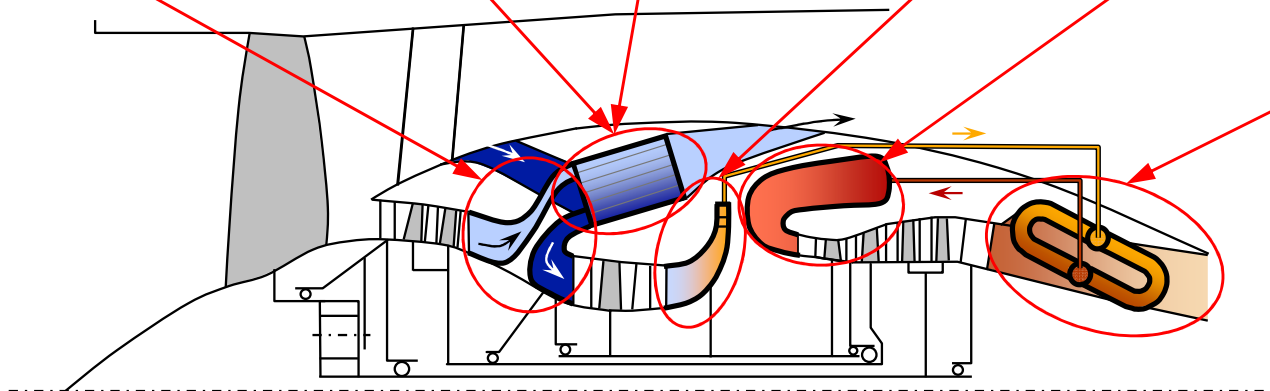
Innovative radial compressor suitable for IRA integration

Combustor

Injection systems for lean combustion

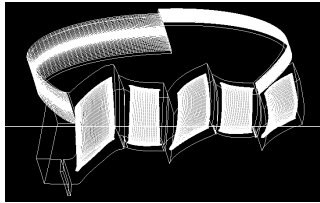
Recuperator

Heat exchanger arrangement and nozzle geometry concept

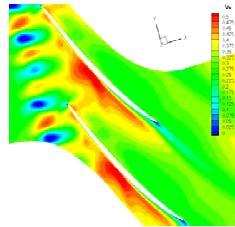


-  SP3 RR
-  SP2 MTU
-  SP2 TM
-  SP6 Avio, RR, TM

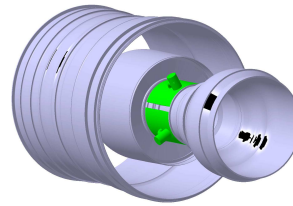
NEWAC Key Technologies for Compressors



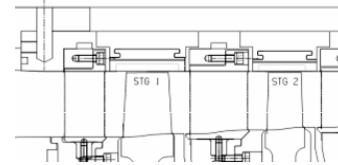
Tip Injection



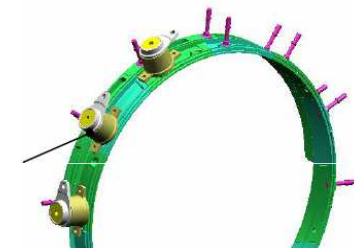
Casing Treatment



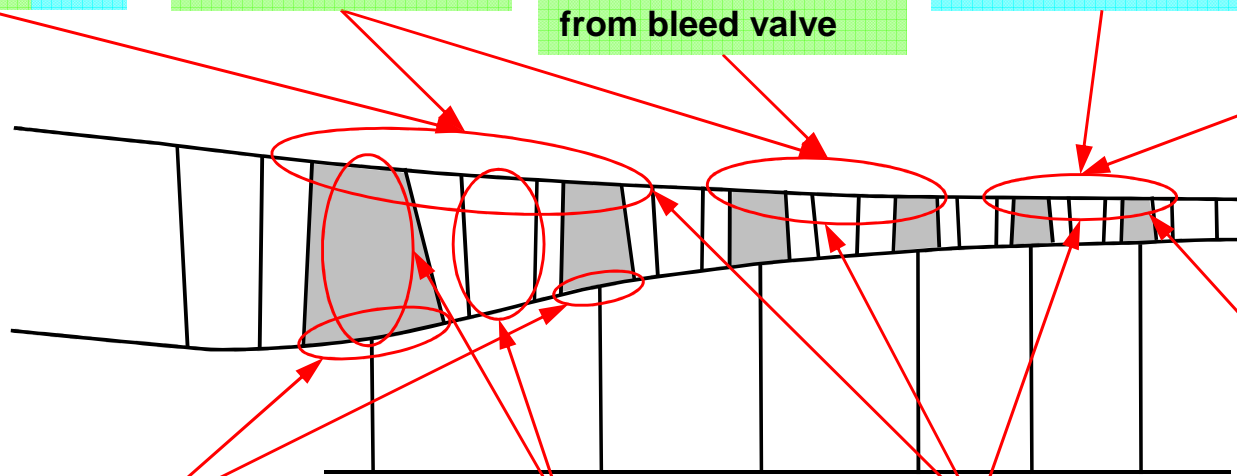
Stall Active Control from bleed valve






Casing Treatment

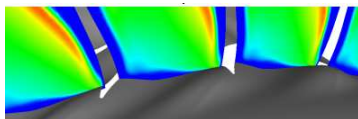


Active Clearance Control

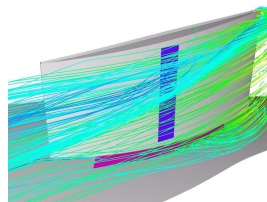


-  SP3 RR
-  SP4 MTU
-  SP5 SN

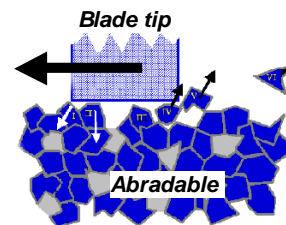
Non axi-symmetric endwalls



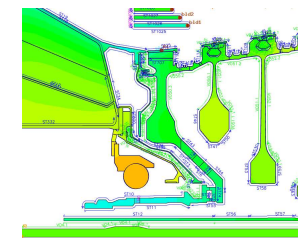
Aspiration on blade profiles and endwalls



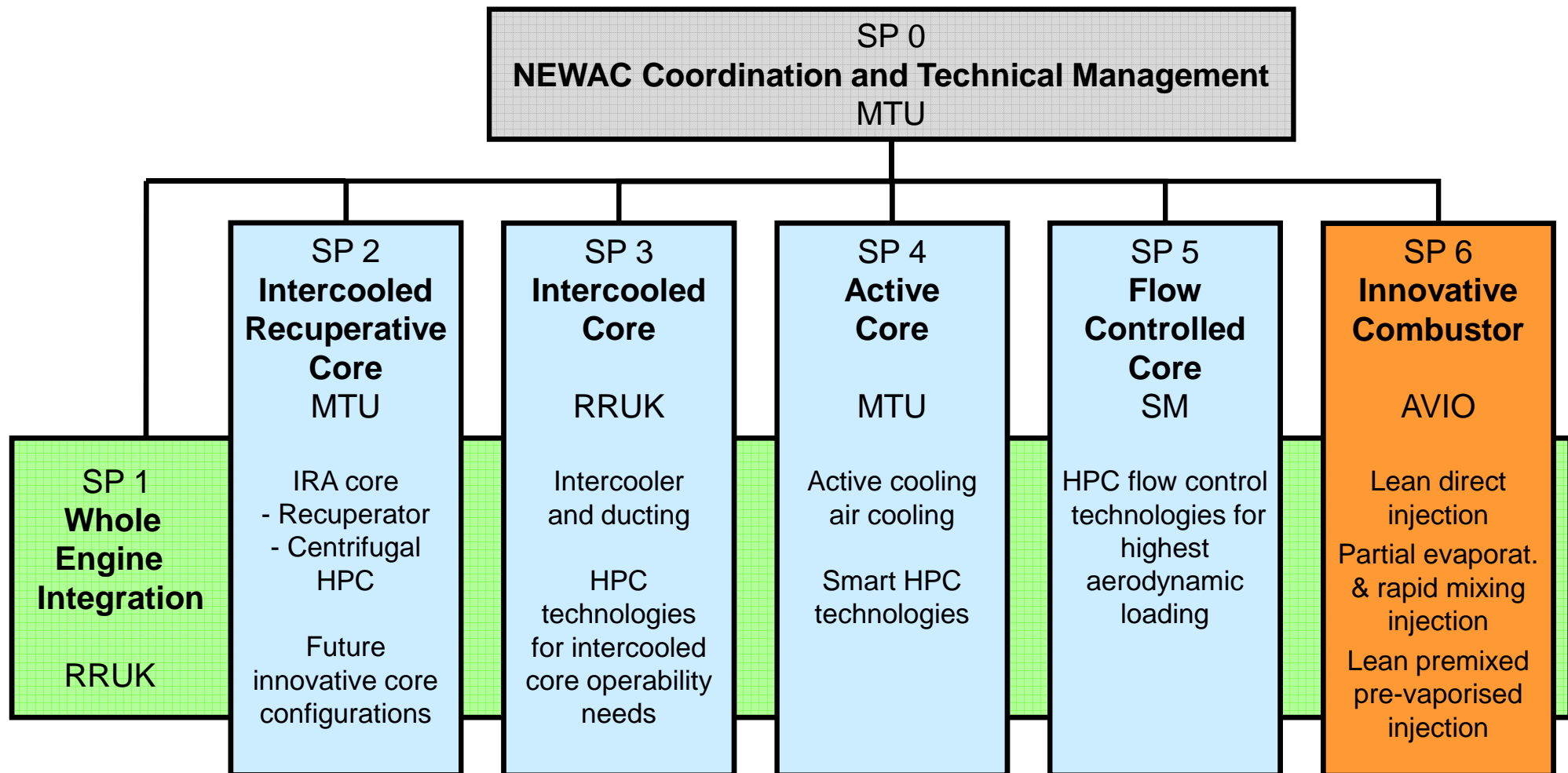
Rub management



Passive Clearance Control



NEWAC Project Structure



NEWAC Consortium

Coordinator:
MTU Aero Engines

40 Partners:
(Engine Manufacturers, Air Framer
Airbus, Equipment manufacturer,
Universities, Research centres and
SME's)

Project duration:
May 2006 – April 2010

Total budget: 71 M€

EC contribution: 40 M€

