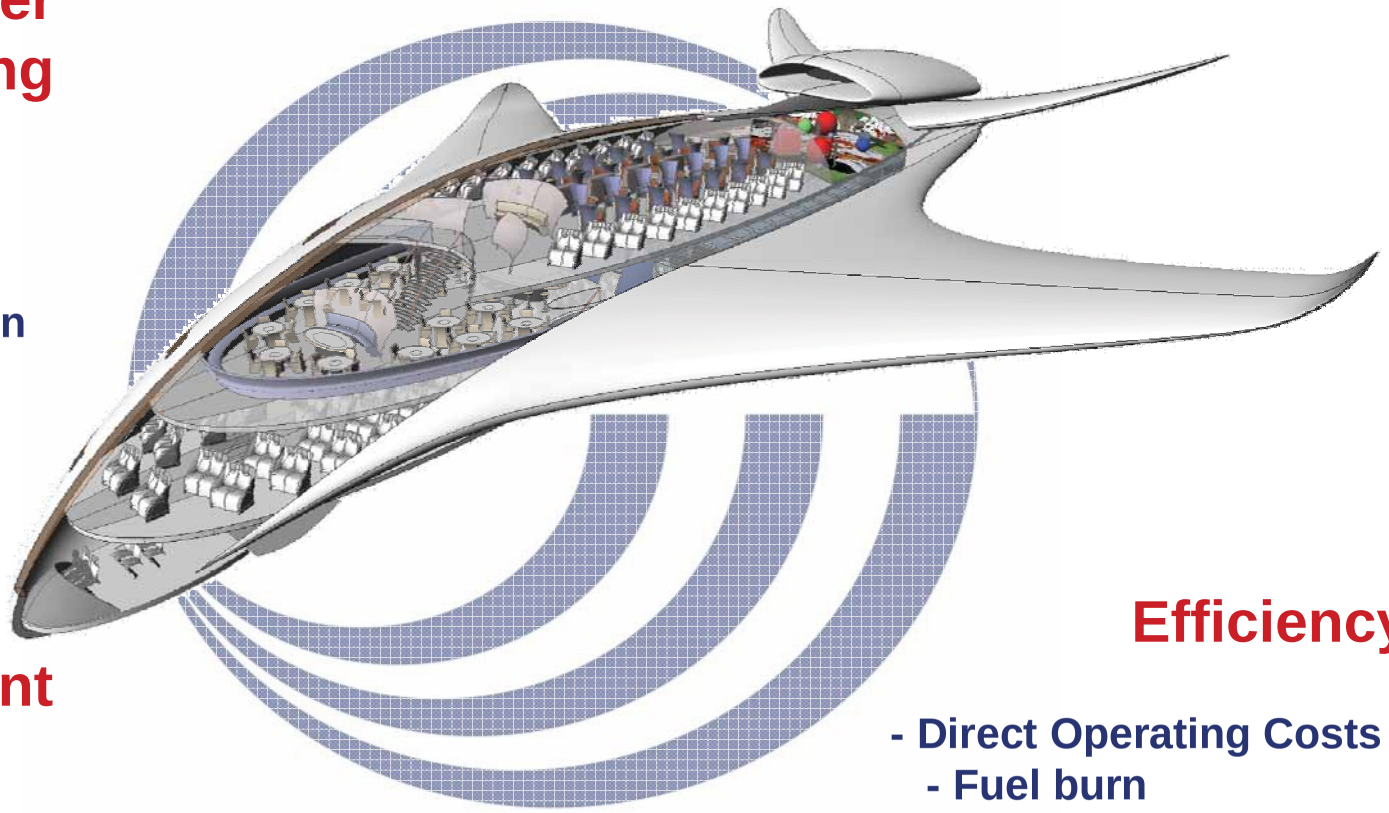
Contents

- Technologies
- Airbus experience in Ukriane
- EU process / IMG4 projects
- Comments

Main drivers of Airbus R&T

Passenger Appealing

- Comfort
- Additional Services
- Differentiation



Environment Friendly

- Emissions
- Green Manufacturing
- Recycling

Efficiency

- Direct Operating Costs
  - Fuel burn
  - Direct Maintenance Costs
- Dispatch Reliability
- Turn Round Time
- Simplicity

Airbus research is developing technologies to meet future needs of society

Potential innovations for the future

Smart Wing Technologies

- Natural Laminar Flow
- Hybrid Laminar Flow

Air Traffic Management

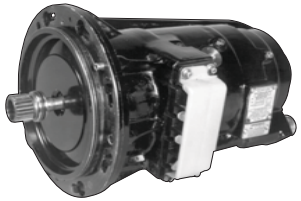
- SESAR
- Green trajectories

Innovative Power Plant

- Open Rotor configuration
- Geared Turbo Fan
- Advanced Turbo Fan
- Alternative Fuels

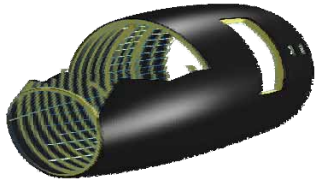
Systems for green operations

- All electric Aircraft
- Smart ground operations
- Energy management
- Fuel cells



Innovative Structures

- New materials, composite, advanced alloys
- Self healing, Structural health monitoring
- Nano technologies



Cabin innovations for the passenger

- Active surfaces
- Wireless cabin

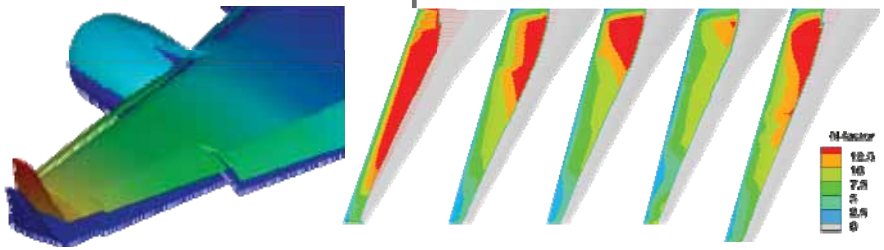
Individual technologies have significant potential to address the challenge

AIRBUS

Smart Wing Technologies

- **Aerodynamic drag minimisation**
  - Surface technologies
  - Natural laminar flow
  - Hybrid laminar flow

- **Simulation methods**
  - Integrated & Multi-disciplinary Design
  - Radical Increase in Simulation Capabilities



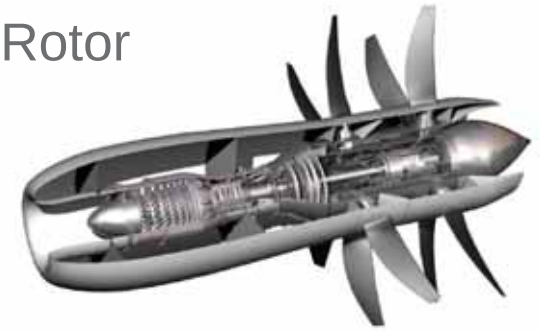
- **Weight savings though load management**
  - Active and passive load control

Smart wing technologies require a full interdisciplinary integration to deliver maximum benefit

Innovative Power Plant

- **Innovative Turbofan Architecture**
  - Geared Turbo Fan
  - Counter-Rotating Fans

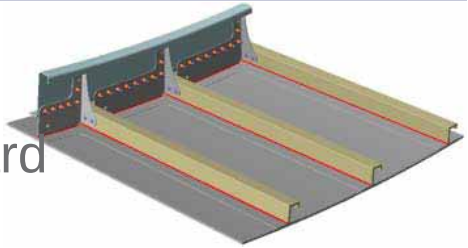
- **Counter- Rotating Propfan Engines**
  - By Pass Ratio up to 80 with open Rotor



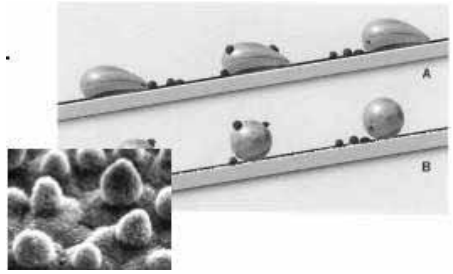
Systematic exploration of engine technologies and architectures, evaluation of their impact on overall aircraft efficiency and configuration

Innovative Structures

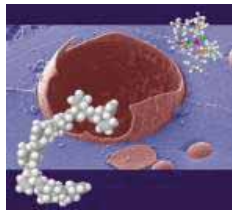
- **Composite technologies**
  - New fiber and matrix
  - Optimised composite design solutions
  - Efficient and automated manufacturing technologies



- **Metallic technologies**
  - Advanced light and hard alloys
  - Tailored integral structures
  - Bonding technologies



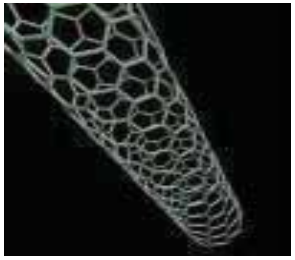
- **Nano technologies**
  - Smart and multifunctional structures
  - Self healing / repairing structures
  - Coating technologies

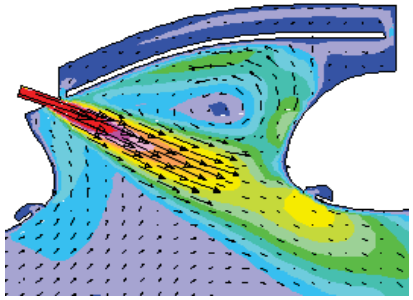


A large range of materials, manufacturing processes and technologies will generate weight saving

Cabin innovations for the passenger

- **Active surfaces**
  - Improved cabin ambience and comfort
  - Reduction of maintenance costs
  - Enhancement of cabin efficiency

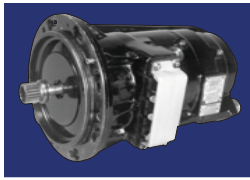




- **Air conditioning**
  - High level of thermal comfort and air quality
  - Weight reduction, lower cabin noise level
  - Lead time reduction

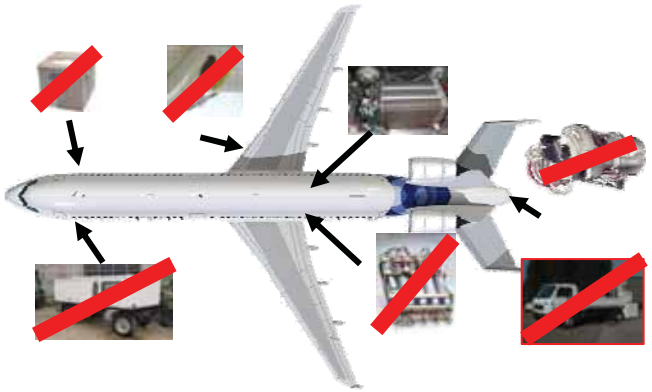
- **Wireless cabin**
  - Save time per (re-) configuration of seat rows
  - Weight reduction through wireless technologies
  - Save FAL time per aircraft

In many technology areas a wide choice of technologies are investigated and narrowed down to the most suitable selection



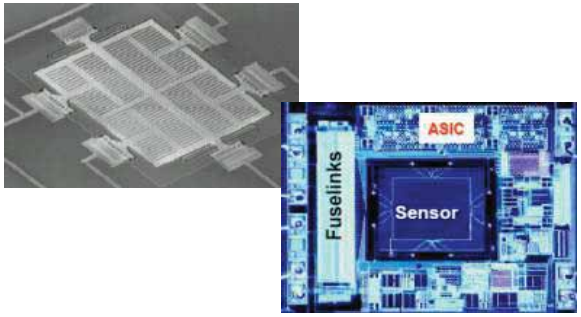
Systems for green operations

- **Electric systems**
  - Fuel cell technology
  - Power electronics
  - Simplified maintenance



- **Health monitoring technologies**
  - Structure health monitoring
  - Systems health monitoring

- **Micro technology**
  - Micro Electro Mechanical Systems (MEMS)
  - Pressure sensors
  - Gyrometer and accelerometer



Systems technologies will move towards enhanced and more integrated architectures

Airbus as Architect and Integrator

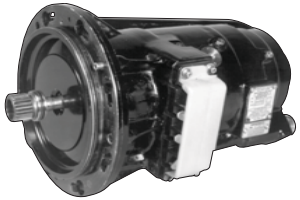
Smart Wing Technologies

Innovative Power Plant

Air Traffic Management

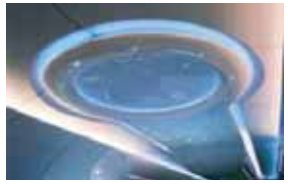
Configurations - Integration

Systems for green operations



Innovative Structures

Cabin innovations for the passenger



The overall improvement potential is not the sum of the individual technologies.

Airbus R&T Experience in Ukraine: Partners

Airbus has had good experiences in Ukraine with:

- Institute of Metal Physics (IMPh), Kiev
- Paton Welding Institute, Kiev.
- Charrington Ltd., Kiev
- Kharkiv Aviation Institute (KhAI), Kharkov
- Taras Shevchenko Univ, Kiev
- Karpenko Physico-Mechanical Institute, Lviv

Airbus R&T Experience in Ukraine: Projects

Completed Projects:

- Wing dry-bay redesign
- Explosive treatment of Friction Stir Welds
- Evaluation of wide welded extruded panels
- Surface fatigue indicators, (EU INTAS)
- Al casting evaluations
- Electron-beam welding of spars
- Numerical simulation of welds, (EU INTAS)
- Vortex Dynamics, (EU INTAS)
- Composite Structural Health Monitoring, (EU INTAS)
- Cr6+ replacement in coatings, (EU INTAS)

Current Project :

- ALCAS EU project on composite wings with KhAI

ASD-IMG4 European Aeronautics Industry

- ASD-IMG4 coordinates industry's position with regard to the EU Civil Aeronautics Framework Programmes.
- ASD-IMG4 represents, through the Industry Management Groups (IMG), the European Aeronautics Industry.

IMG4 comprises representation from four groupings :

Euromart IMG

Agusta*
Alenia Aeronautica
Airbus UK
Airbus SP
Airbus G
Airbus F
Dassault-Aviation
Eurocopter
Saab AB
S.A.B.C.A.
Westland*

(*an AgustaWestland company)

Engine IMG

Alstom
AVIO
ITP
MTU Aero Engines
PBS Velká Bíteš
Rolls-Royce
RRD
SNECMA
Techspace Aero
Turbomeca
Volvo Aero
WSK Rzeszow

Equipment IMG

Galileo Avionica
BAE systems avionics
Diehl avionik system
Hellenic Aerospace Ind.
Liebherr-Aerospace
Lindenberg GmbH
Messier-Dowty Ltd
Messier-Bugatti
Smiths Industries
TRW-Lucas aerospace Ltd
Thales avionics
Thales avionics electronic systems
ZF Luftfahrttechnik GmbH
Auxitrol
Cesa
Dräger AG
Fokker-Elmo
Sagem
Marconi
Nord-micro
Skysoft
Saab AB

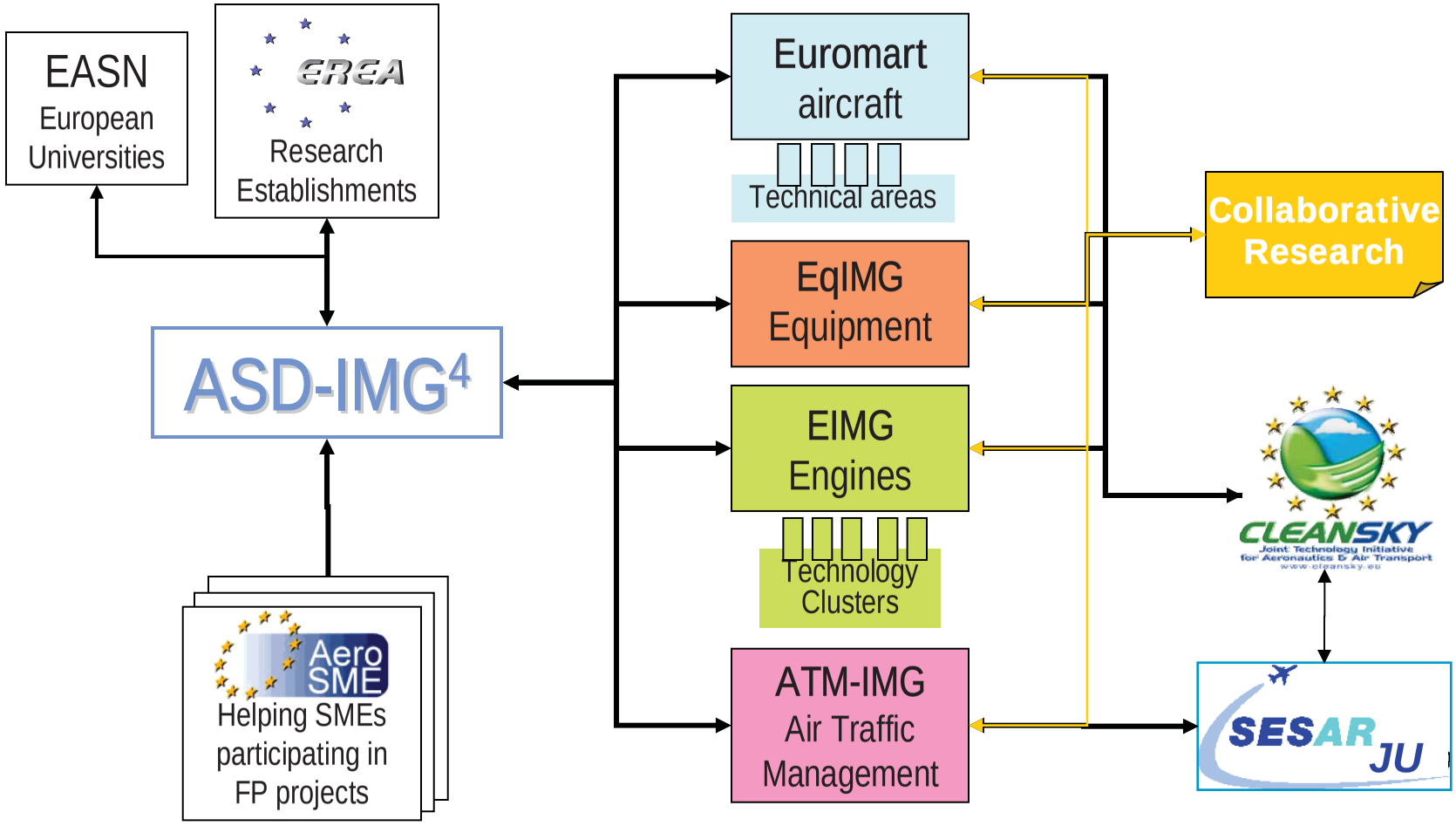
ATM - IMG

Airbus
Alcatel Alenia Space
Alenia Aeronautica
Avitech
Bae Systems
Dassault Aviation
EADS
Eurocopter
Galiléo avionica
Hellenic Aerospace Industry
Indra
Raytheon
Selex Comms
Smiths Aerospace
Selex SI
Thales ATM
Thales Avionics

Role of ASD-IMG4, The Network

- Develop and maintain the coordinated industrial position on EU R&T programmes in the field of civil Air Transport in line and in coordination with ACARE
- Represent, through the Industry Management Groups (IMG), the European Aeronautics Industry
- Maintain tight links with ARG (research establishments)
- Support workshops with Aeroportal and universities
- Support workshops to promote international cooperation

ASD-IMG4 in the technical coordination network



Lessons learnt from FP7 previous calls

- Win / bid ratio for L1 is poor
  - Budget for Collaborative Research is to small to reach ACARE goals
  - Budget share for industry is decreasing thus weakening product innovation

- Only very good quality proposal can pass:
  - Technology innovation
  - Strong consortium
  - High level of management

How make best use of the opportunities

- Project leaders first natural behaviour is to start organising the proposal team with well-known partners
- Globally capacities from new comers are not well known by major industrial partners
  - Perceived as a risk
  - Capabilities are hidden
- New comers need help at presenting themselves
  - Highlight specific strength – propose instead of request
  - Show management capability
  - Introduce themselves well before the calls

How make best use of the opportunities

- Get use of the procedures: start as partner in a L1 project, then grow ambition
- Make use of the National support to better understand the administrative procedures
- Get in touch with IMG4 and IMG
- Influence the Commission to provide incentives to integrate new comers
- Connect Universities and Industry to increase excellence
- Request a National Programme complementary to EU programme and guided by major EU Industrial Partners recommendations to support National industry
- Orientate structural funds towards Aeronautic R&T funding

IMG4 view on Call 4 - Very Low Cost ATS

- SARISTU - Smart Intelligent Aircraft Structures
  - *Self-Sensing Structures,*
  - *Morphing*
  - *Application of Nanotechnologies for higher material performance*
  - *Self-diagnostic capabilities*

- Health monitoring
  - *At aircraft level:*
  - *Continuous monitoring*
  - *Anticipating specific maintenance at the most convenient time.*
  - *Reduction of human errors in aircraft operation and maintenance*

  - *At engine level:*
  - *Control of the engine (stall margin management, tip clearance management, thrust management, stress management…),*
  - *Vibration monitoring system (advanced bearings survey, loss of airfoil…),*
  - *Blade deterioration and crack monitoring,*
  - *Oil and fuel systems monitoring (smart filters, leakage detection…),*
  - *Starter system monitoring, the electric power system monitoring, the control system (sensor & actuator default survey...) and the embedded automatic inspections (NDE).*

IMG4 view on Call 4 - Very Low Cost ATS

- HUCCE - Human Centered Cabin Environment
  - *Passenger Environment Comfort and cabin crew Working Conditions*
  - *Integration of Innovative Cabin Components to assess the compliance versus the requirements of stakeholders, including advanced multimedia systems limited to aspects impacting on comfort and wellbeing on board*
  - *Standard integration criteria for the design of interiors systems*

- ASHLEY – Distributed Modular Electronics
  - *Services and tools for development and integration of applications*
  - *Fault tolerance*
  - *Reconfiguration*
  - *Extend the scope of the IMA concept further into highre integrity applications*

IMG4 view on Call 4 - Ultra Green ATS

- HISAC 2 - High Speed Aircraft
  - *Pave the way for an ultra green and time efficient aircraft (fast and clean) with large number of innovations*
  - *Maintain european competitiveness and attractiveness for a future supersonic small transport aircraft development*
  - *Continue the new supersonic regulations*

- LEMCOTEC – Low Emissions Core Engine Technologies
  - *The primary focus of the project will be large scale rig and core engine testing of relevant technologies for the high pressure system*
  - *Ultra-high bypass ratio and improved core thermal efficiency with reduced Nox*

- ACTUATION 2015 - Smart Actuation
  - *Actuation networks and clusters*
  - *Power management*
  - *Use of novel materials*

IMG4 view on Call 4 - Highly time-efficient ATS

- TOTAL AIRPORT
  - *An airport IT platform to integrate all the fragmented activities as a single entity.*
  - *Concepts and techniques for Time efficient passenger, luggage flow, passenger boarding patterns, airport security and green operations, fleet management concepts and techniques for fast turnaround. Advanced Virtual Operational Centre*
  - *Integration of Airport turnaround in the CDM Process*
  - *Total Airport Management (TAM) using System of Systems methodology*

- FAME Fleet & Aircraft Time Management
  - *Improve AOC fleet management processes*
  - *Include cockpit, cabin and maintenance*
  - *Validated system architecture*

IMG4 view on Call 5&6

- Composite structures with embedded health monitoring
- Technologies to support crew reduction
- Active wing
- Engine component technologies
- Electrical power systems
- Flight deck technologies