Association of
European Research Establishments in Aeronautics

Expected Investment Needs for Research & Testing Infrastructures

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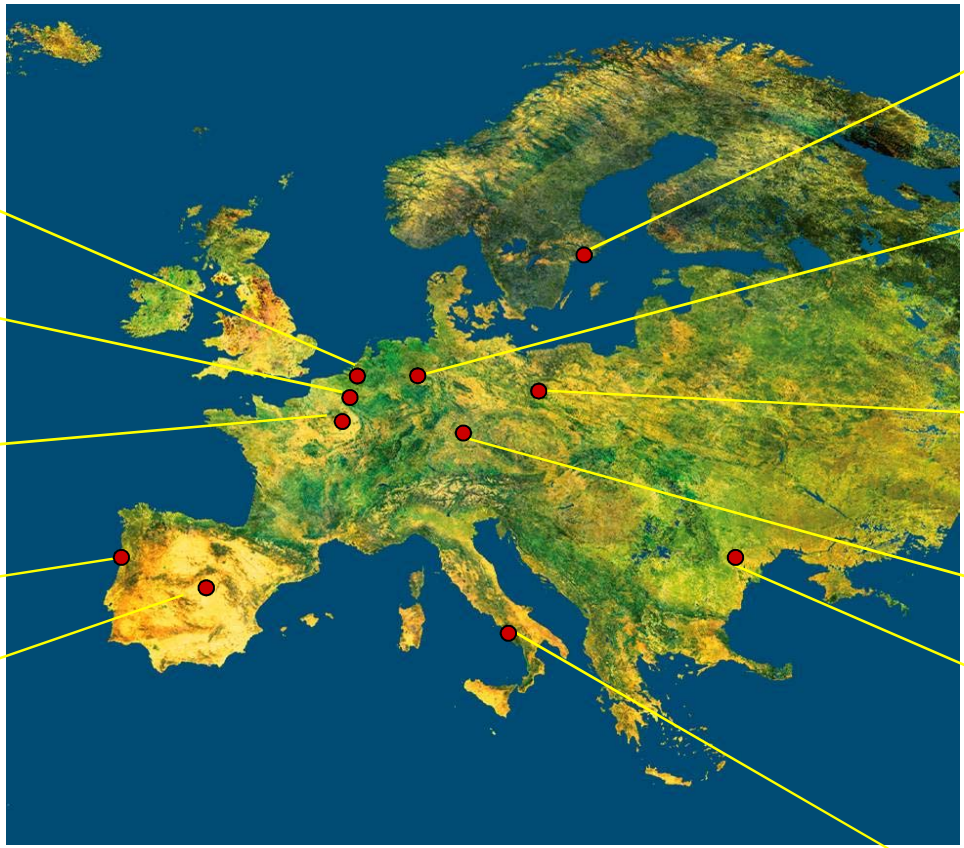
Member of the EREA Board
General Director INCAS

Outline

- EREA – facts and figures
- Overview of EREA capabilities
- Operting Facilities for R&D
- Operation and maintenance – cost models
- The need for investments ...
- Some conclusions

Association of European Research Establishments in Aeronautics



www.erea.org

Associate Members & Strategic Partners

AIT **A**ustrian **I**nstitute of **T**echnology

CSEM **S**wiss **C**enter for **E**lectronics and **M**icrotechnology

TsAGI Central Aerohydrodynamic Institute (Russia)

EREA Objectives

EREA is a **non-profit association** with the objectives :

- to promote and represent the **joint interests** of its members
- to intensify the **co-operation** between its members, aimed at **further integration** of their activities in the field of **civil, military and space-related aeronautics**
- to improve and intensify the co-operation of EREA and its members with third parties in the field of aeronautics
- to facilitate the ultimate goal of the Members of **an integrated management of joint activities**, thereby contributing to **Europe's role as a global player in aeronautics.**

EREA in numbers

5.135

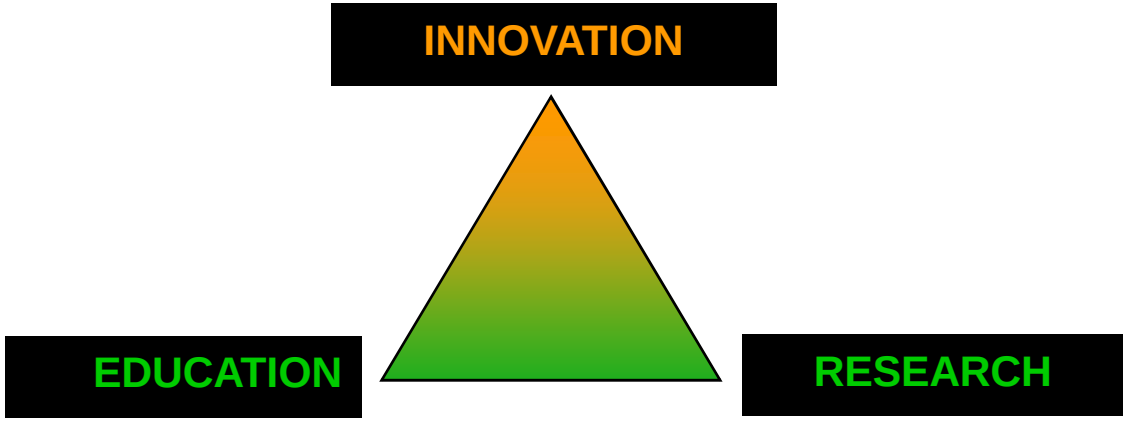
Employees in aeronautics

€ 447.000.000

Spend on research in aeronautics

EREA Strengths

- EREA is a major contributor to European aeronautical research, addressing all elements of the "triangle of knowledge" in this field:



- EREA members are owners of R&D infrastructure
- EREA members have specific national missions

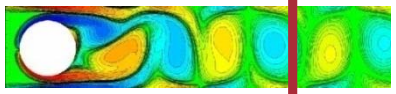
The position of EREA

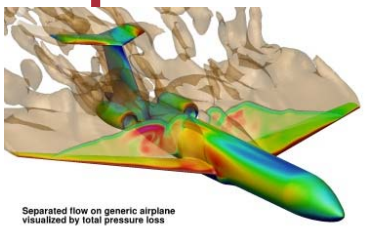
Research

Development & Integration of technologies

Transfer to industry

Production & commercialisation



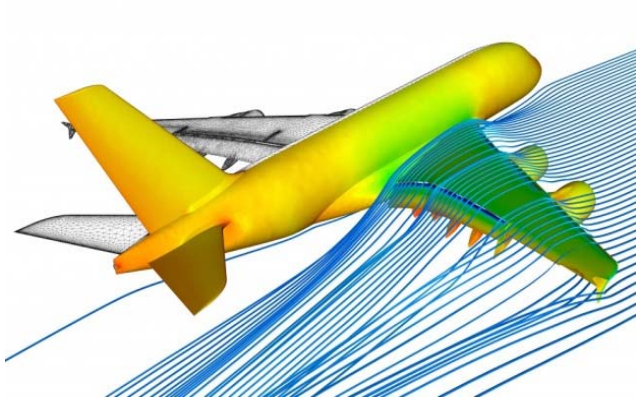


Universities

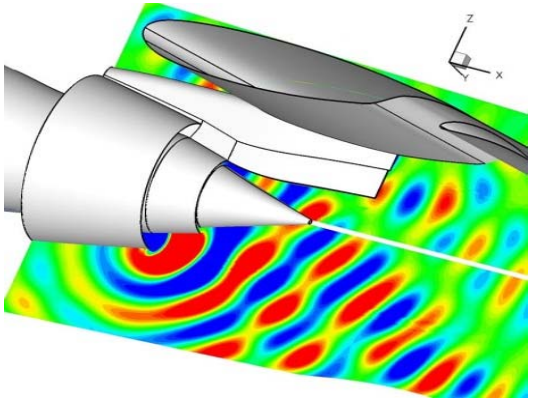
Industrial partners, Spin-offs, Start-ups

Capabilities

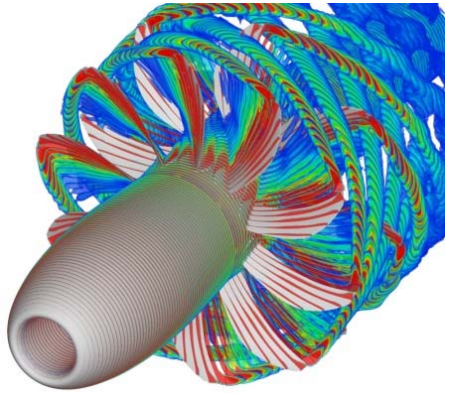
Our tools to take aerospace research further



Aerodynamics



Acoustics



Propulsion

Environmental research

Safety

Materials and structures

Capabilities

Our tools to take aerospace research further

Avionics

Flight mechanics

Security

Flight testing & simulation

Human factors

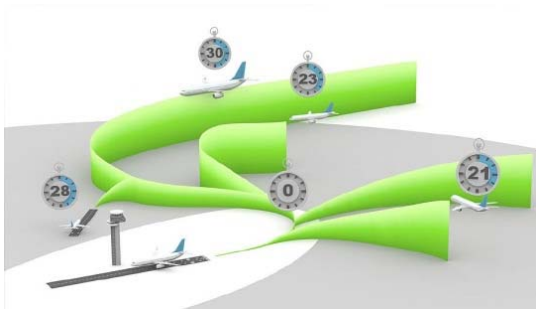
Aircraft operation

Capabilities

Our tools to take aerospace research further

Certification

MRO



ATM & airport

Multi-disciplinary Research and Testing Infrastructures

Research aircrafts

Structure facilities

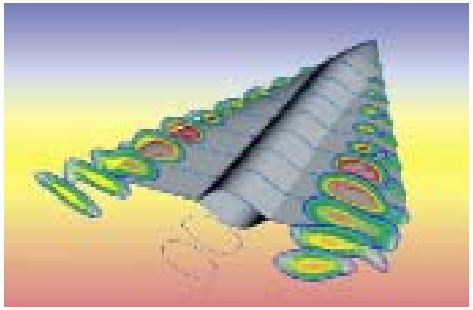
Materials facilities

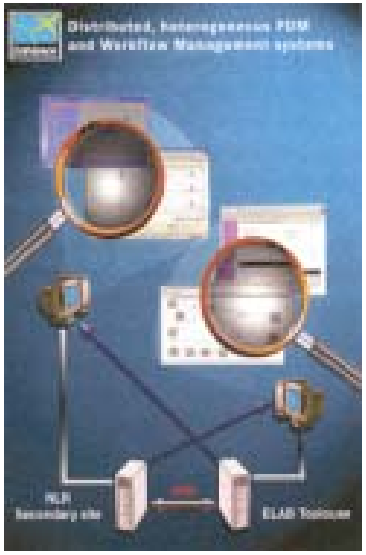
Windtunnels

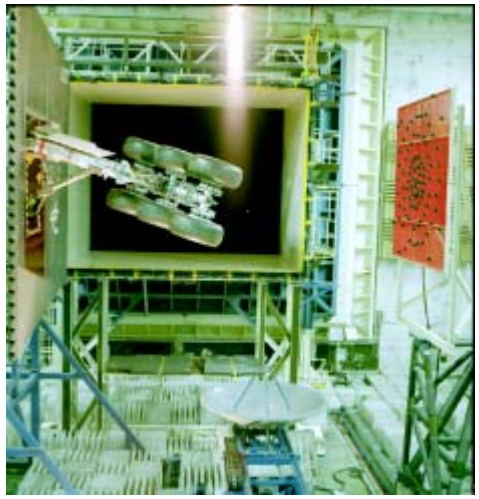
Engine testing

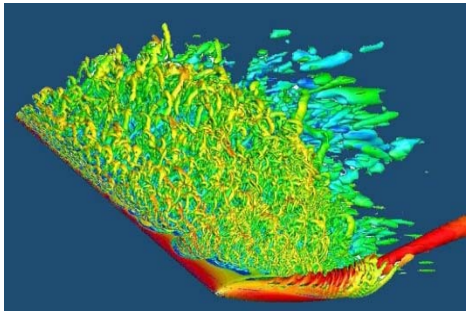
Simulators

Multi-disciplinary Research and Testing Infrastructures







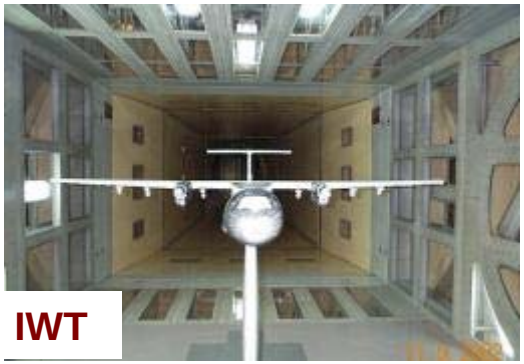


Acoustic facilities

Super computing

Concurent Engineering

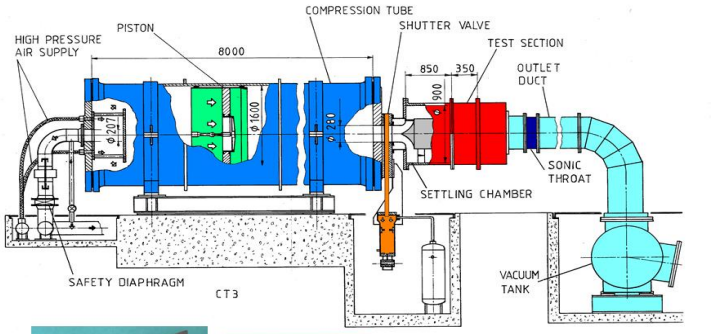
Multi-disciplinary Research and Testing Infrastructures

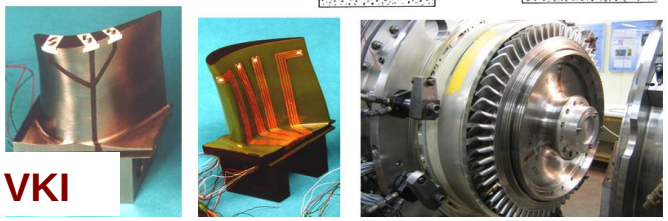


IWT

SWT

Tower Simulation



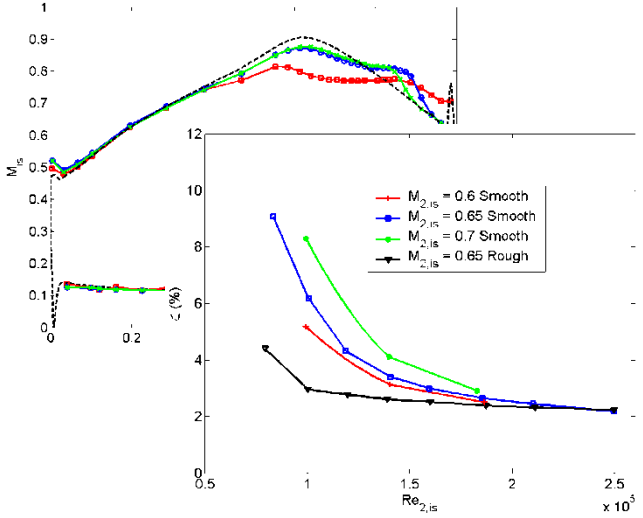


VKI

LISA

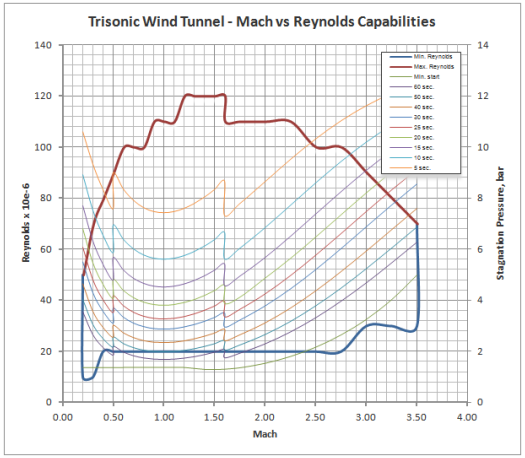
Crash Tower

Operating Facilities for R&D



The Low Re, High Mach number LPT Facility - VKI

Operating in Relevant Environment
(Mach, Re, St, etc.)



INCAS Supersonic Wind Tunnel

Operating Facilities for R&D

Various modes for operation :

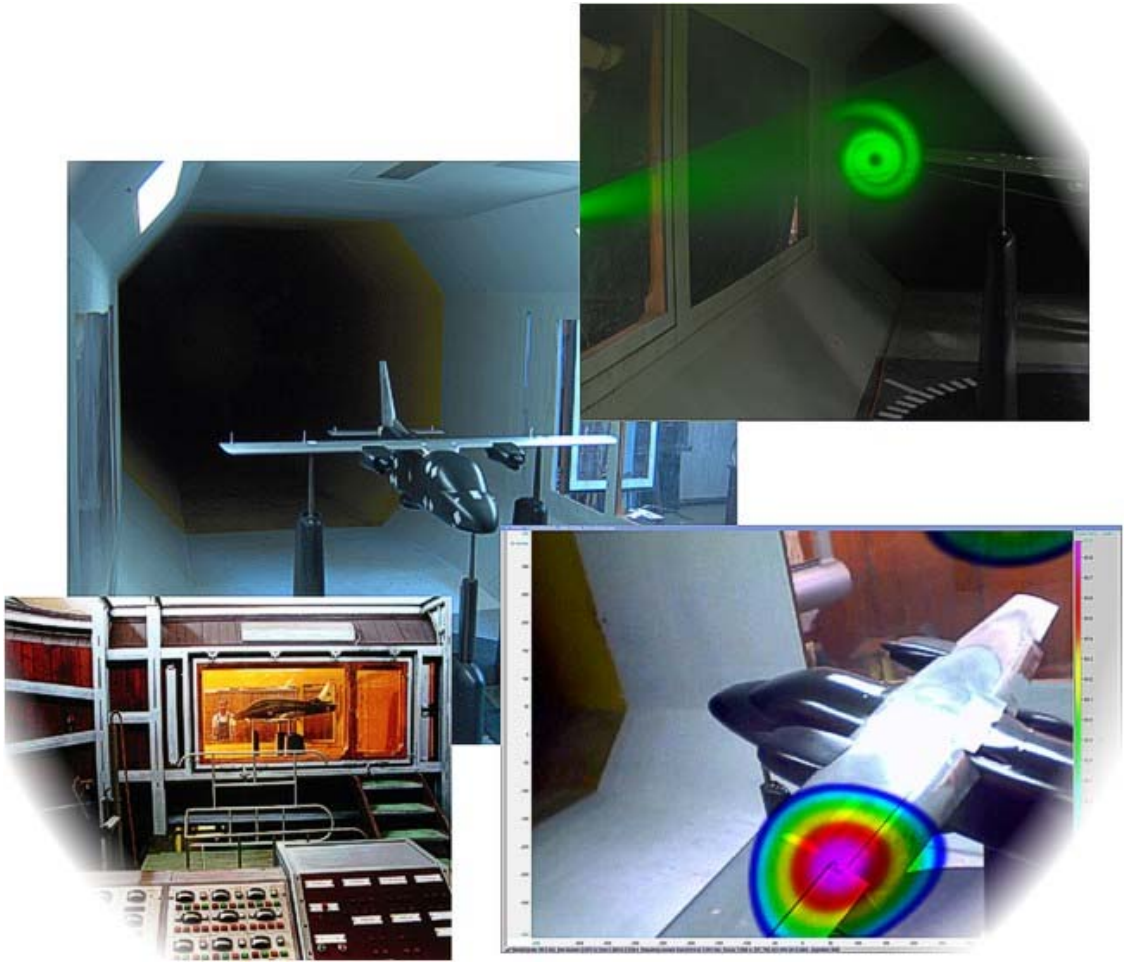
- Service providers for the industry
  - 100% funding from customer (industry)
  - Infrastructure developed and used according to industrial needs/specifications
  - Cost-effective operation ? – Not the main criteria !
  - Operation for profit ? – Possible !

- R&D activities – applied research based on co-funding scheme
  - Funding up to 75% - What are “Direct Costs” ?
  - Needs additional funding scheme – national programs
  - Cost-effective operation is mandatory !

- Basic research activities
  - Funding should not be a problem – low costs and/or dedicated grants

Operating Facilities for R&D

INCAS current practices



Subsonic Wind Tunnel

- Atmospheric pressure, continuous
- Maximum speed : 110 m/s
- 2.5m x 2.0m x 4m test section
- Reynolds number up to 2.5 million.

Basic operation:

- Aerodynamic testing – general
- Aeroacoustics and airframe noise evaluation

Cost Model :

- co-funding up to 50%
- R&D grants – national and international

Operating Facilities for R&D

INCAS current practices

Subsonic Wind Tunnel

- Blowdown type
- 1.2m x 1.2m test section
- Mach number range : 0.1 … 3.5
- Reynolds number up to 100 millions/m
- Max test run duration : 90 sec.
- Max pressure : 16 bar (settling chamber)

- Interchangeable porous transonic test section
- Variable porosity from 0.01% up to 9%
- Active model/combustion capability

Basic operation:

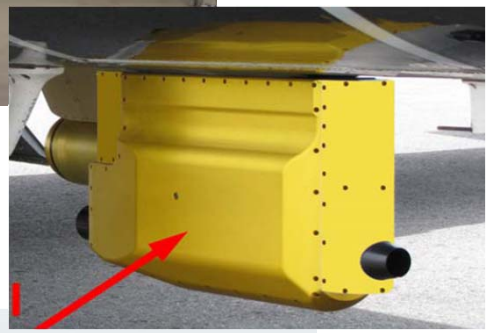
- Aerodynamic testing – general
- Special test rigs for industrial partners

Cost Model :

- Industrial service – cost effective !
- co-funding up to 25%
- Basic funding – national support 5%

Operating Facilities for R&D

INCAS current practices



ATMOSLAB

- Beechcraft King Air C90 GTx
- SPEC Hawkeye Cloud Particle and Precipitation Probe
- CAPS - Cloud, Aerosol and Precipitation Spectrometer
- RIEGL LMS-Q680i long-range airborne laser scanner

Basic operation:

- Atmospheric research – ice particles/ volcanic ash
- ATM research - EGNOS

Cost Model :

- Industrial service – cost effective !
- co-funding up to 50%

Operation and maintenance

cost models

Various cost models for EREA partners:

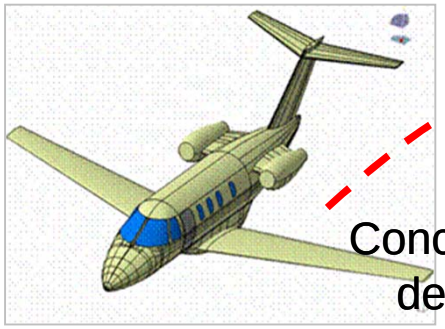
- Externalized service
  - Specific for large testing facilities
  - International cooperation cost models
  - Charged as “Other Direct Costs” in FP7 projects
  - Maintenance costs are included in the global price

- R&D cost
  - Small/Medium testing facilities
  - Funding up to 75% - What are “Direct Costs” ?
  - No maintenance costs charged – additional funding needed !

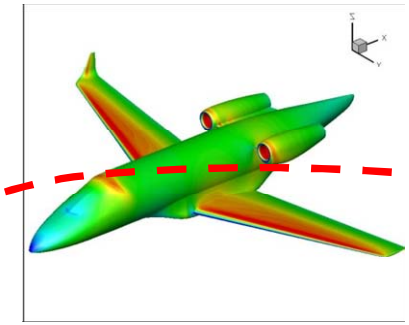
- Package for R&D activity
  - Model design & instrumentation included
  - Model manufacturing – basic option
  - Funding up to 75% - “Direct Costs” + “Other Direct Costs”
  - No maintenance costs charged – may be compensated by the “Indirect Costs” (partially!)

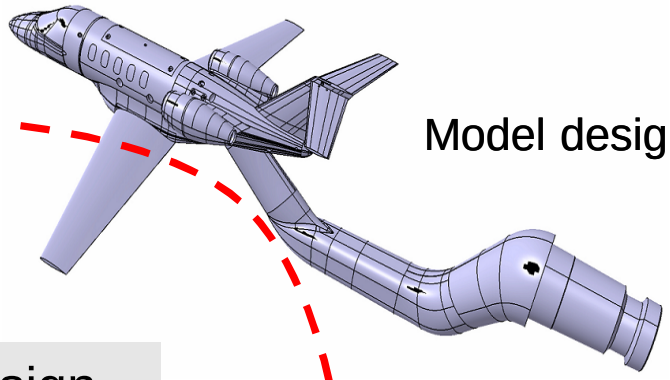
Operation and maintenance

INCAS



Conceptual design

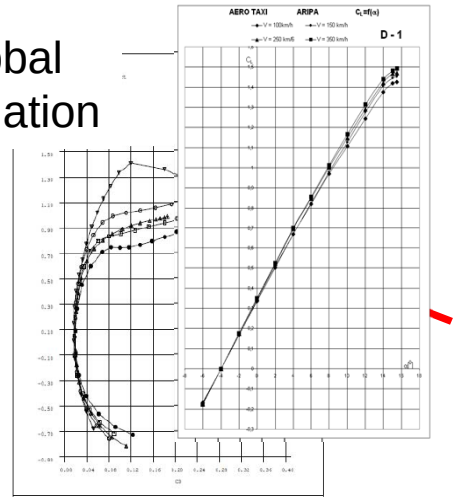


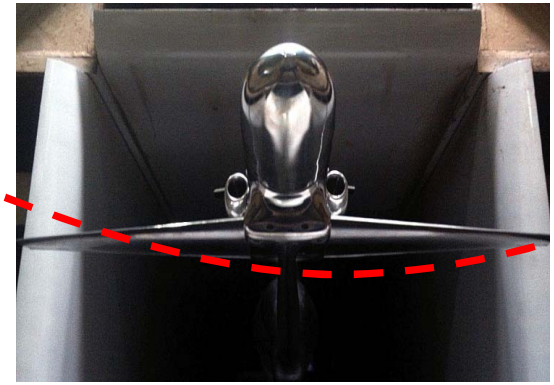


Model design

Integrated design, manufacturing and testing capabilities

Global evaluation





WT testing

Model manufacturing

The need for investments

- Maintain the cost-efficient capability using state-of-the-art systems and experimental technologies
- Extend the "relevant environment" capabilities for industrial services
- Human resources investment plan – *unique personel with unique expertise*
- Enable low cost access for basic research using dedicated instruments (national/EU)

Proposed measures

- Inclusion of Aviation research infrastructures into ESFRI list
- Additional European funding for RI (H2020, Structural funds, CF!)
- Increase efficient use and operation of facilities by
  - Joint management
  - Common operation teams
  - other…

Conclusions

- Research infrastructures (larger and smaller ones) are needed to carry out aeronautical research;
- RI should be reconsidered based on the relevant environment capability criteria;
- Our trained staff turns these infrastructures into strategic research capabilities for Europe;
- Some RI can be run and maintained on national basis for national/regional demands;
- EU action is needed/requested to support sustainable development

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