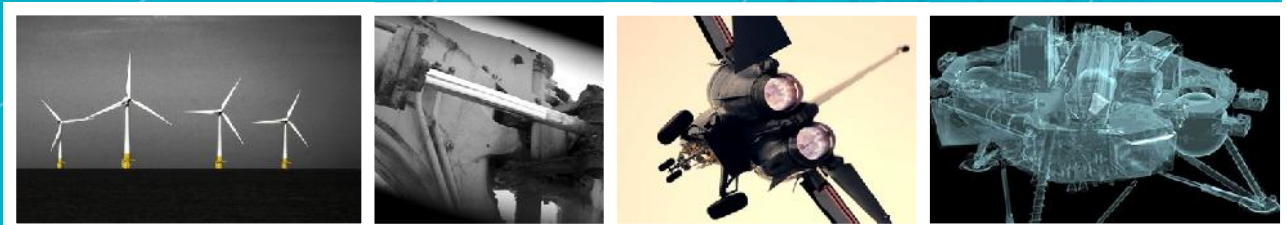


# AIRWORKS // Company Profile

Monfalcone – 15.05.2012

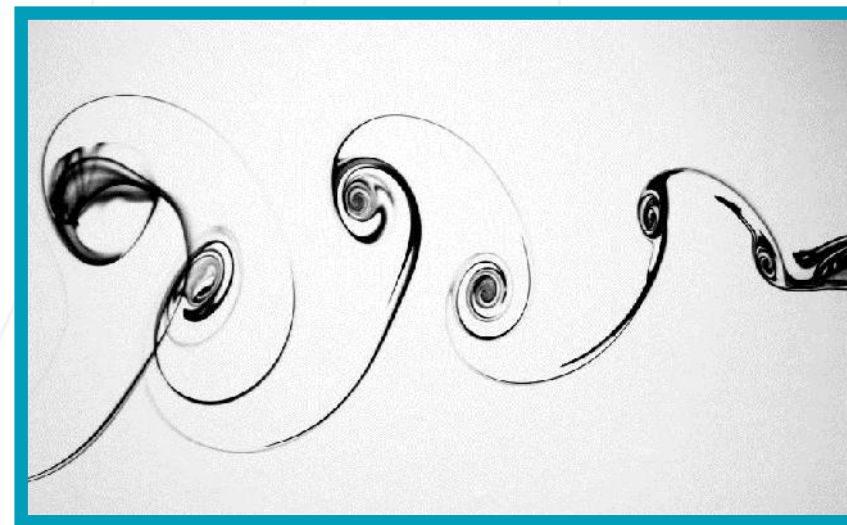
AIRWORKS is an engineering consultancy for advanced systems. We support technology development across industries as Aerospace, Energy, Automotive & Defense.



# AIR

## Our Symbol.

In traditional cultures, AIR is seen as a universal power or a pure substance. According to ancient Greek philosophy AIR is the element in relationship with imagination and thought, focusing on ideas which have not materialized yet.



# WORKS

## Our Facts.

Cosmo-Skymed 2, PK-4, Compact SAR, eROSITA, EUVL Collector, EMSOM, A340, A350, A330F, A380, A380F, A440M, Learjet 85, MRJ, Mirach 200, B787, Falco, Falco EVO, DT-93-2000, DT-82-2000 & more

# AIRWORKS

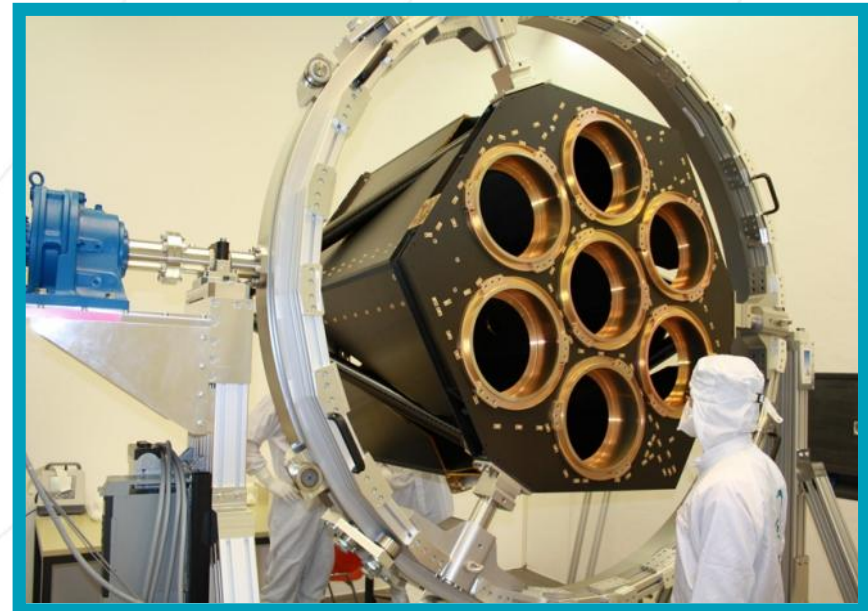
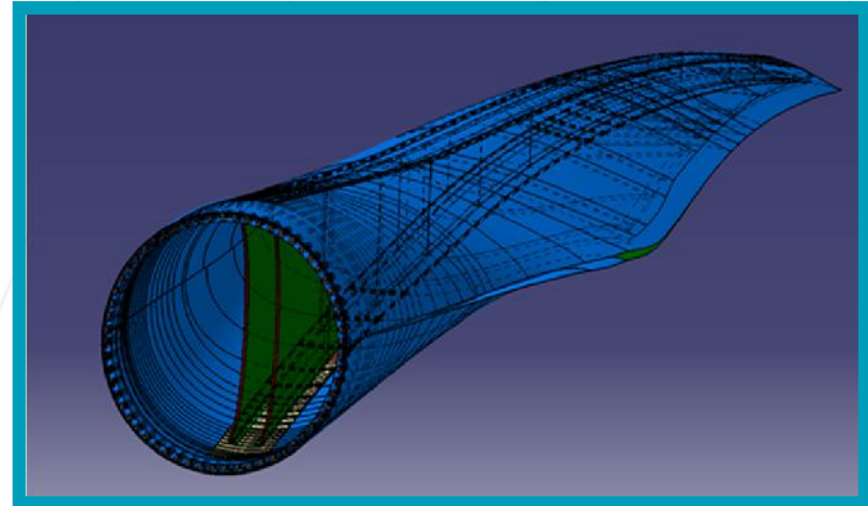
Engineering Advanced Systems

# Airworks

## Engineering Advanced Systems

A consultancy supporting technology development in segments as Defense, Energy, Space, Aviation, Automotive, Heavy Industry. Operations at global level.

- Product Development
- Technology Development
- Turn-key Designs incl. Prototype Manufacturing
- Sub-Contracting from Engineering Prime
- Optimization of Complex Systems
- Mechanical Design
- Kinematics
- Mechanical Analysis (FEA, CAE)
- Fatigue
- Structural Dynamics
- Industrialization

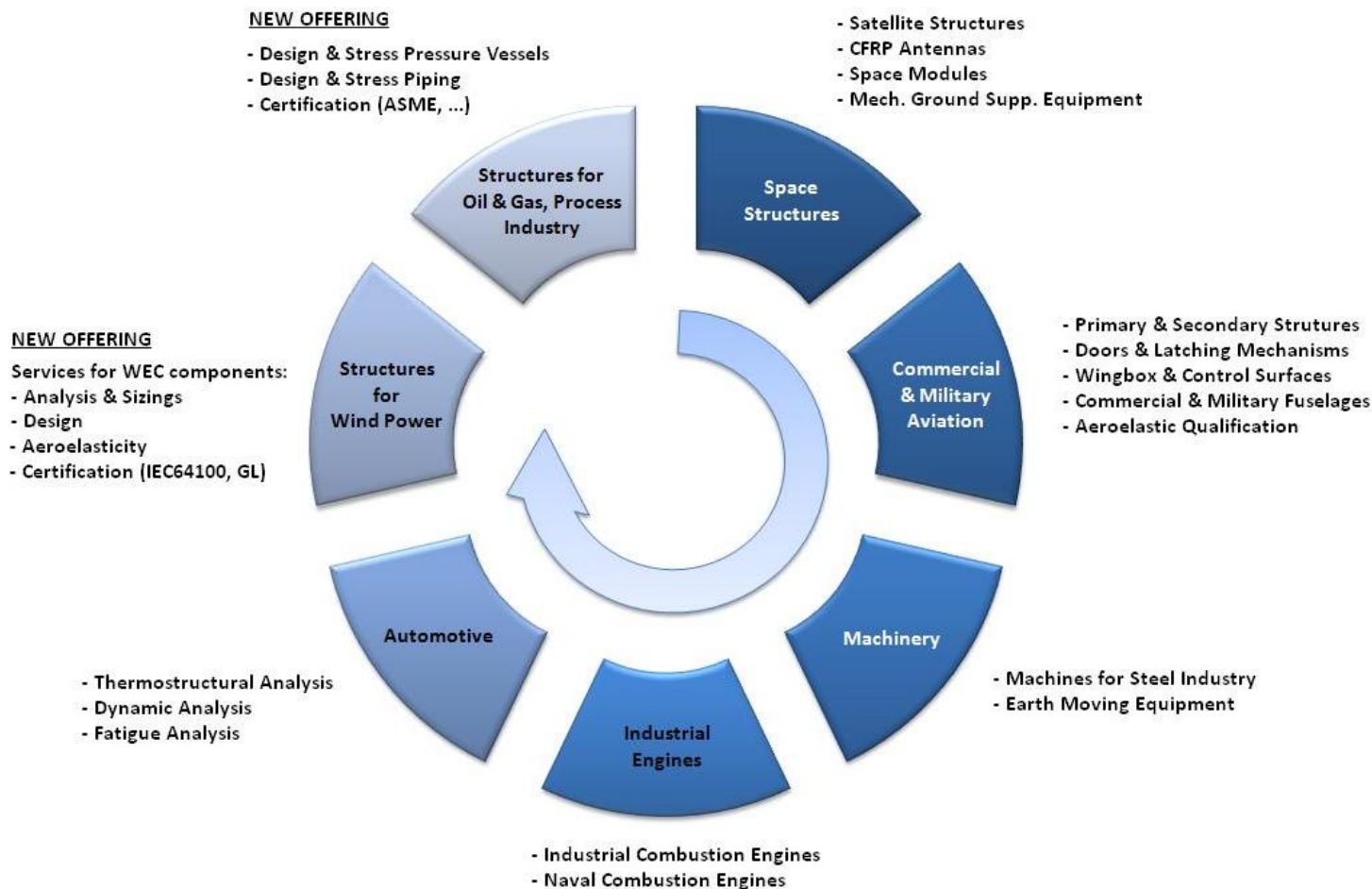


# Evolution

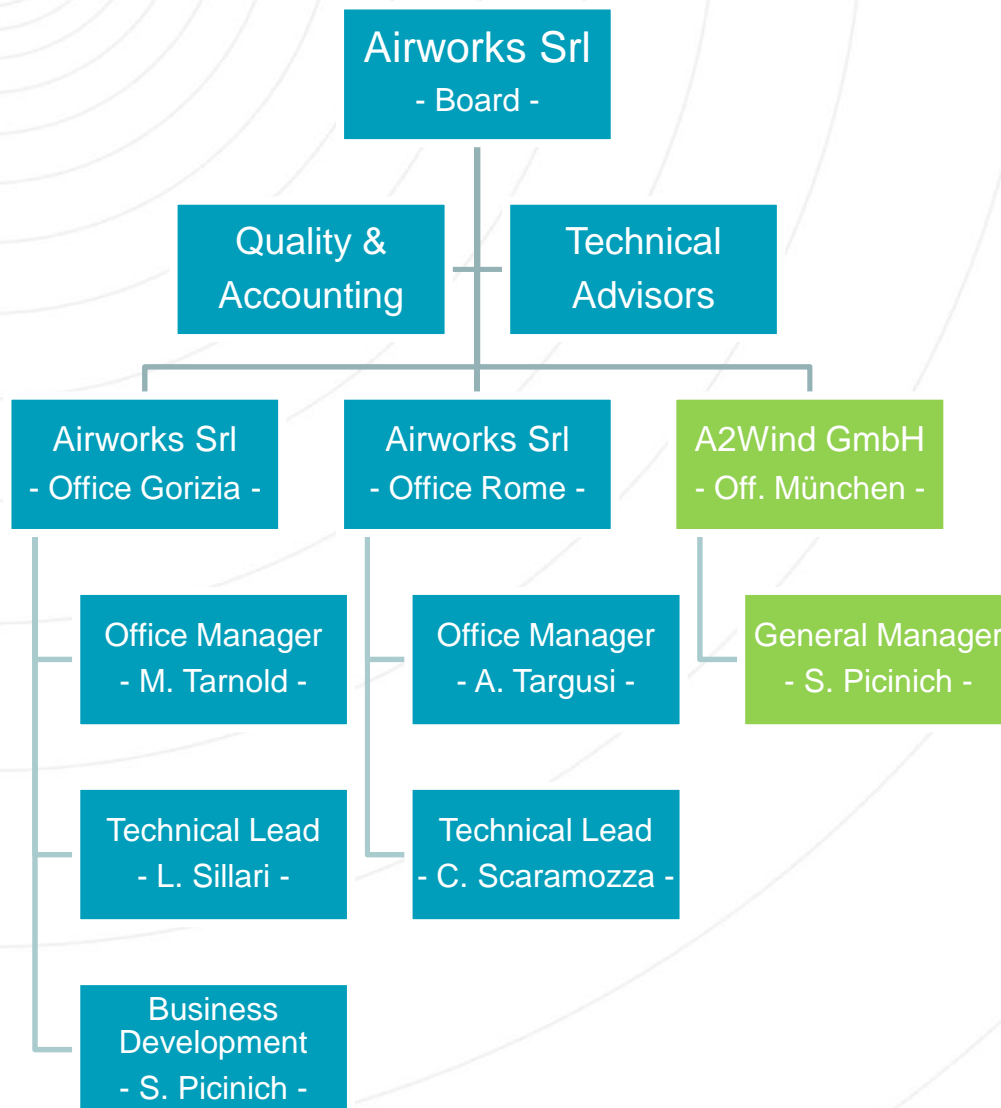
AIRWORKS sets Mechanics as his reference discipline, but it's flexible and able to encompass many different industrial sectors.

Starting from the Aerospace industry, the company is continuously expanding the range of structures that is able to develop, analyse, certify.

The list of standard that we work with is in constant evolution (JAR 25-23, NASA, ESDU, ECSS, Eurocode, IEC64100, etc.).



# Organization



## OUR COMPANY AT A GLANCE

**2 Offices :** Rome (Cnt. Italy) & Gorizia (North. Italy) –  
**Current Capacity:** 30000 hours / year–  
**10 years / person:** our average working exp.–  
**Main Businesses:** Aerospace, Defence, Wind Power –

## SUBSIDIARIES

**A2Wind GmbH:** München (Germany), Wind Power –  
**Shareholders:** Airworks (50%), IABG mbH Group (50%) –  
**Web:** [www.a2wind.net](http://www.a2wind.net) –

## BUSINESS MANAGEMENT

**Sales** // [s.picinich@air-works.eu](mailto:s.picinich@air-works.eu)  
**Rome Office** // [a.targusi@air-works.eu](mailto:a.targusi@air-works.eu)  
**Gorizia Office** // [m.tarnold@air-works.eu](mailto:m.tarnold@air-works.eu)  
**Wind Power** // [s.picinich@air-works.eu](mailto:s.picinich@air-works.eu)



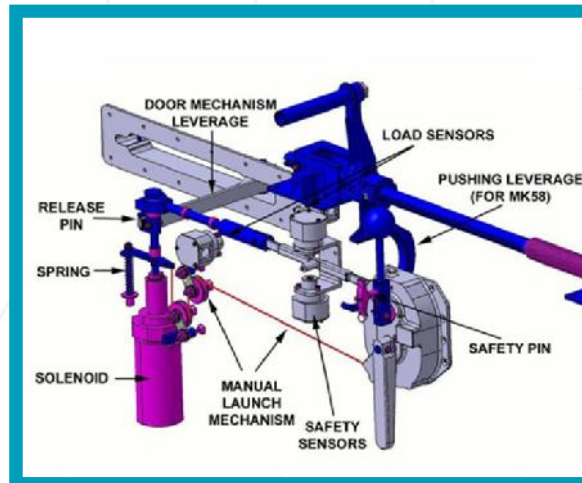
## Development

### Knowledge

- Contractor for turn-key projects –
- Structures, from scratch to production –
- Lightweight Systems Specialist –
- Applied Research –
- Manufactured Prototypes –

### Expertise

- Space Systems, MGSE –
- Military Drones –
- Technologies for Wind Power, Blades –
- Aerospace Structures & Kinematics –



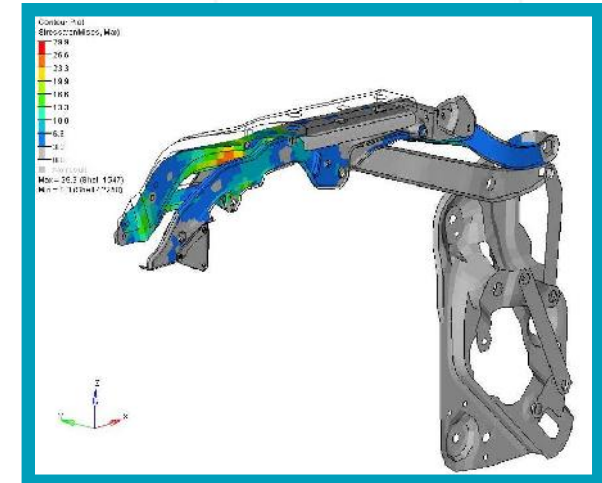
## Design

### Knowledge

- Conceptual Design –
- Detailed Design (3D, 2D) –
- Material & Process Selection –
- Aerostructures, Primary & Secondary –
- Space Structures & Instruments –
- Opto-Mechanical Design –
- Mechanisms –

### Software

- Catia V5 –
- Inventor / Solidworks & More –



## Analysis

### Knowledge

- FE analysis –
- Structural Dynamics & Aeroelasticity –
- Strength & Stability –
- Multidisciplinary Optimization –
- Fatigue & Damage Tolerance –
- Kinematical Simulation (Multibody) –
- Test Correlation Analysis –

### Software

- ModeFRONTIER –
- Hyperworks / Mdesign / Scilab & More –

# Test-Proof Designs

Passing GL Certification with our 45 meter blade design in Baoding  
(20/02/2012)





# Reliable Engineering Platform

## Responsive.

Time is essential.  
 We set responsiveness as the key value.  
 From pre-contractual contacts down to project management and after-sales **expect immediate response.**



## Project Centered.

We have reversed the typical engineering consultancy Business Model: we mainly employ personnel exceeding 10 years of experience in Engineering and Project Management.

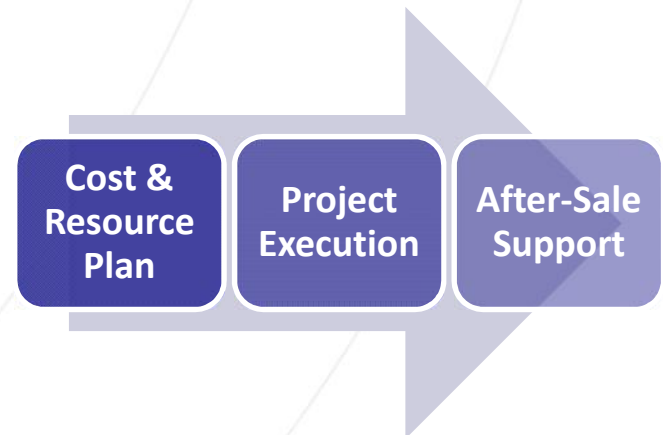
Rather than on "interim manpower" AIRWORKS is project-centered: positioned to support clients in **managing each or all phases of Product Development**, from R&D and conceptual studies to the industrialization.



## Efficient.

Experienced with international highly complex technology development programs, our management approach is clear and systematic.

No surprises with time and costs, no undefined project areas. Planning is precise, progresses are reported accordingly.



# System Engineering (Mech.)

## Josef Eder



Broad skills and a comprehensive experience are the foundation for the development of sophisticated designs such as space instruments.

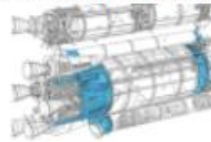
The supervision of our designs is assigned to Josef Eder, a specialist with over 30 years of experience in the management and execution of projects for Space.

Please check: [www.e-der.de](http://www.e-der.de)

### Involvement in Aerospace Projects

[click for list of Aerospace Projects](#)

[click for list of Design Studies](#)



ARIANE 4  
Launcher & Equipment



ARIANE 5  
Launcher



COF  
ISS Infrastructure



EQUATOR-S  
Small Satellite



BIOPAN  
Exposure Facility



EPCH European Photon  
Imaging Camera Head



EPCH  
Filter Mechanism



ORFEUS  
Space Telescope



SOFIA  
Airborne Telescope



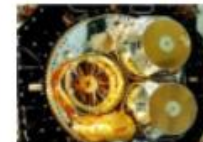
SUMER  
Data Processor Unit



TerraSAR  
MGSE



XMM  
Space Telescope



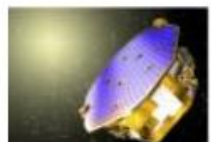
XMM  
Mirror Modules



LASCO  
Space Telescope



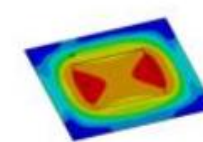
AGILE  
Transport Container



LISA  
Pathfinder Inertial Sensor



eROSITA  
Space Telescope



IXO WFI  
Active Pixel Sensor



IXO MIRROR  
Slumped Glass



BC High Temperature  
Rotary Joint



# Projects

## Selected Implementations

# Business Aircrafts

## PRODUCT CONCEPTION

Since the very project start, AIRWORKS has been feeding structural conceptual design of Learjet 85, an all composite Business Jet.

For this program our operations extended to Germany and Canada, at Bombardier Product Development Center.



### BOMBARDIER LEARJET 85 – All Composite Business Jet

- Global FE model management (Wing, Center & Aft Fus)
- Conceptual stress analysis
- Trade studies on wing planform
- Compliance of the wingbox (stiffness, weight, fuel volume)
- Wing CFRP optimization with respect to: loads, stiffness, fuel
- Studies on MLG attachment
- Studies on engine mounts and pylons
- Studies on Center & AFT Fuselage



# Doors & Mechanisms

## SPECIALISTS IN DOORS

Our company takes complete responsibility of the stress analysis of Doors for commercial and business aircrafts, including latching mechanisms.



### AIRBUS A330 FREIGHTER MD CARGO DOOR & LATCHING MECHANISM

FE model generation. FEM management. Static and Fatigue stress analysis, from concept to certification.



### AIRBUS A380F-800 MD & UD CARGO DOOR

FE model development & management, Static and Fatigue Analysis. Certification Reports.



### LATCHING MECHANISM

**AIRBUS A350 XWB (2009-11)**  
Design and Analysis of Cargo Doors Mechanisms (from definition to CDR)



# Commercial Aviation

Our team has participated to all latest Airbus and Boeing programs. We selected here some reference projects from Airbus programs.



## NACELLES

### AIRBUS A380-800

Static & Fatigue Analysis of the Fixed Fan Duct & Thrust Reverser. Certification Reports. 12500 working hours.



## WING

### AIRBUS A380-800

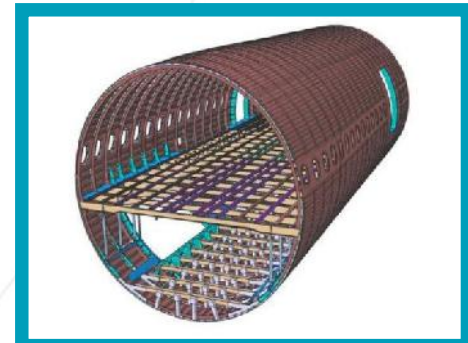
Static Analysis and Certification Reports for Fixed Leading Edge, Actuator Hinges and Ribs of the Trailing Edge.



## PAX FLOOR GRID

### AIRBUS A350-900

Preliminary analysis and structural sizings of longitudinal Pax Floor Grid structural components.



# Satellite Design

Since start, AIRWORKS has served Space Integrators by supporting the development of the satellite mechanical and structural designs

## Cosmo - Skymed 2<sup>nd</sup> Generation

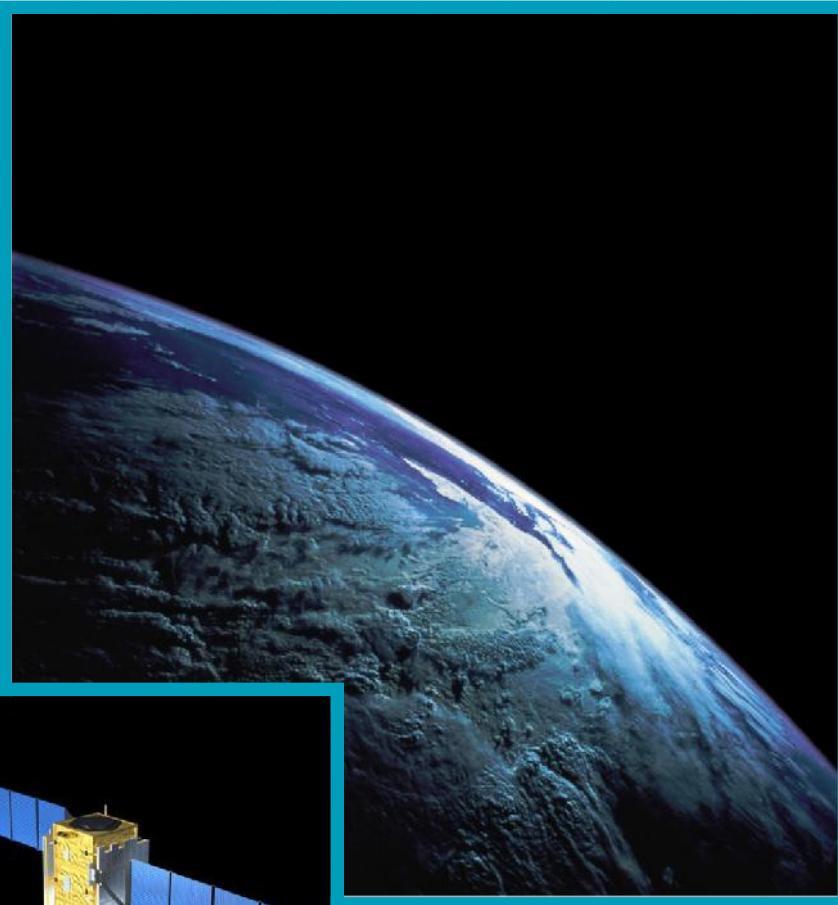
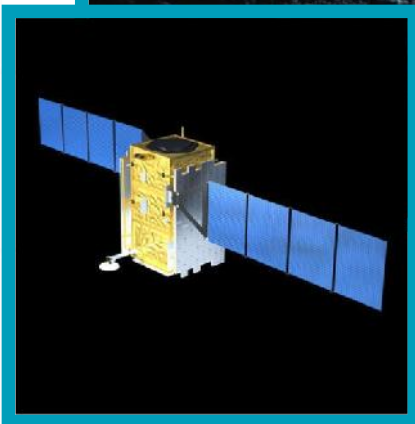
Thales Alenia Space (2011-12)

### Mechanical Design

- Design and manufacturing optimization of the Frame (primary structure) –
- Design and manufacturing optimization of the MacroTiles (secondary structure) –
- Design of the brackets of the Fixed Hold and Release Mechanisms (FHRM) –
- Design of the Radiating Board assy including the FRP chassis –
- Harmonization of the 3D structural models with the Harness/Piping requests –
- 2D drawings and Interface Control Drawings (ICD) –

### Mechanical Analysis

- Generation of FE models –
- Structural and thermo-elastic sizings –
- Sine analysis in the frequency domain (accelerations, forces, stress) –
- Notching masks –
- Random analysis in the frequency domain –
- Dynamic analysis vs. structural tests correlation –





## eROSITA

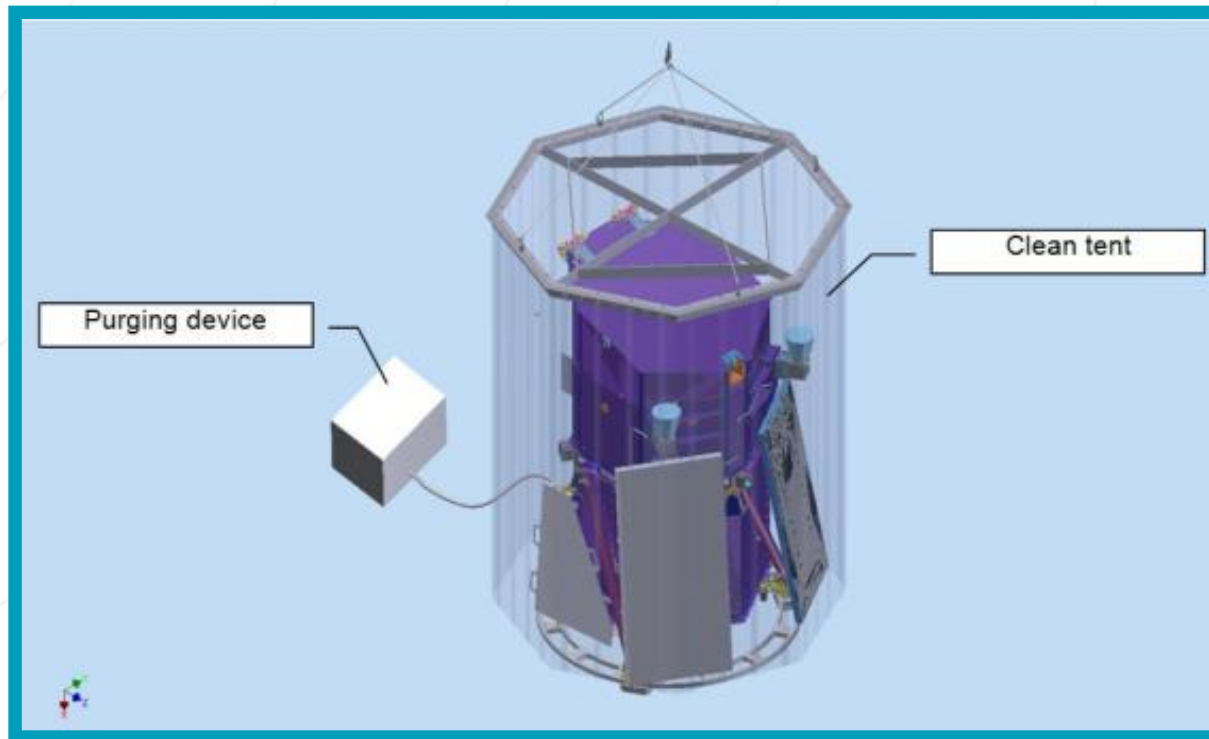
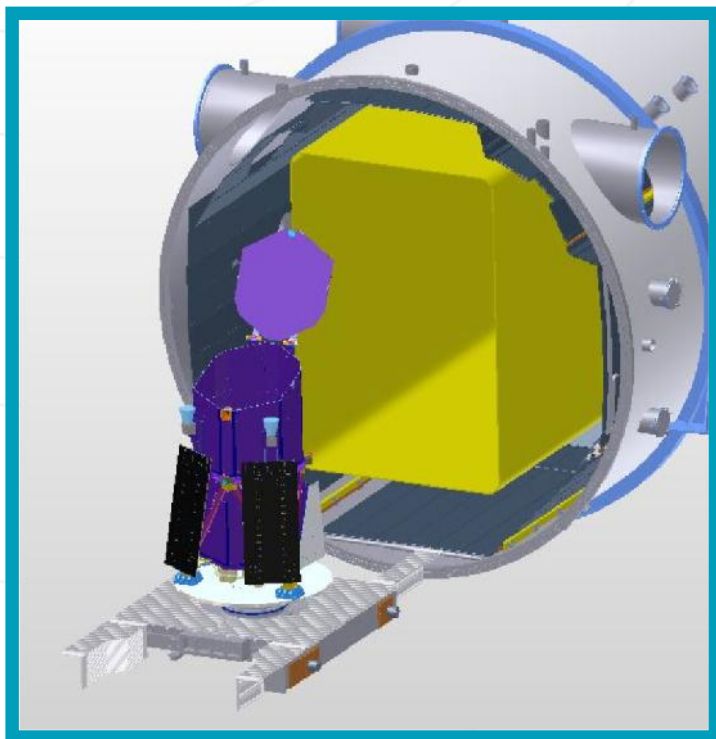
MPE / 2010 -12

- Study of thermal insulation –
- Test set-up design –
- Design of MGSE –
- Handling & test procedures –



# Ground & Test Support

AIRWORKS delivers a complete set of solutions for Satellite & Instrument management on ground & during tests, including designed / manufactured MGSEs, jigs, tools, storage systems, test set-ups, handling procedures.



# ISS Experiments & Instruments

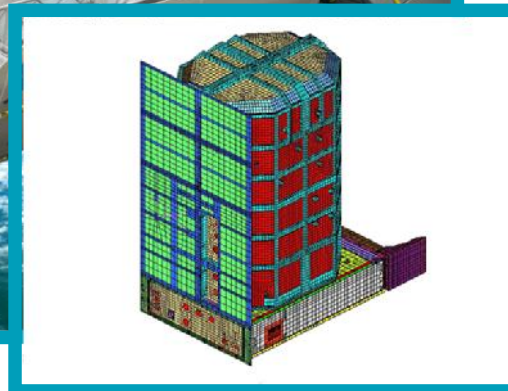
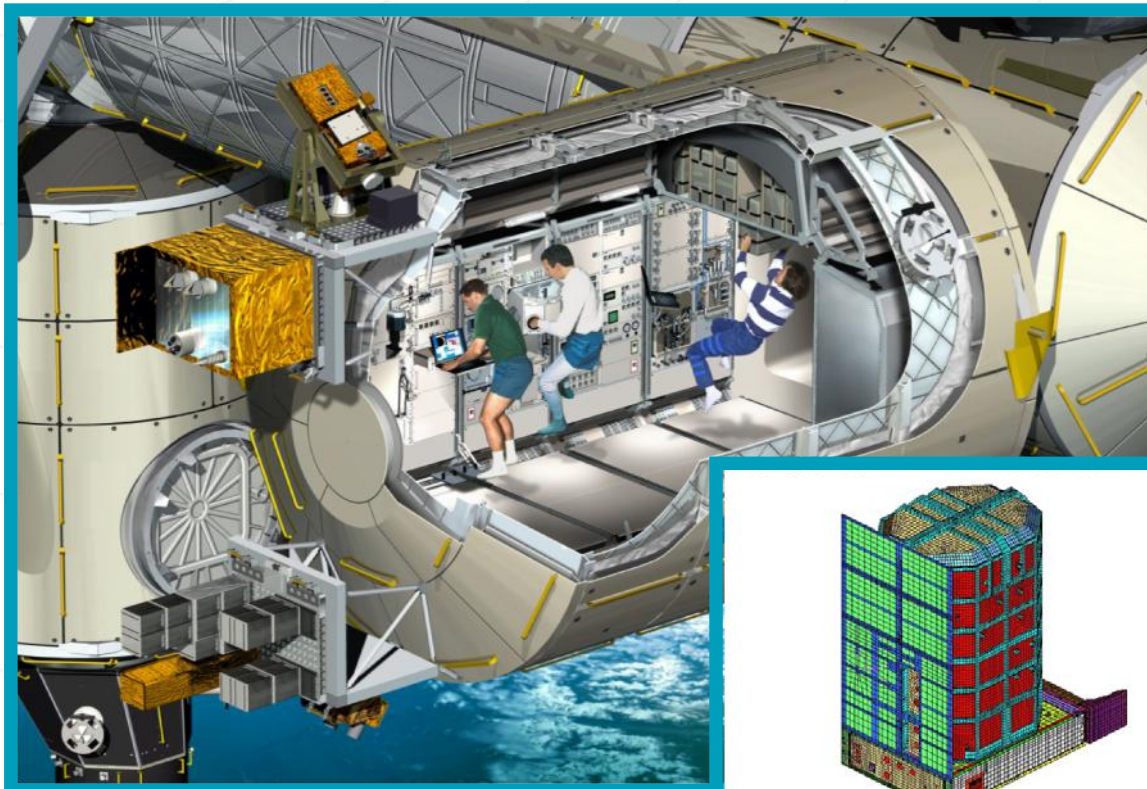
AIRWORKS provides comprehensive design, analysis or turn-key development services up to prototypes for ISS experiments, at system or sub-system level.

## The PK4 Experiment

Kayser-Threde GmbH (2012)

### AIRWORKS Tasks:

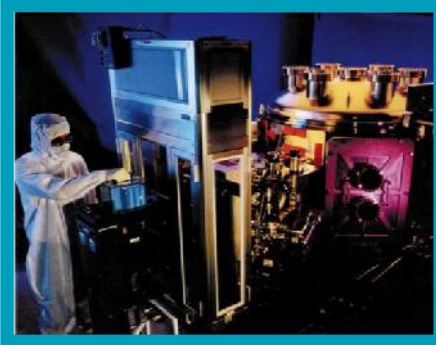
- Review of the existing analysis documentation –
- Consolidation of the applicable mech. requirements –
- Upgrade PK4 facility FE models to latest designs –
- Thermo structural calculations (ground / on orbit) –
- Justification of the facility: intact & failsafe launch set up –
- Modal analysis –
- Random analysis –
- Shock response analysis –
- Test correlation analysis –
- FE model tuning to measured dynamic response –
- Burst– pressure strength check –
- Containment analysis –
- De - / Repressurization analysis –
- Joint check including fatigue –
- Structural analysis reports for CDR with ESA –



**MAIN CHALLENGES:**

High dimensional stability (10µm)  
under extreme thermal impact (10kW).

High accuracy manufacturing,  
assembly and co-alignment of mirrors



# Optomechanics

Since year 2010, AIRWORKS has been supporting the development of new optical systems for different industrial applications.

## EUVL Grazing Incidence Collectors

Media Lario Technologies (2010-12)

**Support to Opto-Mechanical Design**

- Mechanical design and configuration control of the Collectors –
- Development of the mirror cooling system –
- Materials compatibility with plasma, EUV light, vacuum –
- Design of permanent and demountable joints –
- Design of the Heat Exchangers –
- Design of adjustable supports systems for mirrors –
- Design of jigs and tools –

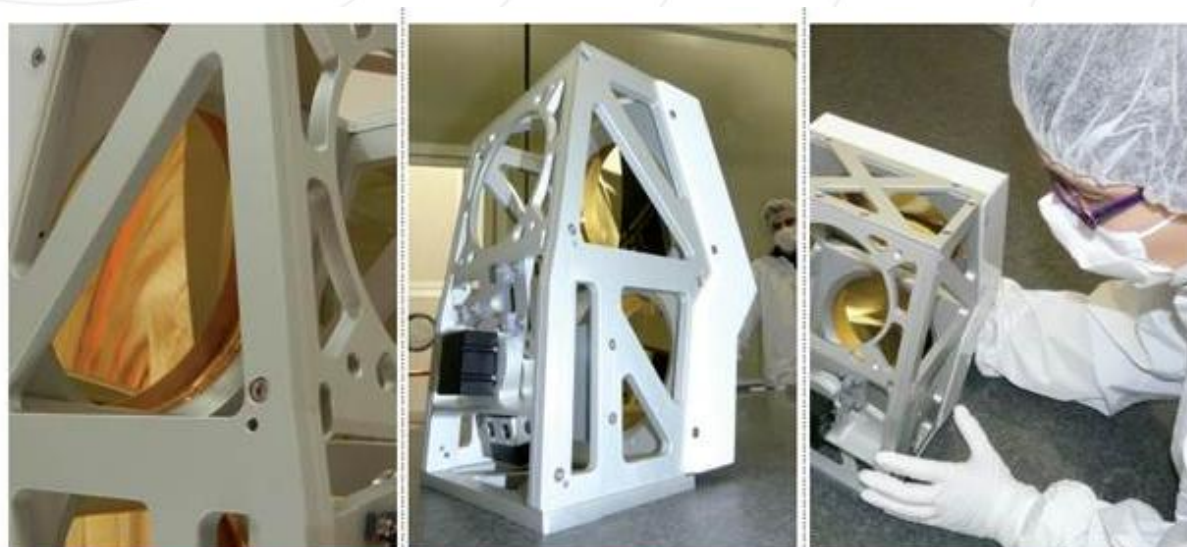
**Analytical and Experimental Development**

- 1D Simulations of the cooling system –
- Experimental fluidynamics, Measurements. 1D model calibration –



# Optomechanics

AIRWORKS has been the selected partner by MEDIA LARIO TECHNOLOGIES to support the development & optimization of the Single Aperture Multispectral Sensors System. Unveiled in April 2012, the sensors outperform most of current available systems in the market.



## Single Aperture Multispectral Sensors Systems for Defense Surveillance and Space Earth Observation

Athermal telescope employing thin non-rotationally symmetric e-formed mirrors  
 - 0.45-12 micron waveband; F/no 1.4; diffraction limited in IR bands; 94mm effective aperture

## EMSOM (2010 -12)

### AIRWORKS Tasks:

- Conceptual module mechanical design
- Technology feasibility
- Mathematical optimization of the mechanical design
- Maximize stability of the optical response in operation
- Compliance with assembly and alignment requirements
- Compliance with maximum weight requirements
- Thermo-structural strength
- Design of flight and lab modules
- Design of tools
- Design and manufacturing documents

### Capabilities of the Multispectral Modules:

- Suited for Airborne, UAV, Security and Space
- Compatibility with MIL-STD-810G
- Compatibility with cooled and uncooled detectors
- Optical design for a dual detectors scheme
- Available cold stop position
- Available beam splitter position

# UAS systems

AIRWORKS is a selected supplier of SELEX GALILEO unmanned technology department to support the development of drones. The cooperation extends through engineering & certification process.

## SELEX GALILEO

### MIRACH 200 (2010)

Thermal analysis (Avionics),  
Static structural analysis of the  
UAS body, load application,  
FEA , Certification Reports.



## SELEX GALILEO

### FALCO EVO (2011-12)

Development of the new  
empennage FE model, Sizings,  
Static structural justification of  
the empennages and boom



## Falco UAS (2011-12)

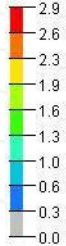
### AIRWORKS Tasks:

- Upgrade UAS platform to new materials –
- Consolidation of existing global FE models –
- Modeling of the applicable loads –
- Static analysis. Stability –
- Strength check of FRP & metallic structures –
- Check of primary interfaces –
- Bonded and fastened joints' check –
- Preparation of structural analysis reports for UAS certification –

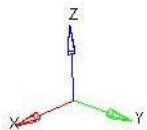
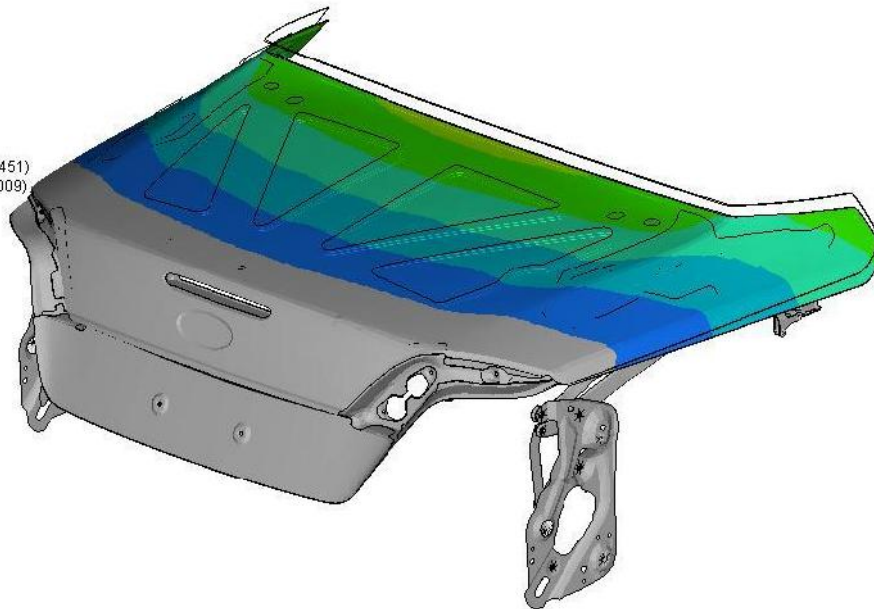
# Automotive & Vehicles

From our background in Airworks and previous experiences:  
Selected reference projects for Automotive & Vehicles

Contour Plot (Analysis system)  
Displacement(Mag)



No result  
Max = 2.9 (Node 43451)  
Min = 0.0 (Node 47009)



## GROUND VEHICLES

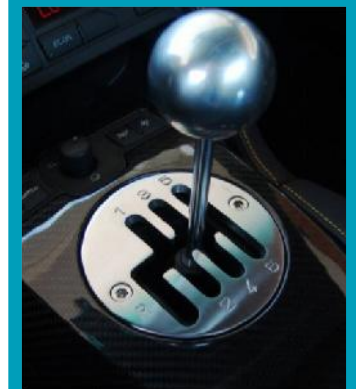
### CONFIDENTIAL – Project S389

Non linear static analysis in Open Trunk Lid configuration. Stress of arms & brackets, determination of the kinematical center under gravity load.

## HOFER POWERTRAIN

### GEARSHIFT SYSTEM

Design of the new concept of BMW shift system minimizing vibration at the knob and increasing shifting precision



## EARTH MOVING VEHICLES

### LANDINI - PowerLift

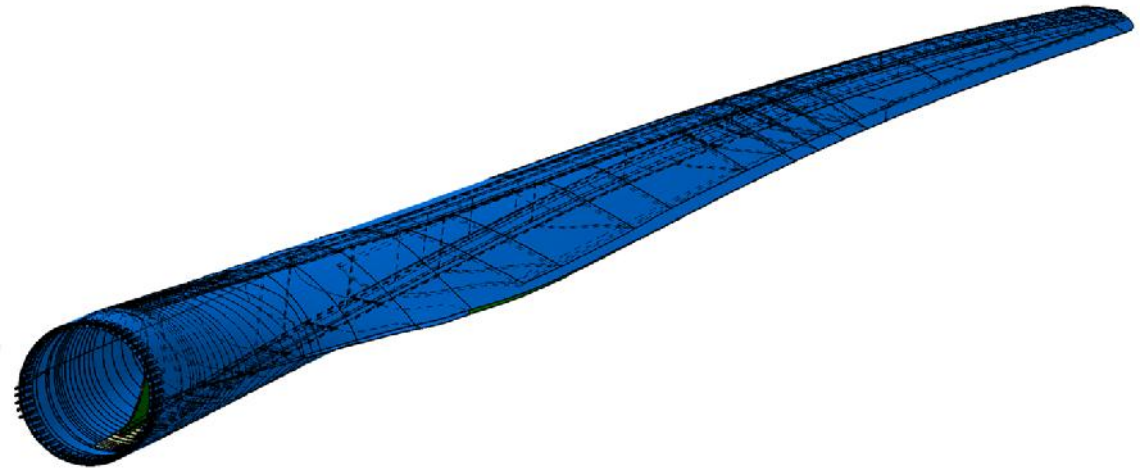
Design and analysis of the withdrawn arm and the hydraulic coupling for several implements. Analysis of the load capacity of the vehicle.



# Wind Power

## BLADE SYSTEMS

Since year 2010, AIRWORKS is developing technologies to support Wind Power turbine manufacturers in the segment of large rotor blades.



## SERVICE RANGE

- Contractor for complete rotor design
- Contractor for Research & Development projects
- Aerodynamic design of rotor blades
- Structural blade design
- Mould design
- Sizing and Certification of rotor blades according to GL, DNV
- Design of systems & components (Nacelle, Tower, Hub)
- Turbine load calculations
- Performance optimization on existing turbines
- Implementation of composite materials
- Manufacturing support

# Blade Projects

## XEMC-DARWIND

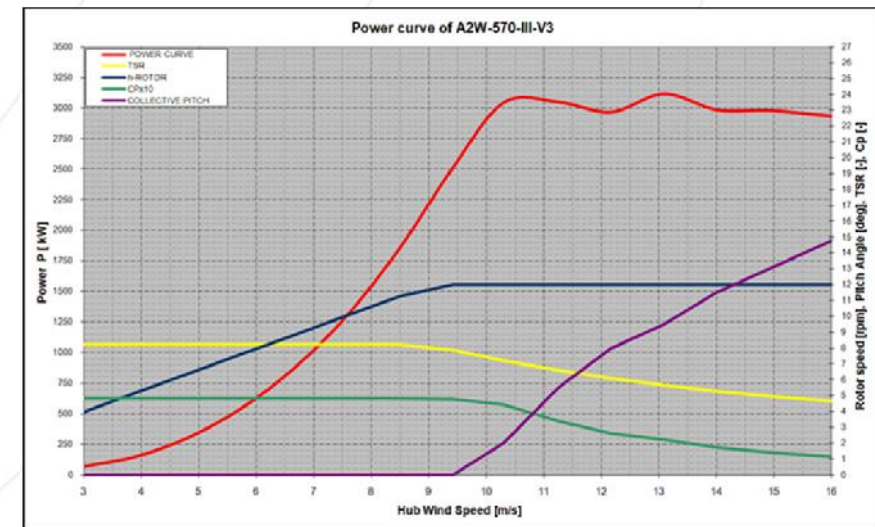
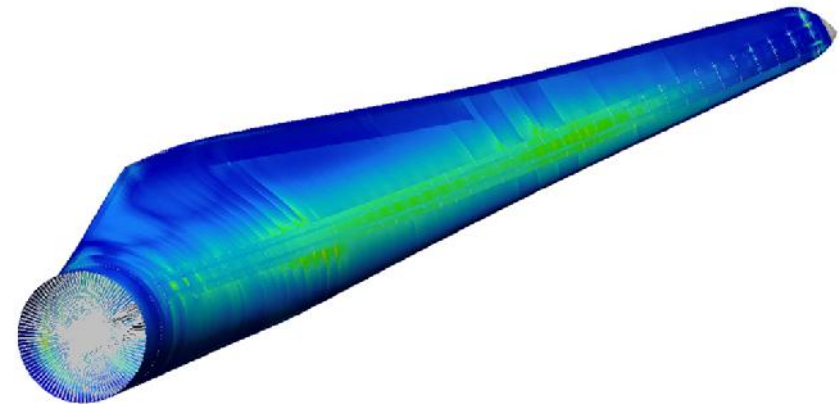
- 2MW // GFRP Blade 45.3 [m] - IEC Wind Class III
- 2MW // GFRP Blade 40.0 [m] - IEC Wind Class I

## KM BLADES

- 250 kW // GFRP Blade 15.5 [m] - IEC Wind Class III
- 250 kW // GFRP Blade 14.2 [m] - IEC Wind Class II

## AIRWORKS (R&D)

- 3MW // GFRP Blade 57.0 [m] - IEC Wind Class III
- 3MW // GFRP Blade 55.0 [m] - IEC Wind Class II
- 3MW // GFRP Blade 53.0 [m] - IEC Wind Class I



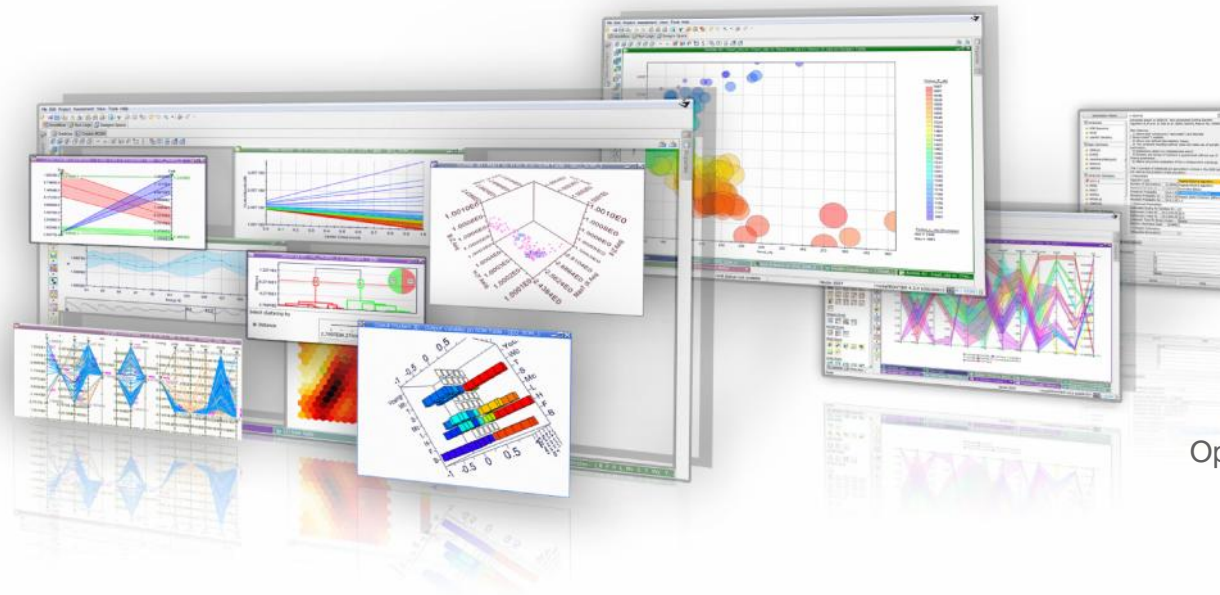




**modeFRONTIER**  
the multi-objective optimization and design environment

Highly complex problems, involving different disciplines and multiple objectives, require not only engineering understanding but also a systematic approach through process automation and mathematical optimization.

**This is our know-how.**



**Capabilities**

- Engineering process automation –
- CAE software integration –
- Statistical data analysis –
- Single & multi-objective optimization –
- Optimization based on analytical & exp. models –
- Robust design –

**Offering**

- Optimization-based product design –
- Development of automated engineering processes for the customer –
- Integration of customer analytical models (CAE) with experimental data –

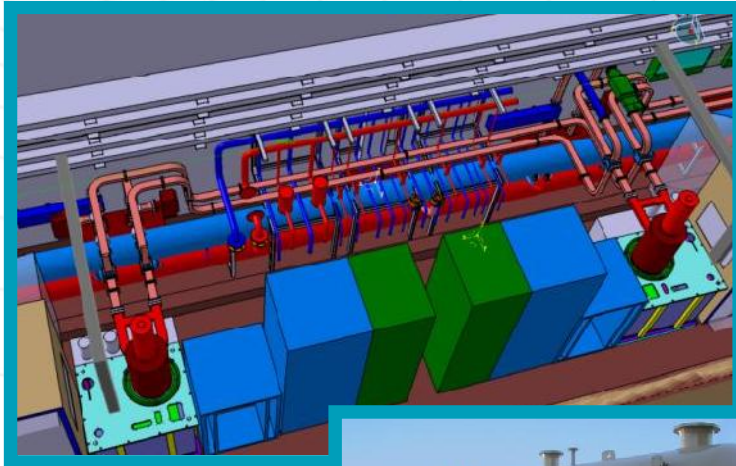
**Applications: Instruments, Space, Power plants, Structures**

NEW ACTIVITIES

# Pressure Vessels & Piping

**DESIGN & STRESS ANALYSIS**

AIRWORKS INDUSTRY has launched activities to support the design of Pressure Vessels, Heat Exchangers & Piping for Energy, Process & Pharmaceutical Industry.

**PROJECTS**

- SINCROTRONE (TS): Basic Piping Design, Laboratory Area
- ORION S.p.A: Analysis activities, Valves
- (AIRWORKS): In-depth standard familiarization (ASME, ANSI,...)

**CURRENT TECHNICAL OFFERING:**

- Design & Stress Analysis of Pressurized Systems (ASME VIII, etc)
- Design & Stress Analysis of Support Structure for Pressure Vessels
- Design & Stress Analysis of Valves and other components
- Basic Design & Stress Analysis of Piping

**FUTURE ACTIVITIES – *In Progress***

- Advanced Piping Design & Stress Analysis (ASME III, ANSI B31)
- Advanced Fluidmechanics (CFD)

# Contacts



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[sales@air-works.eu](mailto:sales@air-works.eu)