

June 15–21, 2015, Paris Le Bourget, Hall 1, Booth G316

# **PARIS AIR SHOW LE BOURGET 2015**





## FRAUNHOFER TOPICS

Flying has become an essential part of modern society, a means of bringing people together as well as an instrument of global trade and economic growth. At the same time, the industry has shown itself to be sensitive to environmental concerns such as air pollution, noise and climate change. One of the central questions in this context is the question of "economy": How can air traffic become more and more ecological but at the same time remain economic?

**Six Fraunhofer establishments present their innovations at a theme pavilion (hall 1, booth G 316).**

The Fraunhofer-Gesellschaft is the leading organization for applied research in Europe. Its research activities are conducted by 66 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of nearly 24,000, who work with an annual research budget totaling more than 2 billion euros. Of this sum, around 1.7 billion euros is generated through contract research. More than 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.



### Fraunhofer Institute for Electronic Nano Systems ENAS

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Fraunhofer ENAS develops smart systems and components for various applications. The developments of high-precision silicon-based sensors, polymer-based sensors and actuator systems are counted among the core competences of the institute. The research activities also focus on security and reliability of these components and systems.

The institute shows different samples of the product and technology portfolio at the Paris Air Show 2015:

- Pulsed and synthetic jet actuators for active flow control
- Smart Vortex generators for the integration into movable control surface
- Wireless power and data transmission for flexible cabin and object furnishing
- High-temperature shock test for studying the true failure mechanisms of components and systems

### Fraunhofer Institute for Building Physics IBP

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The Fraunhofer Institute for Building Physics IBP focuses its work on research, development, testing, demonstration and consulting in the various fields of building physics. The implementation of these competences on close-by subjects expands the classic circle of partners to the aviation industry. Therefore scientists develop solutions for noise reduction, indoor environment, hygiene and health protection, avionics as well as more sustainability in aviation.

- Flight Test Facility and Ground Thermal Test Bench
- eco DESIGN® Tool ENDAMI
- Aircraft-recycling (lecture)
- Air quality in aircraft cabin (lecture)
- Local climatization for more passenger comfort (lecture)



### **Fraunhofer Institute for Chemical Technology ICT**

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Product and manufacturing development in the fields of plastics, environmental and energy technology are competences of the Fraunhofer ICT. Furthermore, the recycling of aircraft materials is deeply investigated.

For the SIAE 2015 we will present you:

- Flexible PUR foam made from renewable resources
- Non-halogenated flame retardant systems for aircraft seating cushion

### **Fraunhofer Institute for Chemical Technology ICT, Branch ICT-IMM**

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Aiming at innovative concepts for energy supply in aerospace applications we develop microchannel heat-exchangers and reactors for heat management, tank inertization and catalytic combustion as well as reformers and complete fuel processors for the hydrogen production for fuel cells.

Our services include detailed engineering and manufacture of individual reactors and components as well as testing and integration of complete systems for a power range of 50 kW and upwards. We also develop our own catalysts for implementation in our reactors, with stability of up to many thousands of hours.

- Energy supply concepts for aircrafts
- Tank inertization systems for aircrafts

### **Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM**

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In order to maximize the aerodynamic performance of aircraft wings Fraunhofer IFAM has developed materials and adaptive structures for morphing at cruise flight conditions. The purpose of this class of morphing parts is to realize a smooth, gapless transition between moving and fixed parts of the wing. For the morphing parts a new material had to be designed. Core feature of this new elastomeric material is the constant elasticity between  $-55\text{ }^{\circ}\text{C}$  and  $120\text{ }^{\circ}\text{C}$ .

At SIAE Le Bourget 2015 Fraunhofer IFAM presents:

- Adaptive trailing edge
- Morphing part of wingtip active trailing edge

### **Fraunhofer Institute for Production Technology IPT and Fraunhofer Institute for Laser Technology ILT**

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ADaM: Adaptive Production for Resource Efficiency in Energy Generation and Mobility

New drive concepts are essential in meeting growing demands to significantly reduce emissions and fuel consumption in the automotive, aviation, and power-generation industries. The goal of the innovation cluster AdaM is to significantly increase the efficiency of energy conversion, measurably reduce

CO<sub>2</sub> emissions, and conserve natural resources. The innovation cluster's activities have been planned over a period of two-and-a-half years with a total budget of 10 million euros, funded by the Fraunhofer-Gesellschaft, the state government of North Rhine-Westphalia, and in particular the 21 industrial partners.

### **CAx Technologies**

Data consistency across the entire manufacturing and repair process chain by means of flexible software design and open interfaces

### **Laser**

Work on methods to adapt processing strategies and process parameters for selective laser melting and laser material deposition according to material and geometry

### **Machining**

Development of individual machining, clamping, and process monitoring technologies, including their integration into adaptive process chains

### **Design**

Methodical comparisons of different design and manufacturing variants by evaluating measurable variables from both a product and manufacturing perspective





## SHORT LECTURES

To learn more about Fraunhofer Technologies we would like to invite you joining our short lectures concerning new technologies for airframe, engines, systems, eco DESIGN and air quality.

**JUNE 16, 2015**

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|----------------------|--|----------------------|---|
| <b>09:00 - 09:20</b> | <i>Airframe</i><br><b>CLEAN SKY 2</b><br>Giuseppe Pagnano<br><b>Joint Technology Initiative Clean Sky</b>  | <b>10:40 - 11:00</b> | <i>Engines</i><br><b>ADDITIVE MANUFACTURING TECHNOLOGIES FOR AERO-ENGINE COMPONENTS</b><br><i>Dr. Johannes Witzel</i><br><b>Fraunhofer ILT</b>                                |
| <b>09:20 - 09:40</b> | <i>Airframe</i><br><b>FRAUNHOFER DROOPE NOSE:<br/>A TECHNOLOGY PLATFORM FOR CLEAN SKY</b><br>Dr. Valerio Carli<br><b>Fraunhofer Aviation TMO</b> | <b>11:00 - 11:20</b> | <i>Engines</i><br><b>ADVANCED SLOTTING AND FINISHING TECHNOLOGIES FOR AERO-ENGINE COMPONENTS</b><br>Daniel Schraknepper<br><b>Fraunhofer IPT</b>                              |
| <b>09:40 - 10:00</b> | <i>Airframe</i><br><b>POLYMER BASED MORPHING SKIN FOR ADAPTIVE WINGS</b><br>Andreas Lühring<br><b>Fraunhofer IFAM</b>                            | <b>11:20 - 11:40</b> | <i>Engines</i><br><b>ADAPTIVE PROCESS CHAINS FOR AERO-ENGINE COMPONENTS</b><br>Daniel Schraknepper, Anders Such<br><b>Fraunhofer IPT/ILT</b>                                  |
| <b>10:00 - 10:20</b> | <i>Airframe</i><br><b>ACTIVE FLOW CONTROL – PULSED AND SYNTHETIC JET ACTUATORS</b><br>Mathias Lipowski<br><b>Fraunhofer ENAS</b>                 | <b>11:40 - 12:00</b> | <i>Engines</i><br><b>INTERNATIONAL CENTER FOR TURBO-MACHINERY MANUFACTURING ICTM, AACHEN – STRUCTURE AND CAPABILITIES</b><br><i>Torsten Moll</i><br><b>Fraunhofer IPT/ILT</b> |
| <b>10:20 - 10:40</b> | <i>Engines</i><br><b>ADVANCED TECHNOLOGIES FOR AERO-ENGINES WITHIN FRAUNHOFER</b><br>Torsten Moll<br><b>Fraunhofer IPT/ILT</b>                   |                      |   |

**JUNE 17, 2015**

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|----------------------|---|----------------------|---|
| <b>09:00 - 09:20</b> | <i>Systems</i><br><b>LOCAL CLIMATIZATION FOR MORE PASSENGER COMFORT</b><br>Thomas Kirmayr<br><b>Fraunhofer IBP</b>                      | <b>10:20 - 10:40</b> | <i>eco DESIGN</i><br><b>&gt;&gt;BIRD&lt;&lt; – A TOOL TO IMPLEMENT RECYCLING INFORMATION IN A/C DESIGN</b><br>Ann-Kathrin Wimmer<br><b>Fraunhofer ICT</b> |
| <b>09:20 - 09:40</b> | <i>eco DESIGN</i><br><b>AIRCRAFT-RECYCLING – CHALLENGES AND SOLUTIONS</b><br>Dr. Florian Mayer<br><b>Fraunhofer IBP</b>                 | <b>10:40 - 11:00</b> | <i>eco DESIGN</i><br><b>GROUND THERMAL BENCH TEST</b><br>Markus Siede<br><b>Fraunhofer IBP</b>  |
| <b>09:40 - 10:00</b> | <i>eco DESIGN</i><br><b>CLEAN SKY – ECO DESIGN® TECHNOLOGIES AND EVALUATION</b><br>Thomas Reichert, Ana Salles<br><b>Fraunhofer ICT</b> | <b>11:00 - 11:20</b> | <i>eco DESIGN</i><br><b>THE THERMAL MODEL</b><br>Markus Siede/Dr. Victor Norrefeldt<br><b>Fraunhofer IBP</b>  |
| <b>10:00 - 10:20</b> | <i>eco DESIGN</i><br><b>ENDAMI – ECO DESIGN® TOOL FOR THE AVIATION INDUSTRY</b><br>Robert Ilg/Laura Brethauer<br><b>Fraunhofer ICT</b>  | <b>11:20 - 11:40</b> | <i>eco DESIGN</i><br><b>THE FUTURE OF ECO DESIGN®</b><br>John Simpson<br><b>Fraunhofer</b>  |



**JUNE 18, 2015**

**09:00 - 09:20** *eco DESIGN*  
**ENERGY SUPPLY CONCEPTS FOR  
AIRCRAFTS – REFORMING OF  
POLYALCOHOLS/PROPYLENE-GLYCOL**  
Prof. Dr. Gunther Kolb  
**Fraunhofer ICT-IMM**

**09:20 - 09:40** *eco DESIGN*  
**HIGH TEMPERATURE THERMAL  
CYCLING TEST FACILITY AND  
ACTIVE POWER CYCLING BENCH**  
Eberhard Kaulfersch  
**Fraunhofer ENAS**

**09:40 - 10:00** *Systems*  
**WIRELESS DATA AND  
ENERGY TRANSMISSION**  
Christian Hedayat  
**Fraunhofer ENAS**

**10:00 - 10:20** *Systems*  
**TANK INERTIZATION  
SYSTEMS FOR AIRCRAFT**  
Prof. Dr. Gunther Kolb  
**Fraunhofer ICT-IMM**

**10:20 - 10:40** *eco DESIGN*  
**COMFORT FOR BODY AND CONSCIENCE:  
SUSTAINABLE RAW MATERIALS  
FOR AIRCRAFT SEATING CUSHIONS**  
Bert Käbisch  
**Fraunhofer ICT**

**10:40 - 11:00** *Air quality*  
**MOX SENSOR FOR AIR QUALITY  
MONITORING IN AIRCRAFT CABIN**  
Dr. Florian Mayer  
**Fraunhofer IBP**



# FRAUNHOFER EXHIBITORS

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FRAUNHOFER EXHIBITORS

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## FRAUNHOFER ACTIVITIES WITH CLEAN SKY

### FROM CLEAN SKY TO CLEAN SKY 2

Mid-2014 saw the launch of Clean Sky 2, the second part of a major European research initiative in which Fraunhofer will play a continued key role. The European Commission and the private sector will together be providing a further budget of some 4 billion euros. The project is designed to complement the objectives of Flightpath 2050, which sets out a vision for air travel and aviation in the year 2050. Clean Sky 2 also takes into account the new agenda for strategic research and innovation drawn up by the Advisory Council for Aeronautics Research in Europe (ACARE). Clean Sky 2 is a private public partnership established under the Council Regulation until the end of 2024. Further information can be found under the link:

[www.cleansky.eu/content/homepage/about-clean-sky-2](http://www.cleansky.eu/content/homepage/about-clean-sky-2)



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### **Photo acknowledgements**

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Image