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CEAS/KATnet Conference on Key Aerodynamic Technologies

To Meet the Challenges
of the European 2020 Vision

In Association with the
2005 RAeS Aerodynamics Research Conference



20 - 22 June 2005

Hilton Bremen, Germany

>>>

Final
Programme

Sponsored by: EU European Union

www.kat-net2005.com

SCOPE OF CONFERENCE

In the *ACARE Vision for 2020*, the Group of Personalities has formulated a clear set of requirements for civil transport aircraft operation in order to reach the following specific goals:

- **Five-fold reduction in accidents**
- **Halving perceived aircraft noise**
- **50% cut in CO₂ emission per passenger-km**
- **80% cut in NO_x emissions**
- **Air traffic system capable to handle 16 million flights/year**
- **99% of all flights within 15 minutes of timetable.**

The 2005 CEAS/KATnet Conference is devoted to key aerodynamic technologies that open up to meet the challenges of this vision.

This conference is succeeding the CEAS/DragNet European Drag Reduction Conference held 2000 in Potsdam, Germany and the CEAS/TRA3 Aerospace Aerodynamics Research Conference held 2002 in Cambridge, UK. The conference is organised by DGLR under the auspices of CEAS and amalgamated with the 2005 RAeS Aerodynamics Research Conference.

The conference provides an excellent opportunity for the aeronautical community to present and discuss the status that has been reached in the key disciplines of aerodynamics relative to the 2020 goals.

The performance of the conference in Bremen as the *City of Aeronautics & Astronautics* and the *2005 City of Science* will be maximising attendance and success of this event.

PROGRAMME COMMITTEE

Prof P Thiede, KATnet, Bremen
Chairman

Prof J Fulker, QinetiQ, Bedford
Co-chairman

Dr P Eliasson, FOI, Stockholm
Dr U Herrmann, DLR, Braunschweig
Dr D Knörzer, EU, Bruxelles
Mr F Monge, INTA, Madrid

Dr J Müller, RUAG Aerosp., Emmen
Mr D Reckzeh, Airbus D, Bremen
Mr J Reneaux, ONERA, Châtillon
Dr S Rolston, Airbus UK, Bristol
Mr D Sawyers, Airbus UK, Bristol
Dr G Schrauf, Airbus D, Bremen
Dr V Selmin, Alenia Aeronautica, Turin
Dr C Warsop, BAE SYSTEMS, Bristol

ORGANISATION

DGLR Bremen

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PROGRAMME OVERVIEW

Monday, 20.06.2005

- 12:00 Registration
14:00 Opening Ceremony
14:30 Session 1 Vision 2020 Challenges
15:30 Coffee Break
16:00 Session 2 Novel Configurations
19:00 Mayor's Reception at Town Hall

Tuesday, 21.06.2005

- 08:30 Session 3 Plenary Lectures I
09:30 Coffee Break
Room Weser Modersohn Hoetger
10:00 Session 4 Multidisciplinary Design Session 5 Flow Control Methods Session 6 AIAA Selected Papers I
11:15 Session 7 High Speed Technologies Session 8 FC Actuator Concepts Session 9 AIAA Selected Papers II
12:30 Lunch
14:00 Session 10 High Lift Systems I Session 11 FC Pulsed Jet Actuators Session 12 Drag Prediction & Reduction
15:40 Coffee Break
16:10 Session 13 Wing Tip Devices Session 14 Various FC Applications Session 15 Airframe Noise Reduction
19:00 Boat Trip & Conference Dinner

Wednesday, 22.06.2005

- 08:30 Session 16 Plenary Lectures II
09:30 Coffee Break
10:00 Session 17 AWIATOR Platform Session 18 Laminar Flow Technology Session 19 Numerical Flow Simulation
11:15 Session 20 High Lift Systems II Session 21 Transition Control & Measurement Techniques Session 22 Transition Prediction
12:30 Lunch
14:00 Session 23 Future Prospects
15:50 Coffee Break
16:00 Airbus Bremen Plant Visit

12:00	Registration	
14:00	Opening Ceremony	Weser
	<p>P. Thiede, KATnet, Bremen, Germany Chairman of the Programme Committee</p> <p>J. Szodruch, DLR Cologne, Germany President of DGLR, CEAS Representative</p> <p>W. Lemke, State of Bremen, Germany Senator for Education and Science, State of Bremen</p>	
Session 1	Vision 2020 Challenges	Weser
	Chairman: P. Thiede, KATnet, Bremen, Germany	
14:30	Europe's Contribution to Master the Challenges for Aeronautics (invited)	
	J. Metthey, EC Brussels, Belgium	
14:50	ACARE Vision 2020 - The Second Strategic Research Agenda (invited)	
	J. Szodruch, DLR Cologne, Germany	
15:10	ACARE Vision 2020 Challenges - Preparing the AIRBUS Answer (invited)	
	G. Dirks, D. Schmitt, Airbus S.A.S., Toulouse, France	
15:30	Coffee Break	
Session 2	Novel Configurations	Weser
	Chairman: G. Dirks, Airbus S.A.S., Toulouse, France	
16:00	Flying Wing Aerodynamics Studies at ONERA and DLR	
	B. Mialon, ONERA Chatillon, France; M. Hepperle, DLR Braunschweig, Germany	
16:25	Aerodynamic Studies of Novel High Speed Configurations in the NEXUS Programme	
	K.C. Hackett, QinetiQ Bedford; T. Gibson, Airbus UK, Bristol, UK	
16:50	A Joint DLR-ONERA Contribution to CFD-based Investigations of Unconventional Empennages for Future Civil Transport Aircraft	
	G. Carrier, ONERA Châtillon, France; L. Gebhardt, DLR Braunschweig, Germany	
17:15	An Energy Scavenging Wing	
	D. Nixon, Los Altos, USA	
19:00	Mayor's Reception at Town Hall	

Session 3	Plenary Lectures I	Weser
	Chairman: H. Körner, DLR ret., Braunschweig, Germany	
08:30	Boeing 787 - Design for Optimal Airplane Performance (invited)	
	M. Goldhammer, Boeing, Seattle, USA	
09:00	Overview on Flow Control Concepts (invited)	
	J.-P. Bonnet, J. Delville, University of Poitiers, France	
09:30	Coffee Break	
Session 4	Multidisciplinary Design	Weser
	Chairman: B. Stoufflet, Dassault Aviation, Merignac, France	
10:00	Rapid Multi-Disciplinary Analysis and Preliminary Design of Novel Aircraft Configurations	
	J. Doherty, QinetiQ, Farnborough, UK	
10:25	MDO Design and Aerodynamic Off-Design Analysis of a Mach=1.6 Aircraft	
	U. Herrmann, DLR Braunschweig, Germany	
10:50	On the Use of Active Aeroelastic Structures to Optimise Aerodynamic Performance	
	J. Cooper, M. Amprikidis, University of Manchester, UK	
Session 5	Flow Control Methods	Modersohn
	Chairman: J.-J. Thibert, ONERA Châtillon, France	
10:00	Numerical Investigation of Flow Control for High Lift and Transonic Buffet Improvements	
	J.C. Courty, J.-M. Hasholder, G. Petit, Dassault Aviation, Saint-Cloud, France	
10:25	A Combined Experimental and Numerical Investigation of the Buffet Phenomenon and its Control through Passive and Active Devices	
	J. Reneaux, V. Brunet, D. Caruana, S. Deck, P. Naudin, ONERA Châtillon, France	
10:50	Vortex Generator Simulation on Transonic and High Lift Configurations	
	V. Brunet, C. Francois, D. Caruana, ONERA Châtillon, France	

Session 6	AIAA Selected Papers I	Hoetger
	Chairman: G. Schrauf, Airbus D, Bremen, Germany	
10:00	Design and Testing of a Blended Wing Body with Boundary Layer Ingestion Nacelles at High Reynolds Numbers R. Campbell, M. Carter and O. Pendergraft, NASA Langley Research Center, Hampton, VA, USA D. Friedman and L. Serrano, Boeing Phantom Works, Huntington Beach, USA	
10:25	Physical Considerations of Leading Edge Flows K. Visser, Clarkson University, Potsdam, NY, USA; M. del Carmen Ferrero, Ecole Polytechnique, Paris, France; R. Nelson, University of Notre Dame, Notre Dame, IN, USA	
10:50	Force, Surface Pressure, and Flowfield Measurements on a Slender Missile Configuration with Square Cross-Section at Supersonic Speeds F. Wilcox, NASA Langley Research Center, Hampton, VA, USA; T. Birch, DSTL, Bedford, UK; J. Allen, NASA Langley Research Center, Hampton, VA, USA	

Session 7	High Speed Technologies	Weser
	Chairman: T. Gibson, Airbus UK, Bristol, UK	
11:15	Design of Blended Wing Body Configurations Using a Constrained Numerical Optimisation Method J.J. Varona, INTA Madrid, Spain	
11:40	Aerodynamic Design Study for Multi-Lifting Surfaces Q. Yang, T. Streit, G. Wichmann, DLR Braunschweig, Germany	
12:05	An Investigation on Gurney Flaps to Increase Lift in Transonic Flows N.D. Sellars, D.S. Amor, BAE Systems, Brough, UK	

Session 8	FC Actuator Concepts	Modersohn
	Chairman: C. Warsop, BAE Systems, Bristol, UK	
11:15	Actuators & Actuation Approaches for Effective Active Flow Control A. Seifert, University of Tel-Aviv, Israel	
11:40	Perspectives of Non-Intrusive Flow Control with Pulsed Lasers C.J. Kähler, TU Braunschweig, Germany	
12:05	Experiments to Plasma Assisted Flow Control on Flying Wing Models B. Göksel, I. Rechenberg, TU Berlin, Germany	
12:25	AEROMEMS II – Advanced Aerodynamic Flow Control Using MEMS (poster) C. Warsop, BAE Systems, Bristol, UK	

Session 9	AIAA Selected Papers II	Hoetger
	Chairman: F. Monge, INTA Madrid, Spain	
11:15	Numerical Study of Flow Past a Circular Cylinder Using RANS, Hybrid RANS/LES and PANS Formulations A. Elmiligui, Analytical Services and Materials, Hampton, VA; K. Abdol-Hamid, S. Pao, NASA Langley Research Center, Hampton, VA; S. Massey, Eagle Aeronautics Inc., Hampton, VA, USA	
11:40	Pressure-Sensitive Paint Investigation of Double-Delta Wing Vortex Flow Manipulation G. Erickson, NASA Langley Research Center, Hampton, VA; H. Gonzalez, Naval Air Systems Command, Patuxent River, MD, USA	
12:05	A Sensitivity Study of Downwash Weighting Methods for Transonic Aeroelastic Stability Analysis R. Silva, O. Mello and J. Azevedo, Aerospace Technical Center, Sao Jose dos Campos, Brazil	
12:30	Lunch	

Session 10	High Lift Systems I	Weser
	Chairman: G. Heller, Airbus D, Bremen, Germany	
14:00	Innovative High Lift Configurations B. Kiefner, Airbus D, Bremen, Germany	
14:25	European Research on High Lift Commercial Aircraft Configurations in the EUROLIFT Projects R. Rudnik, DLR Braunschweig; P. Thiede, Airbus D ret. Bremen, Germany	
14:50	Aerodynamic Studies of Alternative High Lift Devices in the NEXUS Programme C. Newbold, QinetiQ, Farnborough; K. Bohannon, S. Galpin, Airbus UK, Bristol, UK	
15:15	Aerodynamic Design of High Lift Wings in Multidisciplinary Environment D. Reckzeh, Airbus D, Bremen, Germany	

Session 11	FC Pulsed Jet Actuators	Modersohn
	Chairman: H. Bieler, Airbus D, Bremen, Germany	
14:00	Performance Optimization of Pulsed Jet Actuator Arrays for Active Flow Control P. Scholz, C. Kähler, R. Radespiel, TU Braunschweig, Germany	

- 14:25 **Variables Influencing the Formation of Embedded Structures from Multiple Synthetic Jets**
S. Liddle, N. Wood, University of Manchester, UK
- 14:50 **Near-Field Evolution of Round Synthetic Jets**
M. Jabbal, S. Zhong, University of Manchester, UK
- 15:15 **Relevance of Frequency and Duty-Cycle for Dynamic Flow Control at High Lift Conditions (poster)**
J. Ortmanns, C. Kähler, R. Radespiel, TU Braunschweig, Germany
- Time Evolution of the Interaction of Synthetic Jets with a Turbulent Boundary Layer (poster)**
L. Garcillan, S. Zhong, N. Wood, University of Manchester, UK
- Effectiveness of Synthetic Jet on Stationary and Pitching Airfoils (poster)**
A. Rehman, K. Kontis, University of Manchester, UK
- A PIV Investigation of the Performance of Circular Synthetic Jets in Quiescent Flow (poster)**
J. Wu, S. Zhong, H. Tang, N. Wood, University of Manchester, UK

Session 12 Drag Prediction & Reduction Hoetger

Chairman: P. Eliasson, FOI, Stockholm, Sweden

- 14:00 **Aircraft Aerodynamic Simulation with CFD++**
S. R. Chakravarthy, U.C. Goldberg, O. Peroomian, Metacomp Technologies, Agoura Hills, CA, USA
- 14:25 **DRAG Prediction and Wake Survey Techniques**
M. Meheut, D. Bailly, ONERA, Chatillon, France
- 14:50 **Validation and Optimisation of 3D Bumps for Transonic Wing Drag Reduction**
N. Qin, W.S. Wong, A. Le Moigne, N. Sellars, University of Sheffield, UK
- 15:15 **REMFI - Rear-Fuselage and Empennage Flow Investigation**
A. Abbas, J. Dias, Airbus E, Madrid, Spain
- 15:40 **Coffee Break**



Session 13 Wing Tip Devices Weser

Chairman: J. Chu, Airbus UK, Bristol, UK

- 16:10 **M-DAW – Modeling and Design of Advanced Wing Tip Devices**
A. Mann, Airbus UK, Bristol, UK
- 16:35 **CFD Analysis on Different Wing Tip Devices**
S. Barakat, DLR Göttingen; E. Elsholz, Airbus D, Bremen, Germany
- 17:00 **Improving High Lift Behaviour of Nonplanar Wing Tip Devices using Moving Parts**
A. Büscher, R. Radespiel, TU Braunschweig, Germany
- 17:25 **Impact of Multiple Winglet Configurations on Civil Air Transport**
U. La Roche, H.L. La Roche, La Roche Consulting, Zuerich, Switzerland

Session 14 Various FC Applications Modersohn

Chairman: M. Borsi, ALENIA, Turin, Italy

- 16:10 **Key Nacelle Aerodynamic Technologies for Aircraft Safety**
S. Raghunathan, E. Benard, J.K. Watterson, Queens University of Belfast; D. Riordon, Bombardier Aerospace, Belfast, UK
- 16:35 **Control of Boundary Layer Separation on a Civil Turbofan Intake Using Air-Jet Vortex Generators**
S.D. Erbsloeh, W.J. Crowther, University of Manchester, UK
- 17:00 **Wing Tip Vortex Control Using Synthetic Jets**
P. Margaris, I. Gursul, University of Bath, UK
- 17:25 **Drag Reduction and High Lift Improvement for UAV Wings through Boundary Layer Suction/Blowing**
D.P. Coiro, F. Nicolosi, A. De Marco, E.F. Bellobuono, University of Naples, Italy

Session 15 Airframe Noise Reduction Hoetger

Chairman: J. Delfs, DLR Braunschweig, Germany

- 16:10 **Overview on Airframe Noise Generation and Reduction (invited)**
H. Rémy, P. Lempereur, Airbus F, Toulouse, France
- 16:35 **Project Activities to Support Low Noise High Lift Design**
M. Fischer, H. Bieler, Airbus D, Bremen, Germany
- 17:00 **EPISTLE: High Lift System Design for Low Noise Applied to a Supersonic Aircraft**
U. Herrmann, DLR Braunschweig, Germany



17:25 **Noise Suppression Methods for Transonic Cavity Flows**
P. Nayyar, G.N. Barakos, K.J. Badcock, B.E Richards,
University of Glasgow, UK

19:00 **Boat Trip & Conference Dinner**

Session 16 Plenary Lectures II Weser
Chairman: R. Henke, Airbus D, Bremen, Germany

08:30 **Climate Change Impact of Air Traffic (invited)**
U. Schumann, DLR Oberpfaffenhofen, Germany

09:00 **Technological Challenges for Business Jets:
A Focus on Aerodynamics (invited)**
B. Stoufflet, P. Rostand, C. Lucius,
Dassault Aviation, Saint-Cloud, France

09:30 **Coffee Break**

Session 17 AWIATOR Platform Weser
Chairman: D. Knörzer, EC Brussels, Belgium

10:00 **Wing Technologies between Evolution and Revolution:
Status of the European AWIATOR Programme (invited)**
R. Henke, Airbus D, Bremen, Germany

10:25 **Application of Adaptive Trailing Edge Elements
within the AWIATOR Project**
H. Hansen, Airbus D, Bremen, Germany

10:50 **AWIATOR Wake Vortex Characterization Methodology**
F. Laporte, Airbus D, Bremen, Germany

Session 18 Laminar Flow Technology Modersohn
Chairman: K.-H. Horstmann, DLR Braunschweig, Germany

10:00 **Status and Perspectives of Laminar Flow**
G. Schrauf, Airbus D, Bremen, Germany

10:25 **Drag Reduction using Boundary Layer Suction and Blowing**
P.W.C. Wong, M. Maina, ARA Bedford;
G.C. Doig, University of Glasgow, UK

10:50 **The ALTTA HLF Nacelle**
B. Humphreys, P. Meyer, AS&T, Consett, UK

Session 19 Numerical Flow Simulation Hoetger
Chairman: K. Becker, Airbus D, Bremen, Germany

10:00 **Large Eddy Simulation of Aircraft Wake Vortices
on Unstructured Grid**
A. Le Moigne, N. Qin, University of Sheffield, UK

10:25 **CFD Simulation of Flow Control Devices for Helicopter Rotors**
G.N. Barakos, K.J. Badcock, B.E. Richards,
University of Glasgow, UK

10:50 **Detached Eddy Simulation for Synthetic Jets in Cross-Flows
Using Dynamic Grid**
H. Xia, N. Qin, University of Sheffield, UK

Session 20 High Lift Systems II Weser
Chairman: D. Reckzeh, Airbus D, Bremen, Germany

11:15 **Advances in Low Speed Aerodynamics: The IHK Approach**
M. Sutcliffe, Airbus D, Bremen, Germany

11:40 **Use of Upper Surface Blowing and Circulation Control
for Gapless High Lift Configurations**
K.C. Pfingsten, R. Radespiel, TU Braunschweig, Germany

12:05 **Lift, Drag and Moment Control by Means
of Active Flow Control**
R. Petz, W. Nitsche, R. Becker, R. King, TU Berlin, Germany

**Session 21 Transition Control
& Measurement Techniques** Modersohn
Chairman: K.-P. Neitzke, Airbus D, Bremen, Germany

11:15 **Prospects for Laminar Flow Control
Using Distributed Roughness Elements**
C. Atkin, M.S. Mughal, QinetiQ, Farnborough, UK

11:40 **Active Control of Laminar Separation Bubbles**
U. Rist, K. Augustin, University of Stuttgart, Germany

12:05 **Application of TSP/PSP
in a High Speed Cryogenic Wind Tunnel**
Y. Egami; U. Fey; R. Engler, DLR Göttingen, Germany

Session 22 Transition Prediction Hoetger

Chairman: D. Arnal, ONERA Toulouse, France

- 11:15 **Effect of 2D and 3D Imperfections on Laminar-Turbulent Transition**
 J. Perraud, A. Séraudie, D. Arnal, ONERA Toulouse;
 J. Reneaux, ONERA Châtillon;
 D. Tran, Dassault Aviation, Merignac, France
- 11:40 **Calibration of the e^N -Method for Transition Prediction in 2D and 3D Supersonic Flows**
 J.-P. Archambaud, D. Arnal, A. Séraudie, G. Carrier, F. Louis
 ONERA Toulouse, France
- 12:05 **Pressure Sensitive Paint in Quantitative Wind Tunnel Studies (poster)**
 R. Engler, DLR Göttingen, Germany
- 12:30 **Lunch**

Session 23 Future Prospects Weser

Chairman: J. Fulker, QinetiQ Bedford, UK

- 14:00 **Introduction: Future Needs to Meet the Vision 2020 Challenges (invited)**
 A. Abbas, Airbus E, Madrid, Spain
- 14:30 **Round Table Discussion**
Topic: Aerodynamics Vision 2020
 Senior Experts from the EC, Industry and Research Community
- 15:30 **Final Conference Review (invited)**
 E. Stanewsky, DLR ret., Göttingen, Germany
- 15:50 **Coffee Break**
- 16:00 **Airbus Bremen Plant Visit**

Conference Venue

Hilton Hotel
 Böttcherstraße 2 Phone: +49 421 3696 - 0
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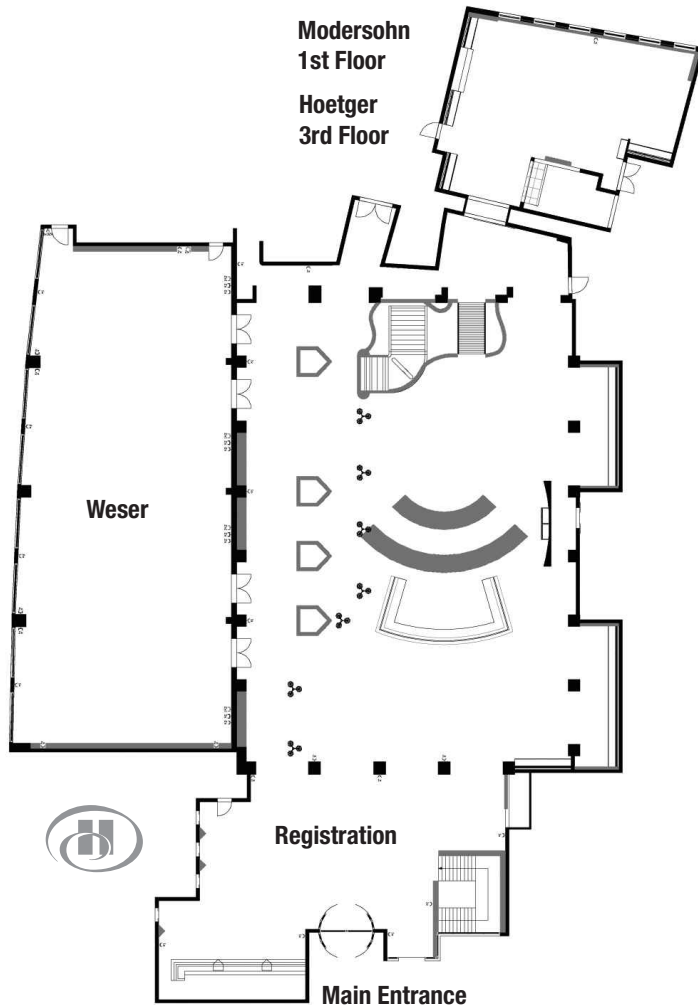
Registration office on-site

You can pick up your name badge and conference documents at our registration office on-site during the following hours:

Monday, June 20th 05, 10:00-16:00
 Tuesday, June 21st 05, 08:00-16:00
 Wednesday, June 22nd 05, 08:00-12:00

Conference Secretariate

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Social Events/Accompanying Person Programme

Monday, 20th June 2005

p.m. **Guided Bremen City Tour** Price per Person: approx. EUR 10,-*)
Min. Participants 10

19:00 **Mayor's Reception at Town Hall**

Tuesday, 21st June 2005

a.m. **Visit to Arts Village Worpswede** Price per Person: approx. EUR 30,-*)
Min. Participant 10

19:00 **Boat Trip & Conference Dinner** Price per Person: EUR 50,-
Meeting Point: 18:45, Hilton Lobby

Wednesday, 22nd June 2005

16:00 **Airbus Bremen Plant Visit**)**

Please utilize the conference registration form to book your desired tours.
All prices include 16% VAT.

(*) Prices depending on the number of participants, to be paid directly at the on-site registration office
(**) by request of AIRBUS additional information (passport no., citizenship, date and place of birth) is needed by the participants of the technical visit. Please register for the tour at the on-site registration office with your ID.

Area Map

The Hilton Hotel Bremen is directly located in the city centre. It can easily be reached from the airport (direction University) and from the railway station (direction Airport) by tram no. 6 – get off at station "Domsheide".

