



Aerospace Research in the Czech Republic

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Institute of Aerospace Engineering

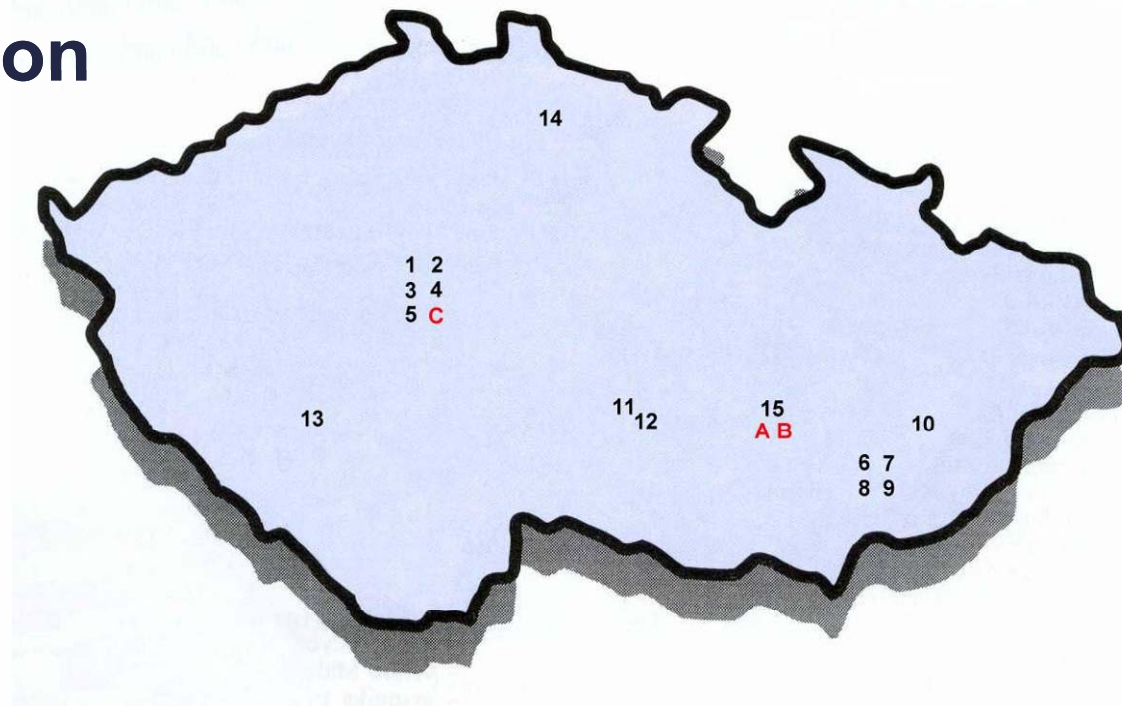
Faculty of Mechanical Engineering

Brno University of Technology

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Current situation



- Currently 15 main aeronautical manufacturing companies of which are 6 producers of complete aircraft and engines
- 10.000 employees in the Czech aeronautical sector

AERO Vodochody



Zlín

(Moravan Airplanes – small aerobatic and sport airplanes, safety belts, ejection seats,...)



Moravan Airplanes (ZLIN)



Prague

(AERO, AVIA, Letov-Latecoere, Aerospace Research and Test Institute, ...)

- military jets, business airplanes, small transport airplanes, assembly line for Sikorsky helicopters, production for Airbus and Boeing)

Czech Aviation Industry

(main locations)

Institute of aerospace engineering



Kunovice (Uherské Hradiště)

(Aircraft Industries, EVEKTOR, ... – small transport airplanes, small sport airplanes, gliders, agricultural airplanes, ...)



Aircraft Industries,
LET Kunovice

EVEKTOR



Czech Aerospace Industry

- *ULL producers*
- *Aero Vodochody*
- *Aircraft Industries (LET Kunovice)*
- *Moravan Zlin*
- *EVEKTOR*
- *Space Program* (Aeronautical Research and Test Institute, Academy of Sciences, Czech Space Office, European Space Agency)
 - *Jihlavan*
 - *Technometra*
 - *LETOV*
 - *Mikrotechna*



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Major current Czech research and industrial projects

(both, with and without support of ARC)



L-410 upgrade programme

Coordinated by Aircraft Industries (LET) and supported by Ministry of Industry and Trade (Czech Republic), held together with major Czech industrial and research partners (2010-2014)

Acronym: MOSTA

Partners involved:

Aircraft Industries

AERO Vodochody,
Aerospace Research and Testing Institute,
Brno University of Technology,
EVEKTOR,
UNIS,
Jihlavan,
Jihostroj,
Avia Propeller,
MESIT,
GE Aviation,
VR Group,
SVUM





Evektor / Brno University of Technology

VUT100 Cobra

VUT100 Cobra

Development started at *Institute of Aerospace Engineering/ Brno University of Technology* in 2000.

Evektor company joined the project in 2001 and after the first flight took over coordination of the realization (2005).

First flight: **16.11.2004**



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Evektor

EV-55 Outback

EV-55 Outback

Coordinated by EVEKTOR and supported by Ministry of Industry and Trade (Czech Republic), held together with major Czech industrial and research partners (since 2006)

First flight: **24.6.2011**



Partners involved in development:

Evektor, Evektor-Aerotechnik
AERO Vodochody, Alucast, Avia
Propeller, Jihlavan, Jihostroj, Mesit,
Mikrotechna, PBS Velka Bites, **Brno**
University of Technology,
SVUM, TEAZ, Technometra, UJV Rez,
UNIS, VR Group, Aerospace Research
and Testing Institute.

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Brno University of Technology

VUT 001 Marabu

Experimental aircraft

VUT 001 Marabu

Development started at *Institute of Aerospace Engineering/ Brno University of Technology* in 2006.

First flight: **29.4.2010**



Development of experimental aircraft for testing of developed UAV components. Supported by Ministry of Industry and Trade (Czech Republic)

Partners involved in development:

Brno University of Technology/ Institute of Aerospace Engineering
PBS, Velká Bíteš, JIHLAVAN airplanes
Plastservis-L.



Support for research on national level

Governmental support for research in Czech Republic





Support for research on national level

Governmental bodies supporting research in Czech Republic



Technology agency of the CR

(using programmes ALFA, BETA, OMEGA, *Competence centers*)



Ministry of Industry and Trade - MIT

(using programmes *TIP*, Innovations, Potential, etc.)



CzechInvest

(agency established under supervision of MIT)



Ministry of Education Youth and Sports

(using programmes „Specific research at universities“, Support for R&D, „Research intentions“, etc.)



Ministry of Transport

(using programmes XX, etc.)

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Support for research on national level



Technology agency of the CR

The Technology Agency of the Czech Republic (TA CR) was established to centralize governmental R&D support programmes within Czech Republic.

Supporting programmes

ALFA – Programme supporting projects of applied research and experimental development and stimulating increased intensity and effectiveness of R&D cooperation between businesses and research organizations.

Competence Centers – The programme is focused on **supporting the creation and operation of research, development and innovation centres for progressive fields with strong application potential and a perspective for significant contributions to the growth of the competitiveness of the Czech Republic.** At the same time, these centres will create conditions for the development of long-term collaboration between the public and private sectors on research, development and innovations.



Support for research on national level



Ministry of Industry and Trade - MIT

Supporting programmes

TIP – “Support for research and development” – applied research and experimental development of new products with potential to improve competitiveness of Czech Rep.

INOVATION – “Operational Programme Enterprise and Innovation” – support for the commercialization of R&D results and the transfer of technologies onto markets through innovation activities



CzechInvest

Agency established under supervision of MIT. CzechInvest is investment and business development agency of the Czech Republic whose services and development programmes contribute to attracting foreign investment and to developing Czech companies.



Support for research on national level



Ministry of Education Youth and Sports

(using programmes „Specific research at universities“, Support for R&D, „Research intentions“, etc.)

Supporting programmes

Specific research at universities – Support for research done by students (MSc. or Ph.D.) at universities.

Support for R&D

Research Intentions





Aerospace Research in Czech Republic

Main aerospace research establishments in Czech Republic

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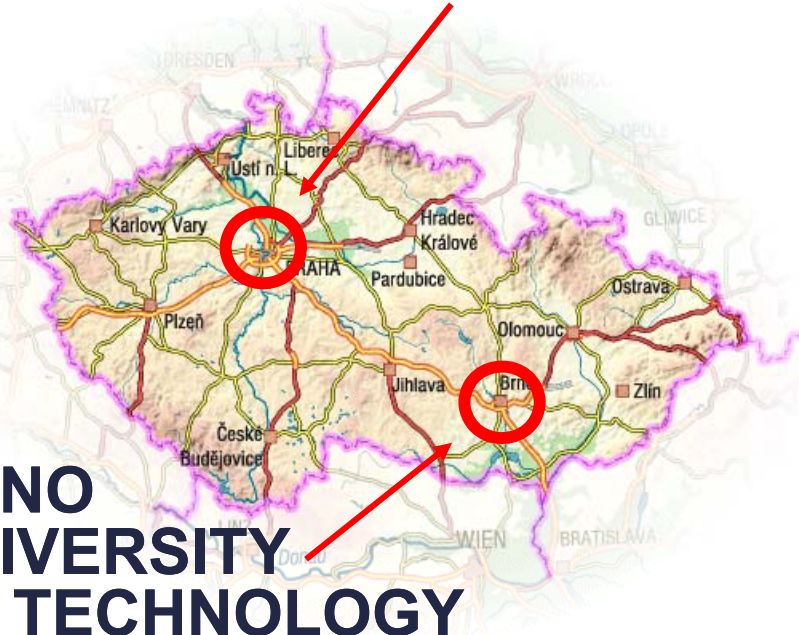
Aerospace Research in Czech Republic



Aeronautical Research and Test Institute, Prague

Technical University, Prague

Department of Automotive, Railway and Aerospace Engineering



**MAJOR
CENTRES OF
AEROSPACE
RESEARCH**

Czech Republic



**BRNO
UNIVERSITY
OF TECHNOLOGY**

Institute of aerospace engineering

IATE



AEROSPACE RESEARCH CENTRE

Brno University of Technology
Institute of Aerospace Engineering

Technical University,
Prague



Aeronautical Research
and Test Institute, Prague



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(National) Aerospace Research Centre (ARC)





Aerospace Research Centre (ARC)

Goals of the Centre:

a) in the technical area

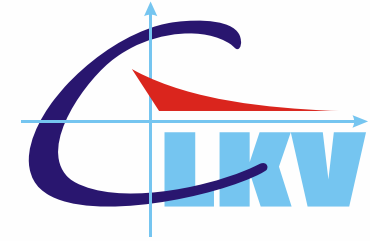
- support specially the development of small GA aircraft
- introduction of new selected disciplines and fields
- completion of missing infrastructure in aerospace field, which is a necessary condition for connection to western research and development structures and programs (EU, NATO)
- gradual connection of the “Centre” to similar associations working in EU countries

b) in the personal area

- teams of the “ARC” include experienced specialists and young perspective engineers
- functional connection of the best specialists from schools, institutes and companies
- involvement of students and Ph.D. students on specific projects

c) in the economic area

- connection of the best specialists to teams provided high effectiveness
- using the existing infrastructure, the equipment and facilities to minimize the cost
- strongly support the applied research on technical universities





ARC coordinator



Brno University of Technology Institute of Aerospace Engineering

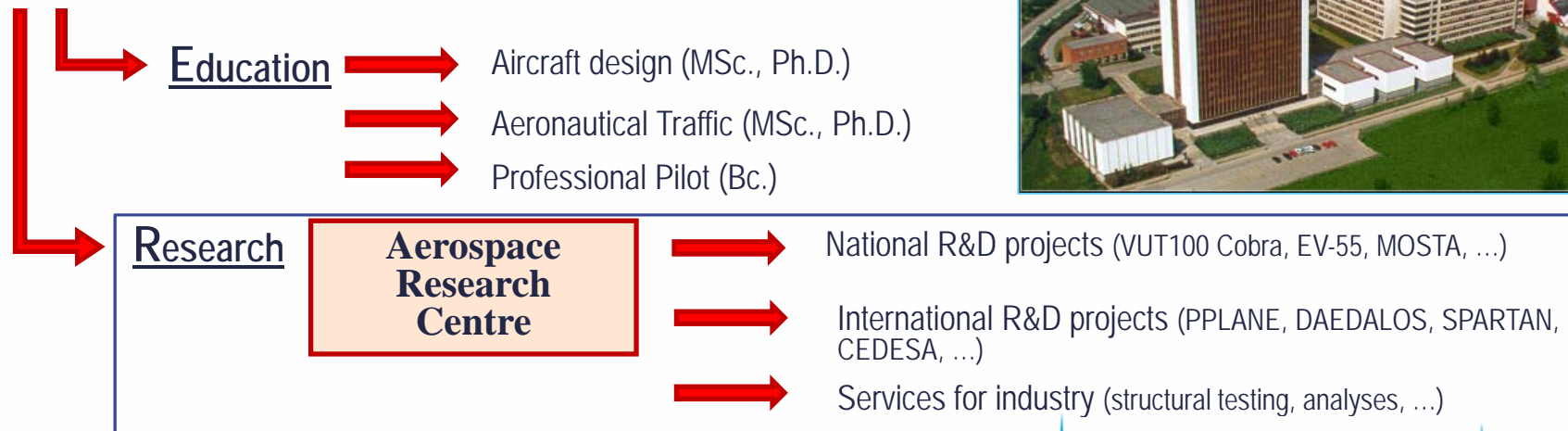
Brno University of Technology

The second oldest and biggest technical university in the Czech Rep.

20.000 students
2.473 employees (1.015 academics)
8 faculties

Institute of Aerospace Engineering

(at the Faculty of Mechanical Engineering)

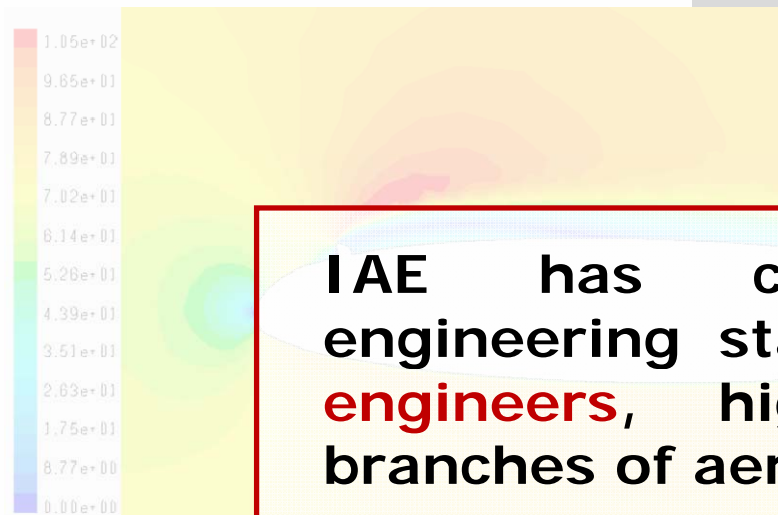




ARC coordinator

(Institute of Aerospace Engineering)

IAE has constantly research and engineering staff of **30+ researchers and engineers**, highly skilled in different branches of aerospace design.



Contours of Velocity Magnitude (m/s)

Mar 20, 1999
FLUENT 5.0 (2d, coupled exp, S-A)



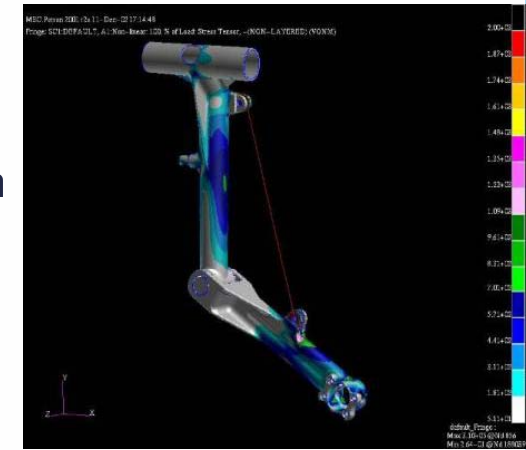
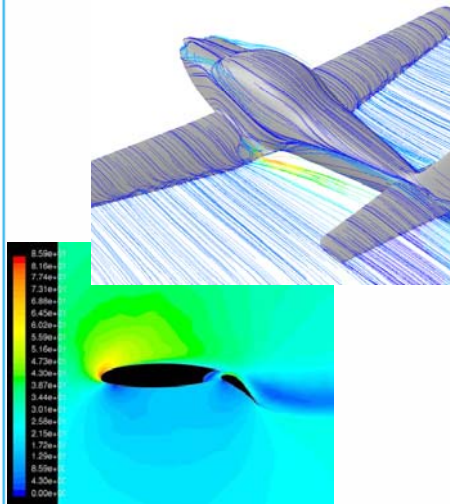


ARC coordinator

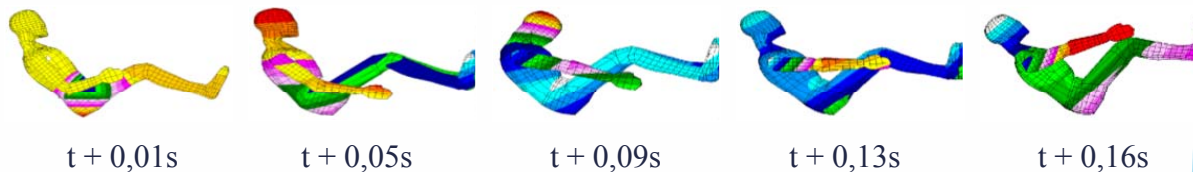
(Institute of Aerospace Engineering)

Institute of Aerospace Engineering domains:

- Aerodynamic analysis and optimization
- Load definition and Structural design
 - Aeroelastic analysis
- Stress analysis and optimization (inc. fatigue, impacts)
- Reliability analyses for aircraft systems
- Structure testing (static + fatigue)



Crashworthiness of aircraft: Impact velocity $v = 15 \text{ ms}^{-1}$



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ARC coordinator (Institute of Aerospace Engineering)

Static test of the wing of SG 304 Glider





Drop test



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Partner organizations in ARC



Aeronautical Research and Test Institute, Prague

Address: VZLÚ, Beranových 130, 199 05 Prague – Letňany



Involvement in national and international projects:

CESAR, ESPOSA, Ae-270, MOSTA, EV-55, ...



Activities:

- Aerodynamics - Computing
- Aerodynamics - Wind tunnel testing
- Structure and material testing
- Structure and material analyses
- Accredited test laboratories
- Composite technologies
- Propellers and Fans
- Engines
- Space
- Special technologies and services
- Production of models
- Metrological works



Technical University, Prague

Address: Karlovo náměstí 13, 121 35 Praha 2

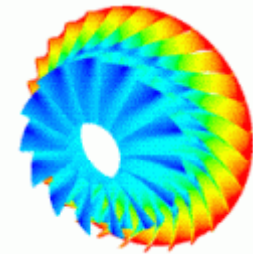


Education → Aircraft design (MSc.)

Research → National R&D projects (cooperation with Walter engine, TL electronics, ...)

Activities

- Improved performance and greater safety for aircraft Research on Ultra-Light Aircraft (structural life monitoring instruments, design and analyses of engine components, ...)
- Research on Ultra-Light Aircraft (measuring and testing of free vibration frequencies, design of aircraft structural parts...)





ARC Cooperation with Industry

(Major projects)

- **VUT100 COBRA** – small GA aircraft (4-5 seater for VFR/IFR flights). Cooperation with EVEKTOR, s r.o. (partially supported also by Czech Ministry of Industry and Trade)



- **EV-55** - development of new small transport airplane. Coordinated by EVEKTOR, supported by Czech Ministry of Industry and Trade.



Copyright: Zdeněk Španihel; EVEKTOR

- **Ae-270** – Cooperation with Aero Vodochody on single-engine turboprop





ARC Cooperation within EU



- **CESAR** - Cost Effective Small AiRcraft, supported by EU in 6th FP (2006-2010))

First project coordinated by partner from Czech Republic - **Aeronautical Research and Test Institute, Prague** (project has 40 participants from whole Europe)

-HELENA-

**Highly Environmental Low Emission Next generation
regional Aircraft**

- ARC partners participate(participated) in many EU projects, for example DATON, VELA, ENFICA-FC, CELPACT, PPLANE, DAEDALOS, SPARTAN, etc.



VUT 051 RAY - FULLY ELECTRIC POWER



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Thank you for your attention ...

Further information on the web: <http://lu.fme.vutbr.cz>

