HAIF
Hungarian Aviation Industry Foundation

Aeronautics Related RTD Activities in Hungary

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General

- HAIF has been established in summer 2003
- An independent non-profit organization
- Founded by leading aviation industry managers

Mission Statement

To pursue the continuous growth and development of the Hungarian Aviation Industry...

Our vision

To become the catalyst and facilitator of the industry development process helping the best Hungarian companies to join the global aviation industry by way of diversification…

Segmentation of the industry

Design/Development	**4+(6)**
Component manufacturing	**5**
Small a/c manufacturing	**4**
Parachute manufacturing	**1**
Air Ballon manufacturing	**1**
Maintenance/Overhaul	**26**
Training	**4**
Consulting	**2**
Parts sale	**1**
Tools manufacturing	**3**
Calibration	**1**
Engineering	**2**
HR services	**2**
Modification	**1**
Marketing	**2**
Industrial organizations	**3**

In order to increase the number of component manufacturers HAIF has launched the **Aerospace Supplier Initiative Programme** in December 2004.Mainly automotive component manufacturers are involved in the programme. More than 20 companies were interested in aerospace diversification.

In March 2006 HAIF initiated and organized the establishment of the **Hungarian Aerospace Cluster** with four founders and 12 members

Total 72 organizations, 2000 people with a few component manufacturers

Introducing the Hungarian Aerospace Cluster

Founded in March 2006 by four small aircraft developer:

1. **Corvus Aircraft Ltd. –** *UL & LSA manufacturer*
2. **Halley Ltd. –** *UL manufacturer*
3. **Composite One ltd.-** *small aircraft design & prototype developer*
4. **Hungarocopter Ltd. –** *small helicopter designer*

Joined members:

1. **Design & Engineering companies (4)**

Edag Hungary Ltd. – finite element analyses
eCon Engineering Ltd. – finite element analyses
CAD-Terv Engineering Ltd. – finite element analyses
Delta-Tech Engineering Ltd. – special tool design

Cont.

2. Prototyping companies (2)

Varinex Informatics Plc. – rapid prototyping
Technoplast Ltd. – rapid prototyping

3. Part manufacturing companies (5)

Dendrit Ltd. - machining
Borsodi Mühely Ltd. - machining
High Tech Composite Ltd. – composite parts
Produktum Ltd. – sheet metal
Ostorhazi Ltd. – special coatings

4. Testing company (1)

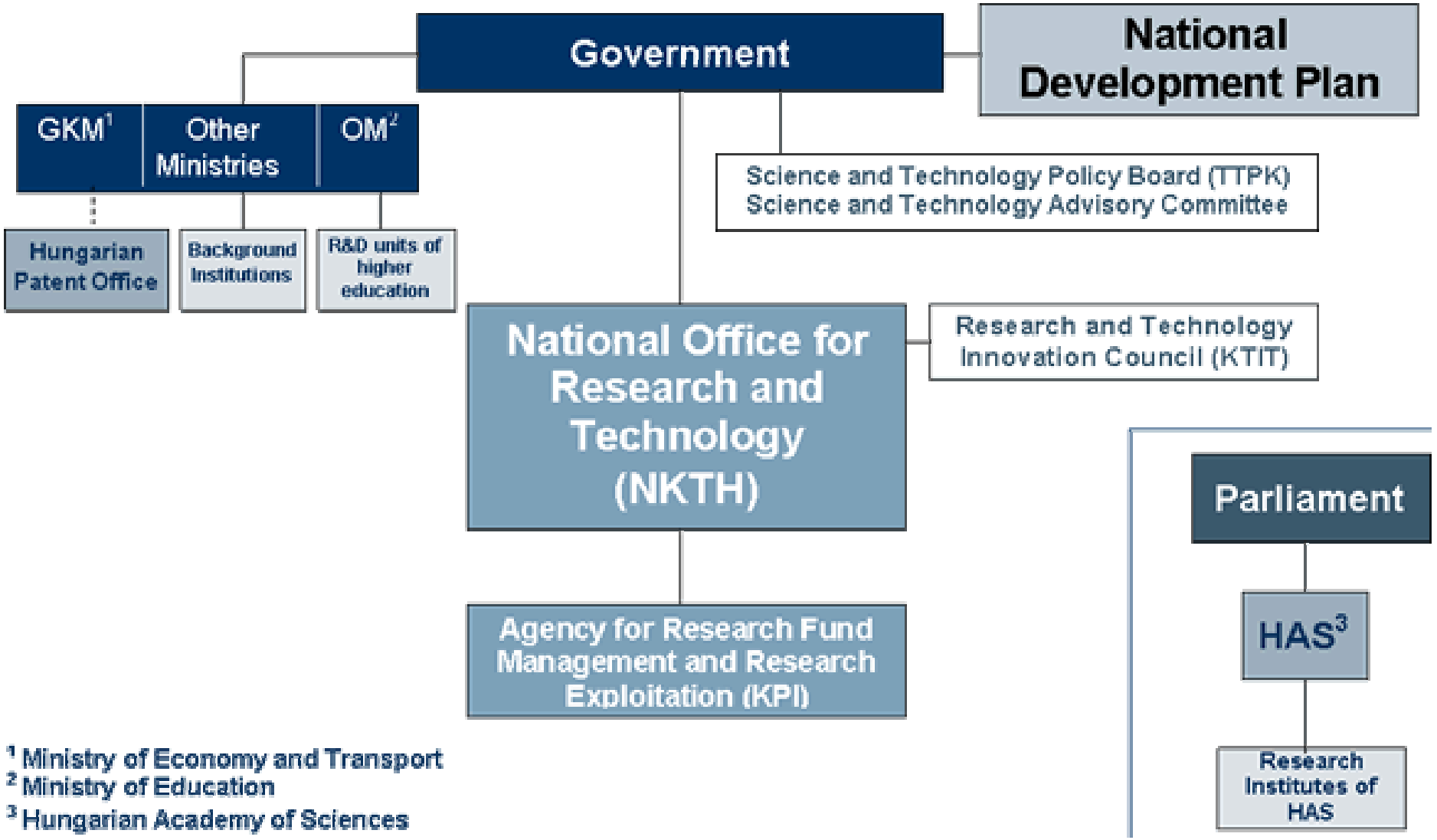
Naturen Ltd.

HAC
Hungarian Aerospace Cluster

Objectives of the Cluster

1. **Speed up the development of the Hungarian Aerospace Industry**
2. **Diversification of the best part manufacturers to aerospace**
3. **Creation of a network of aerospace and related industries**
4. **Development of new Hungarian designed small aerospace vehicles**
5. **Organize the production of these vehicles regionally**
6. **Organize and develop complementary capabilities among Hungarian firms to be able to manufacture higher assemblies for large aircraft**
7. **Achieve sinergies and economies of scale using networking in the fields of design, development, training, logistics, quality (AS 9100), IT, marketing and certification**
8. **Introduction of modern management methods and principles to the SME sector – six sigma, lean manufacturing**
9. **Develop new supplier relationships with other countries**
10. **Replace expensive foreign suppliers with low cost ones**
11. **Increase the Hungarian participation in EU founded aerospace projects**

The New Governmental R&D Institutions – from 2004



Main components of the national STS

1. **Governmental organizations**
   - **Science and Technology Policy College (TTPK)**
   - **Science and Technology Advisory Committee (TTTT)**
   - **National Office of Research and Technology (NKTH)**

2. **The Hungarian Academy of Sciences**

3. **Research and Technology Institutions**

	Research Institutes	Higher Education Units	Enterprise units	Total
1992	118	1071	98	1287
2002	143	1613	670	2426

4. **Wide range of financial incentives**
   - **Tax allowances**
   - **Non-refundable financial subsidies awarded via tenders**

R&D spending stood only at 0.8% of GDP in 2005…

Multinational R&D centers in Hungary

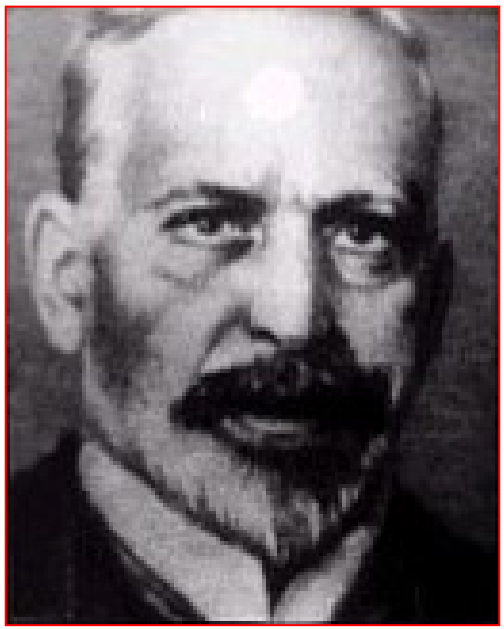
GE
Ericson
Nokia
Philips
SAP
Electrolux
Samsung
IBM
Flextronics
Astra Zeneca
Glaxo-Wellcome

Audi
Denso
GM
Knorr-Bremse
Michelin
Valeo
Visteon
Zenon Systems
Continental
Novartis

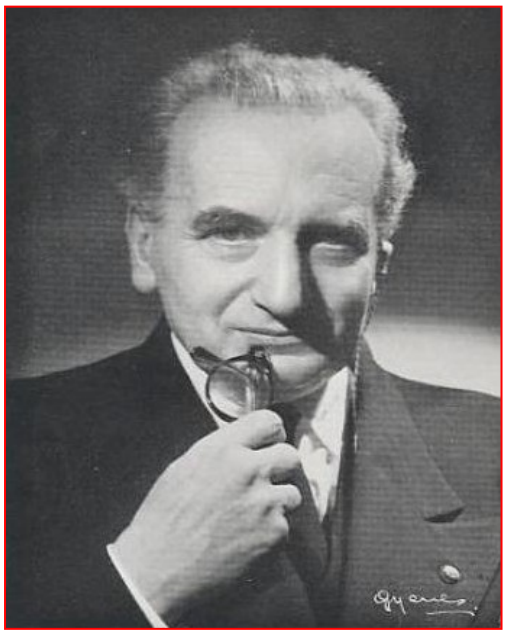
R&D in Telecommunication, Electronics and Medicine are the leaders…

Budapest University of Technology and Economics - BUTE

In 1910, the University Council asked professor Bánki to deliver lectures on theory of flight.



First lecturer of aeronautics in Hungary professor Bánki and his famous student Teodor von Karman



BUTE - Department of Aircraft and Ships.

The department has good results in the field of:

- thermal and fluid micro machines
- vehicle thermal process analysis,
- gas turbine and combustion engine analysis and development,
- real flight situation modelling,
- identification of aircraft state and parameter identification,
- unconventional flight analysis,
- studies on special airplanes and air transportation management

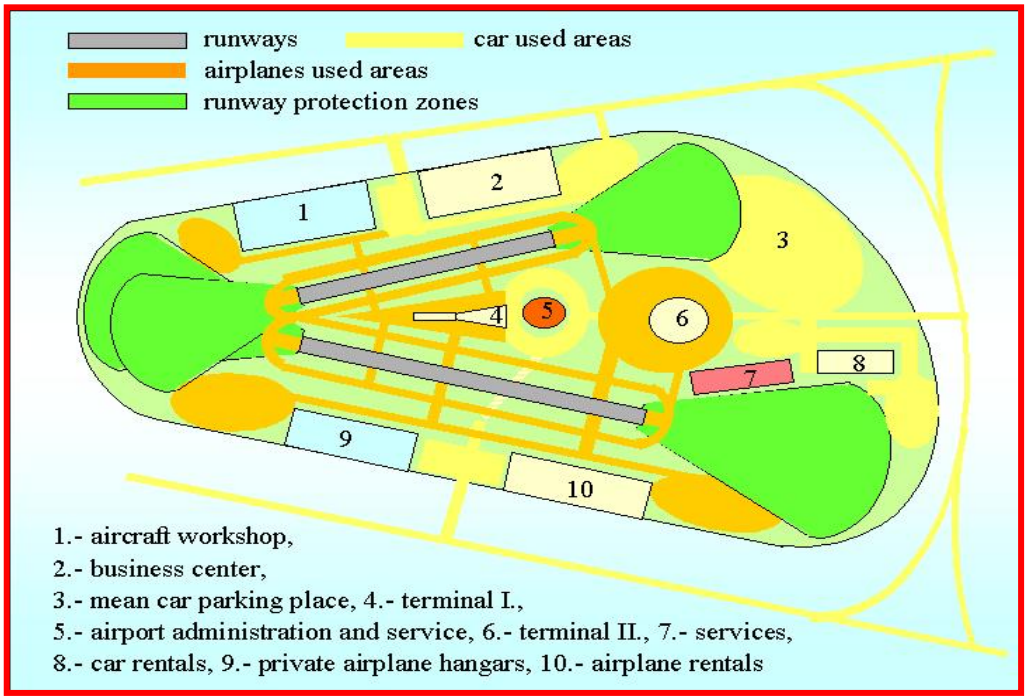
BUTE - Department of Aircraft and Ships

EU FP6 project: CREATING
(Definition of sustainable transportation system through indexing)

- performance indicators and indexes can be used for description of the condition of sustainability
- simple models are based on „half-theoretical" models identified from measured data
- the sophisticated models deal with dynamics and stochasticity of the sustainability
- most complex model is based on controlled Markov model that can be applied for guiding the optimal (control) policy strategy

Following slides show a few interesting projects proposed by the department

PATS – Personal Air Transportation System



Project of small airport

- airplanes for privat use
- rent a plane system
- new small airplanes
- new engines
- revolutionary new cockpit instrumentation and aircraft control
- new small airport system
- new aATC, ATM

International cooperation for supporting the PATS project.

VÉRCSE V-09 – Szeged

2 seater ultralight

Composite one - Tököl

5-7 seat full composite turbopr.

APOLLO Fox Ultralight- Eger

Certified in 6 countries

APOLLO Classic - Eger

UL with composite fuselage

APOLLO A3 - Eger

2 seater ultralight

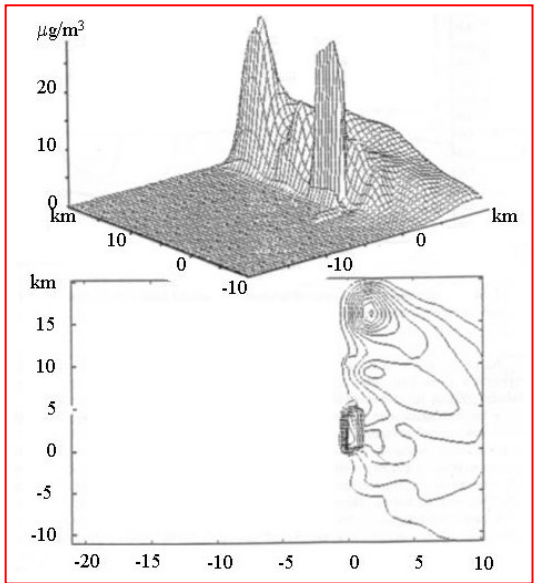
Corvus - Balloszog

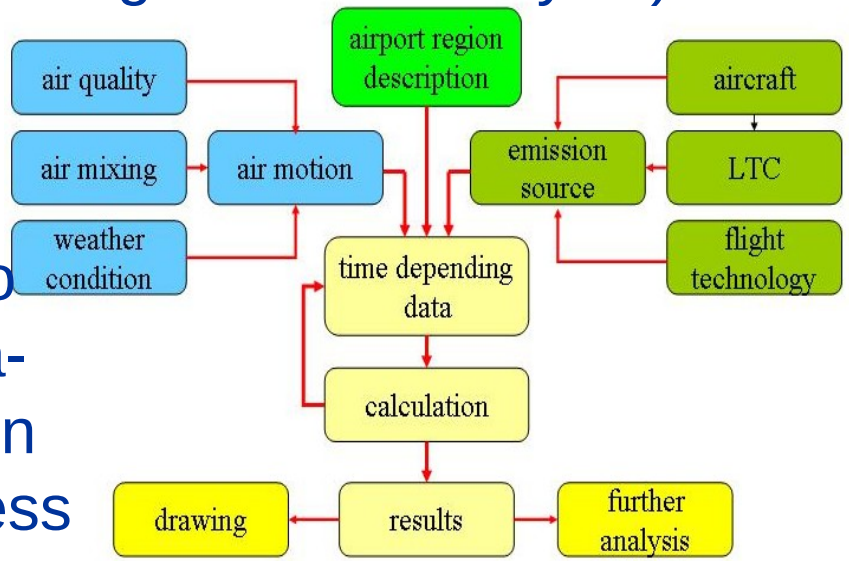
2 seater light sport aircraft

Aircraft emission scattering simulation

emission determined from LTC (landing and takeoff cycle) defined by ICAO

- aircraft sizes and movements generates by random way
- air characteristics are defined, too
- simulation is based on approximation of emission diffusion process by Markov chains



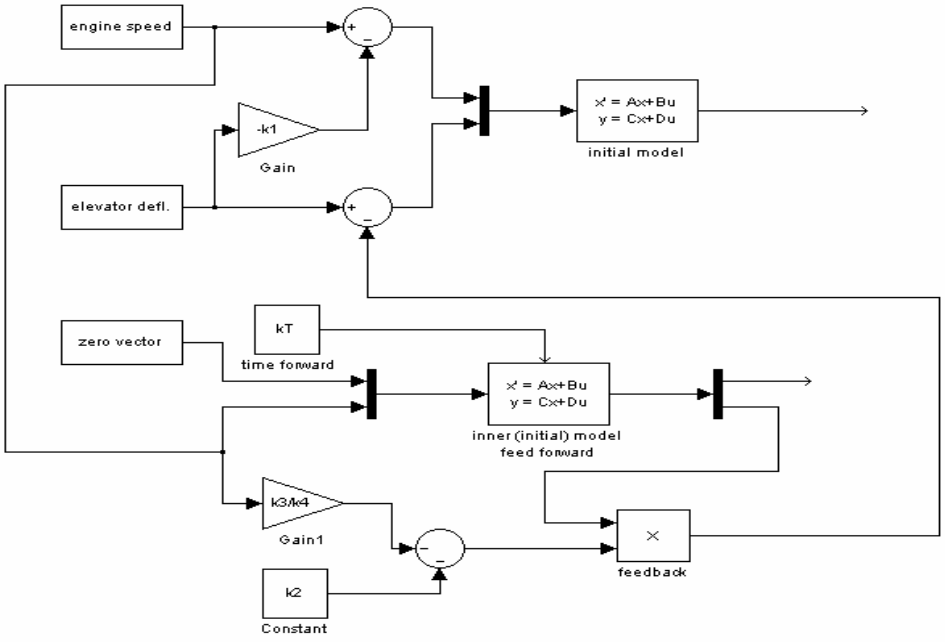


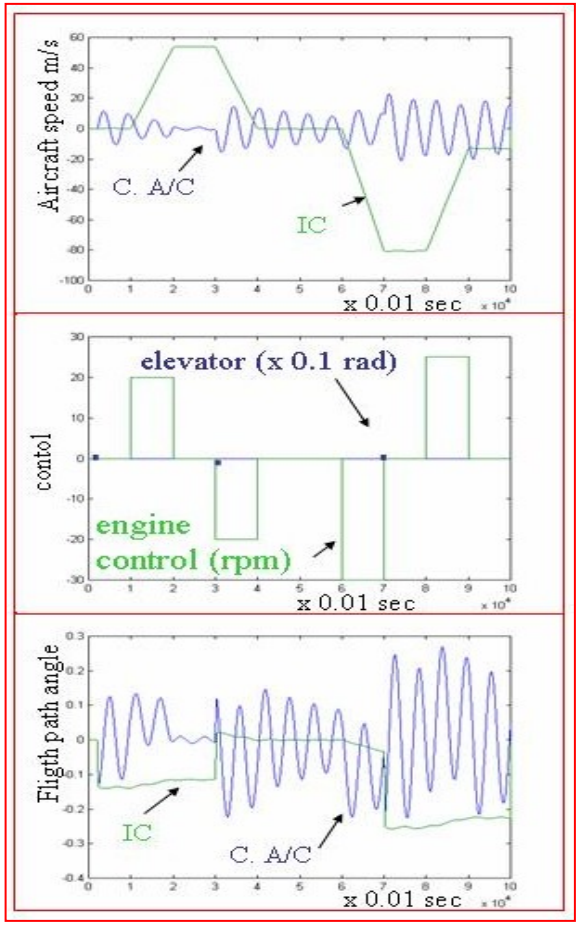
Principal schema of method developed by Department for determining the aircraft emission scattering at airport regions

Results of 3D image and contours of carbon oxide (CO) distribution at summer late morning simulated for Hungarian Kiskunlachaza Airport region

Development of control for special cases

- control with system anomalies
- integration of control channels
- controls for aeroelastic problems
- nonlinear control for jet engines
- etc.



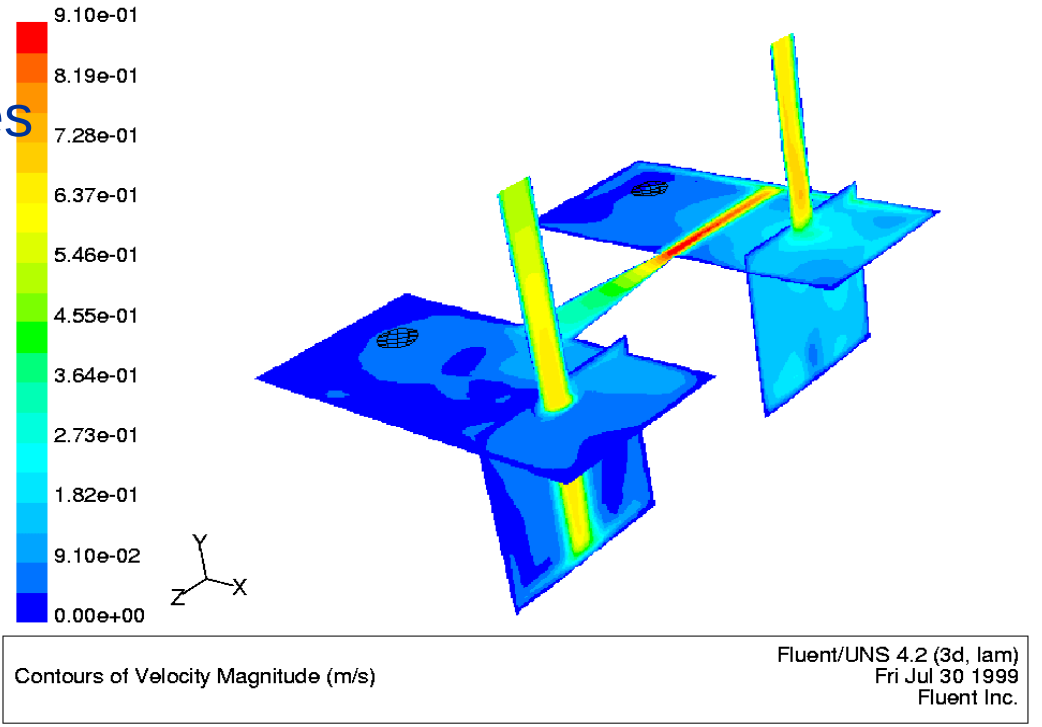


Comparison of the integrated (IC) and conventional (C. A/C) control with elevator and engine speed

Application of MEMS technology

MEMS – Micro-Electro-Mechanical System

- micro sensor
- micro actuators
- control of micro devices
- use of set of micro devices
- application to
  - operator load and condition monitoring
  - communication command and control system, etc.



Dynamic valve velocity field at ΔP=1000 [Pa]

BUTE - Department of Transport Automation

Participation in EU6 Framework Program under the title:

Distributed and Redundant electro-mechanical nose wheel steering System - DRESS

Plans for FP7

Aircraft modelling and fligth control systems

Testbed generation for Unmanned Air Vehicle (UAV)

Detection filter design algorithm, and its application in safety critical vehicle systems (trains, aircraft, road vehicle)

MTA SZTAKI

/Computer and Automation Research Institute - www.sztaki.hu/ is governed by the Hungarian Academy of Sciences.

Over the past years its **Systems and Control Laboratory** has grown to be the national center in the research of systems and control theory and also in its industrial applications in computer controlled systems. The results became known both to the national to the international community gaining reputations to the Laboratory. Besides research and applications, the Laboratory has served as a graduate and post-graduate center for teaching modern and postmodern signals, systems and control theory in **a close collaboration with the Budapest University of Technology and Economics - Department of Transport Automation** and with the University of Veszprém.

The laboratory has research projects in the following areas:

- System identification
- Simultaneous identification and control
- Robust control
- Uncertainty and performance in continuous-time stochastic adaptive control
- Recursive estimation
- Information-theoretical methods in identification
- Randomization methods for direct adaptive control
- Estimation of Hidden-Markov processes
- Financial mathematics
- Fault tolerant and reconfigurable control
- Integrated Vehicle Control System
- Advanced signal processing methods
- Linear and bilinear systems
- Model-based diagnosis and control of process systems
- Discrete methods in process control

Miklós Zrínyi National Defense University

Research themes with possible civilian application:

A/c engine diagnostics and modelling

Industrial application of microwave technology

Computer aided system design

Use of virtual reality, multimedia and operational models in aviation education

HI-Aero Ltd

This is a Hungarian-Italian Joint venture for research, development, manufacturing of UAV and advanced security systems.

Also partner in Sky Arrow U project for the development of a medium altitude long endurance (MALE) UAV system for governmental, civilian and military use

Participation in the Framework Programmes

- Hungarian Contact Point: Slot Consulting Ltd.
- The aim is to try issue at least one Hungarian proposal for every Call of the Framework Programme (1st Hungarian proposal: ASCENDS - 2005)

- **SCRATCH IV (FP6)** - Support for CollaboRative Aeronautical TeChnical Research (2004 – 2006)

  SCRATCH V (FP6) (2006 – 2007)
- The aim of the project is to help SMEs working in the Aeronautics industry to submit research project proposals to Calls for Proposals issued by the European Commission R&D Programme. www.aero-scratch.net

Other research projects with the participation of Slot Consulting Ltd:

- **THENA (FP5**) - THEmatic Network on Airports (2001 – 2003) was a research and development network focusing on airports. www.thena.aena.es
- **CAATS (FP6)** - Cooperative Approach to Air Traffic Services (2004 – 2006)
- The task of the CAATS network is to coordinate research processes and methodologies among other 6th Framework projects dealing with safety, human factor and validation issues. www.caats.isdefe.es
- **OPTAG (FP6)** - Improving airport Efficiency, Security and Passenger Flow by Enhanced Passenger Monitoring (2004 – 2007)
- The project aims to develop a new passenger monitoring system that can improve security and efficiency at airports.Debrecen airport had been selected for trials.www.optag-consortium.com

START PROJECT

13 Hungarian companies have been listed in the database with fields of expertise ranging from image processing and crystallization through space geodesy, GPS, space dosimetry to fault tolerant computers.

Aviatronic Ltd.

An example for the Hungarian research enterprise.

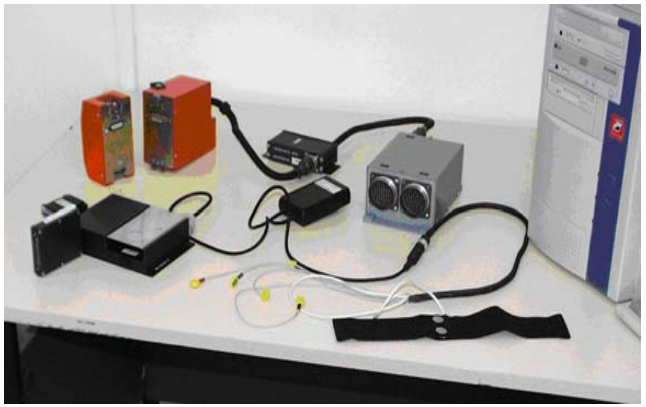
The company is active in the following aeronautical R+D fields:

- Flight data recorders & evaluation systems for aircraft and helicopters
- Ground control station and on-board camera systems for Unmanned Air Vehicles (UAV)
- Special high power electronic power supply units for aircraft maintenance facilities.

Aviatronic instruments

- MAKI - A new Quick Access Data Read-out and Express Evaluation System for the Processing of the flight data of SU-22 and MIG-29 aircraft

- MEDICINA - An air-borne data recorder and ground evaluation system to record and analyse the physiological parameters of pilots



FP7 and Clean Sky JTI opportunities:

- **HAIF** will focus on strategic and networking issues
- **HAC** will focus on product development, manufacturing and supplier development – *DOA, AS/EN 9100 projects*
- Well developed related industries will be involved – turbine, plastics
- **PANAC** Automotive Cluster part supplier network will be invited to join aerospace initiatives – *300+ companies in Hungary*
- **FP7** Information day is planned for Oct/Nov in Budapest
- Foreign aerospace clusters will be approached to start advanced collaboration

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