Lithuanian National Aeronautical Technology Platform: perspectives for the international cooperation

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Goals

- To introduce the **structure** of the **aviation system** in Lithuania
- To analyse the **specifics** of the **development of aeronautics** in Lithuania
- To present the **opportunities** of the **Lithuanian National Aeronautics Technology Platform**
- To present the **perspectives** of the **international cooperation**
Structure of aviation system in Lithuania (1)

Lithuanian Aviation

Civil Aviation
- CAA
- Air Navigation serv.
- 14 Airlines
- 17 Maint. & Repair Org.
- 1 Aviation Factory
- 4 International Airports
- Private and GA ent.
- 2 Education and Research institutions

Military Aviation
- 2 Aviation Bases
- Air Defence Bat.
- Baltic Air Traffic Control Center

Border Police
- Baltic Air Traffic Control Center
- Air Defence Bat.
There is a wide range set of aviation related companies in Lithuania:

STRUCTURE OF LITHUANIAN AVIATION INDUSTRY

- **MANUFACT.**
  - Sportine Av
  - Helisota

- **REPAIR**
  - Helisota
  - Termikas
  - AviaBaltika
  - Nerka
  - Klaipeda Av

- **OVERHAUL**
  - LAL TC
  - Apatas
  - Aurela
  - Elsa
  - Aviavilta

- **DESIGN**
  - "Helisota"
  - VGTU AGAI
  - LAF

- **RESEARCH LEARNING**
  - VGTU AGAI
  - KTU

- **PUBLIC ORG.**
  - LAPIA
  - LAK (LAF)
Helisota Ltd

- Repair and overhaul
- Supply of spare parts
- Modification and upgrade
- ‘Mobile workshop’ service
- Cockpit and interior upgrade
- Searchlight installation
- Experimental production of composite airplanes
Joint Stock Company “Sportine Aviacija” ("Sport Aviation") was established in 1969. It was (and still remains) the only enterprise in the Baltic countries designing, manufacturing and repairing sailplanes. The first composite sailplane BK-7 'Lietuva' flight tests were made in 1972.

- The structure of the Sportine Aviacija factory includes:
  - design department
  - production departments: sailplanes assembling, mechanical workshop, divisions of electronic and galvanic plating
  - flight test station
ANTANAS GUSTAITIS AVIATION INSTITUTE
VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

- Aviation Technologies Department
- Aviation Mechanics Department
- Avionics Department
- Aviation Research Laboratory
- Flight Training Unit
- Air Traffic Control Training Unit
- Aviation Specialists’ Qualification Improvement Centre
Specifics of the development of aeronautics in Lithuania

- **Lithuania has small and medium enterprises (SME)**
  - Association of Lithuanian Aviation Industry Companies
  - Stock company “Helisota”
  - Stock company “Kauno aviacijos gamykla”
  - Stock company “Termikas”
  - Stock company “Sportinė aviacija”
  - State enterprise “Oro navigacija”

- **Lithuania has steady developed scientific potential**
  - Vilnius Gediminas’ Technical University
  - Kaunas Technological University
  - Vilnius University
  - Institute of Mathematics and Informatics
  - Institute of Chemistry
Sequence of NTP establishment

initiative incorporate practice agreement

Industry

Priorities selection

Science

Formation of research strategy

Determination of finance needs

Determination of finance sources

Private sources

Budget sources

National sources

EU resources

Structural support funds

Development of thematic program

Science and technologies developmental strategy program affirmation in governmental level

Execution
Lithuanian National Aeronautical Technology Platform (1)  

**GOALS:**

Implementation of EU Long-term Aeronautical Research Strategy  
SRA-2 Means

- to maintain the further development of technology and research in Lithuanian National aviation industry
- to incorporate Lithuanian aviation industry and research potential into the aeronautical frameworks of EU having the goal to implement the attitudes of SRA-2
Lithuanian National Aeronautical Technology Platform (2) 

**Partners**

- Civil Aviation Administration
- Association of Lithuanian Aviation Industry Companies
- Stock company “Helisota”
- Stock company “Kauno aviacijos gamykla”
- Stock company “Termikas”
- Stock company “Sportinė aviacija”
- State enterprise “Oro navigacija”
- Vilnius Gediminas’ Technical University
- Kaunas University of Technology
- Vilnius University
- Institute of Mathematics and Informatics
- Institute of Chemistry
- Lithuanian Academy of Sciences
- Ministry of Interior
- Borderer Police Aviation
Lithuanian National Aeronautical Technology Platform (3)  

LNATP

Strategy and Programme of National Aeronautical Technology Platform

Thematic Groups
1. Reliability and Durability of Structures
2. Composite Materials in Aviation
3. Aerodynamics
4. Laser Technologies
5. Mechatronics Technologies
6. Air Traffic Control Technologies
7. Satellite Technologies in Aviation
8. Electronic Technologies
9. Information Technologies
10. Aviation Materials
11. Acoustic Technologies
12. UAV Design and Monitoring
13. Environment and Borders Monitoring Systems
14. Cockpit Ergonomics and Flight Control System
15. Aircraft Maintenance
16. Geodesic and Cartographic Technologies
17. Strategic Research of Air Transport Development
18. Human Performance
19. Aviation Specialist’s Training and Qualification Improvement
1. Reliability and Durability of Structures

- Aircraft reliability
- Mechanics of decay
- Numeric mechanics of distort body
- Determination of fuselage reliability
- Research of engine reliability

Leader - Prof. A. Ziliukas
Kaunas University of Technology
2. Composite Materials in Aviation

- Composite materials
- Composite constructions
- Research of composite materials parameters reliability and durability

Leader - S. Skalskis, AB “Sportine aviacija”
### 3. Aerodynamics

- **Low-speed aerodynamics**
- **Computer simulation of air flow**
- **Design and analysis of wing profile**
- **Research of aircraft stability and control characteristics**
- **Analysis of aircraft flight dynamics parameters**
4. Laser Technologies

- Calorimetric measurements of the optical coating losses in the wide spectral range
- Measurements of laser induced damage thresholds in wide spectral and temporal range
- Investigation of laser-induced electrical discharge
- Investigation of light filaments in solids, liquids and gases

Leader – Prof. A.P. Piskarskas
Vilnius University
5. Mechatronics Technologies

Leader - Prof. R. Bansevicius
Kaunas University of Technology

- Enlargement of surface hardiness
- Piezoelectric sensors with variable geometrical parameters
- Piezoelectric sensors with control boundary conditions
- Piezoelectric robot's eye
6. Air Traffic Control Technologies

- **UAV implementation into the control air space**
- **Legalization of the range of various UAV in the control air space with manned air vehicles**
- **Harmonization air traffic control rules without hazards for others air space users (manned air vehicles)**
- **Development and deployment of CNS/ATM technologies**
7. Satellite Technologies in Aviation

Leader - Asoc. Prof. A. Jakucionis
Vilnius Gediminas’ Technical University

- Evaluations of GPS regional positioning accuracy with developments of GPS signals and GPS augmentations
- GALILEO and GNSS-2 systems implementation for regional use and ground based navigation and precision approach systems decommissioning problems and solutions
- Research of needs for additional differential GPS stations with respect of EGNOS signals quality for general aviation aircraft precision approach in regional airfields
- Creation of flight control and communication equipment based on satellite and integrated technologies for regional missions UAV
8. Electronic Technologies

- Numerical analysis of acoustic signals
- Simulation, development and application of wide-band high frequency electronic measurement and data processing equipment
- Development of linear induction electric drives
- Methods of optimization adaptive control systems
- Modeling of neural networks

Leader - Prof. R. Kirvaitis
Vilnius Gediminas’ Technical University
9. Information Technologies

- Development of aircraft technical diagnostic systems software
- Development of flight management systems software
- Development of UAV control software systems
- Analysis and recognition of observation information
- Development of ground flight control system software
- Development of multilanguage supported control systems
10. Aviation materials

Leader - prof. Dr. Eimutis Juzeliunas,
Chemistry institute

- Nondestructive evaluation of corrosion activity of aluminum alloy by SQUID magnetometry
- Protective coatings on light metals deposited by plasma methods
11. Acoustic Technologies

- Ultrasonic methods of composite materials and structures research
- Ultrasonic vision systems
- Ultrasonic navigation
- Ultrasonic gas thermometry

Leader - Prof. R.Kazys, KTU
Ultrasound institute
12. UAV Design and Monitoring

- **UAV design, technology development**
- **Long-endurance UAV based on LAK-17AT motoglider**
- **Mid-size UAV from Sportine Aviacija Ltd.: LAK-SAV-7/10**
- **Shoulder launched folded-wing mini UAV concept (AGAI)**
- **Local fast deployed UAV-net system**
- **Development of monitoring systems**
13. Environment and Borders Monitoring Systems

Leader - D.Kazlauskas, Ministry of the Interior

- UAV based monitoring systems
- Rotorcraft based monitoring systems
14. Cockpit Ergonomics and Flight Control System

Leader – J. Legenzov,
AB “Helisota”
15. Aircraft Maintenance Technologies

- Upgrade and modification
- Experimental production of composite airplanes
- Technical maintenance, repair and overhaul:
  - “Boeing 737-200”, “Boeing 737-300”, “Boeing 737-400”, “Boeing 737-500” Line and Base maintenance up to and including D-check, avionics system modification, structure repair;
  - “Saab-2000” Line and Base maintenance including 8 years inspection, avionics system modification, structure repair;
  - “Saab 340A/B” Line and Base maintenance including 4 years inspection, avionics system modification, structure repair.
  - Technical maintenance, repair, upgrade, modification an overhaul for “MI-8” and “MI-17” helicopters
16. Geodesic and Cartographic Technologies

Leader- Prof. A. Zakarevicius
Vilnius Gediminas’ Technical University

- Development of satellite geodesy technologies for the navigation purposes.
- Development of accredited laboratory for EDM calibration.
- Establishment of GPS instruments calibration base.
- Creation of data base of airports cartographic and navigation data and digital mapping with GIS technologies.
- Optimization of navigation maps legends compatibility and improvement of mapping by applying GIS technologies.
17. The Strategic Research of Air Transport Development

- Strategic research of development of air transport infrastructure and human resources
- Arrangement of strategy of new air traffic control conceptions

![Graphs showing data over time](image-url)
18. Human Performance

- Research of pilots operating conditions and physiological alterations at work
- Estimation of influence of operating conditions to the human health
- Selection of the preventive service
19. Aviation Specialist’s Training and Qualification Improvement
Leader - Asoc. Prof. R. Malinauskas
Vilnius Gediminas’ Technical University

- **Bachelor degree studies**
  - Aircraft Piloting
  - Air Traffic Control
  - Aviation Mechanics
  - Electronics Engineering
  - Aviation Electrical Equipment
  - Aviation Business Management

- **Master degree studies**
  - Aviation Mechanics
  - Avionics
  - Aviation Electric Equipment and Systems

- **Doctoral studies**
  - Transport Engineering
  - Measurement Engineering

- **Aviation specialists' qualification improvement courses**
International collaboration on technology platforms (2)
International collaboration on technology platforms (3)

UAV - NET

Industry
- Agusta (Italy)
- Airobatics (Germany)
- Alenia Aerospazio (Italy)
- Bea Systems (UK)
- Carlo Gavazzi Space (Italy)
- AEDS (France)
- EUROCOPTER (Germany)
- EUROCOPTER (France)
- IAI (Izrael)
- Marconi (Italy)
- Snecma Moteurs (France)
- SONACA (Belgium)
- Tadiran Electronics (Izrael)
- Tadiran Spectralink (Izrael)
- Thales (France)

Institutes
- CIRA (Italy)
- DLR (Germany)
- FHS (Sweden)
- Aviacjos institutas (Poland)
- INTA (Nederland)
- ONERA (France)
- Swedish Space (Sweden)

Universities
- Bologna Univ. (Italy)
- Brno Univ. (Czech Republic)
- Defence Univ. (Hungary)
- Gediminas Univ. (Lithuania)
- Lecce Univ. (Italy)
- Naples Univ. (Italy)
- Technion (Izrael)
- Torino Univ. (Italy)
- Varšavos Univ. (Poland)
Lithuanian industry consists of the small and medium enterprises able to be integrated in to aeronautical research and development process of EU

The aeronautical research and education system of Lithuania is able to meet requests in further development of aeronautics industry of EU

There are two key positions of the strategy of Lithuanian National Aeronautics Technology Platform

- to maintain the further development of technology and research in Lithuanian National aviation industry

- to incorporate of Lithuanian aviation industry and research potential in to the aeronautical frameworks of EU having the goal to implement the attitudes of SRA-2
Acknowledgements

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