

National contact point “AERONAUTICS”

The Central Aerohydrodynamic Institute named after N.E. Zhukovsky (TsAGI)
1 Zhukovsky St., Zhukovsky, Moscow Region, 140180, Russian Federation
Tel: +7 (495) 556-31-62, +7 (498) 483-29-09, +7 (498) 483-21-00 ext. 53-48
Website: <http://ncp.tsagi.ru/en/>

*Factsheet*¹

Opportunities for the Development of EU-Russia Science and Technology Cooperation in Aeronautics

Moscow Aviation Institute (National Research University) – MAI

In order to maintain and develop the scientific and technological EU-Russia cooperation in the field of aeronautics, **Russian National Contact Point for aeronautical research – NCP “Aeronautics”** informs you about Russian organizations performing their activities in the field of aeronautics and being potential partners for international cooperative activities in this field.

At present, **Moscow Aviation Institute (National Research University)** (hereinafter – **MAI**) is a leading high-tech university in Russia, providing training of engineers and conducting world-class advanced scientific research.

About the University

The mission of the University is a qualitative training of the global elite of engineering personnel for the digital economy through advanced research at all stages of the high technology life cycle.

Currently, about 21,000 students study at 7 faculties, 8 institutes (as faculties) and 5 branches of MAI.

New technologies in aircraft and propulsion engineering are being created, small space vehicles are being launched, research in the field of control systems, IT, new materials, radio engineering systems and others is being carried out on the basis of the University.

Advanced research in MAI is implemented with the use of **breakthrough technologies**:

- product lifecycle management;
- mathematical simulation;
- new composite structures and additive technologies;
- integrated avionics;
- electrification of engineering systems.

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MAI is the only university in the world which has a **certificate of a light aircraft developer** and a **license to develop aircraft engineering**. The University provides educational and scientific support for aircraft mass production.

Based on the results of the monitoring of the Ministry of Education and Science of the Russian Federation, MAI is included in the TOP-5 of Moscow engineering and technical universities in terms of job placement rate and the level of salaries of its alumni. More than 80 percent of MAI graduates work for industry-based enterprises, making up the backbone of the enterprises of the Ministry of Industry and Trade of the Russian Federation, State Space Corporation ROSCOSMOS, Rostec Corporation, UAC, Tactical Missiles Corporation, Almaz-Antey Corporation.

MAI Management School established in the University aims to modify the life cycle management systems in the digital reality, develop new educational programs and knowledge management technologies, and launch technological business projects. Currently, more than 70 specialists of high-tech enterprises (UAC, UEC, USC), as well as 30 employees and talented students are being trained at MAI Management School under the program "Process management: corporation transition to the life cycle business model".

Also, the IT-center has been set up on the basis of MAI, which is aimed at training personnel to solve practical tasks for business in the context of Industry 4.0, the implementation of new formats for cooperation with the industry through the implementation of joint innovative educational programs and research, the development of student entrepreneurship through the implementation of incubation and accelerating programs, the generation of high-tech IT services and solutions.

On the basis of the center, the joint accelerator for IT projects of MAI and the Internet Initiatives Development Fund has been launched, Master Degree Programs in the following areas are being formed:

- digital production management;
- high-load Internet service design;
- big data management;
- software development process management;
- Internet information security.

MAI takes an active part in the projects of the National Technology Initiative (NTI). MAI representatives are the members of the working group on the development and implementation of the National Technology Initiative Roadmap for the AeroNet direction, as well as experts in promising projects by NTI areas of activity. The MAI projects are included in the road maps of AeroNet, AutoNet, NeuroNet markets. The University also organizes one of the competitions of the NTI Olympiad: Unmanned Aircraft Systems.

Science and technology base

The newest and unique equipment allows MAI to carry out scientific research for the benefit of the largest Russian and international corporations. On the basis of the University there are resource centers, including for multiple access, research laboratories, scientific and educational centers, design offices, pilot plant, aerodrome, flight control center and other units. In MAI, start-ups are actively initiated with the participation of students, university employees and corporate partners. For this purpose, accelerating programs are developed and implemented, interaction with technology companies and venture funds is built.

Sci-tech and consulting services portfolio of MAI Technopark includes more than 35 high-tech work activity types in the following areas:

- metal working;
- additive technologies;
- radio engineering measurements;
- coating;
- materials research;
- instrument engineering;
- engineering software development;
- engineering consulting.

Laboratory facilities

MAI has unique laboratory facilities: full-scale machinery models, including aircraft, helicopters, missiles, robotics, avionics and radar systems.

MAI test facilities in the field of aviation systems:

- wind tunnels;
- flight simulators;
- modern 3D printing;
- coordinate measuring machines;
- metal working complexes;
- distributed product development system;
- end-to-end design support system;
- modern systems of quantitative X-ray non-destructive testing and flaw detection of industrial products.

MAI test facilities in the field of space systems:

- thermal-vacuum test rigs;
- oscillation test systems;
- zero gravity simulator;
- modern facilities of data acquisition and processing;
- modern NC machines.

International Collaboration

MAI's participation in international scientific cooperation

The University cooperates and develops joint activity projects with foreign companies COMAC, Safran, ONERA (France), SNECMA (France), Institute of Aerodynamics and Flow Technology, DLR (Germany), Shanghai Jiao Tong University, Beijing University of Aeronautics and Astronautics (China), Chungnam National University (Republic of Korea), Korea Aerospace Research Institute KARI (Republic of Korea), Avionics Division of Thales (France), etc.

MAI took part in RESEARCH project (Architecture of electric drive systems of increased reliability and safety), conducted within the European Union (EU)'s Seventh Framework Program (FP7).

To date, the University is participating in RUMBLE project (Regulation and norm for low sonic Boom LEVELs) of Horizon 2020, EU Research and Innovation program, one of the areas of which is the development of a supersonic passenger aircraft.

Within the framework of scientific and technical international cooperation, MAI carries out projects with MBDA-France (France), CNRS-Orleans (France), Airbus (France), MTU (Germany), Oxytrol (France). MAI took part in the French project on developing LEA hypersonic demonstrator vehicle.

In the framework of scientific programs conducted by the Federal Space Agency, the Institute of Spacecraft Engineering of MAI cooperates in space research with the largest foreign space agencies - the European Space Agency (ESA) and the National Aeronautics and Space Administration of the United States (NASA).

MAI takes part in various international space programs, such as the creation of the International Space Station and the creation of the Sea Launch complex.

International training and education activity

MAI provides training for foreign students from 57 countries, including from 10 CIS countries. The university has contracts with the countries of Southeast Asia (Malaysia, the Socialist Republic of Vietnam, the Republic of the Union of Myanmar, the Republic of Korea, etc.), as well as with India, China, Egypt. Many foreign MAI graduates hold senior positions in their countries. Currently, more than 1,500 foreign citizens study at MAI and its branches.

Currently, MAI is implementing programs in the following areas: Aircraft engineering, Aircraft engines, Missile complexes and astronautics, Management in engineering systems, in the framework of which foreign students are trained in English.

Joint Master Degree Programs have been launched

- with Shanghai Jiao Tong University (60 students in 2017):
 - composite structures design;
 - Product Lifecycle Management technologies;
 - engine design;
- with Beijing University of Aeronautics and Astronautics (53 students in 2017):
 - aircraft engineering;
 - aircraft engines.

MAI entered the priority list of the universities identified by the government in the framework of the project on the Russian education export. The project focuses on the attraction of foreign students by Russian universities, increase of foreign participants in online courses and of foreign secondary school students.

Exchange programs and academic mobility

The trainees from Austria, Belgium, Brazil, Great Britain, Hungary, Germany, Greece, Holland, Egypt, Spain, Italy, Mexico, USA, Finland, France, Czech Republic, etc. came to MAI over the last 5 years. During the same period of time, the students and postgraduates of MAI underwent training in Austria, Brazil, Great Britain, Hungary, Germany Holland, USA, Finland, France, Sweden, Switzerland, Japan, etc.

At the moment, **exchange programs** are being implemented with the following universities:

- Technical University of Munich (TUM), (Germany);
- Technical University of Dresden (TUD), (Germany);
- University of Heilbronn, (Germany);
- University of Applied Sciences, Ingolstadt, (Germany);
- University of Applied Sciences, Esslingen, (Germany);
- University of Pisa (Unipi), (Italy);
- King Juan Carlos University, (Spain);
- Antonio de Nebrija University, (Spain);
- French Civil Aviation University (ENAC), (France).

This type of cooperation is planned to be expanded.

In general, MAI has concluded more than 100 agreements on cooperation with foreign universities. The main foreign partners of MAI among the universities are: the Technical University of Munich (Germany), the Technical University of Berlin (Germany), Institut Supérieur de l’Aéronautique et de l’Espace ISAE-SUPAERO (France), Institut Aéronautique et Spatial IAS (France), Beijing Aerospace University (China), the Polytechnic University of Advanced Science IPSA (France), Bedford University (Great Britain), the National University of Singapore, Liege University (Belgium), Seoul Aerospace University (Korea), Nanjing University of Astronautics and Aeronautics NUAA(China), and others.

The main **areas of cooperation** with international **partner-universities** are:

- development of joint educational and research programs;
- introduction of double diploma programs, including within the framework of the Partnership of European Aerospace Universities PEGASUS;
- holding international discipline-related schools, organizing specialized Academic Olympics, calls for research-and-technology proposals in order to attract the best students to participate in the programs of the exchange education and / or continue education in MAI;
- and others.

MAI takes an active part in international associations and programs, such as:

- World Initiative for Engineering Education ([CDIO](#));
- Association of Technical Universities of Russia and China ([ASRTU](#));
- European Association of Aerospace Universities [PEGASUS](#);
- International Council for Aeronautical Sciences ([ICAS](#));
- International Astronautical Federation ([IAF](#));
- [TEMPUS](#) Master Program in Aviation of the International Educational Program of the European Union;
- Scholarship programs of the German Academic Exchange Service [DAAD](#).

Conferences, seminars, exhibitions

MAI takes part in major international scientific and technical events, as well as hosts some of them:

- ICAS congresses;
- European Conference for Aeronautics and Space Sciences EUCASS (EU);
- Activities of the International Forum for Aviation Research (IFAR);
- [Franco-Russian Forum in Aerospace Education and Science](#) (Russia, MAI / France);
- International Aviation and Space Salon [MAKS](#) (Russia);
- International Exhibition and Scientific Conference on Hydroaviation [GIDROAVIASALON](#) (Russia);
- International Helicopter Industry Exhibition [HeliRussia](#) (Russia);
- International week of Aerospace Technology ([Aerospace Science Week](#)) (Russia, MAI);
- International Conference on [Aviation and Cosmonautics](#) (Russia, MAI);
- Moscow International Salon of Inventions and Innovation Technologies "[Archimedes](#)" (Russia);
- [Open Innovations Forum](#) (Russia, Skolkovo Technopark);
- International Forum of Leading Aerospace Universities (EU/Russia, MAI);
- International Symposium "Dynamic and Technological Problems in Structural and Continuum Mechanics" (Russia, MAI);
- International Seminar "Dynamic deformation and contact interaction of thin - walled structures under the influence of fields of different physical nature" (Russia, MAI);
- International Conference on Nonequilibrium Processes in Nozzles and Jets (Russia, MAI);
- International Youth Scientific Conference "Gagarin Readings" (Russia, MAI);
- and others.

The accumulated scientific and pedagogical, educational and scientific-methodological experience, the availability of a unique technological base, broad networking with industrial enterprises allow MAI to train specialists of the highest qualification, whose level of training, knowledge, skills and abilities meet the up-to-date requirements of the domestic and world labor markets.

MAI is always open for international cooperation, which is vitally important today to realize the scientific potential of Russia on the world stage.²

More information you can find here:

- ✓ MAI official website: <http://en.mai.ru/>;
- ✓ MAI Technopark: <http://en.mai.ru/research/science-and-innovation/>;
- ✓ Resource and research and educational centers of MAI: <http://en.mai.ru/research/labs/>;
- ✓ Russian NCP "Aeronautics" support: +7 495 556 31 62, +7 498 483 29 09, <http://ncp.tsagi.ru/en/>.

² Prepared using the materials of the MAI official website: <http://en.mai.ru/>.