



Siberian State Aerospace University

Program of creation of the scientific and educational, technological microsattellites series

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2015

Program of creation of the scientific and educational, technological microsattelites series

- **development of the integrated system of the engineering education**
- **students' participation in designing and manufacturing of satellites, service systems and scientific devices**
- **scientific experiments in space**
- **technological development and obtaining of the flight qualification for the advanced service systems, devices and elements of the satellites**

PROJECT PARTNERS:

- **Siberian State Aerospace University named after academician M.F. Reshetnev (SibSAU)**
- **Joint-stock Company "Information Satellite Systems" named after academician M.F. Reshetnev" (JSC "ISS")**
- **Scientific Center of Krasnoyarsk under Siberian branch of Russian Academy of Sciences**

Siberian State Aerospace University is the only one aerospace university in the Siberian and Far Eastern regions of Russia.

The university was established in 1959.



- **Number of students - 11 500.**
- **PhD students - 337.**
- **The total number of staff - 1680.**

The main base for the university enterprise is Joint-stock Company “Information Satellite Systems” named after academician M.F. Reshetnev”

RESHETNEV COMPANY. MAIN ACTIVITIES

- design,
- development,
- manufacturing,
- tests,
- operational support



of **space systems and satellites** designed to provide TV-broadcasting, data-relay, navigation and geodetic services to the benefit of domestic security, social & economical and cultural development of the country and international contacts.



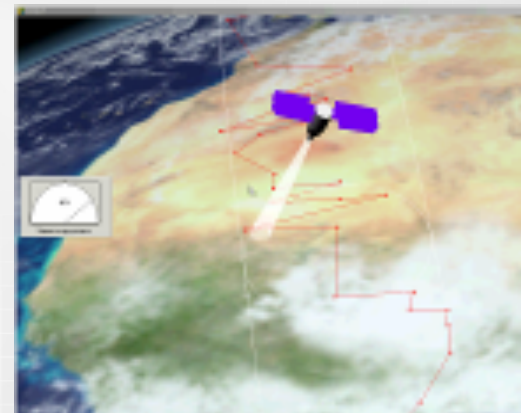


РЕШЕТЕВ
ОАО «ИСС»

Reshetnev Information Satellite System Company (ISS)

TP ACTIVITIES DIRECTED TO INCREASE A COMPETITIVENESS OF THE RUSSIAN MANUFACTURERS

1. Fixed Satellite Communications
2. Personal Mobile Satellite Communications
3. Satellite TV Broadcasting and Wideband Access to Multimedia Content
4. Global Navigation Satellite System (GLONASS-M, GLONASS-K)
5. Global High-precision Geodetic Earth Observation and Measurements (GEO-IK)
6. Remote Earth Sensing
7. Meteorological Satellites
8. Scientific Research in Space
9. Maintenance of in-orbit vehicles



PROJECT OBJECTIVES AND TASKS

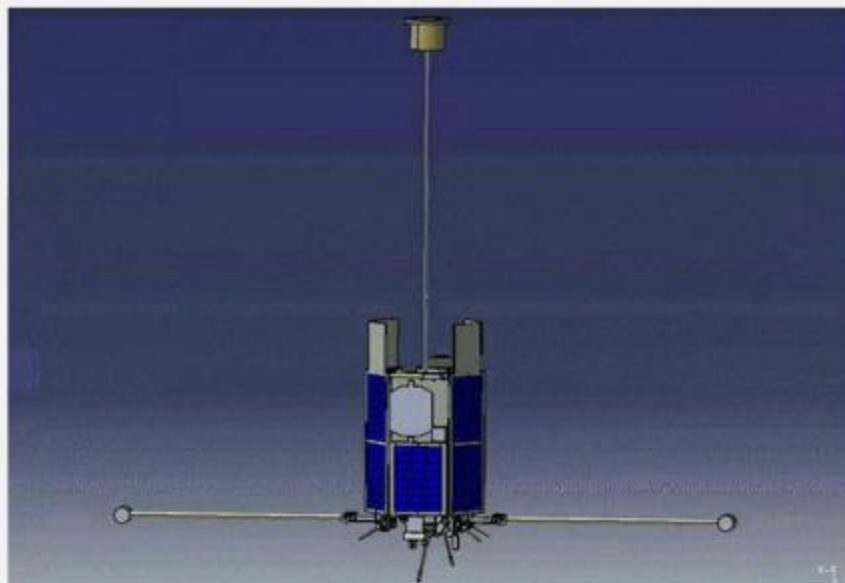
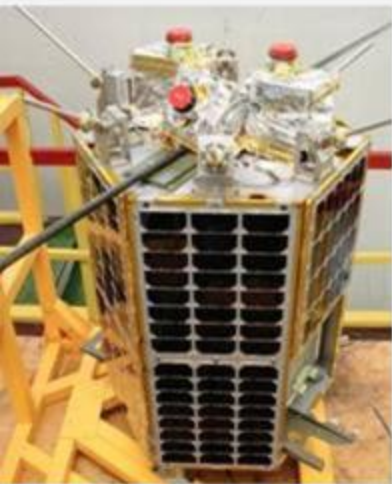


The objectives and tasks of the program for creation of the scientific and educational, technological microsatellites series being implemented:

- development of the integrated system of the engineering education (distance learning system, laboratory sessions performing using the ground stations of microsatellites control etc.);
- implementation of the design-oriented educational technology during formation of the space domain specialists professional capacities (students' participation in designing and manufacturing of satellites, service systems and scientific devices);
- scientific experiments in space (development of the Earth natural resources space monitoring methods, multifunctional nanomaterials, high-temperature superconductors and other intelligent materials use in space);
- technological development and obtaining of the flight qualification for the advanced service systems, devices and elements of the satellites (of the attitude determination and control subsystem, electric power subsystem, thermal control subsystem and other subsystems with the increased lifetime).

First small student satellite «Yubileyniy»

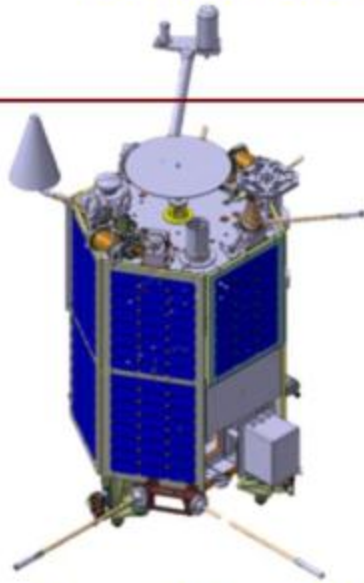
2009



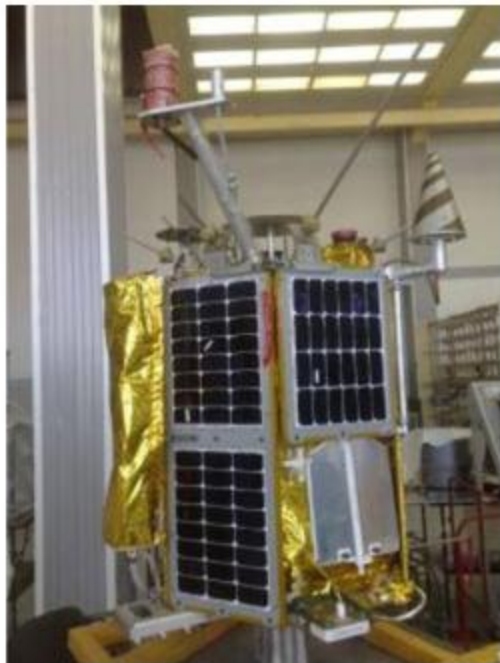
The spacecraft was produced by JSC «ISS» with the participation of students and specialists of SibSAU

launching of «Yubileyniy» by rocket «Rokot»

Small satellite “Mikhail Reshetnev”. 2012



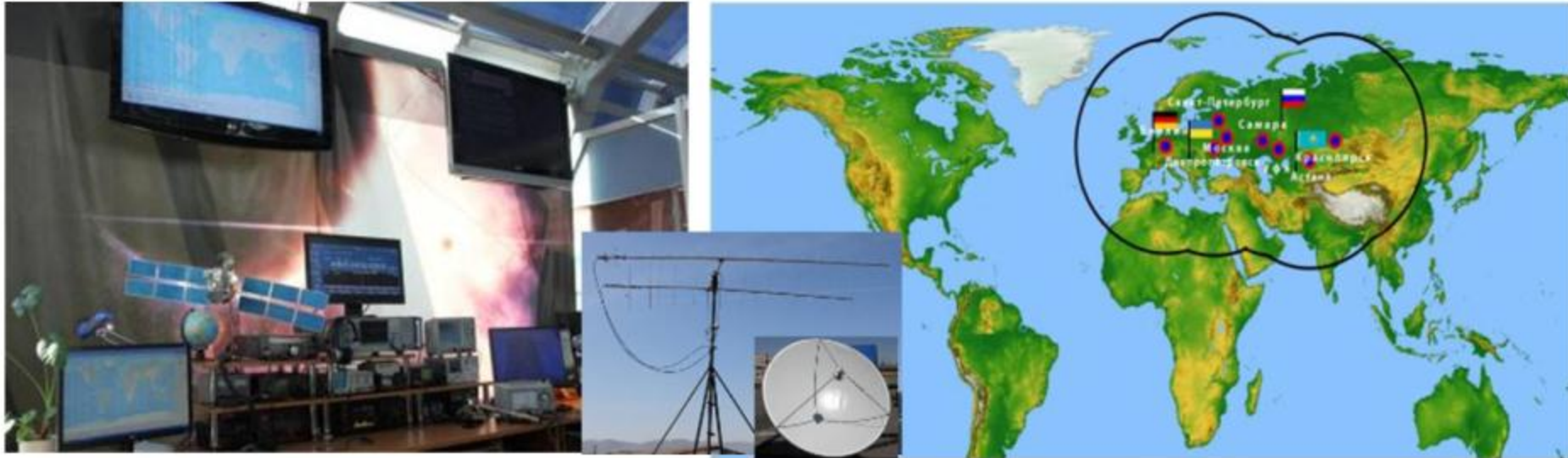
Small satellite “MiR”



Main performances of the “MiR” satellite

Orbit type	Low circular up to 1500 km
Frequencies of command radio lines:	- 145 MHz - 435 MHz - 2,4 GHz
- Earth – Space	
- Space – Earth	
Frequency of target radio line:	
Platform mass	30 kg
Payload mass	35 kg
Power of payload	not less than 40 W - mean per turn
RAM capacity for payload	2 GByte
Supply voltage	12 ±0,4 V (for some equipment 27V)
Data transmission speed:	
- along command radio line	- 2,5 kb/s
- along target radio line	- 1 Mb/s
Orientation type	3-axial, orbit, magnetic-gravitational
Orientation accuracy, not worse:	
- roll	±3°
- pitch	±3°
- yaw	±20°
Thermal control subsystem	Based on gas-regulating heat pipes
Lifetime	1 year

CREATION OF THE DISTRIBUTED NETWORK OF THE UNIVERSITY'S SATELLITES GROUND CONTROL STATIONS



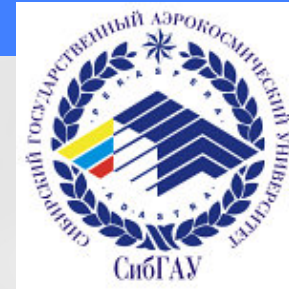
The SibSAU the students' small satellites control center

Directly control the Russian small satellites ("Yubileyniy", "Mozhaets", "Chibis" and "Mikhail Lomonosov" and "Baumanets 2", "MiR") and satellites of the Technical University of Berlin (DLRSAT, TUBSAT)

International network of Small satellites control centers

In 2010 in the frame of the international TEMPUS project "Reformation of the educational programs in the field of space technology in Russia, Ukraine and Kazakhstan" (CRIST)

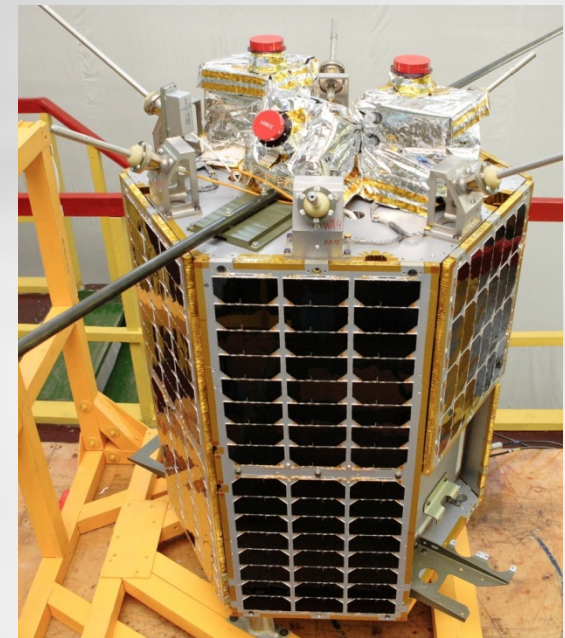
Small satellites, which are managed by student center



BEESAT



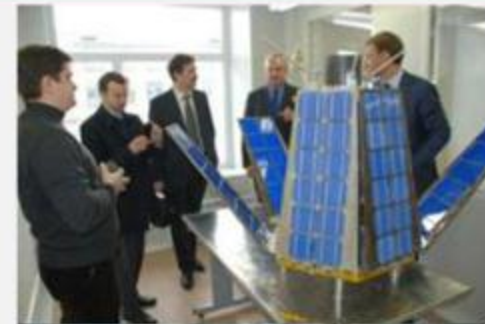
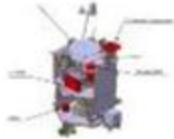
YUBILEYNIY



MOSHAETS

Project-and-team education technology in the educational process

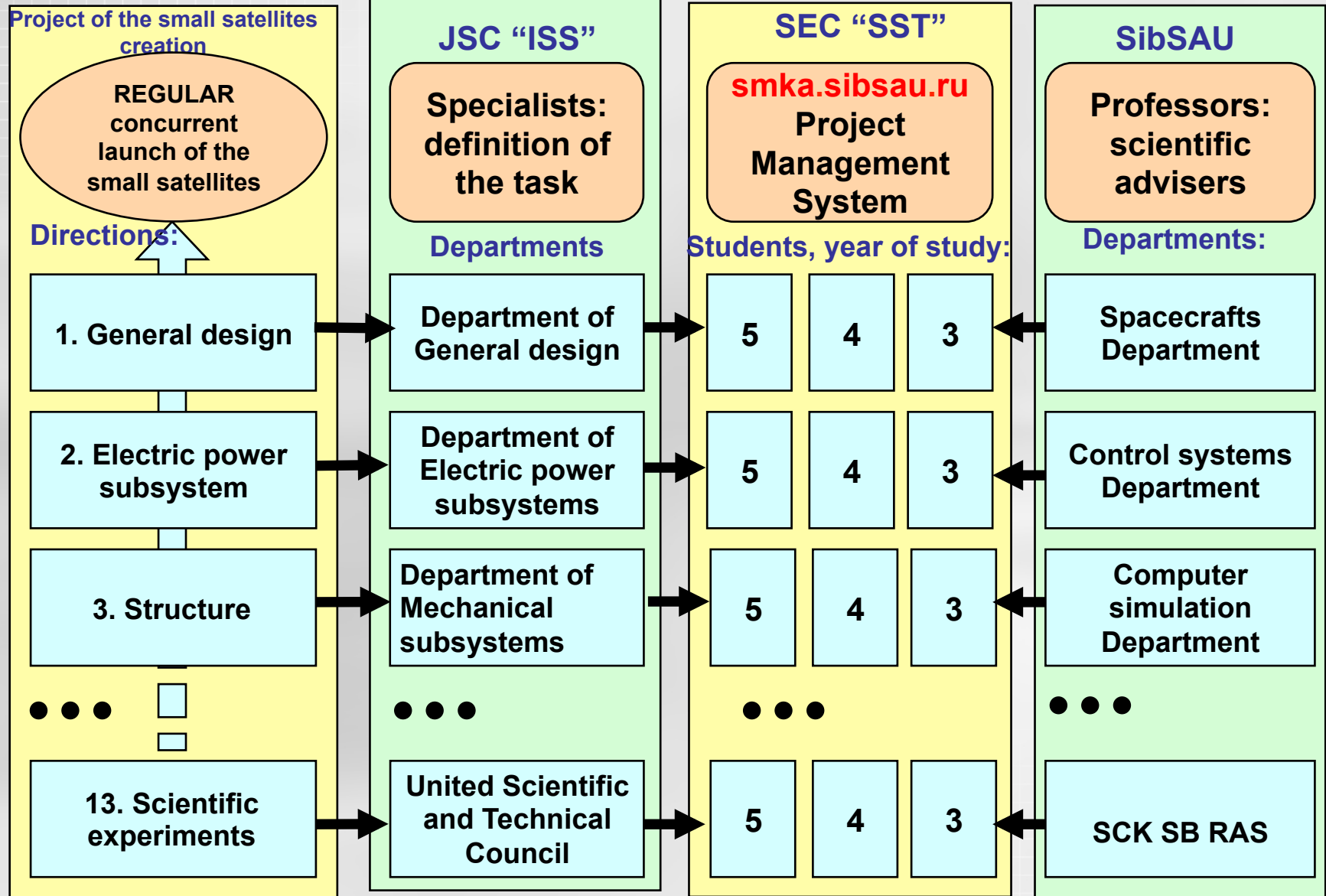
This technology is practiced in the Science Education Center “Space systems and technologies” when realizing the unique project of development and creation of the students’ scientific and educational small satellites series



Center infrastructure in SibSAU



Diagram of the project-and-team preparation



Training project «KazSat-3»



12 participants from Kazakhstan, specialists of JSC National Company 'Kazakhstan Garysh Sapary', underwent training and received diplomas in the programmes 'Spacecraft and Upper-stage Rockets' and 'Industrial Training of Specialists'.

Specialists underwent a course within the framework of project-oriented training, working on the design and manufacture of a mass-size evaluation model of the space vehicle «KazSat-3».

In the initial stage of training, lecturers and academics of SibSAU taught Kazakh specialists in Alma-Ata, after which visitors from abroad arrived in Russia for practical training.



A photograph of a natural rock formation in a winter forest. Several tall, thin, weathered rock pillars stand prominently in the center, their surfaces showing signs of erosion and discoloration. The ground is covered in a layer of snow, and the surrounding trees are mostly evergreens, with some bare deciduous trees visible in the background. The sky is a clear, bright blue. The text "Thank you for your attention!" is overlaid in the center of the image in a large, white, sans-serif font.

Thank you for your attention!

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