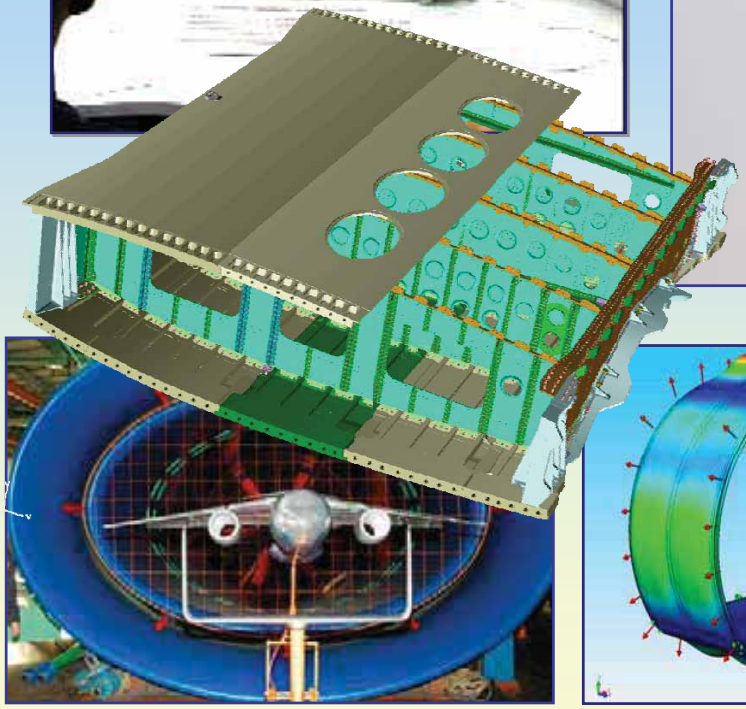
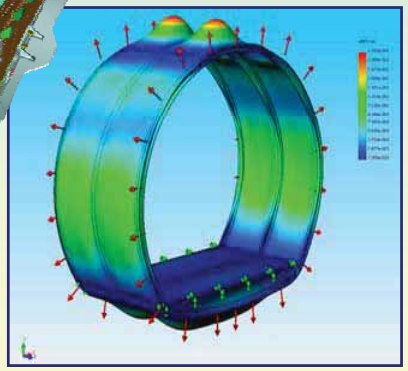
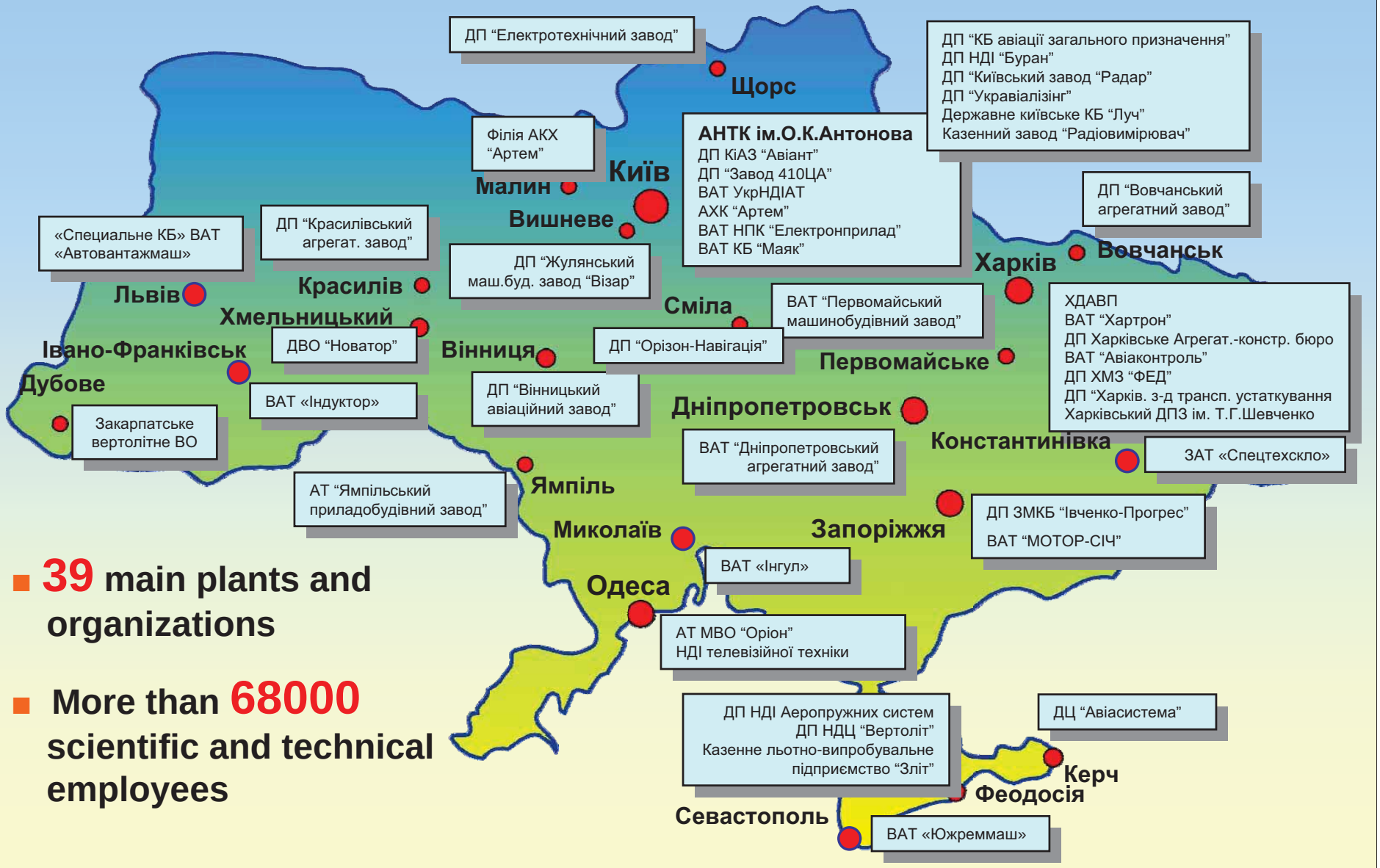




Ukrainian Aviation Industry and Capabilities for Cooperation with the European Union

Major Ukrainian Aeronautical Enterprises



- **39** main plants and organizations
- More than **68000** scientific and technical employees

ANTONOV State Aircraft Manufacturing Concern

ANTONOV ASTC	KYIV STATE AIRCRAFT PLANT	KHARKOV STATE AIRCRAFT PLANT	No.410 AIRCRAFT PLANT OF CIVIL AVIATION

ANTONOV ASTC – Aviation Scientific and Technical Centre

ANTONOV ASTC

- Design Bureau and Scientific Laboratories

- Flight Test Base

- Prototype Production Plant

There are 10 Research Complexes of a National Level at ANTONOV ASTC.

Ukrainian Aviation Series Plants

KYIV STATE AIRCRAFT PLANT

- AN-148, AN-70 and AN-32 aircraft series production

KHARKOV STATE AIRCRAFT PLANT

- AN-140 and AN-74 aircraft series production

No.410 AIRCRAFT PLANT OF CIVIL AVIATION

- AN-24, AN-26, AN-30, AN-32, AN-72, AN-74 aircraft and D36 aircraft engine repair and overhaul

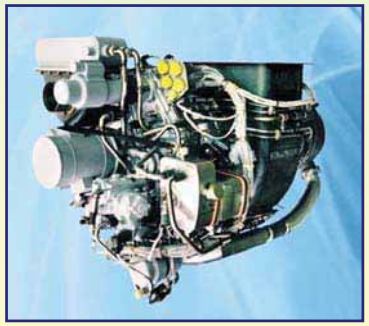
Aircraft Engine Makers in Ukraine

IVCHENKO PROGRESS SE

- Development of new engines and modernization of existing engines

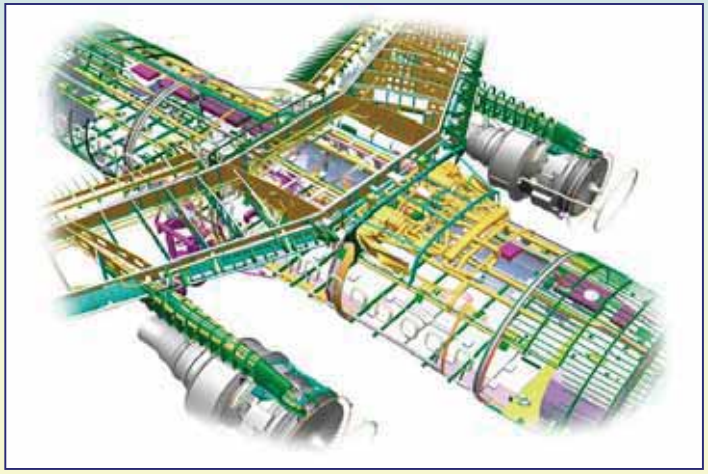
MOTOR-SICH JSC

- Series production and modernization of aircraft engines and APU



Developers and Manufacturers of Avionics, Aircraft Systems and Special Equipment in Ukraine

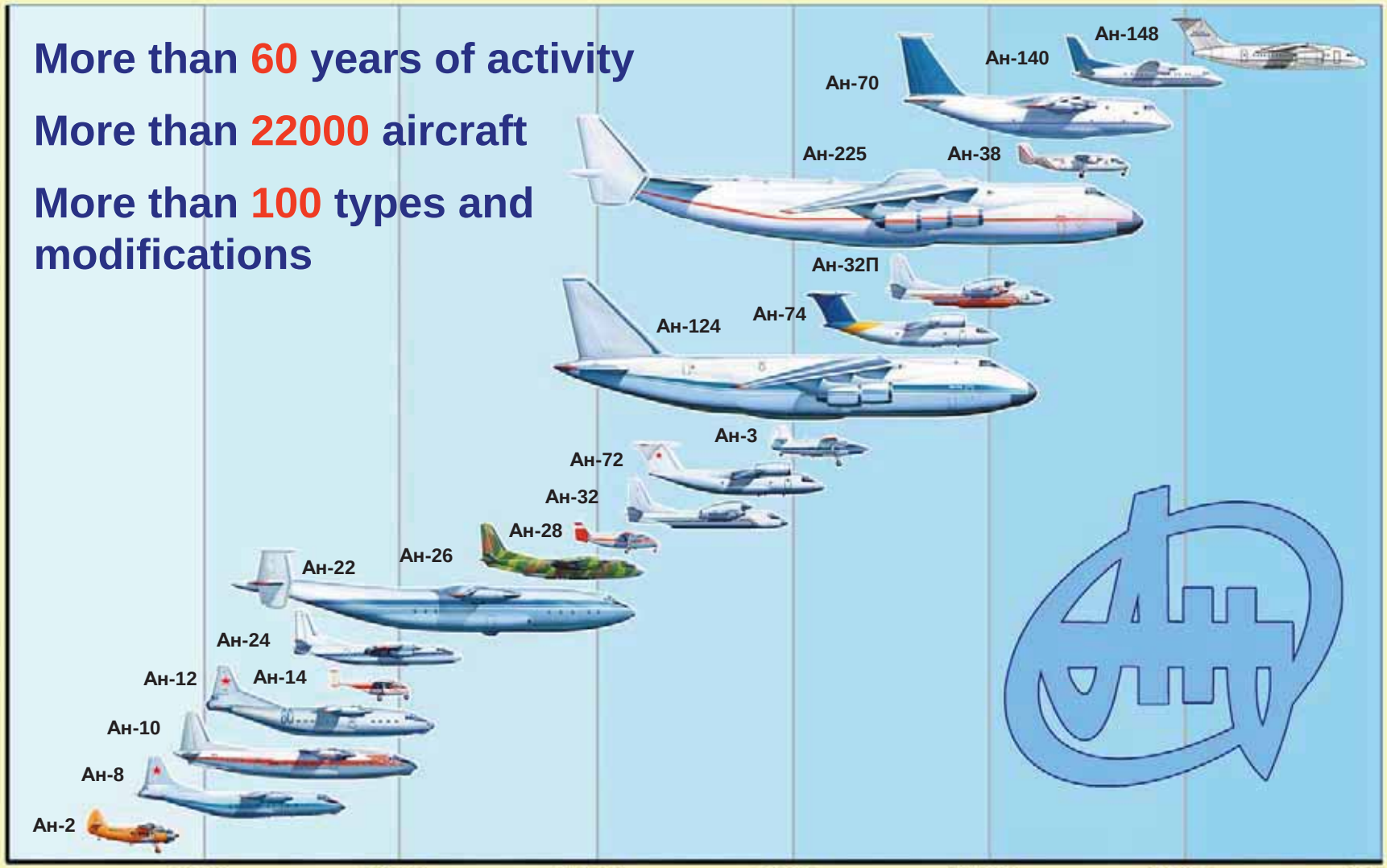
“FED” SE	(Aircraft Systems and Components)
“Novator” SE	(Radio Equipment)
“Buran” Research Institute SE	(Radio Equipment)
“Orizon-Navigation” SE	(Navigation Equipment)
“Electronprylad” JSC	(Radio Equipment and Electric Power Supply)
Research Institute of Television Technology	(Radio and Special Equipment)
Research Institute of Aeroelastic Systems SE	(Parachute Systems and Equipment)



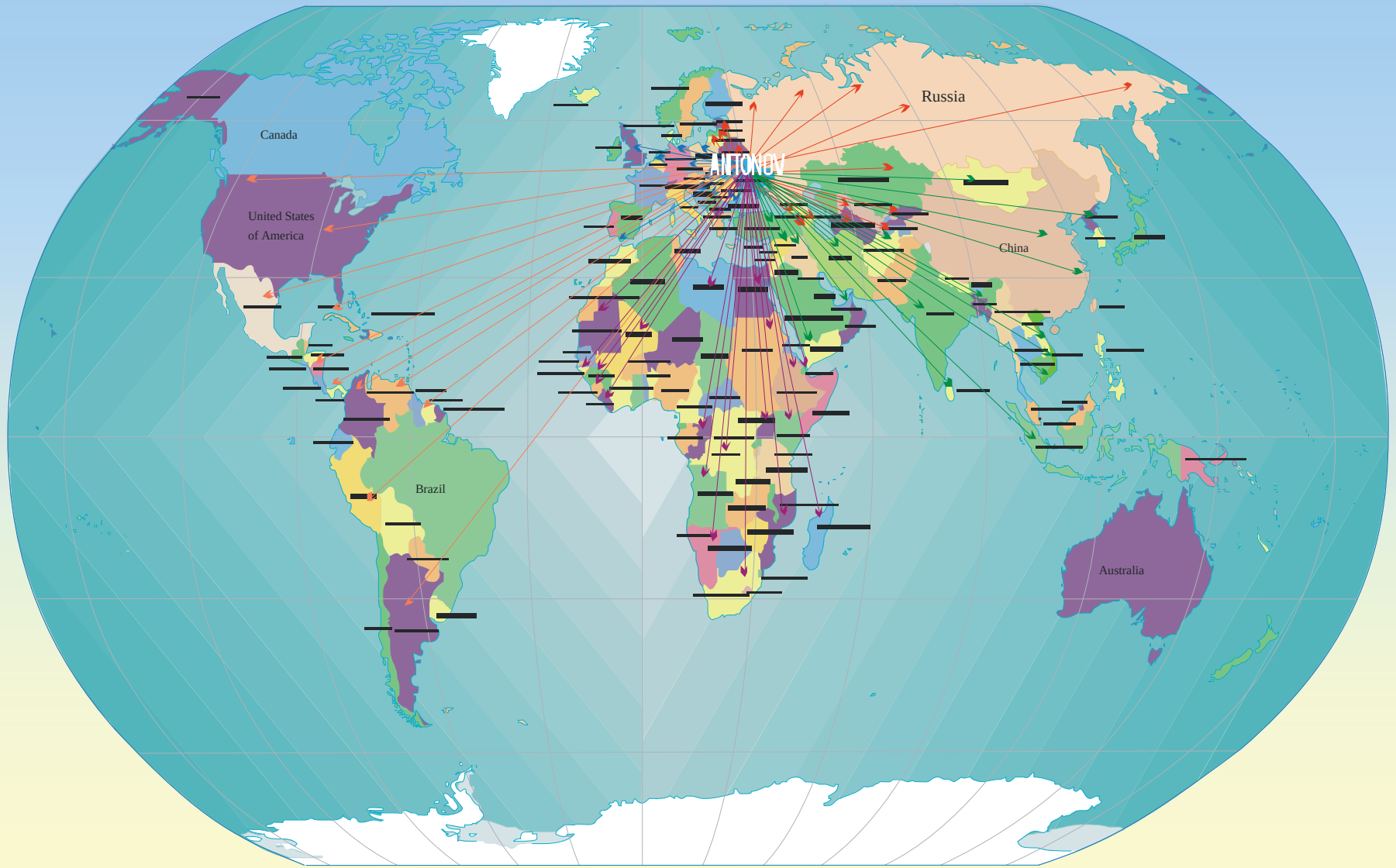
Main ANTONOV ASTC Activities

- Development and creation of new aircraft
- Research activities on advanced projects
- Aircraft series production support and modernization of serial ANTONOV aircraft
- After-sale support of aircraft
- Outsized cargo transportation
- Other kinds of activity

ANTONOV ASTC



6043 aircraft in 76 countries



Main Antonov's programs and partners

AN-148-100,
and modifications

AN-124
modernization and development

AN-140
and modifications

PARTNERS

Ukraine: «ANTONOV»
Russia: VASO

Ukraine: «ANTONOV»
Russia: «Aviastar», «Volga-Dniepr»

Ukraine: «ANTONOV»
Russia: «Aviakor»
Iran: HESA

Main Antonov's programs and partners

AN-74
modernization and modifications

AN-38
modernization and modifications

AN-3
modernization and modifications

AN-32
modernization

PARTNERS

Ukraine: «ANTONOV»
Russia: «Polyot»

Russia: NAPO

Ukraine: VAP,
Russia: «Polyot»

Ukraine: «ANTONOV»
India: HAL

New Antonov's programs and partners

AN-70
and variants

AN-158
and variants

AN-168
and variants

New Transport Aircraft

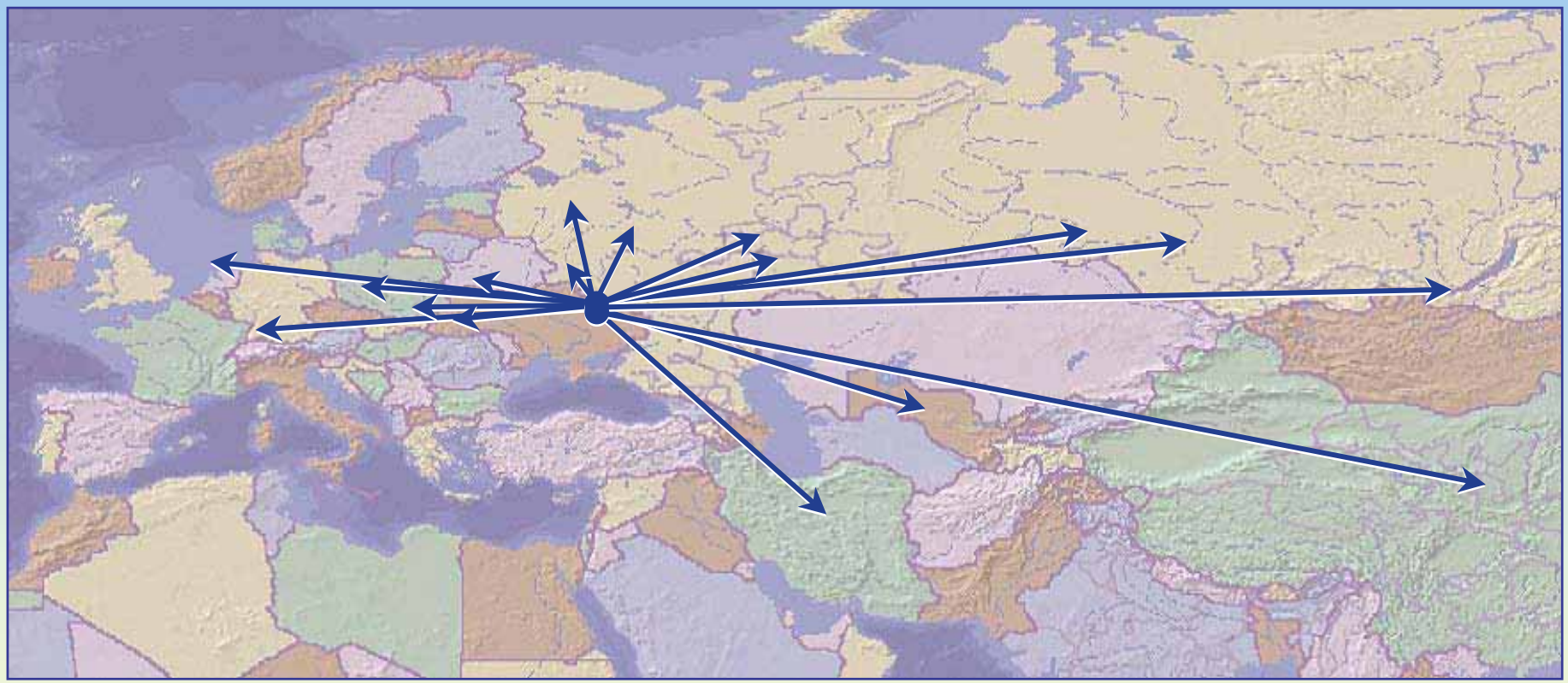
Other New Projects

PARTNERS

Ukraine: «ANTONOV»
Russia: «Polyot»

Ukraine: «ANTONOV»
Russia: VASO

Partners of ANTONOV



13 production and **15** repair plants

More than **50** research organizations

More than **1000** enterprises and companies

AN-148-100. 33 Main Enterprises from Ukraine

AN-148-100 International Cooperation. More than 180 Enterprises in 15 Countries

Basic Directions of Scientific Research

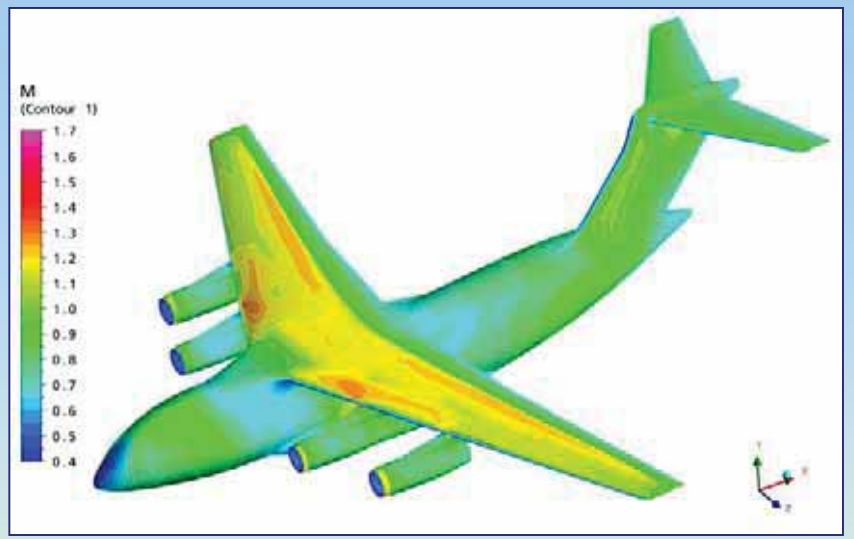
- AERODYNAMICS
- STRESS ANALYSIS
- MATERIAL SCIENCE
- AIRFRAME AND STRUCTURES
- POWER PLANT
- AIRCRAFT SYSTEMS
- MANUFACTURING PROCESSES
- INFORMATION TECHNOLOGIES

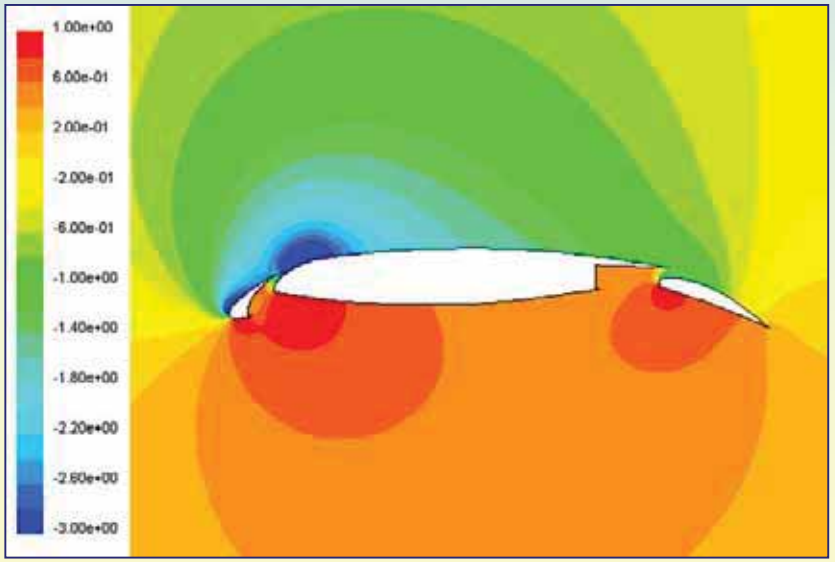
Jointly with ANTONOV Scientific Partners

Aerodynamic Research

Research and development of:

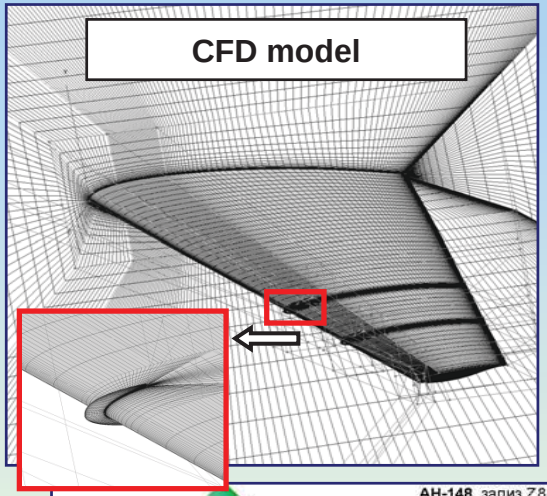
- aerodynamic configurations of new aircraft
- aerodynamic configurations of new airfoils and wings
- wing flaps, slats and other high-lift devices



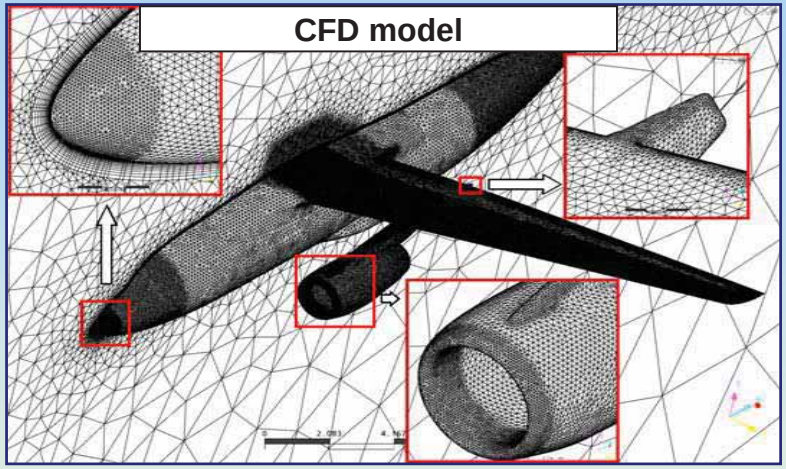


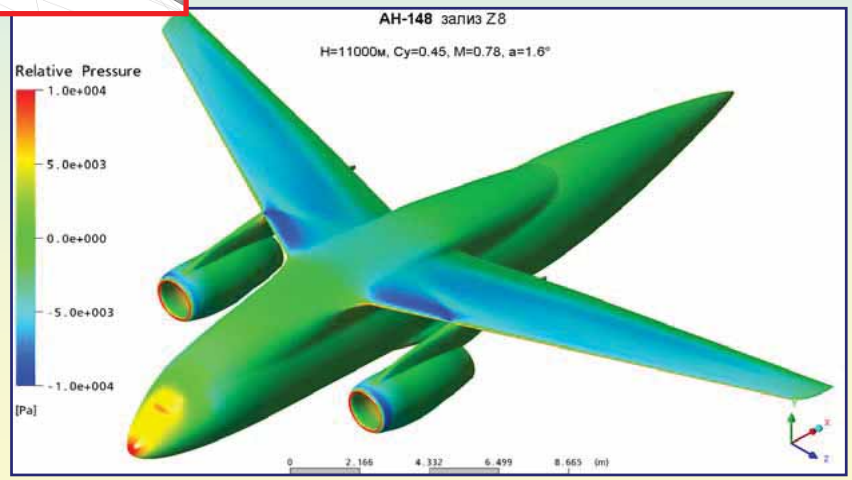
Aerodynamic Research

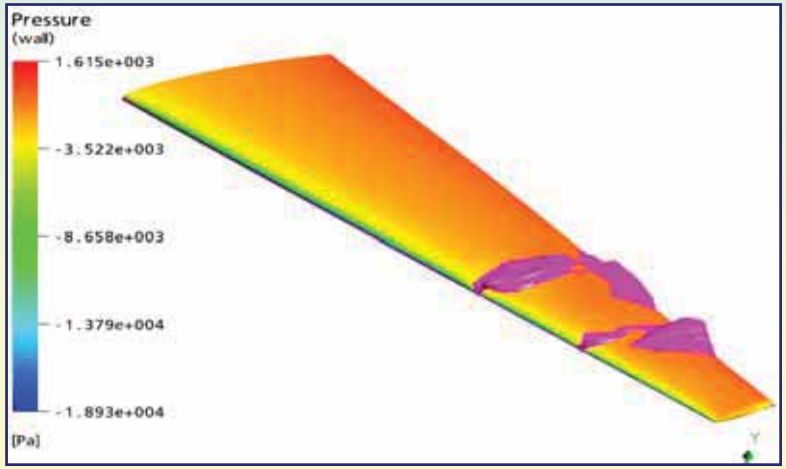
In cooperation with the Institutes of Hydromechanics and Cybernetics of Ukrainian National Academy of Sciences (NAS)



Investigations of aerodynamic characteristics of the aircraft in cruise configuration

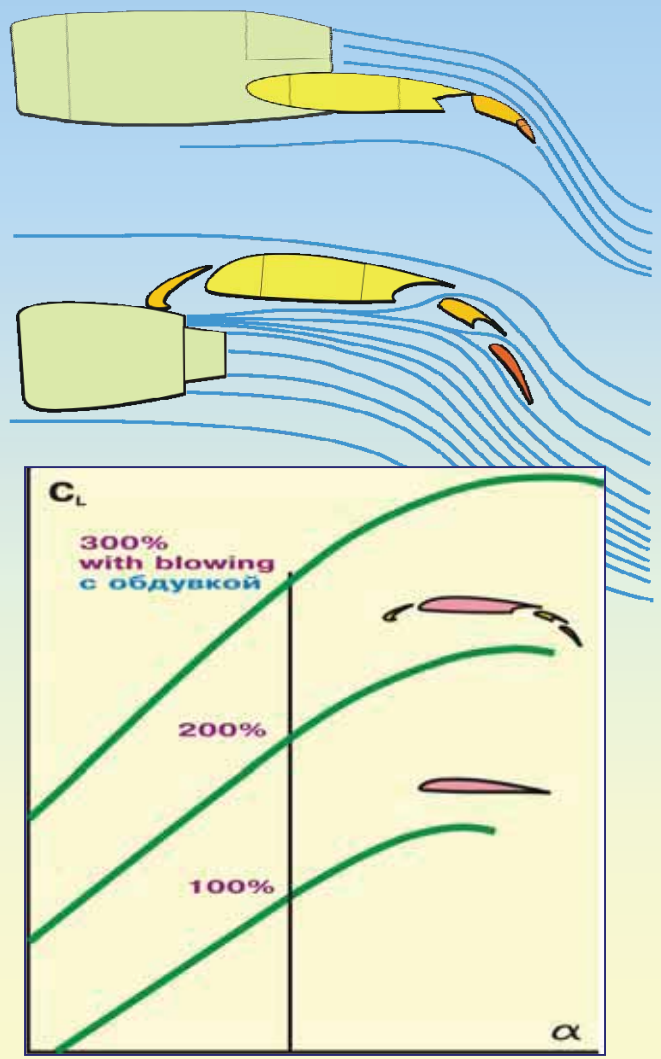




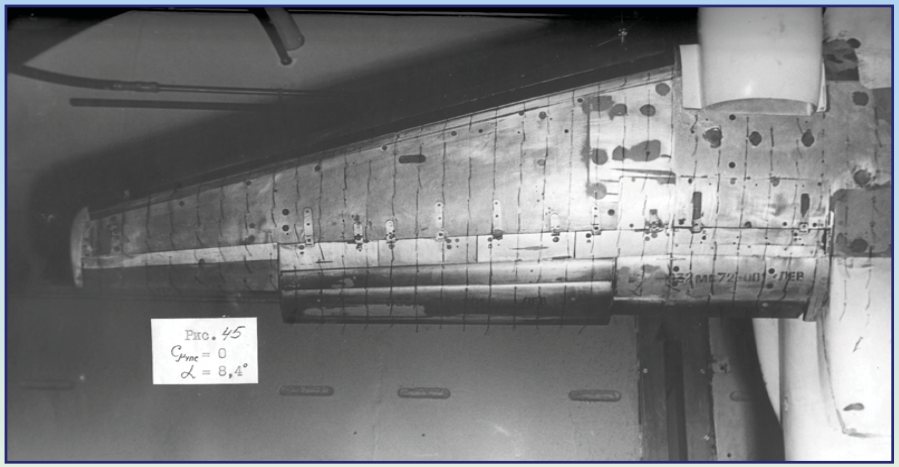


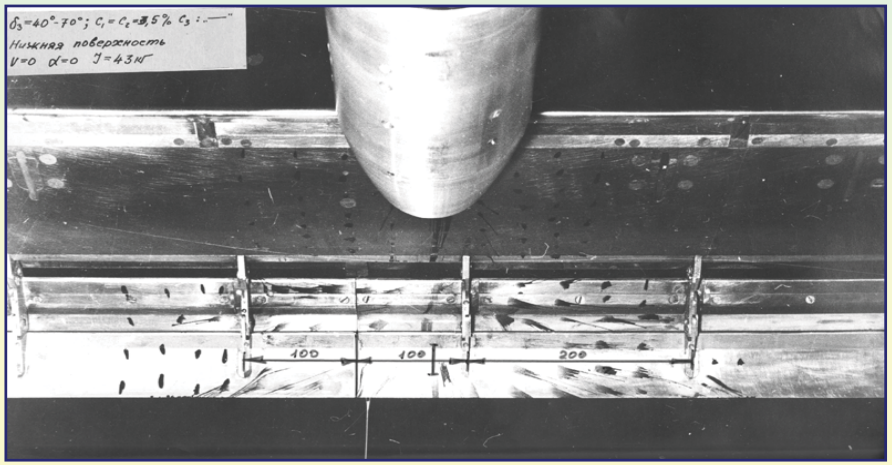
Aerodynamic Research

Methods of Increasing Wing Lift Using Engine Power



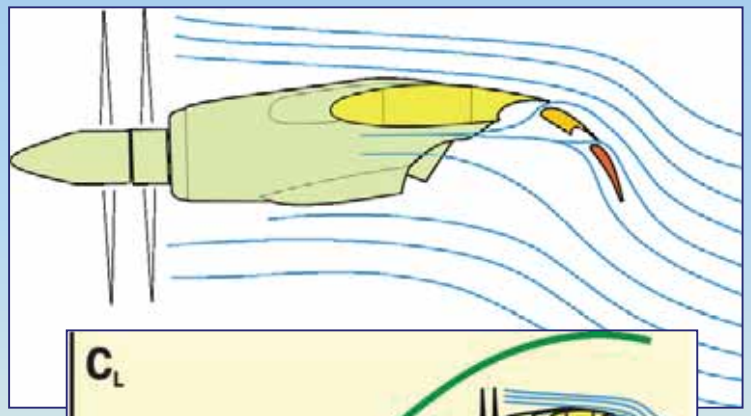
Blowing on upper and lower wing surface with stream of the bypass turbo-jet engines

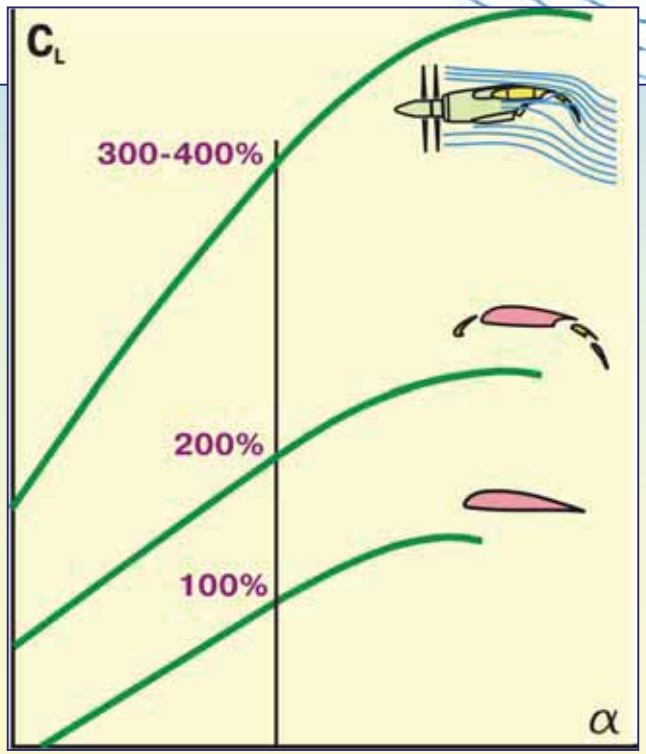




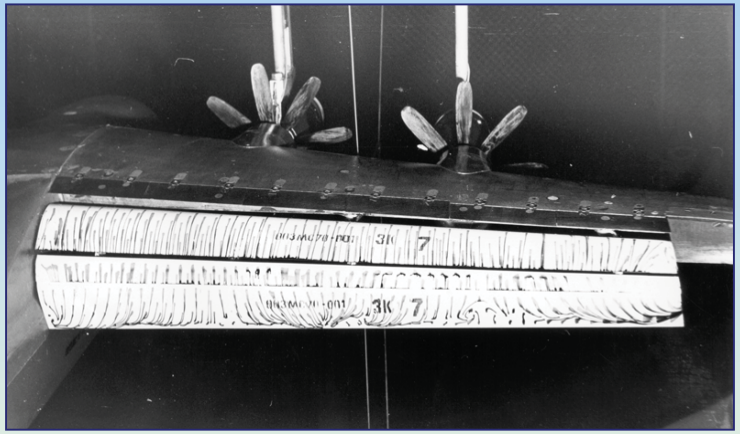
Aerodynamic Research

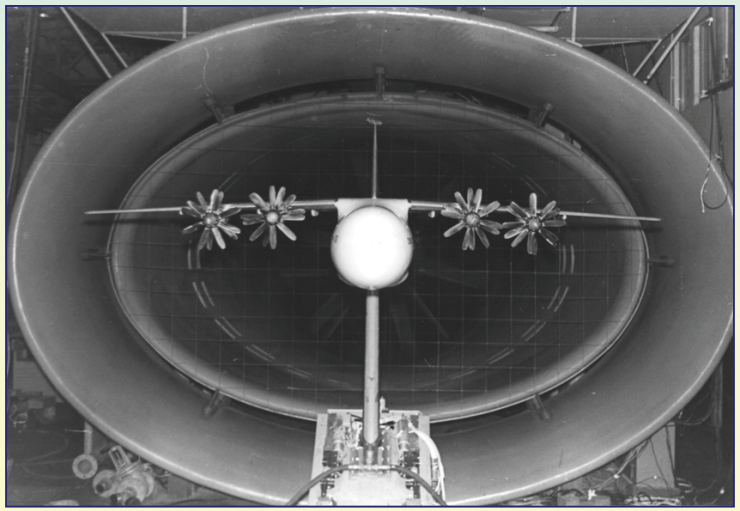
Methods of Increasing Wing Lift Using Engine Power





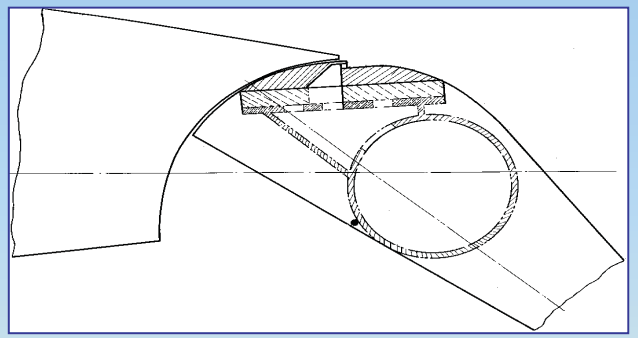
Blowing on upper and lower wing surface with the stream of the propfans

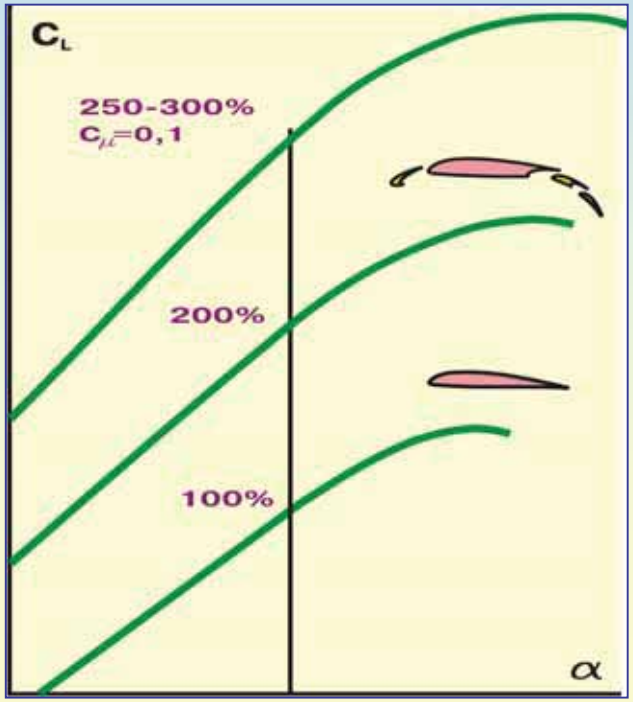




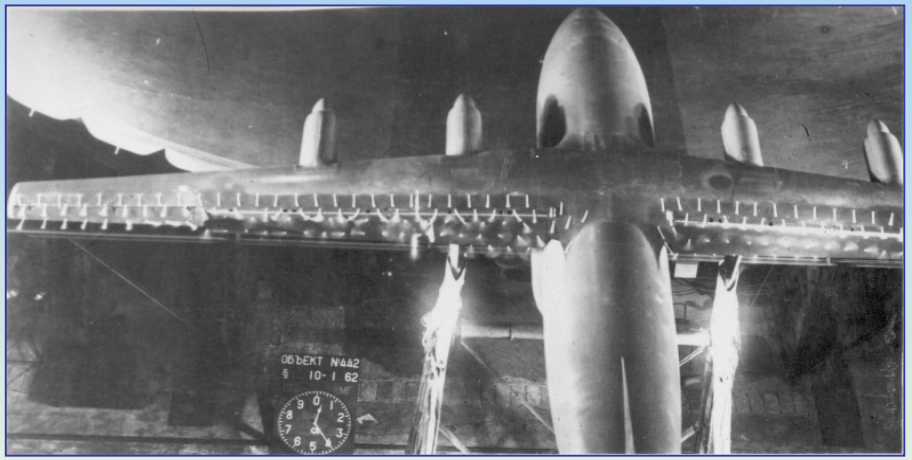
Aerodynamic Research

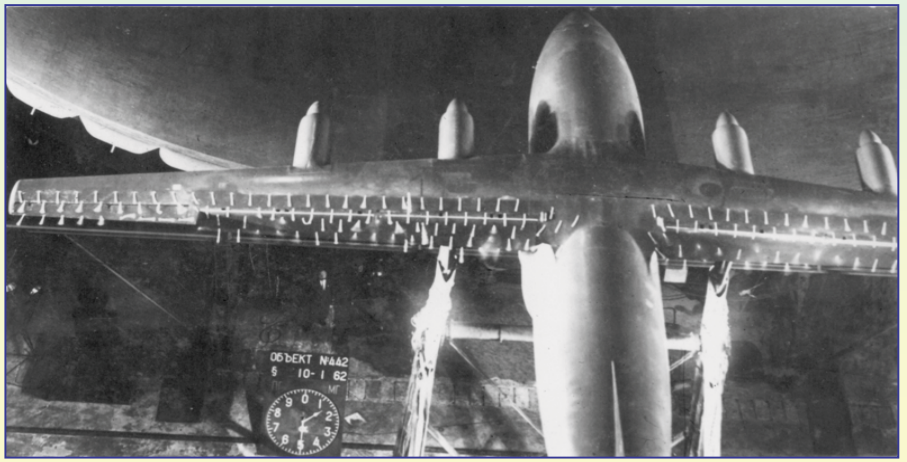
Methods of Increasing Wing Lift Using Engine Power





Wing lift control by boundary layer blowing and suction

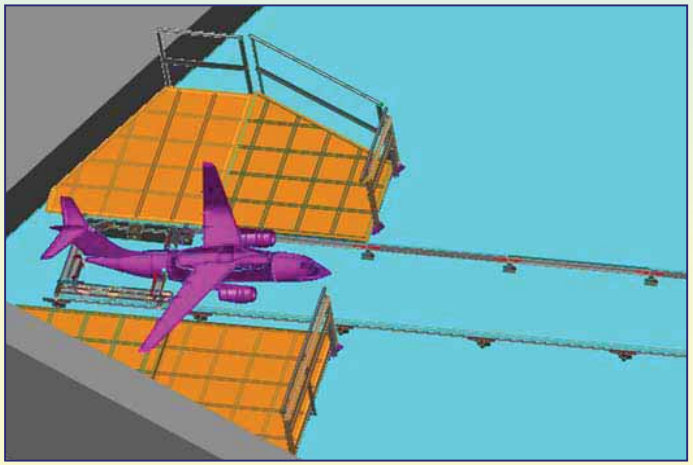




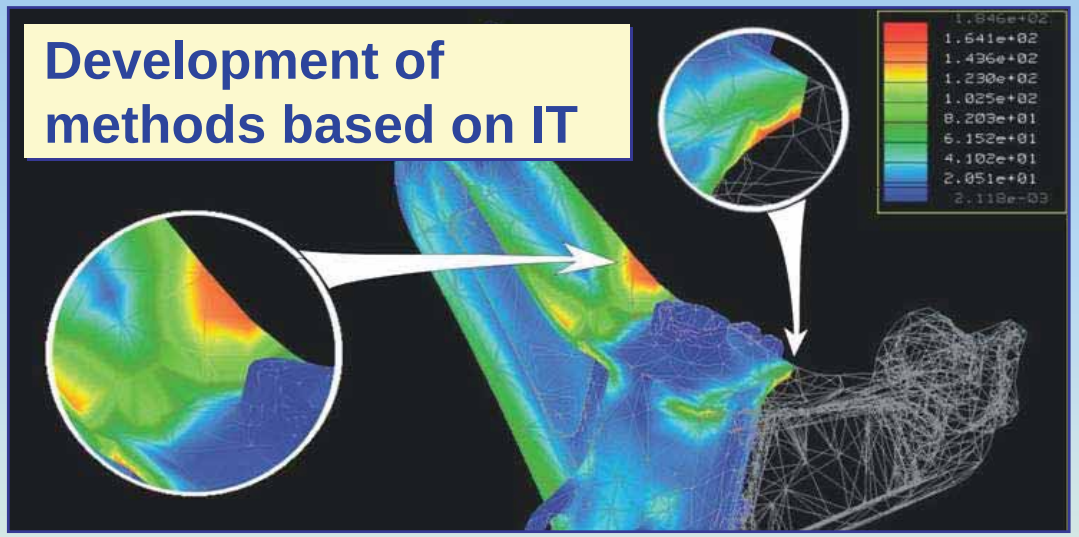
Aerodynamic Research

- Complete Cycle of Experimental aerodynamic tests

- Aero-hydrodynamic Research Laboratory is being created



Strength Research



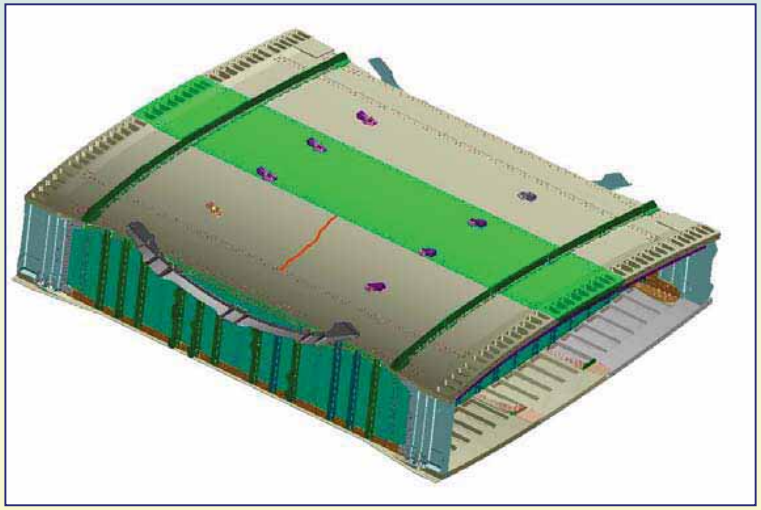
One of the biggest in Europe Structural Test Complex:

- **Static Strength Tests**
- **Fatigue Strength Tests**

Strength Research

Research for Prolongation of Service Life of existing Aircraft

- Research of operating conditions and loading of aircraft groups
- Research of fatigue life and damage tolerance
- Research of possible corrosion damaging and its aftereffects



Strength Research

Together with Institute of Problems for Machine-Building of the Ukrainian NAS

- **Simulation of Bird Strike as Complex dynamic process**
- **Simulator was created that reliably simulates Bird Strike**

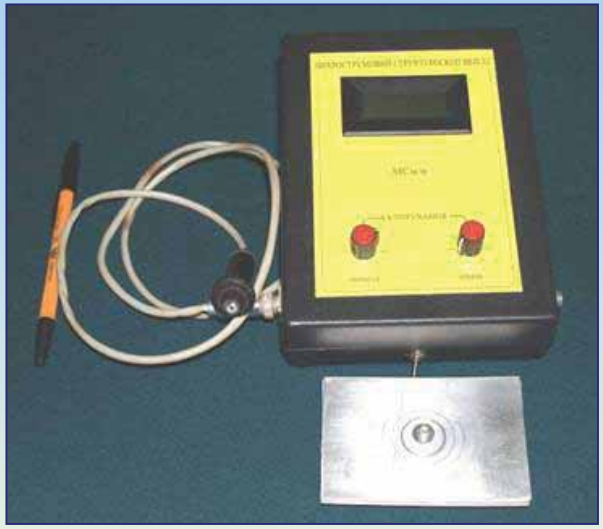
Special pneumatic gun

Bird simulator

Strength Research

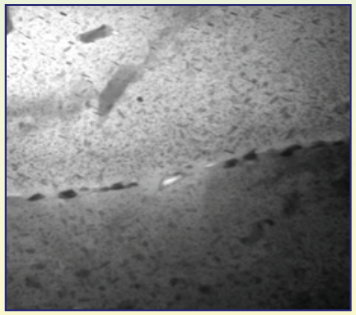
In cooperation with the Institute of Physics and Mechanics of the Ukrainian NAS:

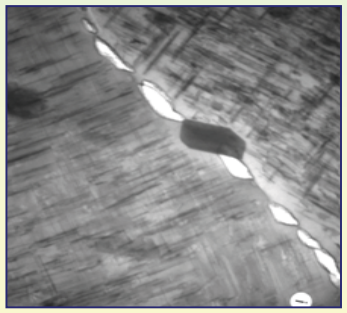
- **Development of surface hardening processes**
- **Substantiation of structural reliability and durability**
- **Methods and tools for inspection of technical condition of structures**



The ВЕП-22 structure meter was developed

Monitoring of material property degradation using NDT





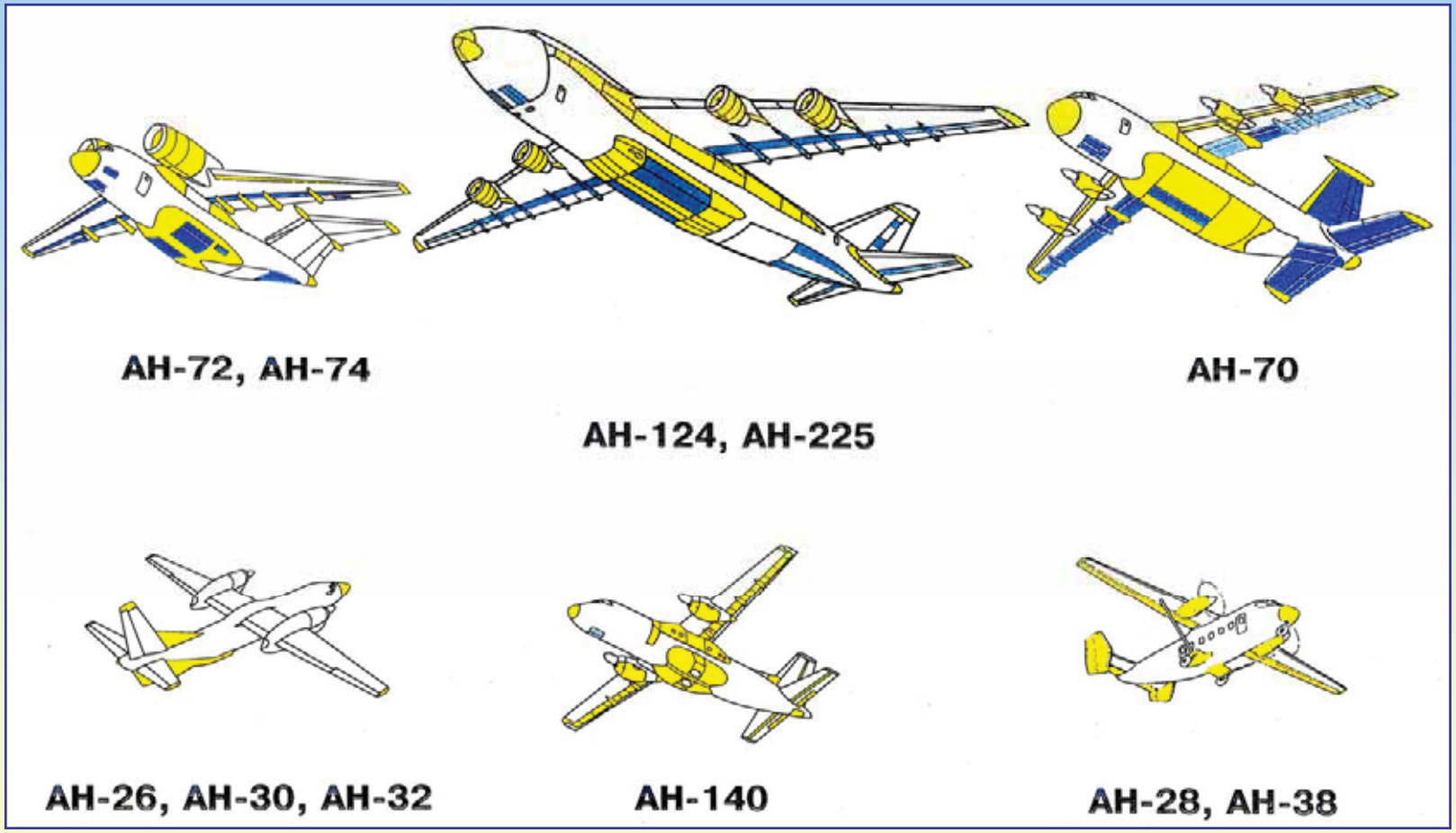
Magnification a) x30000 **b) x100000** **c) x100000**

Composite Materials Research

- Centre of Composite Structures Development and Implementation;
- Nonmetal Structures based on Carbon, Glass, Organic and Hybrid Fibers.

Composite Materials Research

Areas and Amount of Composite Materials Application in ANTONOV ASTC Aircraft



- Components of GFRP

- Components of CFRP

Composite Materials Research

Application of Composite Materials on the ANTONOV ASTC Aircraft

Stabilizer of AN-70, span 7 m

Engine nacelle of AN-148

Cargo door panels of AN-124

Composite Materials Research

In cooperation with the Institutes of Mechanics, Material Science and Problems of Structural Strength of the Ukrainian NAS

- **Investigations of high- and medium-stressed structures made of composite materials**
- **Investigations of resistance to fuel, flame and corrosion**
- **Investigations of atmospheric effects on strength and service life**
- **Development and introduction of processes for series production of integral structures**

Fin torsion box

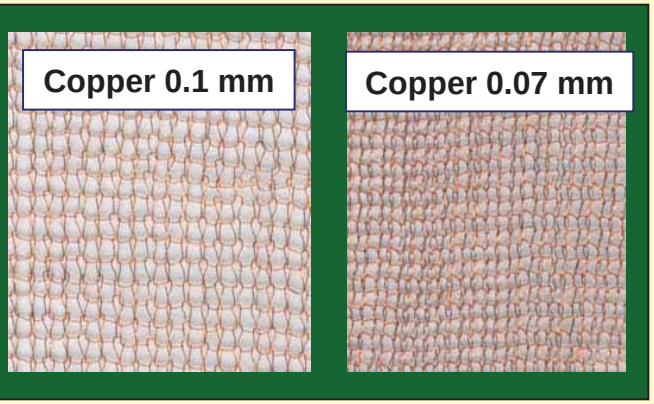
Wing box autoclave molding

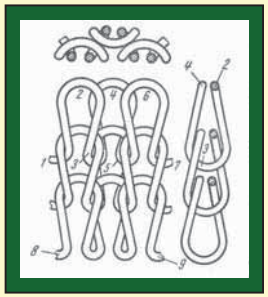
Composite Materials Research

Together with Material Science problems Institute of the Ukrainian NAS

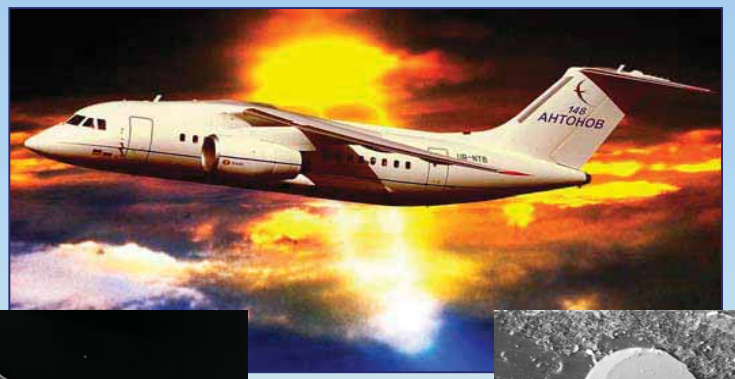
Research and development of lightning protection meshes

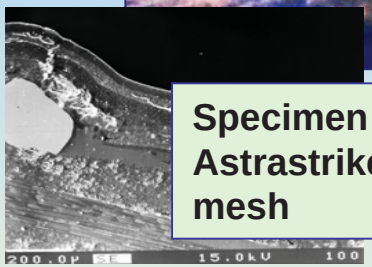
Knitted meshes



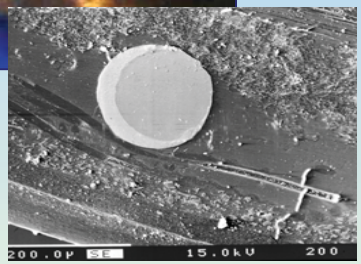


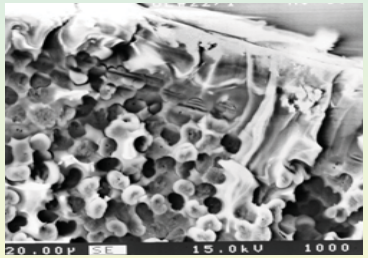
'1+1 rib knit' structure of the knitted mesh

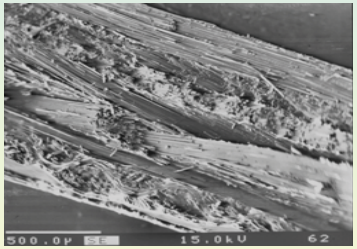




Specimen with Astrastrike Cu 029 mesh







Specimen with domestic CM-008 and УНТ mesh

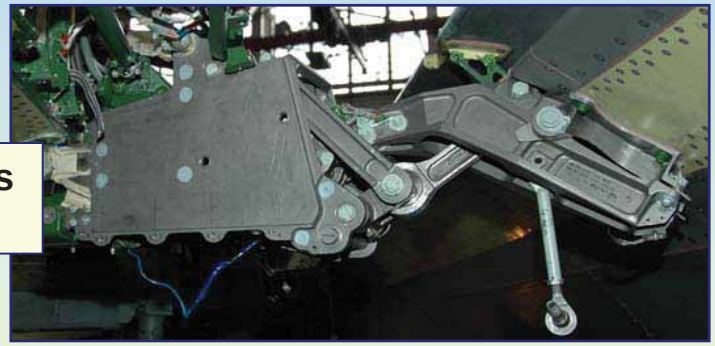
Research into Metallic Materials for Aircraft

Application of Titanium Alloys in ANTONOV Aircraft

For the first time in the world, the relative volume of application of titanic alloys in An-148 landing gear has reached 80 %

An-148 landing gear of BT-22 alloy

Titanium Components



Parts of high-lift devices made of BT-22 alloy

Thin-walled pipeline made of ПТ-7М alloy

Titanium pipelines

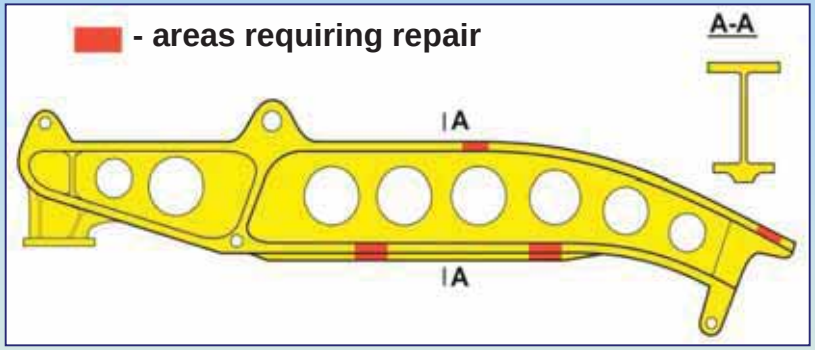
Pipeline of complicated shape made of ПТ-7М alloy

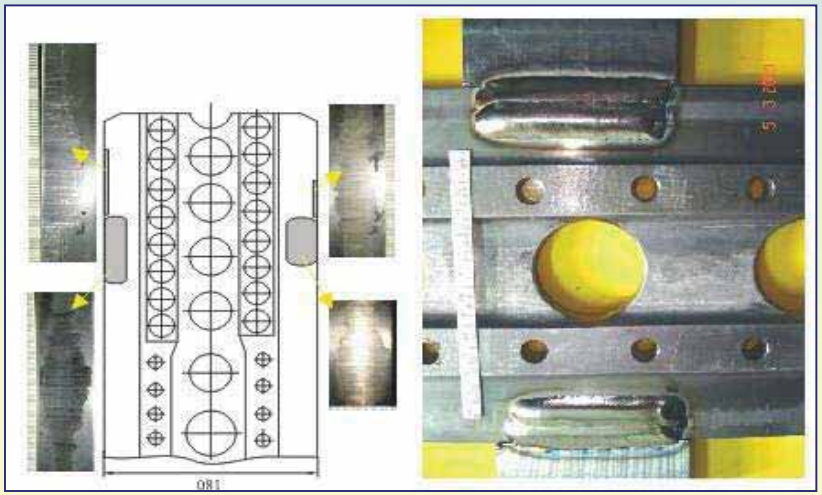
Research into Metallic Materials for Aircraft

In cooperation with the Institute of Electric Welding of Ukrainian NAS, a process is developed for metal deposition on parts made of Ti alloys for local surface repair

Features of the process:

- minimum thermal cycle effects on the structure of base material
- lower residual stresses in base material
- no effects of wear up to a considerable depth



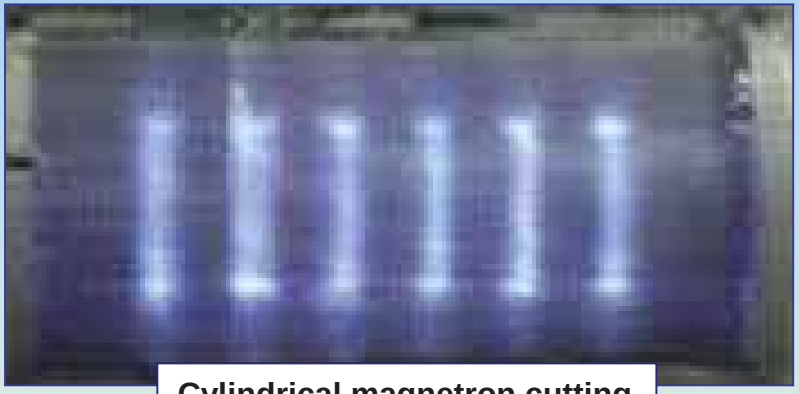


The track after deposition on areas of wear has passed successfully fatigue bench tests.

Research into Metallic Materials for Aircraft

In cooperation with the Institute of Engineering Mechanics of Ukrainian NAS, processes are developed for application of wear and corrosion resistant coatings to aircraft parts

- **Research and development of Ion and plasma processes of plating**
- **Plasma process tools and equipment for plating of inner surfaces**



Cylindrical magnetron cutting

Experimental cylinder before coating

Ti hydraulic cylinder has passed successfully fatigue bench tests

Research and development of Counter Rotating Open Rotors (CROR)

Two-row Counter-Rotated Propfans on the AN-70 aircraft

Long-term experience of use of Counter-Rotated Propellers on the AN-22 aircraft

Research and development of 'More Electrical Aircraft'

An-124 – the world's first heavy transport airplane with a fly-by-wire control system

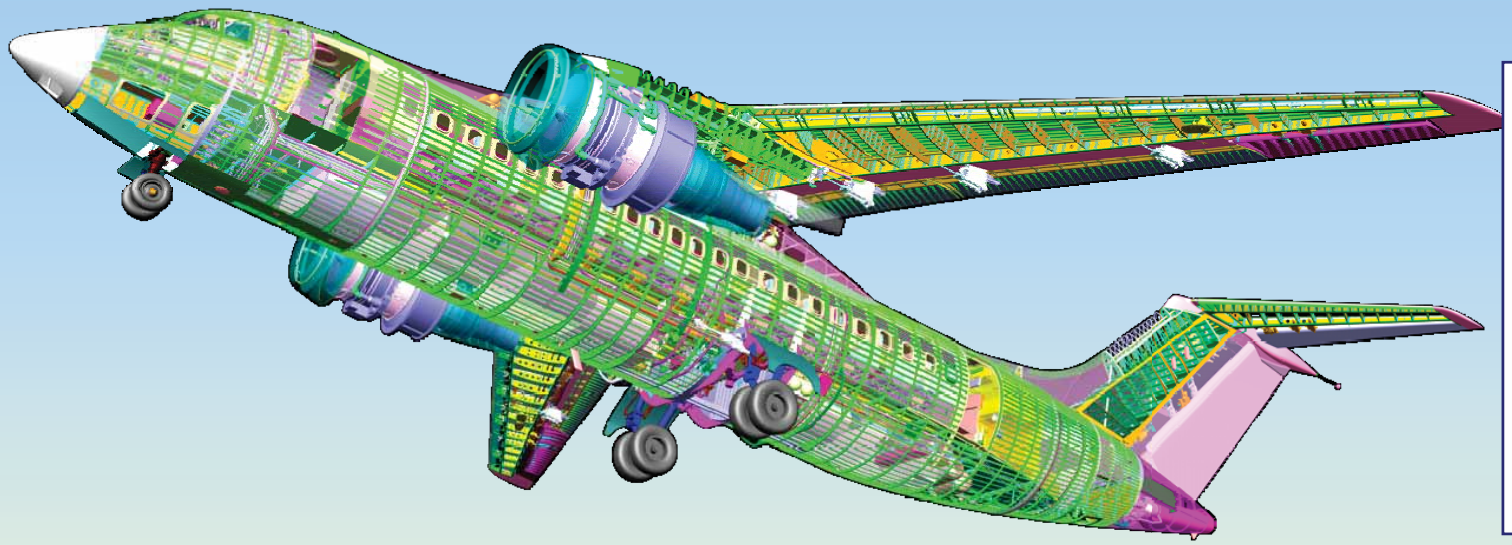
An-70 – introduction of the electrical flap drive

An-148, 2004 – practical result of the development of energy-optimized airplane

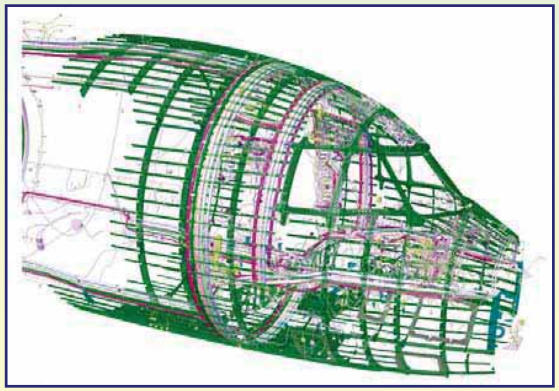
An-148 – the world's first transport-category airplane with a 'more electrical' configuration of the control surface drive system achieved through introduction of electric drives ensuring:

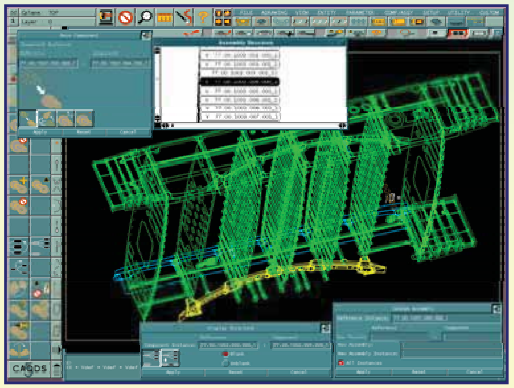
- **100 kg lower airplane weight.**

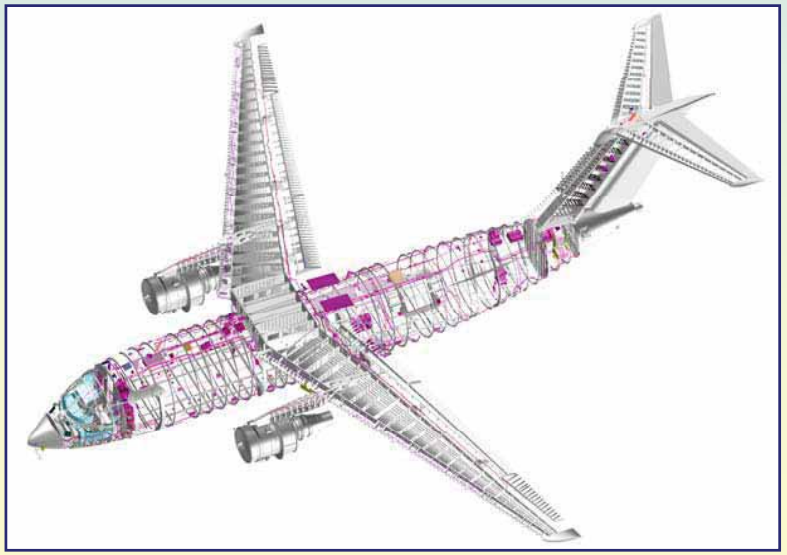
Aircraft Design According to CALS Technologies



164.000 **3D-models**







THANK YOU FOR YOUR ATTENTION!