National University
"Zaporizhzhia Politechnic" as a New Step in the History of the Technical Education in the Black Sea Region
”Black Sea Universities Network

Dr. Sergiy Byelikov, Rector
Bucharest, 2019
Beginning - Technical school
1900
MEMORABLE DATES OF THE UNIVERSITY HISTORY

**November 5 (18), 1900** - first seven-year mechanical technical vocational college in Ukraine was established in the town of Alexandrivsk (now Zaporizhzhia).

**1920** - the mechanical technical vocational college was reorganized in an industrial college with qualifications of the higher education institution.

**1930** - Zaporizhzhia Industrial College became Zaporizhzhia Agricultural Engineering Institute.

**1941** - the Institute was evacuated to Barnaul, Altai Region.

**1944** - the Institute reopened in Zaporizhzhia after the fascist occupation of the city ended.

**1957** - Zaporizhzhia Agricultural Engineering Institute was renamed Zaporizhzhia Machine construction Institute (ZMI).

**2001** - ZSTU was awarded a status of national institution; ZSTU is renamed Zaporizhzhia National Technical University.

**2008** - Sergey Belikov, Yuriy Vnukov and Alexander Kachan became State Award Laureates in Science and Technics.

**2010** - ZNTU receives a Laureate Diploma of social act “Leaders of Ukrainian science and education” and Grand Prix diploma “Leader of High Education of Ukraine” for significant contribution to scientific and educational development of state of Ukraine, development of Education and Science image of Ukraine.
Our latest achievement - «ZAPORIZHZHIA POLITECHNIC»
Open laboratory of cyber-physical systems
Laboratory in Virtual Reality
Laboratory in Virtual Reality
Unmanned technologies in education

- NXP Cup
- RoboRace
Remote laboratory of embedded systems
Board of European Students of Technology

EBEC - European BEST Engineering Competition
Zaporizhzhia region industry
Cooperation with JSC “MOTOR SICH”
Products of JSC “MOTOR SICH”

- MS-500V-S family engines
- D-18T series 3
- MSB-8 Helicopter
- AI-450-MS
- D-27
- Mobile power station
The technology processes for producing aircraft engines based on severe plastic deformation method Twist Extrusion

We have unique equipment and technologies for severe plastic deformation of the blanks made of titanium, titanium powders and aluminides.

We have a technology for obtaining blank for the aircraft engine parts with submicrocrystalline structure.
New «green» technologies for manufacturing aircraft engine parts from powders.
Our partners:

- General Electric
- MOTOR SICH
- DonIPE National Academy of Sciences of Ukraine

We cooperate with:

- Lund University, Lund, Sweden
- Laboratory of Excellence "DAMAS" University of Lorraine-Metz, France
- Institute of Nanotechnology (INT), Karlsruhe Institute of Technology (KIT), Germany
- Institute of Fundamental Technological Research, Polish Academy of Sciences, Poland
The application of IoT technologies for vibration diagnostics of complex aviation systems and the process of cutting thin-walled parts.
Development of program code for improving the technology of turning GTE parts on CNC machines using cutting speed and feed variation

Scheme of spindle speed variation

\[ n = n_{\text{nom}} \times (1 + \text{RVA} \times \sin(2\pi \times \text{RVF} \times \frac{n_{\text{nom}}}{60} \times \tau)), \text{ rev/min} \]

- **n** – actual spindle speed, rev/min;
- **\( n_{\text{nom}} \)** – nominal spindle speed, rev/min;
- **\( \tau \)** – time, sec;
- **\( T \)** – variation period;
- **\( F \)** – variation frequency;
- **\( \text{RVA} \)** – ratio \( \Delta n / n_{\text{nom}} \);
- **\( \text{RVF} \)** – ratio \( 60 \times F / n_{\text{nom}} \)

Scheme of main drive capabilities

Possible variation zone – the range of values of amplitude and frequency, which main drive is able to execute in accordance with control program

Impossible variation zone – the range of values of amplitude and frequency, which main drive is not able to execute in accordance with control program

Scheme of cutting process in main section plane \( Pr \):

Cutting zone

Sensor of horizontal tool displacement along X axis

Sensor of vertical tool displacement along Z axis

Device
Heat-resistant nickel alloys castings after hot isostatic pressing

In the process of hot isostatic pressing (HIP) of blades it occurs the "healing" of micropores and friables which are not coming out to the surface of parts. It results in stabilization of the structure and properties of the material. The structural un-homogeneity is typical for the material of blades and samples after HIP. It appears as the result of formation of the «raft»-structure in the form of zonal parts in the places of "healing" of pores and around of MC-type carbides.
Biodegradable casting alloys based on magnesium for osteosynthesis

Maleolar screw D-3.5 mm, made from a new biodegradable magnesium alloy

X-ray of the rabbit after osteosynthesis by implants from a bio-soluble magnesium alloy.

Preclinical and clinical trials have investigated that this alloy is non-toxic and provides reliable bone grafting. Medical experiments have shown that the developed magnesium alloy has good biocompatibility, the required level of biocorrosion, mechanical properties and modulus of Young's elasticity, as close as possible to the cortical layer of the bone, as well as have an antibacterial effect.
Rest and sport