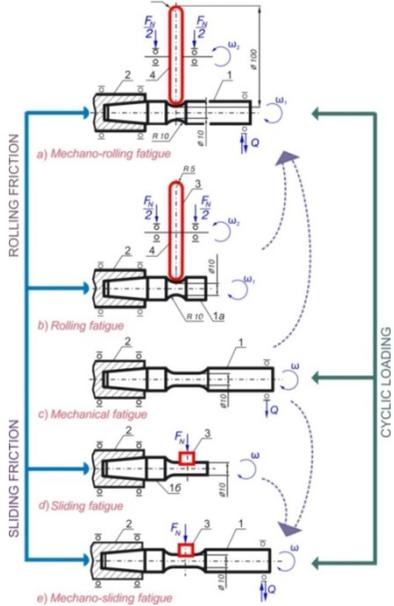
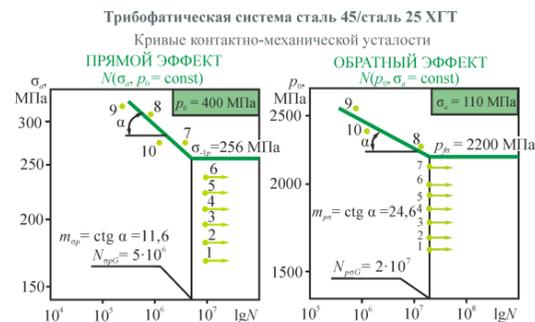
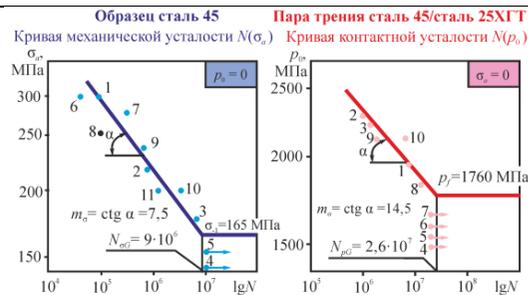
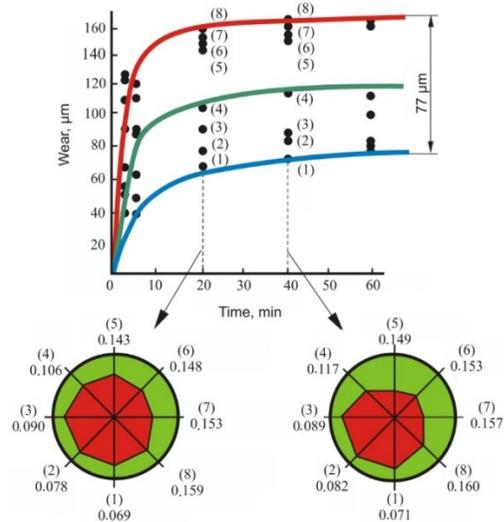


Belarusian-Japanese projects proposed for implementation in cooperation with ROTOBO

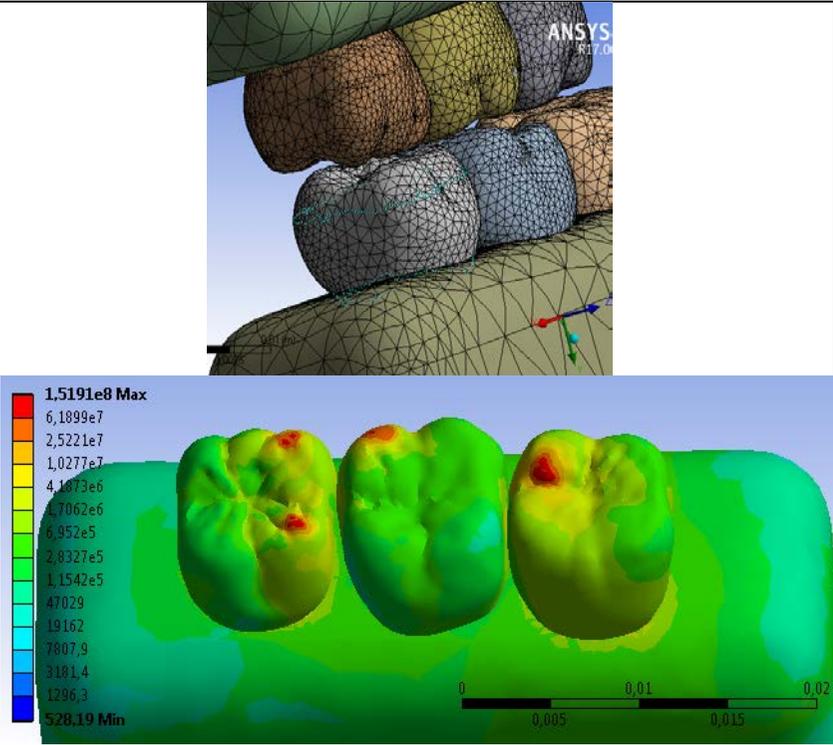
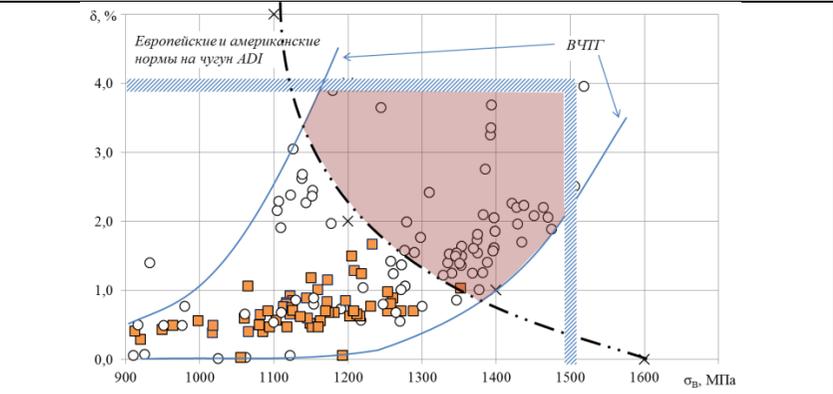
№	Name	Description	Graphical illustration	Contacts
1.	Universal test Centre SZ-01	<p>Manufacturing of universal test centre SZ-01 “3 in 1” which defined creation of the new class of research and training fully automated equipment for wear-fatigue tests that substitutes both in quantity and price 3 machines for mechanical, rolling and sliding fatigue tests. SZ-01 allows results be easily comparable since all types of tests are performed with the same unified specimen.</p> <p>The universal test centre SZ-01 allows carrying out wear-fatigue tests of different materials and choose corresponding characteristics for fracture resistance under mechanical, rolling, sliding, mechano-rolling, mechano-sliding fatigue (also under mechano-corrosion or mechano-erosion fatigue) for various loading conditions, geometric characteristics of specimens and counter-specimens in relation to the requirements of the customer.</p> <p>SZ-01 also allows investigating the development of heterogeneous local damage at certain points of the specimen at friction process lasting for many millions of loading cycles.</p>	<div style="text-align: center;">  <p>Испытательный центр SZ-01</p>  <p>An example of possible test schemes conducted on SZ-01 test centre</p> </div>	<p>Aliaksandr Bahdanovich Professor, DSc, PhD. Department of Theoretical and Applied Mechanics, Faculty of Mechanics and Mathematics, Belarusian State University, room 406, 4 Nezavisimosti ave., 220030, Minsk, Belarus. e-mail: bogal@tut.by</p>



Test results on mechano-rolling fatigue



Nonuniform wear of the friction track at eight points around its circumference

<p>2.</p>	<p>Modeling multielement biomechanical teeth-mandibles system</p>	<p>Modeling multielement biomechanical teeth-mandibles system of human dentoalveolar apparatus in terms of multiple contact interactions, 3D stress-strain state which according to the concept of personalized medicine allows making the optimal plan of dental surgery of concrete patient basing not only on CT scanned geometry of the dentoalveolar apparatus but also on minimizing its stress-strain and damage states.</p>	 <p>Model of human dentoalveolar apparatus and its stress state</p>	<p>Sergei Sherbakov Professor, DSc, PhD. Department of Theoretical and Applied Mechanics, Faculty of Mechanics and Mathematics, Belarusian State University, room 406, 4 Nezavisimosti ave., 220030, Minsk, Belarus. e-mail: sherbakovss@mail.ru</p>
<p>3.</p>	<p>Hi-Tech structural material MONICA</p>	<p>New Hi-Tech structural material MONICA “2 in 1”: Strength of Steel and Fabricability of Cast Iron has high strength (up to 1400 MPa), plasticity (elongation up to 4-5%), mechanical and rolling fatigue characteristics for casting heavy-duty products. Unlike usual metallic materials it loses brittleness with the rise of strength.</p> <p>MONICA was successfully applied to replace steels in the manufacturing high load cast elements of critical-use systems: gears, cutting machines for agricultural combines, railway</p>		<p>Aliaksandr Bahdanovich Professor, DSc, PhD. Department of Theoretical and Applied Mechanics, Faculty of Mechanics and Mathematics, Belarusian State University, room 406, 4 Nezavisimosti ave., 220030, Minsk,</p>

rails.

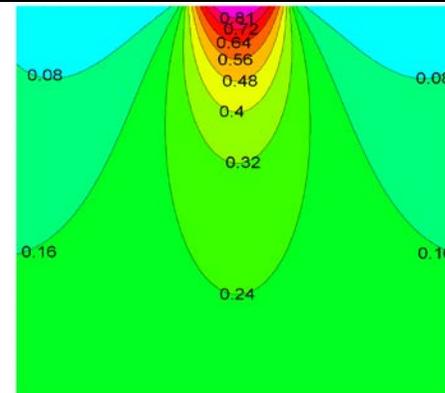


MONICA strength – plasticity diagram; its microstructure; gears, knife and rails made of MONICA

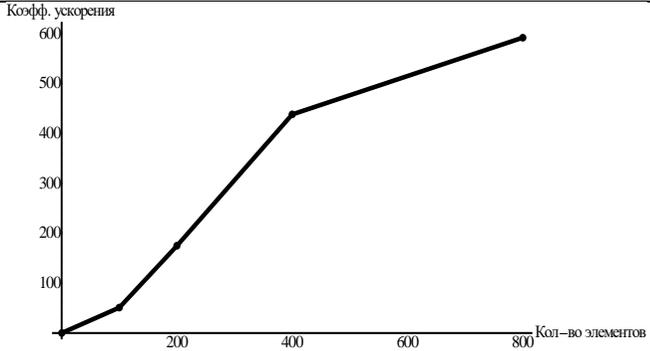
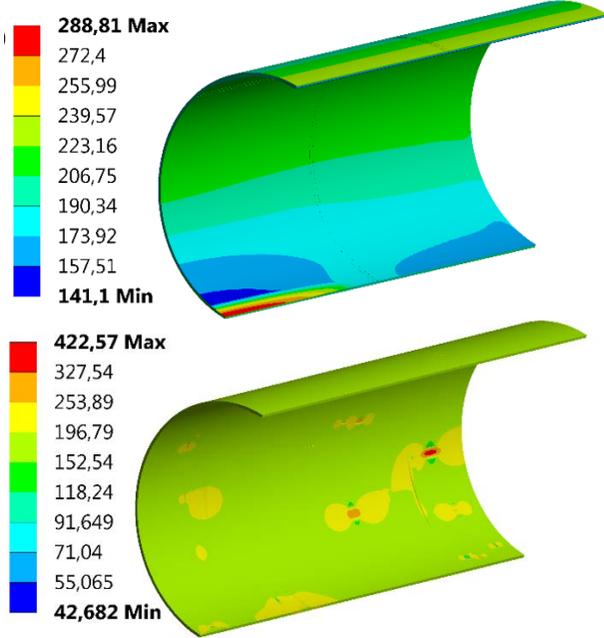
Belarus.
e-mail: bo-
gal@tut.by

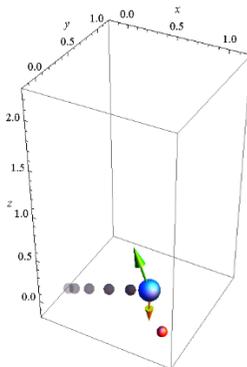
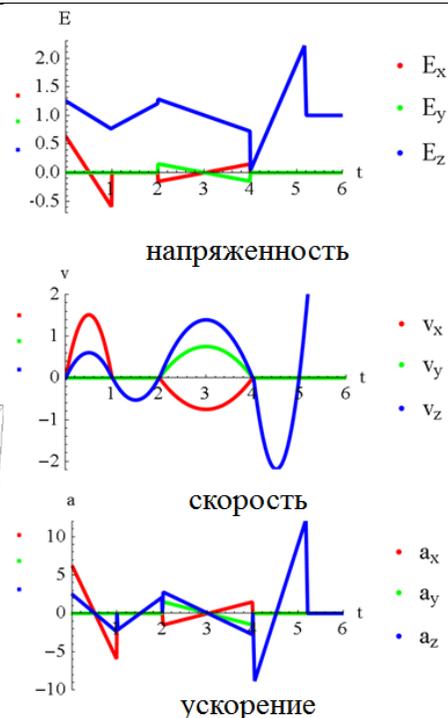
4. **High performance quantum-like engineering computations**

Reducing computation time while maintaining enough accuracy is one of the most serious problems of modern computational mathematics. **High performance quantum-like engineering computations** allow for **acceleration of calculations up to 600 times** by parallelization of the boundary-element simulation at conventional graphics accelerators using the superposition of states principle according to quantum computing concept.



Sergei Sherbakov
Professor, DSc, PhD. Department of Theoretical and Applied Mechanics, Faculty of Mechanics and Mathematics, Belarusian State University, room 406, 4 Nezavisimosti ave., 220030, Minsk,

		<p>For complex engineering systems with multiple friction pairs, it is proposed to find the distributions of the components of stress and strain tensors with subsequent analysis.</p>	 <p>The distribution of the potential in the half-plane and the acceleration coefficient when calculating the interaction matrix</p>	<p>Belarus. e-mail: sherba- kovss@mail.ru</p>
<p>5.</p>	<p>Complex technology of prolonging the life of the main pipelines</p>	<p>Complex technology of prolonging the life of the main pipelines after the end of the depreciation period is based on field tests, accelerated tests of metal samples before and after operation, the results of intra-pipe diagnostics and the corresponding modeling of 3D stress-strain, taking into account large and multiple small corrosion defects and various types of repair works.</p>	 <p>Von-Mises stress in the linear section of the magistral oil pipeline considering large and a set of small internal defects</p>	<p>Sergei Sherbakov Professor, DSc, PhD. Department of Theoretical and Applied Mechanics, Faculty of Mechanics and Mathematics, Belarusian State University, room 406, 4 Nezavisi- mosti ave., 220030, Minsk, Belarus. e-mail: sherba- kovss@mail.ru</p>

6.	Mediator method for control of macro displacements of nanoobjects	<p>Mediator method for control of macro displacements of nanoobjects up to several meters using electromagnetic fields to move mediator and van der Waals forces to attach nanoobject taking into account magnetic resistance and electric permittivity of the environment without application of any mechanical force or laser beam.</p>	  <p>Realization of the mediator method – control of macro-displacements of nanoobjects</p>	<p>Sergei Sherbakov Professor, DSc, PhD. Department of Theoretical and Applied Mechanics, Faculty of Mechanics and Mathematics, Belarusian State University, room 406, 4 Nezavisimosti ave., 220030, Minsk, Belarus. e-mail: sherbakovss@mail.ru</p>
----	--	---	---	--