



National Technical University
“Kharkiv Polytechnic Institute”
Dynamics and strength of machines
Department



PROPOSALS for cooperation

Department of Dynamics and strength of machines
**National Technical University “Kharkiv Polytechnic
Institute”**

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Experience of participation in international projects



TEMPUS - Tacis project

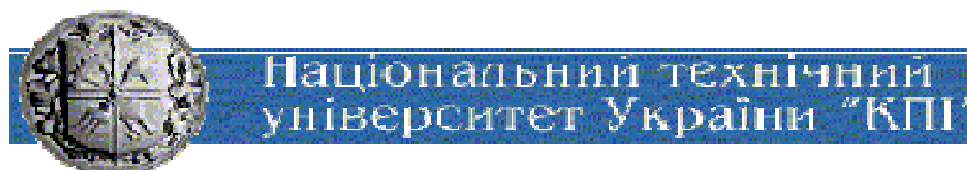
«Adaptation of Higher Technical Education of Ukraine to the European system, in the light of the Bologna Process»



European Parliament, Brussels, Belgium

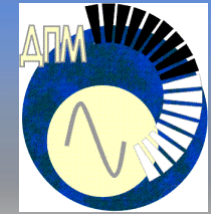


Project members

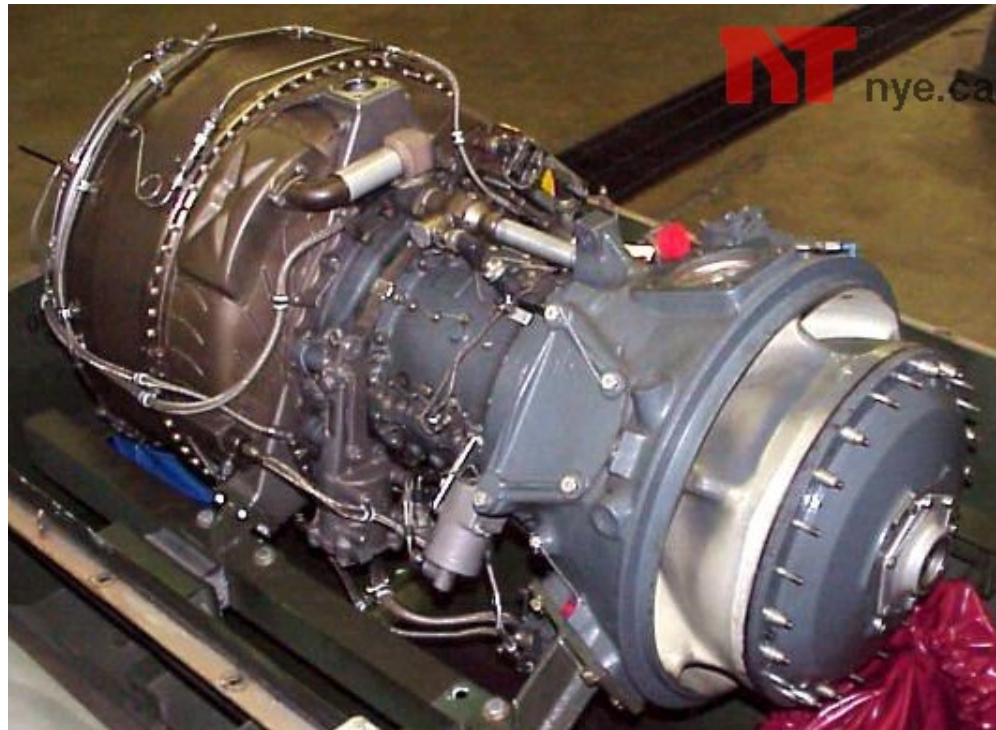




Experience of participation in international projects



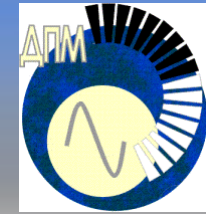
International contract for "GENERAL ELECTRIC".
Temperature calculation of gas turbines



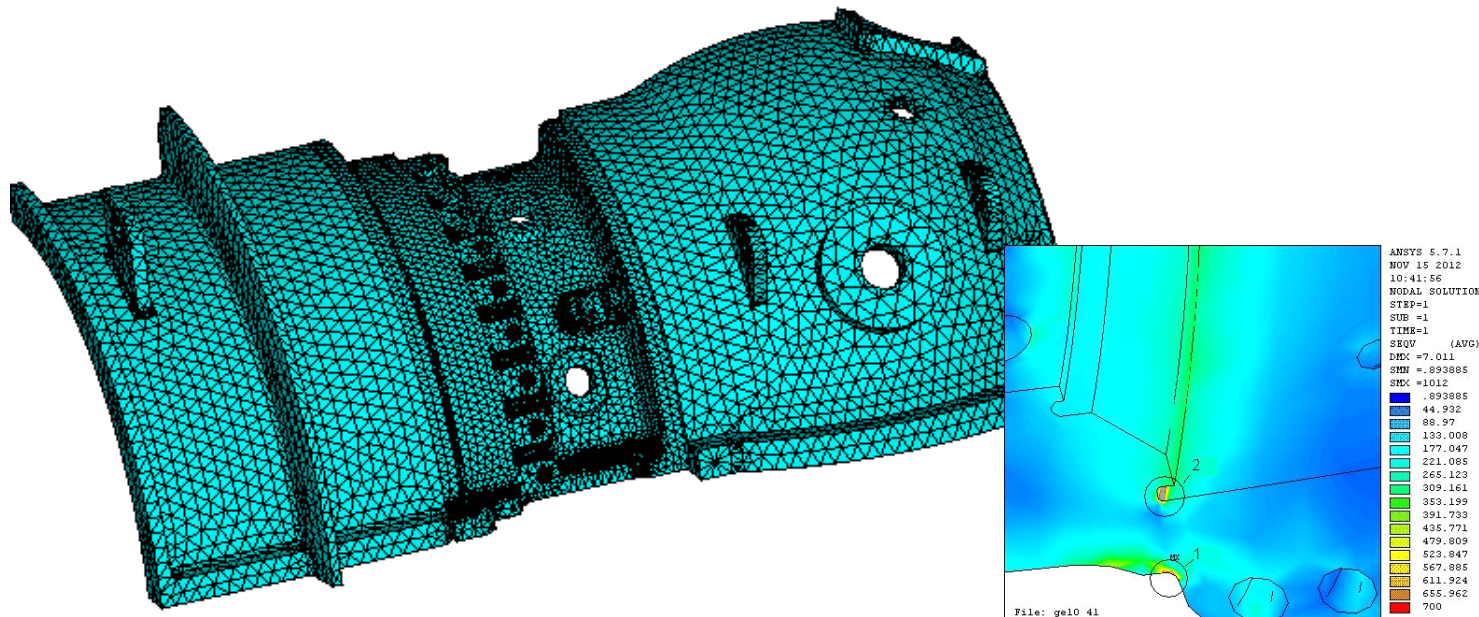
Turbine GE-05
"General Electric "



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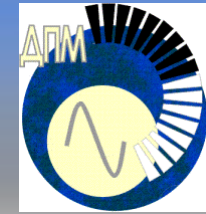
International contract for "GENERAL ELECTRIC".
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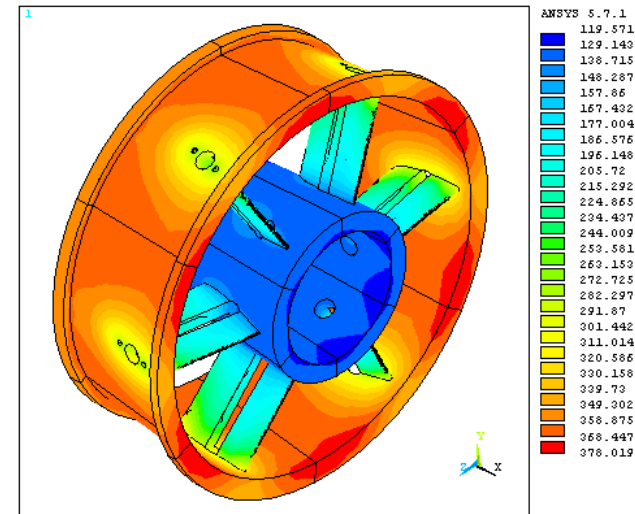
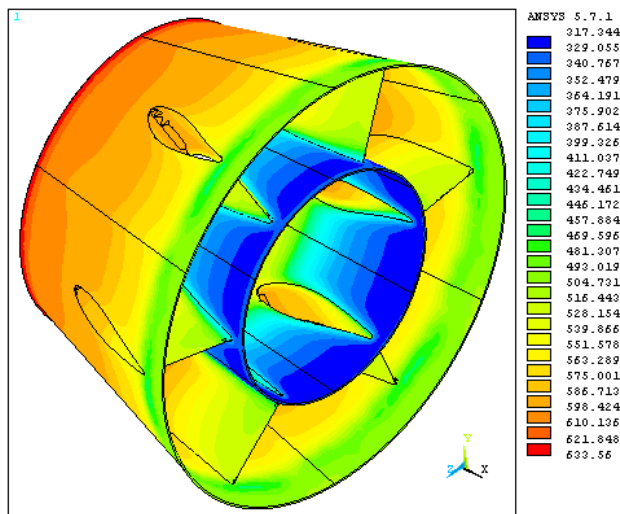
Finite element model of
housing turbine GE-10



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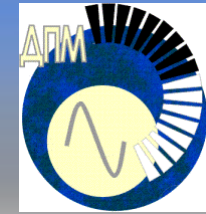
International contract for "GENERAL
ELECTRIC". Temperature calculation of gas
turbines



The temperature distribution in the diffuser and the turbine wheel GE-05

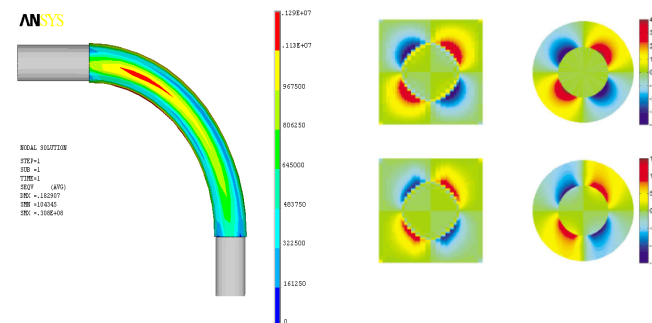


Experience of participation in international projects



European grant "INNOPIPES"
2012-2015 **830 000 euro**

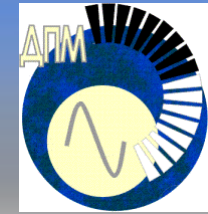
Repair of the main gas pipelines by composite materials
without stopping the pumping process



Optimization of the mechanical
characteristics of composites



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The purpose of the project - development of methods for the repair of pipelines with local bulk defects without stopping the transportation process



The content of the work:

1. Development of constructs repair compounds
2. Optimization of the mechanical characteristics of composites
3. Ensuring the strength of the pipe to the bulk defects
4. Analysis of cyclic loadings composite joints





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Proposals for new international projects



Proposals for new international project

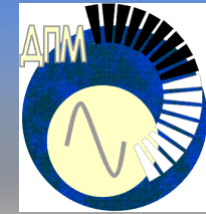


COMPUTER-AIDED DESIGN AND BIOMECHANICAL MODELING OF THE INNOVATIVE BONE OSTEOSYNTHESIS

One of the modern trends in the world of traumatology and orthopedics is the development and widespread application in the practice of innovative methods of osteosynthesis, aimed at reducing the time fracture healing and rapid social adaptation of the victim. Clinical efficiency of fixation depends of many factors, among which important are sizes and mass of fixer, its strength and rigidity qualities, simplicity of installation and removal. The modern means of computer simulation and analysis, the latest achievements of biomechanics allow for substantiated choice of rational variant of osteosynthesis based on the theoretical prediction of the effects of the operation.



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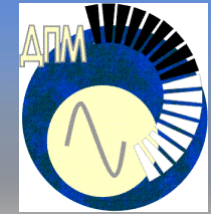


The aim of the project is to develop a means of computer-aided design (CAD) of construction fixing elements, fastening technology, taking into account the specific features of the clinical case. The project will develop special software for generating three-dimensional models of damaged areas of a bone on the basis X-ray images of the individual patient (Fig. 1). It is important to choose a rational structural solution to reduce the risk of postoperative complications. For the success of the treatment is necessary to develop the theoretical prediction of micromotion under the action of physiological loads leads to the conclusion about the effectiveness of the device. Computer analysis (CAE) stress state of biological bone tissues, fixing requires the development of mechanical material models for different parts of the bone.

To achieve these goals, it is planned to develop methods for parametric modelling of fixation devices and their installation methods using computer tomography data that will enable adaptation to specific clinical cases. Performing finite element analysis will require the development of new rheological models of materials reflected the heterogeneity of bone structure, anisotropy of mechanical properties.



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For general use computer-aided design in medical practice planned development of automated software systems oriented on the use by staff of clinical centres orthopaedics and traumatology.

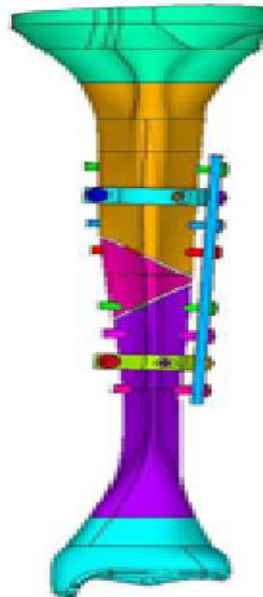


Fig. 1 Damaged areas of a bone