OUR KEY PROJECTS

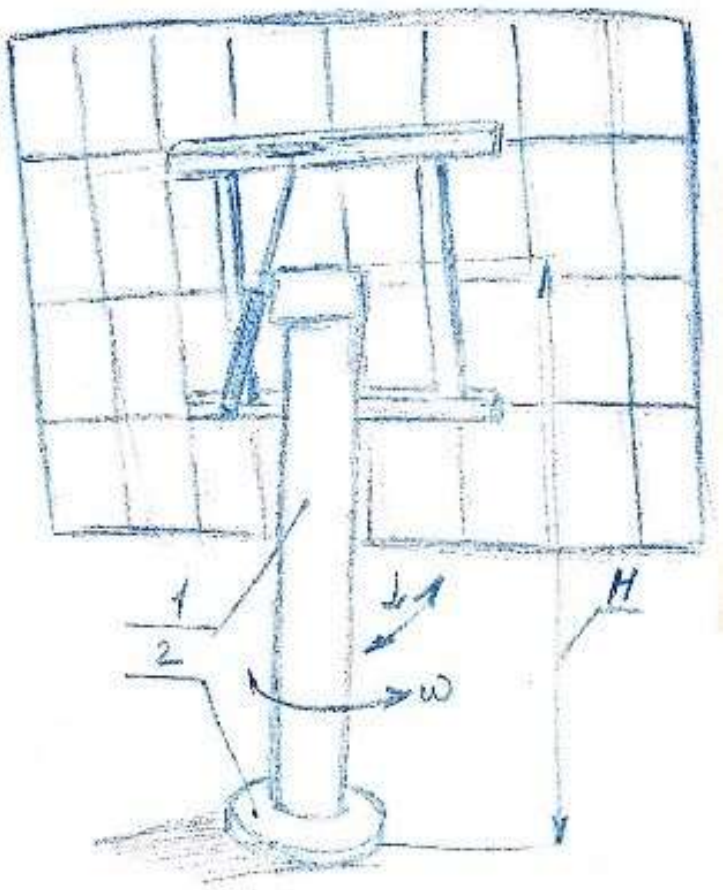
1. Green energy

Solar tracker EL-98

A tracker is a smart robot designed to orient the supporting structure in such a way as to obtain maximum efficiency from photovoltaic modules (or other devices installed on the tracker).

General properties about tracker

Scheme	Dual axial
Maximum working area	95 m^2
Maximum swept area	98 m^2
Work area with 56 modules ALM 250	87,8 m^2
Work area with 60 modules ALM 250	94 m^2
Power with 56 modules ALM 250 (250 W)	14 kW
Power with 60 modules ALM-250 (250 W)	15 kW
Number of control motors	2
Motor supply voltage	380 V
Motors protection class	IP54
Maximum height	7,7 m
Max. tilt angle of modules to the horizon	70^o
Maximum working wind speed	20 m/s
Maximum wind speed in safe mode	35 m/s
Maximum modules weight	1300 kg
Tracker weight without modules	2900 kg
Tracker weight without rack and modules (with drives)	2350 kg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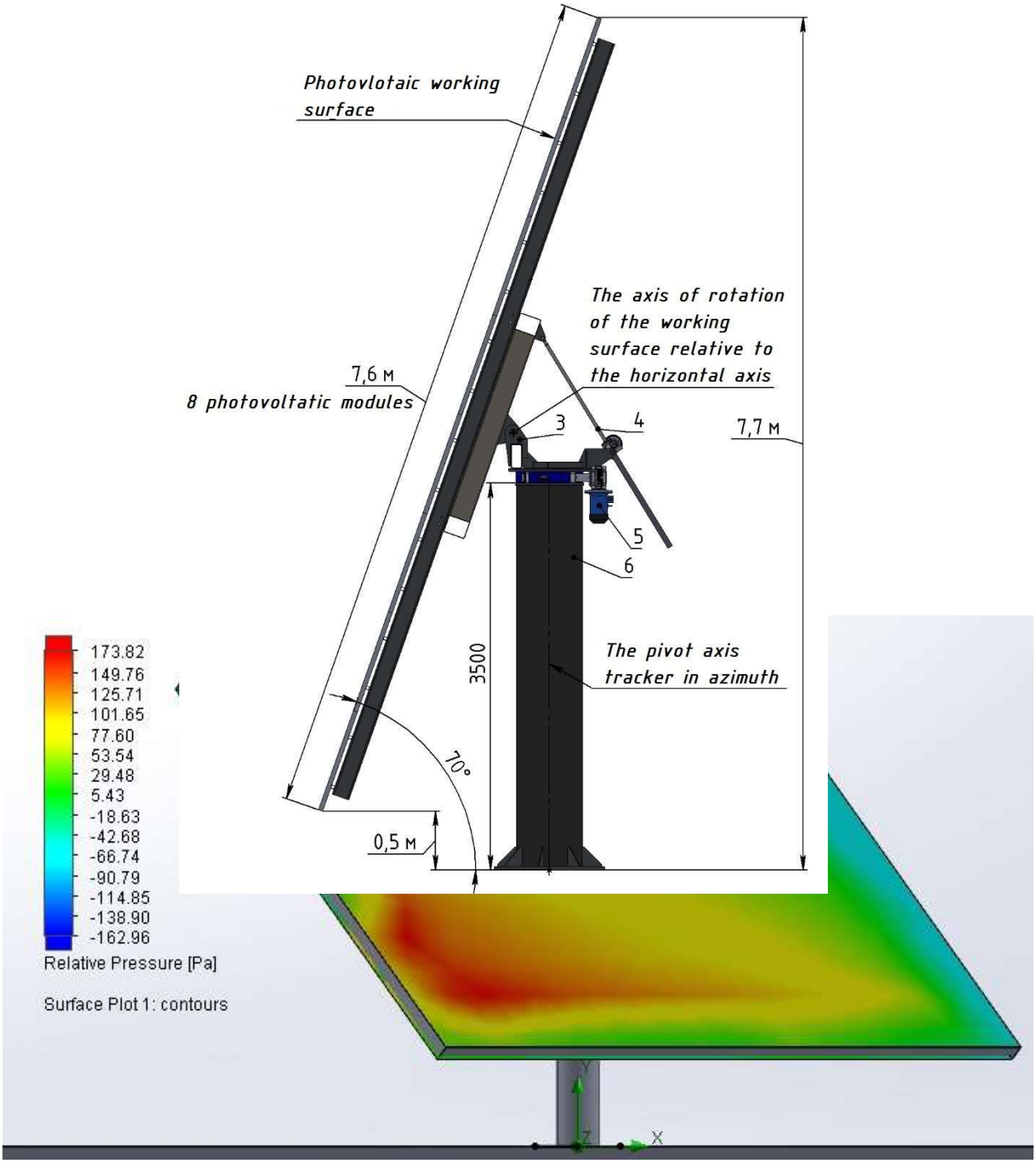


-------3D TRACKER- PDF------

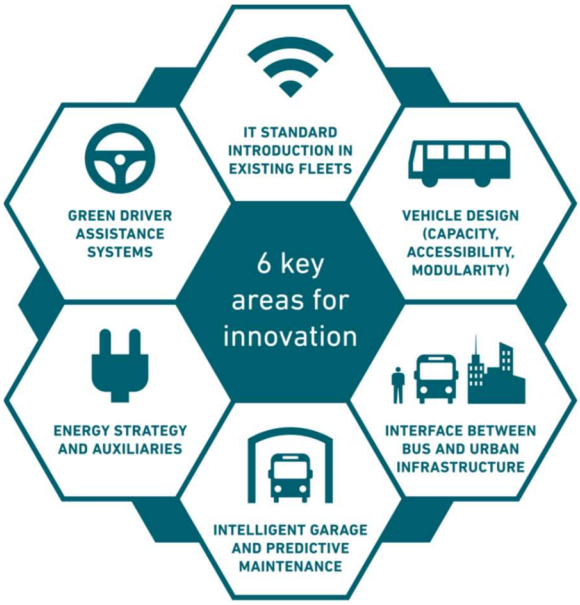
2. Public transport

Electric Bus «Tarpan»

For too long, buses as a mean of transport have lived on its gains. Nowadays, technological innovations such as electrically-powered transport modes present a world of opportunities for revamping the bus experience on its own terms, matching mobility industry trends and the wider social evolution.

This design charter for “Tarpan” buses has been designed to promote buses as a mode of transportation in their own right.

“Tarpan” forms the ecosystem of the ‘bus of tomorrow’. Design principles are illustrated by conceptual sketches, which should not be viewed as final design specifications. Manufacturer will be able to interpret and adapt these principles according to their own design culture and processes.



MAIN TARGET OF THE PROJECT

- ✓ **Production of electric/CNG/hybrid microbuses**
- ✓ **Reduce the weight of the bus**
- ✓ **Maximum using of electric/green energy**

CREATING SMART EXPERIENCES FOR...

PASSENGERS

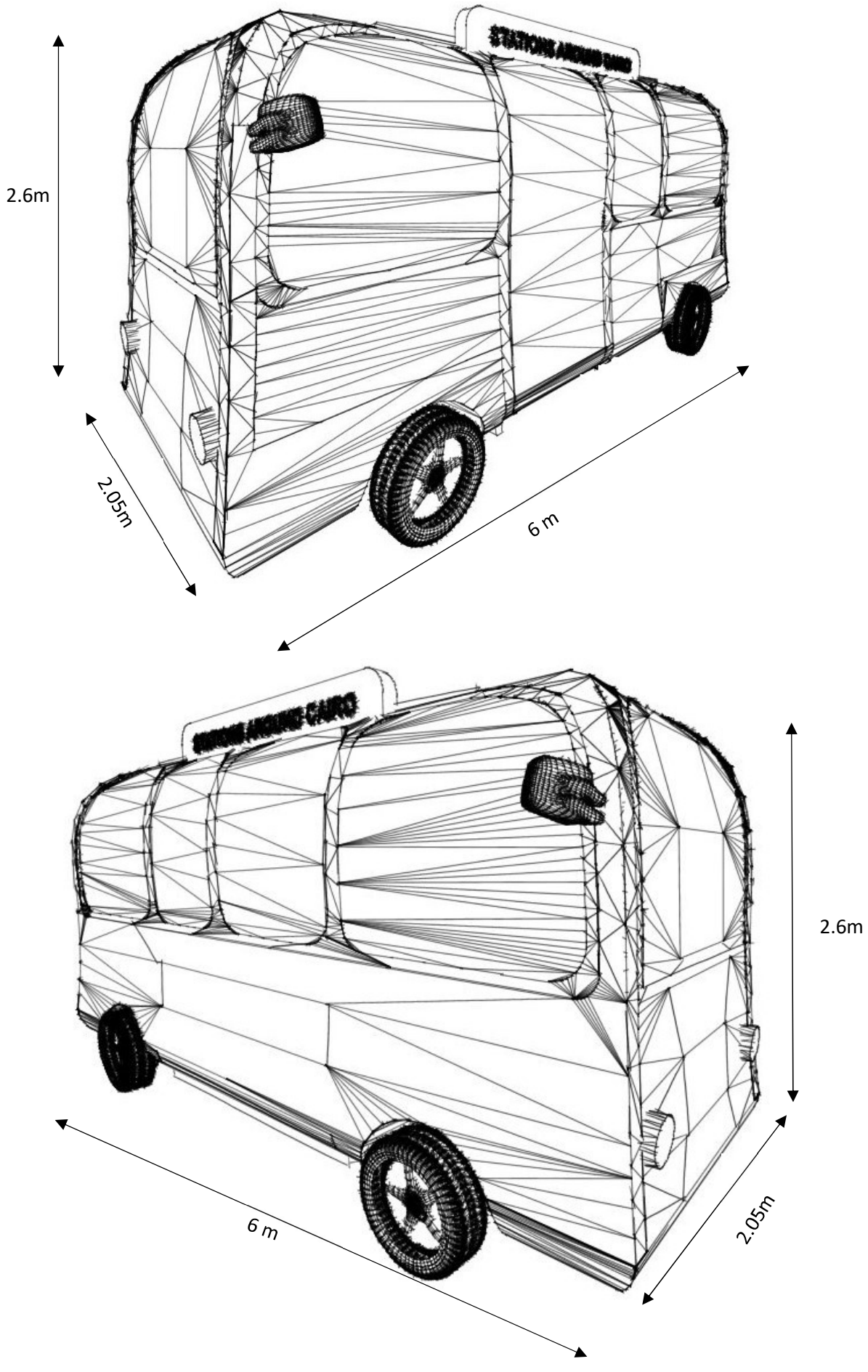
CITIES

OPERATORS

MANUFACTURERS

Benefits

- ✓ Increased passenger capacity compared with similar length, due to the best layout.
- ✓ Effective life cycle costs (fuel savings, fewer parts and reduced body repair costs, body life increased to 10 years compared to similar microbuses).
- ✓ Reduced load on suspension and roadbed.
- ✓ Environmentally friendly efficient energy recovery during braking - up to 30%.
- ✓ Corrosion resistance and adaptation to climatic conditions (hot and moisture weather).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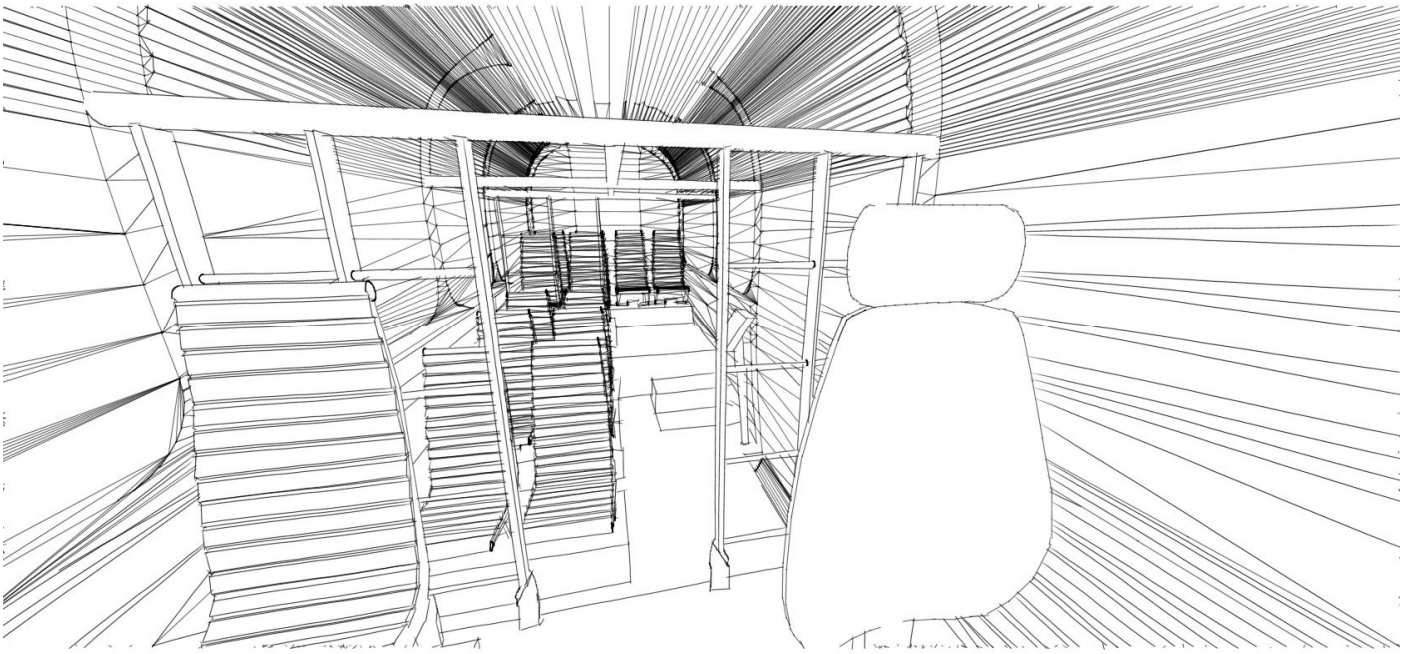


Comparative analysis of the mechanical properties of materials for the bus body manufacturing

Physical and mechanical properties of various materials could be used for bus body

Physical & mechanical properties	Fiberglass	Steel	Aluminium
Density, t/m3	1,6-2,0	7,8	2,7
Ultimate tensile stress, MN/m2	410-1180	410-480	80-430
Flexural strength, MN/m2	690-1240	400	275
Elastic modulus with stretching, GPa	21-41	210	70
Linear expansion coefficient, 10-6ºC	5-14	11-14	2,2-2,3
Thermal conductivity coefficient, W/(m.k)	0,3-0,35	46	140-190

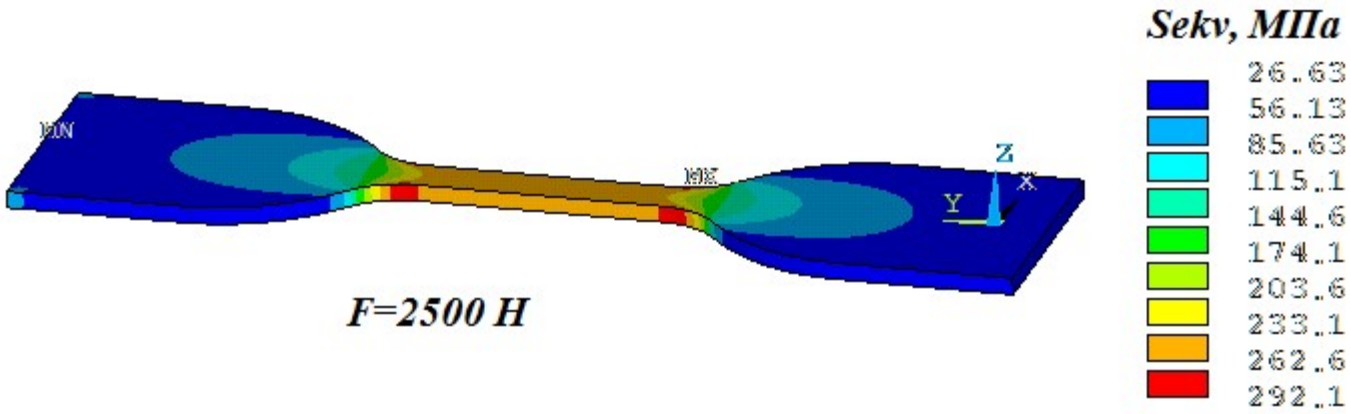


Figure 1 – The distribution of equivalent stresses in the sample under the action of tensile force F = 2500 H

Strength reserves for samples

Material	σ_B, MPa	$K_m = \sigma_B / \sigma_{max}$	Relative mass
Fiberglass	(410+1180)/2=795	795/292= 2,7	0,205
Steel	(410+480)/2= 445	445/292= 1,52	1
Aluminium	*(80+430)/2* = 255	225/292 =0,77	0,346

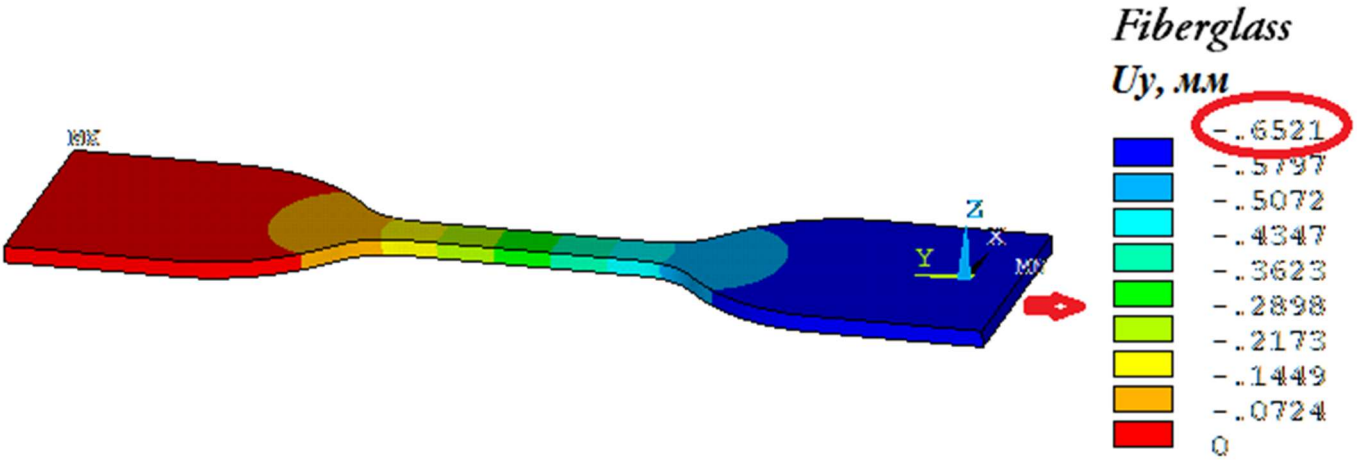


Figure 2 - Fiberglass sample under stretching force F=2500 H

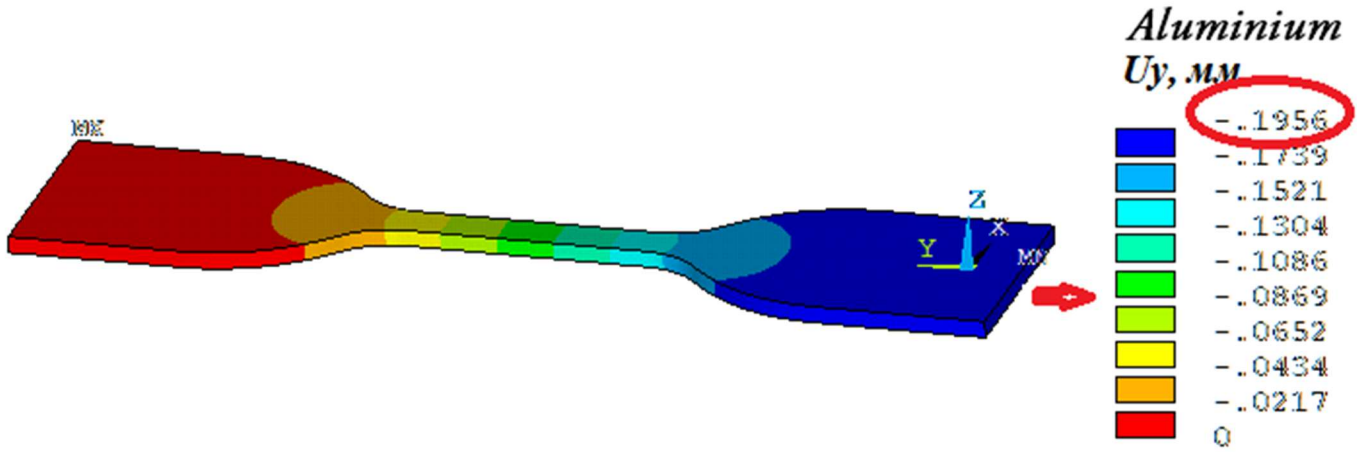


Figure 3 - Aluminium alloy sample under stretching force F=2500 H

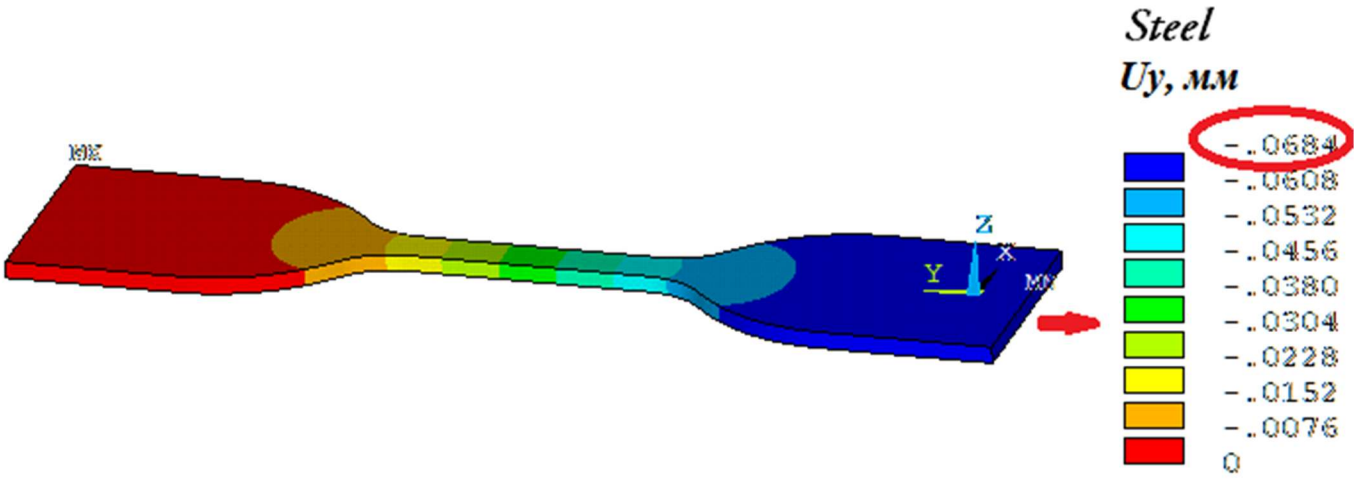
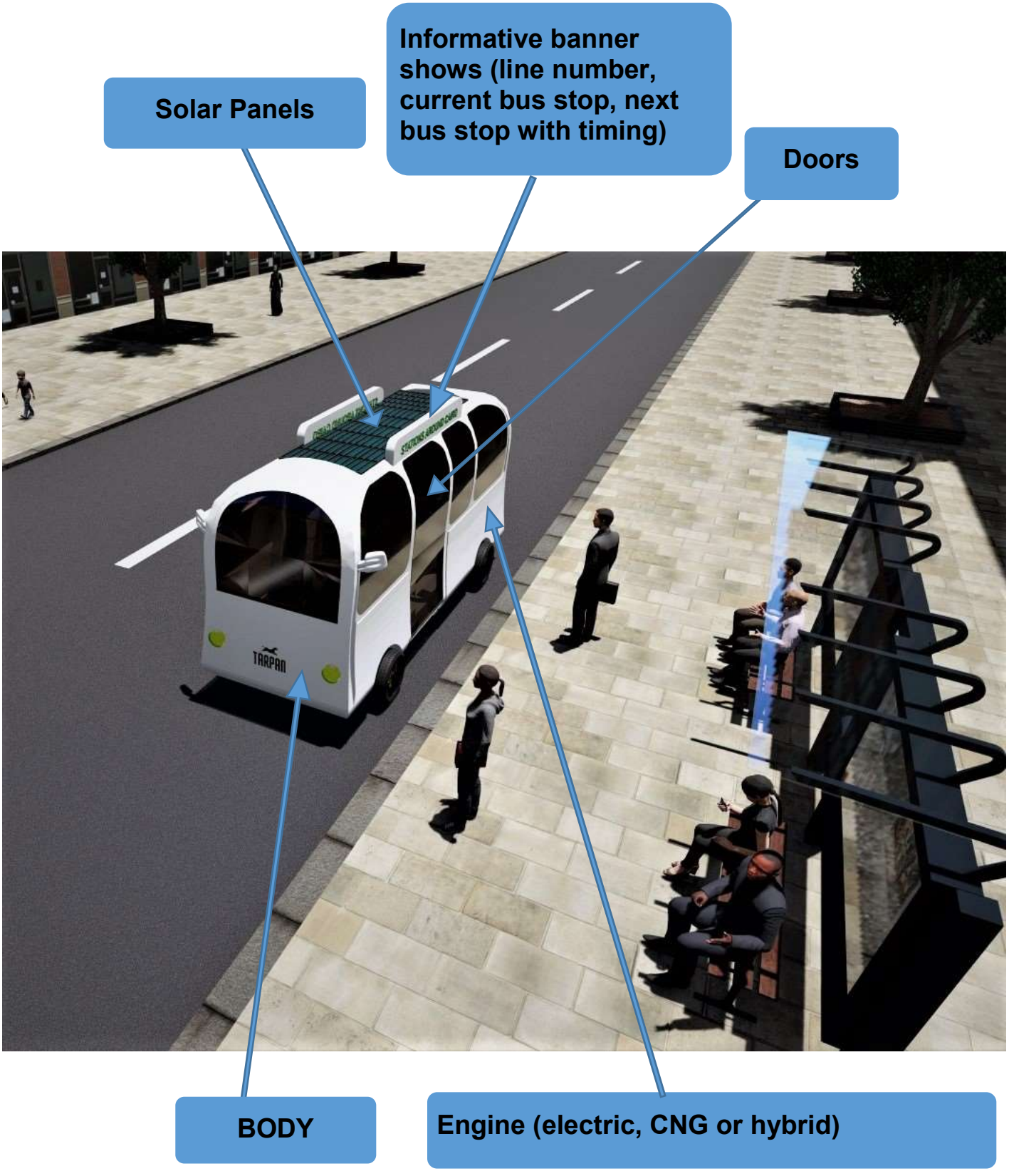


Figure 4 - Steel alloy sample under stretching force F=2500 H

General properties for “Tarpan”

Transport type	Microbus
Using purpose	Urban transport
Seating capacity	12
Max. passenger capacity	19
Dimensions	6m X 2.05m X 2,6m
Used materials	Metal/polymer composite
Energy	Electric, CNG, hybrid

Particular microbus



Passenger Friendly interior

- ✓ Lower TCO (total cost of ownership)
- ✓ At least 70% low floor construction
- ✓ Wide corridors and wide doors allow rapid passenger flow
- ✓ Spacious interior results high comfort for passengers
- ✓ Compared to traditional equal length vehicles, more passenger can fit in
- ✓ Semi-automatic ramp for wheelchairs
- ✓ Kneeling function

Mock-up

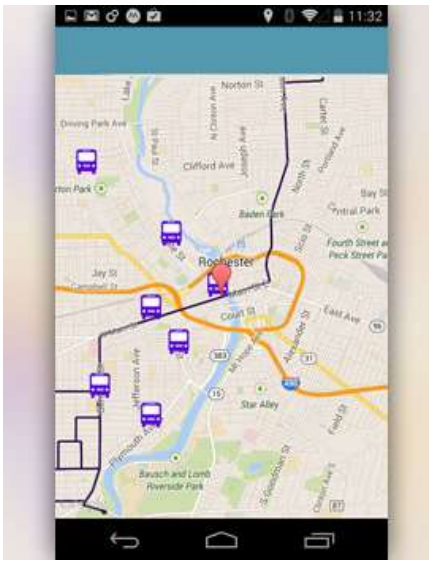
E-pay

The microbuses will be equiped with wifi devices for E-payment.

Tickets can be bought cash, using credit cards and on the internet.

GPS tracking application

Life for users will be more comfortable thanks to GPS tracking chip which will be installed in every bus. This will enable users to know exactly when their bus should arrive at the bus stop using an easy application.



2. Math modeling

Solving mechanical problems by numerical method

Structural strength is a mandatory requirement when designing products. In any industry, engineers ask themselves the same fundamental questions: “How long will this product last for daily use?”, “Under what conditions will it break?” And many others.

And there is an infinite number of questions "What if ...", for example: "What will happen if you reduce the thickness of this rib by 1 mm to save material?" Solutions for the mechanics of a deformable solid, using in particular ANSYS Mechanical, allow us to solve similar problems.

Overview of the capabilities of our team to solve engineering problems.

Currently, engineering tasks are becoming more complex and complex, affecting several sections of physics at the same time.

Our team solves the following types of tasks:

• strength analysis - static;

• stability:

- linear,

- nonlinear;

• dynamic:

- transient analysis,

- modal analysis,

- harmonic response,

- spectral response,

- random vibrations;

• super elements;

• form optimization;

• contact tasks:

- slip separation

- friction

- seals;

• thermal analysis:

- stationary,

- transitional;

• thermal models:

- conductivity

- convection

- radiation

- thermal / strength,

Static calculations

Determination of structural strength is the most common type of calculation in the framework of the mechanics of a deformable solid body, which is carried out by engineers in all industries. Our team with the help of mathematical modeling with ease provides the ability to calculate the stress-strain state of a structure of any complexity.

As a typical application of static calculations can be identified:

• Express stress-strain state assessment of structural elements.

• Calculations of parts under load, taking into account the nonlinear response of materials.

• Solving contact problems: calculating seals, shaping and modifying, calculating gear joints and couplings, modeling bolted joints, etc.

• Determining the stress-strain state of structures caused by heating or cooling.

ANSYS Mechanical is certified in many industries, which guarantees high quality and accuracy of calculations and a high degree of verification of the obtained results with experimental data.

Some examples of solved issues but our team :

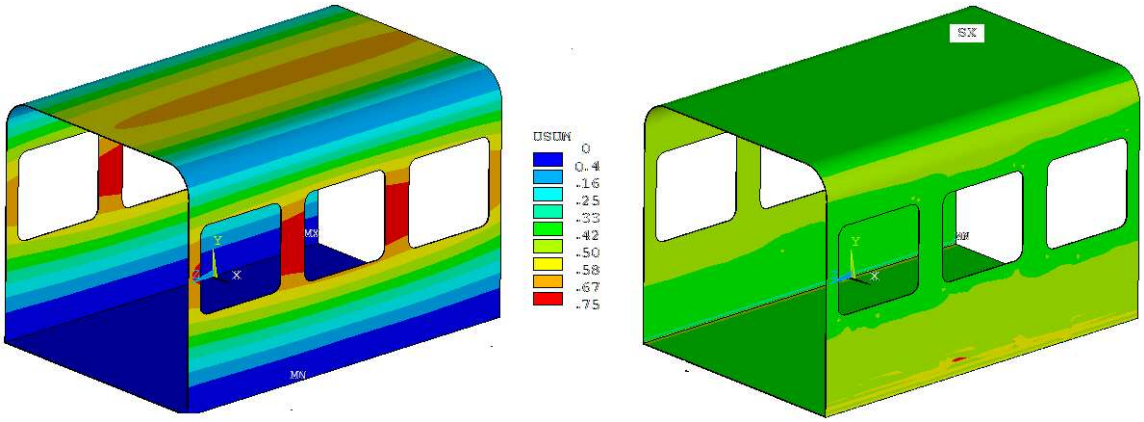


Fig.1- Static strength of the bus body

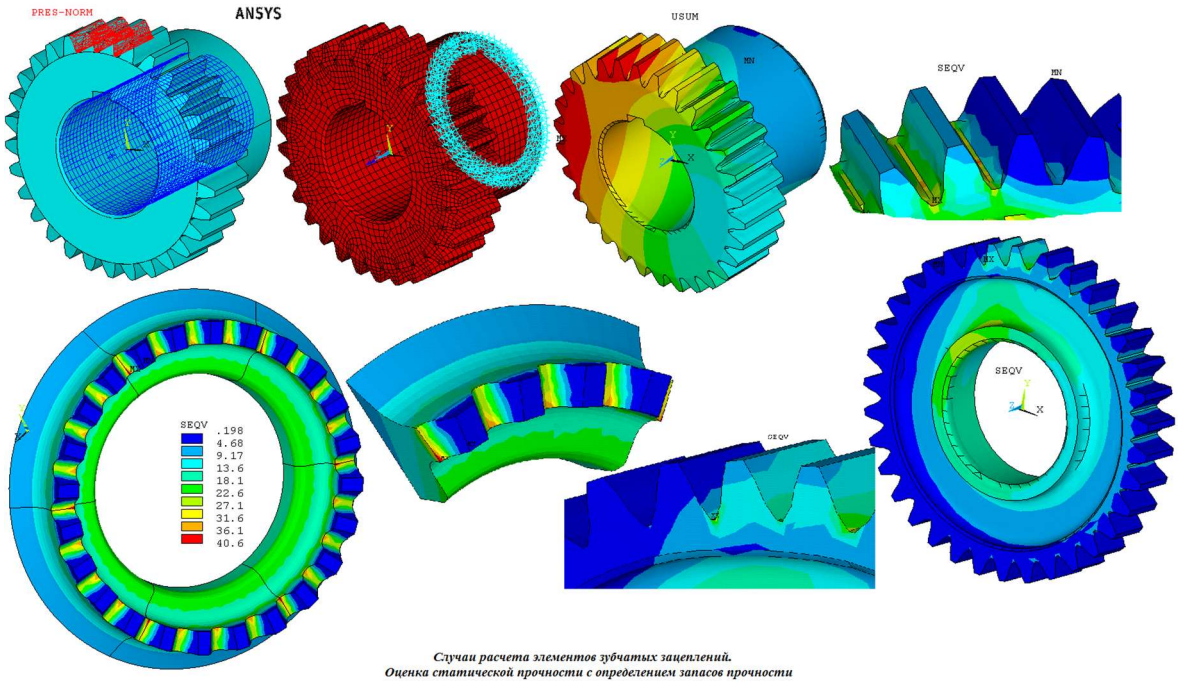


Fig.2- Static strength of gearing elements

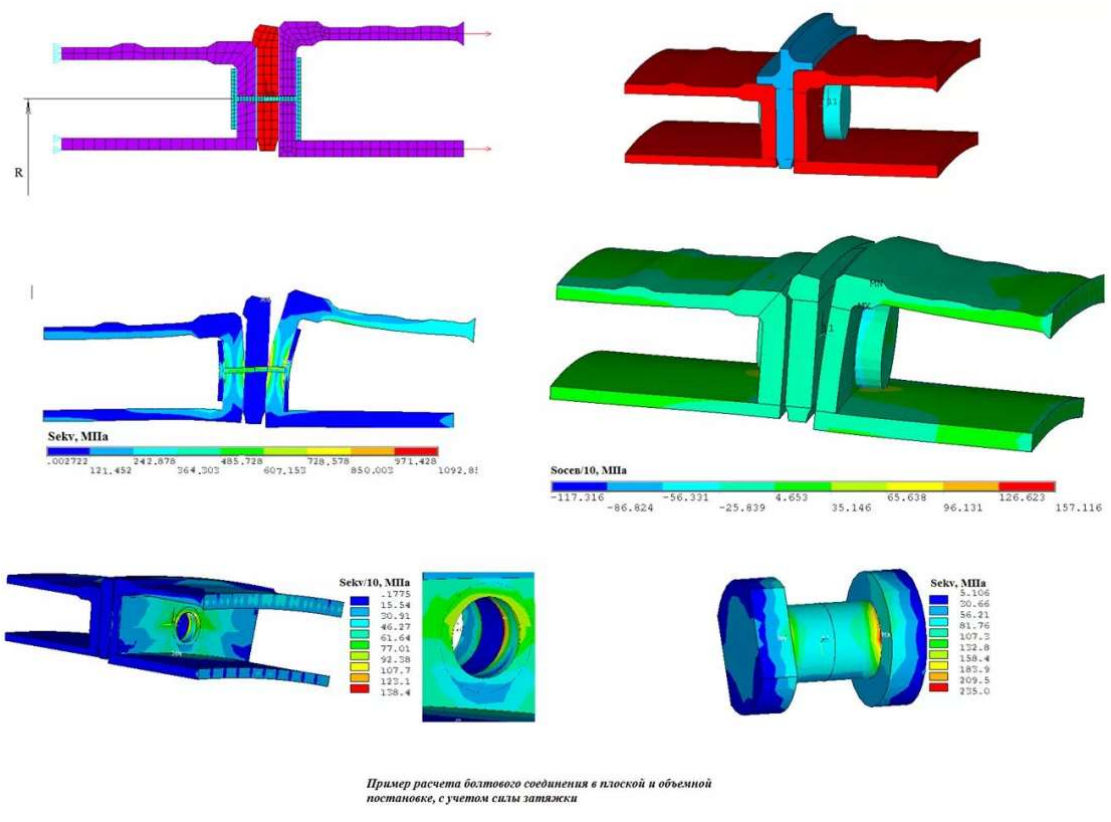


Fig.3- The static strength of a bolted joint in a non-linear formulation

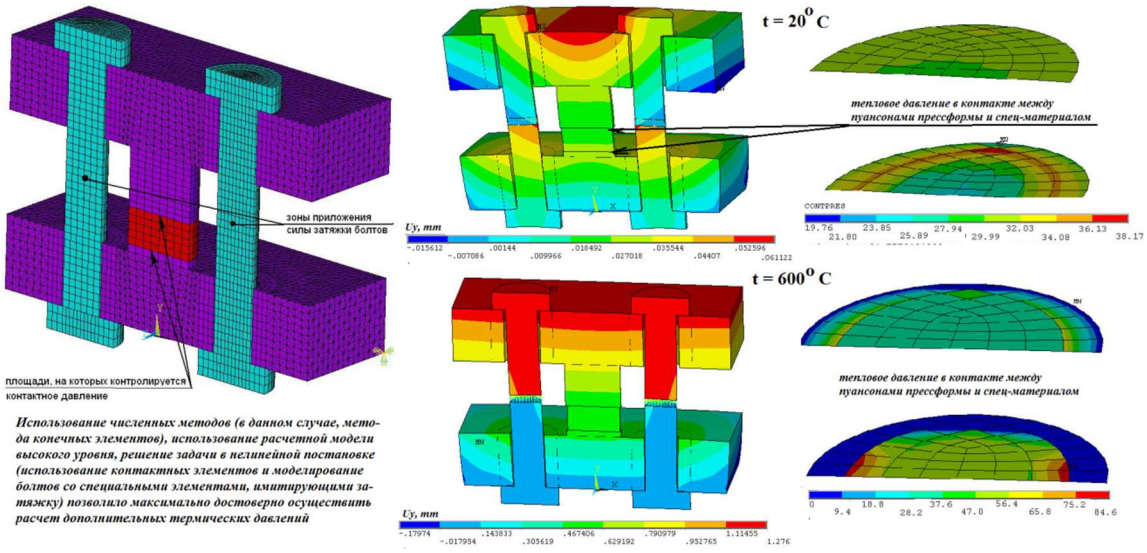


Fig.4- Static strength of the installation to determine the thermal pressure

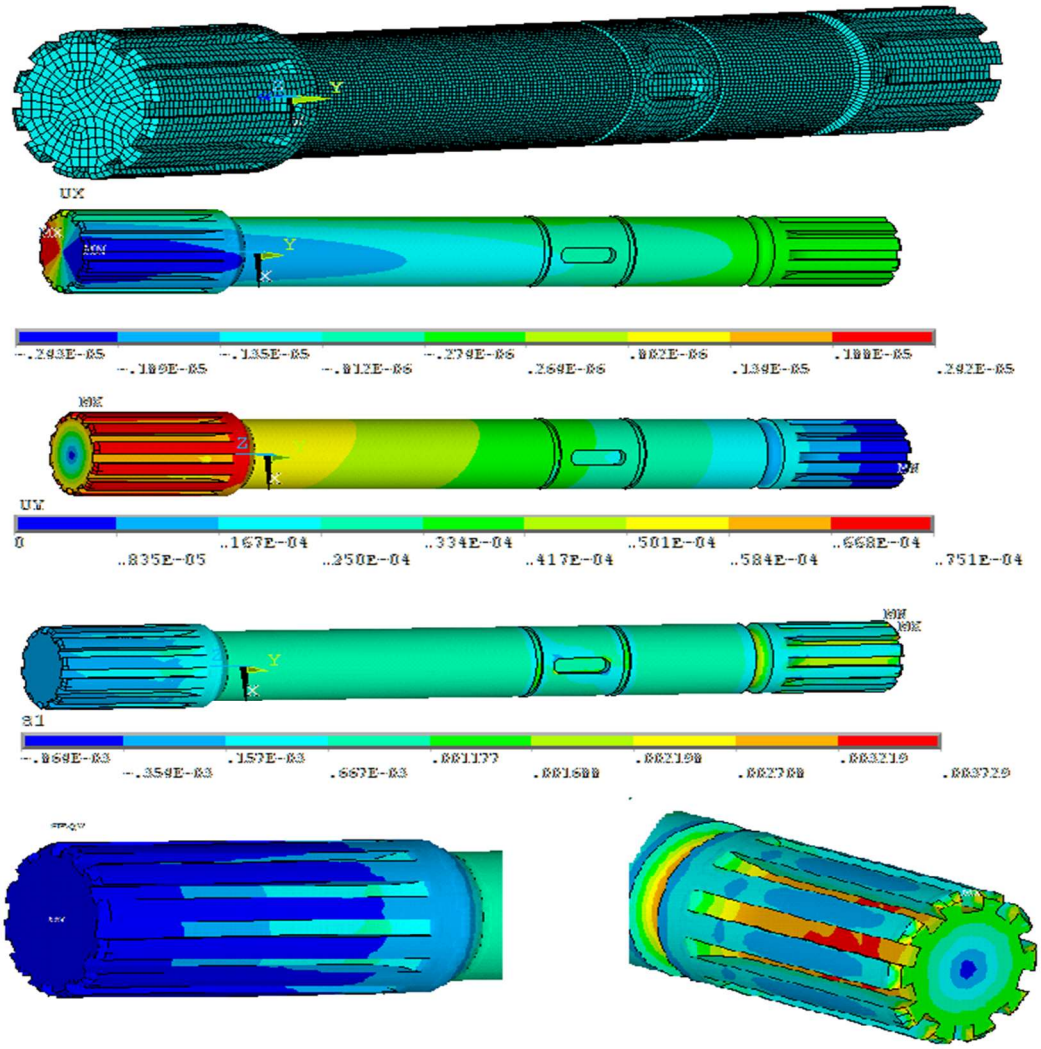
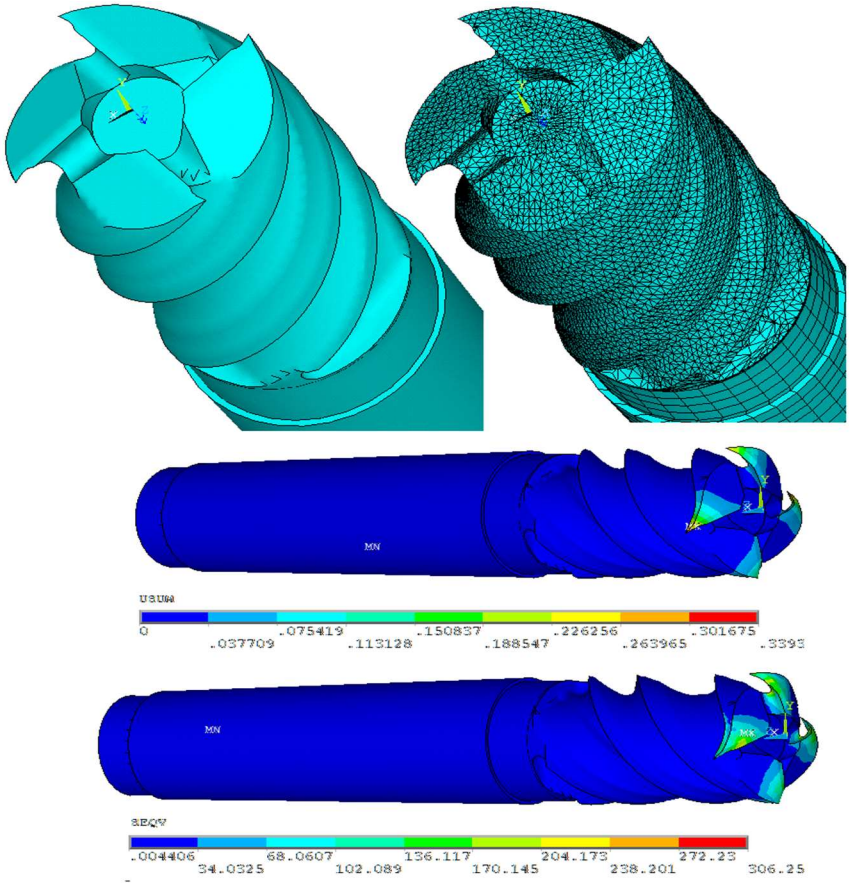
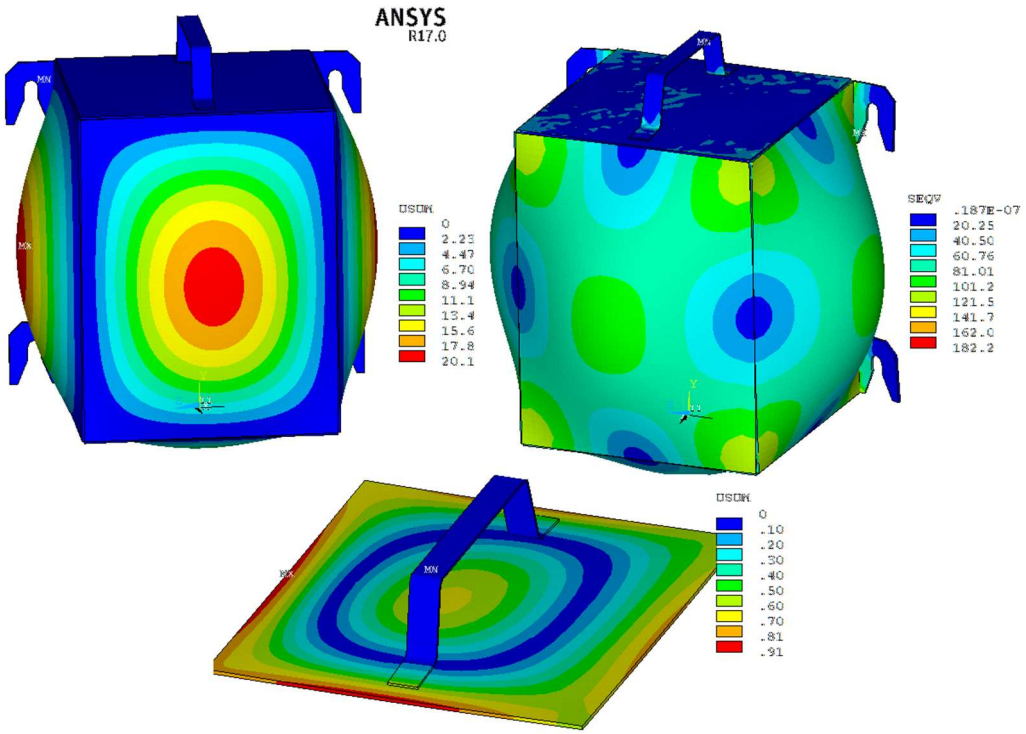


Fig.5- Static strength of one type of intermediate spline roller



Расчет НДС фрезы

Fig.6- Static strength cutting tool (mill)



Оценка напряженно-деформированного состояния сварного бачка из листовой стали.
На внутренние поверхности бачка приложено максимальное расчетное давление.
Оценка по уровню напряжений и перемещений

Fig.7- Статическая прочность емкости от внутреннего давления

3.1. Dynamic calculations

Resonance is one of the most dangerous phenomena in technology. The ability to find out the composition of the natural frequencies of the structure allows to avoid the appearance of resonance, ensuring high reliability of the design and long service life.

To solve this problem, the possibility of a modal analysis is realized - analysis of the natural frequencies and vibrational modes of structures. These are the most important dynamic characteristics of each mechanical system, and it is with their definition that any dynamic calculation of structures begins.

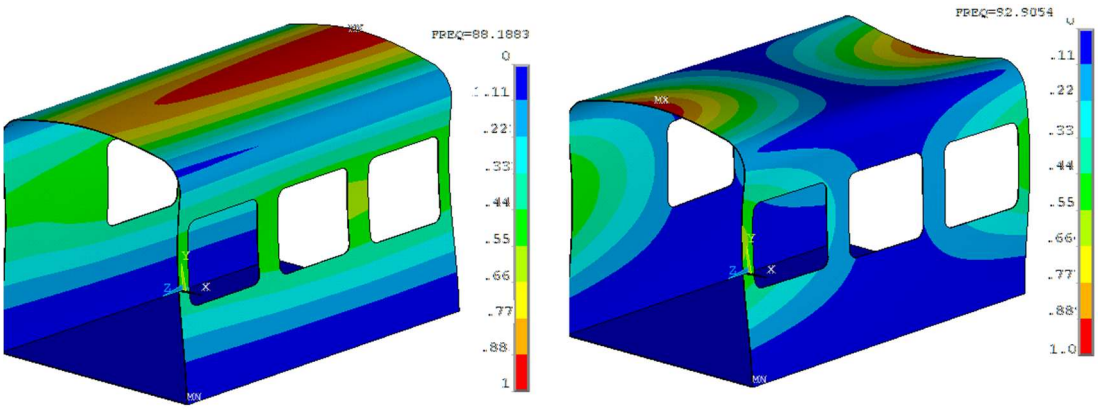


Fig.8- The first forms of natural vibrations of the bus body

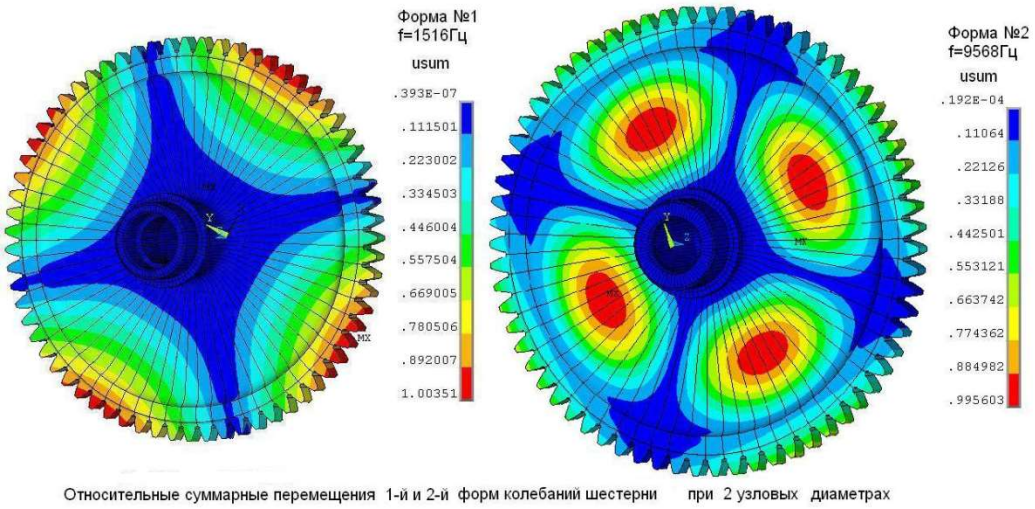


Fig.9- Gearing elements vibrations shapes

3.2. Thermal calculations

• As a rule, the main goal of heat exchange problems is to determine the temperature fields and heat fluxes, both in individual parts and in whole structures.

• We simulated 3 types of heat exchange: thermal conductivity of an isotropic or orthotropic material, convective heat transfer and heat transfer by radiation with the environment.

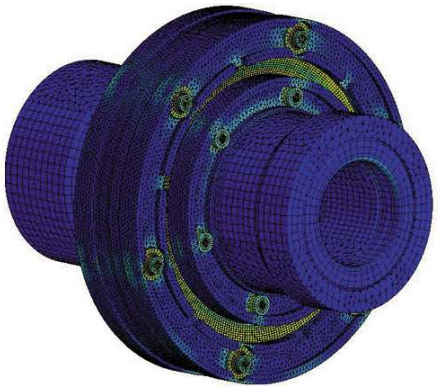


Fig.10- Finite element motor model with flywheel

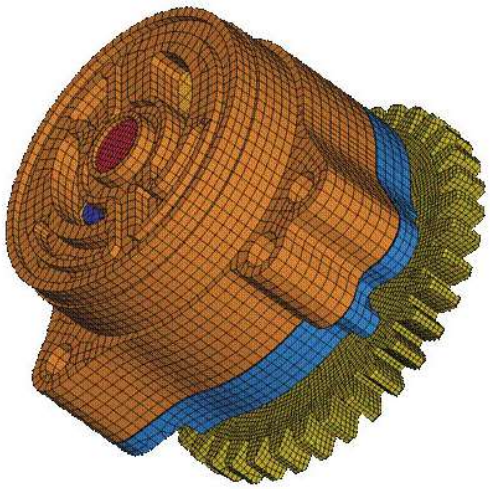


Fig.11- Pressure distribution on the pump impeller

3.3. Control of all design stages

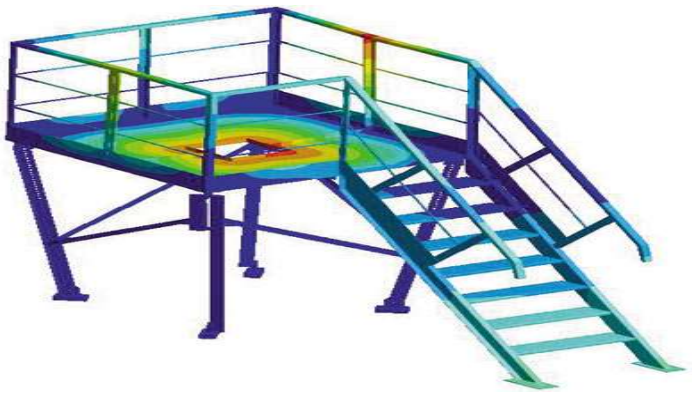


Fig.12- Structural analysis of the scene frame

3.4. Efficient calculation of large models

Due to the possibility of performing parallel calculations in software products, the entire calculation process takes place in parallel mode. Additional in-depth techniques, such as cyclic symmetry analysis, sub-modeling techniques, also help to work effectively with large models.

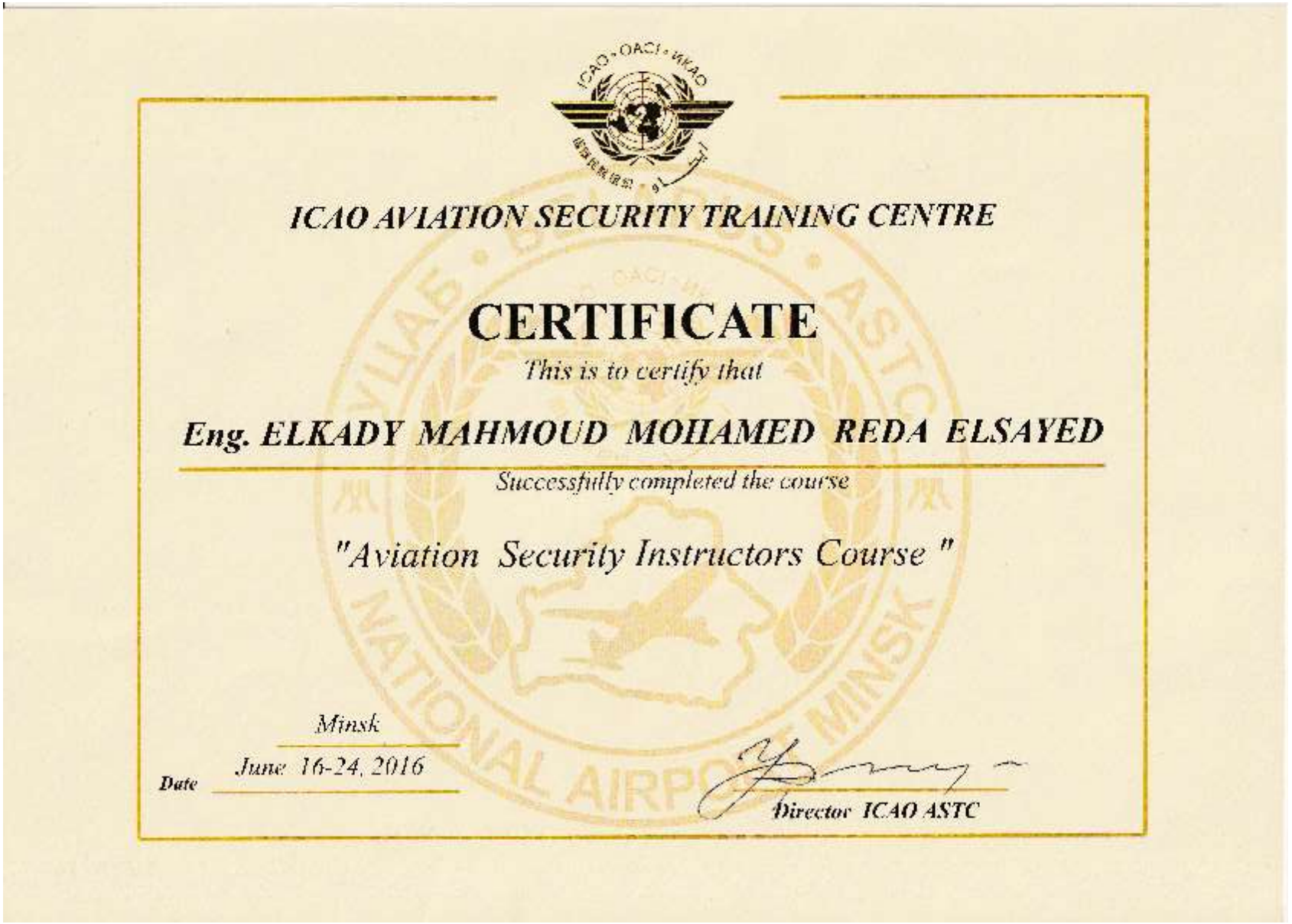
Fig.12- Interdisciplinary analysis scheme

The choice is obvious

Finite element modeling reduces the number of physical prototypes and tests, which accelerates the return on investment by reducing development time and also contributes to the development of a more flexible information-based development process and leads to the creation of innovative and high-quality products and production processes. This leads to a transition to a higher level of product launch into the market in less time and with less cost.

To remain competitive, to meet customer needs, to develop reliable innovative products, while reducing design steps, developers and engineers need modeling tools that provide reliable and accurate integrated solutions.

Our certificates



ICAO AVIATION SECURITY TRAINING CENTRE

CERTIFICATE

This is to certify that

Eng. ELKADY MAHMOUD MOHAMED REDA ELSAYED

Successfully completed the course

"Aviation Security Instructors Course "

Minsk

Date *June 16-24, 2016*

Director ICAO ASTC

УКРАЇНА

ДЕРЖАВНА СЛУЖБА ІНТЕЛЕКТУАЛЬНОЇ ВЛАСНОСТІ УКРАЇНИ

СВІДОЦТВО

про реєстрацію авторського права на твір

№ 59452

Стаття "Вдосконалення маркетингового процесу підприємства машинобудівної галузі на основі досвіду іноземної компанії"

(вид, назва твору)

Автор(и) **Борисенко Олена Євгенівна, Елькалі Махмуд Мохамед Реда Ельсаєд, Онуфрієнко Наталія Леонідівна**

(повне ім'я, псевдонім (за наявності))

Дата реєстрації 28.04.2015

Голова Державної служби інтелектуальної власності України

А.Г. Жарінова

М.П.

ICAO EUROPEAN REGIONAL GOVERNMENT SAFETY INSPECTOR TRAINING CENTRE

ICAO Institute, National Aviation University, Kyiv, Ukraine

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has successfully completed

ICAO SAFETY MANAGEMENT SYSTEMS TRAINING COURSE

conducted under the auspices of International Civil Aviation Organization for the effective implementation of aviation safety management concept contained in Annex 19 to the Convention on International Civil Aviation

Place Kyiv

Date 23 May 2016 - 27 May 2016

ICAO Institute Director

State Aviation Administration of Ukraine

«Boryspil International Airport» State Enterprise

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Aviation Security

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Issued: 06 July, 2016

BORYSPIL

Yevhenii H. Dykhne

Acting Director General of
Boryspil International Airport State Enterprise

Sergii V. Rubanov

Head of the Committee

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MAHMOUD MOHAMED
REDA ELSAYED ELKADY

has successfully completed the course assessment and examination for

the

Quality Management Systems
Internal Auditor Training Course
(based on ISO 9001:2015 and ISO 19011:2011 Standards)

Held on: *29.06.2016 – 01.07.2016* at: *KIEV, UKRAINE*

Signed:

Issued date: *13/07/2016*

Certificate Serial No: *UA/004/012823*

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Signed: Issue date: 18/10/2017

Certificate Serial No': UA/005/00576

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