



**Pishran Sanat Modares**

**Pioneer In:**

- Condition Monitoring
- Automated Control and Protection Systems
- Test Services and Equipment
- Maintenance and Repair Equipment
- Test Certificate and Applying Standards
- Engineering Services

**psmsystems.ir**

## About Us :

With more than 15 years of experience and accomplishment of over 20 medium to large industrial projects, Pisharan Sanat Modares (PSM) company is known as an engineering service and solution provider who works as a subsidiary of PESG company and has access to engineering and trading offices in 5 countries with more than 90 employees. PSM has a great relationship with international companies all over the globe in the field of railway industry and established strategic partnership with expert companies of this field. Thanks to its highly-skilled experts and partners, PSM provides several services in railway industry including but not limited to:

- Condition Monitoring
- Automated Control and Protection Systems
- Test Services and Equipment
- Maintenance and repair equipment
- Test Certificate and Applying Standards
- Engineering Services

Herein, the above services are explained in more details.

## 1. Condition Monitoring

The health of railway systems could be monitored and guaranteed by means of Condition Monitoring. By this, major failure could be diagnosed and excessive times and costs would be prevented. The life time of the systems will be extended accordingly.

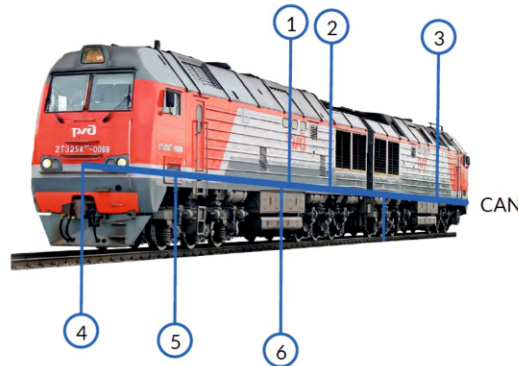
Thanks to the support of its international partners, PSM performs and delivers condition and health monitoring services for the railway systems. The scope of these services encompasses but not limited to the tracks, bridges, locomotives and wheelsets. In line with these services and in order to complete the process setting up advanced monitoring center for these services could be done by PSM at the highest world-class level.

### • Condition Monitoring of Tracks and Rolling Stock Structures:

- ✓ Measuring the vertical and lateral forces, displacement and temperature of several points of tracks, and the measurement of rolling stock structures by strain gauges with the capability to test up to 20kHz per channel and up to 1000 measurement channels.
- ✓ Health monitoring of bridges and infrastructures by use of large variety of sensors, equipment and set up reliable data center that can monitor and analyze the health of railway structures.

• **Condition Monitoring of Locomotive**

This system can monitor all necessary parameters of locomotive and measures and record all necessary information and data to online check and send all useful events and failure alarms to the monitoring center.



1. Event-recorder and databank
2. Mobile communication unit
3. Protective unit
4. Measuring power of traction motor and generator measurement unit
5. Multi-measurement unit
  - Pressure sensors
  - Engine rotational frequency
  - Inductive sensors
  - Water, oil and gas thermal transducer
  - Inlet and outlet flow meter of air, oil and water
  - Misfiring detection of diesel engine
  - Measuring fuel level and consumption (e.g., Fuel stealing detection system)
  - Online location tracking
  - Condition monitoring of turbocharger
6. Standby power unit



• **Vibration Diagnostics of Train Wheelsets**

This system can be installed directly near the object of interest for monitoring or diagnostics the wheelsets with standard output interface for integration into a SCADA system. It shows:

- ✓ Defects of construction –zone of contact of moving and stationary elements
- ✓ Defects of rolling surface and cracks (such as flat wheel)
- ✓ Lack or excess of lubricant



• **Providing Full Chain of Data Measurement, Data Center and Data Analysis**

It includes but not limited to:

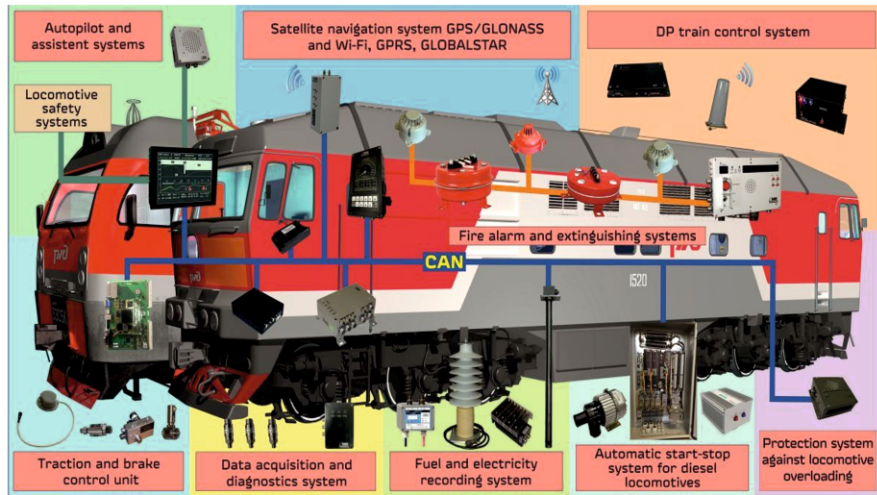
- ✓ Modular data acquisition system
- ✓ Performance/energy-based CM
- ✓ Integration of ADC/DAC modules for field and mobile applications
- ✓ Fuel and electricity recording systems



## 2. Automated Control and Protection Systems

- Universal Locomotive Control System

This system is suitable for all types of locomotives including: passenger and freight, intercity and local.



Equipment of this system consists of driver's desk, autopilot system, complex diagnostics system and event recorder.

Friendly HMI allows simplifying driver's work by reducing the different information for memorizing. Traction and brake control subsystem based on microcontrollers network allow to correct the wrong driver activities, which can cause damages and dangerous situations. All missions and locomotive parameters store by event recorder into the special flash drive. Also, the data can be sent to remote server by GSM network.

- **Automatic Control System (Autopilot)**

The automatic control systems are designed for automated control of traction rolling stock in compliance with traffic safety standards in accordance with the schedule based on the choice of an energy-saving driving mode.

Auto guidance system for all types of locomotives including Freight, Diesel, and Passenger Electrical locomotives and Suburban Electrical Trains and all type of tractions and brakes could be intended. The advantages of using such systems are:

- ✓ Energy-saving
- ✓ Diminishing the operating costs of the locomotive like fuel or power consumption
- ✓ Automatic monitoring for: state of power circuit of locomotive, brake system, and driver actions
- ✓ Increasing traffic safety
- ✓ Reducing the breakdown and maintenance time
- ✓ Reducing the negative impact of psycho-physiological factors of driver in difficult situations
- ✓ Decreasing maintenance time due to condition monitoring

- **Distributed Thrust Control**

The intelligent system for automated driving of trains of increased mass and length with locomotives distributed along the length, is designed for automated asynchronous and synchronous control of freight electric locomotives when driving connected trains up to 12 thousand tons and more. The system takes into account the track profile, permanent and temporary restrictions, longitudinal dynamic forces and selects the energy-optimal train driving mode.

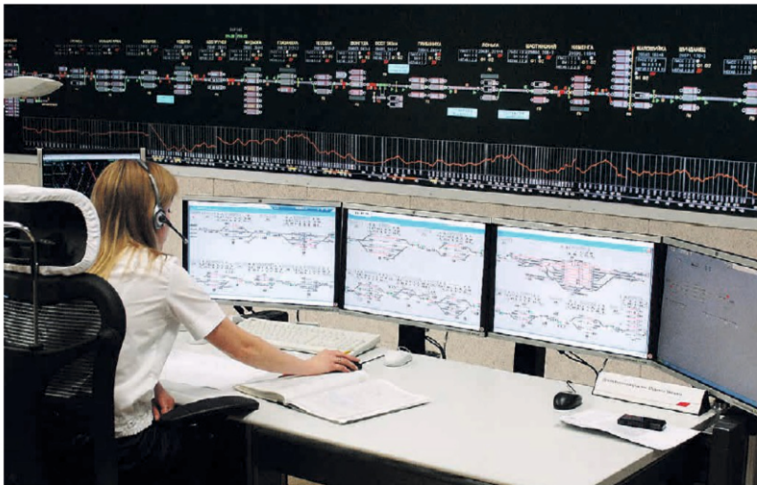


- ✓ Increasing the rate of the service speed
- ✓ Information support for making decision by locomotive crews in difficult onboard situations
- ✓ Increasing the level of traffic safety
- ✓ Registration and transmission with cryptographic protection of transmitted information via wireless GSM channels to the journey log

• **Driver Assistant System (DAS)**

The DAS system is designed to provide information support for the technology of driving freight trains on a schedule, to automate the process of recording the working time drivers and energy consumption of locomotive. Its main advantages are:

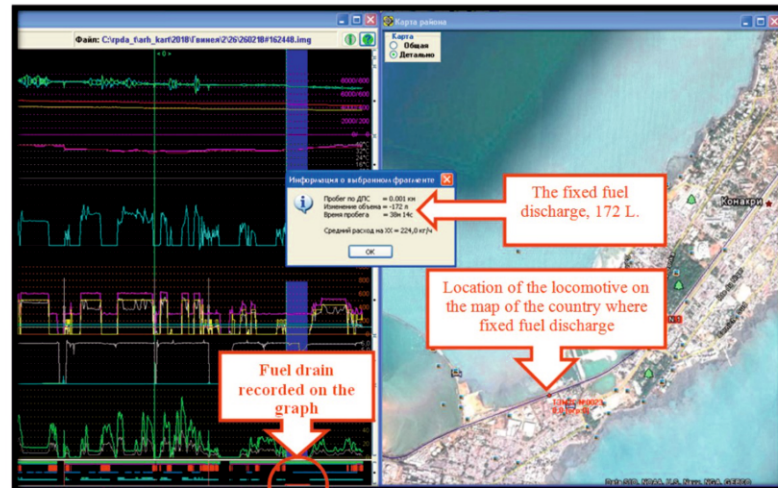
- ✓ Reduction of energy consumption for traction of trains
- ✓ Facilitate to reduction of time and financial outlay
- ✓ Increasing line traffic-capacity by following trains in a uniform traffic flow through firm-time slot



### 3. Test Services and Equipment

PSM with the support of international partners, provides professional services and complex solutions in the field of test and certification focused on rolling stock, railway systems, transport and other industrial sectors. PSM helps some of the leading railway companies in regulatory approval processes for their new and refurbished vehicles, components and systems. Also, PSM performs tests in accordance with technical specifications, directives and

- ✓ Design and Construction of Test Stands and Infrastructure of Tests
- ✓ Design and Development of Test Software
- ✓ Comprehensive non-destructive static, running (dynamic), impact and life tests
- ✓ Performing both Preliminary and Acceptance tests for freight and passenger cars, EMU and DMU railway vehicles, locomotives, containers and their assemblies.



• **Dynamic Component Testing**

We provide dynamic test services for rail vehicles, road vehicle parts, infrastructure and etc.



• **Test of Running Characteristics**

- ✓ Running characteristics and safety test– simplified and complete methods according to UIC 518, EN 14363
- ✓ Passenger comfort test – comfort of standing passengers according to UIC 513, EN 12299

• **Traction and Energy Tests**

This type of tests covers verification of characteristics of traction railway vehicles, train resistance measurement, rolling stock anti-skid testing equipment and measurement of rolling stock energy parameters. Nowadays, electric rail vehicles feature energy saving and storage systems that reduce their overall energy consumption. Measurement of traction/braking characteristics by the quasi-dynamic acceleration and deceleration methods can also be performed according to EN 50215.

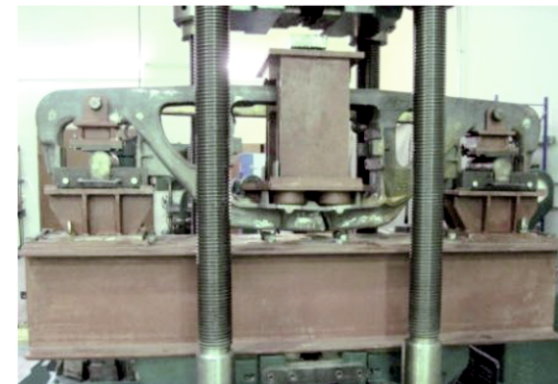


• **Modal Test of Cars and Bogie**

Tests can be conducted to determine the resource of full-scale cars and bogie frames with natural vibrations on the suspension springs and wide range Modal Analysis.

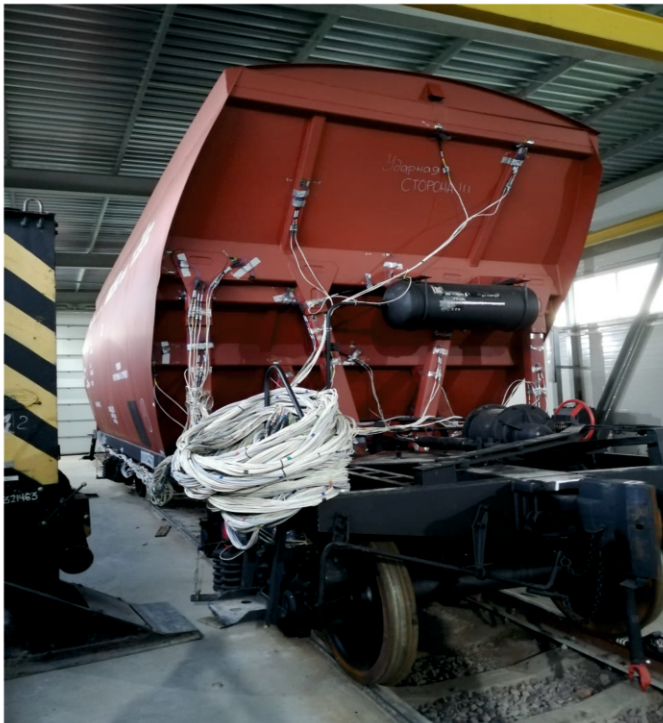
• **Static and Fatigue Tests of Bogie Frames and Their Components**

All types of fatigue testing of the side frames and bolsters of freight car bogies, including the construction of a fatigue curve, using the developed technological equipment for installing parts on a hydraulic press machine can be done.



- **Car Body Structural Test**

The test bench performs car body structural testing according to EN 12663. The structural design (and hence safety) of railway vehicle bodies depends on the loads they are subjected to and the characteristics of the materials they are manufactured from. These load requirements considered during the structural design. The vehicle body tests are based on proven experience and supported by the evaluation of experimental data and published information.



- **Locomotive Compressor Test Stand**

The stand for running compressors is designed to test electric compressors in accordance with the instructions for maintenance, repair and testing of pneumatic equipment of the rolling stock of subway cars and the instructions for testing electric compressors after repair.

- **Stand for Control of Dynamic Parameters of Bogies**

- ✓ Carrying out sea trials of bogies of subway cars and rail buses
- ✓ Static tests and measurements
- ✓ Checking the operation of an asynchronous motor
- ✓ Checking the operation of the DC drive
- ✓ Checking the operation of gearboxes of wheel pairs of bogies
- ✓ Wheeled trolley weighting
- ✓ Speed control of wheel parameters
- ✓ Run-in for non-motor bogies and rail bus bogies



#### 4. Maintenance and Repair Equipment

PSM has remarkable capabilities due to deep cooperation with most experienced international partners in design and constructions of technological equipment related to repair of rolling stock for the railway. It consists of mechanized complexes for dismantling and assembling axle box units of freight and passenger cars, electric trains and locomotives, mechanized complexes for dismantling and assembling bogies, tilters of high and low power for electric motors, diesels, frame, mechanized lines for the repair of wheel sets, etc.

Herein, some samples of the equipment are presented. Note that, the characteristics of equipment can be modified based on customer requirements.

- **Mechanized Line and Transport Equipment**

- ✓ Rotating Device for Turning Wheel Pairs
- ✓ Mechanized Elevated Path
- ✓ Electro Mechanical Hoisting and Turning Device of Wheel Pairs

- **Equipment For the Repair of Bogies**

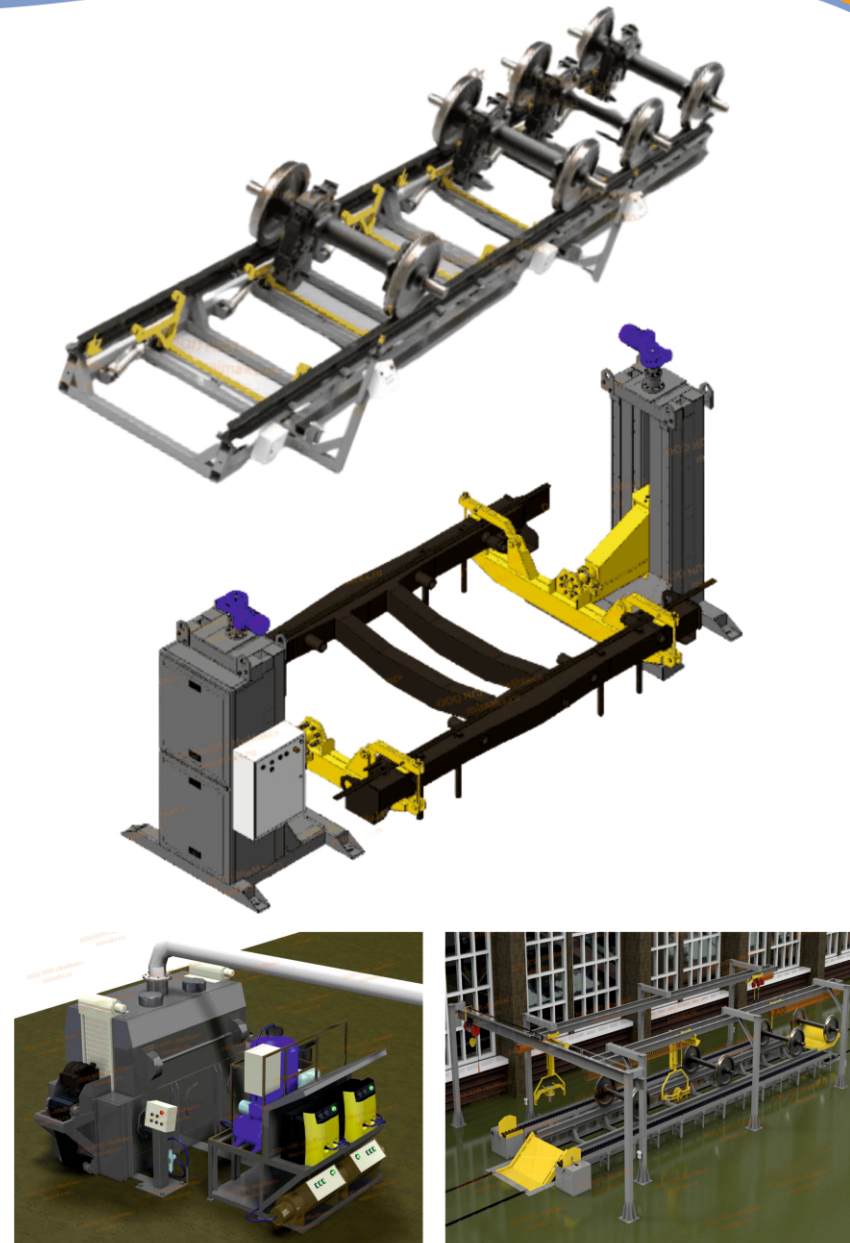
- ✓ Tilter for Bolster Repair
- ✓ Frame Tilter for Subway Car Bogies

- **Equipment for the Repair of Wheel Sets, Axle Boxes and Gear Boxes**

- ✓ Mechanized Complex for Assembling Wheel Sets on an Elevated Track
- ✓ Gearbox and Axle Box Dismantling

- **Equipment for Repair of Automatic Coupler, Electric Traction Motors and Generators**

- **Equipment for the Washing of Rolling Stocks**





## 5. Test Certificate and Applying Standards

Our third-party Certification services provide customers with tests and certifications compliance with associated regulatory standards, in order to support enterprises across all aspects of projects, operations, logistics and legislation.

PSM company in cooperation with experienced international certification bodies successfully operate on EU railway market and beyond as an independent and competent authority for certification, providing an impartial assessment of the conformity of railway products in a wide scope of accreditation.

### • NoBo and DeBo services

Carrying out EC verification process interoperability of railway system in CIS region, European Union, Baltic countries and for national implementation standards.

### • TSI Certificates

To meet the essential requirements and ensure the interoperability of the railway system of the European Union.

PSM company and its strategic partners are capable of providing TSI including following regulations:

- ✓ LOC&PAS: for locomotives and passenger rolling stock (EU No.1302/2014)
- ✓ WAG: for freight wagons (EU No.321/2013)
- ✓ NOI: for noise (EU No.1304/2014)
- ✓ PRM: accessibility for persons with disabilities or reduced mobility (EU No.1300/2014)
- ✓ SRT: for safety in railway tunnels (EU No.1303/2014)

### • European Accreditation for Conventional Railway Subsystems:

European Accreditation is available for following conventional railway subsystems:

- ✓ Diesel or electric multiple units;
- ✓ Diesel or electric traction units;
- ✓ Passenger coaches;
- ✓ Tanks for 3-9 class substances transportation;
- ✓ Mobile equipment for the construction and maintenance of railway infrastructure;
- ✓ Freight wagons: for rails with gauge of 1435 mm, 1520 mm, 1524 mm, 1600 mm and 1668 mm

### • Russian Accreditation Scope Certification Services (GOST 31235-2004)

### • Accreditation to Conduct Tests for Compliance with the Requirements of the Technical Regulations of the EAEU:

- ✓ TR TS 001/2011 "On the safety of railway rolling stock";
- ✓ TR TS 002/2011 "On the safety of high-speed rail transport";
- ✓ TR TS 003/2011 "On the safety of railway infrastructure";
- ✓ TR TS 032/2013 "On the safety of equipment operating under excessive pressure".

### • Applying and Reconciling Among Standards for GOST, EN, DIN, RIS and etc.



## 6. Engineering Services

PSM company has additive values in the field of engineering services, including design, upgrading and engineering solutions for railway systems. Besides, it provides transfer of technology from well-known international companies.

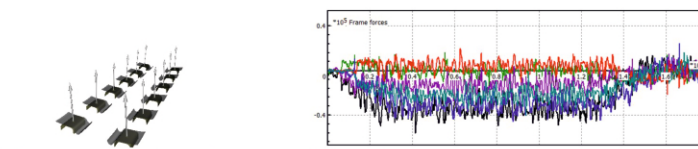
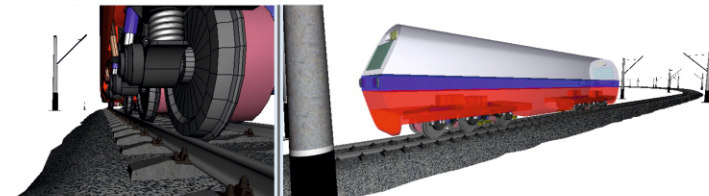
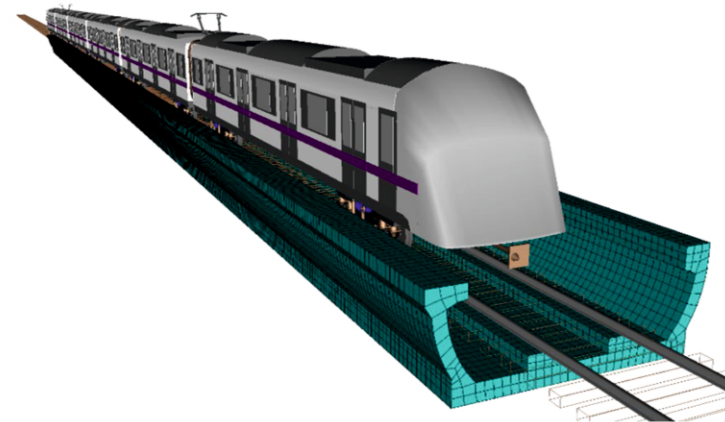
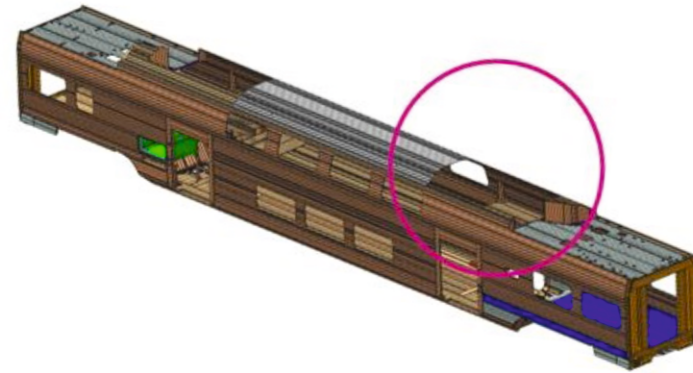
- **Rolling stock system Design and Upgrading**

PSM company has a great capability to design, upgrade and optimization of existing rolling stock systems based on the long history of engineering experience of the company and deep collaboration with well-known companies.

- **Simulations (MBD, CFD, FEM Analyses)**

Based on our experience in the field of railway transport, engineering and other industrial segments, our company offers computational services such as aerodynamic and structural simulations (CFD and FEM). We perform strength calculations using commercial software preferred by our clients, such as ABAQUS, ANSYS, SOLIDWORKS, and etc. PSM with support of a partner offers an engineering software for simulation of railway vehicle dynamics (MBD) which makes it possible to solve the following problems:

- ✓ Dynamic characteristics, stability and safety of rolling stock;
- ✓ Suspension optimization, selection of optimal technical solutions;
- ✓ Ride comfort improvement;
- ✓ Durability analysis and optimization;
- ✓ Wheel and rail wear and profile optimization;
- ✓ Derailment reconstruction, reducing the probability of catastrophic failures



- **Locomotive Simulator**

Locomotive simulator is designed for training crews with different types of locomotives. Simulator imitates driver's cabin and desk in details. 3D video playback subsystem shows real track according to train control regimes, daytime (day or night) and train speed. The educator can change daytime, weather, lightness, traffic light signals; also, he can organize irregular situations to teach drivers work in those conditions. Trainer can change train situation directly from his work- place; also, he can monitor activities of trained driver. Simulator automatically generates a log-file of each test mission. Those log-files are taken into account to generate a recommendations for next education steps and for estimating driver's activity.

- **Consulting Services**

PSM provides specialized consulting services to help clients export their products to international markets and certifies them accordance to customers' requirements. Also, PSM provides extensive consultation to a company in need of expert advice and solutions. The firm can take on the project and work to evaluate, design, simulate, and test the product.





## Strategic Partners

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**MiMaks**



**Mera**



**AVP  
Technology**



**НВЦ «ВАГОНЫ»**



**LCARD**



**universal  
mechanism**

universal  
mechanism



**ENGINTEC**



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