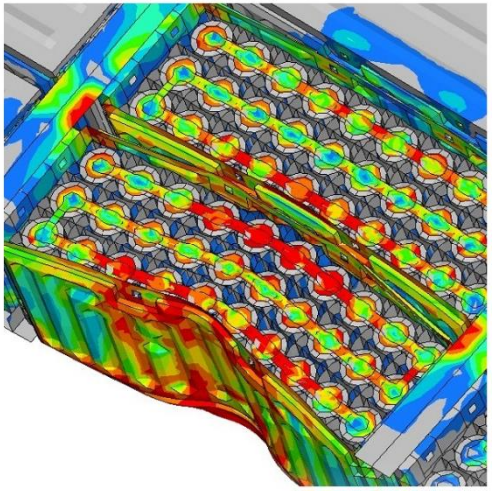


INVENCO

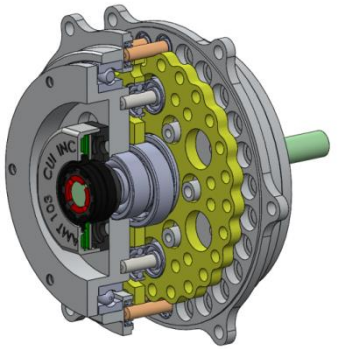
ENGINEERING

INVENCO ENGINEERING

About

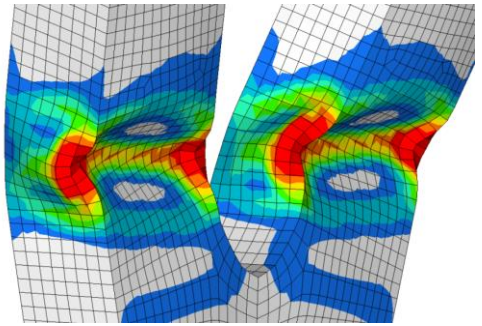
Vision & Mission:

- Work in advanced and important engineering projects that can change the world
- Provide highest quality engineering services and develop highest level products
- Use scientific and engineering knowledge in the research and development process from the scratch



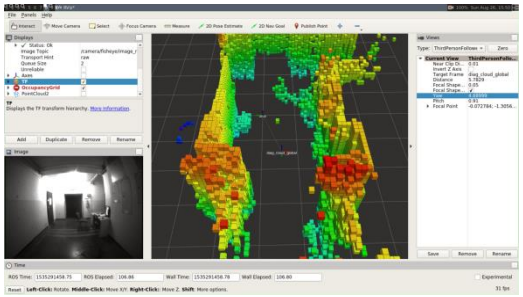
Mechanical engineering branch:

- Rail, road & off-road vehicles body engineering
- Engineering simulations (FEA, CFD, MBD, direct mathematical models)
- Composite structures development
- General machine design, CAD &CAE



Mobile robotics, software and industrial automation branch:

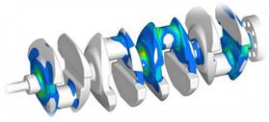
- Control algorithms (Model Predictive Control, PID, …);
- Computer vision (OpenCV, PCL, Convolutional Neural Networks)
- Software (Python, C, C++, Visual Basic)
- Industrial automation (PLC)
- Drone engineering



Our team: **15 employees**

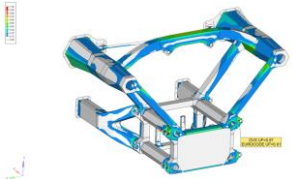
Location: **Warsaw, Poland**

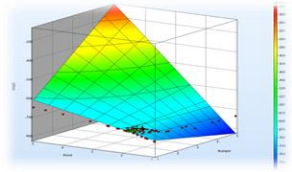
Competence areas



Engineering expertise:

- Crashworthiness;
- Structural engineering;
- Thin wall structures;
- Fatigue engineering;
- Long fiber composites;
- Polymer materials;
- Mechanisms and machines;
- Road vehicle suspension systems;
- System integration;
- General vehicle design;
- Optimization;
- Finite element methods for mechanics;
- Computational fluid dynamics;
- Control, programming;
- Robotics, automation.





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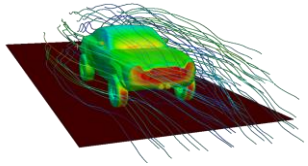
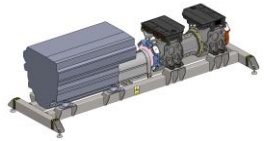
Team experience in machine & automotive engineering

- **Automotive engineering (mass production):**
  - crash & static simulations of vehicle seats;
  - conceptual design of the battery pack integrating floor panel & crash simulations of engineering concept of electric car in European consortia with leading automotive companies including novel materials and joining techniques, full scale body EuroNCAP simulations;
  - engineering design and simulations of components.

- **Conceptual design of crash absorbing systems and vehicle bodies, FEM analysis for crash, fatigue, vibration and statics, CAD works devoted to rolling stock , full vehicle body design**
- **Conceptual design of crash absorbing systems and bodies, FEM analysis for crash, fatigue, vibration and statics, CAD works devoted to small series road vehicles, multibody simulation of vehicle suspension:**
  - special vehicles;
  - buses;
  - sport cars;
  - components.

- **Design& analysis for other industries**:
  - mechanical integration of a large marine diesel-electric power generation systems including shafts and coupling design& vibration calculations
  - spur and bevel gears, bearings, shafts, cams, springs for mass produced mechanisms
  - casted housings, brackets (Cast Iron, Cast steel, Aluminium alloys)
  - design, calculations of electromechanical systems;
  - test stands.





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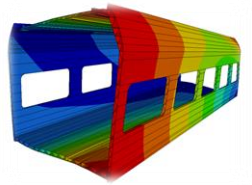
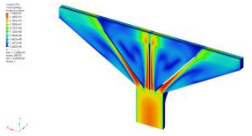
Team experience in rail vehicle engineering

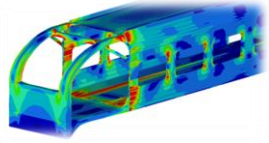
- **Conceptual and final design of crash absorbing systems including energy absorption mechanisms, analytic analysis of folding process, FEM based design, full vehicle crash simulations**
- **Analytical& FEM model based conceptual design of vehicle bodies FEM analysis & structural optimization for fatigue, vibration and statics of vehicle bodies and components**

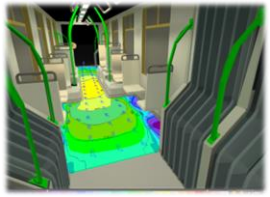


- **Analytical & CFD analysis of HVAC and electric motor cooling systems**

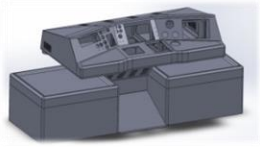


- **CAD engineering design:**
  - design concept, vehicle configuration, styling;
  - packaging, ergonomics;
  - vehicle openings, doors, windows;
  - HVAC system design;
  - electric motor cooling systems;
  - body load carrying structure engineering;
  - driver control console design;
  - interior lighting analysis.





- **Dozens of large projects for passenger vehicles& locomotives:**
  - electric and diesel locomotives;
  - diesel multiple units;
  - electric multiple units;
  - shunting locomotive;
  - diesel single units;
  - tramways;
  - components.



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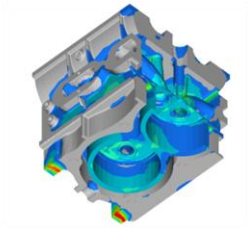
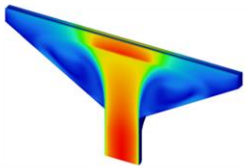
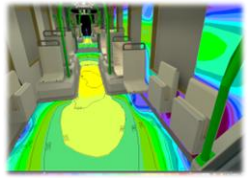
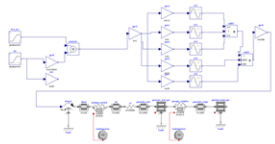
Software

- Altair Hyperworks: Hypermesh, Hyperview, Optistruct, Radioss, MotionSolve, Accusolve, …;
- LSTC: LS-Dyna, LS-PrePost, LS-TASC, LS-Opt;
- IDAB SE – Fatevas (advanced fatigue analysis);
- Dassault Systems - Solidworks, (Catia on request);
- Siemens (NX on request);
- National Instruments –Labview;
- Hexagon GmbH, MitCalc- (machine parts, in example screw connections according to VDI 2230);
- OpenFoam, AccuSolve -CFD;
- Dialux – lighting;
- open source math sorftware (Scilab, Octave, Smath, OpenModelica, Jupyter, SciPy, Matlab/Simulink on request);
- C, C++, Python, Visual Basic, TCL/Tk, ROS, OpenCV, TensorFlow, PCL:
- almost anything else if needed.





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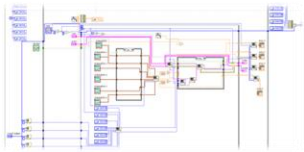
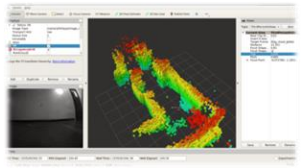
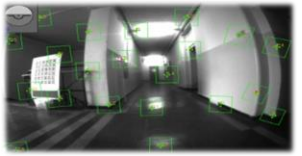
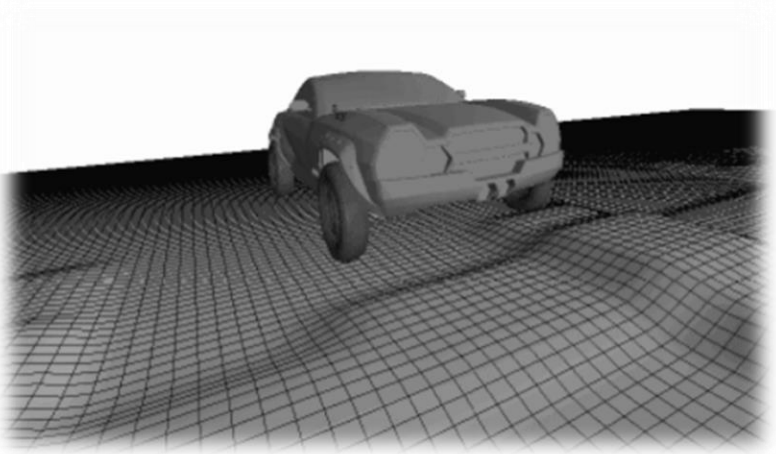
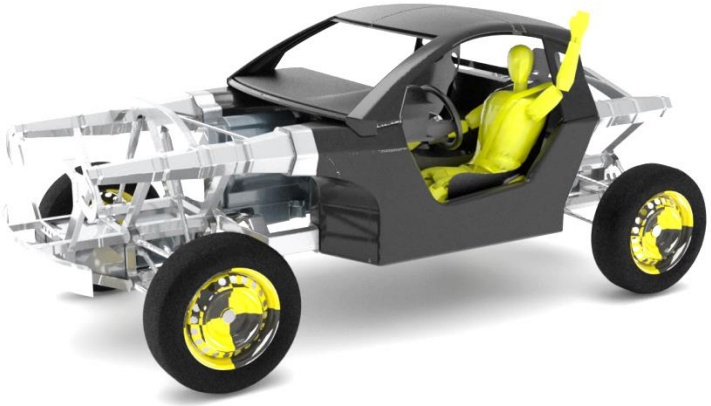
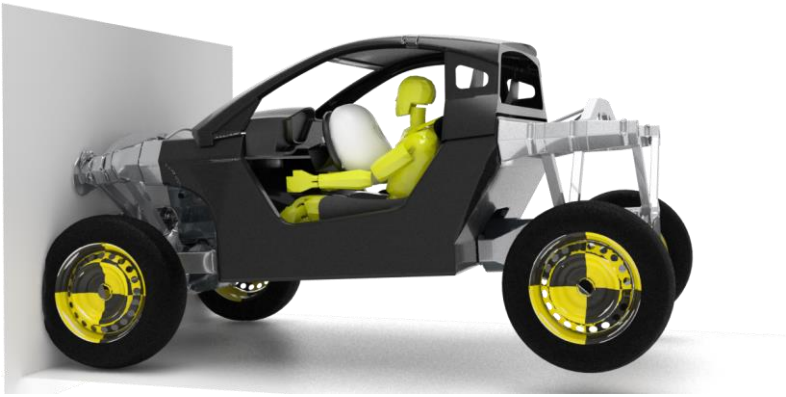
Services in field of mobile robotics and software:

- mobile & stationary robots design
- robots software based on ROS, general LINUX based progams in C++, C, Python and microcontrollers;
- visual-inertial odometry system and SLAM;
- PID and advanced model predictive control of dynamic systems;
- sensor data fusion;
- design of mechatronic systems;
- industrial automation based on PLC;
- drone engineering.

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