



Overview of scientific results of the project

Reporting period **Nr. 7.**

01.11.2020. - 31.01.2021.

Project: Nr. 1.1.1.1/18/A/133 "Prototype development of transportable in multimodal traffic mobile space test facility "Metamorphosis".

Project promoters: Riga Technical University (Leading Partner), "CRYOGENIC AND VACUUM SYSTEMS" Ltd.

Overall Project Objective: To develop a prototype mobile test facility "Metamorphosis" (MSTF) transported in an intermodal traffic environment on the basis of industrial research and to raise MSTF Technological Readiness Level from TRL2 to TRL4 (under European Space Agency (ESA) scale) for further evolution of the project.

Project activities and accomplishments during the reporting period:

Activity 1. Design calculations and design documentation for the design elements of prototype:

Work 1.1. Calculation of the vacuum system

Vacuum system calculation and thermophysical calculation completed. The results of the calculations are used in the development and improvement of design documentation and in the production of prototype elements.

Work 1.2. Strength calculations

The strength calculation is complete. A report is being prepared.

Strength calculations are used in the development and refinement of design documentation and in the production of prototype elements.

Work 1.3. Development of a set of design documentation

On the basis of the results of the prototype vacuum system and strength calculations, the determination of the external appearance of the prototype construction elements, development of sketches for the creation of design documentation has been continued.

Work 1.4. Development of 3D CAD model of prototype construction elements

Based on the analysis of standards and industry methodologies in the field of 3D modeling of complex equipment and systems, as well as on the basis of previous calculations, work has continued on the development of a 3D model of prototype construction elements.

Activity 2. Prototype software development:

Work 2.1. The prototype work algorithm is complete.

Prototype work algorithms are used in prototype software and hardware development.

Work 2.1. Prototype software and hardware development

Work has begun on the development of software for prototype vacuum pumping system element controllers. Development of prototype cryogenic system software has started.

Activity 3. Production of structural elements and assembly of prototypes

Work 3.1. Production of prototype construction elements

Work continues on the production of prototype structural elements, materials and components are purchased:

- production of structural elements of the prototype vacuum chamber;
- manufacturing of structural elements of the support frame for transporting the prototype in intermodal traffic;
- production of structural elements of vacuum pumping system and cryogenic system of the prototype;

- procurement of materials and components for the production of prototype elements;
- incoming inspection of materials and components;
- development and production of control system elements;
- prototyping and modeling of electrical circuits.

Development of proposals for changes in project documentation.

Work 3.2. Improvement of prototype design elements according to test results

Development of test equipment for testing the technical properties of prototype elements.

Activity 4. Industrial research and prototype testing

Work 4.1. Prototype structural stability tests under operating conditions

The development of technical materials to organize the procurement of elements for in-service inspections continues.

Work is continuing on the development of a testing program and methodology.

Testing the components of the vacuum pumping system in real operating conditions.

Prototyping and testing of electrical circuits continues.