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### Abstract

Preferred Topics: TESTING / TURBO

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### Title

## Pumps and Turbopumps Test by Similitude

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### Abstract

Launchers are the main components of space industry, continuously diversified for placement a wide range of loads into orbit, with low costs and respect for the environment. They are “the second largest area of space-manufacturing activity in Europe after commercial satellites, boosting European industry” [1].

Development and operating launchers technologies are no longer a monopoly of large states and government agencies, but available for private sector, even to SME’s start-ups. Because of that, the launchers propulsion is faced towards hybrid or liquid propulsion, more accessible as type of fuels and components complexity and “green”. Their development needs simple, but reliable test benches, easy to operate, with a high degree of data acquisition and interpretation of the results

The paper is focused on presenting a facility for testing by similitude either the new generation of pumps driven by electric engines and new developed turbo pumps. The small and medium launchers engines constructive constrains require a decrease of electro-pump/turbo-pump dimensions, but an increase of working parameters, respectively flow and pressure, which requires high drive powers and rotation speeds. The papers provide information on the characteristics of the test-bench, emphasizing and insisting on the command control and data acquisition system, designed to obtain the required data for clearly supply information of the pumps or turbo-pumps working parameters as well as behavior on different working regimes and range of input parameters.

The test – bench commissioning is extensively explained in the paper and there were supplied information regarding the input and output data obtained using of shelves common pumps, as basement for calibration of the facility.

An important part of the paper is dedicated to the turbo-pump tests with neutral gas, closely tied up to pumps test. There are presented the engineering solutions for supply high mass and high pressure neutral gas for driving the turbines, and the corresponding SCADA system, linked to the general command control and data acquisition system. The paper provide information regarding the noise suppressor, and the commissioning actions are presented too.

As time as the pumps and turbines contain sensitive shape components, as inducers, impellers and blades, also sealing systems and bearings, the possibilities to test them for providing design solution and validating CFD are holistic analyzed.

A sustainable approach of test activities is considered in respect of test, maintenance and utilities costs, as well as a marketing and promotion plan, for entering the space test industry.