SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

Author: Mr. Marc Scheper
OHB System AG-Bremen, Germany, marc.scheper@ohb.de

Dr. Rolf Janovsky
OHB System AG-Bremen, Germany, janovsky@ohb-system.de
Mr. Piotr Perczynski
MT Aerospace AG, Germany, piotr.perczynski@mt-aerospace.de
Mr. Sascha Larch
MT Aerospace AG, Germany, sascha.larch@mt-aerospace.de

NELS - LAUNCHER CONCEPT SELECTION FOR THE "NEW EUROPEAN LAUNCH SERVICE"

Abstract

The guarantee of access to space for Europe currently relies on the family of launchers composed of Ariane 5, Soyuz from Kourou and Vega. Ariane 5 represents Europe's workhorse for the GTO missions, heavy SSO, ISS servicing and escape missions. Over the past years, as is the case in other space-faring nations for their domestic launch systems, the exploitation of the Ariane 5 launch system has required public funding to cover certain exploitation costs. In view of the above the feasibility of a novel approach for access to space for Europe aiming at achieving a self-sustained exploitation phase was investigated. The NELS development therefore is driven by the end goal of providing an enabling service with the "best product at the best price to European customers, favoring simplicity and robustness of design". The starting point of the concept finding procedure was a concept tree, based on the most important basic launcher design features to cover the potential design trade space. To reduce the amount of more than 700 possible launcher configurations some "Killer Criteria" were established, leading to only 12 remaining concepts. These remaining 12 concepts were further reduced to 5 by application of a qualitative assessment procedure. The following last step in the down-selection process was performed quantitatively, using the method of the "Analytic Hierarchy Process" (AHP), to ensure an objective and transparent approach. It provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements and for relating those elements to the overall goal. This process is structured in six steps, beginning with the selection of criteria and their grouping. In the next step, the criteria groups are weighted by a pair wise comparison with each other. The same applies to the single criteria within the groups. After this, an assessment function for each criterion is defined, which then gets applied to each single concept for each single criterion. Based on mathematical calculation, the single results are combined with the weighting of the criteria and the final ranking gets evaluated. As a final task the results of the evaluation of the five concepts were fed into the AHP tool. This paper will show the assessment of the five concepts with respect to each criterion. Also the sensitivity of the overall ranking with regards to changing market demands and the variation of the criteria weighting will be presented.