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Author: Dr. Norbert Frischauf  
TU Graz, Austria

Dr. Martina Faenza  
Nammo Raufoss, Norway

Mr. Gilles Boure  
France

Mr. Eduard Diez  
GTD, Spain

Dr. Philipp Christ  
Germany

Mr. Sigve Haugsnes  
Norway

Mr. Wenzel Schoroth  
DLR (German Aerospace Center), Germany

Mr. Dirk Dautzenberg  
The Netherlands

Mr. Clas Andersson  
GKN Aerospace Engine Systems, Sweden

APPLICATION OF EFFECTIVE SYSTEMS ENGINEERING METHODOLOGIES WITHIN ENVOL —  
THE EUROPEAN NEWSPACE VERTICAL ORBITAL LAUNCHER**Abstract**

Due to the recent developments in the miniaturisation of electronics and on-board systems, the space launch market is experiencing a substantial growth in the number of small satellites planned to be launched into low-Earth orbits, and market needs are veering towards faster and cheaper access to space. Aiming to address these needs by providing a reliable and cost-effective, yet green launch vehicle, nine European aerospace companies have joined forces within ENVOL — European Newspace Vertical Orbital Launcher project of the European Union's H2020 programme. At the end of its three-year development, the ENVOL consortium aims to create Europe's first competitive, commercial, green and customer-centric NewSpace launch service.

As part of ENVOL's innovative vertical orbit launch system, the launch vehicle developed within the project will be powered by green and storable hybrid rocket propulsion technology based on hydrogen peroxide (HO) as liquid oxidiser, its entire architecture will be modular and its development will follow a staggered approach. Its ground segment will be designed with the simplest and minimal interfaces with the launch vehicle, with the goal of resulting in a flexible, automated and easily deployable system. During the development of the launcher, in order to achieve a high level of launch system maturity, particular attention will be afforded to the composite oxidiser structural tanks, the HO turbopump and the launcher and payload avionics. The avionics of the payload and the interconnected elements and subsystems that interface with it will be standardised and modularised, so that they can be easily adapted to the mission profiles of a variety of different customers.

After its completion, the ENVOL project will transition into an independent commercially competitive

organisation that will be able to service the small satellite launch market in Europe and beyond, offering low-cost, flexible and frequent access to low-Earth and Sun-synchronous orbits to small satellites (up to 200 kg) as early as 2024.

This article will showcase the ENVOL project and the results achieved by the end of its first 18 months of activity, as well as its future aims and prospects, with a special focus on the application of state-of-the-art engineering design methods to the architecture of the vertical orbit launch system that is in development.