

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – missions current and future (3A)

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EXOMARS 2016 MISSION EDL DEMONSTRATOR MODULE TECHNOLOGIES, SCIENCE
OPPORTUNITY AND PLANETARY PROTECTION IMPLEMENTATION**Abstract**

The Exomars mission is the first ESA led robotic mission of the Aurora Programme and combines technology development with investigations of major scientific interest. Italy is the major contributor to the mission through the strong support of the Italian Space Agency ASI.

Whereas the ExoMars 2018 Mission will focus on exobiology and geochemistry research using a Rover to provide key mission capabilities such as surface mobility and subsurface drilling, the ExoMars 2016 Mission consists of a Trace Gas Orbiter (TGO) plus an Entry, Descent and Landing Demonstrator Module (EDM). Thales Alenia Space Italy (TAS-I) is the ExoMars Industrial Prime Contractor and is responsible in particular for the development of the EDM for which the S-CDR has been successfully closed in October 2014 and the proto-flight model is now under environmental test campaign in TAS test facilities.

The EDM is primarily designed to prove European EDL technologies (ablative Thermal Protection System, supersonic parachute, controlled landing with Reaction Control System, Doppler Radar, crushable structures) while offering science opportunities measuring key features of the Mars atmosphere near and at the surface. Reconstructing the EDL flown trajectory and assessing the EDL subsystems performance will also be feasible by using the data gathered by a set of engineering sensors implemented in the EDM. This reconstruction will also allow deriving scientific information such as the atmospheric density profile along the entry trajectory, helping to improve the understanding of the Martian atmosphere and improve models used for future missions.

Landing on Mars requires the implementation of a stringent Planetary Protection plan to ensure the level of EDM bioburden contamination brought on Mars surface will comply with COSPAR regulation. The implication on the EDM design definition, manufacturing process and AIT required an extraordinary effort to achieve this objective with the perspective to re-use the lessons learnt for EXOMARS 2018 Mission.

This paper describes the EDM configuration and mission architecture, the EDL technologies, the science instrumentation and the constraints induced by the Planetary Protection rules followed so far in the EDM PFM AIT and to be taken into account until launch.