

SPACE DEBRIS SYMPOSIUM (A6)
Mitigation and Standards (4)

Author: Mr. Mauro Balduccini
AVIO Propulsione Aerospaziale, Italy, mauro.balduccini@aviogroup.com

Mr. Luciano Battocchio
Aero Sekur, Italy, battocchio@sekur.it

Mr. Fabrizio Bertini
Scuola di Ingegneria Aerospaziale, Italy, fabbricius@libero.it

Prof.Dr. Augusto Nascetti
Univ. Roma La Sapienza, Italy, augusto.nascetti@uniroma1.it

Mr. Luca Raponi
SIOI, Italy, rapoluca@alice.it

THE END OF LIFE NATURAL DEORBITING (END) ADD-ON SATELLITE MODULE, IN THE
CONFIGURATION CAPABLE TO CHARACTERISE THE MMOD LEO ENVIRONMENT:
CHARACTERISTICS AND FIRST DEVELOPMENT TEST RESULTS**Abstract**

The End of life Natural Deorbiting (END) module designed by ELV/AVIO is an add-on cylindrical section to be installed between a generic Spacecraft and the (standard) Launcher Adapter, aimed to house and permanently deploy an aerobrake system whose function is to shorten the orbital life of the Spacecraft, at the end of its operative lifetime, in order to meet the orbital debris control requirement on max Low Earth Orbit orbiting lifetime of 25 years. The subject of this paper is a specific configuration of the END module, named END/MMOD in which the aerobrake membrane is constituted by a layer housing sectors of piezoelectric material capable to detect and characterise the impacts with micrometeoroids and orbital debris (MMOD). Being the major critical challenge of the END/MMOD constituted by the aerobrake deployment (after a possibly very long orbit storage time), and by the electrical characteristics of the impact sensor with the relevant signal processing electronics, a program development phase has been started by ELV/AVIO. The major testing carried out to date is relevant to deployment test of an inert membrane in a 1:1 scale, and the manufacturing, and hyper velocity ground testing, of a sensor sector together with its signal processing electronics. This paper summarises the END/MMOD module design, the piezo sensor assembly characteristics, the development testing logic and the preliminarily obtained results. It reports as well additional functions that could be carried out by the proposed "multi-function membrane" (i.e. supporting the installation of solar cells, of large electrical coils, of multi-bodies antennas....)