

SPACE DEBRIS SYMPOSIUM (A6)
Hypervelocity Impacts and Protection (3)

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IMPROVEMENTS FOR SPACE MISSION PROTECTION AGAINST SPACE-DEBRIS HAZARDS

Abstract

The increasing amount of space-debris around Earth is becoming a more and more significant threat to the proper functioning of our satellites in orbit. To minimize the impact of this ever increasing threat, different strategies to enhance mission protection are being established by a European consortium composed in a multi-disciplinary manner, involving research organizations and academia, on the one side and industrial companies and SME on the other. The work is being performed within the EU's 7th Framework Programme as a collaborative project in the activity "Strengthening of space foundations".

Within the proposed paper, based on existing space debris/meteoroids protection technology for human spaceflight spacecraft, current understanding of post-structural penetration kinematics and current regulations in place in order to mitigate debris generation, a number of strategies will be formulated in the following fields:

- improvement of spacecraft protection by innovative shielding;
- improvement of spacecraft protection by enhanced redundancy and design;
- spacecraft self-protection;
- fractionated mission design;
- improved mission operations;
- and maintenance and repair.

For each of the concepts, a draft design of the proposed technologies, a determination of the improved performance over design lifetime along with a determination of the associated efforts will be presented. In addition, an insight will be provided into the integration of Space-debris protection through the different development phases of a satellite project (Phase A/0 – Phase D).

As the space-debris environment around Earth is not constant and changes significantly from orbit to orbit, it was decided to orientate the proposed strategies around three representative missions:

- Sentinel 1 (Earth radar Observation mission in LEO – SSO 693 km altitude)
- Galileo in MEO (Navigation mission in MEO – around 23000 km altitude)
- MTG in GEO (Meteosat mission in GEO)