Technical Day on De-orbiting Technologies

17th of March 2015

Clean Space Team

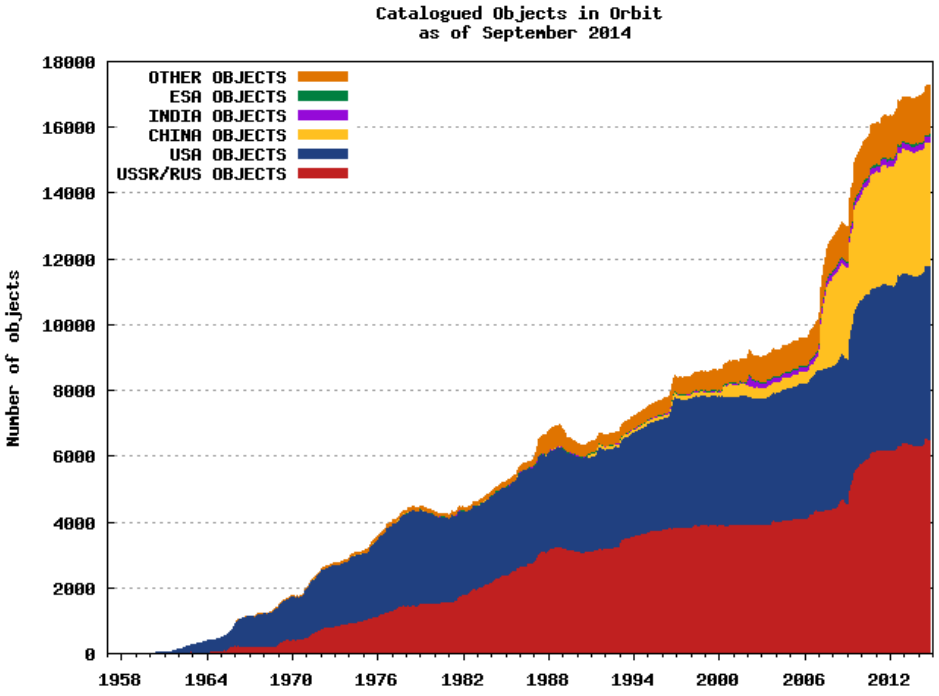
WELCOME to the 1st Technical Day on De-orbiting Technologies

Topics:

- Drag augmentation devices
- Solid rocket motors de-orbiting systems
    - Materials and processes
    - Analysis: development of tools and methods, validation of tools and methods.
    - Testing: on-ground testing facilities, quality control tests, qualification methodologies, in-flight testing opportunities.
- 12 oral technical presentation + 14 posters
- Technical Discussion on passive strategies (paper flip-chart)
- Technical Discussion on solid rocket motors systems (paper flip-chart)

Description of the Problem

- 17.000 debris larger than 10 cm in orbit
- Under 10 accidental and intentional collisions in orbit
- 700.000 debris larger than 1 cm in space
- 1100 objects are operational for the time being
- ESA missions today perform four to six debris avoidance manoeuvres each year
- GEO is the home to more than 400 operational communications and other spacecraft which serve vital purposes for all countries of the world
- 1,100 objects are catalogued in or near the GEO region



Passive De-Orbiting
Running Activities

Development of a **deployable drag augmentation sail**, applicable to satellites compliant with the on-ground casualty risk requirement for uncontrolled re-entry.

2 GSTP contracts KO in 2014 will:

- address the development of deployable membranes
- study the stabilization aspects
- test a modular sail mechanism up to TRL 5

1GSTP contract to start in 2015

- GNC for deployable sail de-orbiting devices

Envisaged Future Activities

Drag augmentation system up to TRL6

- Identify a possible mission
- Testing EM/STM to achieve TRL6

Agenda – Morning presentations

9.00	Opening	ESA	T. CARDONE
9.15	Introduction to the Clean Space initiative	ESA	L. INNOCENTI
9.30	Sails … and more "Made in Luxembourg"	Luxspace	F. DALLA VEDOVA
9.50	De-orbiting technologies developments at Surrey	Surrey	G. AGLIETTI & A. VIQUERAT
10.10	Satellite inflatable deorbiting equipment for LEO Spacecrafts	Airbus	B. RASSE
10.30	Tea break		
10.50	State of the art concepts and verification strategies for passive de-orbiting systems using deployable booms and membranes	DLR Institute of Space Systems	P. SEEFELDT
11.20	Development of Passive Deorbiting System	HPS	L. TIEDEMANN
11.40	Design and Development of a Deployable Membrane for Passive Deorbiting Systems	HTS	R. HAHN
12.00	Technical discussion	ESA	T.CARDONE, A. RINALDUCCI & A. GABRIELE
13.00	Lunch break		

Agenda – Afternoon presentations

14.20	Requirement on EOL deorbiting	ESA	S. VENTURA
14.40	Solid Propellant Autonomous DE-orbit System	ESA	R.SCHONENBORG
15.00	Design considerations when selecting low-particle content solid propellants for de-orbiting applications	NAMMO	
15.20	A long term space debris mitigation approach based on independent decommissioning device for satellite and launcher space	D-Orbit	S. ANTONETTI
15.40	Coffee break		
16.00	Thrust Vector Control Systems for Solid Propellant De-Orbit Motors	Almatech	
16.20	Solid rocket motors with particle-free composite propellant at Bayern-Chemie	Bayern-Chemie	K. NAUMANN
17.00	Technical discussion	ESA	R.SCHONENBORG
18.00	Wrap-up	ESA	T. CARDONE