



cleansat

BB#11
RWA
ALTRAN

24/05/2016



Building Block 11: DEMISE Wheels



Reaction Wheels Assemblies are **DEMISE** - problematic for LSI LEO S/Cs

- **Major Contributor** in S/C Demise Casualty Area (~50% of admissible P/F DCA_{total})
- **Major D4D Initiatives** are needed on those P/F equipments (4 x RWA on each S/C)

— Option 1 : Mechanical Upgrade

D4D optimised (RSI 68) with flywheel material swap **Steel**->**Aluminium**

GOAL: DEMISE improved to COMPLIANCE and AOCS performance still COMPLIANT

— Option 2 : Electrical Upgrade

Mechanical downsizing (RSI 45) & **Increase of Speed and Torque Capabilities**

GOAL: DEMISE COMPLIANCE and AOCS performance increased to COMPLIANCE

— Option 3 : Additional Options :

Internal Dismantlement, Core Material Swap, Re-use of Magnetic Wheels Technologies, Core Down-sizing (Ball Bearing Unit Assembly), D4D Techniques at S/C Level



Description of proposed technology Building Block

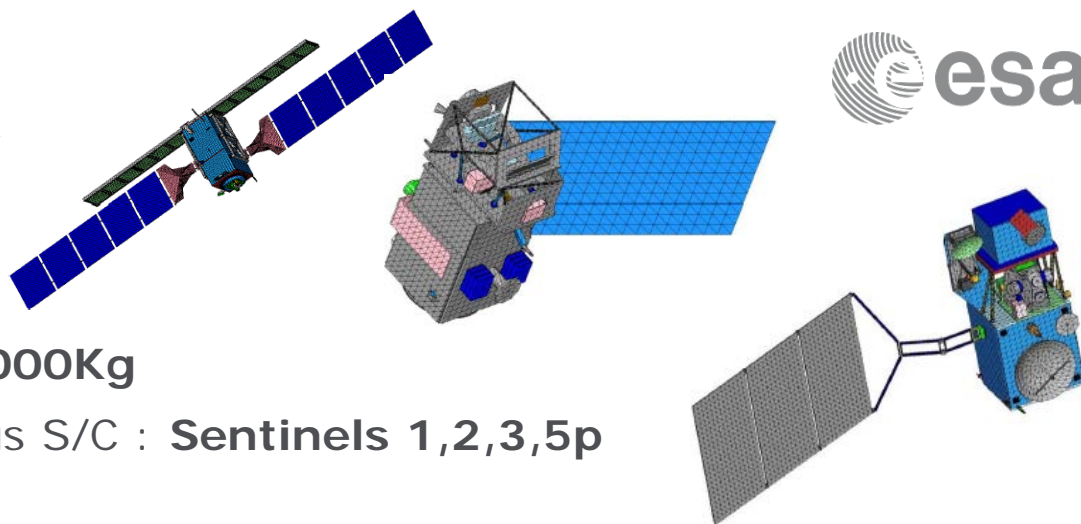


Applicability :

Most LEO S/C concerned such as :

- Medium – High Class : **700 - 2000Kg**

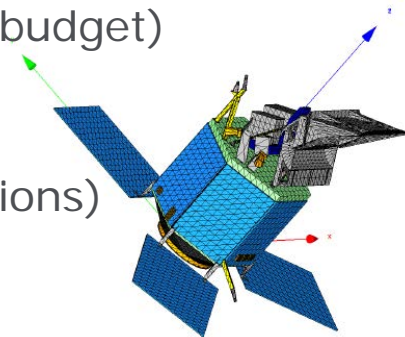
For instance, ESA-GMES Copernicus S/C : **Sentinels 1,2,3,5p**



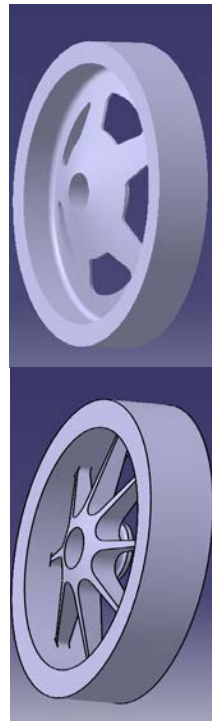
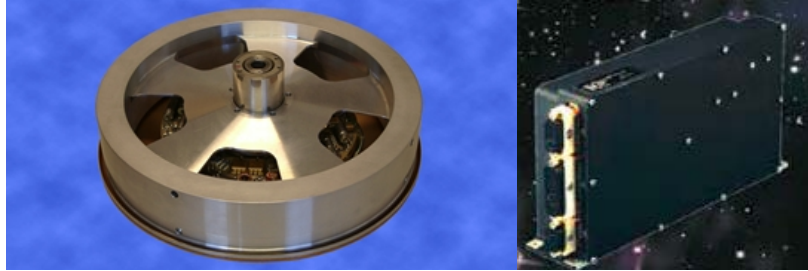
BASELINE Options 1 & 2 **are confirmed** after **CLEANSAT CDF2**

System level impacts (risk, mass budget, power budget and link budget)

- Mass budget : **Almost Unchanged** (Both Options)
- Volume budget : **Iso-Housing** of current Units (Both Options)
- Power budget : - Option 1 : **Unchanged**
- Option 2 : **Increase of power**
- Risks : Both Options baselined are **LOW Risks** in development



Development



Main Technical Challenges

Option 1: Confirm **ALTRAN concepts** compliance on RCD Bearing models
=> Take opportunity of RCD Initiative on **Monobloc Flywheels**
=> **Full Qual°** needed assumed then with **Low Risk**

Option 2: Confirm expected performances in **RCD Elegant Bread-Board**
=> Take opportunity of RCD Initiative on **High-Torque Electronics**
=> **Full Qual°** needed assumed then with **Very Low Risk**

Option 3: Core Material Change (Ball Bearing Unit Assembly)
=> Take opportunity of **ALTRAN DEMISE Materials Survey**
=> **Several Qual°** needed assumed **with Risks** (likely iterations)

Conclusions :

- **BB11_RWA Options** are demonstrated **DEMISE Compliant** (DEBRISK @ 78Km)
- RCD **internal initiatives** on-going match **DEMISE purposes** (GOAL -> 65km)

