



# cleansat

BB06

Mechanisms for early structure break-up  
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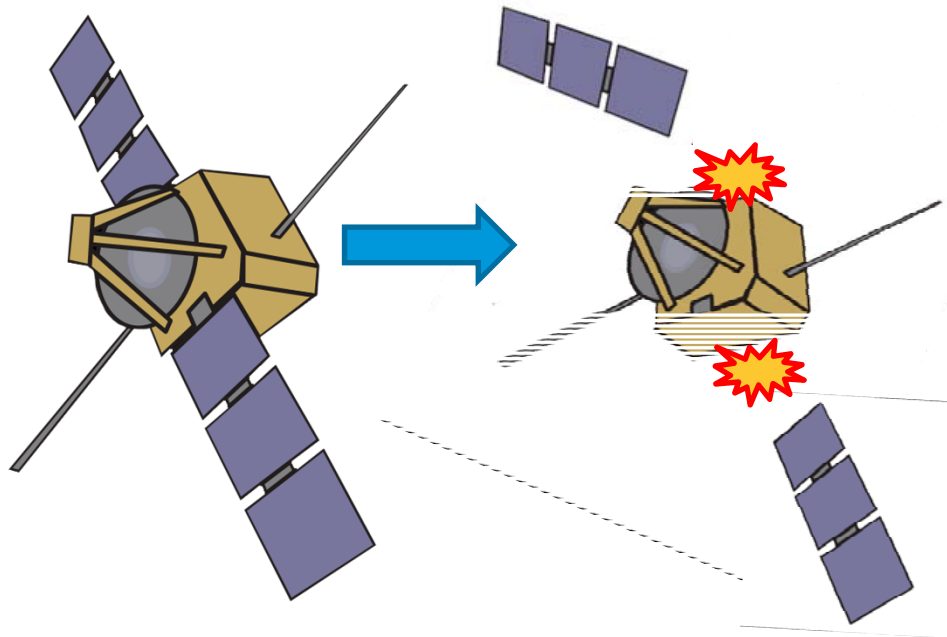
24/05/2016



# Description of proposed technology Building Block

## — Baseline + design options

*Subject of the study is a structural element with shape memory alloy (SMA) non pyrotechnical actuator that disjoints upon at a certain temperature, e.g. 100°C tbd*



### Preliminary main requirements:

- *Non operating temperature -40 .. 90 °C*
- *Lifetime on orbit: 25 years*
- *Mech I/F: flange D=100mm*
- *Mass < 1kg, L/D < 200mm/50mm*
- *No generated particles >500µm*

Baseline: *activation by reentry heat*

Option: *activation by electrical heater*

## — Trade offs to be performed

- *Detailed specification*
- *Selection of actuator alloy (activation temperature, force / stroke)*

# Description of proposed technology Building Block

- Applicability range (satellite class and target orbits in LEO)
- *The mechanism is dedicated to spacecraft that will perform a reentry during end of life (in most cases LEO orbits)*
- Discussion of the system level impacts (risk, mass budget, power budget and link budget)
- *Risk: Unwanted activation due to unpredicted S/C temperature excursions*
- *Mass budget: < 1kg per mechanisms, x mechanisms per S/C*
- *Power budget: neutral (baseline is activation by reentry heat)*
- *Link budget: no active telemetry (seperation detection sensor tbd)*



# Development

- Main technical challenges during development
- Actuator alloy procurement / development
  - depends on:
    - required activation temperature  
(driver: S/C thermal environment during operation and re-entry)
    - Required actuator dimensions  
(driver: max. tensile force/moment)
- Limitation of particle generation



## Starting point / IPR

- Design ideas (patent under application)

## Activities / Work Logic

- Elaboration of mechanism specification / System needs
- Design Trade off (e.g. active vs. passive heating)

## Outcome

- Valve Specification
- Technical Report