



cleansat

BB#19

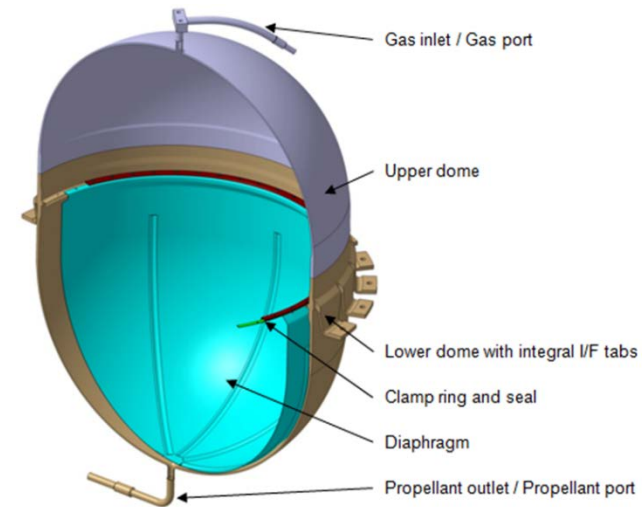
BB Demisable Metallic Tank
MT Aerospace

24/05/2016



Description of proposed technology Building Block

- Baseline + design options
 - Approach: substitution of commonly used shell material: Ti → Al alloy
 - Baseline: AA2219 as shell material
 - Heritage at MT from Ariane 5 tanks
 - Good demisability (DRAMA verification)
 - Flexible design
 - Mounting: polar / equatorial
 - Diaphragm or PMD
 - Tank volume: $50 \text{ l} \leq V \leq 200 \text{ l}$
 - Design options:
 - Use of other Al alloys (e.g. AA2195)
 - Bolted instead of welded assembly
 - Al liner with thermally instable overwrap
- Trade offs to be performed
 - Change of proof and burst factors: mass saving, but additional testing



Description of proposed technology Building Block



- Applicability range (satellite class and target orbits in LEO)
 - Wide range of tank volumes feasible
 - Propellant compatibility: Al is compatible to Hydrazine
 - DRAMA assessment: demisable with altitude 78 km as starting point
- Discussion of the system level impacts (risk, mass budget, power budget and link budget)
 - Main risks
 - Long-term compatibility of materials with propellants to be verified
 - Degradation of diaphragm due to heat generated during welding
 - Mass budget
 - Target (max 10% increase) expected feasible
 - Compatibility with propellant: tank shell and diaphragm
 - No impacts on functionality and external I/Fs except development of Al-Ti welds for line transitions

- Main technical challenges during development
 - Compatibility with green propellants (LMP-103S)
 - Reliable and safe integration of diaphragm (due to closure weld)
 - Mass optimization of local design (e.g. supports)
 - Transition weld: Al to Ti tubes
 - Verification of demisability
 - For design options
 - AA2195: Application of friction stir welding for closure weld
 - Bolted connections: mass optimization and verification tightness
 - Overwrapped liner: selection and design of overwrap