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BB01
Battery Safety
EnerSys ABSL Space Products

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EnerSys Power/Full Solutions
ABSL
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OHB
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A Thales / Finmeccanica Company

Description of proposed technology Building Block

- Although battery passivation is generally agreed to be a necessity, there are no set standards or guidelines of how to implement this, ground tests to be performed to demonstrate these concepts or any comprehensive de-risking efforts
- To limit the risk of all future battery break-ups passivation must be investigated at the **cell**, **battery**, **power system** and **full system level**
- This building block will endeavour to provide a comprehensive summary and recommendations of current and future cell and battery passivation methods for ESA projects by:
  - Determining a framework (or guidelines) for future passivation work
  - Recommendation of passivation methods
  - Determining which tests should be performed as part of cell qualification to conform to these recommendations
  - Identifying and where possible reducing the risk of any potential hazards relating to mission EoL and passivation techniques

Description of proposed technology Building Block

- This BB is applicable to all satellites and all Earth orbits under taking passivation at EoL
    - Within this project, there will be a particular focus on LEO as well as the worst-case scenarios. To meet this ABSL intend to present a worst-case study which are assumed to be a LEO small satellite and a GEO/MEO large satellite
- This clearly feeds into the system risk assessment as the battery is one of the largest stores of energy within the satellite
- Management of this may impact the mass budget, increasing the power subsystem mass
- The mitigation method used will impact the power budget, preferably only during the passivation process

Development

- Examples of the main technical challenges associated with this BB are:
  - Required level of discharge at EoL (50% state-of-charge (SoC), 0% SoC, 0V etc)
  - How will this discharge be performed
  - What system failures could cause a critical battery failure
  - Determining the battery behaviour under conditions which may be seen during passivation (for example, temperatures in excess of 100°C for long durations)
  - Determining any risk of creating debris if a battery is accidently and rapidly overcharged
  - Determining which tests are most appropriate to perform on ground to ensure the safety at EoL and during passivation