Needs and requirements of COTS at INMARSAT

Kristiina Jokela, Product Assurance Manager

ACCEDE Workshop on COTS, 6-8 November 2019

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Global Xpress

GX7 - GX9

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EEE Parts Selection

Space Qualified

Qualified to military or space standards as per:

- ECSS
- JAXA
- MIL
- CECC
- NASA

Non-Space Qualified

- Qualified to automotive standards AEC-Q100, Q101 or Q200
- Components having reliability data from the manufacturer
- Components without reliability data, but successful LAT
- ECSS-Q-ST-60-13: Commercial electrical, electronic and electromechanical (EEE) components
- PEM-INST-001, LEVEL 1 Instructions for Plastic Encapsulated Microcircuit (PEM)

Qualification on the lot+ Adequate radiation hardness

Specific screening

Screening can be reduced in specific cases

Screening can be reduced if:

- No impact on reliability
- Removed step is ineffective
- Manufacturing is well controlled

Note:

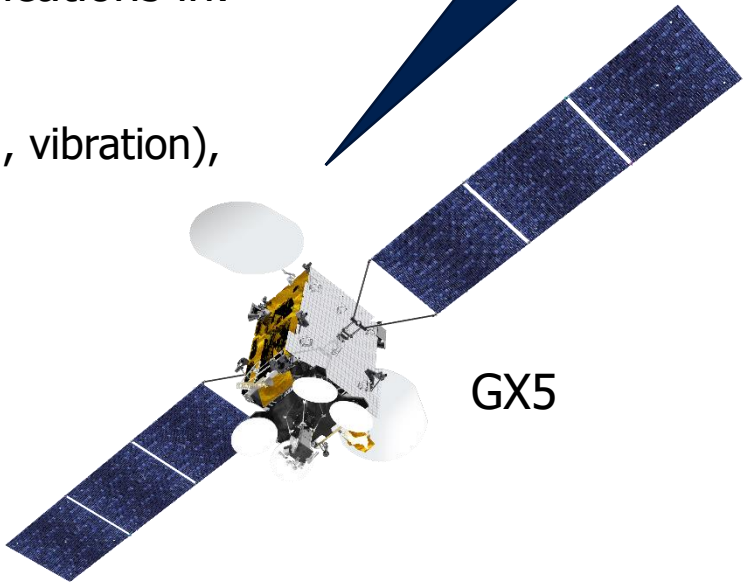
- Solid Tantalum Capacitors: 100% single unit surge current
- Cavity devices: 100% PIND + 100% hermetic seal (fine and gross leak)

Lot Acceptance Test (LAT)

Necessary for EVERY non-qualified part (Each datecode or tracecode)

- Custom-made LAT, including following verifications in:
  - Construction analysis
  - Mechanical environment (shocks, acceleration, vibration),
  - Highly Accelerated Stress Test (HAST)
  - Thermal cycling
  - Lifetest
  - Radiation
  - C-SAM

Tailoring possible



GX5

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Radiation verification

Requirement unchanged

Radiation analysis

- RADLAT

TID and TIDL

- Margin > 2
- Margin >1.2, if data on the lot

SEE

- Safe use of components
- SEU rate and SET effects transparent to operations.

Radiation verification necessary.

Testing required if data not available

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Parts Procurement Control Boards

Inmarsat approves all parts in **as-design** phase

Space qualified parts approval

- Listing in DCL

Non-Space qualified parts approved

- Listing in DCL
- Justification document detailing
  - Technical description of the part
  - Heritage use
  - Specifications, LAT, Screening, procurement
  - Planned radiation tests or demonstrated radiation capabilities

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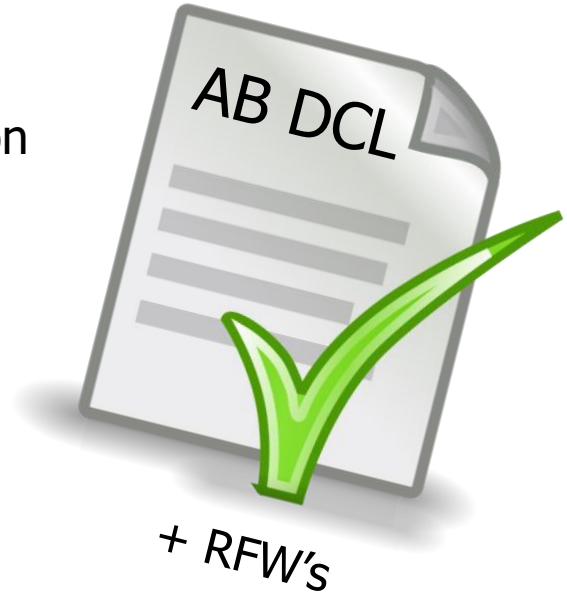
Parts Procurement Control Boards

Inmarsat approves all parts in **as-built** phase

Review

- That LAT and planned activites has been performed on mounted DateCodes
- Max lifetime 15 years
- NCR's, RFW's



Lifetime

Max lifetime 15 years

Parts which are older than **15 years** at time of assembly shall not be used.

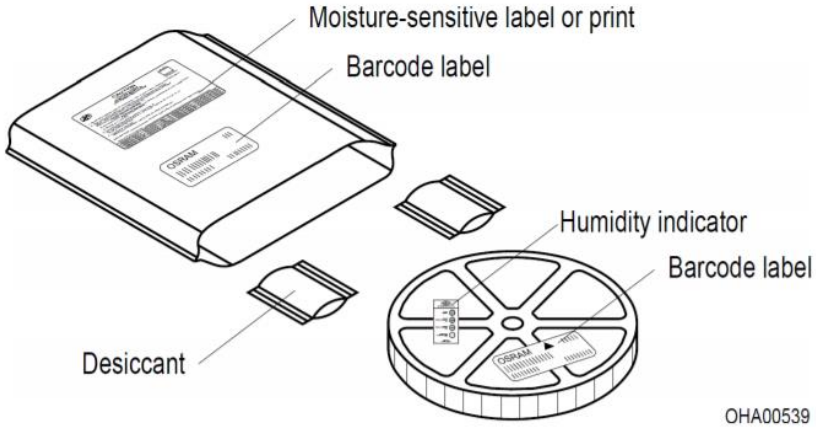
> Relifing activities are not required during the 15 years timeframe.

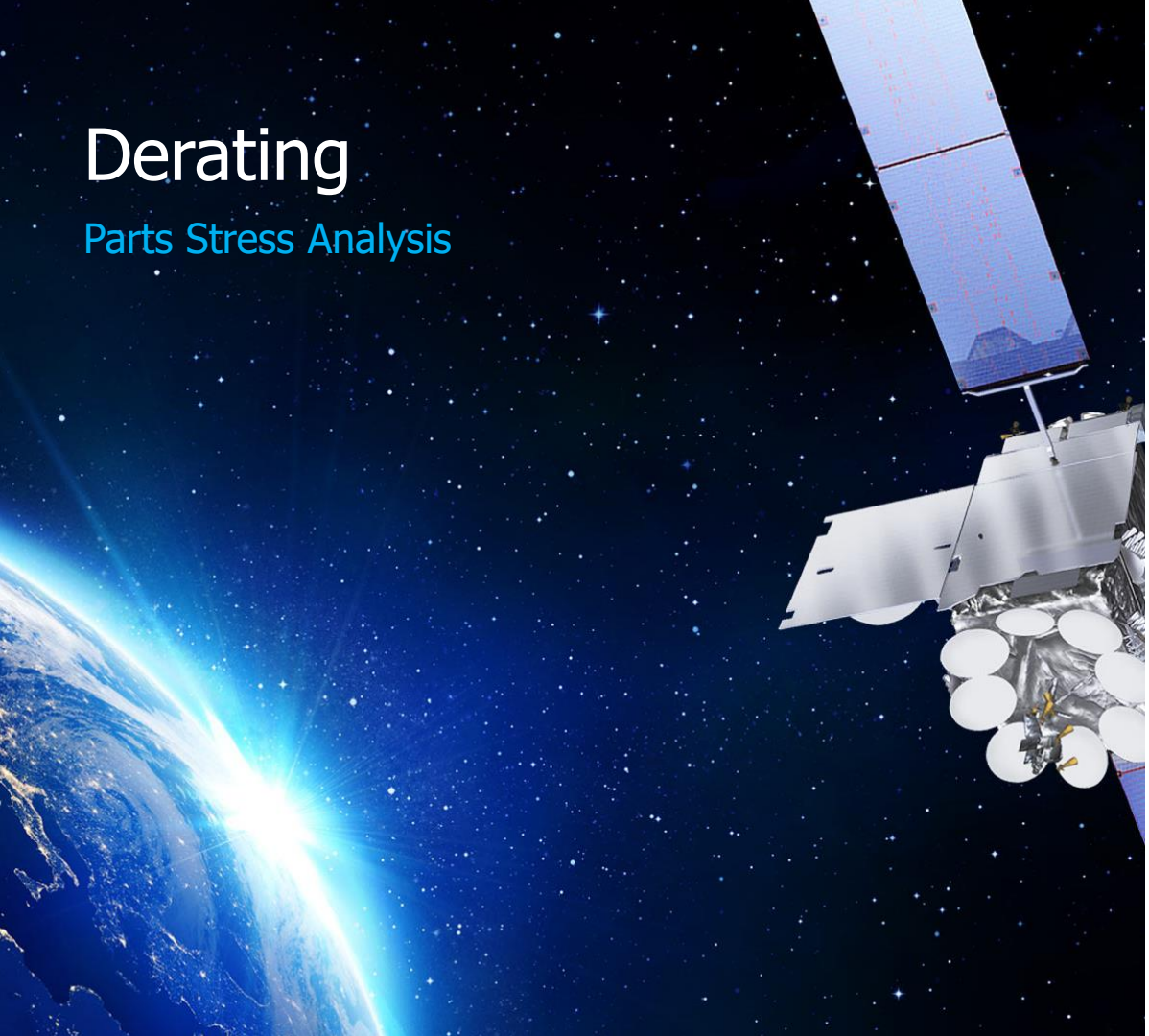
- Parts storage in adequate storage conditions
- Advantageous for
  - obsolesce management, strategic stocks (radiation tested), long delivery time, heavy lot charges, long production cycles.

Storage

Commercial parts encapsulated in plastic package shall be stored:

- Under Nitrogen, or
- under dry and ionised air (RH shall be kept to 20% maximum), or
- In dry packs





Derating

Parts Stress Analysis

Derating rules to be respected in order to keep the reliability along the mission

- The ECSS-Q-ST-30-11(latest version) or
- NASA EEE-INST-002, or
- corresponding MIL specification

Stresses to be calculated as per real application

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Thank you!
QUESTIONS?
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