



NEW SPACE COTS PARTS SELECTION FOR LASER COMMUNICATION IN CONSTELLATIONS

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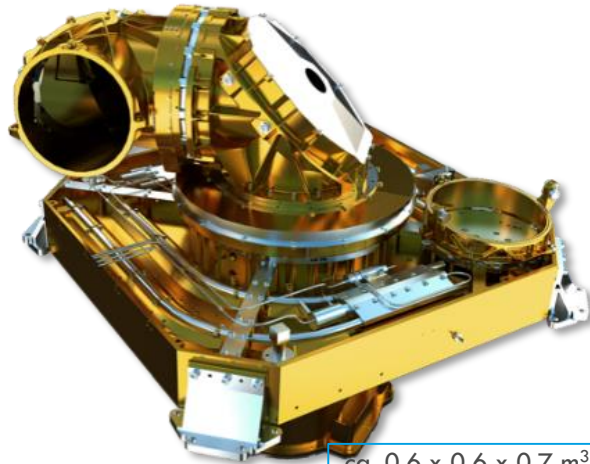
Multimedia Use Cases of Laser Communication, from Transport Media to Applications



Near-Realtime Transfer for Earth Observation

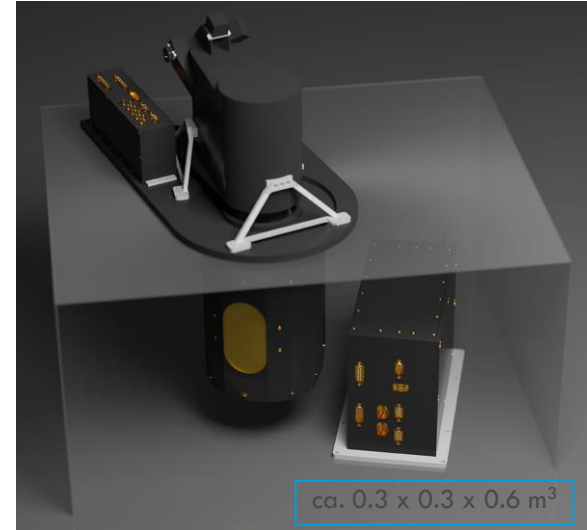
Broadband Connectivity

GEO LCT 135



ca. 0.6 x 0.6 x 0.7 m³

ConLCT

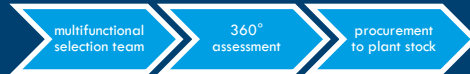


ca. 0.3 x 0.3 x 0.6 m³

- » Constellation programs: other quantities, other missions, other cost expectations
- » New EEE parts concept, also for opto-electrical components
- » Same complexity of solutions: internal and with subcontractors

- » The New Space Concept: nearly established
- » Extensions to opto-electronic parts
- » Two examples
- » The take away's

COTS part selection process from design to plant stock



TESAT & Airbus Quality standards and Radiation standards for COTS



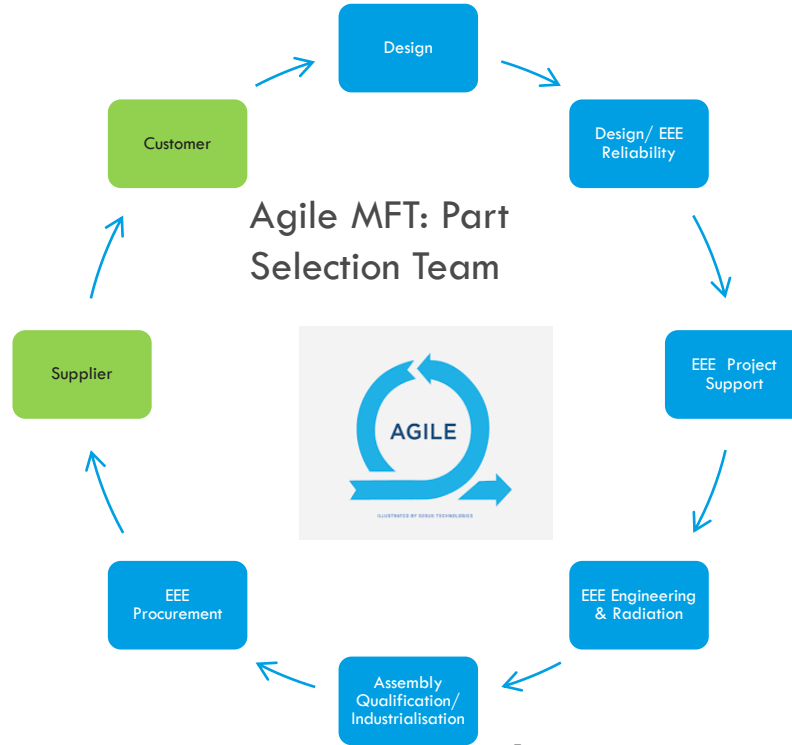
EEE New Space Parts Processes & Requirement



Radiation and Technology experience on industrial grade parts



Design to cost approach implemented to meet cost targets



→ **Co-Engineering also in all levels including subcontractors***

11/03/21

*see also talk at ACCEDE, Daniela Staerk

THE NEW SPACE CONCEPT: SELECT THE RIGHT INDUSTRIAL PART

Upstream and Downstream Quality

Upstream Approach

Part Designed for Space Usage



Part Qualification



Small Volume Production established for Space Parts



Screening with Burn-in and Cycles and regular Lot Acceptance tests



High Reliable Part by Testing

Classic Space Approach

Downstream Approach

Part Designed for Industrial Usage



Part Qualification



Continuous large Volume Production

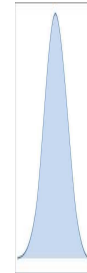
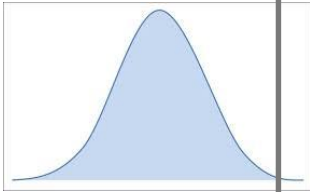


Electrical Checks



High Reliable parts by production

New Space Approach



PARTS SELECTION: SELECT THE RIGHT INDUSTRIAL PART

Endurance testing example of an integrated circuit

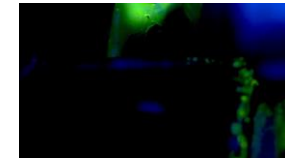
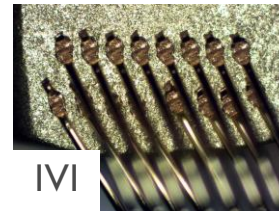
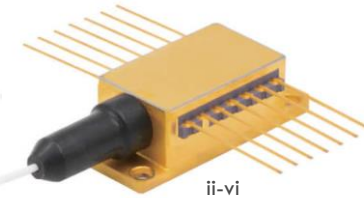
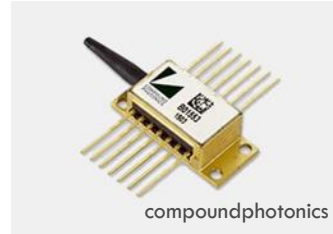
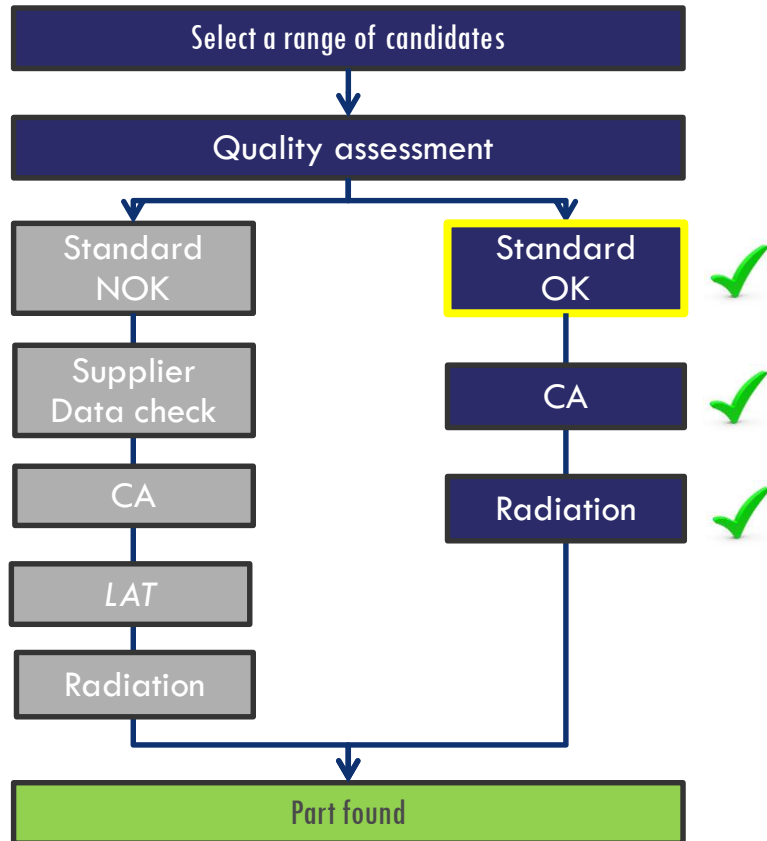
| Endurance Testing (HTOL) | AEC-Q100 | JEDEC | MIL (classic space) |
|--------------------------|----------|---------|---------------------|
| number of parts | 3x77 | min. 80 | 45 (22) |
| Duration [h] | 1000 | 1000 | 1000 |
| Temperature Ta [° C] | 125/150 | 125 | 125 |

| | ESCC 23202 | Telcordia |
|---------------------|---|---|
| Mechanical Shocks | 1,500 g (peak), 0.5 ms MIL-STD-883, 2002 | 500 g (peak), 1 ms MIL-STD-883, 2002 |
| Temperature Cycling | 100 cycles -40° C to 85° C | 100 cycles -40° C to 85° C |
| Operation Life | (70 °C) 2000 h, | 70/85 °C 5000 h |

→ Equivalent Qualification

PARTS SELECTION: SELECT THE RIGHT INDUSTRIAL OPTICAL PART

Qualification Example of Laser Diodes



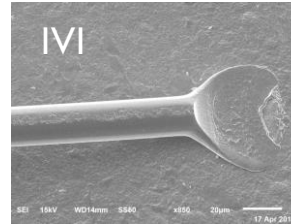
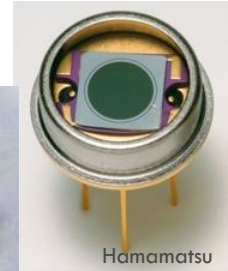
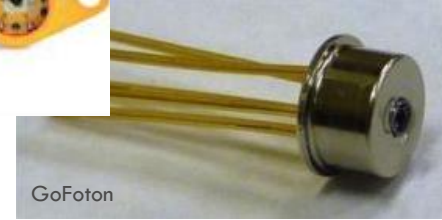
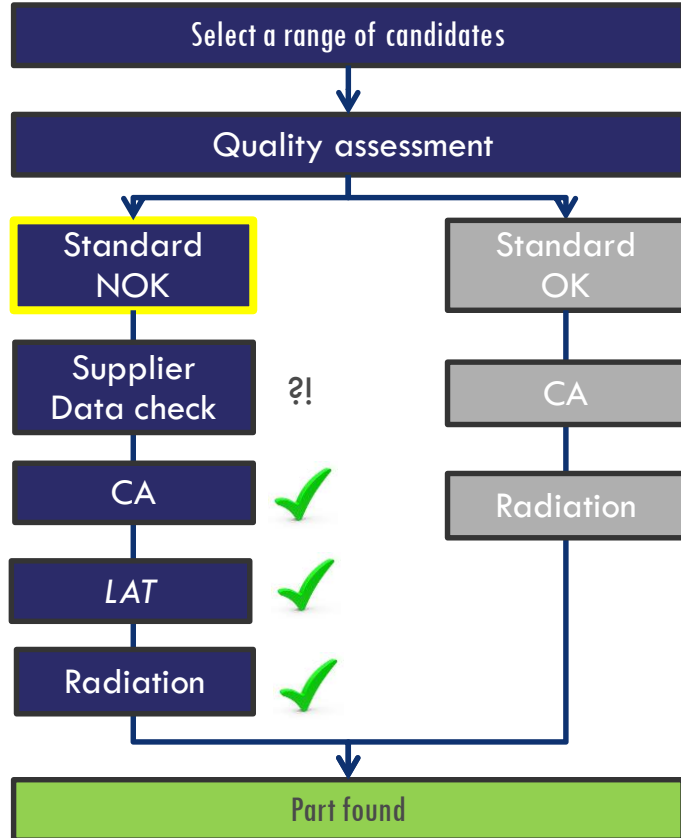
2. Hermetic Seal Test

Fine Leak Test Method:

MIL-STD-750-1, Method 1071, Condition H2 (flexible)

PARTS SELECTION: SELECT THE RIGHT INDUSTRIAL OPTICAL PART

Qualification Example of Photo Diode



2. Hermetic Seal Test

Fine Leak Test Method:

MIL-STD-750-1, Method 1071, Condition H2 (flexible)

| LAT | | |
|--------------|---------------|---|
| Shocks | 1500 g | ✓ |
| Temp. cycles | 500 | ✓ |
| vibration | random & sine | ✓ |

- » Select the right industrial parts
- » Trust the qualification and processes → no additional screening
- » Use our space knowledge on known quality risks
- » Work together with your commercial suppliers especially for optical modules

Final result: a high quality and radiation tolerant EEE opto part for our missions

THANK YOU!