

Airbus Defence and Space
Harness component roadmap

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S. Riandière, T. Antonini, S. Mariojouls
15/10/2026

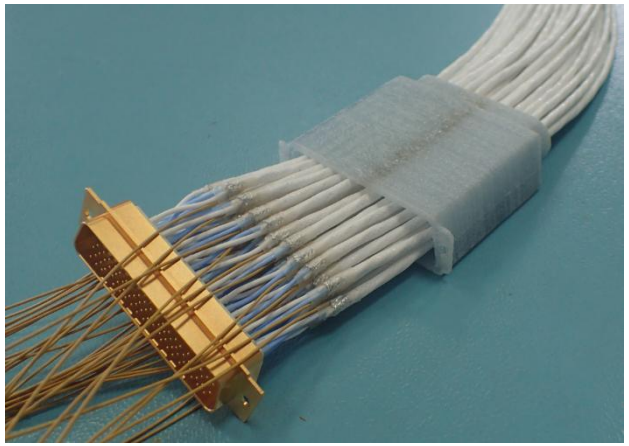
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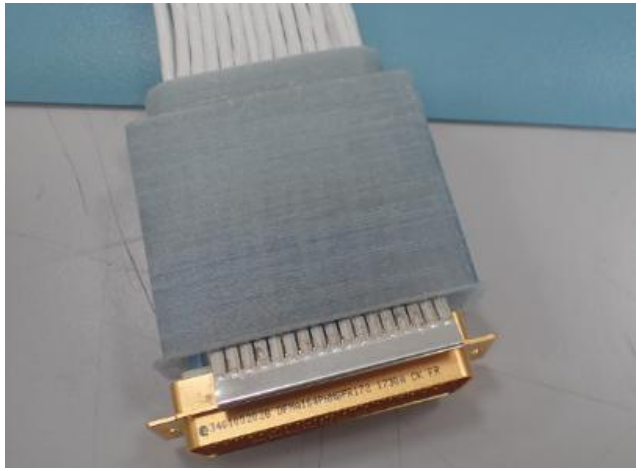
Equipment “optimization”

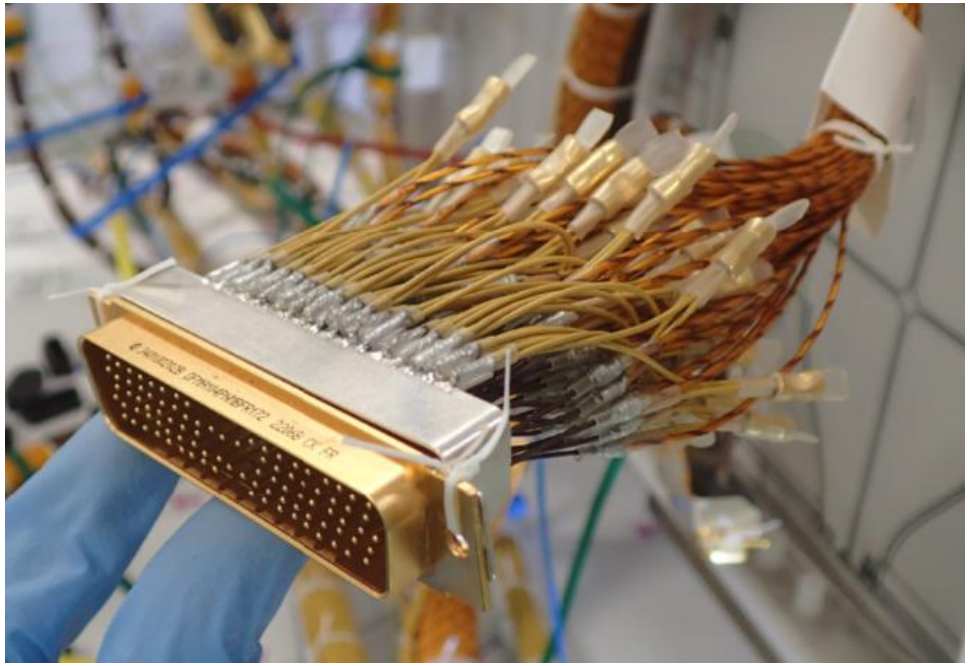
Equipment optimization leads generally to a size reduction and higher connexion density.

From spacecraft harness point of view, it becomes difficult not to say impossible sometimes to access to all electrical signals which are made available at equipment level.

=> we are trying to identify these limitations to drive unit design

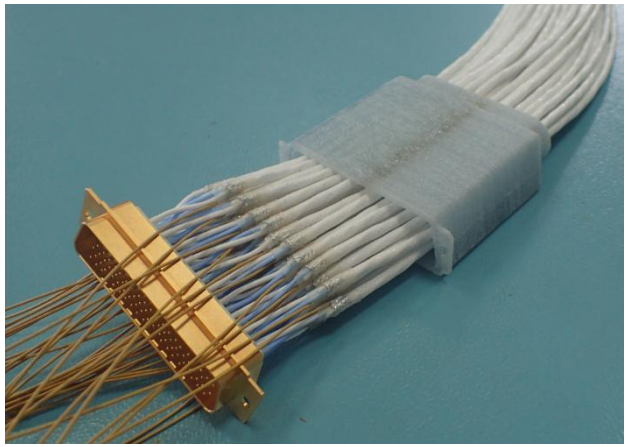


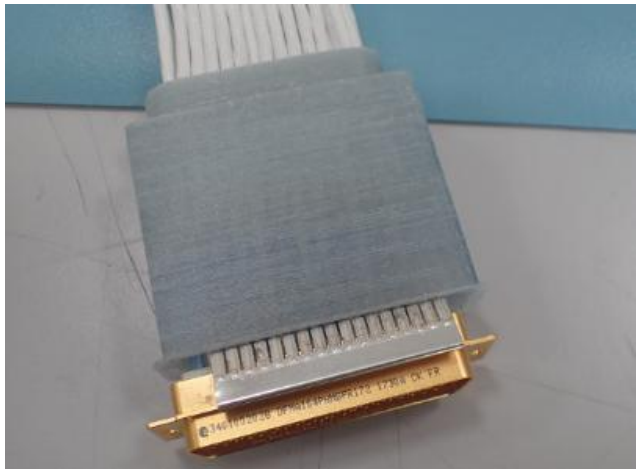




Equipment “optimization”

At unit level 104 ways high density sub D connector
=> 48 LVDS like signals
⇒ 120 ohms impedance controlled cables
⇒ **Only 40 out of 48 are accessible** on spacecraft side with standard hardware solution





At unit level 104 pins high density connector
=> 90 thermistor like acquisitions…

⇒ 90 forward wires + 90 return wires…

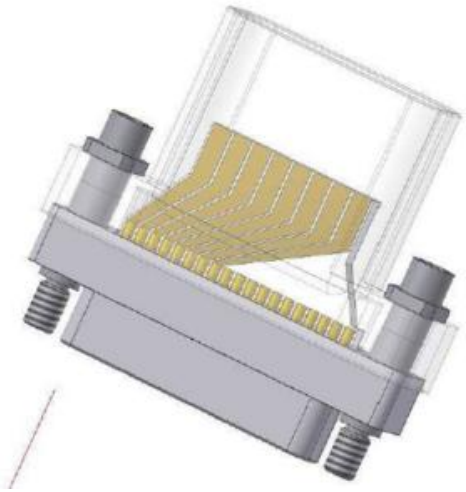
⇒ 180 wires for 104 pins + shielding connexion if needed at system level

⇒ 14 pins used as common return for 90 wires
⇒ 14 splices with 6 to 7 thermistors wires on one side and 1 wire on the other side to be crimped into the pin

Equipment “optimization”

For power supply, even if at unit level several pins are made available to cope with the power consumption, it is not always very easy to accommodate on spacecraft side.

Indeed, generally to meet voltage drop and derating requirements at spacecraft level, it ends up a lot splices and wire gauge adaption.



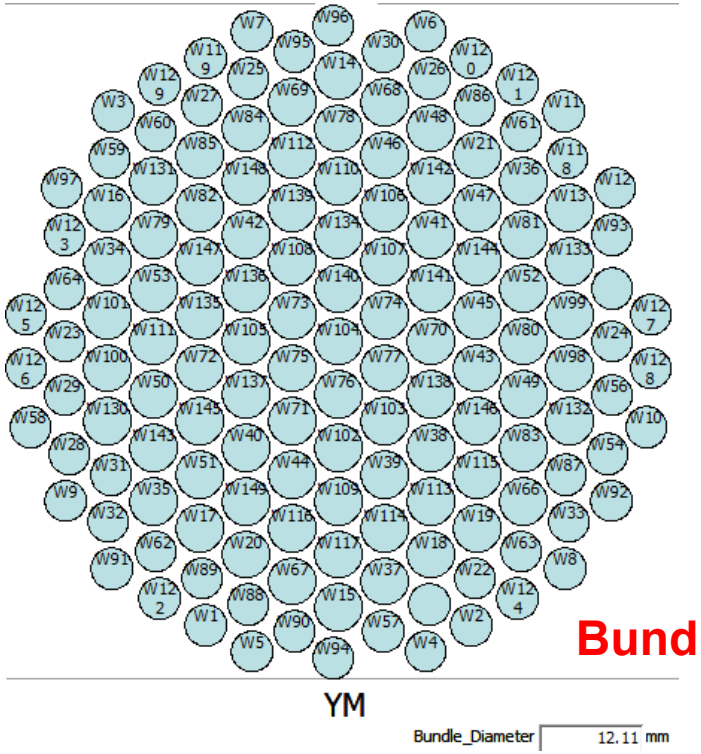


Equipment “optimization”

=> And even when you can put several wires in parallel, you are impacted by derating and bundle size.

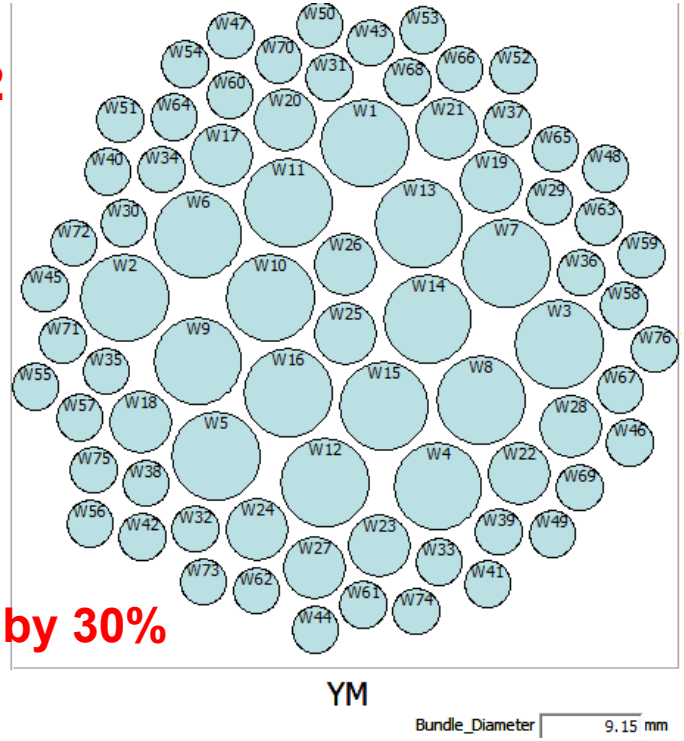
Example:
Same current conditions, first bundle limited to AWG24 (µD connectors), second one with AWG 20 (sub D connectors)

149 wires
Bundle ⌀ 12.11mm



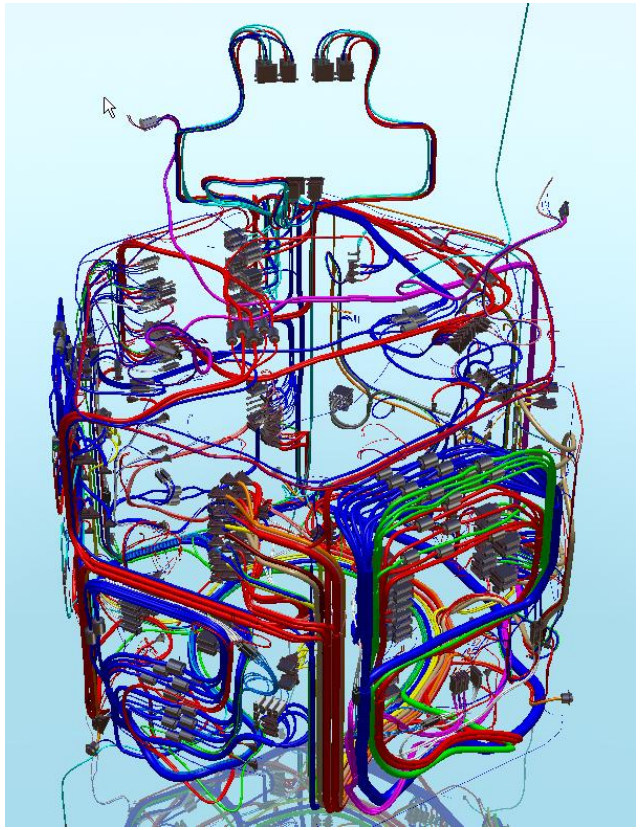
Wire Number x 2

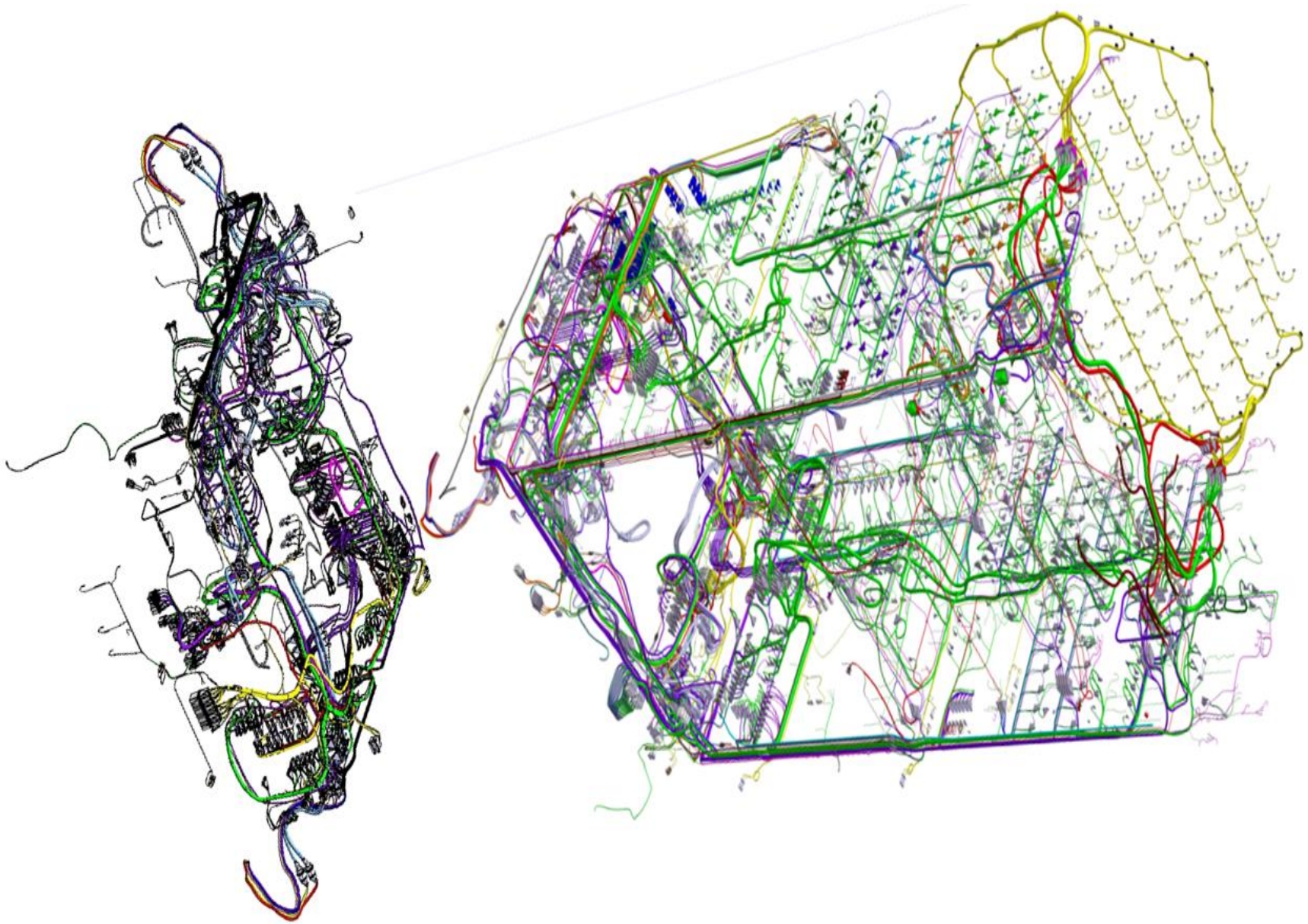
76 wires
Bundle ⌀ 9.15mm



Bundle Size increases by 30%

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Equipment “optimization” take away

- **We are not choosing harness connector but we try to influence**

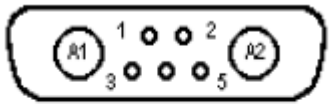
⇒ By limiting the applicable connector list in our specification for equipment design (ex: 104 ways Sub D and µD connectors with more than 37 ways are forbidden and even 78 ways Sub HD are submitted to our approval).

⇒ And trying to be involved in early design phases.

Connector miniaturization needs to be considered carefully not only thinking at equipment but more at system level.
On your side you can support us when you are asked for high density connection or very small connector by equipment supplier to provide them with this kinds of warning

- **Maybe qualified “mixed” µD connectors would help as it can be with sub D connectors**.

Sub D “mixed” configuration transposed to µD connectors



A
7W2
5
2

Less contacts but some which allows “enlarged” barrel ?

Constellation landscape

In a constellation logic with high volume and repeatability, the industrial efficiency becomes key.
In that way, all components which allow a faster manufacturing and integration are really an enabler of the global system planning target.

Fast locking DC and SMA connections, thermal HW with **“one way” connectors** like become really an asset because it can reduce integration operation, inspection without the need of highly skilled operators and controllers.

Also splices everywhere is not an option so “flying lead” connectors are not an industrial solution, and we are looking for instance for crimped version of µD connectors (3401/091).

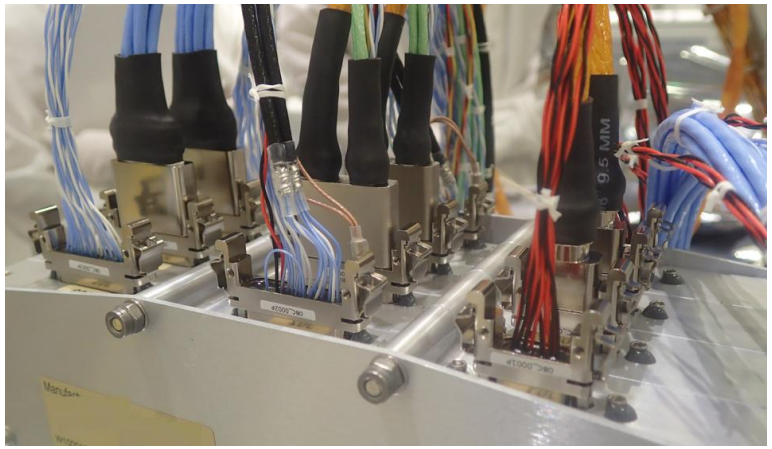
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Constellation landscape

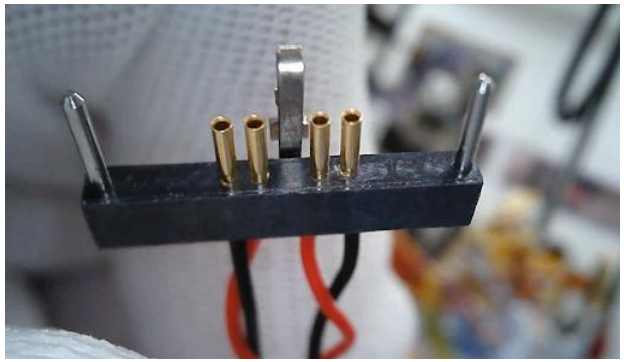
OneWeb figures:

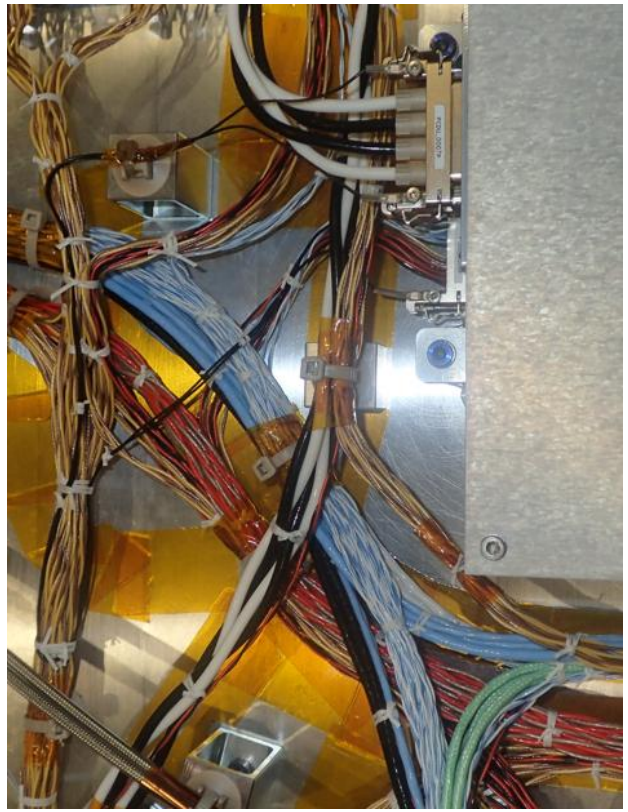
- 160 connectors, 1800 connections, cumulated wire length 600m
- Full use of fast lock connectors, rackable connections, and thermal “connectors”
- Zero splice on harness
- Use of harpoons clips to speed up harness installation

=> less than 1 hour needed to install the harness on the spacecraft







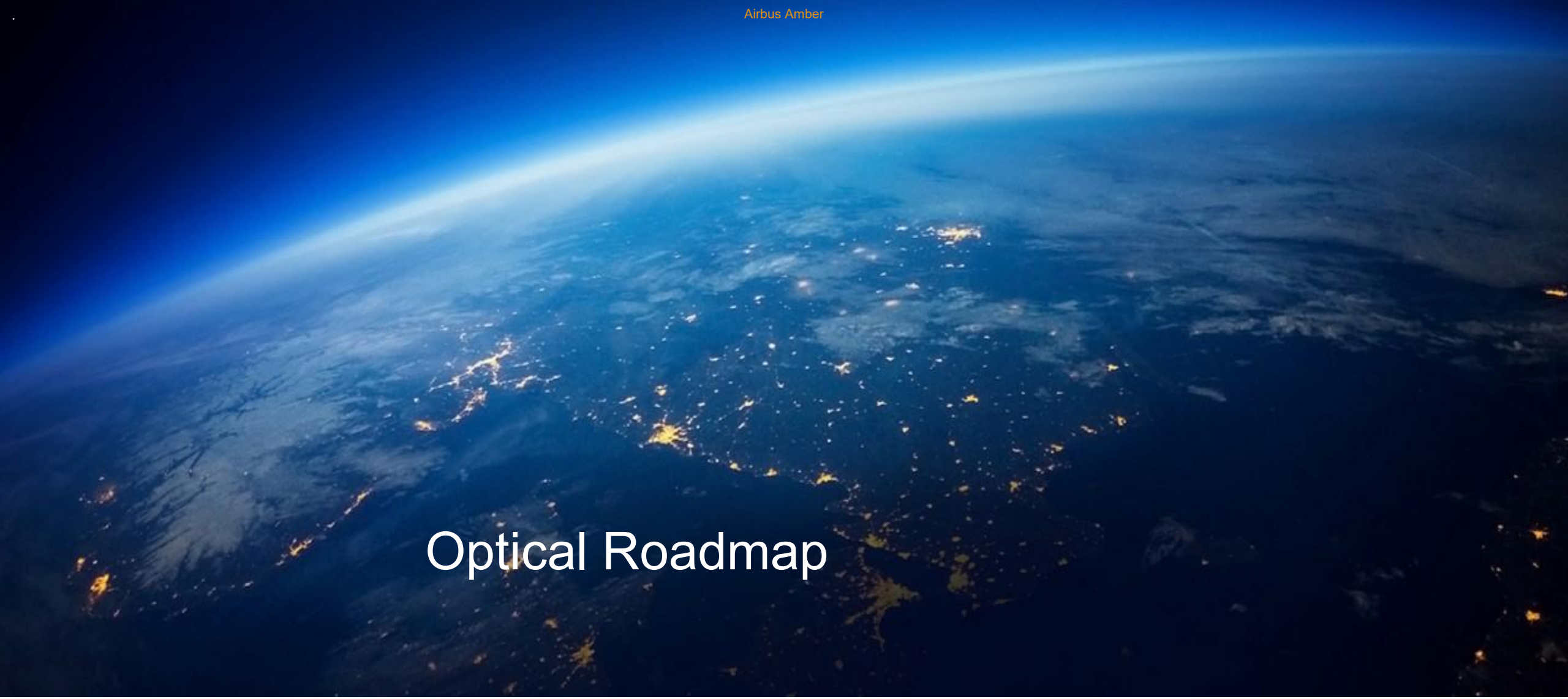


Specific case: Gold plated lugs and splices

Not easy to procure and limited production volume doesn’t help.

Nevertheless, we need to have some when strictly required and the actual situation is that sometimes the design solution shall be deoptimized to cope with available components.

=> When requirement is not strictly asking for gold plating, we are qualifying alternative solutions.
=> But we also need to find other sources for gold plated components procurement.



Optical Roadmap

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23/07/2026

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From customized & non-optimized solutions to generic and competitive ones

Optical HSSLs 10-28Gbps per channel: digitalization, instrument complexity, constellations,...are pushing strong today !

First use cases at SpS (legacy):

- Interconnections between **telecom payload elements** (digital processors)
- End-to-End Data Handling of payload : Complex focal planes, processing, digital antennas, Optical communication terminals.

Starting from **highly customized** photonic technology (as driven by a unique and complex design & urgent schedule)

→ Airbus Defence & Space is moving forward …

GENERIC PHOTONICS TECHNOLOGIES ARE KEY

(REC & NREC costs, supply chain stability, inter operability,...)

High data rates between equipment's is now **a reality in our architectures**



- Driven by E2E data handling – Optical technology alignment
  - **All Space equipments manufacturers** soon involved : optical interfaces + internal optical routing
  - **All primes** involved : technical alignment across the E2E data handling + mastering the optical harness between equipments (AIT)
  - **Airbus D&S position : push for common & standardized interfaces**

- New challenges
  - **Optical performance validation** with interface specification standard, at equipment level, at satellite level, taking into account agencies guidelines (test as : Insertion loss, Bit Error rate…)
  - **Interoperability:** In case of lack of techno alignment
  - **AIT :** Specific trainings, cleaning problematics, reparation, …

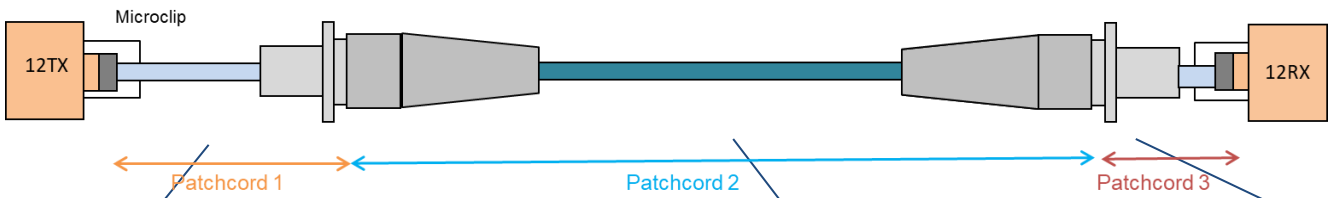
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Airbus D&S Key Standard Technological bricks

Taking into account the industrial constraints, ADS push for **a MT ferrule and MPO based optical harness**

- MPO is a **Standard** interface, cost effective
- Compatible of all telecom tools, making it very **AIT friendly**

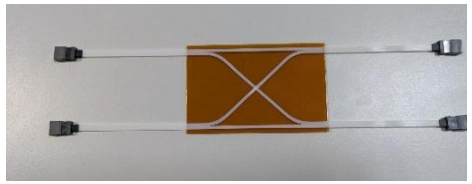
Full optical harness solution **TRL6 in November 2026**



Internal Optical Patchcord

- Providing routing flexibility





External optical Patchcord

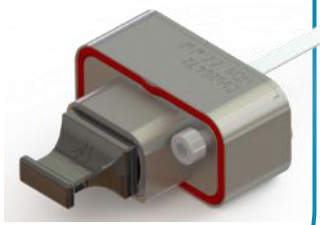
- Standard external patchcord, easy to replace



MT to MPO Adapter

- Design-to-cost, Standard interface
- EMI Harshened

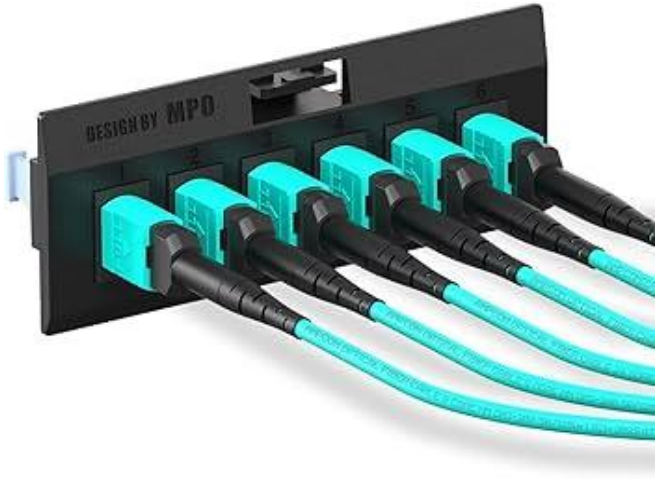




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Airbus D&S Shuffling function

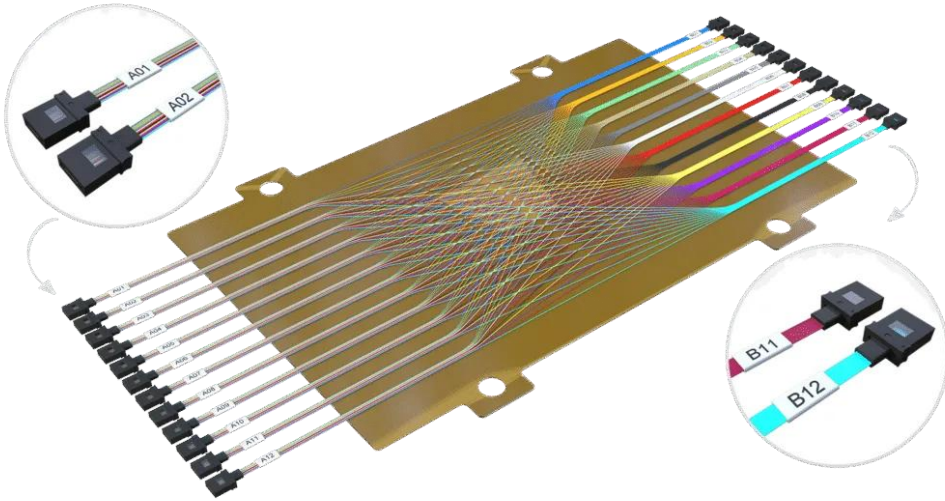


Based on basic technological bricks (flex, MPO to MT adaptor), ADS develops **shuffle boxes** through R&T

- addressing complex routing
- minimizing industrial constraints

- Makes it possible to address **architectures of varying complexity** while relying on proven technologies for shuffle boxes for max 500 fibers.

- This approach might enable the **successive integration of multiple shuffle boxes**, significantly easing industrial constraints as manufacturing, testing, and repair



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For more information…

ICSO 2026

- White Paper : Optical High-Speed Serial Links (HSSLs) in Airbus Space Systems Payloads, Platforms, and Products
- Poster : Design-to-cost optical harness development for optical High Speed Serial Links (HSSLs).

GSTP activity : End-To-End On-Board Data Handling Architecture Based On Optical High- Speed Links, in progress. Contact - Manuel Armbruster manuel.m.armbruster@airbus.com

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