More Electrical Aircraft: Potential impacts on the Supply Chain

MEA 2015 Conference
Toulouse, February 3rd, 2015
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TOMPASSE is an association set in 2007 that groups industrial companies in the “Aeronautics, Space and Embedded Systems” field in the Midi-Pyrenees Region.

- Promote the industries involved in the Region
- Facilitate regular discussions between industrial companies in the sector
- Become a natural point of contact for regional partners (Local State authorities, local communities, etc..)
- Be involved in regional actions for Aeronautics, Space and Embedded Systems.

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Starting point:
A new aircraft significantly more efficient (DOC, emissions..) than today aircrafts will necessitate:

• An improved aircraft configuration
• New engines
• Breakthrough technologies for systems and structural parts conducting to new products

The MEA is fully involved in this adventure
TOMPASSE, on request of DIRECCTE Midi-Pyrénées has driven an analysis with ARCHERY Consulting in order to evaluate the trend of the supply chain structuring.

The work in still on-going however some preliminary results of this study are included in this presentation.
On existing platforms the supply chain for **aircraft parts** is well structured: a simplified view

- Aircraft manufacturer packages:
  1. Structural parts (*) (complex or critical packages)
  2. Pylon between engine and wing
  3. Cockpit design & integration
  4. Some generic components or critical systems
  5. Integration packages (HP, LP air ducting, fuel piping, hydraulic ducts, wiring...)

- Tier 1 Supplier packages:
  1. Engines with or without nacelle: engine are certified separately ➔ large autonomy
  2. Structural parts: A/C manufacturers significantly involved ➔ limited autonomy
  3. All systems mainly splitted by ATA chapter ➔ Intermediate autonomy

(*) Structural parts mean: fuselage, wings, pressure bulkheads...

In the value chain, each package has its own supply chain (Tier 2, 3, 4...). Some suppliers may be common to several packages.
In the last twenty years the trend was to increase the size of the supplier packages for two main reasons:

• Share program & financial risks between the A/C manufacturer and its major suppliers
• Launch several programs in parallel without increasing too much the size of design offices and therefore reducing NRC at A/C manufacturer.

The result is:

• Tier 1 suppliers are becoming bigger and bigger and could become a new category of Super Tier 1 allowing some existing Tier 1 to become Tier 2.
• A consolidation of the industry is on-going and there are less and less independent intermediate size companies.
• The gap between big groups and small companies is wider than before.

However, this picture is not totally stabilized as some A/C manufacturers are going back and resize packages.
How a MEA could impact the supply chain:

- New technologies will imply new actors:
  - Examples: Connected Aircraft, power electronics, high voltage technologies, new generation of composites etc.

- The A/C design will necessarily go across ATA chapters to have a global optimization of the electrical configuration → power management, thermal management, degraded modes etc..

- A rupture aircraft by definition will present new technological challenges and may lead A/C manufacturers to keep more products internally to mitigate risks, at least for the first application.

- Same behaviour could also be seen at major Tier 1.
A possible scenario!

- Definition of the overall architecture of a new aircraft
- Global optimization of the electrical and thermal architecture
- Identification of the new functional chains
- Definition of consistent technical packages minimizing interfaces and interactions between them
- Definition of procurement packages allowing competition
- Selection of suppliers mastering the key technologies of the considered package and having the financial strengths ➔ new Tier 1.
• What could be the trend for the various players?
As a consequence we can expect to see Tier 1 and Super Tier 1 with a minimal critical size i.e. above 1 BUSD turnover able to:

- Develop complex work packages
  - Contract Management, Program Management, System Architects

- Develop a real product policy

- Have financial strength to live with a business model including more than 50 to 100 MUSD development NRC per program

- Guarantee its package for the life of the program
  - Spare and Piece part availability, obsolescence management, technical follow-up / retrofit …

- Manage a worldwide supply chain
Tier 2 suppliers will be of intermediate size i.e. 100 to 200 MUSD turnover and able to:

- Share a mix between built-to-print and built-to-spec
- Share a limited risk transfer from their customers
- Have financial strength to follow the technology changes and stay state-of-the-art in their domain
- Be competitive & manage their supply chain
In that scenario what could become the supply chain particularly SME:

- Components suppliers
- Technology « niches »
- Piece parts and special processes for A/C manufacturers & Tier 1
- Capacity sub contractors

And outside A/C parts:

- Test rigs and tooling
- Proximity services
- Special expertises
Possible schedule for a new MEA:

- **Next five years**: R & T to reach the right TRL for MEA new technologies
- **RFTI & RFI** will be a competitive phase to evaluate the readiness of MEA technologies and organize the supply chain
- Therefore timeframe from 2015 to 2025 can be used to improve existing family of aircrafts.

Unless one player decides to launch a new program earlier.....
Thank you for your attention !!