Lightweight Construction: A Chance Throughout the Entire Supply Chain?

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Lightweight Materials in Aircrafts

The airlines' demand for fuel efficient aircraft led to the greater use of lightweight materials in aircraft construction. Increasingly larger portions of the fuselage and other parts of new aircraft will be composed of lightweight materials, such as carbon fiber reinforced plastic (CFRP), which get their stability from carbon fibers embedded in the plastic matrix. These materials make aircraft lighter than ones with aluminum fuselages, are highly rigid, and have excellent properties in terms of fatigue and corrosion resistance.

While the Airbus A380 was already a step forward in lightweight aircraft construction with a CFRP share of around 25%, Boeing's 787 and Airbus's A350 XWB mark the next step in the journey towards an 'all composite aircraft' with CFRP shares of more than 50%. Besides materials of primary structures, new engine concepts, seating, or aviation electronics systems will have to contribute to weight reduction. Aircraft manufacturers need their suppliers' support in all of these areas.

The Supply Chain for Lightweight Materials

For many suppliers in the aircraft supply chains of Airbus and Boeing, building up and nurturing competencies in innovative lightweight technologies and lightweight production has become inevitable. The challenges on the OEM as well as the supplier side are manifold, and both, process and product innovations are required.

First, the production of components from CFRP is still a largely manual process. Even automated process steps often require rework, and scrap is generated. A challenge for the introduction of new lightweight aircraft and the subsequent ramp-up of production volumes is the development of production methods for primary aircraft structures that are highly automated and produce predictable quality with no scrap.

Second, lightweight technologies are complex and R&D intensive, and therefore, innovation will require efforts to join forces along the supply chain and with research partners. The 'carbon cluster' in the Munich-Augsburg-Ingolstadt area or the 'CFK-valley' in Stade are examples of such efforts. Knowledge from suppliers and partners which traditionally have not been involved in aerospace supply chains will be needed.

Third, new and disruptive technologies will likely question established relationships in supply chains. Innovation pull from the OEMs can shift towards innovation push of the suppliers, power and dependence can change, or new models of risk and profit sharing will be needed.

In any case, setting up and developing an OEM's supplier network will not become an easier task. But for suppliers and OEMs who see it as a chance to move into the next millennium of aircraft construction, preparing the grounds for process and product innovations along the aerospace supply chain will pay off in the future. This can only be successful if long-term oriented partnerships between OEMs, suppliers and other partners in the supply chain are actively developed.

Moderator

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