

Leading  
Business  
by Design:  
**Aerospace  
sector**

### **About Design Council**

**Design Council is an enterprising charity which improves people's lives through the use of design. Our work places design at the heart of stimulating business growth, helps to transform our public services and enhances places and cities to ensure a sustainable future for everyone. We advance new design thinking, encourage debate and inform government policy. Our vision is to create a better world by design.**

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# Contents

Executive summary	4
Main themes	8
Recommendations	12
Introduction	14
Research findings	20
Case studies:	
Section 1 – Innovation and growth	
Factorydesign	44
Bombardier	48
Section 2 – Collaboration	
GKN Aerospace	56
Simon Pengelly	60
Rolls-Royce	64
Section 3 – Designers' skills and competencies	
James Park Associates	70
MEL Aviation	74
Controls and Data Services	78
Section 4 – Future trends	
The Advanced Manufacturing Research Centre	84
Virgin Atlantic	90
PriestmanGoode	96
Appendix:	
Methodology	101
Interview questions	103
Bibliography	105
About RS Consulting	106

# Executive summary

*“ We can’t not invest, design is so engrained. We can’t separate design from the business. It is not a function. It is a way of being and doing. ”*

Head of Customer Experience, Airline

Civil aerospace poses unique challenges to designers working within it. Rightly one of the most heavily regulated and scrutinised of all industries, its design vision is relentlessly impacted by legislation, certification, environment, safety and security. Yet it is an industry where rewards for successful design are high and new technologies and materials are pushing the art of the possible.

To understand the current and future role of design in civil aerospace, RS Consulting has conducted research on behalf of Design Council, interviewing those in leading positions across the UK industry. A broad understanding of design was adopted as this is how it is understood in aerospace.

It covers a continuum from design that is focused directly on the experience of passengers – from in-flight service to seats in cabins – to design in a more technical sense – for example, sensors and fundamental components of the aircraft structure itself.

However, even passenger-facing product and service design must operate in an environment defined by technical design-engineering aspects. This can lead to tension, for instance between airframe manufacturers keen to spread costs over long, standardised production runs and airlines seeking to differentiate through regular refreshes of cabin interiors every few years.

The aerospace industry is highly fragmented so organisations' visions of design tend to fall on the more directly passenger-facing or more technical side of the design continuum. However, it is important to highlight the interconnection between these two. If design is viewed centrally and strategically, it can serve to provide sustainable competitive advantage for both airlines and the manufacturing supply chain.

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Five themes emerged in this study, building on evidence in Design Council's 2014 *Leading Business by Design* report:

- 1 Where design succeeds most it is driven and informed by passenger and customer requirements and creates a positively differentiated result
- 2 For sustained corporate success, design needs to be embedded strategically and take place in a corporate environment with a strong design vision
- 3 Design-led innovation is challenged by the complexities of the supply chain and conflicts between different actors. To achieve best results, designers must collaborate with customers and companies across the supply chain
- 4 Design in aerospace requires many technical skills, but a common theme is the need for trade-offs to successfully execute briefs. Therefore, strong collaboration with disciplines covering technology, manufacturing, sales and marketing are vital
- 5 Evolving industry trends pose a whole new series of challenges for designers in aerospace. In the cabin, the increasing sophistication of in-flight entertainment (IFE) and passenger-driven requirements for connectivity will transform the future passenger experience. Elsewhere, new materials, innovative manufacturing techniques such as 3D printing and new tools for modelling and non-destructive testing require aerospace designers and companies to acquire new, more rounded skill sets as new applications and benefits are explored and developed.



# Main themes

## **Innovation and growth**

In an industry with hugely lucrative B2B customer-supplier relationships, the customer, ie, the passenger is still the end-user. Supply-chain partners may view the customer as the airframe manufacturer or the airline, but the most successful organisations in the industry retain a focus on design as a tool to directly or indirectly meet passenger needs.

There are several successful routes for design-led innovation and growth:

- The best design and engineering teams understand passenger's needs and desires. For best effect they are often embedded with insights teams or liaise frequently with sales and commercial functions to stay close to marketplace trends
- By monitoring wider technological developments and trends, designers can anticipate passenger requirements and offer useful, useable, desirable and innovative solutions that create new value in an increasingly commoditised market
- Designers looking at parallel and unconnected fields confer competitive edge. For example, inspiration for the earliest flat-bed premium seating configurations came from yacht design
- For sustained competitive advantage, a strong design vision must suffuse the organisation, cascading from the top, with an appropriate corporate structure in place to facilitate this.

*“In some airlines, CEOs are like gods. If they have the right design vision that works really well, it trickles down the chain.”*

**Director, Design Agency**

### **Collaboration**

Aerospace is characterised by extremely complex supply chains not just between different organisations, but also within larger manufacturers such as Airbus and Bombardier. This poses challenges for designers, especially where there is conflict or poor communication between different players. The greatest successes are often achieved where:

- The design requirement is specified as broadly and non-prescriptively as possible, focusing on solution and benefit, not just inputs
- The brief is shared by the company and its relevant supply chain companies as early as possible so all partners appreciate their role
- The customer encourages unconstrained thinking within industry safety/regulatory constraints

- Arrangements are in place for intellectual property ownership, incentivising the entire supply chain to innovate
- Within organisations, cross-disciplinary collaboration is encouraged between design, manufacturing and sales teams.

Some airframe and Tier One manufacturers are investing in supply chain innovation capability and improvement. For example, Rolls-Royce has partnered with Design Council to use design to drive innovation and better engineering design capability to deliver consistent service levels, foster greater collaboration, build customer understanding and achieve a unified approach across their strategic supply chain.

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### **Designers' skills and competencies**

Almost regardless of where designers are employed and the briefs they work on, design in civil aerospace is characterised by trade-off and compromise, imposed by regulation, certification constraints and technical, safety and environmental considerations. Therefore, while designers must have certain technical skills, they are increasingly the bridge between commercial, technical and passenger driven demands.

Successful designers are:

- Strategically creative yet grounded in the lore (and laws) of the sector
- Prepared to work in multi-disciplinary teams to ensure design reflects commercial, manufacturing and regulatory realities
- Able to involve and engage all partners, influencers and suppliers as early as possible in the development process
- Champions for dissemination and advocacy of the design vision throughout the supply chain
- Integrators of varying viewpoints, inputs, partners, interests and considerations in the quest for design-led innovation to create differentiation
- Design engineers that have strong strategic and human-centred design skills
- Strategic designers with a firm grasp of the technical requirements of the sector.

### Future trends

Although the industry is apparently entering a consolidation phase following the billions of dollars spent developing the Boeing 787 and Airbus A350/A380, aerospace companies face a whole series of new design challenges. At the same time, emergent materials, techniques and technologies may help resolve some historic dilemmas. Emerging future trends are:

- In the cabin, the race to devise highly specified and frequently refreshed premium offers is balanced by the need to innovate in Economy. For the latter, with space always a constraint, there is an increasing focus of differentiating via improved ambience using lighting
- In all classes, passengers are demanding improved customer experiences, particularly around in-flight entertainment (IFE) and connectivity opportunities consistent with experience on the ground
- Composites, magnesium alloys and other new materials are increasingly important in aircraft components. Together with 3D printing's adoption in manufacturing, these will allow significant weight savings.

Also, it is possible that even more radical designs will be needed in future as limits to current technologies such as gas-turbines are reached. Academia and industry will need to work hand in hand to explore these issues in order to bridge the gap between research and commercialisation.

Computer modelling and non-destructive testing techniques will increasingly change the way aerospace components are designed. For example, design prototyping as early as possible will help organisations avoid what was referred to as "innovation trauma and sunk cost thinking" - the fear of expensive failure, driving safer, less innovative, solutions.

The future of aerospace design will be increasingly about designing novel passenger experiences with new materials and advanced manufacturing methods.