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FOR PUBLICATION

Superlight aircraft seating
6.4 product professional
Acro Aircraft Seating Ltd
Factorydesign
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Design Effectiveness Award entry 2011

Executive Summary (233 words)

Acro Aircraft Seating is a start up company, born out of an engineering company with 20 years experience in the aviation market. They set up to produce a bespoke seat for low-cost airlines to offer significant savings in weight, which is key in aviation due to the effect on fuel consumption, and improved passenger comfort, in particular, by increasing leg room.

Factorydesign were selected as the design partner and the Superlight was created for the launch customer Jet2.com. Designed specifically for short-haul, single aisle aircraft applications, Acro's first production seat is the lightest in its class, providing real fuel savings to airlines, more comfort for passengers and a significant environmental advantage.

Through the success of the design, supply and final realisation of the product, Acro have fulfilled their launch order and gone on to secure business in Lithuania, Russia and Italy; all without any advertising spend.

From start-up, the company has been trading for three years and grown solely from the sales of Superlight. Building on this success, the product range is growing with the addition of the type 'R' (recline version) and the 'Ultra' which provides enhanced facilities such as integrated in-flight entertainment (IFE).

Installing Superlight on a typical low-cost aircraft such as a Boeing 737 could mean a saving of 950Kg, which would equate to fuel savings of USD150,000 to USD200,000, per aircraft, per year.



Project Overview

1. Outline of project brief

Until Superlight, aircraft seat manufacturers had been slow to respond to the emergence of the low-cost carrier, with all the unique constraints that they bring. The marketing objective and resulting brief was simple, although challenging, to design a low-cost, lightweight seat, specifically for low-cost carriers without reducing and preferably enhancing the passenger experience. From a business viewpoint, to create a seat that could be manufactured in the UK without requiring specialist suppliers.

2. Description

Acro developed the initial engineering for an innovative single spar support chassis geometry which had the potential to be very light and, as such, of considerable interest to airlines because weight is money in the industry. They commissioned Factorydesign to assist with the evolution and development of the seat construction and overall ergonomics and configuration of the seat, plus the aesthetic design, material selection, colour and trim, and the detailing of this new seat proposition.

3. Overview of market

Conventional economy aircraft seating is typically comprised of a metal chassis with seat base and seat back components and mechanisms which are then clad with mouldings, foam seat cushions and seat covers. It is also more common than not that certain external components are then clad with additional elements to provide an aesthetic passenger facing surface and material. This conventional construction leads to a 'layering' of components that inevitably adds size and weight.

Understandably, there are highly demanding Certification requirements within the aviation industry. In order to supply to airlines, Acro have been required to achieve EASA part 21G Production Organisation approval. This is a considerable achievement for the company, made easier by the low part count, simple supply chain and organisational controls they have had to set up.

4. Project launch date

March 2009

5. Size of design budget

Not for publication.

'Factorydesign bring refreshing creativity, invention, knowledge of trends and the aviation market, Acro would not have achieved what we have without them...'

Chris Brady, commercial director, Acro Aircraft Seating

6. Outline of design solution (430 words)

Superlight is an example of design taking advantage of manufacturing constraints and turning them into positives by revealing the qualities of the materials rather than hiding them. Superlight is the first product launched by this start-up company, with all the pressures that entails.

The design is all about reduction and simplicity using as few parts as possible, designing component parts to perform a function and look good rather than covering them up with unnecessary cladding, and using modern lightweight materials such as modern composites and E-Leather. Above all, designing with the passenger in mind.

Using the simple manufacturing processes required to keep cost down, components are featured as integral parts of the aesthetic. Machined details such as the armrest are declared resulting in an honest simplicity of form and style. The unique backrest is only 3mm thick and yet the highly ergonomic form makes it extremely comfortable. The design of the seat back creates more legroom for passengers at a typical pitch due to the carefully contoured form which transfers unused space from the seat pan to the knee area of the passenger behind. The simple, slim covers are designed to make the seat look, as well as, feel comfortable.

The modular construction allows any part of the seat to be replaced with a standard Allen key in less than 2 minutes. The seat has fewer than 60 parts per triple, which reduces maintenance requirements, and the manufacture of components has been kept simple, partly to keep cost to a minimum but also to enable them to be sourced locally in the UK.

Superlight is comfortable, robust and cheaper to own than comparable seats in service today. Every aspect of the design has been considered with the cost of ownership in mind and represents a huge leap forward in maintainability over current models. At 30kg per triple, Superlight is the lightest seat in its class and is EASA 16g certified, meeting Boeing and Airbus fire, smoke and toxicity regulations.

Assembly is very simple and very quick, taking only one man hour to assemble each passenger place. The simplicity and ease of assembly makes production scalable either up or down to meet variations in demand, making production highly efficient and cost effective.

Easy to adopt enhancements have enabled Acro to offer variations to the basic seat product including : recline options, integrated seat back and table mouldings, IFE solutions, arm and seat cushion customisation, all of which provides each customer with their own version of the Superlight, and not simply through colour change. **Differentiation that is vital in the airline world.**

Summary of results (2 pages)

Increase in sales

Not for publication.

Increase in market share

Not for publication.

Increase in fuel savings

The reduced part count, careful design detailing and material selection makes this seat very light at 31kg per triple, the lightest seat flying in it's class. This light weight reduces the fuel required and, in turn, reduces the CO2 emissions of the aircraft.

Environmental advantage

The local supply chain creates a minimal CO2 footprint as components are not sourced from overseas. While the light weight of the seat (saving typically 1tonne per aircraft) significantly reduces CO2 emissions when in service.

Compared to a conventional seat in a typical single-aisle aircraft :
(per aircraft)

Passenger numbers :	189
Conventional seat weight 47Kg per triple :	2961Kg
Acro seat weight per triple 31Kg :	1953Kg
Weight saving :	1008Kg
Approx. fuel saving per annum :	122,000Kg
Approx. CO2 saving per annum :	382 tonnes



Summary of results (continued)

Reduction in part count

The reduced part count resulting from the simple design, bring many benefits to Acro and customers. Less parts mean fewer suppliers, minimum administration and an easier to manage supply chain.

Reduced assembly time

The low part count and attention to detail of manufacture, means a shorter assembly time.

Local supply chain

Less complex parts means less need to source specialist suppliers, creating a local (UK based) supply chain. More choice of suppliers means a more competitive supply of components which reduces costs.

Improved maintenance

Fewer, simple parts, the elimination of trim panels and the deconstructed nature of the design, also means the seats are very robust and easy to maintain, with any part easy to access and replaceable with a standard Allen key in minutes. The low part count also benefits airlines with a lower stock and spares holding requirement.

Impact on market / competitors

Much like the complacency that existed within the mobile phone market until Apple introduced the iPhone, now much copied, the Superlight has shaken up the market such that the established seat manufacturers are all racing to produce a product that matches the performance of the Superlight. It has made the industry question convention and will continue to provoke significant change in the market.

Industry recognition

Recognition has come from both the design and aviation industry as the Superlight was shortlisted for the Crystal Cabin Awards, nominated by the D&AD and won a Design Week award.

Our passengers think that the Acro Superlight offers excellent overall comfort. We appreciate the durable design and light weight through minimal maintenance costs and future fuel savings...

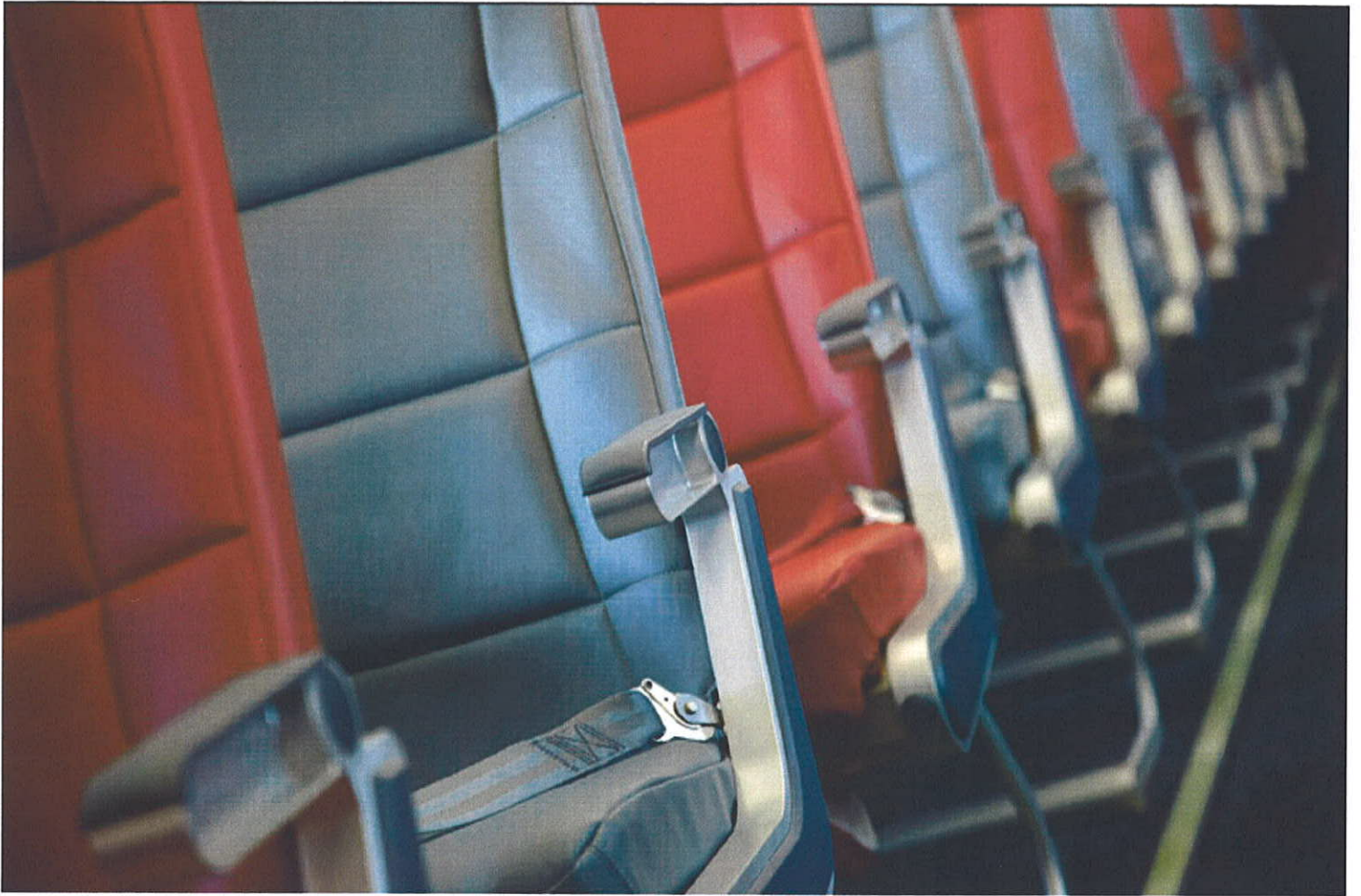
Andrey Yurikov, Avianova



...sales have increased year on year...



*...31kg per triple, the lightest seat
flying in it's class...*



*...any part of the seat
can be replaced with a
standard Allen key in
less than 2 minutes...*



...equating to an approximate CO2 saving per annum, per aircraft of 382 tonnes...

Thank you

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