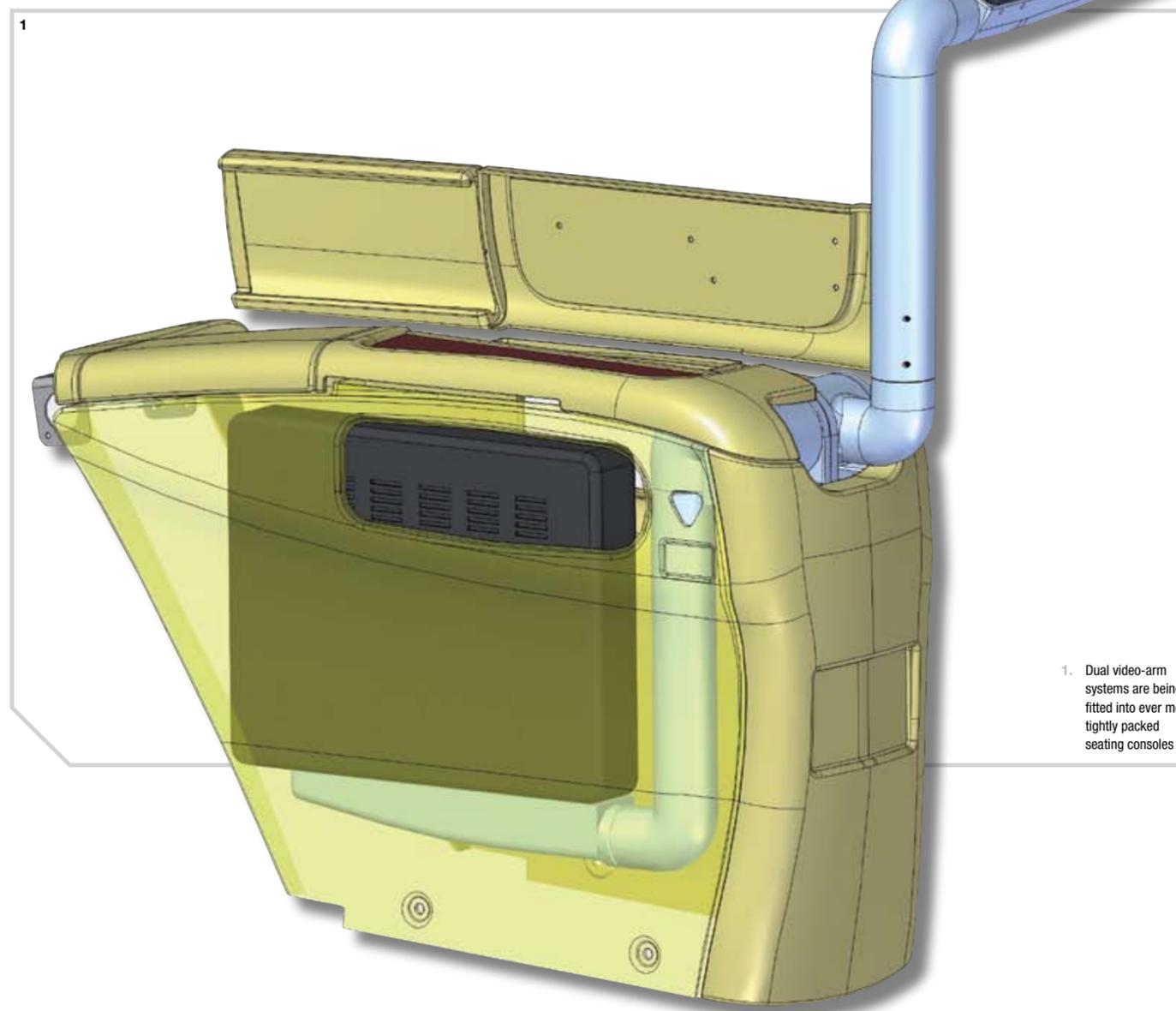


new heights

S&S NUMERICAL CONTROL REPORTS THAT THE A350, A380 AND B787 ARE DRIVING DEMAND FOR BETTER IFE COMPONENTS

As in all prior generations of wide-body commercial aircraft, the demand for lighter and stronger materials is leading the way. The pressure for more efficient designs is felt not only in major structural components – with their increasing use of advanced composites – but throughout the realm of internal electrical and mechanic parts as well. Inside the modernised cabins of the A350, A380 and B787, the strength-versus-weight demands placed on designers are compounded by new targets for space reduction, lower cost and enhanced aesthetics. The combined impact of these challenges is well illustrated by what is happening now with key elements of IFE systems for the new aircraft, especially with regards to wiring harnesses and video-monitor-deployment arms.

Compensating for cabling In the A380 programme, the increased weight of the electrical cabling needed to span the longer fuselage has had an impact on the design of mechanical IFE components, some of which have had to be made lighter to compensate for heavier cables. A good portion of the wiring on the A380 is for the IFE



1. Dual video-arm systems are being fitted into ever more tightly packed seating consoles

system, the cabling for which has increased not only in length but also in diameter. To address the demands for broader, faster, multiple streams of content, cable diameters have doubled from around 0.25in (6.35mm) to the 'new standard' of 0.50in (12.7mm) in all the latest systems. The same content-hungry market has IFE video monitors expanding from 10in (254mm) to 18in (457mm). Monitor weights have doubled along the way with some premium-class screens now weighing 20 lbs (9.1kg). On top of all that, seat manufacturers are being pressured to fit a greater number of electrical and mechanical components into consoles constrained to finite amounts of space. The crux of the problem, the point at which these factors converge to produce the highest degree of difficulty, is in the monitor-deployment system (the video arm).

Designing video arms under these conditions is an interesting feat, one that represents the challenges found in various other programmes relating to the newer aircraft. Video arms need to be smaller and lighter than before, while accommodating larger cables and heavier monitors. "Monitors are not only larger than ever but heavier, in some cases now incorporating credit-card readers and other data-processing into the monitor itself. The added weight means higher leverage, so the arm needs greater lifting capacity despite being lighter and smaller," explains John Satterfield, president of Satterfield Aerospace, S&S Numerical Control Division, located in Northridge, California, USA. Satterfield has been designing and manufacturing video-arm components since 1995. "It's all about weight, durability, aesthetics and cost. We've reduced the weight of our arms by as much as 40% in some cases – arms that were 3 lbs are now down to 1.8 lbs," he says.

Satterfield also outlines some of the maintenance issues involved, which are

vital as airlines are always looking for ways to reduce maintenance costs. "The most common mode of failure in IFE systems is damage to cables. When that happens, you incur the cost of a new cable, the labour to replace it, and the lost revenues when a seat can't be sold during IFE downtime," he notes. "Cables fail primarily by twisting and bending, which is why we've gone to great lengths to eliminate these types of stresses on cables. Video arm specs typically call for inside diameters of 0.5in (13mm). Starting five years ago, we decided to future-proof our products by building in an ID of 0.75in (19mm) wherever possible. It allows larger harnesses to install easily and it protects them from damage due to chafing in service. It also saves time and money in routine maintenance since you don't have to wrestle the cable through a tight space," he adds.

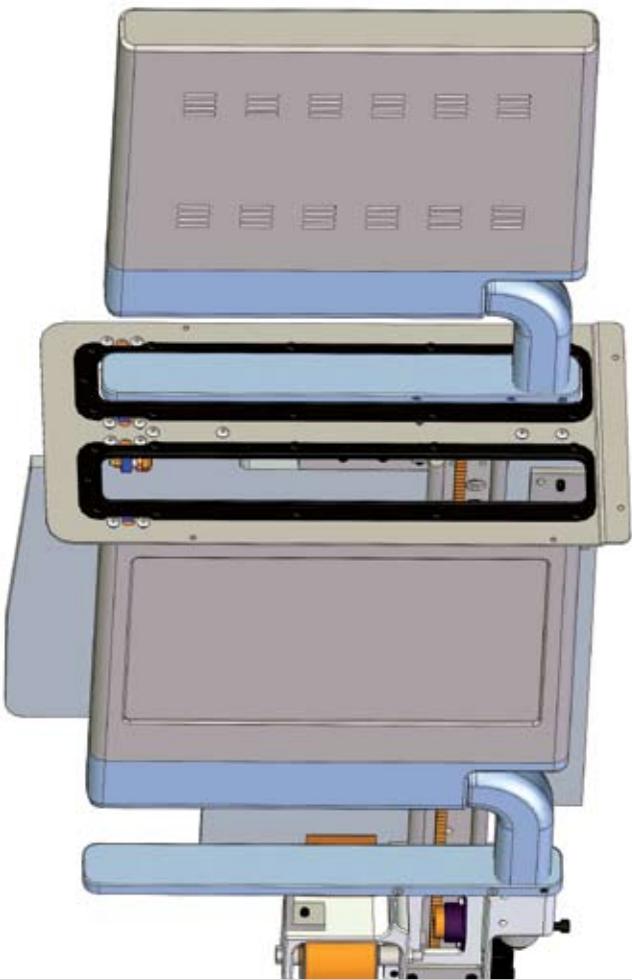
The new aircraft also have certain visual requirements. "For durability and aesthetic appeal, we make our arms from aluminium, never from plastics or composites. It maintains low weight and allows more complex machining. A350, A380 and B787 cabins call for arms with better styling, no sharp corners, nice smooth contours, with clean, smooth coatings like bright anodize, satin polish and powder coating. Machined aluminium has that premium look and feel you just can't get with composites," says Satterfield.

Perfect fit A strong new factor in video arm design is the trend towards vertical integration of the arms with their directly mating seat components. In IFE applications, video arms and seating components must fit neatly together to maintain the quality of the user experience. "There are problems whenever you stack tolerances between two or more components coming from different sources. All too often they do not work smoothly together and usually the fact is discovered too late,"

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2. Video arms are integrated with mating console components to ensure trouble-free performance

reflects Satterfield. “A good example of how we prevent this is an A380 project started a few years ago. A major international airline asked us to work directly with the seat vendor to supply them with not only the pop-up style of video arm, but the console bezel through which the arm passes when deployed or stowed. We were to design and manufacture the arms and the seating structures that directly interface with the arm,” he explains. “By building arms and mating parts together, we were able to ensure everything fit perfectly and functioned without problems when installed into the seat. All the seat manufacturer had to do was ‘plug and bolt’ the solution into place.” This approach also allows the seat vendor to turn over some of the engineering work. “There’s a steady demand for suppliers who can work directly with a customer’s engineering staff because it relieves them from having to manage every small detail of a project. It reduces the chances of a failure caused by some invisible detail. The ‘plug-and-bolt’ approach is now a standard offering on our programmes for seat builders,” Satterfield remarks.

Time-to-market is also a major factor on projects like these, but new technology is helping in this area. “The latest 3D modelling software allows us to conduct our primary testing on CAD systems using finite element analysis, which saves time in the design phase. To speed up development of the design once approved, we have in-house rapid-prototyping equipment that can deliver tightly toleranced prototypes in

very short timeframes. The minute the prototype is accepted, our on-site factory is able to turn around completed arms for formal design review within a matter of weeks, not months,” reveals Satterfield.

Market awareness As a company specialising only in video arms, it is important for S&S Numerical Control to keep up to date with every aspect of the market for arms and seats. “We try to anticipate events relating to design, manufacturing and new product development long before the situation becomes critical. For example, we already have arms that interface with the new self-contained portable IFE modules,” he discloses. “We are seeing more and more people wanting solutions for video-on-demand and audio-on-demand. And then the latest thing is the integration of personal content devices into traditional IFE systems. We saw and began responding to that trend some time ago and are already several iterations into the development of iPod docking stations built right into video arms.”

Satterfield believes the key to the company’s future success lies in reacting quickly to new developments. “There are unpredictable new requirements on the horizon and we intend to address them as quickly as they appear,” he asserts. “Our mission as we see it is to support the industry by keeping sharp, new, world-class products – our own and our customers’ – rolling rapidly down runways and launching smoothly.” **END**

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