

Completion &
Refurbishment
2005

OEMs and independents gear up for good times



by Kirby J. Harrison

Two years ago at this time, Jim Renfro, president and owner of Highlands Aviation at Avon Park, Fla., said he was spending most of his time on the road, “drumming up business and hanging on.” Last July, he allowed that things were looking better and his small independent shop was booked through the summer. As it turned out, last year was “the best year we’ve ever had,” and as of June this year, the company was booked well into the fall.

The economic recovery continues, and as it does, business aircraft manufacturers are ramping up production and carefully watching as the backlog of new airplanes stretches into 2008 and beyond. At the same time, pre-owned aircraft sales, which grew steadily last year, are picking up speed and the inventory reduction so far this year already exceeds that in all of last year.

It would be hard to argue with Renfro’s optimistic outlook, one shared by other completion and refurbishment executives who are looking at the increase in sales of both new and pre-owned aircraft, aware that a small percentage of the former and virtually all of the latter will be showing up at their shops in growing numbers.

Based on deliveries of new business jets and turboprops in the first quarter—up nearly 16 percent from the first quarter last year—the optimism appears justified. According to totals compiled by **AIN** and the General Aviation Manufacturers Association, manufacturers delivered 173 aircraft in the first quarter of this year, 30 more than during the same period last year.

Cessna reported the most dramatic increase. The Wichita-based OEM saw Citation deliveries jump from 33 in the first quarter last year to 54 in the same period this year. Raytheon Aircraft delivered 27 turbine aircraft in the first quarter, nine more than in the first three months of last year. Raytheon Aircraft chairman and CEO James Schuster put it in bottom-line terms, saying, “This quarter is the first time in 10 years in which Raytheon Aircraft is both profitable and cash-positive at the end of quarter one; that’s a pretty good sign that the business is making progress.”

If the arrival of new and derivative aircraft on the market is any indication, the OEM interior shops are going to be hard pressed to meet delivery deadlines.

Bombardier began delivering the Learjet 45XR in June last year. The company delivered its first Challenger 300 in January, and more than 40 are already in service. The Learjet 40 also entered service in January, and the Global 5000 began service in April. The Canadian OEM’s Learjet 40XR will enter service later this year, and Global XRS should receive certification early next year. At the European Business Aviation Convention & Exhibition (EBACE) in May the company announced three corporate shuttle versions of its CRJ regional jet—the Challenger 850, 870 and 890—“to meet the evolving needs of both existing shuttle operators and a new generation of potential users.”

Cessna Eyes A \$6 Billion Backlog

Cessna Aircraft certified its Citation XLS in March last year, the Citation Sovereign in June and the CJ3 in October. This summer the Wichita manufacturer expects to get certification for the CJ1+, with approval for the CJ2+ to follow in the fall.

At EBACE, Cessna chairman and CEO Jack Pelton said the company’s backlog had climbed to near pre-2001 levels. “We have a backlog of \$6 billion and we’re already taking orders for 2007,” he said.

At Dassault, the Falcon 900DX is expected to be certified by the end of the year, and the company claims to have orders for “more than 55” Falcon 7Xs already. The big business jet is set for certification “before the end of next year,” according to the company.

Embraer, which has been marketing executive Legacy and Legacy Shuttle versions of its ERJ 135, announced in March that it has created a separate business aircraft division and that its first two aircraft will be a six- to eight-passenger light jet and a four- to five-passenger very light jet. The company is also studying six other new aircraft possibilities, including Legacy derivatives, one larger and one smaller than the current model. While the light and very light jets are not expected to enter service before 2008 and 2009, respectively, they represent a positive forecast by Embraer of the future of business aviation over the next five years.

In the past year, Gulfstream has obtained certification of its G350 and G450 business jets. It expects FAA approval of its G150 next year.

Raytheon recently issued a revised forecast for delivery of 243 aircraft this year, a figure that does not include a tentative agreement with fractional operator NetJets for the purchase of 50 Hawker Horizons. The Horizon received FAA provisional certification in December.

While it expects to deliver only three Horizons this year and six next year, Raytheon anticipates delivery of



The midsize cabin of a Hawker 800 presents a special challenge to interior designers. In this particular cabin, above and at top, Flying Colours took an older eight-passenger Hawker 800A cabin and created a nine-passenger cabin that resembles that of a newer Hawker 800XP, including a more compact galley (middle).

25 airplanes a year thereafter. At EBACE the company announced no new aircraft but did unveil two derivatives: a Premier IA upgrade of the Premier I, and a Hawker 800XPi upgrade of the Hawker 800XP.

In the narrowbody, large executive/VIP market, Airbus revealed at EBACE that nearly 30 of the 38 Airbus Corporate Jetliners (ACJs) ordered since the aircraft was launched in 1997 are now in service. The ACJ line is divided into four groups: the original ACJ, which includes private, charter and government use; the A319LR (configured for first-class shuttle operations); the A319 Executive, a basic A319 with a VIP interior; and a

Prestige VVIP model. The European consortium manufacturer claims orders this year for 10 of various versions.

Airbus v-p for executive and private aviation Richard Gaona caught the interest of those attending EBACE when he revealed that the company is in advanced negotiations for two VIP A380s, one of which might be concluded by the end of the year.

Putting in an early bid for such a job, Lufthansa Technik at a nearby display was showing a cutaway model of an executive/VIP A380 upper deck. On the other hand, Airbus recently revealed that deliveries of the A380 in its airline guise have been delayed at least six months. Part of the problem is in customizing the airplane for individual airlines, according to Qantas CEO Geoff Dixon. Imagine the problems an independent completion center might face in designing, building and installing an executive/VIP interior.

Airbus competitor Boeing Business Jets has seen a revival in orders for its BBJ, marked by signatures for six aircraft since November last year. Boeing would not comment on the possibility of an executive version of its new 787 Dreamliner, other than to say, "If a customer were to express some interest in the airplane as a



If market projections of very light jet deliveries bear fruit, interior vendors and suppliers will get a boost as they provide cabin components for some 8,000 airplanes through 2023. Cessna, which traditionally keeps interior work in-house, will do completions for its new Citation Mustang VLJ, above.

business jet, we would be happy to have that conversation." Word among vendors and independent completion centers, however, is that the Seattle company already has at least one customer for a bizjet version. The Dreamliner is scheduled to enter service as a long-range airliner in 2008.

Very Light Jet Interiors Will Provide Volume Business

While the first very light jet is yet to come to the market, there's apparently no shortage of shoppers. Adam Aircraft expects to have certification for its six-place A700 "early next year." Despite a relatively thin order book—for about 35 airplanes—the Denver-based company expects to deliver 40, 65 and 120 aircraft, respectively, in the first three years.

At Cessna, the company says it has firm orders for 230 copies of its own VLJ—the Mustang—and hopes to get certification of the twinjet in time to begin deliveries before the end of next year.

Eclipse claims orders and options for 2,200 Eclipse 500s. Certification of the five-passenger VLJ is expected in March next year.

While the very light jet cabins are relatively small, the potential market for cabin component vendors is considerable. In its fall 2004 forecast Rolls-Royce estimated a market for as many as 8,000 VLJs through 2023.

Since January last year, three new business jets and seven derivatives have been certified or entered service. Between July and the end of next year, another four new airplanes (three of them VLJs) and six more derivatives are likely to be certified, and most will enter service in that same time period. That would be a total of

seven new airplanes and 13 derivatives in just three years. And while the Airbus A380 and Boeing 787 are not scheduled for certification before late next year and 2008, respectively, independent completion centers are already looking forward to bidding on executive/VIP interior jobs that might be worth as much as \$200 million.

Nowhere was optimism in the business aviation industry more on display than at EBACE 2005. In just its fifth year, the event at Geneva International Airport drew 7,667 registrants, compared with 6,487 a year ago. With 278 exhibitors, exhibit space sold was up 21 percent and the aircraft static display was up from 36 airplanes last year to 51 this year.

Used Airplane Market Shrinking Steadily

If anything is causing a Pavlovian market response on the part of OEM and independent refurbishment specialists, it's the jump in used aircraft sales in the past year. Interior shops are well aware that the first stop for 90 percent of the buyers of a used aircraft is a completion and refurbishment center, either for exterior paint or an interior upgrade, or both.

There are a number of reasons for the increase in used aircraft sales, reasons that may continue to be a driving force in refurbishments for several years to come. The most obvious is the growing backlog of new aircraft orders.

OEMs learned a hard lesson in the recent recession, and so despite the improving economy, they have been increasing production cautiously. Nevertheless, backlogs are beginning to stretch well into 2007 and beyond.

A Bombardier spokesman described business as "good," noting that the company does not discuss backlogs. At the same time, the company is rapidly acquiring partners among the independent centers that are capable of helping reduce unwieldy backlog.

Dassault Falcon Jet, already ramping up airplane production, has "firm orders with non-refundable deposits" for more than 55 copies of the new Falcon 7X extending into the second quarter of 2009. According to Dassault Falcon Jet president and CEO John Rosanvallon, based on demand, the company has decided to increase the full production rate from two to three aircraft a month.

At Gulfstream, the financial report for the first quarter this year from parent company General Dynamics listed a total aircraft funded backlog valued at \$6.934 billion, slightly above the funded backlog valued at \$6.844 billion for the first quarter last year. The company declined to discuss backlogs in terms of specific aircraft.

Raytheon Aircraft launched the new Hawker Horizon in 1996, and it took the company almost nine years to gain certification. Even so, the earliest delivery date for the buyer of a new Horizon today is 2007.

OEM Backlogs Drive Used Aircraft Sales

Anxious customers unwilling to wait two or three years for delivery of a new airplane often will buy an immediately available pre-owned one, usually one that holds its value well. They will use it while they await delivery of the new airplane, and at that point, they will sell the old airplane and write off any loss.

The result has been a shrinking pre-owned inventory as those customers look for an interim aircraft. Gulfstream, in fact, reported that as of the end of the first quarter this year, it had only three aircraft in its entire pre-owned inventory.



Interior shops are working to design lavatories that are more than just a place to hide the potty. A full-length mirror in the lavatory of a Challenger 604 by Midcoast Aviation makes it appear more spacious.

Other customers who might have considered buying a new airplane are reconsidering and taking advantage of the market to pick off a bargain from among the best airplanes in the pre-owned inventory.

Two years ago, the U.S. business aircraft fleet consisted of some 10,000 airplanes, of which approximately 35 percent were officially on the market. Last year, that number was reported at about 20 percent, and as of the middle of this year, used aircraft broker analysts estimated that it was approaching 10 percent.

Rick Engles, president of aircraft broker Vance & Engles, believes the cream is rapidly disappearing. Late-model aircraft only recently out of production seem to be the most popular. Engles said that of a production run of 286 Gulfstream IV-SPs, only 11 are on the used-aircraft market, and of the production run of 213 GIVs, just 25 are for sale. Other aircraft in high demand are the Global Express, Gulfstream V and Falcons 900B, 900EX and 2000EX.

Bryan Comstock, president of Jeteffect, an aircraft brokerage and marketing firm in Long Beach, Calif., agreed, and pointed out that as the number of aircraft at



The generous cabin of an Embraer Legacy allows for a variety of designs, creating separate cabin compartments and a greater sense of privacy. A fabric-covered divan gives the cabin a feeling of warmth.

Completion & Refurbishment Update

Airshow Makes a Splash at European Bizav Show

At the European Business Aviation Convention & Exhibition in May, Rockwell Collins announced completion of AirCell's ST 3100 Iridium satellite communication system for the Airshow 4000 in-flight information system.

The ST 3100 satcom gives aircraft operators access to worldwide voice and data services at all altitudes and on the ground through Iridium's network of 66 low-earth-orbit satellites.

Rockwell Collins also announced a number of new supplemental type certificates (STCs) for its Airshow products.

Among them was a limited STC for the first Bombardier Global 5000 that included the first application of the Ethernet-based Airshow 21 cabin electronic system. The Ethernet-based version supports a full suite of functions, from entertainment and cabin controls to global office connection. All cabin capabilities, said a company spokesman, are controlled by a full-function graphical user interface, also designed by Rockwell Collins. The system's local area network (LAN) provides a data connection for multiple users, as well as access to a printer, fax and file-sharing. The network can be enhanced by the addition of wireless LAN.

Rockwell Collins' Tailwind 550 multi-regional satellite-direct television system has received an STC for installation on the Boeing 767-200, -300 and -400. The first installation was by Jet Aviation at its Basel, Switzerland, completion center and allows in-flight satellite television reception in Europe, the Middle East and the U.S. Also in Switzerland, Jet Aviation installed and received an STC for the first Tailwind 550 system on a Boeing Business Jet.

Jet Aviation Installs EMS Satcom eNfusion Accelerator in Falcon 900

The eNfusion cabin network accelerator from EMS Satcom appears to be gaining a following. The Ottawa company reports that it has delivered more than a dozen in the past several months, and Jet Aviation installed the first full eNfusion in a Falcon 900 at its West Palm Beach completion and refurb facility. The cabin accelerator, designed to boost performance of EMS Satcom's HSD-128 terminal, is a multifunction device that replaces a mixture of off-the-shelf networking hardware including hubs, routers, Ethernet switches, multiplexors and 802.11g wireless access points. It is also Swift broadband-ready. The bundled eNfusion package consists of EMS Satcom's high-gain AMT 50 antenna and tail-mount radome as well as the HSD-128 transceiver and the cabin accelerator.

Broadband Connection Now on Gulfstream G350 and G450

Gulfstream Aerospace has received an STC that permits installation of the Savannah-based company's new Broadband Multi-Link data transfer system in its G350 and G450. The first installation is being done on a G450 that was scheduled for delivery last month.

The STC came just a month after the company received an STC for the installation of Gulfstream's Broad Band Multi-Link in the G500 and G550.

The Gulfstream broadband service is provided by SkyLink from Arinc Direct. Arinc received its service license from the Federal Communications Commission in April. According to Gulfstream, Broad Band Multi-Link allows Gulfstream passengers to access the Internet, receive and send e-mail, monitor the stock market and perform other Web-based tasks at the same speeds available in most corporate offices.



Even in a narrowbody bizliner, owners often opt for multi-use cabin compartments. In the BBJ, above, completed by Jet Aviation in Basel, Switzerland, the dining room also serves as a conference room, and a widescreen, bulkhead-mounted plasma monitor provides entertainment. Ample room in the lavatory of the same airplane, left, allows for storage space not typically available in smaller business jets. When the first Airbus A380 comes in for an executive/VIP cabin, designers will be faced with more than 6,000 sq ft on two levels.

the top end of the market is reduced, more customers will focus on older aircraft with relatively low time and a reputation for reliability. Among them, he listed the Citation III, Falcon 20, Hawker 800A and Learjet 55. These, he said, are particularly popular with buyers whose new aircraft will not be delivered for two or three years and who are looking for interim lift.

The growing backlog among the OEMs has also created business for independent shops with the ability to handle green completion work.

Bombardier has been the most active of the OEMs in this respect. It has a longstanding partnership with Midcoast Aviation to finish green Challenger 604 interiors and recently announced the appointment of both Midcoast and Savannah Air Center as "preferred" completion centers for the new Global 5000 and Global XRS.

"We have good visibility two years down the road as to demand versus capacity, and we think [our green completion business] will grow 20 percent a year for the next three years and beyond fairly easily," said Kurt Sutterer, president of Midcoast.

Independent Interior Shops Expand as Business Grows

For those who subscribe to a "trickle-down" theory that supposes a relationship between an upswing in used aircraft sales and an increase in aircraft cabin refurbishment, there is considerable evidence of this phenomenon from among the independent completion and refurbishment centers.

Randy Keeker, president of Indianapolis Jet Center, needed just one word to describe business in the past year: "wonderful." This despite a two-

month period during which the company went through a move from an off-airport site at Whitestown, Ind., to the former Bombardier repair facilities at Indianapolis International, and a name change from Keeker Aircraft Interiors to Indianapolis Jet Center.

Last year, the company finished an executive interior refurbishment on a 737-200 for former Florida Marlins owner Wayne Huizenga. More recently Keeker has signed to do a complete interior conversion of an MD-87 airliner to an executive/VIP configuration. With two Challenger 604 and one Learjet 45 interior refurbishments already under way, he predicted the center will be busy well into next year.

Stevens Aviation has its headquarters and main completion and refurbishment site in Greenville, S.C., and Randy Znamenak, v-p of sales and marketing, is happily filling up slots in Greenville as well as at Stevens' other four centers. "We're backlogged a good 60 days and we're getting a tremendous number of requests for quotes," he said, "particularly from Hawker and Citation owners."

The Greenville facility continues to be the U.S. completion center for the Piaggio Avanti. "We have at least two Avantis in the flow at any one time," said Znamenak, "[and] we expect that number to increase." This despite efforts by several competitors to attract Piaggio to a new shop.

Jim Swehla, executive v-p of sales and marketing at Premier Air Center, described the company's backlog as "pretty good through the end of the year" and added that interior refurbishment business this year has been much stronger than it was last year. Swehla also noted that most of the cabin refurb work Premier has been doing lately has

been on larger business jets, in particular the Falcon 900 and Falcon 2000, as well as some Falcon 50s.

Looking back he recalled RVSM and TAWS requirements that became mandatory on January 20 in North, Central and South America and the Caribbean were a driving force for interior work by customers who took advantage of downtime for the avionics upgrade to have some cabin work done. Most of the U.S. operators who were going to have their aircraft modified to meet RVSM and TAWS have done so.

"We've seen a considerable increase in the used aircraft [refurbishment] market," said Sutterer. He also pointed out that being able to provide aircraft technical appraisals has brought in additional interior refurbishment business.

Eddie Hidalgo is director of sales for StarPort, a new completion and refurbishment center that opened

In an improving economy, the used aircraft inventory is dwindling as buyers snap up the more popular, low-time business jets, such as this Falcon 900 recently refurbished by Jet Aviation at its West Palm Beach completion and refurbishment center.



Completion & Refurbishment Update

Startup DunnAir Awaits Repair Station Certificate

The DunnAir Business Jet Completion Center, which was scheduled to open its doors earlier this year at Tucson International Airport, is now forecasting an official July 1 opening.

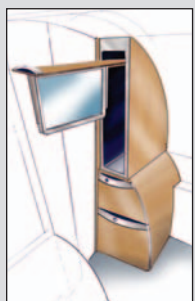
Founder Dale Dunn said obtaining repair-station certification has taken longer than anticipated but that the company has taken advantage of the delay to set up new shops and begin hiring. "It's our intention to do everything in-house, from cabinetry and upholstery to wiring," said Dunn.

He said that despite the delay, DunnAir has been getting a large number of requests for quotes, in particular from customers who are converting to private use Boeing aircraft they bought when the airlines were downsizing. He added that an experienced core of former Bombardier interiors specialists will make the center particularly attractive to owners of aircraft made by the Canadian OEM.

Stevens Launches Heritage Refurb Program for Used Aircraft

As an added revenue source, Stevens Aviation in Greenville, S.C., plans to officially launch its Heritage Program at the NBAA Convention this fall.

The program, said Randy Znamenak, v-p of sales and marketing, will target "undervalued corporate jets and



turboprop aircraft" to be purchased and upgraded by Stevens for resale.

"We're currently looking at some Cessna and Raytheon products that have great upside potential.

"The interior is a large part of the overall upgrade designed to give the customer greater value for less money," he said. To that end, Stevens hired an outside design

firm to develop an integrated interior style that would still appeal to a customer's individual tastes.

Those aircraft done on spec will be sold "as is," according to Znamenak, "but customers will be able to choose from among options such as seating arrangements and lighting."

Flight Display Introduces Single-box IFE Package

At the Aircraft Electronics Association convention and trade show in April Flight Display Systems (FDS) of Alpharetta, Ga., introduced a new in-flight entertainment "pyramid" in the form of a single box priced at "less than \$10,000." While the box is small enough to fit behind an aircraft seat, it includes a moving map, DVD and CD players, three-channel wireless audio, and an audio/video switcher for eight seats. The box will also allow the true audiophile to plug in two iPods or two RodyTwos. An audio splitter for XM Radio can be added for another \$1,250. Tack on another \$1,250 and you can get a universal remote with LCD display that will run up to 20 separate pieces of cabin electronics.

The company has also upgraded its moving map, taking the processing speed from 300 MHz to two gigahertz, allowing a seven-fold increase in speed, a bigger database and better resolution. And this comes at no increase to the \$6,800 list price for the old moving map system.

According to FDS president David Gray, the company sees a convergence of off-the-shelf consumer electronics into the aviation market as key to bringing prices down and to bringing the latest technology into the business aircraft cabin more quickly. FDS has just moved into a new 11,200-sq-ft facility, and Gray said he expects business to double this year.

its doors last September. Since then, said Hidalgo, "We've done exterior paint on a Challenger and a couple of [Citation] Excels, a partial refurb job that included an entertainment system on a Beechjet and full paint and full interior refurb on a Citation II." The company expects a King Air 200 to arrive this month for full paint and interior refurb, and Hidalgo said the paint shop is booked into September.

At Jet Aviation in West Palm Beach, Fla. interior completions manager Jim Harrison said that while last year was a good one, business has slowed down a little in recent months. At the same time, he said, "We have a lot of quotes out and we think things are going to pick up."

Harrison said the company has been doing a lot of Gulfstream interior refurbishments, and has done seven Sikorsky Black Hawk helicopters for the Egyptian government as well as a mix of green completions and refurbishments.

Jet Aviation currently leases space to Piaggio America. The Italian manufacturer of the Avanti twin turboprop moved its headquarters from Greenville, S.C., to West Palm Beach last year, and Jet Aviation has been lobbying for a share of Avanti interior completions.

Garrett/Piedmont Hawthorne/Associated, formed last year when The Carlyle Group added Garrett Aviation to its Piedmont Hawthorne and Associated Air Center holdings, is still looking for a brand name. In the meantime, aircraft completion and refurbishment businesses appear to be doing well.

According to Garrett president Frank Klaus, there are no plans to merge Garrett's completion center assets with those of Associated Air Center. "The skill set required to manage the custom completion of a transport-sized aircraft is very different from that of completing a midsize or large business jet," explained Klaus. "From this perspective, we have decided to leave these businesses as separate entities, though we have been successfully sharing personnel and expertise."

Capital Aviation Ahead of Last Year, On Track To Do 50 Completions This Year

Capital Aviation at Wiley Post Municipal Airport in Oklahoma City is busy and expanding. The company added 1,000 sq ft to its cabinetry shop in May and expects to do 50 business jet refurbishments this year. "At this point, we're about 30 percent ahead of last year, and last year was 50 percent above the year before," said director of sales and marketing Larry Price.

Savannah Air Center is preparing to take in the first Global 5000 under contract for Bombardier. The airplane has already been spec'd, according to Savannah president Frank Dodds, and will arrive in the first quarter of next year. Montreal-based C&D will provide the



Duncan Aviation's interior designers have become adept at creating galley and refreshment centers that make the most of limited interior space, such as the galley placement just forward of the cabin door in this Citation Encore.



Exotic woods are commonplace in the business jet cabin, such as the inlay work on these cabinet doors in a 767-300 recently delivered by Gore Design Completions. Veneer on the main door is quarter-cut sycamore and the oval inlay is karelian birch burl.

interior. Subsequent Global 5000s, he said, will have highly customized interiors designed and built by Savannah Air Center.

The Savannah, Ga.-based center opened a new 13,000-sq-ft cabinet shop last year and has already begun work on an upholstery shop of the same size. Later this year, Savannah Air will break ground on a new 60,000-sq-ft hangar "fully dedicated to interior completion work."

Duncan Aviation has two major completion and refurbishment sites, one at Battle Creek, Mich., and the main facility at Lincoln, Neb. Momentum has been building since the first quarter, according to John Slieter, v-p of completions and modification sales and design in Lincoln. "It seems to be originating in the used aircraft market, which heated up in February, and that always pushes the refurbishment business."

Last year, Slieter noted a slow period that he suspects was the result of fewer aircraft flying more hours. "We had some customers who wanted to come in for an interior refurb but said there just wasn't a hole anywhere in the flight schedule."

Slieter said the increase in production by the OEMs is also sending business in the direction of Duncan in the form of interior cabinetry. "We've been contacted by most of the OEMs in the past few months about availability through the end of this year and into early next year."

At this point, Duncan is looking at a 60- to 90-day backlog in the refurbishment shops, "most of it as part of a maintenance or avionics upgrade," he added.

Last month, Bombardier named Duncan an approved service center, which likely strengthens the company's relationship with the Canadian OEM.

Duncan is also happily providing interim, mid-life and full refurb on most of the NetJets non-Gulfstream fleet. Full exterior paint typically comes with the full refurbishment. "We'll run a little more than 100 of their airplanes through Duncan every year."

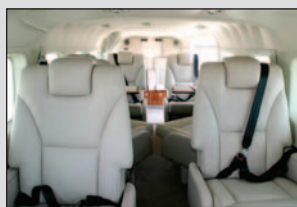
Slieter said that while he doesn't want to discourage any business, he has been warning customers that the refurb shop space has been filling up. "In particular the guys who schedule a C check and on the day they arrive suddenly want some interior work at the same time."

Looking ahead, Duncan's next expansion is

Completion & Refurbishment Update

Capital Aviation Installing 'Big Sky' in Small Cabins

Capital Aviation expects to deliver its 100th executive Caravan this summer, this one with the typical "Big Sky" cabin. The Bethany, Okla. completion and refurbishment center began installing executive interiors in Cessna's Caravan turboprop singles in the mid-1990s, and according to company president Bill Boettger, about half of them have the Big Sky interior that typically includes a three-channel audio/video entertain-



ment system with a 15-inch liquid crystal display (LCD) flat-screen bulkhead monitor or 10.4-inch LCD pocket monitors, XM Radio, executive seats for six

passengers, a two-seat bench against the rear bulkhead, and an electric flushing toilet with privacy curtain.

Cost of the Big Sky interior ranges from \$150,000 to \$175,000. "Our customers are private individuals who are going out to rough it, but in a certain style," said director of sales and marketing Larry Price.

Aero Interior Offers an Alternative to a Major Refurb

Five years ago, Ed Laverentz was a full-time fireman "looking for a part-time job that might bring in \$20,000 a year." Now he and his wife, Barb, are the full-time president and general manager, respectively, of Aero Interior Maintenance, and the only fires he's putting out are in the form of emergency repairs to the soft goods in business aircraft cabins.

While Aero Interior is based in Cheney, Kan., a few minutes west of Wichita, Laverentz has obtained a repair station certificate that includes six other locations. And he also has "away" teams. "You can bring it to us, or we can come to you," said Laverentz. The company specializes in cleaning, repairing and reconditioning of leathers and vinyls.

A complete refurbishment of eight to 12 seats in a Gulfstream requires about 60 to 70 hours of labor, approximately two or three days with a team of two or three people, depending on how serious the damage to the seat and/or panel coverings.

"Our customers consider us the alternative to a full reupholstery job, at a fraction of the cost," said Laverentz. "We often get called in to do an interior at the same time the airplane is in for maintenance or service."

Rosen's FlightView In Production

After much market research and considerable research and development, Rosen Aviation Displays' FliteView moving map passenger information system will go into production in August. The Eugene, Ore.-based company describes FliteView as fitting a niche between the low- and high-end products but at about one-fourth the price of the high-end.

According to v-p of sales and marketing Andy Beers, the box is "extremely small," about 8 inches by 8 inches by 5 inches, and weighs just four pounds. And he noted that it works well with Rosen's new seven-inch widescreen personal plug-in display monitor.

Rosen has also begun deliveries of the new Slimline LCD 6.5-inch multi-standard, plug-in display, which replaces the older 5.6-inch display. Best of all, the viewing area has in essence doubled, the resolution is doubled, video input capability has tripled, and it is "completely backward compatible with the 5.6-inch display it replaces." Including the plug-in arm, the Slimline is priced at about \$3,000.



Throws and pillows serve to accent the side-facing divan in this Gulfstream IV interior refurbishment by Hop-a-Jet of Fort Lauderdale. With the growth in pre-owned aircraft sales, interior shops are seeing Gulfstreams in increasing numbers.

at Battle Creek, where it will build a third paint shop, capable of accommodating a Global Express.

Associated Air Center is the other source of completion and refurbishment revenue at Garrett/Piedmont Hawthorne/Associated, but its focus is on large executive/VIP completion work on aircraft the size of the BBJ and larger.

Jeff Bosky, the center's new president, said Associated now has completion and refurbishment slots stretching into the third quarter of next year. Currently at the facility is a 747-400 due for delivery this month and a BBJ total refurbishment to be delivered in August. Four other large executive/VIP jobs—two ACJs, one BBJ and one BBJ2—are under contract.

An A380 Contract Might Justify Expansion

With nearly one million square feet of available space, the center can accommodate as many as nine narrowbodies the size of a BBJ or Boeing 727. And, he said, "We've been approached about providing quotes for an A380 and a Dreamliner." He noted that the company has some small expansion plans. He added, however, "First I want to see a business plan that justifies it." An A380 contract might just do that.

Lufthansa Technik isn't at capacity but is close enough that 70 percent of the company's total hangar space, which includes maintenance and service, is now dedicated to executive/VIP narrowbody completion and refurbishment work. At its Hamburg facility, two 747-400s are in various stages of completion. Also in various points in major and minor refurbishment and exterior paint are an A340, one 757, a 767 and a BBJ.

The company recently signed an agreement with Airbus to become the "preferred supplier of interiors"



The presidential office of this BBJ by Gore Design Completions features a kidney-shaped desk, surrounded by cabinetry of birch veneers. The taupe carpet has a sculpted center shaped to match the desktop.

for executive/VIP versions of the A380.

While Hamburg is the focus for all executive/VIP narrow- and widebody work, the service center in Frankfurt—already set up to handle BBJ maintenance and service—would be capable, if necessary, of performing some interior refurbishment as well.

Jet Aviation in Basel, Switzerland, is also doing well. The narrow- and widebody executive/VIP specialist is working on a BBJ2 for delivery in the fall. A second green A319 ACJ for the same customer will arrive for completion this month, and by the end of the year, an A320 will arrive for completion.

One of two 747-400s is due for delivery this fall with an executive/VIP interior, and a second is scheduled to arrive at about the same time.

The facility at Basel, which is currently working on two Falcon 900EXs, is the only independent completion center Dassault has authorized to do completion work on green Falcons. A mix of Falcon 50EXs, Falcon 900EXs and Falcon 2000EXs is scheduled to arrive later this year.

The relatively new Jet Aviation refurbishment facility in Zurich is busy, said Heinz Aebi, Jet Aviation v-p of marketing and communications. The center has



A new Gulfstream G550 interior demonstrates the use of darker accent trim to highlight the predominant color. While more customers opt for darker carpet and cabinetry veneers, the preference for lighter colors—particularly beige—for the seats remains the same.

already done five interior refurbishments, Citations and Hawkers, and expects to do another six by year-end. That would represent a 25-percent increase over refurbishments last year. The company's facilities at Biggin Hill Airport near London, Geneva International Airport and Singapore Seletar Airport are all doing minor cabin refurbishment work and all are busier than they were last year, said Aebi.

Gore Design Completion in San Antonio is another narrow- and widebody specialist. Earlier this spring, the company dedicated a new, \$12 million facility at Kelly-USA capable of accommodating airplanes as large as the 747, and shortly thereafter delivered a 767-300ER with a head-of-state executive/VIP interior. Barely two months later, the company welcomed another 767, a 200ER, that it is finishing with a "full VIP" cabin. And later this summer, a BBJ will arrive for an interior refurbishment, including satellite direct television and belly cameras linked to the entertainment system.

"The market's looking really good," said CEO Jerry Gore. "We have a lot of quotes out and we expect to have some green BBJs coming in the near future."

Completion & Refurbishment Update

PATS Delivers Fifth BBJ Interior

Since the first Boeing Business Jet entered the PATS Aircraft completion center in September 2001, the company has rolled out five finished BBJs. The company delivered the latest, for a South American head of state, last month.

Four of the five BBJ interiors by the Georgetown, Del.-based company were head-of-state aircraft, a fact that should come as no surprise, according to Dominick Scott, v-p of quality and procurement. "Personal attention is a major part of our business model," said Scott. "And the cabin is a very personal symbol of the owner, especially if it's the symbol of a country."

PATS' business model also maintains a tight focus on green BBJ completion work and refurbishment. "We've gone from one BBJ to the next since we started," said Bill Hubbard, v-p of marketing, sales and contracts. "We're right now doing a cabin refurbishment on the BBJ that belongs to our first customer, and we have a corporate-owned BBJ coming in early next year."

PATS generally does one BBJ at a time. While there may occasionally be two jobs in progress at one time, it rarely creates a problem because the various skills required at different stages do not overlap.

Scott said business has been good this year and he predicts that will continue through 2008. He added that at this point, PATS is contracted through next year, "and we are hiring."

Kalogridis Launches 3-D Tapestry

Carpet specialist Kalogridis International of Dallas has just launched a new line of bulkhead tapestries available in a variety of colors and with three-dimensional surface texture. The new surface was developed by company president George Kalogridis and research and development designer LiChing Tsai.

The tapestry was created to fill a gap between hard panels that were limited in design and had no real sound absorption qualities but were cheap and relatively inexpensive and soft carpet tapestries that absorbed sound and were more attractive but costlier and heavier.

The result is a fire-resistant, ultra-lightweight covering with a three-dimensional bulkhead covering that can be applied in several ways, "the most practical of which is pressure-sensitive tape." It will come in a variety of materials, colors and patterns or a customer may prefer a more personalized one-off design.

According to Kalogridis, several customers have already expressed an interest in the new material to cover the lower sidewalls "and we think we can do it."

IWG Sells 1,000th Aircraft Water Treatment Unit

The end product may not be Perrier, but it's just as tasty and just as clean. It's what comes out of the business end of International Water Guard's (IWG) ultraviolet water treatment units, and the Burnaby, B.C. company has just shipped its 1,000th unit.

President and CEO David Fox said there has been a "significant" increase in sales over the past several years, which he attributes to "a steep increase in awareness about the problem of biological contamination of onboard water supplies."

The original NPS-A2 was the first flight-approved ultraviolet potable water disinfection unit developed and three other versions have since been developed. One of the latest, the NPS-A4, is the smallest unit and Fox said demand for it as a point-of-use water treatment device in aircraft galleys has been growing.



In the UK, Mann Aviation Group is also busy, with an S-76 helicopter and an Agusta A109 Power. "We're currently booked for a good six months," said marketing manager Barry Jarlett.

In the past, Mann Aviation has focused on interior refurbishment of aircraft in its own charter operation. But in recent months the company has doubled its workforce and is expanding to take on work from outside, despite the limits put on aircraft size by a relatively short 2,788-foot runway at its Fair Oaks Airport base southwest of London.

OEMs Finding Ways To Deliver on Time

During the boom times as this decade began, OEMs discovered that the labor-intensive cabin completion process was a major cause of delays and late deliveries. Customers were angry. After months of delays, some simply refused to accept delivery and sued for return of their deposit.

Now, with the release of pent-up demand, OEMs are increasing production rates and finding ways to avoid slipping delivery schedules that were a problem in the past.

Bombardier's solution is simple: "We decided to do what we do best, and that is to build airplanes." And while the solution was simple in its concept, the execution was a major undertaking.

About 18 months ago Bombardier began a major restructuring that included shutting down its facility in Tucson, where it installed interiors in the Global Express and Challenger 604, as well as in four Learjet models, the 40, 45, 45XR and 60. The last aircraft to be completed at Tucson—a Challenger 300—rolled out on May 27.

Now, installation of Challenger 300 interiors is being done at Dorval plant No. 3, and Challenger 604 interiors are being handled at the old Innotech facilities at Dorval. The interiors for the Challenger 300 are being built in Denton, Texas, by DeCrane Aircraft and shipped to Montreal for installation. C&D Aerospace of Huntington Beach, Calif., provides the interiors for the 604.

Is it working? Eric Martel, v-p and general manager of the Challenger product line, notes that "Reliability numbers for the Challenger 300 are now approaching those of the Challenger 604, and this is

Russian completion and refurbishment center Kvand, headquartered in Moscow, has had a steady market in cabin refurbishments of aircraft built in the former Soviet Union such as this Yak-42 in an executive configuration.

Jet Aviation in Switzerland is better known for its narrowbody, executive/VIP completions in Basel, but its refurbishment center in Zurich also has a healthy share of the interiors market for smaller aircraft, such as this Citation Excel.

a very satisfying state of affairs."

The Global Express is no longer in production and as the last of them roll out of the Global Completion Center in Montreal this year, they're being replaced by the Global 5000. Later, the new Global XRS will also be finished at the same facility. C&D Aerospace is also doing the Global 5000 interiors, but instead of shipping them thousands of miles, C&D set up shop near Dorval International, where some 250 interior specialists build the interior components and "roll 'em down the street to the Global Completion Center for installation."

As for the Learjet, all the models are now being completed at Wichita as part of an "add-only" process in which major cabin components, such as cabinetry and seat upholstery, for most models are manufactured on site by the outsource provider. Bombardier describes the program, similar to the partnership with C&D in Montreal, as "strategic in-sourcing."

The result, said Learjet v-p and general manager Mike Kanaley, is on-time deliveries. In fact, he noted, a Learjet 45 interior was recently installed in just five days after the airplane was released from the paint shop.

As for backlog, Kanaley emphasized the importance of flow management. "I won't let the salesman sell it until I know I can deliver it," he said. "We refuse to over-commit our capacity."

"It says much for Bombardier that we were able to make this transition and still meet the delivery schedule," said a spokesman. "It was a monumental undertaking."

At the same time, Bombardier completion specialists realized that, despite a wide array of cabin configurations and options for the company's airplanes, some customers would want something beyond the typical interior. With those customers in mind, Bombardier selected independent completion and refurb centers Midcoast Aviation and Savannah Air Center as "preferred" providers for its Global aircraft line. Midcoast is already working on three Global 5000s and Savannah Air expects to receive its first Global for completion in the first quarter next year. Both companies will also be prepared to do more standard interiors if Bombardier's Montreal center falls behind.

Some of the aircraft sent to Midcoast and Savannah will be under contract to Bombardier. For others, Midcoast or Savannah will be the primary contractors for the job.

Lufthansa Technik is also benefiting from Bombardier's completion outsourcing. Following the EBACE introduction of its new Challenger corporate shuttle program, Bombardier announced it had selected the German widebody completion specialist

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as a preferred provider of interiors.

The shuttle line is based on the company's Canadair CRJ regional jet with three configurations—a standard cabin with economy seating throughout, a split cabin with a combination of executive seats and cabin furnishings forward and standard CRJ seating aft, and the deluxe cabin layout with business class seating throughout. Bombardier plans to install the standard and split-cabin interiors at its Mirabel facility where the regional jet is produced. Only the deluxe cabins will be installed by third-party independent contractors such as Lufthansa. Lufthansa Technik expects to see the first two deluxe shuttle aircraft arrive for completion in September.

Gulfstream Goes the Other Way

Gulfstream Aerospace has taken a different approach to green cabin work, keeping virtually all aspects of the completion process in-house.

Lombardo. "There's a tendency when production rates go up to automatically assume you need more brick and mortar, but we decided that the first step is to eliminate waste and work more efficiently.

"With four 10-hour shifts, we can crank up the rate of completions without increasing our physical size."

At this point, G450s and G550s are being completed at Brunswick. G350/450 and G500/550 interiors are being done in Savannah and Appleton, and Long Beach is finishing only G550s. Dallas is handling interior work on the G200 and will do the G150 when production begins next year. The G100, currently being completed in Appleton, will be phased out as it is replaced by the G150.

Over the past several years, Gulfstream interior designers and engineers have also worked to create a choice of options that will meet the desires and needs of the most demanding customer, reducing the number of expensive "one-off" items. Lombardo said this has made the refurbishment process more efficient.

Larry Flynn, president of Gulfstream product sup-

port and General Dynamics Aviation Services, said,

"There is a tight connection between green completion and refurbishment."

When something new is introduced on a green completion, he explained, it quickly becomes available to refurbishment customers. Both completion and refurbishment use the same resources in terms of cabinetry and upholstery, and the two sides of Gulfstream interiors share as well in research and development. "Our refurb customers know that when a Gulfstream comes in for interior work, they're getting the same quality and workmanship that goes into a new airplane cabin."

Flynn said Gulfstream does the service and/or refurbishment on approximately 70 percent of the worldwide fleet of some 1,500 Gulfstreams. At the same time, he added, the refurbishment side of the house makes a point of soliciting work on aircraft from competing manufacturers, in particular Falcons, Challengers and Hawkers. "We've found that the quality of the work we do on them helps sell new Gulfstreams."

It is typical that when a customer brings a Gulfstream in for interior work, it is connected in some way to maintenance and/or service, "So we have to be priced competitively in terms of both cabin refurbishment and service parts," he added.

Both Gulfstream completion and Gulfstream refurbishment shops regularly engage in a shifting of skilled employees from one site to another. It's a matter of the right people in the right place at the right time, said Flynn, that keeps all the facilities level-loaded.

Dassault's Little Rock Center Gearing Up

Dassault Falcon Jet's Little Rock, Ark., Completion Center celebrated its 30th anniversary on June 1.

With the festivities over, workers at the sprawling complex are rolling up their sleeves and preparing to meet growing demand for the French manufacturer's line of Falcon business jets, most of which are built in France and flown to Little Rock for interior finish and exterior paint.

It wasn't that long ago, mid-2003 to be exact, that aircraft production at the company's Merignac facility dropped from a high of seven a month to four a month. Two years later, that is changing quickly as production races to catch up with strong sales this year.

The company currently has three airplanes in production and two more nearing certification—the Falcon 900DX by year-end and the Falcon 7X late next year. With orders for more than 55 copies of the 7X in hand, Dassault has a backlog for the airplane that stretches into the second quarter of 2009.

Falcon 7Xs will begin arriving in Little Rock early next year, and Rosanvallon believes the key to meeting the delivery dates and maintaining a high level of



A Falcon 50 refurbishment by the Dassault Falcon service center at Le Bourget Airport in Paris features a unique wrap-around divan and a photo panel on the aft bulkhead. The forward cabin compartment can serve as a meeting area. The aircraft has a forward galley and is designed to seat up to 12 passengers.

quality means "a heavy investment in energy and brain power. We need to work smarter."

Rosanvallon said the goal at Little Rock is to reduce the completion cycle time to less than four months. He is convinced that the company's using new engineering software and a product lifecycle management process make it possible.

At Little Rock, Dassault is moving ahead with plans for a cabinetry shop expansion and a new ramp staging area. And the company will break ground this month on new hangar dedicated to 7X interior installation. Already operating is a new paint shop, capable of accommodating the 7X, that results in a 20-percent decrease in paint cycle time. Also available is a second paint shop that opened in mid-2000 at the company's Dassault service facility in Wilmington, Del. Like the

Introduction of a new aircraft model tends to drive the cycle time up, and according to Lombardo, even with the addition in the last year of the G350 and G450, "We've not missed any of our delivery dates."

What was an overall completion cycle of 30 to 40 weeks is now approaching 14 to 18 weeks. "We've hit that a number of times recently, and it's our goal for this year."

It is interesting to note that despite the gradual increase in production, and the introduction of two new airplanes in the past year, the company has managed to reduce the amount of "bricks and mortar" it maintains, closing the facility at Alliance Airport just north of Fort Worth, Texas, and moving the assets to the Love Field site in Dallas. At the same time, Gulfstream moved GIV-SP completions from Love Field to Appleton, Wis., and Brunswick, Ga., and downsized the Long Beach hangar.

"We also created a furniture center here that can do virtually anything, and which is also making furniture for the completion centers in Appleton and Brunswick and Long Beach.

"We're producing more airplanes in less space," said



Jet Aviation in West Palm Beach created this Falcon 50 refurbishment for a client with a penchant for the Florida Everglades. The sculpted carpet features alligators and sea turtles, and galley trim shows a fox and heron.

paint shop in Little Rock, the 40,000-sq-ft, \$9.5 million facility can accommodate the 7X.

The Wilmington facility also includes a growing business in interior refurbishments—aircraft from other manufacturers as well as the Falcon line.

Cessna: The Quiet Company

At Cessna Aircraft, the words of French critic and author Alphonse Karr come to mind: “The more things change, the more they remain the same.” It’s the quiet company from Wichita, at which even a new airplane receives a relatively understated introduction.

In 2001, Cessna delivered 313 Citations, and over the next two years of the economic downturn saw that number drop to 307 in 2002, 197 in 2003 and 179 last year. If the decline made for rough water within Cessna, there was hardly a ripple outside. It just kept building airplanes. This year deliveries are expected to

jump to 240 from 179, and if sales this year are any indication, next year deliveries will remain at least at that level.

If it hasn’t made the headlines other manufacturers have, Cessna has nevertheless gone ahead with expansion projects that will allow its completion facilities to meet the promised finished-aircraft delivery dates, and to increase its share of Citation cabin refurbishment work.

The most obvious project is at Cessna’s Independence, Kan. plant, which is best known for production of the OEM’s line of piston singles. In December the company broke ground at the site for an 11,000-sq-ft center dedicated to interior completion work on the new Citation Mustang very light jet. The facility, which includes an exterior paint shop, is scheduled for completion in December. The Mustang will be built at Independence in

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Bombardier recently announced the launch of three corporate shuttle versions of its regional jet in three cabin configurations and has already selected Lufthansa Technik to do the interiors. The Hamburg, Germany shop expects to begin work on the first airplane this fall.

Electronics for the Well Equipped Cabin

We live in a brave new world of constant connection, to our homes, offices, business acquaintances, friends and family. We’re connected by our cellphones, personal digital assistants (PDAs), laptops and Blackberries. And that’s the way we want it, in the air as well as on the ground.

The “gotta-have-it” customer list these days usually starts with high-speed datalink, and the leader at this point appears to be Swift64, launched a few years ago by satellite communication specialist Inmarsat. The service can deliver in-flight Internet connection speeds of as high as 64 kbps for single-channel systems and 128 kbps and higher when two channels are bonded. But it’s not cheap, and the prices vary.



An entry-level system starts at about \$150,000 for an onboard data terminal and climbs by a few hundred thousand dollars with the addition of extra equipment such as a satcom antenna, satcom transceiver, network file server, router, wireless hub, data ports and so on. And there are air-time charges, generally about \$10 a minute.

Those willing to wait for faster connection speeds may want to wait for Inmarsat to deploy its next-generation satellite data service called SwiftBroadband. The first Inmarsat-4 satellite went up in March, a six-ton behemoth capable of delivering broadband service over all major flight routes. A second I-4 satellite is scheduled for launch this fall and at that point the system will provide coverage for about 85 percent of the earth. A third I-4 satellite is planned for the Pacific, which will give SwiftBroadband near-global coverage.

Thrane & Thrane is already looking forward to Inmarsat’s new system. At the European Business Aviation Convention & Exhibition (EBACE) in Geneva in May, the Danish satellite communication specialist introduced a flexible approach to its established two-box Aero-HSD+ Inmarsat system. It will allow

customers to specify the level of capability desired and to upgrade as their needs evolve.

The package starts with six-MCU (modular concept unit) boxes for two channels of voice, one of packet data and one of Swift64 high-speed datalink. Adding a two-MCU, high-speed unit to the basic satellite data unit (SDU) and high-power amplifier provides another Swift64 channel. A built-in PBX enables the user to connect six handsets directly to the system.

The user can select any combination of voice, fax, cockpit and high-speed data from a single Swift64 channel at a list price of \$78,500. The full five-channel system will cost \$232,000. An application-specific upgrade to the SDU will enable it to support two 432-kbps Swift64 broadband channels when the new Inmarsat service becomes available.

Rockwell Collins is also very much in the race and in May obtained an experimental license from the Federal Communica-

Rosen Aviation’s FliteView, seen here on its 15-inch, widescreen LCD monitor, was introduced last year at the NBAA Convention and goes into production in August. The “moving map and passenger information system” is priced in the \$10,000 range and includes a passenger briefing.

tions Commission (FCC) to deploy and test its eXchange broadband connection for business aircraft. Part of a strategic agreement with Connexion by Boeing, the system combines Rockwell Collins’s Tailwind 550 satellite-direct television antenna and signal processing technology with the broadband service of Connexion by Boeing. It will allow real-time, near-global, two-way Ku-band data coverage.

Passengers will be able to use eXchange to access the Internet and firewall-protected corporate intranets, send and receive, get news, weather or destination information, or view satellite-direct television programming. Bombardier’s Global 5000 and Global XRS will be the launch aircraft. Certification of exchange is expected later this year.

Equally market-hungry, EMS Satcom of Ottawa was showing its HS-400 HDS terminal at EBACE, claiming the unit is the only single-LRU Swift64 box available. In the near future, EMS Satcom expects to offer four channels instead of two, capable of upgrading to the 432-kbps Swift64 Broadband service. The single-LRU (line replaceable unit) is already operational in Europe on Boeing Business Jets and Airbus Corporate Jetliners (ACJs). EMS says it has seen growing interest for the terminal from Bombardier, Dassault and Gulfstream. (See “Jet Aviation installs EMS in Falcon 900,” page 22.)

At EBACE, AirCell offered a sneak preview of Axxess, its own

wireless data hardware package for business aircraft and claimed it will allow passengers to talk on wireless “smart phones,” surf the Internet on their wireless PDAs and laptops, and at some point, use their personal cellphones to place calls in flight.

The system will create wireless “hotspots” by installing special transceiver modules, WiFi cabin antennas and wireless interfaces inside the cabin.

Basic Axxess will include two Iridium channels, expansion capability to as many as four Swift64 channels, voice-over-IP compatibility, graphic weather delivery and fax service. A spokesman said the price of the basic hardware package would start at about \$40,000.

Inflight Use of Personal Cellphones Near

In May, the completion and refurbishment industry welcomed news of services that would allow passengers to use their cellphones in flight.

At the NBAA Convention in New Orleans in November, AirCell expects to provide an update on its efforts to launch an airborne system and ground network that will permit passengers in U.S. airspace the in-flight use of cellphones. The company was expecting to begin flight demonstrations of a prototype system last month. Unlike similar projects that would route calls through a satellite array, the AirCell system would use modified existing cellular towers on major flight routes across the U.S.

Preparing for the day when aircraft passengers are allowed to use their cellphones in flight, Arinc and Telenor created AeroMobile earlier this year. Intended initially for airline customers, the system can be adapted for the business aviation market as well.

It would cost no more than \$100,000 to install on each aircraft and users would pay about \$3.50 per minute for calls and about \$1 per text message.

In the U.S., the FCC prohibits in-flight use of cellphones. But the agency would approve the technology being envisioned because it would not interfere with aircraft cockpit avionics or other cellphone users on the ground, according to its design engineers.

The technology calls for a receiver that would instruct the user’s cellphone to go to its lowest power setting, thereby preventing airborne calls from interfering with users on the ground or with cockpit avionics.

So-called “pico” cells would form a mini-mobile cell system in the cabin, replicating the ground-based GSM network and translate the GSM voice call into a format that can be sent to ground stations via the relatively narrow band of the aircraft’s satcom system.

Satellite-direct Television at an Affordable Price?

Flight Display Systems (FDS) of Alpharetta, Ga., is working to bring to market an in-flight entertainment system—Ellipse Direct—priced at less than \$100,000.

The company says the hardware package will sell for one-third the price of competing satellite-direct receiving systems and will fit on smaller aircraft, even helicopters. The heart of the system is

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stand-alone facilities.

The new, 443,000-sq-ft service center in Wichita includes 140,000 sq ft of space devoted to interior refurbishments, as well as a 27,000-sq-ft paint shop capable of accommodating Cessna's largest business jet, the Citation X. The location in the service center makes it easier to do interior work at the same time an aircraft is in for maintenance or modifications, reducing the overall downtime.

The Direction Is Up

Looking back at the past year, and ahead to the remainder of this year and beyond, the only direction appears to be up. Those seeking proof may only look at hiring if they wish.

Almost without exception, everyone is hiring. Many still remember the heady days at the turn of the century when there was a shortage of the skilled technicians—upholstery specialists, cabinetry workers, installers, painters and design engineers—necessary in such a labor-intensive industry. The shortage reached a point that one company's employees emerged from their shift to find their cars papered with help-wanted fliers from a competing completion center.

With an improving economy and the industry thriving, the hiring has begun.

Bombardier has ramped up production of the Challenger 300 to an aircraft every five days and is hiring people as it looks at further increasing production in September to one every four days. "I think it's fair to say that the business aircraft business is busy," said a spokesman.

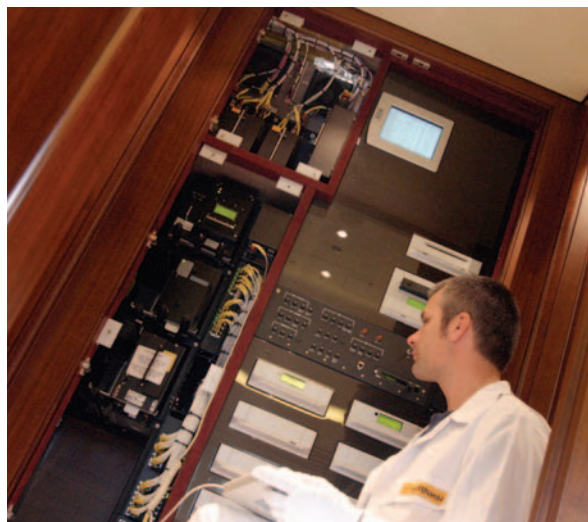
A Dassault spokesman recalled that a little more than two years ago, the Little Rock Completion Center had put 250 to 300 of its workforce of 1,500 on a reduced workweek. "They're back at work now and we're hiring more," he said. "We're approaching the 1,500 level again, and we'll continue hiring as production goes up."

The Search for More Skilled Workers Is Already Starting

The independent shops are also hiring. Slieter described as "ambitious" Duncan's plans for hiring at the Battle Creek facility, where the fastest rate of growth is being experienced.

"We'll soon be back where we were four or five years ago, looking for talented people." Slieter said the company made a point of not laying off employees during the recession. This makes hiring a little easier, he said. "Employee prospects know who the solid employers were when times were hard, and that's where they're going first."

The workforce at Savannah Air Center is now up to about 145 and "we're definitely hiring," said Dodds. "We've been on four or five recruiting trips recently."



A Lufthansa Technik cabin systems technician, above, tests the Hamburg, Germany-based company's new networked integrated cabin equipment system being installed in a BBJ.

Gore Design Completions, which just received a 767-200ER, is hiring, but slowly. "Engineering comes first, then production," said Gore. He noted that there has always been a pool of skilled workers in San Antonio. "Companies have been doing aircraft interiors here since the 1940s and there's an incredible pool of talent."

Starport in Sanford, Fla., opened its doors earlier this year with four people. Spokesman Eddie Hidalgo said the company hopes to increase that number to 15 or 20 by year-end.

At Stevens Aviation in Greenville, S.C. interior completion and refurbishment manager Rich Morgan said, "We are hiring, and it's a struggle to find experienced people." To ensure a ready pool, the company is working with a local aviation technical school and bringing students to work at Stevens as part of a mentoring program.

Stevens is typical of independent completion and refurbishment shops where management is looking ahead to a growing industry.

According to Znamenak, business is good, something of an understatement at a company that had a record year last year and is on pace to exceed that this year. Business is good enough that the company plans to move its cabinetry and upholstery shop from its current off-site location to a new location at Stevens' main Donaldson Center Airport facility. "We're looking at renderings and negotiating with the airport," said Morgan. "We'll probably incorporate engineering and the design center under the same roof."

In this Sabreliner 65 refurbishment, Bizjet International of Tulsa, Okla., used lighter colors to make the cabin seem less confining and designed a small forward galley for refreshments.



Indianapolis Jet Completions opened its doors eight months ago, but boss Randy Keeker said he is already considering a move to a different site on the field where another airport resident is building a series of large hangars. As an incentive, the owner is also building a new paint shop capable of accommodating aircraft as large as the Global Express. There's the matter of the two-year lease he signed for the existing site, but when that expires, Keeker mused, "It would sure be nice to be able to offer both interior refurb work and exterior paint."

The note of optimism seems to run throughout the industry. According to Frank Klaus, "The Garrett business has seen a remarkable 65-percent increase in revenue over the same period last year."

Midcoast Aviation reported a strong year last year

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Electronics Continued from page H

a phased-array antenna originally developed for yachts and high-end mobile homes. FDS and its project partners have modified the mechanically steered antenna to fit airplane fuselages by placing it in a radome that sits on four aluminum legs in a configuration similar to that used by military AWACS aircraft. Any performance penalties, say the designers, would be comparable to those of conventional blister-type radomes.

The company has been testing the Ellipse Direct system on a Challenger 600 since November, satisfying the FAA with regard to icing and structural integrity. The company has completed all the tests and documentation. An STC allowing installation in the Challenger 600, 601 and 604 is expected this summer. FDS president David Gray said the system will deliver DirecTV to virtually any business aircraft, "even single-engine turboprops such as the Pilatus PC-12 and Cessna Caravan."

Big-screen No Longer Means Gas Plasma

In recent years, buyers of larger business jets were partial to gas plasma monitors for one simple reason: they were bigger—up to 42 inches—and bigger was better. But plasma screens were also heavier, drew more power, generated far more heat and tended to react badly to rapid changes in altitude. So what if they cost \$20,000 to \$25,000? They were bigger, and you don't spend \$40 or \$50 million on a big airplane and watch satellite-direct television on a small screen.

That's changing, said Andy Beers, v-p of sales and marketing at the Little Rock, Ark. offices of Rosen Aviation Displays.

Liquid crystal display (LCD) units produce a better picture. The pixels are more compact, providing better resolution, and it is now possible to produce larger screens. Rosen is now evaluating several 42-inch LCD monitors, and Beers believes that one day, "LCD technology will dominate the large-screen market." The price is expected to be "a little more expensive than a comparable plasma screen," but that is expected to decrease as demand increases.

More important than choosing LCD or plasma is getting the best signal to the monitor. "Most of the monitors available, LCD or plasma, are made to receive high-resolution video signals," said Beers, "and the equipment from most of the cabin management sys-

tem providers doesn't permit distribution of high-resolution output."

There seems little doubt that the industry is moving toward a business aircraft cabin in which all elements of the electronic architecture are linked through a cabin-management system that is reliable, easy to maintain and user-friendly.

Ethernet Backbone

The future appears to be an Ethernet backbone with a single loop through which all the applications operate. According to Eric Olson, marketing lead for Honeywell cabin products, "It will mean easier installation and easier maintenance. For the user, it will mean higher speeds, better clarity, more byte information and greater reliability. It takes the entire cabin [electronic] architecture and makes it digital."

It was with this in mind that PGA Avionics of Chateauroux, France, delivered its first Paradize II "advanced cabin management system," already in service on board an executive Airbus A330.

According to the company, the system links all the airplane's in-flight entertainment and cabin lighting components, including audiovisual systems, DVD, CD and external video cameras, satellite-direct television, high-definition monitors and individual reading lights and cabin "mood lighting."

Elsewhere, Intheairnet purchased all the outstanding shares of IEC Inflight Systems stock last year, including the UK-based cabin systems integrator's entertainment and cabin control systems for executive widebody aircraft.

At the time, the company said the acquisition would allow IEC to "seamlessly add our integrated solutions to increase customers' technology choices, while opening new markets for Intheairnet."

It will take the form of a fully digital Ethernet system, with the unlikely but amusing acronym "Nawtie." The company has completed testing of the system on a Challenger 604 provided by GE Corporate Air Transport and hopes to have "a fully functioning unit and certification" in time for the NBAA Convention in November.

In the end, completion and refurbishment centers, while running to keep pace with all the new electronic technology, available now and in the near future, are looking forward to such cabin-management systems.

"We're spending a lot of time on cabin-management systems," said Olson. "We're adding so many things so quickly that it makes the challenge of producing a user-friendly cabin-management system that much more difficult."

—K.J.H.

It's all about the environment

by Kirby J. Harrison

Cabin environment has been a major element of the completion process in the past couple of years, and it promises to become more so as concerns about air quality and drinking water grow.

There is sufficient concern that the FAA is establishing a Center of Excellence for Airliner Cabin Environment Research at Auburn University. The facility is expected to produce valuable information about air quality as well as protection against chemical and biological threats. The FAA will spend \$1 million in the first year and \$500,000 a year for the two succeeding years.

Outside the walls of government and the ivy halls of academia, vendors are offering new technology that promises cleaner air and protection against the spread of bacteria and viruses. Englehard of Iselin, N.J., has developed a new system it claims will reduce ozone concentration by more than 90 percent as well as remove a "substantial portion" of volatile organic compounds such as fumes from jet fuel. For business aircraft flying at 51,000 feet, in the lower reaches of the earth's ozone layer, ozone introduced to the cabin through the bleed-air system may well create a health hazard to crew and passengers. The ability of the system to reduce hydrocarbon concentrations in the cabin air is an added benefit.

Earlier this year, Marshall Aerospace at Cambridge in the UK teamed with Cabin Air Sterilisation to promote an "air sterilization" system designed to reduce the spread of airborne virus and bacteria—including severe acute respiratory syndrome (SARS) and avian flu—throughout the cabin. The technology sterilizes air by exposing it to strong UV-C ultraviolet lamps for less than half a second and can be

installed through "a simple modification" of the existing air recirculation systems, HEPA filter and fan units.

Swiss-based Askair Technologies is developing another cabin air sterilization system. The two-stage device (convergent vortex and divergent vortex) is mounted in the existing cabin ductwork and destroys viruses and bacteria by subjecting them to alternating positive and negative plasma zones. In the self-sustaining plasma zones, viruses and bacteria are destabilized and cracked by collisions with radicals created in the plasma.

All of these cabin air systems are currently being developed and tested for use in airliner cabins but can be scaled easily for use in business jets.

International Water-Guard (IWG) of Burnaby, B.C., has a growing list of clients for its circulating potable water system and recently received an STC for installation in the BBJ.

Equally important, IWG has just received "an order valued at approximately \$500,000" for the purchase of an unspecified number of its potable water treatment units from an unidentified business jet manufacturer. IWG declined to identify the customer, but president and CEO David Fox pointed out that it is not the first OEM to contract for what IWG calls the NPS-A6. It is a "long-term procurement item" for installation on the Gulfstream G550 and on Bombardier's Global 5000. Its function combines filtration and ultraviolet disinfection to deliver water free of potentially harmful bacteria and viruses.

"We're following the uptick in the industry, and a growing number of buyers are requesting it if it isn't standard," said Fox. "More buyers are realizing that ensuring clean

water is a major part of the cabin environment."

Noise is also part of the cabin environment, and a most undesirable part of it, at that. Studies have shown that the high-frequency vibration (another term for noise) to which passengers and crew are subjected can contribute to fatigue and is a major contributing factor to what is commonly known as jet lag.

Dassault is making a major selling point of its efforts to reduce the noise in the cabin of its new Falcon 7X. The company hopes to deliver an airplane in which the noise level is 52 dBSIL (decibel speech interference level) under most flight conditions, comparable to the noise level in a luxury car at 68 mph, according to Falcon aircraft acoustics manager Jean-Marc Pini.

The objective is to reduce noise levels at the medium- and high-frequency range, which have the most adverse effect on conversation.

To achieve the goal, Dassault built dedicated test equipment at its Merignac and Argenteuil facilities to deal with thermal-acoustic issues and worked closely with engine manufacturer Pratt & Whitney Canada and with Lord Corp., a U.S.-based specialist in vibration, shock, motion and noise control. The result is:

- a special felt layer between floor and carpet;
- flexible engine mounts to reduce noise produced by engine vibration;
- and special thermal-acoustic insulation that will retain its acoustic barrier properties in extreme temperatures.

Meanwhile, Pini and his team are looking forward to the first flight of 7X S/N 3 before year-end. The airplane, with a fully completed cabin, will provide a definitive platform to determine if they have been successful.

Lufthansa Technik is also looking into cabin noise reduction as part of a noise- and weight-reduction program for what it calls "the intelligent cabin." The company has been working both in house and with thermal-acoustic ven-

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What? No Tattoos?

Bruce Rossmeyer, proprietor of Daytona Harley-Davidson dealerships in Fort Lauderdale and Daytona, Fla., and the owner of a new Citation XLS, has left no doubt as to his cycling allegiance.

He took the Citation XLS to the West Star Aviation completion and refurbishment center in Grand Junction, Colo., for a special exterior paint job, starting with overall silver metallic paint, using Sherwin-Williams "Acry Glo" applied from special pressure-pots to ensure an even coat.

For the "Screamin' Eagle," West Star worked closely with the motorcycle manufacturer to ensure an authentic replication of the distinctive image. After West Star applied the basic elements—eagle head, eyes, flames—Harley-Davidson sent its artist to

the facility for the fine air-brushing of shadows and highlights on the tail art, eagle and flames, creating a 3-D appearance. Finally, the West Star paint shop applied two more protective clear coats.

Out-of-the-ordinary exterior paint has become something of a specialty at West Star. The company has also done a Challenger 604 with three different metallic silver tones and a Citation X in a platinum/gold metallic finish. A Citation CJ3 scheduled to be done in August will feature three different pearl shades in a special paint that changes color depending on the angle at which it is viewed. —K.J.H.



Environment

► Continued from page J

dors toward this end. Lufthansa engineers believe that an "inner and outer acoustic ring," in combination with vibration dampers and other measures, will provide a solution.

In growing numbers, customers are expressing a desire for a quieter cabin. "They don't understand why the interior of their \$60,000 Lexus is quieter than the cabin of their \$40 million business jet," said Emon Halpin, president and CEO of Flight Environments.

The Paso Robles, Calif.-based company is currently working on a BBJ project with PATS' completion center in Georgetown, Del., to produce a BBJ cabin in which the speech interference level is less than

50 dBSIL. In the average luxury car, the dBSIL is typically about 56. On a typical airliner, the dBSIL is in the mid-60s.

"We're actually writing a BBJ contract requirement for a dBSIL of 49," said Dominick Scott, v-p of quality and procurement at PATS.

Reducing aircraft cabin noise is more than simply a matter of putting in more layers of "the pink stuff" said Halpin. "It's a matter of attention to detail, such as where the furniture is placed and how it's attached and where the pumps and fans and valves are located."

One of Flight Environments' recent customers is the owner of an executive/VIP Boeing 747, in which some individuals have actually refused to fly because of the high cabin noise levels. At the owner's request, Flight Environments set

about redesigning a acoustic package for the airplane's conference center. "We actually got the dBSIL down to the mid-40s," said Halpin, "so we know what's possible."

Halpin's company is also working on a BBJ refurbishment for a customer for whom they created the original thermal-acoustic package for the airplane five years ago. "He came to us and said he's having the airplane refurbished, and that if we could get the dBSIL down to the mid-40s, he would be willing to pull out the entire interior to do it."

"A noisy cabin places a burden on physical stamina, and a quiet cabin is especially important in a head-of-state business jet," said Scott. And, he added, more and more customers see a quiet cabin as an essential part of the cabin environment. □

Completions

► Continued from page I

and is forecasting that this year will be better, "probably 25 percent better," said Sutterer.

Completion management specialist Aerospace Concepts of Montreal said in July last year it expected to double its business from the previous year, and it did, from managing 10 airplane completions in 2003 to 21 last year. And president and CEO Kevin Hoffman said the company anticipates more of the same this year.

"Beyond that, we'd have to increase the size of the company, and we're not quite ready for that," he said. At the same time, Aerospace Concepts has opened an office in St. Louis to manage the progress of Bombardier Business Jet completion

work going on at St. Louis Downtown Airport by Midcoast Aviation.

Meanwhile, Hoffman said with a satisfied chuckle, "We've been invited to submit detailed proposals on three 747 executive/VIP interiors."

Aviation Concepts in Dallas is hiring more people, and with good reason. In 10 days in May, said chairman Ralph Emery, "We picked up seven design contracts, two green BBJs and BBJ refurbishment, and full cabin refurbishments on a Challenger and two Gulfstreams."

Throughout the completion and refurbishment industry, at OEMs and independents alike, there is an air of optimism, along with a feeling that the growth is going to continue, at least for the next several years. "And it's a good feeling," said Randy Keeker. "A real good feeling." □