THE X FACTOR

X-Hawk may be the forerunner of a new family of rapid response air vehicles. *Paul Derby* reports.

Rewind 13 years to the ill-fated US military rescue operation in Mogadishu, Somalia when 18 US special forces soldiers died during attempts to rescue the aircrews of two downed Black Hawk helicopters.

The incident was immortalised in the Hollywood blockbuster *Black Hawk Down* and marked a low point in US foreign conflicts.

Now fast-forward to a revised scenario where the rescue mission is aided by the ability to insert a rapid assault and exfiltration force using VTOL vehicles designed to operate in the sort of narrow hostile streets which characterised the Somali mission.

That is exactly the type of scenario that Bell Helicopter and Urban Aeronautics are envisaging as the staple mission of the X-Hawk – the intriguing Fancraft that the two businesses unveiled for the first time yesterday at Farnborough.

Agreement

Discussions between Bell and the Israeli firm have been ongoing for about a year. To date there is no fully established teaming agreement, but instead a collaboration which will continue to investigate the feasibility of a full development programme for the X-Hawk.

The model on display here is in part the result of months of development work undertaken by Bell's XworX research and development team in Arlington, Texas. But long before Bell's involvement, Rafi Yoeli, president and chief executive of Urban Aero, had sown the seeds of a programme which he believes can dramatically alter the shape of vertical lift in the aerospace industry.

"I do believe that the X-Hawk is more than a business opportunity," says Yoeli. "I see this as the forerunner to a new family of vehicles. Our vision is that there is a clear need for a craft that can operate in confined areas, particularly urban environments, to take people out of harm's way and in some cases into harm's way for certain missions.

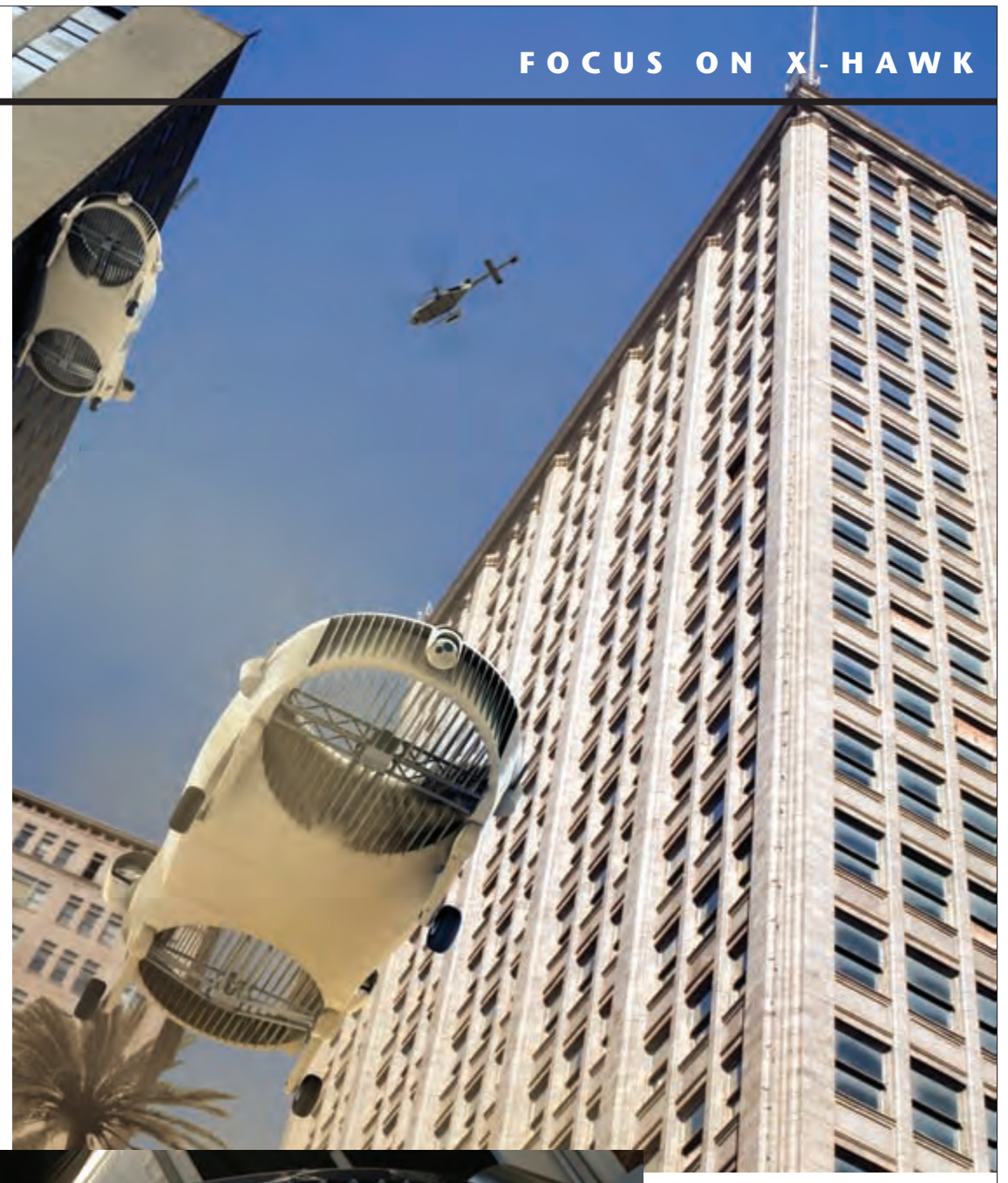
Rooftop

"It is a craft that would be able to fly below rooftop level, in situations that are currently incompatible with existing platforms."

The full-scale model is approximately 27ft (8.2m) long and 14ft (4.3m) wide at its widest point. Initial iterations of the craft call for manned operation, but the X-Hawk could also be configured for autonomous flight. The craft features a semi-autonomous flight control system allowing it to be operated from a ground station. Yoeli says the vehicle is fully scalable, raising the possibility of a wider family of Fancraft.

One of the key innovations that Urban Aero designed into the airframe was a way of dealing with momentum drag – the condition that affects the way that an aircraft behaves in flight when subjected to a variety of airflows.

The result is a set of louvred ducts which are open during the cruise, but close in a graduated way as airspeed decreases, creating the minimum disturbance to airflow and hence more efficient operation. The design also includes a vane control system which provides lateral control.



Above: The vehicle is designed to be able to fly at low levels in a city environment. Left: Bell and Urban Aero throw the wraps off the X-Hawk.

Bell has designed the craft to include integral torque motors on the landing gear, meaning that it has some ground power without the need to fire up the turbines.

Current estimates are that the X-Hawk would have a useful load of about 3,000lb (1,362kg), an endurance of 2h with a full fuel load and would be capable of flying at 240kt (440km/h). "We think the endurance is about right," explains Yoeli. "If the mission needs to be longer than 2h then there are other aircraft which would be more suitable.

"There have been so many developments in the industry in the past 20 years, with the addition of composite structures, fly-by-wire, GPS and far more efficient turbine engines that the time is now right to look at the X-Hawk."

Proposal

Jon Tatro, Bell's director of advanced concept development, says a proposal is with the US Office of Naval Research (ONR) for funding consideration, which could lead to a properly-funded feasibility study. The X-Hawk concept has also been discussed with other potential US military customers.

"Initially, we are looking at offering the X-Hawk exclusively to the US military," says Tatro. "If the proposal to the ONR is successful then we will revisit the teaming agreement.

"The aim of presenting the concept to an international airshow audience here at Farnborough is to accelerate the prospects for funding.

"We want to get the word out there. This doesn't have to be a 25-year programme. We could potentially be fielding X-Hawks long before that, but it could become a 25-year programme if we don't work hard now to raise the interest levels."

The X-Hawk concept is brimming with 21st Century technology, but has its roots in the 1960s when the Piasecki Company built vehicles known as 'flying jeeps' which proved the basic viability of ducted dual fan configurations. At that time, limitations in controlling the craft and problems with payload capacity halted any further large scale development.

In more recent times, Urban Aero created a predecessor to the X-Hawk, dubbed the CityHawk, which conducted proof of concept flights. The company, based at Tel Aviv's Ben Gurion airport, is now striving to take the concept to a new level where it can be deployed on a commercially viable basis.

To accelerate the development process Bell and Urban Aero have agreed on a phased model. Technology assessments and market analysis will be performed alongside the search for sources of funding.

It is expected that Urban Aero will lead air vehicle design activities and that Bell will take responsibility for systems integration and production work. During this second phase, Bell's XworX team will build a demonstration vehicle.

Although it might be a decade or more before the fruits of the X-Hawk project are borne, what Bell and Urban Aero achieved with yesterday's unveiling at Farnborough was to whet the appetite of the wider aerospace community with a tantalising glimpse of a concept that could transform vertical flight.

THE BEST OF BOTH WORLDS

Don Schreiber, chairman of Kellstrom Industries is making significant cultural changes at the company, writes *Alan Peaford*

Don Schreiber came through the polished school of management that is GE, and working under Jack Welch he developed an appreciation and understanding of what is needed to make a billion-dollar company even better.

Now he heads a company with a turnover that, he says, GE would consider "rounding up" money – but he is happy.

Schreiber is chairman of Kellstrom Industries, headquartered in the sun-drenched city of Miramar, Florida. He's at Farnborough to do the vital networking that will see his company develop growth in a way that would make Welch proud.

"It's a great place and an efficient way to network," says Schreiber. "Our customers are from different countries – we work with 80 different air forces around the world – and we can talk to the OEMs.

"We get to see all of the big MRO customers in one place and interestingly we meet our USA customers here as well."

The story that Schreiber will be telling them is that Kellstrom is more efficient than ever and is undergoing significant cultural change that will take it even further.

The company provides inventory management solutions and lists its core competencies as asset management, OEM distribution, component repair and overhaul, and supply chain management utilising impressive IT through its global sales and marketing network.

"We have a good balance in our business," Schreiber says. "In commercial, 45% of our business is with the OEMS and MROs such as Lufthansa Technik and SR Technics, 37% is direct with the airlines and 18% is with the resellers such as AAR and Volvo Aero."

Don Schreiber.

Kellstrom buys engines and airframes and tears them down, often selling the parts to the companies contracted to do the tear-down work.

Specialist

Other components can be repaired and are on the shelves of the 250,000ft² (23,000m²) of warehouse in Miramar or in one of the specialist facilities around the world such as with Marshall Aerospace in the UK where Kellstrom has its own warehouse and staff to work in partnership on Lockheed Martin C-130 Hercules aircraft and engines.

"Here too we have balance," says Schreiber, adding that 37% of defence activities are with service centres or MROs such as Marshall, L3/Spar, Pemco or Lockheed Martin, 27% is with international air forces such as the UK's RAF, the Royal Australian Air Force the Portuguese and the Singaporeans.

Kellstrom is using leading edge IT to get a competitive difference. It uses its own inventory management and order processing system which allows online inventory search and ordering with real-time status checking. Its wireless barcoding and material handling speeds up the distribution processes.

Kellstrom's recent acquisition of High Tech Avionics gives a new dimension to the company with FAA and EASA approvals as repair station for unlimited radio, instrument Class 1,2,3 and 4 and Class 3 electronic accessories.

The High Tech global reputation for work on TCAS, air data computers, FMC and autopilots will continue under the Kellstrom banner, says Schreiber.

With a new focused management team in place, Kellstrom has de-fragged its warehouse. "It's like your garage at home," says Schreiber.

"There are bits in there that you were never going to use but didn't want to throw away, just in case. We had a good look at material and equipment that had been in the warehouse for some time and thought we could make better use of the space." The clear-out has allowed High Tech to incorporate into the Miramar facility and share the Kellstrom value and goals that Schreiber is keen to see shared by the whole workforce.

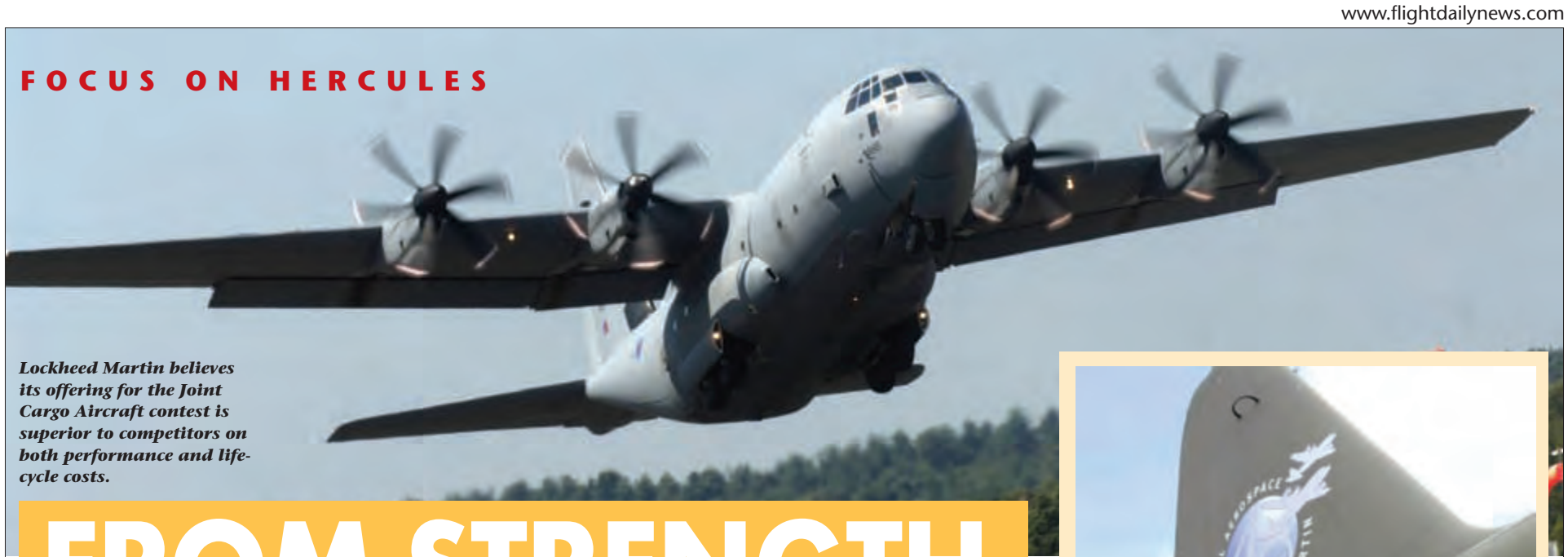
> **"There are bits in there that you were never going to use but didn't want to throw away, just in case. We had a good look at material and equipment that had been in the warehouse for some time and thought we could make better use of the space."**
>
> **Don Schreiber**

"I look at GE and all the big company characteristics and I look at where we have come from and the small company attributes.

"What I am doing is bringing those together so we have the characteristics such as integrity, resources, structured processes and so on and combine that with attributes such as accessibility, responsiveness, flexibility, personal service and efficient cost."We have introduced a bonus scheme where every employee gets a share – not just the top management team. I think people will notice the difference."

Schreiber is determined not to stop at aerospace. "Our core competencies work across other industry sectors. We are looking at wheeled and tracked vehicles.

"There are lots we can do and we can do well. I am excited about what's happening here and am really looking forward to getting the chance to bring people up to date at Farnborough."



Lockheed Martin believes its offering for the Joint Cargo Aircraft contest is superior to competitors on both performance and life-cycle costs.

FROM STRENGTH TO STRENGTH

As Lockheed Martin seeks yet another role for the evergreen C-130, the UK's Marshall Aerospace celebrates four decades of supporting the aircraft. *Alan Dron* reports.

At first sight, it seems to be just too much aircraft for the role. But that's not how Lockheed Martin sees it.

The Joint Cargo Aircraft contest for the US Army/Air Force intra-theatre transport has for some time been fought out between the GMAS C-27J Spartan and the EADS Casa North America CN-235/C-295.

Lockheed Martin (Outside exhibit OE11) believes, however, that its decision last month to offer the four-engined C-130J can be a significantly cheaper option over the long term.

"There's a perception that this contract is about a replacement for the [Shorts C-23B] Sherpa," says Rob Weiss, vice-president, business development at Lockheed Martin Aeronautics. "But when you start to delve down into the requirements it's much more than a Sherpa replacement programme.

"You're talking about high-altitude operations, a hot environment and significant payload. When you put together that combination of hot, high and heavy you need a powerful aircraft to do that and, in our assessment, the twin-engined aircraft will fall short of meeting this requirement."

Weiss argues, for example, that the C-130J – Lockheed Martin would offer the short-body version, essentially the US Marine Corps KC-130J tanker without its aerial refuelling equipment – can better its smaller opponents on several performance parameters, including the ability to operate from smaller runways and time-to-climb.

That additional power also becomes significant when one calculates the safe available weights that are required to ensure safety should an aircraft lose an engine on take-off, Weiss argues; the required safety margins severely cut into the payload that a twin-engined option can carry, he says.

The C-130J's greater capacity will also mean that fewer sorties will be required to execute a given mission and it will have a greater margin of growth to cope with the inevitable increase in requirements that will emerge in future, he adds.

He says that, despite being a major subcontractor on the C-27J, of which Alenia is teamed with L-3 and Boeing, Lockheed Martin's decision to offer the C-130J as a competitor for JCA has not caused any friction with the Italian company: "We're fully supporting and upholding our responsibilities as a subcontractor to deliver the kind of capability on time, on cost that they require. We certainly recognise that there are some markets worldwide for which the C-27J is the right solution, but don't believe this happens to be the case on JCA."

On cost grounds, Lockheed Martin says that it has driven down the cost of the C-130J from around $70 million to the "high fifties to low sixties" but more significantly, it believes that the existing US infrastructure supporting the C-130J will give 40% lower costs over the life cycle of the programme compared with the twin-engined options.

Looking beyond JCA, Weiss believes that further orders will come from the US Marine Corps for the KC-130J. The corps has a requirement for 52 aircraft, of which 34 have so far been ordered.

Overseas, much attention is being given to India's requirements for an Antonov An-32 replacement. Lockheed Martin's understanding is that the IAF has already made a decision that the C-130J is the right aircraft. "They might start out with a relatively small number of aircraft but that has the potential to become very significant over the years." However, a cheaper Russian option may also be in the running. India has 100 An-32s in service.

Israel is another export prospect, says Weiss. Although the country's air arm has the option of refurbishing the avionics and structure of existing C-130s.

Marshall will be supporting the UK Royal Air Force's C-130J/K fleets until they go out of service under the recently announced Hercules Integrated Operational Support contract.

Ross Reynolds, vice-president, air mobility programmes, Lockheed Martin and Martin Broadhurst, chief executive, Marshall Aerospace, under the fin of a C-130K specially decorated to mark Marshall's 40-year involvement with the C-130.

RAF contract puts icing on Marshall celebration

Marshall Aerospace comes to Farnborough buoyed up by the signing last month of a £1.5 billion ($2.7 billion) deal to support the UK Royal Air Force's fleets of C-130J/Ks for the next 24 years.

Marshall, which is celebrating a 40-year involvement in maintaining and upgrading the service's C-130s, will take a greater role in maintaining the 24 C-130Ks and 25 C-130Js until they go out service around 2030.

Under the Hercules Integrated Operational Support contract (HIOS), RAF personnel will be responsible for first-line maintenance at RAF Lyneham, Wiltshire, assisted by a 'forward support team' from Marshall. The company will also be responsible for all aircraft depth maintenance activities at its Cambridge base.

HIOS calls for 80% aircraft availability for the C-130K fleet and 85% for the C-130J. As well as providing guaranteed availability levels, Marshall also has responsibility for providing surge capability by backing up the first-line servicing. The contract aims to save £170 million over 25 years.

The C-130Ks, which entered service in the 1960s, are due to be replaced by the Airbus Military A400M. Broadhurst says that the UK Ministry of Defence continues to study fleet options in the event of the A400M schedule slipping and that retirement dates for the C-130K are dependent on how long the aircraft remains in the special forces role.

Marshall expects to put forward by the end of this year a similar proposal to support the RAF's nine Lockheed TriStar tanker/transports.

Meanwhile, the latest estimate for the A400M's Europrop TP-400-D6 engine to be delivered to Marshall for air testing is now December, with first flight in spring 2007, says Marshall's engineering director Bob Ward.

Marshall is modifying the sole Hercules W Mk2 used by the UK for meteorological research as a testbed. The Europrop powerplant is to be fitted in the port inboard position. The engine will be flown for around 100h over a six-month period.

William Hynett with vision for the UK's aircraft manufacturer B-N Group.

GROWTH INDUSTRY

The UK's only remaining commercial aircraft manufacturer is busier than ever. *Alan Peaford* **meets a business that is set to grow.**

Britain has played a major part in aircraft manufacturing over the past century – but today the mantle of responsibility for upholding that reputation rests on the shoulders of one small company located on a small island off the English mainland.

But that company – headed by an ambitious and focused former Royal Navy jet pilot, backed by Omani capital and delivered by a workforce with genuine old-fashioned values – is growing and flying the flag for the UK aerospace industry.

The company is the B-N Group, owner of Britten-Norman. It is the UK's only commercial aeroplane manufacturer with a business that continues to defy the odds by growing from its Bembridge airfield base on the east coast of the Isle of Wight, about 50 miles (90km) south of Farnborough.

That corner of the beautiful green island is known by locals as 'God's waiting room' since so many people choose the area for their retirement. Now there is a new vitality about the place as former Sea Harrier pilot William Hynett steadily rebuilds a brand. Ravaged by past failures, it is now firmly set on a course for success.

"We are a small company," says Hynett, "and probably the smallest manufacturer bringing an aircraft to Farnborough. But we want people to know we are here.

"We want people to know we are new team but with a well-established product that has shaken off the problems of the past and with a lot of new options."When Hynett was brought in to Britten-Norman four years ago by the Zawawi brothers, the company was beginning a painful growth with 21 employees salvaged from the collapse of Britten-Norman Ltd.

"We now have more than 160 full-time employees plus a number of contractors based at the Bembridge site," says Hynett.

The B-N Group incorporates a range of services, from the manufacture of the world-famous Islander aircraft through to Fly BN, the MRO provider and now aero composite business.

The company is also re-assembling the world's best-selling GA aircraft, the Cirrus SR20 and SR22 models. BN Resources is developing type rating for the BN2T Islander and planning further growth in training.

Says Hynett: "We had a good look at what we were doing. A key was getting the right managing directors to run the business.

"Our drawings were all being done by hand and the only computers were 286 model PCs. We have modernised our systems and changed the approach." The core of the Britten-Norman business is the Islander. More than 800 of the type are flying in 120 countries. "The majority are 30 years old but they are rugged aircraft and keep on going."

B-N Group has also become involved in spares. "That was something we had outsourced. But we realised we were losing touch with our customers," says Hynett.

"We now have businesses in Australia and the USA specifically to work with our customers in those areas."

The company is also offering an ambitious buy-back programme for Islanders and its three-engined Trislanders. "We can put new wings and engines on a zero-houred airframe and produce an aircraft that it is hard to not make money with."

Hynett is keen to produce a refitted Trislander as well as continued development on a BN2C, an upgraded version of the successful BN2B, but the company has been too busy.

A contract to provide the British government with four Defender 4000s, alongside the commitment to reassemble more than 100 Cirrus aircraft in a year has fully occupied the business.

"We are ready to go with these projects but we need orders first," says Hynett. "We will get on with producing demonstration aircraft but as we get busier that gets put back."

The fourth Defender 4000 is currently in production at Bembridge. The aircraft capitalises on the 40 years of Islander heritage with its low-speed handling characteristics, extended endurance and increased payload.

At Farnborough, BN is showing a BN2T Islander reconfigured for surveillance work. The aircraft – with G-SELX registration – is being used to demonstrate the success of integrating Selex sensors and airborne systems integrated mission sensor suite (IMSS) onto the platform.

The demonstrator has been repainted for its Farnborough debut and is operating demonstration flights to show just how well the infrared and other surveillance equipment works. Between flights it is on display in the static park.

The BN2T features low loiter speeds, long-range endurance and low signature noise, despite the power of the Rolls-Royce engines, and superior image quality thanks to the Selex IMSS.

"The slow speed cruise of 60-70kt (110-125km/h) compares favourably with a helicopter at a fraction of the price," says Hynett.

Greater Manchester Police are using the aircraft alongside helicopters. "It's an ideal solution. Helicopters can be there for fast response and low-level flights for crowd control, but when it comes to a mission where surveillance counts, then the Islander is ideal."

Working as a systems integrator, BN has offered its aircraft as a test bed for surveillance equipment. "We test different equipment that will be used on all aircraft types. It is an ideal platform."

Hywell says the company is also getting greater demand for a business aviation version of the aircraft. "This is ideal for people who want to fly the routes a helicopter would but who don't want a helicopter," Hywell says. "It costs far less than a helicopter but can put down in tight fields."

Hywell demonstrated these capabilities on a recent private flight. "I was with my brother-in-law on a flight to Sywell [in England's Midlands]. The runway was barely 500m with a cross-wind. ATC couldn't believe we wanted to take off on the short runway. We were airborne with more than half of the runway remaining. This airplane is remarkable for its performance."

Hywell has opened the doors to Bembridge. "I love the way that the USA embraces GA," he says. "I want this to be a little bit of the USA.

The Britten Norman Islander BN2T is at Farnborough fitted out for Selex. It is pictured here before leaving from Bembridge.

Are we witnessing the next giant leap forward for aviation – or are we just hoping to? *Liz Moscrop* reports

ALL HAIL THE AIR TAXI?

Top: Embraer has an order for 50 Phenom 100s for a European fleet. Above: Dayjet has 239 Eclipses on order.

Silcon Valley chutzpah is flying into aviation as former IT entrepreneurs Vern Raburn (Eclipse) and Ed Iacobucci (DayJet) are on short finals to land new companies in an unproven market.

Several manufacturers are behind them on base leg, with Cessna, Embraer and Adam Aviation in advanced stages of developing their new machines.

Not everybody is as bullish about the prospects for a very light jet (VLJ) air-taxi market and the airframers and upstart start-ups are spawning acres of newsprint.

In May, Raburn fuelled further debate when he told EBACE attendees in Geneva that Eclipse is looking to develop very light jet self-recovery systems.

Two weeks later Diamond Aircraft's CEO Christian Dries said at Berlin's ILA airshow that he, too, is working on such a system using unmanned air vehicle technology and applying it to a Diamond light aircraft.

The headline-grabbing statements threw up even more possibilities and on 23 May, *Flight International* wrote that certification issues – not the ability to create a simple 'get-me-home' system – are going to be the major hurdles to overcome.

The technology exists, but the challenge lies in creating a system that would eliminate the need for a second pilot, while ensuring the safety of everyone involved in getting a pilotless aircraft back on to the ground.

David Wu, flightdeck systems marketing manager for Rockwell Collins Business and Regional Systems, agrees: "The avionics system that underlies integrated flightdecks certainly has the capability to grow to 'get me home' capability. The challenge will be in the regulatory requirements."

There is strong business rationale behind the manufacturers' statements. In most of the world, jets used for air-taxi operations require two pilots. If regulatory agencies were to accept that fitting an aircraft auto recovery system would dispense with the need for a second pilot, operating costs would fall dramatically.

But the biggest obstacle will be passenger confidence. Aviation professionals might embrace new industrial concepts, but a typical passenger would be leery of an aircraft flown by one pilot, let alone none.

Says Rupert Dent, chief executive of UK air charter operator Air Med: "It's exceptionally difficult to convince the flying public that a self-landing system is safe. Today people still ask us to fly two crew even on aircraft where they can fly with one. We will likely only feel the benefit of self-landing technology when it has become ubiquitous."

The spark behind the VLJ concept was Raburn's notion of designing a jet that could compete directly with the car, therefore opening up a brave new world of business opportunities.

Thanks to his vision, air-taxi operators are springing up around the world and potentially creating a whole new market sector. The ability to travel to previously inaccessible areas is proving enticing.

Pricing is an attractive part of the proposition. An Eclipse 500 costs $1.45 million. Cessna wants $2.5 million for its Citation Mustang and Embraer and Adam and are asking $2.85 million and $2.28 million respectively for the Phenom 100 and the Adam 700.

Analysts can't quite agree on the number of new machines set to shape the new market. The Teal Group predicts we'll see 2,310 VLJs in the next decade, Pratt & Whitney Canada have plumped for 5,000-plus, while Rolls-Royce offers 8,000 over the next 20 years.

Teal is sceptical about the viability of a VLJ air-taxi market, believing them to be too small for business flyers and too pricey for piston pilots wanting to upgrade. It also says that excessive deadhead legs on a VLJ point-to-point service will render an air-taxi service very expensive.

But the IT boys have a history of successfully flying against prevailing winds and a new per-seat-on-demand air-taxi model is evolving, spearheaded by DayJet in the US. With 239 Eclipses on order, the company is recruiting pilots and ground crew to staff its first five 'DayPort' locations, opening for business this November in Florida where little or no scheduled services are available.

Silicon thinking is evident as the company plans to develop a community-based corporate culture at DayPorts to enable them to grow rapidly, supported by their staff. It expects to cover seven states across southeast USA within two years. If a new air-taxi market's about to land in the US, here in Europe it's just starting on take-off roll. Embraer recently secured a European fleet launch order for 50 of its Phenom 100s from Swiss start-up JetBird, an on-demand charter operator scheduled to begin operations in April 2009. Founder Domhnal Slattery says: "We plan to start from our base in Zurich and within five years operate a fleet of 100 aircraft from up to five hubs."

Embraer is equally upbeat, predicting 24% of new business jet deliveries in Europe to be VLJs.

Eclipse says it will increase investment in Europe, with European certification and first deliveries set for mid-2007. Cessna has sold seven Mustangs to UK air-taxi operator London Executive Aviation and Adam Aircraft's A700 is scheduled for European certification and first deliveries in late 2007.

Spectrum Aviation Europe looks likely to announce its first European fleet customers at NBAA this autumn, with chief executive Stefano Sturlese saying: "We anticipate around 70% of our customers will be classic charter companies, 20% per-seat-on-demand air-taxi/fleet operators and 10% owner pilots."

However, established air charter operators are cautious. Says Dent: "The Eclipse and Mustang were designed with the US market in mind and are very effective there. In Europe there are fewer owner pilots and the need for two crew to pilot complex aircraft means that they will be costly to operate.

"That means they are more likely to appeal to a target audience of first class users. The manufacturers are going to have to pre-educate brokers as well as end-users."

With so much at stake, that education process should be an interesting spectacle.

"The biggest obstacle will be passenger confidence. Aviation professionals might embrace new industrial concepts, but a typical passenger would be leery of an aircraft flown by one pilot, let alone none."

Attractive pricing options: Cessna wants $2.85 million for its Mustang.