ISTAT

Jetrader

INTERNATIONAL SOCIETY OF TRANSPORT AIRCRAFT TRADING

Airbus A380

COMPARE | CONTRAST

Boeing 7E7

FALL 2004


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President's Letter

Michael A "Mike" Metcalf
President . ISTAT

"Farnborough 2004"

Is the Long Hoped for Recovery Really Underway?

Does a Cyclical Recovery Really Mean Anything if the Industry Doesn't Learn to Change its Ways?

Farnborough 2004 is now history and attendees are left to mull their visceral feelings of whether the aviation and airline industries have indeed entered into a period of upturn and some form of pending recovery. Quite honestly the signs emerging from this year's aviation extravaganza are mixed - encouraging, but still not clear-cut.

What is clear enough is the fact that the world's largest aircraft marketplace, the United States, is still in a state of turmoil as most of the big announcements concerning aircraft, improving airline business and rising passenger counts have been issued ironically from the troubled Middle-East and the not surprising rapidly awakening "Tiger" economies of the Pacific Rim.

While it is now historical fact that the mighty (American, Delta, United) have fallen from lofty perches, the real story of interest will be their recovery, or the survival techniques they employ to remain short-term viable and hopefully long term changed. Likewise, the four major aircraft manufacturers are all undergoing systemic change required for the future, as well as offering new aircraft production models, many of which may well be destined to redefine aircraft categories and usage roles.

Perhaps the most startling techniques of change will likely emerge from the financial community as manufacturers, banks, leasing companies, export credit agencies and end users struggle to define new "techno-finance" techniques and models.

This past cyclical downturn has already heralded a pattern of change relative to ticket pricing, reduced service amenities, on-line bookings, and will likely culminate with a redefinition of the on-going labor-management struggles, work rule changes, and particularly elimination and/or significant redefinition of scope clauses.

Accordingly, whether the predicted and desired recovery is real or still a phantom is debatable, but a sense of change is definable and rapidly becoming visible in daily industry custom and operating practices. This gathering momentum of industry change will affect almost all ISTAT members, and that is probably the real message to be taken away from Farnborough 2004.

The ISTAT Cocktail Reception

What is a certainty emerging from this year's Farnborough 2004 is the continuing growth and appreciation of our hallmark ISTAT events with the ISTAT Farnborough Cocktail Reception this year's instant success.

This "non-denominational," so to speak, event attracted almost a thousand attendees, guests, and those just desiring to be a part of what is now recognized as the

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:: In This Issue

Jetrader

Jetrader is a bi-monthly publication of ISTAT, the International Society of Transport Aircraft Trading. ISTAT was founded in 1983 to act as a forum and to promote improved communications among those involved in aviation and supporting industries, who operate, manufacture, maintain, sell, purchase, finance, lease, appraise, insure or otherwise engage in activities related to transport category aircraft.

ISTAT International Society of Transport Aircraft Trading
Dawn O'Day **Foster** Executive Director
5517 Talon Court . Fairfax Virginia 22032-1737 USA
T +703 978-8156 F +703 503-5964 E istat@istat.org
W www.istat.org
A ADVERTISING Ajax Newservice Inc 219 939 9581
sales@ajaxnewservice.com

hallmark Monday night event at the annual Airshow venues of Paris and this year Farnborough.

ISTAT would like to recognize the fine efforts of this year's sponsor the R B S Aviation Capital and their representatives Mr. Dick Forsberg and Ms. Nodlaigh Goss, concerning their continuing support of ISTAT and in helping to make this event so successful. Ultimately, we were only limited in attendance numbers by the fire marshal's limitations placed on the meeting gallery.

Further, even as ISTAT grows into a much larger organization we have not forgotten our roots and in many ways we are still a very cohesive like-minded aviation family. Proof of this fact is offered by the many ISTAT members and associates who pitched in to help Executive Director Dawn O'Day Foster pull off another almost flawless event.

These people were a tremendous asset to ISTAT in helping accomplish these tasks. In the office, Jennifer Earyes, Valerie Wheeler and Taylor Coffman helped with the RSVPS, badges, shipping and other preparations as needed.

A380 / 7E7 / C Series / E-Jets 170/190

The thematic content of this JETRADER is to recognize the fascinating array of new aircraft types on the horizon and how they might possibly affect the ISTAT Membership as the manufacturer's order books become reality and the machines themselves issue into the hands of their initial operators.

Clearly, the Airbus A380 will likely be among the largest metal aircraft to ever be constructed and is almost certain to be the final aircraft of that passenger carrying capacity (or larger higher seating capability) to resemble the traditional outline of an airplane as we recognize it today. This mammoth will require new engine technology, passenger compartment attributes and accouterments, and even will dictate and necessitate specialized loading equipment and airport gate modifications.

The airplane promises to be a high-density cost effective commercial platform to serve the world's traditional gateway hubs. New trans-border production and assembly facilities and systems have illustrated Airbus' commitment to this revolutionary aircraft. Yet in building one of the largest aircraft ever built the aircraft will also be one of the "greenest" environmentally friendly to ever take to the skies.

The Boeing 7E7 might best be summarized by a quote from James Allen, "Dream Lofty Dreams and as You Dream so Shall You Become," appropriately the aircraft is named the "Dreamliner." The airplane promises to be a sea change airplane whose airframe will be largely composite (less than 18% metal composition). The airplane will be a "greater electric airplane" whose new generation powerplants will do away with traditional bleed air systems.

The airplane will be built around an open core architecture allowing for non-proprietary appliances and accessories (non-boutique suppliers), as technology provides newer advances (for instance the APU might ultimately be replaced by improved fuel cell technology) retrofits can be made as economically feasible. The airplane promises to be very long lived in the hands of the original operators and may come with manufacturer provided maintenance and a handful of approved maintenance centers.

Original parts vendors will be required to stock JIT inventory freeing the airlines from massive spares inventories. Perhaps of utmost importance this aircraft reaffirms Boeing's commitment to the commercial aircraft industry making a

cover :: image sources Boeing + Airbus

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ISTAT Reception

There was an air of apprehension about what the mood at the Farnborough Airshow would be and what implications that mood would have on the industry as we enter the second half of Fiscal 2004. Airline orders and defence spending announcements dominated the news with 42 official military delegations visiting the show. New attractions and big contracts dominated the week.

The transportation section of the famous Kensington Science Museum in London was the stage for what was to be the best ISTAT Farnborough Airshow Reception to date. With over 600 members and their guests turning up for a most enjoyable and memorable evening, the attendee's list read straight from the pages of the Who's Who of the aviation industry.

There is no doubt that the ISTAT reception has become and will continue to become one of the premier events of the Farnborough airshow calendar. It is a credit to Dawn and her staff and of course the Seymour family who volunteered to help that evening that all went smooth and according to plan.

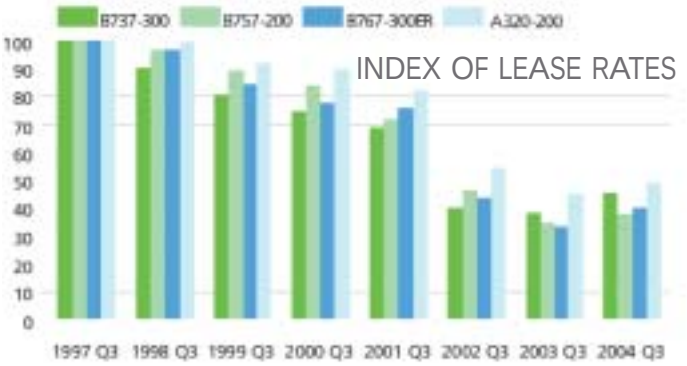
To all concerned, thank you for making this event a great success and of course not to forget The Royal Bank of Scotland who very kindly agreed to part sponsor the event. I look forward to seeing you all next year in Paris.

by Bill Cumberlidge
ALLCO Finance Group
Immediate Past President, ISTAT

Changing Fortunes

by Les Weal, Chief Analyst, Airclaims

THERE is little doubt that the fortunes of many aircraft types, in terms of achievable market lease rates, have undergone a significant improvement during 2004, indeed it is arguable that the rate of improvement has been somewhat unexpected and is beginning to manifest itself in improving market values, which is good news for asset owners, at the very least. Certainly the prevailing mood at the recent ISTAT European Conference was noticeably more optimistic than in the previous year's event.



INDEX OF LEASE RATES

By way of example, the chart below, through an 'index' of market lease rates across all the years of production, illustrates this phenomenon and it is now accepted wisdom that the bottom of the cycle occurred in mid-2003.

This chart tracks the market lease rate movement of four aircraft types which are, or have been, popular amongst the airlines, financiers and lessors and which have been at the forefront of the decline in lease rates, but which are now recovering.

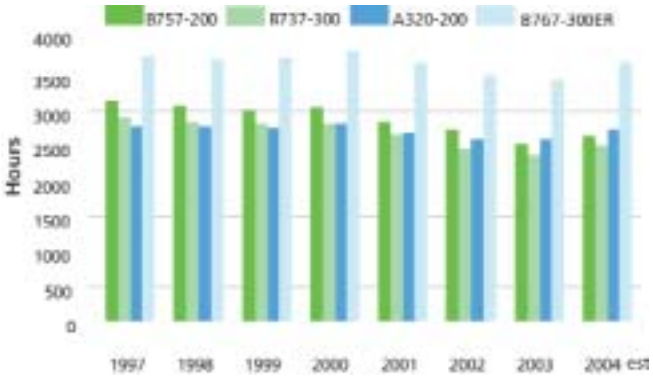
These are the Boeing 737-300, Boeing 757-200, Boeing 767-300ER and Airbus A320-200, and here at Airclaims we have examined some of the parameters which may go some way to explain this improvement in which we currently see no signs of abatement. Indeed, even under the worst case scenario of say, a US Major liquidation, this may only slow the rebound rather than depress or reverse the market. Nevertheless, whilst percentage improvements of up to 20% have been impressive, we are still some way from the levels achieved in the late nineties, although it is fair to say for three of the types under review that these levels may be forever unattainable. The "in production" Airbus A320 is presently offering the best scope for recovery.

Aircraft Usage - Utilisation

The "stored" fleet is symptomatic of over-capacity but perhaps a better measure of potential capacity is the annual utilisation of aircraft. As the chart below illustrates, for the four types under consideration the annual utilisation has declined from the highs experienced in 1999 and 2000.

However, in late 2003 and in the first two quarters of 2004, we have witnessed a significant increase in the average daily hours that these aircraft types are flown, and the portents are for a return to utilisation levels not recorded since 2000.

Of course, increasing the hours flown by their existing fleets is the easiest and most economical way for airlines to increase capacity, and until this 'underutilised capacity' was absorbed the decline in the stored fleet was inevitably going to be delayed. However, with the increases expected this year, it is not surprising that the corollary is that the stored fleet for the types in question has declined dramatically throughout 2004 from the nadir in mid-2003.



ANNUAL AVERAGE UTILISATION

Aircraft Usage - Stored Population

The second parameter to be considered is the number of stored aircraft (the figures include aircraft in both long and short term storage).

Boeing 757-200 The 757 fleet has been a little more lethargic in the recovery, but the demand from the cargo sector is now being coupled with renewed interest from charter operators, airlines in the CIS and the LCCs in Asia, where its range is best suited. This has led to a reduction in stored numbers which have halved in just over a year.

As with the other types under review, there has been a "flight to quality" with customers preferring high specification, 10 years old or younger aircraft, and it is this category where the lease rates have improved more significantly. However, the supply is not inexhaustible and rates should respond in time for older examples, though it is likely that freighter conversion, or maybe the occasional breaking for parting out, will offer more potential.

Airbus A320-200 The last six months have seen availability of the marque rapidly declining, with strong demand from both the LCC sector and charter operators. The main 'silver lining' about the demise of the likes of Sabena, Swissair, and Ansett (which led to the rapid rise in the stored A320 fleet) is that the customer base has subsequently undergone a large expansion and the resultant increased liquidity bodes well for the family.

Boeing 767-300ER Such is the rebound in the long-haul markets, that demand for this still highly flexible and versatile aircraft has seen the stored fleet decline dramatically. Demand, until recently, has tended to favour high

"...recovery and improvement are well underway"

specification CF6 versions but now the PW4000 powered aircraft is proving to be in equally strong demand.
This recovery is likely to postpone cargo conversion of this variant for a few more years, despite increasing interest.

Boeing 737-300

Demand, especially for younger -3C1 powered from all sectors of the industry, has brought about a rapid decline in the stored 737-300 fleet, whilst older examples are finding homes in the freighter conversion market or as part-outs for very low specification aircraft. For younger examples, we believe lease rates will continue to improve as the limited availability of Series 700s should reflect positively on this marque.

Off Lease Exposure

Another parameter and measure of a type's liquidity is how quickly it can be placed back into service after coming off lease - for many reasons, the last thing a lessor wants is an Aircraft on Ground (AOG) where it is not earning any lease revenue.

TIME BETWEEN LEASES - PLACED AIRCRAFT
AVERAGE DOWNTIME IN DAYS

TYPE	1997	1998	1999	2000	2001	2002	2003	2004	PAST 10 YR AVE
A320-200	31	24	48	129	158	322	132	39	124
B737-300	30	44	59	95	116	182	95	34	85
B757-200	30	93	45	98	172	184	72	35	102
B767-300ER	53	13	127	61	170	152	96	36	94

The above analysis, based on data from the CASE Database, looks at how long each individual aircraft within the type has spent parked on the ground between leases (or before being sold on), excluding lease extensions. It is in effect a measure of aircraft inactivity - although the new lease will typically have been arranged in the downtime period or prior to the previous lease ending. It does however provide a benchmark to show which types are likely to be quickly placed, relative to each other.

The four types are amongst the most numerous in the operating lease market fleet. As is shown, most of the types have a relatively short period of inactivity between leases on average (between 3-4 months). It is often the unplanned or unexpected lease endings - e.g. an airline failure or repossession, which result in the average time being pushed up, as the lessor may not have another lessee arranged or in place, straight away.

Time between leases will be influenced by the popularity of the type and also the market conditions at the time. Hence in the recent downturn, the time between leases was pushed up for virtually every type.

It is noticeable however, that 2004 has seen a significant improvement, with the average downtime for all types coming down, to a little over a month. This is further evidence of the improving market and results in the strengthening of lease rates.

Summary

Using just a few of the industry's main barometric measures of 'health', 'liquidity', or 'market condition', it is fairly clear that recovery and improvement are well underway. Lease Rates and Utilisation are up, Stored Population and Average Downtime are down.

These factors even apply to the B757, which had almost been 'written off' by some pundits. Whilst the type still has many of the attributes that challenge its residual value potential and marketability, its improvement does reveal the scale of the upturn in market conditions.

This winter will challenge and severely test the robustness of the recent recovery. US Airways, Delta, and a handful of other airlines currently have the potential to further stress the market as a whole. Some careful manoeuvring by airlines, lessors and financiers alike can help minimise the challenge of the months ahead. A little bit of luck wouldn't go amiss either.

ISTAT International Appraisers Board of Governors — John Keitz Chairman

In the opening of a recent column, I stated that I wondered if anyone ever reads it. I know at least one person read it. In this issue, you will find a "letter to the editor" from Mr. Ted Baker of the American Society of Appraisers who takes exception to my impression of the process involved in getting certification as an ASA appraiser.

I have never had anything to do with the American Society of Appraisers and my impression of the process was based entirely on what I heard from others. I now know from Mr. Baker's letter and from my subsequent visits to the ASA website that I was very wrong. The ASA certification requires, in addition to taking the courses, a reference check, submission of examples of one's appraisal work, a prescribed level of experience and an intense examination. The process is not unlike our ISTAT appraisal certification. This should not be surprising since the founders of the ISTAT appraisers program modeled our program after ASA, with considerable help and advice from various ASA officials at that time.

Our code of ethics is almost identical to that of the ASA and differs only where specific references to aircraft were required. In fact, it may well be that the only significant difference is that we don't require candidates to enroll in formal courses. The main reason for this is that we don't have any courses that address the nuances of transport aircraft appraisal.

I apologize to Mr. Baker and to any other ASA certified appraisers who were offended by my impression, which was made, as Mr. Baker stated, without full knowledge of the facts.

Thanks to the prodding of Fred Bearden, we have established a "chat room" for ISTAT certified appraisers. By the time you read this, it may be old news, but as I write it, the "ISTAT Private Appraisers Forum" as it is officially called, was just recently established and promises to be an effective tool for us. You can sign up by going to istat.org/appraisers/. As I write we have 26 appraisers enrolled. Access is restricted to ISTAT certified appraisers and pains have been taken to keep the exchanges confidential. The webmaster of our ISTAT web site, who also is the trusted webmaster of several highly secure U.S. government sites, assures us that even he can not review the exchanges between our members. After setting-up the system he turned the sign up security over to Bill Bath. That means when a new member wants access to the forum, Bill certifies his or her eligibility before access is allowed. However, even Bill is restricted as to what he has access to and private messages sent between appraisers are secure.

As the appraisers who have signed up know, but other readers may not, in Bill Bath's original e-mail inviting appraisers to join, he stresses that our ISTAT ethics code must be complied with by citing some specific references to the handbook. The purpose of the forum is to exchange ideas and information and it can not be used for collaborating on values or fees, for example. When one signs up he or she must agree to comply with the rules and ethics code.

So far, other than several tales posted by Jack Feir and Fred Bearden, the forum has not been used too much other than for initial sign ups of members. I envision that the forum may eventually become the primary means of communications with our members. To some extent, that should make this column obsolete as a message center for appraisers and I can go back to columns reminiscing about the Concorde or the early days of our business. (That should help keep me out of trouble with the ASA!) Bill Bath has already been using it effectively soliciting ideas for next year's continuing education program, although the responses have been minimal.

I can understand one reason why there are few chatters. The forum has its downside. Remember when you came to work at 8:30 A.M. and began to work? It seems now you must first read your e-mail, delete all the porn and the offers to work at home for $100,000 per week or refinance your mortgage at zero percent interest. Then you must respond to the legitimate messages. Before you realize it, it is 10:00 A.M. and you're just beginning to work. Now, you must check the forum as well to see if anyone is looking for you to share some of your unique knowledge and, since we appraisers always know something that is worth passing along, you find it is now 10:30 when you begin to work.

Another project that has been primarily pushed by Fred Bearden, although a few others have been pushing it as well, is slowly making progress. We have all wanted for some time to create a database of sales transactions for the use of ISTAT appraisers.

Recently, more and more of our ISTAT members among the leasing companies, financial institutions and operators have been more amenable to helping the appraisers' credibility by divulging recent transaction prices. They have been reluctant to do so, primarily because they often have strict contractual restrictions that forbid them from divulging such data. Our proposals have suggested ways of keeping the data confidential by, for example, only giving the aircraft type, engine model, year of manufacture and takeoff weight. The skeptics say that any good detective could probably derive from these data only who the seller, buyer and operator are, thus revealing the information that they are obligated to keep confidential. In an earlier proposal, Fred suggested that confidentiality would be preserved by only identifying the transaction date by calendar quarter and that there be a time lag of one quarter before the information was reported.

The skeptics say, "Suppose there is only one B737-300 transaction, for example, in any one quarter?" Then all the confidential information is revealed. Fred's latest suggested variation is to keep even the names of the participants confidential. So, instead of Fred, for example, asking XYZ Capital corporation to contribute data to the program, he would just submit a list of possible participants, as would I and any other interested appraisal companies. Our trusted administrator, Bill Bath, would then contact the companies and ask their participation. They would not be identified to each other or to the appraisers. ABC Capital would not know whether XYZ is participating in the data pool nor would anyone else except for Bill Bath. It seems like it could work. There is the potential problem that ABC sells an Aircraft to XYZ and both submit the transaction price. Then we would have two data entries and we would be lead to believe that there were two transactions that were ironically at the same price. But too much information is better than none.

Another problem is that we could be manipulated. We all know that some of our clients try to persuade us that our values are too low or, (sometimes!) too high. The participants could influence our conclusions by submitting

Chairman | continued page 22

Aviation Technology at Purdue University: growing the leaders of tomorrow

Submitted by the following faculty members at Purdue University, West Lafayette Indiana:
Prof. David L. Stanley
Prof. Denver Lopp
Prof. Michael Suckow

The aviation program at Purdue University recently celebrated its 50th anniversary. From modest formal beginnings in the 1950s, this program, a department within the School of Technology at Purdue, has since grown to include disciplines in professional flight, aeronautical technology, and aviation management, all of which are four-year baccalaureate degree programs. Graduates of these programs bring a variety of knowledge, skills, and abilities to career positions throughout aviation. They are technology-ready.

The mission of an effective technology program must include outreach and engagement with industry. In the State of Indiana, a partnership has been struck between industry and Purdue University at many levels, and this has been particularly the case for the School of Technology.

There are, however, other attributes of significant importance beyond the technical skills required by professional pilots, maintenance support personnel, and those in positions of aviation maintenance. It is widely recognized throughout the industry that while aviation professionals are generally well-trained and very skilled, important abilities remain undeveloped and lacking in many cases. Furthermore, as the airline and aerospace industry struggle through difficult times, it has become increasingly apparent that the best minds and the strongest possible leadership will be necessary to overcome the problems ahead.

Faculty members in the Aviation Technology Department have recognized this critical need and worked diligently to broaden the undergraduate experience to include important knowledge, skills and abilities. Further effort has been directed towards the development of a graduate program that can respond to these urgent needs. Since the beginnings of these efforts nearly a decade ago, the Aviation Technology graduate program has experienced impressive growth under the guidance of Gary Eiff, PhD, the chair of the aviation graduate program.

For the aviation program at Purdue University, the discovery mission is focused on creating a new body of knowledge for practical application in the industry. This goal is achieved, in part, by engaging with industry to bring the combined resources of faculty, students, and industry to bear upon the issues at hand. Initiatives of this type historically involve aviation graduate students managing the projects, with undergraduate students playing significant roles in observational activities and collection of data, for instance. Faculty members provide general oversight of the initiatives.

Research activities have included studies of human factors, productivity, and safety for a number of major carriers at nearly 50 domestic and 15 international stations. A major project underway at this time is studying third-party maintenance, an industry that has experienced explosive growth over the last decade and the growing pains typical of that success.

For students, learning occurs at a multitude of levels in such an environment. They bring the "sound bites" of education they've heard in lecture and applied in laboratory to the airline or industrial setting, where they put them to the acid test. In these settings faculty members can make significant contributions to the educational experience of their students while also providing invaluable consultation services to the industry.

Purdue | continued page 22

Notes on 11th Annual ISTAT European Conference *by Colin Molloy*

The conference opened on Sunday evening 12th September just in time to have US Air declare bankruptcy yet again! With 900 attendees at the annual conference, we still had 74 Europeans attend the European Converence that did not attend the annual conference. This certainly validates the reason for holding theEuropean Conference and may provide some useful guidance for a South American (Brazilian) event. The introduction by Mike Metcalf noted that ISTAT now has about 1500 members.

Keijo Suila, CEO of Finnair suggested that the cyclical crisis was over but that a structural crisis in the industry remained with overcapacity, yield collapse, weak balance sheets, poor profitability and too rigid cost structures. EBIT returns by airlines are of the 3% range compared to the suppliers to the industry such as lessors at 30% and airports 26%. Finnair started to improve the value chain and returns back in 1999 by adapting its route network, fleet and a new objective " It is not enough to be an excellent airline but we need to be an excellent business enterprise as well". Finnair has lowered unit costs by 25% since but as yields have also followed the same trend, profitability has remained depressed.

Chris Tarry of CTAIRA asked "Is history a guide to the future?" and answered "NO " because the structural changes needed are not historical but have been driven by factors such as Low Cost Carriers. Peter Morris of Airclaims suggested that the world narrow-body fleets would increase by 3% per year to 2013 as opposed to 4% for wide-body. If yield erosion continues at the same rate, airlines could expect to fly their passengers for free by 2025! Russ Hubbard of IBA took a regional view 1) Europe is steady but yields continue to decline, 2) The US is very unsettled and changes will have to occur and 3) Asia Pacific has an optimistic outlook with low cost carriers starting and the market expanding very rapidly.

Conference | continued next page

The ISTAT Foundation

Chairman | Thomas G. Hiniker

GEORGE E. BATCHELOR $10,000 SCHOLARSHIP AWARDED

The ISTAT Foundation Scholarship Committee, headed by Chairman Roland Moore, has selected Katryzina Zaranek, a senior at Daniel Webster College in Nashua, New Hampshire, to receive the George E. Batchelor Scholarship for 2004.

Kate Zaranek is a dedicated, young aviation enthusiast from upstate New York. She committed herself to a career in aviation and enrolled at Daniel Webster College in 1999 (and received her FAA pilot's license on January 18, 2002). Kate is a senior this year, is excelling academically, and will receive her Bachelor of Science Degree in Aviation Management in May, 2005. She has worked hard, been active in campus activities and sports but had incurred ten's of thousands of dollars of personal debt to fulfill her dream of becoming an aviation professional. She is a most deserving candidate for this scholarship award.

Following graduation next spring, Kate will seek employment with an airport operation and hopes to develop her career either on the airport or airline side.

Congratulations Kate!

DAVID LOWE WINS FARNBOROUGH RAFFLE

David Lowe, Chairman of Belvest Limited in Pulborough, England is the winner of the raffle fundraiser conducted at the London Farnborough Air Show. David's name was picked from the roughly 300 tickets sold to be the lucky winner of the Segway Human Transporter. David's Human Transporter will be delivered to his home in England by British Aerospace, the agent for distributing the Human Transporter in England. Upon delivery, Segway will also provide training so that David can safely tour the country roads of Southern England on his two-wheel Segway.

Tom Hiniker presents a $10,000 check to Kate Zaranek, a senior at Daniel Webster College. Also pictured is Hannah McCarthy, President of the college.

EUROPEAN FUNDRAISERS GENERATE $14,000

The two fundraisers conducted by the ISTAT Foundation in Europe this summer, the raffle at the Farnborough Air Show and, subsequently, the auction at the European ISTAT Conference, raised almost $14,000 which will be used for scholarship funding. A very special thanks to both the many companies that contributed merchandise and to the many enthusiastic bidders that overbid to generate great proceeds. A very special thanks to Charlie Willis, of Willis Lease Finance Corp., who generously purchased the March ISTAT Conference package for well-above its stated value.

Mr. Willis' generosity exemplifies the enthusiasm and spirit that ISTAT members have to support continuing commercial aviation education.

Charlie Willis bids in the Silent Auction as Tom Hiniker looks on at the European ISTAT Conference.

Conference | continued

Adam Brown of Airbus presented the Airbus marketing forecast showing market growth for large widebodies but not for smaller narrow-bodies. Kevin Bruce of Boeing expected long term traffic of about 5,1% over the next 20 years which would double current traffic focused on point to point flights even in long haul market. They anticipate freighter growth with 110 widebody conversions per year. Steve Fortune expects slower freighter fleet growth forecast by Merge Global of up to 70 freighters only. Converters will have steady business with B757, MD11 and 767 but margins will shrink because there are too many converters.

Colin Stuart noted the 139 firm orders and commitments for the A380 and that it is the world's first aircraft to use less than 3 liters of fuel per 100 passenger kilometers. He reviewed the interior configurations and showed the first models actually in production. It is on time to have its first flight in Spring 2005 and service entry spring 2006.

John Feren noted the 3 different 7E7 models. The structure is half composites and the interior features will showcase spaciousness, lighting and design. Service entry is 2008 for the basic -3 short-range model, the -8 long range one year later and the stretched -9 now in 2012. The no bleed engines that will reduce DOCs by 20% compared with the benchmark 767-300. Boeing is focused on production simplicity and will probably only have about 100 optional features on the 7E7, rather than the 600 on the 747

Conference | continued page 21

Airbus A380

Feeding Technological Evolution

A380 : the flagship of the most technologically advanced fleet on the market

by Jacqueline Gorman, Airbus SAS

For over thirty years Airbus has sought to anticipate and respond to the changing needs of an increasingly competitive market, through the creation and innovative application of leading edge technology.

Before launching the A380, Airbus had already created the most modern and innovative aircraft fleet on the market. Successive generations of the Airbus Family chalked up a succession of 'firsts' for commercial aircraft: the first twin-aisle to be piloted by a two-man crew, fly-by-wire, drag-reducing wingtips, composites in secondary and then primary structures, and laser beam welding.

At the heart of Airbus' commitment to advancing aviation technology, is a belief that new technologies or materials should not be introduced just because it is possible. Instead, by understanding the needs and ambitions of its customers, Airbus seeks to identify the best com-

In January 2005, the world will get its first real look at the A380, the flagship of the Airbus Family, which already includes the A320 Family (the world's best selling single-aisles), the A330-200 (commanding three quarters of the market share in this category) and the A340-500 (the longest range aircraft in the world).

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Boeing 7E7-8 Dreamliner

Composites Introduce New Design Opportunities

Examining the 7E7's new technologies

by Lori Gunther, Boeing Company

Advancements in three key Boeing technology areas combine with new engines to make the Boeing 7E7 Dreamliner an efficient, effective tool for airlines. Materials, systems and aerodynamics improvements over the past 10 years present engineers with new opportunities to refine and optimize airplane designs.

When Boeing announced its decision to make the 7E7 of primarily composite materials, it took a leap from the mature material system of aluminums into the burgeoning category of composites. Still, the composite system being used on the 7E7 is not radically new.

"We're using the same basic composites that have been in-service on the 777 from the beginning," said Frank Statkus, vice president of Advanced Technology for the 7E7 program. "We understand this material system."

That said, there are still development challenges being faced by the team.

"To create the entire fuselage and most of the wing out of this material, we need to really define the design allowables and do a lot of testing to ensure we're really getting the full advantage," Statkus said.

He explained that introducing a new material system for these

binations of material and most appropriate application of new technologies to ensure that safety, quality, performance and costs are optimised for customers, operators, pilots, crews and passengers.

Feeding technological evolution

In launching the A380 as the flagship of an already technologically advanced fleet, Airbus needed to create something special. Not only be the most spacious civil aircraft ever built, but also the most advanced. An aircraft that would benefit from all that was best in the aircraft that had gone before and would in turn feed subsequent technological evolutions back into the rest of the family and the wider aircraft industry, through collaborative working and technology transfer programmes.

To that end, Airbus and its suppliers and industrial partners have developed an array of new technologies for materials, processes, systems and engines for the A380. Every technological evolution is carefully assessed in terms of its maturity and added value, the lifecycle of the aircraft and environmental considerations.

Overall around 40 per cent of the aircraft's structure and components will be manufactured from the latest generation of carbon composites and advanced metallic materials which, offer numerous advantages in terms of improved aerodynamic performance, operational reliability and ease of repair, as well as significantly reducing atmospheric emissions, weight and operating costs.

In fact, the following innovations enable the A380 to weigh in at around ten to 15 tonnes lighter than a similar sized aircraft using 747 technology, yet carrying 30-50% more passengers while creating less noise.

Composites

With Airbus' proven track record in the application of composites, carbon fibre reinforced plastic (CFRP) is of course a prominent feature of the A380. The fin box and rudder, horizontal tailplane and elevators, upper deck floor beams, rear pressure bulkhead and centre wing-box all benefit from CFRP technology. In fact, the CFRP centre wing-box alone saves up to one and a half tonnes compared to most advanced aluminium alloys.

Previous innovations such as the introduction of the world's first carbon fibre keel beam on large commercial aircraft, (on the A340-600) have ensured a continuous evolution in Airbus' skill and expertise in the field, making the advances on the A380 a natural progression in the field.

New materials

But with the balance of technologies and materials available today, composites are not automatically the best solution for everything and the A380 has sought the optimum balance of all possible materials. For example, the wing skins are being constructed from advanced aluminium alloys and the fixed wing leading edge is manufactured from thermoplastics.

Likewise, the upper fuselage of the A380 will also see the first civil application GLARE, a laminate material that alternates layers of aluminium and glass-fibre reinforced adhesive. With ten per cent less density than aluminium, GLARE provides weight savings of around 800 kg and greater resistance to fire and damage. For example, an artificial crack subjected to thousands of flight cycles barely increases in size and with the first glass-fibre layer preventing any penetration beyond the superficial aluminium coating, it is exceptionally resistant to corrosion with. In addition GLARE uses a hot bonded manufacturing process but is repaired in the same way as standard aluminium.

A380 engineers have also succeeded in moving the aircraft's centre of gravity aft by around six per cent, which when coupled with its enhanced fly-by-wire system, has reduced the surface area of the horizontal stabiliser by approximately 40m2, thereby saving additional weight while preserving the stability of the aircraft.

Hydraulic systems

Innovative developments on the A380's hydraulic systems also play a critical role in the weight savings and performance enhancements on the new aircraft, while at the same time, chalking up another first for civil aviation.

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types of structures means that the designers have more to consider in creating their designs.

As one example, Statkus recounted how a test structure that was being tested to the point of failure actually failed well later than anticipated. While on the surface this may be seen as a good thing, it's actually a sign of the challenges being faced.

"It means the part was over designed," Statkus said. "We want to design to the failure limits that are set. They are very conservative and ensure the highest levels of safety already. To over achieve means we've introduced inefficiency and unnecessary weight."

And that is exactly the intention behind doing the materials testing. Tests are done at this phase of the program to create a database that tells designers the properties of the materials so that they don't over achieve and never under achieve.

Another challenge that composites are bringing to designers is the need to rethink the entire design of the airplane.

"Composite parts can be bigger and yet be simpler. They can be more tailored to achieve the performance that is needed," Statkus said. "And it's not just that they can be bigger, simpler, tailored - they need to be bigger, simpler, and tailored so that we can get the full advantage of the material system. If we just substitute composites for aluminums and don't create new designs, we're not going to see the improvements we need," he said.

Statkus said that the 7E7 team is pursuing these challenges vigorously. In fact, test fuselage section tooling is being created to test out the current design efforts and the new tape laying machines being developed for the 7E7.

"Our team is facing these challenges with a great energy and enthusiasm," he said. "They're really focused on doing this right."

He also said that challenges are important early in a program. If everything is easy, he said, Boeing hasn't set stringent enough targets.

"We don't lose sleep over these challenges," Statkus concluded. "We don't have all the answers but we see the path forward and are confident in our ability to find the answers."

Advanced Systems Offer Performance, Flexibility

There is a plethora of advances being introduced in the systems arena with the 7E7 as well. Most significantly, the high-pressure bleed air system that has been standard for the last 60 years on jet airplanes is gone, replaced by new electronics.

"Today's bleed air systems rob the engines of efficiency," said Mike Sinnett, chief project engineer for 7E7 Systems. "In the past, we had to accept this because it was the only way."

Now, electronics have advanced to be light enough and robust enough to provide a better solution.

"We've talked about this concept in systems for years," said Sinnett. "But this is the first time we've been able to really achieve it."

Each 7E7 engine will have two 225 kilowatt generators. The auxiliary power unit will also have two similar generators. They will be used to provide electric anti-icing, to power the environmental control systems, to power hydraulic pumps and to drive the motors on the brakes - all functions formerly powered by pneumatics or hydraulics.

Sinnett said the program is looking for other opportunities to expand the use of electronics. One potential under review is using electrical actuation for some of the secondary control systems.

The primary system would still operate like the 777 - with electronic fly-by-wire signals that cause hydraulic power to move the control surfaces. But the back up system may use the electronic signals to move electronic motors to move other control surfaces. It would be a redundant source of power that would remain in the unlikely event of a total loss of hydraulics.

In addition to eliminating bleed air, the 7E7 will introduce an open systems architecture that is managed through a common core system.

"In an open architecture, you plan for change even if you don't know what it will be," said Sinnett. "Part of the advantage of being computer driven is that we can achieve upgrades and introductions through new software."

In today's airplanes, new technologies are often not introduced because they would require extensive modifications to the airplane.

One technology Sinnett sees on the horizon is a fuel cell auxiliary power unit (APU).

"Fuel cell technology won't quite be ready for 2008, when the 7E7 enters service," said Sinnett. "But because the APU is only required to provide electrical power now and not bleed air, the 7E7 will easily be adaptable to the fuel cell technology when it is ready."

With its common core system, the 7E7 is reducing the number of computers on board and centralizing data processing to allow more efficient use of resources.

"There are about 80 unique computers onboard a 777," Sinnett said. "And there are multiple copies of many of them for a total of about 200 total computers on board. With the 7E7, we're down to 30 unique."

For systems, the 7E7 is all about providing better functionality with fewer parts and greater flexibility.

"We're designing a systems architecture that will start providing service in 2008 and continue well past 2050," Sinnett said. "There's no way we can know what the future will bring but we can sure be ready to bring it on board."

Aerodynamics Tools Lead to Optimized Design

The laws of aerodynamics haven't changed so how can there be advances in this arena - advances equal to the contribution of those offered by new materials and advanced systems?

"The laws haven't changed," explained 7E7 Chief Project Engineer Tom Cogan. "But our understanding of the laws has continued to evolve and so have our aerodynamic tools."

Chief among those tools is computational fluid dynamics (CFD) - complex codes that run on super computers to develop designs that are optimized for minimal drag.

"As computers have become faster and more powerful in recent years, we have been able to do a better job in modeling the entire airplane and predicting the three-dimensional effects of the airflow around it,"

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By increasing the pressure on the A380's hydraulic systems from the standard 3,000 pounds per square inch (psi) to 5,000 psi, smaller piping and components can transfer the necessary power. Again, this not only reduces the aircraft's weight by around a tonne, it also makes it easier to maintain. This technology has already proven itself in military aircraft over many years and trials have shown that the existing hydraulic fluids stand up well higher pressures.

Flight control systems

Through a unique system of dual architecture for the flight control system, the A380 delivers an unprecedented level of separation and redundancy in flight controls. The aircraft provides four independent primary flight control systems with two different configurations. Two of these feature a conventional hydraulic actuation system and two feature local electro-hydraulic actuators for the control surfaces. The aircraft can be controlled using any one of these four systems.

Production

The design and production of the A380 capitalises on Airbus' established centres of excellence around the world. This approach means that the A380 has been able to benefit from the application of a number of innovative techniques originally developed on other Airbus aircraft programmes. Longer term, it also means that where appropriate, any new techniques introduced on the A380 programme can be easily transferred to other Airbus programmes.

A good example of this is laser beam welding, which was first introduced on civil aircraft in 2001 for the manufacture of the lower skin on the rear fuselage of the A318, went on to generate around 100 kilogrammes of weight savings on the A340-600 and has since been implemented on the A380. The technique is used to attach the "stringers" (longitudinal reinforcements) to the lower fuselage skin, instead of traditional riveting, making the process quicker, while preserving the quality of the bond, reducing the risk of corrosion and fatigue cracks and delivering weight savings.

Environmental Friendliness

On of the major advantages of the A380 will be in helping airlines and airports to cope with growing passenger numbers without negatively impacting the environment: carrying up to 50 percent more passengers while operating well within ICAO Chapter 3 regulations and London Heathrow's QC2 (departure) and QC1 (arrival) regulations.

The A380's new-generation engines also exceed the latest regulations for the landing and take-off cycle and, because of its larger capacity, the aircraft offers airlines the maximum benefits from available take-off and landing slots, while reducing fuel wasted in airborne delays and holding patterns.

With a fuel burn that is around 13 per cent lower its closest competitor, the A380 is the first long-haul aircraft to consume less than three litres of fuel per passenger over 100 kilometres (a fuel burn comparable with that of today's most efficient cars). At a time when air-traffic is steadily increasing, this represents a significant reduction of exhaust gases on the atmosphere.

Airport compatibility

In responding to customer and industry demands, Airbus has designed the A380 to be largely compatible with existing airport infrastructures, working with airports and airworthiness authorities to implement innovative solutions that would make this possible.

For example, while the wings and engines have been designed to allow it to take-offs and landings in less distance than current large aircraft, the 20-wheel main landing gear ensures that the A380's pavement loading and footprint remains within

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Cogan said. “The codes we have developed allow us to look at more potential design options faster than ever before

“The process we use today for developing airplanes begins with the computer model - that is the primary tool we use for the actual configuration development. The coding is so accurate that we can evaluate miniscule changes in a design to determine impacts on aerodynamic efficiency,” Cogan said.

In fact, the accuracy of the coding has also focused the application of another aerodynamics tool - wind tunnel testing.

“In the 80s, with the 767, we took more than 50 wing designs into the wind tunnel,” Cogan said. “We were using the wind tunnel to verify our designs.

“In the 90s with the 777, we took 18 designs into the tunnel and we were really not verifying the designs as much as we were verifying that our computation tools were accurate and looking at performance at the extreme operating conditions, which the coding couldn't do.

“With the 7E7, we will take fewer than 12 wings into the tunnel,” Cogan said. “We are still proving our coding and testing the extremes. The tunnel is a great tool but it's not very cost effective. So, being able to really focus on a few designs to get the data we need is helping us be more cost effective.”

Cogan said the program is in its second round of wind tunnel testing, and the tests are going extremely well.

“We continue to find that our CFD programs are extremely accurate in predicting the performance of our design,” he said.

Boeing and its partners will conduct about 15,000 hours of wind tunnel testing on the 7E7 at sites around the world including the Boeing transonic wind tunnel in Seattle, the QinetiQ low-speed wind tunnel in Farnborough, England; and other facilities.

In addition to using the wind tunnel data to select the best designs, Boeing uses it to create the simulation data that will help pilots prepare to fly the airplane.

“By the time we get the first 7E7 in the air, there will be no surprises,” Cogan said. “And that's how it should be. The pilots will know how it handles and reacts because of the work we are doing in CFD and the wind tunnels.”

Integrating the New Technologies

These three Boeing-led technology areas combine with new engines to provide a 20 percent improvement in fuel usage on the 7E7. In fact, the combination is the key to realizing the full improvement.

“It is the integrated effect that allows our improvement to be so dramatic,” Gillette said. “You can only take full advantage of these technologies with a brand new airplane.”

As an example, Gillette noted the cycling effect of composite materials and new engines.
“If you engine is more efficient, you don't need to use as much fuel so your wing can be smaller,” he said. “If you wing is smaller, your airplane is lighter and your engine can get smaller. This allows another cycle of downsizing everything - the wing, the engines and so on.”

In this way, with a new airplane, Boeing can optimize the design to ensure all of the benefits of each improvement is fully realized.
“We've had people ask about taking the 7E7 engines and using them on older airplanes,” he said. “But you wouldn't get the full advantage because to put them on an older airplane you'd have to introduce bleed air again and that would make the engine less efficient. Plus this engine is bigger than the engines found on today's airplanes in this class so you'd have higher drag - more inefficiency. “It just wouldn't be the same.”

Likewise, just making today's designs out of composite materials don't allow you to really get the benefit unless you completely redesign the part to take advantage of the material.

“That's how we know it's time to do a new airplane and not modify our existing airplanes,” Gillette said. “When the technologies add up to something truly unique it's the right time to go forward with a new design and now is the right time with the 7E7.

Boeing 7E7 Dreamliner passenger cabin features

THE A380: Inspired by the industry - created by Airbus

by Jacqueline Gorman, Airbus SAS

By the turn of the millennium, Airbus' innovative application of leading edge technologies had created an enormously flexible family of 12 aircraft types, ranging from 100 to 380 seats and covering up to 16,600km/ 9,000nm.

At this point, Airbus could clearly see the competitive advantage of extending the benefits its commonality philosophy to a new, very large aircraft. Such an aircraft would further enhance airlines' options in terms of seeking the optimum combination of both "hub to hub" and "point to point" routes, while also offering an unprecedented level of flexibility across operating fleets and flight and maintenance crews.

At the same time, Airbus had also gained some thirty years of experience in working closely with airlines, leasing companies, suppliers, airports and regulatory authorities around the world. Airbus was aware that these relationships were a privileged resource and would be invaluable in determining how it could best respond to the needs of the market: including deciding on whether – and how – to proceed with any future aircraft programmes.

Drawing on this expertise, Airbus confirmed that it was in agreement with most of the industry, in predicting that passenger traffic will increase by more than 5% per year over the next 20 years, creating demand for around 1,500 very large aircraft (including 300 freighters), which are expected to make some 3,400 flights per day out of 209 airports. About 70 per cent of these flights are expected to be clustered around 25 key airports and more than half of all very large aircraft are likely to be used on flights from just ten airports, eight of which will be in Asia Pacific.

However, there was also a clear need to balance the growing demand for air travel, with limited landing slots at airports, emerging competition and an increasingly sensitive environment. This meant that any such aircraft would have to be used on a complete range of domestic, local, regional and intercontinental routes, as one third are expected to operate on routes of less than 2,000 km/ 1,100 nm (such as Hong-Kong to Beijing) while another third will be used on routes of over 9,000km/ 4,900nm (such as Paris to Los Angeles).

In listening to the needs, ambitions and concerns of stakeholders from across the industry, Airbus recognised the problems and offered the solution – the A380: a high capacity long-range aircraft that would combine a wealth of innovative new technology with all that is best about the existing Airbus Family, including commonality, and yet be largely compatible with existing airport infrastructures.

As a result, the A380 was officially launched in 2000 and remains on schedule for entry into service in 2006. Thanks to input from across the industry, the A380 will generate up to 15 per cent lower seat mile costs, 13 per cent less fuel consumption and half the noise of its closest competitor, while carrying 35 per cent more passengers and meeting strict local regulations, such as QC2 for departure at London airports. Two years later, the A380F will offer 30 per cent more payload, 54 per cent more volume and 2,600km/ 1,400nm more range than competing aircraft.

With 139 orders and commitments from 13 customers before it has even made its first flight, Airbus remains confident that the A380 is the solution that the aviation industry, passengers and the environment have been waiting for. And when the A380 is revealed in January, it won't just be a celebration for Airbus, it will also be a well-earned celebration for the airlines, suppliers and stakeholders who could see the future of aviation and have helped to make it possible.

With 139 orders and commitments from 13 customers before it has even made its first flight, Airbus remains confident that the A380 is the solution that the aviation industry, passengers and the environment have been waiting for.

With the 7E7, Boeing looks to solve the riddle in the middle

by Debby Arkell, Boeing Company

SOMETIMES THE MIDDLE HAS A BAD REPUTATION: MIDDLE OF THE ROAD, MIDDLE AGED, MIDDLE OF NOWHERE. BUT WHEN IT COMES TO THE COMMERCIAL AIRPLANE MARKET, SOMETIMES THE MIDDLE IS EXACTLY WHERE YOU WANT TO BE.

In late 2002, Boeing Commercial Airplanes President and CEO Alan Mulally announced that the company was shifting its nearer-term product development focus from the speedy, futuristic-looking Sonic Cruiser in favor of a highly efficient, environmentally friendly, e-enabled airplane. The Boeing 7E7 will meet the needs that commercial airline customers worldwide have expressed; and it will serve the flying public effectively and grow the middle of the market. But with a comprehensive family of airplanes ranging from the 100-seat 717 to the 400-plus-seat 747, why would Boeing Commercial Airplanes focus on the middle of the market for its latest developmental project?

What is the middle of the market?

The middle of the market, generally defined, is the segment that airplanes such as the 757, 767 and Airbus A300/A310 and A330 currently serve. These aircraft can fly ranges of approximately 3,000 to 6,500 nautical miles and carry passenger loads of approximately 180 to 250 people in both single- and twin-aisle configurations.

While the middle-market models didn't set any records for number of sales in 2002, this segment presents opportunities for increased sales in the future-up to 3,500 units over the next 20 years-in regions around the world.

''The large twin-aisle segment is currently occupied by the 777, which offers superior comfort, performance and economics to its primary competitor, the A340,'' said Randy Baseler, vice president of Marketing for Boeing Commercial Airplanes. ''The 777 is proving to be very popular with our customers needing larger aircraft. Boeing is represented well in this lucrative market segment with a product that will remain the leader for years to come.'' And airplanes the size of the smaller, single-aisle 737 also are in a strong position in the marketplace.

''The Next-Generation 737s entered service in 1997, so they, too, will be highly effective in the years to come,'' Baseler said. ''And the Next-Generation 737 is the best-selling airplane ever, delivering 1,247 airplanes in its first five years.''

The ideal new airplane to best serve the middle market should be able to operate equally efficiently whether traveling distances shorter than 3,000 nautical miles or as far as 8,500 nautical miles. Efficiencies at shorter ranges are ideally suited to Asia-and somewhat in the United States and Europe-where route density limits the use of single-aisle airplanes. A new airplane also must meet demands where twin-aisle passenger appeal and lower-deck cargo requirements are significant.

If an airplane can be developed capable of flying distances equivalent to a 777 while carrying a 767-level payload, and capable of getting passengers to their destinations quicker, it will allow airlines to offer new nonstop services-profitably.

Bridging the gap; maximizing profits

Interestingly, Boeing and Airbus forecasts for the middle of the market are almost identical.''However, Airbus has a 100-seat gap in their middle-market product line,'' Baseler said. ''This presents a terrific opportunity for Boeing.''

As markets expand and frequencies and volumes increase, airlines will continue to mix and match various airplane size and range combinations to meet changing competitive circumstances in city-pair markets, Baseler said. The right mix can significantly aid profitability. For example, a carrier may fly daily nonstop routes from Los Angeles to Washington, D.C., with Monday mornings and Friday evenings representing peak travel times between these two cities. A carrier with a flexible, optimal fleet mix may choose to use its highly efficient Boeing 7E7 on these peak routes, and switch to its smaller aircraft during non-peak days or times. This will help carriers optimize loads and maximize value.

''A new middle-of-the-market product with greatly improved efficiency and capability will enable airlines to grow profitably by opening new markets,'' Baseler said. ''Airlines can take advantage of a comprehensive family of Boeing products to perfectly match demand on any given flight segment-even as markets change.''

Listening to MoM

The 7E7 is the airplane Boeing's customers have said they prefer. ''Airlines have expressed a desire for an airplane that optimizes efficiency rather than speed at this time,'' said Mike Bair, vice president and general manager of the 7E7 program for Boeing Commercial Airplanes. ''Though the new airplane will also be as fast as today's fastest airplanes, efficiency is what they really need.''

The new Boeing 7E7 not only will complement the existing Boeing products -which will continue to be valuable at shorter ranges-it also will provide significant economic advantages over its nearest competitor, the A330.

By using new materials and technology such as advanced composites and new engine technology, the 7E7 is predicted to burn 20 percent less fuel than the A330 and have an increased range of approximately 1,500 nautical miles.

''This will result in lower seat-mile costs for our customers, increasing their profitability,'' Bair said.

The airplane also will have a modest increase in speed, flying at speeds around Mach 0.85, Bair said. Faster speeds lead to greater frequencies and increased revenue, but the biggest difference with the 7E7 will be in its increased efficiencies.

Riddle | continued page 22

Riddle | continued

''Airlines will love it for its economics, passengers will love it for its ability to get them point-to-point in greater comfort, and the world will love it because it'll be environmentally friendly, like no other airplane in the sky,'' Bair said. ''Efficiency, comfort, speed, point-to-point travel-it's all at the heart of the entire Boeing Commercial Airplanes strategy.''

Timing is key

Boeing launched the 777 into service relatively recently, in 1995, and even the oldest of these large in-service aircraft won't reach potential replacement age until after 2015. The 737 family also is strongly positioned with new models featuring the latest technological advances for smaller markets. However, the percentage of the worldwide fleet in the middle of the market that's getting older is increasing dramatically for both single- and twin-aisles.

The greatest need for replacement will occur in the next market upswing, Baseler said. ''Fleet analysis shows that a significant portion of the current middle-of-the-market fleet will need replacing by 2008,'' Baseler said. ''This represents a significant replacement opportunity of aging aircraft in this segment, as over 40 percent will be 20 years old or older by this time.''

The biggest opportunity is growth. Boeing's new airplane family is optimally positioned to be available during the airline industry's next cyclic upswing. As the 777 did in the mid- to late-1990s, Boeing's new middle-of-the-market offering, the 7E7, will provide the world's airlines with a stateof- the-art tool with which to grow their networks profitably.

''Ultimately,'' Baseler said, ''it's the responsibility of the airplane manufacturer to provide the strategic keys to airlines to serve the middle of the market.''

Flagship | continued

the parameters of existing aircraft, avoiding the need for new runways.

Equally important, the A380 cockpit is midway between the two decks, placing pilots near the aircraft's centre-line for an enhanced view, which when combined with cameras located in the tail fin and on the belly, will facilitate easier taxiing. Likewise, the A380's ability to taxi with only two engines, using two thrust reverses and a low-noise auxiliary power unit will eliminate any noise concerns during turnarounds.

At the gate, the A380's two decks and wide forward stairs will allow turnaround times comparable to those of today's largest airliner, even if access is only via the main deck.

And the benefit of introducing such features through a process of collaboration is already becoming apparent, with 60 international airports expecting to be ready to accept the A380 when it enters service.

and with very little or no BFE as it will all be Boeing supplied.

Robert Nuttall of Rolls Royce reviewed the Trent Program and gave details what Boeing required for the 7E7. He described the Trent modifications thus producing the Trent 1000 as a low risk family member to meet 7E7 requirements.

On Tuesday, Jason Bitter, Commercial Director of V Bird Airlines of Holland, a low cost carrier with four A320s soon to expand to 7 by next spring, carried its 600,000th passenger. They force the flag carriers in most - not all - cases to become more efficient. Capitalization is a major LCC problem because of the 'start up' words but this problem can be managed. [at time of printing, V Bird Airlines has filed bankruptcy and has ceased operation]

Bengt-Olov Näs of SAS reviewed European environmental concerns especially noise, CO2 and NOX. He noted however that with expected traffic increases an absolute decline in these pollutants is not possible. Synthetic fuels may become available but when and cost is another question.

Andrey Bahkmurov of Sukhoi Civil Aircraft reviewed the development of traffic in Russia. Traffic has been steadily increasing with forecast of 4,2% for international and 5,2% domestic. Out of almost 300 airlines the top 20 carry 80% of the traffic but only 3 have western equipment and most of the fleet is more than 15 years old and needs replacing soon. The Russian Regional Jet with 60 - 90 places is Sukhoi's attempt to address this problem but finance shortfalls is impeding progress. Planned introduction is still 2007.

Bob James of TES noted that as aircraft age, the engines become an ever-increasing share of the value of the aircraft. This creates the need for better engine management so that value is retained and maintenance money not wasted.

Charles Willis 3rd of Willis Lease wants to offer OEM type support package including pooling and spares availability during shop visits and removals, engine shop visit management and cost control but at a cheaper cost than the OEMs.

Marc Verspyck of Air France/KLM stated that secured financing was a most important part of any purchase for them. Operating cost is very important so older aircraft such as A320-100s might be more cost effective than new A320s for example. The AF/KLM fleet is 39% on Operating Lease, 25% financed and 36% owned. One of the current problems is the imbalance of Euro-US dollar exchange rates, which makes aircraft owner's balance sheets more susceptible to impairment testing than has been historically the case.

The appraiser panel discussed values of B737-300s, -800s, A320-200s A330-200s, A340-300s, B777-200ERB747-400F and E170s. Dick Forsberg and Les Weal thought the values were coming back to base values for single and twin aisle. Phil Seymour agreed and noted that delivery and redelivery conditions offered by Lessors are much less flexible than in the weak market of a year ago.

Bryson Monteleone also agreed and sensed that demand for classic B737s was stronger than for new because the profit making possibilities are better than highly priced NG aircraft.

Jack Arehart of TIMCO reviewed the MRO market, with current estimates at $35,6Bn expects it to grow to $60Bn in 10 years. Engines are expected to be 36%, airframe 15%, line maintenance 22% and components 27%. Customers now seek a one-stop shop solution so supplying only one aspect of the industry will restrict growth in the future.

Colin Molloy
Helsinki, Finland.

CALENDAR

March 6-8, 2005 ISTAT 22nd Annual Conference; Westin Kierland Resort, Scottsdale AZ :: MONDAY Tim Clark, Emirates; Gerard Arpey, American Airlines; Ed Greenslet, The Airline Monitor; Steve Ridolfi, Bombardier; Alan Mulally, Boeing; Frank Berardino, GRA; Fred Curado, Embraer, + Appraisers Panel with Bill Gardner TUESDAY Robert Crandall, POGO Air Taxi; John Leahy, Airbus; Steve Manley, Universal Asset Management; Doug Parker, America West; Jerry Atkin, Sky West + Cargo Panel with Steve Fortune, Intrepid; Operating Lessors Panel with Alan Coe, GATX Air. President's Gala Dinner Award Recipient, Fred Smith, Federal Express presented by Steve Hazy, ILFC and Herb Kelleher, Southwest Airlines. Reserve your spot now at ISTAT@ISTAT.org.

March 21-23, 2005: SpeedNews 19th Annual Aviation Industry Suppliers Conference, The St. Regis, Century City, Los Angeles, CA www.speednews.com/Conference/commercialconference.html

May 9-11, 2005: SpeedNews Third Annual Aerospace & Defense Suppliers Conference, Park Hyatt, Century City, Los Angeles CA www.speednews.com/Conference/defense.html

Metcalf | continued

true and viable manufacturer duopoly in this aircraft class, which in the long run is beneficial to the industry.

The Embraer E-Jets 170/190 families clearly indicate that the Brazilian manufacturer has made the quantum leap into providing a full product line from thirty seat regional jets to 100+ seat single aisle narrowbodies. The double bubble fuselage and enhanced passenger accommodations and advanced avionics systems combined with the new power-plants on the 190 promise to make the game in the lower end of the marketplace now a three way buying decision. Likely this airplane family and the prevailing economic climate will single handedly change many archaic and wrong minded scope clause provisions currently existing at some of the United States airlines.

Bombardier recognizes the commercial challenges ahead in the 100-seat sector and is currently making noises that it too will enter into this arena with its proposed "C Series" family of 100-150 seat aircraft.

The Road to Recovery

So with all of this change on the horizon and virtually the potential for change creating a powerful driver, which may rewrite many segments of the ISTAT Membership's business model(s), we have much to consider, digest, and then act upon. Undoubtedly the best place to share the ideas and thoughts emerging post-Farnborough with our commercial contemporaries will be at ISTAT's 11th Annual European Conference, one of the fastest growing and most content laden conferences on the circuit.

Purdue | continued

As a result of the educational impact observed with these activities, the university formally recognizes the educational value associated with these efforts. For faculty involved, these efforts are now part of their recognized teaching and research load within the department. This recognition is extremely important and truly embraces the mission and goals for a technology program within a land grant university.

Finally, the industrial stakeholders in these research activities often find themselves examining their own operation from a new and valuable perspective. Through this engagement process between industry and academia, learning and discovery occur, and all parties benefit from the experience.

Solutions to industry problems, development of research and discovery skills, and, most importantly, the educational opportunities these efforts afford our students are important goals for technology education. It is a symbiotic relationship, and one that requires constant fostering and continued commitment.

Nothing is free, and this includes research efforts supported by the university, but industry has found that the return on investment is phenomenal in many ways.

To the Editor :: John Keitz apparently was not in possession of all the facts when he suggested that the American Society of Appraisers'(ASA) educational program for aircraft valuation specialists was "profit motivated rather than quality motivated" (Chairman's Column, Jetrader April-May 2004). The suggestion that an ASA accreditation involves merely "sign[ing] up for the course [and] pay[ing] the fee…with no further screening or testing" is simply not accurate.

ASA has been setting the standard for professional appraisal education, testing and training for more than 50 years. Individuals holding ASA accreditations must successfully complete a series of four Principles of Valuation courses, pass intensive four-hour written examinations, submit two representative appraisal reports for peer review and exhibit proof of ethical behavior. Further, they must demonstrate understanding of and compliance with the Uniform Standards of Professional Appraisal Practice (USPAP) and meet demanding experience requirements (two years of full-time appraisal practice for Accredited Members and five years for Accredited Senior Appraisers).

Students taking one or more of the series of courses developed jointly by the American Society of Appraisers and Embry-Riddle Aeronautical University will further their valuation educations and make progress toward an Embry-Riddle degree, but they will still have to meet every one of ASA's stringent requirements to achieve the association's coveted designation.

Appraisal organizations need to work together to raise the bar for appraisal education and to help the public find and employ only tested, trained and accredited professional appraisers. Negative and uninformed comments from within the appraisal community only serve to make that goal more difficult to achieve.

Ted Baker
Executive Vice President, American Society of Appraisers

Chairman | continued

fake transaction data at higher prices.

Finally, there is one other risk. We must trust Bill Bath to keep everything confidential since he would be the only one privy to sources of some of the information. That is a reasonable risk to take. He is retired from active appraisal work and is involved only in administering the program. I can vouch for him as a trustworthy gentleman. We only have to worry that someone captures him, takes him to Abu Graib prison and tortures him to reveal the data sources.

Let us know what you think about this program. Use the Appraisers Forum, especially if you have further ideas that could help insure the confidentially of the participants.

PEOPLE | going PLACES

and the winner is

LONDON

by Thomas E. Burke

FAVORITE PLACES

This commercial aviation business of ours does require a significant amount of travel. Worldwide, AVMARK has three full-staffed offices and a few other part time operations to provide worldwide coverage for our clients. This year has taken me to Bremen, Brussels, Toulouse, and most frequently to London in the European theater.

Domestic travel has been even more extensive with trips to San Diego, Fort Lauderdale, Seattle, Los Angeles, and most frequently visited Bedford, Massachusetts. So far this year I've taken 11 trips, but even at that, I don't consider my self a "road warrior", just an experienced traveler.

One might ask why an international commercial aviation consultancy would have Bedford, Massachusetts as the most frequently traveled-to spot for the year. Quite simply, we do work with the US Air Force Electronic Systems Center at Hanscom Air Force Base, which requires constant attention. Bremen is a wonderful city, especially in the spring. It is somewhat slow-paced, but is never lacking in things to do. The Saturday market along the River Weser is vibrant and uplifting: just a lot of fun. Brussels is also on my list of places to go when the opportunity arises. Arguably, there are more good restaurants in Brussels than anywhere else in the world. And of course the "City of Lights," Paris, is unsurpassed.

While I do travel to Bedford most frequently, and while other cities have many attractions, I must admit it is London that I prefer.

London has some special characteristics, first of which is the world-renowned theater. I try to take in at least one stage show on every trip. Being a major metropolitan area, there is no lack of hotel choices, everything from rooms with bath down the hall to full-scale opulence. In conversations with colleagues, I find that most prefer the full service hotels with Internet connectivity, business centers, long-distance phone access in room, and the like. Personally, I prefer to do my work during the day at the AVMARK office and leave the work there. Hence, I don't need the business connectivity at my hotel. This being the case, I have found a lovely bed & breakfast just a five-minute walk from Victoria Station.

The Winchester Hotel located at 7 Belgrave Rd, SW1 1RB, is owned and operated by Jimmy McGoldrick, as Irish an Irishman as can be found outside of Ireland. Jimmy takes great pride in the cleanliness and neatness of his premises, and in his breakfasts, which he personally cooks to each guest's order every morning. (Tel: 0171-828-2972)

There are no telephones in the rooms at the Winchester, no Internet connections, and no business center although you may use the hotel fax if really necessary. Jimmy also has a couple of cell phones that he will lend to you during your stay at the hotel should you feel the need for constant electronic connectivity.

What you do get is a clean, well-decorated and neat room with shower at a reasonable price: a perfect place to sleep after a day at work and an evening with clients or at the theater, and a nice place to rest up for the next days work. But bring cash, as the Winchester does not take credit cards.

One of my favorite restaurants is located just around the corner from the Winchester on Warwick Way. The Mirimar is a small family operated, neighborhood place featuring Turkish cuisine. The menu provides a nice selection of Turkish specialties one of which is sure to appeal to any taste. I really like the medley of appetizers that provides small portions of six different starters. Of course London does not lack for larger and more formal dining establishments.

My favorite area for finding good restaurants is Covent Garden. There is a pub, Crown and Anchor, located at the intersection of Neal and Shelton Streets that serves a great a bowl of chili, flavorful, but not Texas hot; not normally what one might look for, but a nice place to know. On another corner just a block off the Covent Garden Square is Le Jardin featuring as excellent French menu, served by wait staff in black tie on linen covered tables with candlelight at each. I personally enjoy the steak-au-poive; and there is a good wine selection.

So, it appears that I like to travel to the big city and when there to frequent the places reminiscent of small towns. Maybe confusion as to large city, small city, or current time zone is what a lifetime of travel will do to you.

Tom Burke is Director of AVMARK, Inc. Founded in 1962, AVMARK provides worldwide aviation marketing and management services.

AVMARK, Inc.
415 Church Street, NE, Suite 203
Vienna VA 22180

T 703 963-7028
F 703 451-0660
E TomEBurke @aol.com www.avmarkinc.com

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nick@sage-popovich.com E

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