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International Society of Transport Aircraft Trading

Having just returned from a visit to the Dubai Airshow and a visit to China, it is clear that the office tower construction business is the place to be! Too bad most construction equipment is not transported by air.

I want to thank Bob Genise and the team at Dubai Aerospace Enterprise for sponsoring a spectacular ISTAT reception at the Dubai Creek Golf Club during the Air Show. A few hundred ISTAT members and their guests enjoyed a great evening under the desert sky. The mood in Dubai was certainly upbeat as orders flowed as freely as the champagne. Emirates and DAE together order over \$60 Billion of aircraft. We even saw a Saudi "Royal" order a private A380. Airbus announced that they intend to deliver over 500 aircraft in 2008!

What does all of this exuberance mean for ISTAT members? Clearly we will all be very busy. All of these aircraft (with the exception of the private A380) will have to be financed. Many will require appraisals. Many will have to be marketed and will replace aircraft that have to be remarketed. Technical inspections, returns, reconfigurations, sleepless nights, ... I don't think too many of us will be surprised to see these record high orders deliver at a time when overcapacity leads to airline difficulties and perhaps failures resulting in even more work for all of us. But work is good. It is how money is made an opportunities arise. It keeps the jet fuel pumping through our veins.

If this doesn't inspire you to log onto the ISTAT website and register for the 25th annual ISTAT Conference in Orlando, Florida in March, then perhaps just thinking about all the opportunities to meet leading industry participants, listen to insightful presentations and have a great time while signing up deals in the hallway will motivate you. We have grown both in membership and in importance. Last year we had 1,000 attendees and this year we anticipate more. There are not enough rooms in the hotel to accommodate everybody, so I suggest you register and book your room now.

In the past we have heard a few negative comments about how big the conferences have become. We are not in the business of excluding people and as the conferences get better, more people, including more CEOs want to come. We will send out a list of registered attendees well in advance of the conference so that you can make prior arrangements to meet with people and make the best use of your time in Orlando. The committee is working on firming up a great panel of speakers, with some very exciting special presentations we are trying to pull off. Our former college fraternity social chairmen (and I dare say we have a few of them among our Board and membership) are putting the finishing touches on some spectacular receptions and our staff is working hard to make this a great experience for everyone.

I look forward to seeing you all in Orlando.

Michael Platt



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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.

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ISTAT Calendar

9 - 11 March 2008

25th Annual Conference

Omni Orlando Resort at ChampionsGate

14 July 2008

ISTAT Farnborough Airshow Reception

5 - 7 October 2008

ISTAT 15th European Conference

Hilton Prague

Prague, Czech Republic

NOTICE

Open BOARD POSITIONS ISTAT Board of Directors

Two positions for the ISTAT Board of Directors will be opening in Spring 2008.

Consider taking an active role in the direction and growth of ISTAT.

Please contact any current Board member and/or the association office for further information. Applications will be available shortly.



The Birth of the 747...and Beyond

An Interview with Joe Sutter

By Micheal Platt, ISTAT President



MP: In your book, *747: Creating the World's First Jumbo Jet and Other Adventures from a Life in Aviation* (Collins, 2007), you wrote that there was a group within Boeing, advocating building the 747 in Walnut Creek, California, and you were vehemently opposed to that idea. Now Boeing aircraft components are built all over the world and only final assembly is done in Seattle. Does this cause more complications and lead to delays like we have seen on the A380 and now on the 787?

JS: I think the delays on the 787 were not really delays. The guys tried to develop a whole new concept of aircraft—all composite, all electric. In combination with farming out major sections all over the world and changing the way the aircraft was being built, the designers simply needed more time to complete, which they are taking now. The program just became more realistic as it progressed. If you remember the 747, the thing that was quite unusual about its development was that we had to do it in a hell of a hurry. Nobody has tried to roll out an airplane in 29 months since that time. It had a lot of new technology and of course was two and a half times bigger than the 707. It was a big enterprise, not to mention that the SST was in competition for manpower and wind tunnel time. If we were going to have engineering in one part of the country and production in another, it wouldn't have worked time wise. If you had another year and a half you could make it work, but not with 29 months. Today's concept is brought out because this is a global enterprise and when you create a new aircraft now, you want to sell it to everybody—and everybody also wants a piece of the action.

MP: Is global production of aircraft more difficult to get right?

It is tougher because the nuances aren't there. For example, if a supplier is having trouble, and you ask him by email if he is going to be able to recover in 30 days, you get an email reply. But if you sat down across the table from the guy, you could size him up to see what he is really talking about. It is not all gravy when you rely on computers and lose that important human contact.

MP: When the 747 came out it represented a huge leap in productivity and technology. Will we see big leaps like this in the future? Will we see all composite, very large aircraft?

JS: Those big leaps are not going to happen anymore. If you look at the 747, in 1970 its cruise speed was .85 Mach, and today it is still the fastest airplane out there. There has been no increase in speed. There have been increases in range and improvements in efficiency, but those gains are coming harder and harder. The gain of the 747-800 is about 10 percent, and I think they are quoting 15 to 20 percent for the 787. Those are the last big steps for quite a while, until you get the next big step in engines. Building an all composite large aircraft like the 747 or A380 is not in the cards at all because the 787 technique for building the fuselage can't be applied to a fuselage that is 50 percent larger. The tools to apply the tape aren't there, and the autoclaves aren't there. Unless you know that you are going to build 700 airplanes like the 787, nobody is going to make those investments. So, I think the gains are not going to be as dramatic as they used to be.

MP: Do you think we will ever see Supersonic technology again?

JS: The Japanese are still studying SSTs. There is still the problem of burning too much fuel too fast. Back in the late 1990s, the FAA and United States government sponsored another round of SST studies, which were compared to the 1970 SST. Those studies showed very little gains in the past 25 years because there have been no breakthroughs in engine technology or in aerodynamics that allow for a big step forward in SSTs. Without the same economic considerations however, there is no reason why you can't have executive jet SSTs. All you have to do is take the big American Mach II fighters and put a big fuselage on them. But the noise and the cost to fly an aircraft like that are huge considerations; the only way you could justify this scenario would be to enlist executives who are willing to pay to get to their destinations quicker. Then, you still have the environmental issue of noise. There have been some efforts made on dissipating the sonic boom, and I think they might be successful enough to meet the environmental regulations, but not without considerable cost.

Sutter Interview continued page 6



MP: So what will we see different on fuselages in 20 years?

JS: Boeing has this phantom works business, developing a blended wing/body for improved efficiency. There again, when you look at today's configuration of a tubular body, a swept wing and pod-mounted engines, which came about with the Boeing B47 in 1947, it is tough to beat that direction of airplane design. Whether passengers will want to sit inside of a cocoon is the question. The blended wing/body airplane is basically unstable and needs black boxes to fly. It also has emergency escape issues. All of the escape hatches on a blended wing/body are either at the leading edge or the trailing edge. The leading edge is the first area that gets beat up in a crash and the trailing edge, which exits just beneath the engines, is hard to reach. So, I think there are issues in both certification and basic design. Although it has promise, this design also has enormous challenges. If you look back at the 747, the biggest decision we made was to go to the widebody. The reason we went to the widebody was that we started designing a double decker airplane, and one day the guys would come in with one problem, and the next day with another problem, and we would have a dozen problems. The conclusion was that we were going to spend all of our engineering effort solving problems, and when we went to the wide single deck, most of those problems went away so we could design an airplane rather than deal with problems. Airplane design is a series of compromises, and all of the requirements must be considered to come up with a satisfactory aircraft.

MP: What was the biggest problem with the double decker design?

JS: We were facing several issues with the double decker. The biggest problem in my mind was the emergency evacuation. Because it is comprised of two decks, the airplane tends to be shorter, so some of the slides are near the engines or there is congestion at the trailing edge. The widebody approach is more straightforward than the double decker. The shorter, double decker aircraft also doesn't allow for much hold area other than for baggage, yet airplanes make money with freight. This style isn't as economical if you need to transport passengers and freight. The systems are also more challenging because the entire aircraft is full of seats and galleys, leaving less room to run the hydraulic and electrical cables. Parking the airplane, loading and unloading and refueling are also problematic. The airplane is so stubby that there will be more trucks running into it, and there is the problem of airport congestion. Airports are not as big as they should be for the capacity they are handling, and that situation is not going to be improved.

MP: Are computers taking over for engineers? How has this changed the landscape of aircraft design?

JS: It is not just the computer. The 787 was built 10 years after the 777. The opportunities to work on new airplanes are becoming less frequent and, as a result, bringing in new talent has become more difficult. The United States needs to develop a system to inspire people to want to become engineers, whether aviation engineers or other types of engineers. At my alma mater, the University of Washington, the percentage of foreign engineering students is huge. We are not developing our own engineers like many foreign countries are. Engineers need projects to work on and see results. Instead of worrying about the fourth decimal point so much, you have to make sure the first decimal point is correct. A good example of this concept is the Hubble telescope. They spent an enormous amount of money polishing that lens to a long equation and got it perfect, but the equation was wrong. If somebody had stood back and looked at it that equation, maybe they would have realized they had the wrong equation. To some extent the computers rob people of the ability to get a gut feel for what is right.

MP: How do we get more bright students involved in aeronautical engineering when today we only develop a new airplane every 10 years or so?

the 747-800 engineers up in Everett, they all think they are having a hell of a good time.

MP: Are you spending much of your time inspiring and guiding your engineers?

MP: Juan Tripp was the catalyst for the 747. He originally envisioned a double

decker. I read about how you persuaded him to accept the wide single deck. What more can you tell us about this process with Juan Tripp?

JS: There are still a lot of interesting engineering jobs. If you look at the 747-800, although it is a derivative, there is still a considerable engineering challenge. They have to take the aerodynamics, structures, engines and put that package together. The challenge is just as big. Even if you are not going after that 20 percent gain, going after that 5 percent gain is just as hard. So the challenge is still there. I think if you talk to

JS: I am giving a talk soon to a group of embryo engineers, trying to inspire them, at the University of Washington. I spent a great deal of time in Everett working with the engineers on the 747-800, and I think they still have a little bit to learn from me.

JS: He was a marketing guy. Although he was excited by the double decker idea, when we brought him to the mock up, he saw it as a real marketing plus to have that wide single deck.



Joe Sutter
1969

MP: Who are today's airplane visionaries that follow in Juan Tripp's footsteps. Who do you want to talk to before you build an air-

JS: I think the guy you really have to talk to these days is Steve Hazy. He has caused one hell of a lot of hell recently. Mostly for the other guy, but I am sure he gives heart pains to Boeing every once in a while also. He is a visionary. Herb Kelleher – there is another visionary, and Bob Crandell was strictly a marketing visionary. He didn't care too much what the airplane looked like. There are a few other guys around. There are times when I felt that Boeing could have been more visionary. For example, I proposed taking the 767

fuselage, shortening it and putting it on the 757 wing. Boeing would have had the smallest, most efficient 150 seat twin aisle airplane in the world, without spending a lot of money. Airbus' A330 fuselage is too wide for this design but the 767, 7 abreast fuselage would have been great. It would have burned a little more fuel than the 757, but I think the possibility of a small double aisle aircraft would have put the pressure on the single aisle aircraft guys. But the guys around here had a lot of things going on and didn't respond to this proposal. I built a model of the airplane when Woodard was President, and I think he left that model somewhere around this building. I think that would have been a hell of an airplane.

MP: Can Boeing or Airbus economically build a 100 seat airplane?

JS: You have the Russians, Japanese, Brazilians and Canadians all in the 100 seat business, and they are subsidized to some extent. I think that Boeing and Airbus should stay away from it.

MP: There is a big focus today on aviation's effect on the environment. Where do you think we should be focusing our efforts?

planes, but if we could cut the fuel consumption of all aircraft by 20 percent within 20 years, that would still be a very small improvement since most fuel is burned on the ground.

MP: What do you think about the new VLJs and that business model?

port for a 200 mile flight and look up in the cockpit and see a 19 year old pilot with 300 hours behind him? It is not the same safety level as getting on a United 777. I think there is a risk that will catch up with them.

MP: What kept you up at night when you were designing the 747?

weight out of the plane? You give a bunch of engineers the time and money to put an airplane together, but it is integrating the whole design and making all of the compromises that must be met in an efficient design. That is a tough job.

MP: When the first 747 flew, what was more exiting for you: the first takeoff or the first landing?

Bill Allen and all those guys watching the first landing. That to me was a very telling picture because that was the moment when it was all going to be told, and it turned out to be a piece of cake. That was the biggest thrill for me on that day.

MP: When you came up with the idea of installing engines under the wing on the 737 you shared the patent on the 737, and Boeing paid you \$50 for that patent. I think Boeing got a pretty good deal there. Is Boeing still so generous?

JS: Today it is \$1,000 for a patent.

On behalf of ISTAT and our 1,500 members, I congratulate you on receiving the 2008 ISTAT award and I thank you for the honor of getting to speak with you today.

Thank you for this honor even though it is going to cost me. My kids all want to come to Orlando and join me. It will be a little family get together.

"I am very surprised and pleased to have ISTAT award me the 2008 ISTAT Award.

When I reviewed the past awardees, I'm somewhat in awe that a lowly airplane designer will be joining that group.

The 747 has had a powerful impact on commercial aviation and I was fortunate to play a part in that saga."

—Joe Sutter
August 2, 2007

Stefan

VilnerChief Operating Officer
JetBird

Stefan Vilner is the CEO of JetBird AG, which is scheduled for launch in 2009 using Very Light Jets (VLJ) to offer on demand, point-to-point service using the low cost carrier aircraft model. Flying the new Embraer Phenom 100, JetBird will fly business travelers in the European Market. Stefan took time to talk to the JETRADER.

J: Thank you for following up On Domhnal Slattery's [JetBird's Chairman] speech at ISTAT's recent European Conference. To start, what was the basis for JetBird, who is your market and how are you going to market to them?

SV: The reason for JetBird is the emergence of a new aircraft type. The VLJ gives us a high quality low cost aircraft which has opened up a new business. There are numerous new VLJ type aircraft being developed but we decided that the Embraer Phenom 100 was the best because it would allow us to build a low cost airline model using very light jets. This requires having low operating costs. You get that by making good deals and having a high utilization rate of your aircraft. This places a burden on these type aircraft as most are built for owner operators rather than a commercial operation. Piston aircraft owners can upgrade to jets for only a slight increase in cost. But he will run it only 2-300 hours per year. Commercial operations require usage of 12-1500 hours per year in order to lower operational costs. The Phenom is built like an airliner, has airline DNA and can be flown for 35,000 cycles. We will be able to fly many years before the end of its lifetime.

We are building the entire operations around this aircraft, with 50 firm orders and 50 options. We are negotiating maintenance for them with Embraer and Pratt & Whitney for the engines. We are applying for an AOC Airline Operations Centre under the Irish Aviation Authority. We are building an Airline.

J: What is your background?

SV: My background was with low fare airlines in Europe (GO Fly, now part of easyJet, Sterling Airlines, now owned by FL Group). Both were 737 operators and the latter had 31 aircraft when I left as Chief Commercial Officer. Our commercial platform is simple: we will offer a high quality extremely flexible jet product at a very low price. We want to be at 50% of a provider of private jet aircraft offers per hour today or 2,500€ per hour. We will pull passengers out of business class. Four people traveling London to Paris in business class will pay the same on Jet Bird. I need to emphasize that we sell one aircraft not four seats. This is a difference from the U.S. model. The U.S. sells per seat and tries to fill the aircraft. We don't do that because it adds complexity. We will sell the aircraft and the customer can take up to four people. This model emphasizes scheduling flexibility and ease of travel on a low cost carrier model.

J: Will Jet Bird be flying out of secondary airports as well?

SV: Reflecting our low cost philosophy, we need to operate our aircraft a lot, which means we will work out of secondary airports. In order to get into Heathrow, Frankfurt or Charles DeGaulle, you need slots and we will have a hard time acquiring those. Additionally we will have a hard time when we want to meet our on-demand prom-




ises. In London we will probably fly from Stanstead and Biggin Hill. They will give us access to both London North and South and better yet, are not congested. We won't go into Heathrow because it offers too much operational complexity. In Paris we fly to Le Bourget, which is also the principal maintenance facility for Embraer. So it makes even more sense to base the aircraft there. It is also the most convenient airport in Paris.

J: What are your travel destinations?

SV: It will be basically a big banana around the corridor of London to Rome. Euro Control data tells us that most of the air traffic in Europe operates in this area. And that brings us back to the low cost operating philosophy. NetJet flies say Reykjavik, Iceland to Vladivostok in Siberia. They are excellent at this but we won't because there are too many dead heads, which affect our operating costs. We will fly where there is the most traffic. The busiest city pair in Europe is London-Paris. It is not very adventurous but it will be very efficient.

J: So your model is based on efficient aircraft, flying high frequency short routes with high paying customers to convenient airports.

SV: I travel a lot in Europe and I spend a great deal of time in security queues, check in queues or waiting for aircraft. I was in Paris with a strike so our aircraft was delayed more than an hour. If you are a leisure traveler, this has less impact but as a business traveler traveling two or three times a week you waste enormous amounts of time. In the last five months I have been based in Dublin, I have lost my bag five times so I have a large collection of amenity bags from various airlines. For people who travel as a living you waste an enormous amount of time being inefficient in airports, or in transfers or in a holding pattern over congested airports. Our service is geared to high net worth individuals and senior managers whose time is not justified sitting in an airport for 2 hours waiting to get on an airplane.



Our service is geared to high net worth individuals and senior managers whose time is not justified sitting in an airport for two hours waiting to get on an airplane.

J: How will Jet Bird handle the passenger check in, security screening and boarding?

SV: We will use special facilities to expedite the process, which are the business jet facilities at these airports. All of the airports we plan on using have their own FPOs generally on the other side of the airport so the process will be much quicker and easier for the passengers. This will actually work very well for Jet Bird because it is so difficult for the ordinary aviation passengers. Just bypassing security queues is a significant benefit to our customers.

J: With European aviation congestion increasing will this have an impact on your operations?

SV: We have established a relationship with Euro Control, the FAA European counterpart, because they were concerned with the darkening of the skies with the arrival of the VLJ. In their world, it doesn't matter whether the aircraft is a VLJ or an A380. So we have helped establish a VIP (Very light jet Introductory Platform) setting procedures for how we operate without increasing congestion. So, first, we are quicker than the existing turbo props so ingress and egress are much faster, secondly we won't fly into the congested airports but the secondary ones so their will be minimum delays, and thirdly we won't get much higher than 25,000 feet because we are flying very short legs of less than an hour. So we won't interfere with most of the European traffic. On a broader issue Euro Control has made dramatic improvements over the last 10 years and we are going to see even more improvements over the next 10.

J: How difficult is it for you to acquire flight personnel, where do they come from and will you train them yourself?

SV: We were initially very concerned about personnel availability, pilot training and pilot qualifications. But the schools are training pilots on synthetic tools, simulators and so the student can train to exactly the equipment they will be working. This decreases the cost

of training, speeds up training time and we get better pilots because they haven't been training on the wrong aircraft and have to unlearn habits. We are becoming actively involved by supporting training schools and training pilots our selves. Then we can offer interesting jobs because we will not be flying all over the planet; we can offer a stable life style and a competitive salary. And finally its fun flying because it is general aviation, you're never too sure where you are going to be on any day.

J: The left-seater will be an experienced pilot?

SV: Yes, they will come from the commuter airlines, the turbo props and from the other GA operators especially the smaller ones where you are always at the end of a phone. We have made no advertising efforts and we have a file of about 50 applications so far from pilots who have contacted us. Because of the GA pilot base we have a large pool of pilots to draw from. Our advantage of course is that we fly just one aircraft type while NetJet flies 14 different types which really is an advantage when looking for 400 pilots to fly 100 aircraft.

J: Will Jet Bird carry cargo?

SV: Well we won't convert the aircraft, but interestingly enough, there is a lot of high value cargo, last minute things such as parts for high value machines and high value operations. At Sterling, we had a cruise ship operator hire Sterling to ship a gearbox part that stopped the ship, costing them \$100,000 per day in lost revenue. And they couldn't get the part from Genoa, Italy to Copenhagen quickly enough. There will be some of this but predominantly we will be a passenger airline.

J: This type of cargo operation will be within the banana of your passenger operations?

SV: Yes.

J: With your first aircraft being delivered in early 2009 and start up shortly thereafter, are you still comfortable with your growth estimates?

SV: Well, we have 50 Embraer Phenom 100 on order and 50 options which we can exercise quite early to grow the fleet. We are concerned that we ordered too few. We won't be able to get any additional planes until 2012 because of production constraints. Embraer has about 480 on order.

J: How does \$100 per barrel oil affect your operations? What is your forecast for future oil levels?

SV: We should look at oil from a macro level. It will hit everyone. Some travelers will limit their trips but most will continue. The cost will be added on the top of the ticket price, which will pass through, and so is an inflation driver. It will decrease travel but only marginally and will not have much of an impact in the long run. Our passengers will not be deferred by a few additional euros on the ticket and we don't have to discount because we don't have to fill a 180 passenger aircraft. So while we are not insulated, we believe that it will have only a marginal impact on Jet Bird.

J: The ISTAT European Conference focused on the Green movement and its impact on the aviation industry. How will Europe's focus on carbon emissions impact JetBird's operations?

SV: For the last three years as president of ELFA (European Low Fare Association) we have been looking at this question. First the focus on the airline industry is a bit absurd as airlines contribute only 2% to total emissions. The shipping industry actually has greater emissions than the airline industry. But we have more colorful characters such as Michael O'Leary that are the focus of politicians and that makes us an easy target. They can slap on a fee or a tax on the tickets and that will be difficult for Ryan Air. With an average fare of 43€, a 10€ tax will be a 25% fare increase. But for us with fares of 2500€ the tax will be easier to absorb even though we won't like it. In addition we are looking for a carbon-trading scheme or we will put one in place to offset our emission footprint. And we will be using the most fuel-efficient aircraft.

Thrust Reverse Systems (Typical) On Transport Category Aircraft

By James E. Neumann, Adjunct Professor - Aviation Studies, Lewis University, Romeoville IL USA | neumanja@lewisu.edu

The approach is normal albeit a little gray and misty outside. You're out of the overcast a little earlier than expected. The runway is right where it's supposed to be. Visibility is good and it's raining lightly. The runway surface is wet. The aircraft touches down smoothly, the auto spoilers deploy, auto-brakes begin to apply, the thrust reverse system is selected and deployed, power in reverse is applied and the aircraft smoothly, efficiently and safely decelerates. The thrust reverser system is selected to stow, the auto-brakes are disconnected, and the aircraft exits the runway. The flight crew contacts ground-control and taxi the aircraft to the gate. This event occurs thousands of times each day at airports around the world. This is the result of people and machinery working in harmony.

One of the key elements in all of this is the thrust reverser system. As aircraft have grown bigger, faster and more sophisticated so also has this system had to change to meet these new demands.

The thrust reverse systems had to make the first quantum leap to the next generation with the introduction of the high bypass turbofan engines in the early 1970's that were being installed on the Boeing 747, Douglas DC-10, Lockheed L1011 and the Airbus A300 wide body aircraft. With the majority of thrust the result of the cold stream air (fan air) it became necessary to re-invent what was a relatively simple (by design) system for blocking and redirecting engine exhaust to a system that blocked this cold stream air yet still allowing the core engine to produce adequate power. The operation in the flight deck is relatively the same with precautions, safeties, interlocks and indications being generally as they were. The design concept for this new engine application necessarily had to become more complex and sophisticated. The big difference was the installation of the translating cowl that is mounted on each side of the engine fan section. The cowl transitions aft for reverse deploy and forward for stow. Typically, (as in the past) these translating cowls are deployed using either hydraulic pressure or pneumatic pressure. Each translating cowl half (right and left

side of each engine) is a complete system in itself that can operate independently upon a common command. (Talking thru a feedback system with the aircraft and engine to insure a proper, synchronized operation). When the translating cowl transitions aft several events occur. As the cowl transitions aft to the reverse deploy position mechanical blocker doors will block the cold stream airflow and uncover fixed vanes built into the cowl to redirect the cold stream air. A signal that the reverser is now in the full deploy position will signal release interlocks to permit the crew to apply power "in reverse". Going to stow is relatively the reverse of the process allowing

the assemblies to stow, lock and depressurize the system.

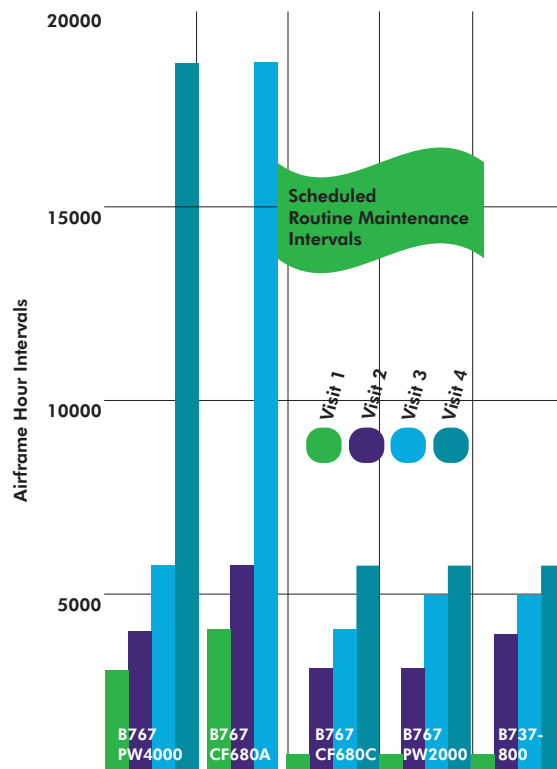
The many special added features that are incorporated into this type of thrust reverse system consequently impact operation and cost. The translating cowl itself is very large and heavy which makes moving it fore and aft a task that requires synchronization for it to translate smoothly, evenly and without binding. Consequently, a synchronizing system for balancing the movement each of the individual cowl's actuators is incorporated. It is also imperative to insure that an individual cowl unit or entire engine reverse assembly does not deploy in flight or when not commanded to.

Today's generation systems incorporate all the typical locking, depressurizing and indicating precautions of the past along with extra safety devices.

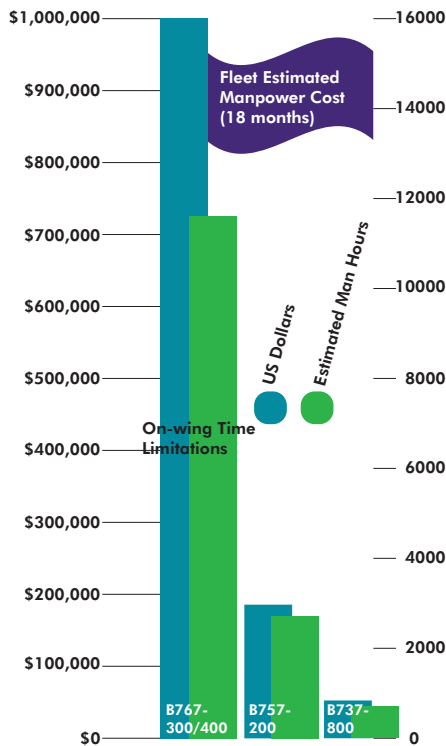
The synchronization shaft lock system, for an example (on some designs), is installed to augment the standard translating cowl locks. The installation of an auto-re-stow system that will sense the slightest un-commanded movements of the translating cowl from the stowed position will automatically re-stow the cowl and alert the flight crew of the occurrence is commonplace. A system for the side-to-side monitoring of each translating cowl position that insures symmetrical movements of the cowls is also incorporated.

Although the translating cowl type of reverse system is the most common design used in the industry today other designs are being successfully used to accomplish this task. An excellent example of this is the system utilized on the Airbus A320 series of aircraft utilizing the CFM56 engine. With this design a thrust reverse assembly is installed in the short nacelle body on each side of the engine aft of the fan cowl. The assembly basically consists of (4) pivoting blocker doors (two per side), which are flush with the cowl for forward thrust and will deploy into the slipstream (at the same time blocking fan air) to deflect thrust. The blocker doors are deployed with (4) hydraulic actuators. Command and control logic is consistent with the industry as are indications and displays to the flight crew. This type of system has proven itself to be simple in design, reliable and efficient.

Full authority DIGITAL engine control (FADEC) was next giant leap into the future. FADEC increased reliability, simplified routine maintenance and en-



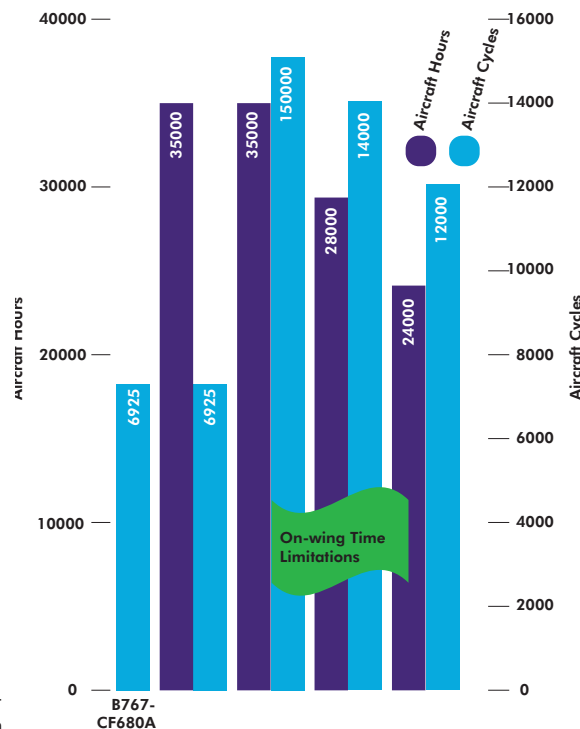
In the scheduled routine maintenance intervals graph the maintenance intervals do not represent routine flight crew and line maintenance required inspections. (Only scheduled routine inspections are displayed) In the case of this particular fleet the CF680A engine is used on the domestic B767-300 aircraft, while the PW4000, CF680C engines are used on the fleet of B767-300ER and the B767-400ER aircraft. The B757 and B737 were being operated domestically. **



In the fleet estimated manpower cost graph we see an example of a typical company fleet and their related cost in man-hours to accomplish the scheduled (routine only) maintenance visits over a (18) month period. The (18) month period is based on the aircraft accumulating 6000 hours of airframe time. (6000 hours is the established time between letter checks.) Outstanding in this chart is the dramatic difference in cost for the B767 aircraft. One possible explanation is that the majority of this particular carriers B767 fleet costs is the result of special (labor intensive) inspection required every 3000 hours (per an A.D.) to the pneumatic reverse system incorporated on the CF680C engines installed on the largest portion of the 300/400 ER fleet. The remaining B767 fleet, B757 and B737 fleet aircraft utilize a different (hydraulically operated) system. Man hour costs for this operator is based on their rate of \$65.00/hr. **

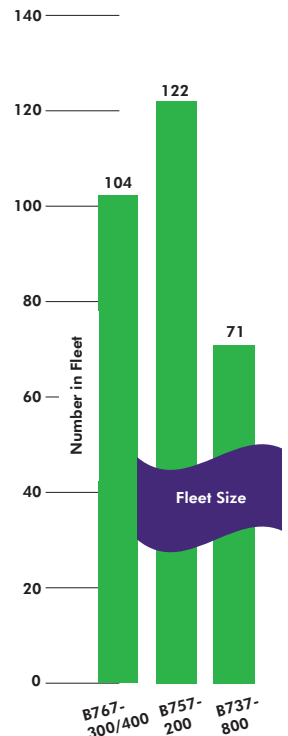
hanced diagnostics to permit a quicker repair and return to service. When a system evolves, as this has then everything changes inasmuch as operation, reliability, required inspections, scope of the inspections, frequencies, times between overhaul and, costs. As we can see, technology advances over the past 30 years in component designs, construction and diagnostic methods have improved right along with all of these new demands to make the thrust reversing system a reliable, maintainable and cost effective system.

The reverse system is designed and built as a joint effort in concert with the engine and aircraft manufacturers for the installation on a specific aircraft and is considered to be part of the airframe. The system is therefore being tracked and maintained as such. (With few exceptions the reverser assemblies are attached to and will stay with the airframe thru it's on wing life cycle allowing scheduled engine changes without disturbing the system) Depending upon the engine type installed on a specific airframe, it's usage (ETOPS for example), special requirements (A.D. notes-etc.) and individual statistics (reliability) we will find that the maintenance schedule frequencies and related costs will vary. Overhaul of these different marriages also vary for the same reasons. Many of the overhauls are accomplished "in house", however, a great volume of the heavy maintenance and overhauls are performed by certified repair facilities.



You can see in the on-wing time limitation example graph that in the case of the B767 the restoration time limits are based on either aircraft time or cycles whichever comes first (with the exception of the CF680A aircraft which is cycles alone) For the B757 aircraft the reverser is removed for restoration at each heavy maintenance visit (HNV) which occur at either 28000 hrs/14000cycles or 24000 hrs/12000cycles. **

Depicted in the fleet size graph the B767 fleet types are combined to reflect (104) aircraft in service at the time of study. The B757 fleet size of (122) represent the in service aircraft at the time of this study. The B737 fleet size of (71) represent the in service aircraft at the time of this study. **



Examples of some typical programs and estimated costs that apply to common fleet types for some specific carriers are shown in the following graphs and are for the purpose of information only. (They are not intended for any other purpose)

We can say in closing that no two (2) thrust reverse systems are exactly alike and that the type, airframe and engine combinations will impact the overall statistics as far as your operation is concerned.

This generation of thrust reverse systems is extremely reliable and maintainable. They do the job that they are asked to do over and over again and are a tribute to their designers and builders!

As the system is tracked and maintained the technology will be continually changing to accommodate the improvements to meet future demands.

** Statistics and reference data for use on the graphs are courtesy of Delta Air Lines Inc.

This study was completed in October of 2007

The 2007 Dubai Airshow dominated the commercial aviation news during the second week of November and with the final announced on-site order tally of more than US\$ 100 billion, the event went straight into the record books. As a first time visitor, DVB Bank's Bert van Leeuwen reports on what to expect as a visitor to the Dubai Airshow.

For many years the Paris Airshow at Le Bourget, together with its UK Farnborough based counterpart, were by far the most important industry events from the point of view of order announcements. With the current order boom from India, China and the Middle East it was almost unavoidable that similar events in Asia or the Middle East challenge the dominant position of the European tradeshows and indeed 2007 turned out to be the year of the breakthrough. With mega-orders coming from local heroes Emirates and Dubai Aerospace Enterprise and additional deal volume from neighbors Qatar Airways, LCAL and other M.E. based buyers, Dubai 2007 smashed all previous declared on-site order tallies for any international airshow.

The set-up of the Dubai Airshow is very similar to its European counterparts. Situated at Airport Expo Dubai, essentially a remote "corner" of Dubai International Airport, the 2007 airshow featured 850 exhibitors from 50 countries, 11 national pavilions and over 140 aircraft. Visitors from colder climates could easily escape the

Dubai desert-sun in the fully air-conditioned indoor exhibition area where companies ranging from giants like General Electric to tiny firms like Lupa Aircraft Models presented their products. Many of the major aerospace firms in addition have a "chalet", where corporate guests are hosted. For visitors not afraid of sun-burn, the real hardware can be admired on the platform area in front of the exhibition halls. Unfortunately, the number of commercial jets was limited this year and apart from a CRJ, some local freighters and several corporate aircraft, the giant Airbus A380 once more was the only major attraction.

Despite the limited number of commercial jets in the static display area, the organizers had ensured some spectacular flying action. Again the A380 was the undisputed star performer on the commercial side, this time F-WWEA, equipped with the GP7200 engines. The military part of the business however was well represented by the incredible MiG-29 as well as stunning performances from the Red Arrows, Patrouille de France and Patrulla Aguilla.

So, can Dubai's airshow logistics compete with established attractions like the Paris traffic jams and the joys of the overloaded UK train system? Well, Dubai is obviously not the worst place in the world to visit. For a someone who only knows the Middle East from industry statistics, arriving at Dubai International immediately makes clear that the Middle East "boom" all very real. The impressive airport terminals are literally all surrounded by an impressive fleet of Emirates A340, 777 and A330 wide-bodies. Even upon arrival, "Dubai Duty Free" is omni-present and it is difficult to resist the temptation to participate in any of the lotteries for a new Porsche, Ferrari or Aston Martin (our local tax-man would love it!).

Clearing immigration and customs is quick and even at 6.30 in the morning there is plenty capacity and the officers are just ... very friendly, something that can not always be said about their colleagues in "certain North American countries". Whilst there is no airport train to the city yet, taxis are plentiful, clean and relatively cheap. A short 20 minutes car ride gives a good impression of the massive construction going on in this part of the world.



Like taxis, hotel accommodation is plentiful and of excellent (5 star) to intimidating (7 star) quality. We stayed in the Jumeirah Emirates Towers (with room keys in the shape of the hotel and a special rubber duck to take home as souvenirs), a very comfortable 5 Star Deluxe place. Normally one would feel "on top of the world" in such a hotel, however not in Dubai where there is always something more luxurious or exotic. In this case the superlative takes the shape of the Jumeirah Burj Al Arab hotel, modestly advertised as "the most opulent hotel in the world". Even from a distance, this hotel in the shape of the sail of an Arabian "dhow" is impressive but unfortunately time (and budget) did not allow a closer inspection. At least now there is still something to dream about.

Back to reality. Transportation from the hotel to the airshow turned out to be easy as well. Apart from a shuttle bus, taxis get you to the Airport Expo within half an hour, even in morning traffic. Now, just as most visitors – including undersigned – were starting to think, "wow, this is all very easy", things start to go wrong.

Despite the fact that 45.000 visitors over a period of five days should be easy to handle, the logistics of getting into the show were, let's say challenging. Despite registering for a press-pass on-line in advance, this pass was not ready upon arrival ("come back in an hour").

Joining the queue we bumped into some of the better known ISTAT members, who also had to wait for well over an hour before being admitted. Apparently not impressed by the fact that some of the people in the queue were about to sign a contract for half a dozen Dreamliners or that they were amongst Airbus and Boeing's best clients for wide-body freighters, the security officers were standing as a brick wall with no hope of sneaking in.

Once "in", the "airport standard" security check turned out to be the last hurdle, although this was executed in a fairly efficient and friendly way. In general facilities at the airshow were excellent, even for visitors that had to self-cater and were not invited to any of the chalets for lunch.

Going around the display area again was easy and especially during the morning hours of the show, the "live traffic" flying in and out of Dubai International was an added bonus. Actually, the afternoon flying display interrupted normal airport operation for several hours during the days of the show. Only during about 30 minutes in the afternoon, the display is interrupted to allow the commercial flights to take off. So after the F117 flight display one could see at least a dozen Emirates wide-bodies taxi to the runway in closed formation to take-off within minutes from each other. For many visitors the Emirates Airshow was at least as impressive as the "official" flight displays.

All good things have to come to an end and after hours of aerospace enjoyment, getting



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Dubai Airshow continued

back to the hotel bar, a business dinner or a cocktail party is the only thing left to do. As in the morning, the logistics of getting all visitors "out" through one door proved challenging. Although a huge number of busses and taxis were available, squeezing all these vehicles through a narrow road that was at the same time was designated the "boarding area" was not such a good idea. While a local dispatcher was shouting at the taxis to hurry up (Toyotas and Lexus, not donkeys or camels), just around the corner one of his colleagues was ordering the vehicles to a halt again as he obviously had orders to the put a stamp on a piece of paper and hand it to the taxi drivers (of which the meaning still remains a mystery). The positive side is that in the evening traffic from the airport is going against the traffic flow leaving the city, so once more just a short ride to the hotels and no excuse for being late at the ISTAT cocktail party.

In two years, when the next Dubai Airshow will be held, all of these problems should have been solved though, as in 2009 the venue will change from Airport Expo Dubai to Dubai World Central's new airport at Jebel Ali, recently renamed Al-Maktoum International Airport. Al-Maktoum International, which will be fully operational in 2015, will take over from Dubai International Airport as the emirate's operational hub.

Despite moving to this new mega-airport, it seems hard to imagine that Dubai 2009 will beat this years order tally. In our cyclical industry, we may have to wait till the 2013 airshow to break this record, when – who knows - the global airlines, all suffering under \$200/bbl oil, will be lining up to order those new, 30% more fuel efficient geared fan, open rotor 737 and A320 successors. At such oil prices, Dubai will surely have its first 9 Star hotel. But then again, maybe, just maybe, the green nightmare from ISTAT Vienna will come true and the 2007 record will stand forever let's hope not !



What's the overall verdict?

All in all a very pleasant experience and – maybe thanks to a good airco system indoors and pleasant sunshine during the flying display – superior to most of the European airshows. On the negative side, only very few big commercial jets on display (apart from the A380) and much room for improvement in the logistics of getting visitors into the show.



ISTAT Reception Dubai Airshow 2007





Nearly 400 guests attended ISTAT's Reception held during the 10th Dubai Airshow.

Recognizing the importance of Dubai as a hub, ISTAT provided a setting for networking and relaxation. Thank you DAE for your sponsorship of this event.



Focus on our ISTAT Scholars

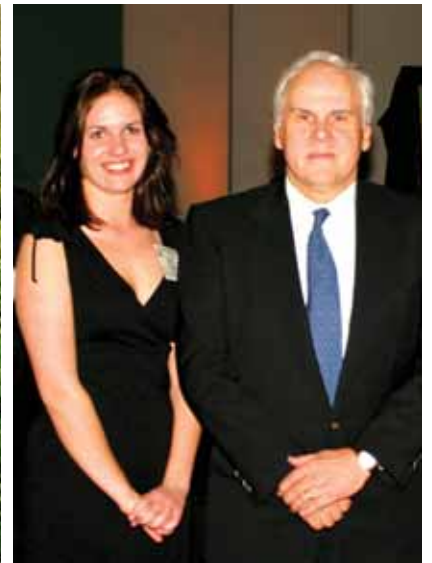
by Roland Moore

As a part of our continuing ISTAT scholarship program, we are tracking our success in selecting the most qualified students whom we believe are destined for exciting careers in aviation (with some help from ISTAT).

We selected Katryzina (Kate) Zaranek for our featured ISTAT scholar column in the *Jetrader*.

Kate graduated from Daniel Webster College in New Hampshire in May 2005, with majors in Aviation Management and Aviation Operations, where she excelled as a student ambassador, orientation leader, Aviation Career Counselor, and student pilot. She was selected by Hannah McCarthy, pictured above, (then president of Daniel Webster and ISTAT Foundation Trustee) to receive a \$10,000 ISTAT Foundation Scholarship based upon financial need and academic excellence.

Kate traveled to Phoenix to be honored by ISTAT, where she met, among others, Fred Smith, pictured right, Chairman of Federal Express, and David Sutton, also from Fed Ex and an ISTAT trustee. Fed Ex hired her in June 2005 as an Air Traffic Intern in Memphis, where she received training as a Ramp Tower Controller and repre-



sented Federal Express at airport authority meetings.

Moving on later that year, she was offered a position with Eclipse Aviation Corporation to an exciting opportunity in assisting in the sales support and marketing of the new Eclipse aircraft.

ISTAT wrote letters of support for her to Eclipse when applying for this position. Kate is one who sets her aviation goals very high, and now is hoping to move even higher, having applied for a management position at Boeing. Good Luck Kate!

Roland Moore
Co-Chair, ISTAT Scholarship Committee

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VALUES B747-400. CF6-80C2B1F. 870,000LB MTOW BASE VALUES INFLATED BY 2.5%												
Year of Delivery	CMV	2007	BASE 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1988	\$36.90	\$34.00	\$30.89	\$28.02	\$25.38	\$22.96	\$20.73	\$18.70	\$16.83	\$15.13	\$13.58	\$12.17
2007	\$111.65	\$117.00	\$104.61	\$93.39	\$83.25	\$74.10	\$65.86	\$58.44	\$51.78	\$45.81	\$40.46	\$35.68



BOEING 747-400 (Including Combi)

466 747-400s in passenger or mixed service, 18 parked. Production has now ended with 389 747-400s; 6 400ER passenger variants; 51 Combis in service or stored; plus 20 low weight 747-400Ds in Japanese domestic service. In service passenger fleet is operated by 38 operators: British Airways (57); Korean Air (23); Japan Airlines (38); Cathay Pacific (23); Qantas (30); United Airlines (30); Lufthansa (30); All Nippon Airways (19); Singapore Airlines (20).

Distribution by Engine Manufacturer

Manufacturer	Aircraft	Operators
G.E.	209	21
P&W	155	19
RR	102	5

Distribution by Region

Region	Aircraft	Operators
Asia/Pacific	259	21
Europe	144	9
North America	46	6

747-400 Availability

Only 1 aircraft that we are aware of being publicly marketed for sale or lease:
 • AWAS Aviation Services are offering a 1990 built GE powered 747-400 for lease from February 2008.

Freight Conversions

- Air Atlanta Icelandic 1990 B747-400(GE) to -400BCF in China's Xiaomen province in mid-September.
- Air France and EVA Air converted B747-400 Combis (GE) into -400 BCFs.
- Dragonair (P&W) B747-400 to -400BCF at Changai International in mid-August.

747-400 Storage

- Currently 18 747-400 passenger aircraft (inc. two Combis) in storage; 5 are undergoing/scheduled for cargo conversion, one aircraft to be leased by Singapore Airlines and 1 to be leased by United Airlines.

747-400 Value and Lease Rate Trends

The 747-400 Market Values have remained stable since the first quarter of 2007, ranging from \$36.90 million to \$111.65 million. Market Lease Rates now range from \$475,000 to \$935,000 per month. 747-400 Combi Series, Market Values are also stable, ranging between \$42.9m to \$86.15m, with Market Lease Rates between \$525,000 and \$805,000 per month.

747-400 Market Outlook

The 747-400 had somewhat of a renaissance in the last 2 years, with the long haul passenger traffic growth seeing the type back in demand and the number committed for cargo conversion now at 60+, removing a potential surplus as newer types replace it in the passenger market. Also, the 747-400 continues to benefit from the delays of the A380, with some interim leases. There is some secondary market activity (e.g. Oasis).

The size of the 747-400 has always been the Achilles heel in remarketing terms, as the fleet is concentrated with only 33 airline operators. The three engine choices also impact on remarketing as the fleet size is further diluted and fragmented. Replacements by 777-300ERs are starting and the A380 enters service in 2008, to be followed in 2009 by the 450-seat 747-8. New production of passenger 747-400s is now over. The recovery in the long haul market is also seeing a minor revival of interest in the 747-400 as a passenger aircraft, with carriers like Air India and Oasis Atlanta taking advantage of availability and lower values to move into the type.

The aircraft values stated herein are work product of independent third parties sources, and ISTAT neither approves or endorses the information contained herein or the use thereof for any purpose whatsoever.

Airbus 340-300 Appraisal . Avitas Inc. tele +1 703-476-2300

Current Market and Future Outlook

The market for the A340-300 is stable. With 213 aircraft in service among 32 operators as of October 2007 (but only 3 firm orders in backlog), the A340-300 has indeed created a niche in the 300-seat long-range market. Operators ordering the A340-300 have used it to replace older widebodies such as the L 1011, the DC-10 and the 747-100/-200. To some extent, the model has already been superseded by the more advanced A340-500 and A340-600 as some existing operators of early A340s are now operating and have placed additional orders for the newer variants. There is also strong competition from the 777-200ER which is a twin engine aircraft as oppose to the four engine A340-300.

Prospects for the A340 300 should continue to improve during the current upturn as air traffic continues to increase. AVITAS believes that there will be a shortage of widebody equipment from now until the next aviation downturn predicted to begin in the 2011 timeframe. Further demand could also be generated because of the program delays being experienced by the A350XWB and A380, with operators looking to types such as the A340 for interim widebody lift, although Boeing should also benefit with its 777 family and the forthcoming 747-8.

However, while the fortunes of this aircraft are increasing due to the current shortfall of widebody capacity, AVITAS does not expect any new large orders for the type. AVITAS believes that typical lease rates for the A340 300 are in the range of \$450,000 to \$700,000 per month, depending on vintage and lessee credit.

Current Operator Base and Backlog

Displayed below are the A340-300 operators and order holders. As of October 2007, there were 213 aircraft in service, with a further 3 held on firm order and options reserved on another 2. No A340 300s were reported as being in storage at this time. Air Canada is the only operator of the type in North America.

Airbus A340-300 Aircraft by Region 10/2007

Africa/Middle East - 37 in service, 2 options, Total 39
 Asia/Pacific - 47 in service, Total 37
 Europe - 113 in service, 3 firm orders, Total 116
 Latin America/Caribbean - 8 in service, Total 8
 North America - 8 in service, Total 8
 GRAND TOTAL 113 in Service, 3 Firm Orders, 2 Options, Total 218

Airbus A340 Current Fleet and Backlog

A340-200 - 20 in service, Total 20
 A340-300 - 213 in service, 3 firm orders, 2 options, Total 218
 A340-500 - 27 in service, 6 firm orders, 5 options, Total 38
 A340-600 - 81 in service, 28 firm orders, 7 options, Total 116
 GRAND TOTAL - 341 in service, 37 firm orders, 14 options, Total 392

Year	Current Market Value	2007 Base Value	Future Base Values at 2.5% Inflation									
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
1992	35.8	35.4	33.5	31.5	29.3	27.4	25.6	24.0	22.3	20.4	18.6	17.2
1994	41.2	40.8	38.7	36.8	34.8	32.6	30.4	28.4	26.6	24.8	23.0	21.1
1996	47.3	46.8	44.6	42.4	40.2	38.2	36.1	33.8	31.5	29.4	27.5	25.7
1998	54.4	53.9	51.2	48.6	46.3	44.1	41.8	39.7	37.4	35.0	32.6	30.4
2000	62.7	62.1	58.8	56.0	53.2	50.5	48.2	45.7	43.4	41.2	38.8	36.3
2002	72.8	72.1	68.3	64.4	61.1	58.2	55.2	52.5	50.1	47.5	45.1	42.8
2004	86.3	85.5	80.7	74.9	70.9	66.9	63.5	60.5	57.3	54.5	52.0	49.3
2006	99.2	98.8	93.8	89.0	83.9	77.8	73.5	69.5	65.9	62.8	59.6	56.7
2007		109.3	102.7	97.8	92.5	87.8	80.9	76.6	72.3	68.6	65.4	62.0

Availability

As of October 2007, AVITAS was not aware of any A340-300 aircraft being advertised as available for either sale or lease. The following Figure illustrates the trend in availability over the last 12 months.



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I trust that you all enjoyed the Holidays and would like to take this opportunity to wish you health, happiness and prosperity in 2008.



December saw the Foundation board meeting take place in a very wet New York City. Alongside the regular business the Board considered recommendations for Grant recipients and grants were approved for the following institutions:

- Airline Ambassadors - \$10,000
- Experience Aviation - \$5,000
- Anadolu University - \$10,000
- Experimental Aviation - \$10,000
- Broward College - \$10,000
- Hiller Aviation Museum - \$10,000
- Brooklands Museum - \$5,000
- Lewis University - \$5,000
- Montoursville School District - \$5,000

The Grant committee expends considerable energy in reviewing the various grant submissions but the job doesn't finish there and we like to follow up and review the impact that the grants have and the exposure that the grants give to the Foundation.

In November we dispatched special agent Ron Pietrzak to visit grant recipient Lewis University on the occasion of their Student Aviation Career Conference. Ron reported back that there were over 300 attendees all interested in a career in aviation. Ron observed that "Lewis did a great job and definitely promoted ISTAT as the primary sponsor on signage at the event, in handouts and in the opening remarks from the Dean who asked me to stand up (not so secret agent I guess!). It was very well done. As a matter of fact, they noted that due to our support this is one of the best attended events of this kind offered by Lewis." Lewis offers a breadth of aviation courses as evidenced by the subject matter of just some of the sessions which included: The new FAA approved Lewis Air Traffic Control program, A career as a commercial pilot, A career as a corporate pilot, Flight Management, Aviation Administration, Maintenance and Aviation Security. Lewis is a new grant recipient and we look forward to working with them further in the future.

I am also pleased to report that in December the Scholarship Committee completed its review of all scholarship applications (44 domestic and international applications were received) and the Board has accepted the committee's recommendations which will see \$145,000 being allocated amongst 16 scholarship recipients. In concluding its deliberations the committee divided the scholarships equally between domestic and international and male and female recipients and achieved an excellent balance in all respects.

So much for the past now looking to the immediate future. You will all by now have received e-mail messages relating to the 2008 Internship programme. We are looking forward to receiving applications for the summer internship programme so I would encourage all of you to review whether you would be in a position to offer a place for an intern and also to encourage anyone that you may know to apply for the programme.

In other places in *Jetrader* you will see mention of ISTAT's 25th Anniversary meeting in March. The ISTAT Foundation Board are reviewing opportunities to celebrate alongside ISTAT in this significant achievement but our eyes are firmly set on this being a money-raising opportunity for the Foundation so please be prepared to have your pocket picked at the meeting and Gala dinner - prepare mentally to leave poorer!



Some Helpful Rules of Thumb

Tools For Making Intelligent Decisions

By Douglas Castle

In the first installment of this article (AUGUST 2007 JETRADER), we discussed several key Rules Of Thumb in terms of simple capital recovery on pre-owned commercial aircraft leasing investments. In this second installment, we will address the additional variables which should be considered relating to financing terms, assumptions about resale and residual values, and the use of third-party opinions to obtain financing at better terms. You may want to take a few moments to review the last issue of JETRADER to refresh your memory regarding the first two basic Rules Of Thumb

before you boldly go forth into this second installment, with its three additional Rules. Welcome back!

THE THIRD RULE OF THUMB: LESS AMORTIZATION, LOWER INTEREST RATES AND LONGER LOAN MATURITIES MAKE MORE DEALS VIABLE AND ATTAINABLE:

Simply stated, the difference between the cash inflow generated by your lease and the payment of debt service to your lender represents positive cash flow to your business, whether it is to be reinvested, held in reserve or distributed to the owners. This spread is the basis for your operating liquidity, and often, for your very corporate sustenance. Generally speaking, any proposed deal can be cobbled together if there is 1) an adequate spread between the lease payments and the debt service on the loan, and if there is 2) sufficient lease-end or off-lease residual value to be able to repay the remaining principal balance (as well as any accrued interest) on the loan in full. Obviously, lenders tend to be shy about making loans with little or no amortization, and to depend significantly upon the residual value of the asset at the end of the lease stream to be able to make them whole. There is much trust and much speculation involved. Having said this, the attributes of a wonderful bank loan are 1) a low rate of interest, 2) little or no amortization to increase the debt service drain (outflow), and 3) the longest possible maturity date. These are things worth negotiating for. Some lenders, such as hedge funds and hard-money lenders, will be accommodating in terms of loan structure providing that they are permitted a healthy portion of the proceeds upon the sale or refinancing of the asset.

The essential corollary is this: get the cheapest loan (i.e., with the lowest payment requirements at the front end), even if you have to sacrifice a percentage of the proceeds upon the disposition of the asset at the end of the lease. It is usually better to give up a sizable portion of an uncertain future than to starve for cash flow in the present.

As a final comment on this issue, it is generally politically prudent to make certain that you provide your lender with a debt service ratio of 1.2:1.0 at minimum. This simply means that if you have debt service of \$100,000 monthly, your lender will be delighted to explain to the rest of his colleagues that your monthly lease income is at least \$120,000, proving to them (and beaming with pride) that there is a "locked in" margin of \$20,000 in excess of the amount required to pay the debt service each month. This represents a responsible margin of debt service coverage, and helps your banker, often weary from spending his day making crucial economic judgments, to justify his or her underwriting of the loan to his colleagues and golf partners.

THE FOURTH RULE OF THUMB: RESIDUAL VALUE IS ALWAYS AN "EDUCATED GUESS", BUT IT CAN BE USEFUL IN NEGOTIATING THE TERMS OF FINANCING AND STRUCTURING A DEAL:

As a teenager, I remember being saddened to learn that most American automobiles tended to depreciate in market value by the greatest percentage of their original "new car" cost after the first year of ownership. After that first glorious year, it would seem that the car's market

price would begin to reflect more of its utility than its newness. In fact, purchasing a car which is one-year old is often a very sound economic decision based upon the invariably increased utility-to-cost ratio.

Perhaps even more interesting than this bit of information is that, assuming continued mechanical viability, the percentage of depreciation in its re-market price following its first sale as a pre-owned vehicle actually tends to decline. Looked at from another perspective, this actually represents an increased retention of value. This phenomenon tends to be applicable as well to many well-selected commercial aircraft assets which are high-utility transport models – especially if they are no longer being manufactured, are in limited supply, and especially if the delivery schedule for new models is particularly backlogged while travel demand is on the rise. It is likely that the 20-year old aircraft asset which you purchased from a downsizing airline or fund portfolio manager may indeed be worth a full 50% of what you paid for it five years from now.

Your lender is obsessed with the value of the aircraft asset as saleable collateral to support his extension of credit. If you can make a strong case that the residual value at the maturity of the loan term will be the greatest possible percentage of the initial principal amount of the loan, your lender will generally be more favorably disposed toward reducing the amount of amortization in your payment schedule, thereby giving you the benefit of decreased monthly debt payments and increased cash inflows. The challenge is to convince your lender. Illustration B-1

There are two ways to achieve this, assuming that you carry as much credibility with your lender as my stockbroker does with me (not much). The first is to show your lender a copy of this article and to patiently explain to him that 1) you have purchased the aircraft at a very reasonable price, 2) it has at least fifteen years of good service life left, and that 3) it will very likely be worth 50% of what it cost you (at least!) after five years, which latter term happens to coincide with the loan maturity. The second is to procure an insurance policy from a well-rated insurer which guarantees the residual value of the aircraft collateral as a function of time. Sometimes this type of policy is called residual value insurance with a stipulated loss provision. It may well be worth the premium which you will have to pay in order to make your lender comfortable with two areas of potential risk, one being the possible but unlikely loss of a lessee or lease during the loan term, and the other being the coverage of any balloon of outstanding principal at the end of the loan term. This leads us to the fifth Rule Of Thumb, which should be intuitively obvious.

THE FIFTH RULE OF THUMB: UNRELATED THIRD-PARTY OPINIONS OR GUARANTEES OF PAYMENT OR VALUE ALWAYS CARRY MORE CREDIBILITY THAN YOUR BEST SALES PITCH TO YOUR LENDER:

I did say that it would be intuitively obvious. Do you take the word of the garishly-attired, staccato-speaking used-car salesman about the "superb" mechanical condition of the car which he is trying to sell you in order to honor his massive child support payment obligations? Do you take your occasionally "imprecise" eighth-grader's word for how well he or she is doing in school? Do you go in for major cardiac surgery without obtaining at least a second qualified opinion from another surgeon (perhaps one whose country club membership is not currently up for renewal)?

If you answered any of the preceding questions in the affirmative, you take a very positive view of other people, and I truly envy you. But I wouldn't let you make many important business decisions for me. In sum, a third-party opinion is very helpful, especially if the third-party is reputable within the industry. Even better is a third-party guarantee of payment or value, particularly when it comes from a well-capitalized, established insurer.

Bill Becker
ca. 1950



Test Pilot

Jetrader has carried several very interesting historical articles by Bill Bath during the past three years on commercial and military aircraft and the people involved in their development and operations. Recently, Bill was persuaded to recount some of his own experiences of a like nature in the magazine. Now, believing he had written enough about himself (hopefully he will change his mind on this idea), he hopes to connect others of us with the B-47, B-52, B-707 and other aircraft he previously described in the Jetrader. Bill asked me to write my experiences in flying these and other Boeing products as a production, experimental and instructor test pilot for the Boeing Company in the 1950s and early '60s.

Background, Visibility And Luck

After 2 years in the Army, then engineering education followed by US Air Force training and pilot experiences, I accepted a position as a lowly flight test engineer at Boeing, Seattle in 1953. Within a year I was assigned as project engineer for flight testing the B-52 tail defense system. However, before there were any B-52A's produced which would incorporate this equipment, the older B-47 was chosen as a test-bed for the B-52 tail radar, gun turret and associated electronics. Eventually, the system would be installed, complete and manned in the B-52 tail. But in the B-47 installation, space was limited so the equipment was spread out through the fuselage with only the guns and radar dish in the tail. The electronics and flight test data gear were placed in the nose/navigator station together with the vendor's engineer, and finally, the trigger and radar scope were placed behind the co-pilot's ejection seat. Following takeoff, the co-pilot lowered his seat, tilted forward, swung around 180 degrees, straightened up and became the gunner (all similar to the standard B-47 tail defense system operation...

Hence, as the flight test engineer/gunner, I had to be a licensed pilot and preferably an ex-USAF pilot acceptable to the resident USAF project manager and to Boeing. Regardless of logging B-47 co-pilot time while facing backwards in the cockpit, my flight test pilot time and first jet aircraft time, was just that. You could say that I backed into my future at Boeing, but I was visible, conducted a successful test program and didn't screw up. Lucky too!

Every Small Boy's Dream

At the end of the project, with the tail defense system being installed in all production B-52s, I was offered a position in Boeing production flight test as a co-pilot under Clayton Scott. Scotty, (recently

deceased at the age of 101,) had been Bill Boeing's Senior's personal pilot in the 1930's. He continued flying for the company through WW II and well beyond. We were flying KC-97 tankers out of Renton in the mid-50's, then B-52s out of Boeing Field flown to the acceptance center across the mountains in Moses Lake (Larson AFB).

Again, being visible, correct and lucky, I was asked to cross the aisle in 1957 to the experimental pilot's group under Alvin Melvin Johnston, known then – and – forever – as "Tex" Johnston, Chief of Flight Test. Tex didn't know of any such thing as an experimental test "co-pilot". So, under severe scrutiny and instruction by my seniors and peers, I checked out for the first time as a jet aircraft commander in the left seat of a B-52.

Projects, Schools, Projects

I quickly made my mark on the experimental group by introducing the peanut, butter and jelly sandwich (PB&J) into the otherwise standard B-52's "picnic" box lunches for flights up to 15 hours. While many other food selections fell by the wayside back then, PB&Js outlasted them all in popularity, perhaps still do.

A wag, or perhaps a sage, once said the flight test consisted of hours of boredom occasionally interrupted by minutes of sheer terror. It was. Avoiding the latter to keep our customers from experiencing it was what we were paid for. Even then, we had our tragic flight crew losses at Boeing, like those at most other manufacturers. An example illustrates how a lesson was learned the hard way.

In 1959, the B-52 program had progressed through most of the standard development stages into full production and USAF service. Cold War life in the military didn't restrain the refinement of attack and bombing procedures from evolving over time – for our side and theirs. Sneaking up

BIG Moves



Peter Huijbers has joined the Nordcapital Group, becoming Managing Director of Nordcapital Aviation as of 1 January 2008. He will be based at the company headquarters in Hamburg and responsible for all Nordcapital aviation related activities, basically building it up from new, and will focus initially on putting aircraft in funds using the German KG model.

Prior to joining Nordcapital Aviation, Peter Huijbers worked with Lufthansa Technik AG, which he joined in 1999. For the last seven years he was Director, Key Account Lessors and Banks in the aircraft trading and leasing market segment. Previously he was Director, Product Management and Product Development, and played a key role in developing the aircraft asset management product at Lufthansa Technik.

Early 2005 Peter Huijbers became a Member of the Board of Directors of ISTAT with an assignment until 2009. You have seen Peter as Chairman of the European Conferences in Hamburg (2005) and Monaco (2006), and he is currently chairing the ISTAT Globalization Initiative.

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on the Russians with a single B-52 at 40,000 feet had become more difficult, presenting a larger and vulnerable target for early anti-aircraft missiles. On the other hand, a low approach to pop up and loft the bomb, roll out and run was a method known to fighter bombers at the time; in the eyes of forward-thinking strategic Air Command planners, it seemed worth testing for adoption by the B-47s and B-52s squadrons.

Boeing B-52 project engineers were given the task of proving the aircraft could withstand the stresses on the structure, and if necessary incorporate changes to make it safe for low altitude, high-speed operations under combat conditions. In flight test, a B-52 was heavily instrumented with strain gauges for on-board data collection with oscillographs. Telemetry had by then reached a high level of reliability and accuracy for air-to-ground data transmission. But on-board data were still collected for back-up. Tracking of low altitude, high-speed operations, however, was not possible with telemetry, particularly as our routes covered almost a third of the western USA. Hence, on-board data collection followed by ground analysis of those data was the norm for these flights. Beginning with an indicated Airspeed of 300 knots at altitudes of 200 to 500 feet above the ground, we proceeded in the program with four to six hour flights about half of which were at low altitude. When possible, we would seek out forecast weather conditions of gusty winds or turbulence to induce measurable structural stresses. After two or three flights, we upped the IAS to 350 knots. It was my turn among three or four pilots to fly the last of those before the next jump in airspeed.

We flew to El Paso from Seattle at 40,000 feet, and then descended to an assigned low level route from about San Angelo, Texas, to Grand Island, Nebraska. Approaching Abilene I diverted slightly left to avoid flying over town at 300 feet up, only to roar directly over a turkey farm. The unintended consequences were about 200 dead turkeys and a bill to the USAF of several thousand dollars, which we learned later, was paid quickly to subdue the local citizens. Shortly after, we passed nearly head on a B-47 on a similar mission, and then continued to complete the flight without further incidents. The on-board oscillograph data were delivered to engineering, which by then was a little behind with analysis.

The next flight a day or two later with another crew, was conducted partly over eastern Oregon at 400 knots IAS. In the vicinity of Baker the aft fuselage and empennage of the B-52 separated from the rest of the airframe, which was then spread over the countryside for well over a mile with all of the engines out beyond what was left.

Without belaboring the aftermath about families, funerals, etc., in which I was deeply involved, the importance of on-board data was suddenly harshly illuminated. Needless to say, the data from that last flight were destroyed; analysis of the previous 350 knot data disclosed a sharp rise in stresses and forces on fuselage structure approaching theoretical limits. Had those data been reviewed just a little earlier, the program would have halted test flights while structural changes were incorporated to the test aircraft. Those changes were made in subsequent production aircraft, with appropriate limits placed on earlier B-52s.

The Lesson: Never let the data analysis lag the flight test operation; not for a week, not for a day; not until the previous flight data were seen – period. As late as 1959, when B-47s and B-52s had been in service for up to 10 years and the B-707s were already in service with Pan Am, we were still learning.

Another of my assignments in Boeing flight test included flights to 30,000 feet and above, in a Cessna L-19 Bird Dog, re-engined with a Boeing 502 ground support turbine. After first setting fire to the installation from leaking hydraulic fluid during ground tests, I flew first to a gross-weight-limited 25,000 feet, after which we decided an old WWII electrically heated flight suit would be fashionable and we could get along without the radios to reduce weight. I then flew to about 31,000 feet before running the fuel tanks dry while

still climbing, then coasted back to Boeing field by spinning to 10,000 feet where full-up elevator trim thawed out and longitudinal control was restored.

In 1958, another Tex Johnson law was imposed on me. His experimental pilots should be graduates of a test pilot school; USAF at Edwards AFB, RAF at Hurn in the UK, or Navy at NAS Patuxent River. I chose the Navy since no other Boeing pilot had gone there and Boeing was increasingly interested in participating in Navy programs. Once there in January 1958, I was a distinct curiosity among the Navy and Marine fighter jocks, all 20 of us now students in Class 20. With my few hundred hours of multi-jet time, most of it with 8 engines in B-52s, comments about super-safety bigger is "worse", etc., were common until I checked out in my first single engine fighter, the F9F-6 Cougar a few days later. For me, that really was an exciting, new experience.

We all graduated 6 months later with Lt. Jim Lovell at the head of the class. Lt. Charles "Pete" Conrad and Lt. Wally Shirra added to the distinction of Class "Roaring 20", never to be equaled. All three became astronauts on the Apollo spacecraft, with Conrad being the third human to walk on the moon in 1969; Lovell was the commander of Apollo 13, 1970, on its near catastrophic journey to the moon when an oxygen tank exploded. Shirra was one of Tom Wolfe's *The Right Stuff* about the original Mercury 7 astronauts; he flew the Mercury; the first space walker in the Gemini and made the Apollo initial flights; he was the only astronaut to fly all three of America's first space craft.

Tex called me home instead of allowing me to go to NAS Pensacola for carrier qualification which would have been frosting on the cake for an old USAF pilot. Instead, I spent the next year and a half as pilot advisor for the new Boeing Dyna-Soar space plane program, which was eventually cancelled. So, while my school classmates went on to become real astronauts, I became Boeing's "virtual astronaut" until replaced by NASA's Neil Armstrong and two other rocket powered X-15 pilots from USAF. But I had experienced a post-graduate education in theoretical space flight which I have never regretted. The lessons continued with more to come in flight test, marketing, management, hand gliding and aircraft appraisals with certification as an ISTAT Senior Appraiser.

A CAUTIONARY NOTE:

These Rules Of Thumb, at best, can serve to make your decision making process a bit better-organized, as well as faster and easier. At worst, this brief article will get you to look at prospective investments and their financing in a completely different light. Good luck.

Illustration B-1: Varying Residual/ Resale Value Assumptions Comparison Matrix

Assumptions:

1. The cost of the aircraft is \$12,000,000
2. The subject lease is fully amortize (at 120%, a 1.2:1.0 debt service ratio)
3. Each lease in the comparison has a term of 60 months
4. In Column C, the aircraft asset is purchased with only equity
5. In Column D, the aircraft asset is purchased using only debt (e.g., 100% leverage)

A Residual/ Resale Value at Lease-End **B** Residual/ Resale Value as a Percentage of Purchase Cost **C** Minimum Monthly Lease Payment (Revenue) Required (Without Interest) **D** Minimum Monthly Lease Payment (Revenue) Required (at 12% Interest)

A	B	C	D
\$9,000,000	75.00%	\$60,000.00	\$80,000.00
\$8,000,000	66.67%	\$80,000.00	\$107,000.00
\$6,000,000	50.00%	\$120,000.00	\$160,000.00
\$5,000,000	41.67%	\$140,000.00	\$187,000.00
\$4,000,000	33.33%	\$160,000.00	\$213,000.00

Illustration B-2: A Sample Lease Matrix, With Financing Assumptions

1. The acquisition price is as set forth in Illustration B-1, above;
2. A residual/resale value is 41.67%, as set forth in Illustration B-1, above
3. An interest rate is assumed at 12% per annum (with a 5-year amortization period)

A %Equity Cost **B** % Debt Cost **C** Equity Lease Payment Investor/s
D Debt Lease Payment Lender/s **E** Total Monthly Lease Payment

A	B	C	D	E
100%	0.00%	\$140,000	\$0.00	\$140,000
90%	10%	\$126,000	\$18,700	\$144,700.00
80%	20%	\$112,000	\$37,400	\$149,400
60%	40%	\$84,000	\$74,800	\$158,800
50%	50%	\$70,000	\$93,500	\$163,500
25%	75%	\$35,000	\$140,250	\$175,250
20%	80%	\$28,000	\$149,600	\$177,600
10%	90%	\$14,000	\$168,300	\$182,300
0.00%	100%	\$0.00	\$187,000	\$187,000

ISTAT member Douglas Castle is the Director of Strategic Planning and Programs for Mojave Jet Group, L.L.C. of Beverly Hills, California (www.MojaveJet.com). He may be contacted at dcastle@mojavejet.com.



J: Riding bicycles are not an option.

SV: Not from London to Paris. When the European ministers wanted to sign the Basel Protocol on emissions they all climbed into their private jets and flew from Brussels to Innsbruck burning tons of carbon. The Dutch and the UK are imposing taxes on tickets already. The problem is that the taxes are indiscriminate. A company such as Ryan Air which has very new and fuel efficient aircraft and with high load factors is penalized compared to Air Italia which has old gas guzzling MDs and fly them with a load factor in the 20s. The right way to tax airlines is to charge the airlines that have old equipment and low load factors and reward the Ryan Airs for their efforts. We really should not penalize but actively sponsor efficiency. This brings us back to the Euro Control discussion. The way airplanes are routed is very inefficient. If you could make a single European sky with one controlling authority and direct flights between locations you could save 10% on fuel efficiency.

J: What will be the financing structure of your new fleet?

SV: As you know Domhnal Slattery is pretty well versed in this area. Right now we are financing the aircraft ourselves and plan to have that all in place when we start accepting the Phenom 100. Ultimately we will fly the aircraft for a few years and then sell them out and acquire new ones so that we can maintain a relatively young fleet.

J: Do you have Euro/Dollar FX risk and how do you manage that exposure?

SV: Most of what we do is in Euros that is true. The aircraft are in dollars and that is part of the ongoing negotiations we are having right now. We are now trying to negotiate the maintenance agreements in Euros to eliminate the risk exposure to FX fluctuations.

J: The ISTAT Foundation is always looking for new sources to place interns. Would there be opening in Jet Bird if we find good candidates?

SV: I would love that. I have always worked with Interns and they are a pleasure to deal with. We get young people full of new Ideas and I would love to work with them. Have them call me.

J: Thanks Stefan. What role do you see ISTAT playing for you and your industry?

SV: It is an important platform for exchanging views and ideas and meeting the right people who have outsized influence on this industry. This is one of the key forums for us.

J: What short term difficulties do you see for the aviation industry.

SV: Political changes and opinions. As part of ELFA, we have been spending so much energy debating, that's the nice word for it, with the European Commission. Politicians are nice people but they do some very strange things. And they are rarely supportive of the industry and many times they are counter productive. Especially on the environment we could see some very mysterious decisions that could have profound impact on our industry.

J: Thank you Stefan for your time.

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