NEWSLETTER

WE STARTED THE LAST ISSUE WITH *THE FOREPLAY IS OVER . . . . THE CRITICS HAVE BEEN BANISHED THRU THE NPRM PROCESS. NOW WE ARE ALMOST READY TO FLY THE WORLD'S LARGEST PLASTIC AIRPLANE. IT ONLY TOOK 669 DAYS FROM ROLL-OUT TO WHERE WE ARE, SO LET'S GET WITH IT. LET THE GAMES BEGIN!* . . . . TODAY WE ARE APPROACHING THE SECOND ANNIVERSARY OF THE ROLL OUT, AND THE MANUFACTURER HASN'T ANNOUNCED WHEN HE IS GOING TO ANNOUNCE *THE NEXT ANNOUNCEMENT* OF THE FIRST FLIGHT. IN THE MEANWHILE ANOTHER "BLENDED" AIRPLANE (THE AIR FRANCE AIRBUS A-330) HAS CRASHED AND THE ONLY PHYSICAL EVIDENCE IS *A PIECE OF TAIL.* WE WILL COMMENT ON THAT IN THIS ISSUE . . . . *JIM*

Often the largest *intact component* of an aircraft acccident, the vertical stabilizer which supprts the rudder used in turning - yaw control, would be an ideal location for the Flight Data and Cockpit Voice Recorder. They've demostrated their floatability and they are easy to find!

"Investigators today said they have determined that the aircraft did not break up in mid-air, and did not transmit a distress message. The current search effort will be abandoned on 10 July and a second phase, using different techniques, will start after 14 July."

One of our readers, a A330 rated pilot who is active in A330 training and engineering flying, told us that he reviewed the conditions at the time of the accident. "The aircraft was cruising at FL310 and he announced his intention to go to FL370. He appeared to 'run out of power' and couldn't get any higher than FL344. At that altitude he was within a few knots of stalling . . the slightest gust - updraft - could upset him, and with or without operating airspeed indicators he was in for an interesting descent. The fin could have failed at anytime on the trip down!" See http://www.flightglobal.com/articles/2009/07/02/329159/air-france-a330-did-not-break-up-in-mid-air-investigators.html.

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THE IMPOSSIBLE DREAM

In the musical "Man of La Mancha" -Don Quixote explains his quest and the reasons behind it ... in doing so, he captures the essence of the play and its philosophical underpinnings.

To dream ... the impossible dream ...
To fight ... the unbeatable foe ...
To bear ... with unbearable sorrow ...
To run ... where the brave dare not go ...
To right ... the unrightable wrong ...
To love ... pure and chaste from afar ...
To try ... when your arms are too weary ...
To reach ... the unreachable star ...

This is my quest, to follow that star ...
No matter how hopeless, no matter how far ...
To fight for the right, without question or pause ...
To be willing to march into Hell, for a Heavenly cause ...

And I know if I'll only be true, to this glorious quest,
That my heart will lie will lie peaceful and calm, when I'm laid to my rest ...
And the world will be better for this:
That one man, scorned and covered with scars,
Still strove, with his last ounce of courage,
To reach ... the unreachable star ...

A new aviation book, *The Impossible Dream* by Hans Van der Zanden, arrived unannounced on my iPhone the other day. It captured my interest immediately . . . I turned my phone to landscape mode and didn't stop reading until I got to page 80 (out of 281). Before I start on *the book* let's take a minute to review *Don Quixote.*

Sherry, keeps our large dictionary open 24/7. I asked her who wrote Don Quixote? Thinking she'd google it . . , she dove into the dictionary which revealed . . . Quixote – [after Don Quixote de la Mancha, chivalrous hero of the satiric novel Don Quixote de la Mancha (1605, 1615) by Miguel de Cervantes Saavedra 1616 Spanish novelist] –

And I like this one . . ..
A Quixotic person – **idealistic and utterly impractical; esp: marked by rash lofty romantic ideas or chivalrous action doomed to fail** <as in a restoration of medieval knighthood.--.Or *"A PLASTIC AIRPLANE"!*

The book (A Draft Copy) is a PDF document that can be searched or cut and pasted into another document as I'm doing here.

CONTENTS

You can down load it at he address noted at the end of this NEWSLETTER.
Before you do let's take a look at the Press Release.

AN IMPOSSIBLE DREAM

An impossible dream deals with the development of all-composite aircraft from the materials' perspective - the draft text has been published as free download for comment at lonelyscientist.com.

Summary

Boeing and Airbus have engaged themselves with large-scale application of composites in an attempt to save on weight. The Dreamliner 787 and the A350 are more than 50% out of composite by weight or some 80% by volume – probably the maximum that can be attained. The A380 is some 22% out of composites and the A400M is designed with composite wings. With all composite aircraft the principal aims are to save on weight and hence on fuel, to make manufacturing easier and hence cheaper, to succeed with less inspection and less maintenance and hence lower operation costs and to improve on flying experience. Large-scale application proved to be much more complicated than expected. As engineers at Airbus and Boeing now know, demonstrating that composites are lighter and stronger is not the same as demonstrating that lighter civil aircraft can be built with composites. With all composite civil aircraft - the new trend in aviation - the principal aims are to save on weight and hence on fuel, to make manufacturing easier and hence cheaper, to succeed with less inspection and less maintenance and hence lower operation costs and to improve on flying experience. So far, composites have led to serious problems with design and manufacturing, resulting in very long delays, huge costs overruns and large overweight. With the A380 development faced a 2 year delay, the plane is 5,500 kg (~12,125 lbs) overweight and ramping up is causing further delay - the A400M is delayed indefinitely and is 12,000 kg (~26,450 lbs) overweight - the 787 is already delayed by more than two years and gained some 21.050 lbs (~9,550 kg) overweight since firm configuration in 2005 - the A350 is still at the drawing board but reported to be to be still 8,000 kg (~17,600 lbs) overweight. Total costs for development - for these planesoriginally estimated at some 50 billion - reached $ 75 billion plus by 2009 and the companies have to deal with some $65 billion late and lost revenues and this will only get worse - the A380, A400M, 787 and A350 face an uncertain future.

Safety issues

Composites have low damage tolerance and special measures have tobe taken to try to compensate for these shortcomings, such at the expense of considerable weight. It can be argued that with all composite aircraft in the end 'similar safety means similar weight' when compared with aluminum aircraft – but even at equal weight all-composite aircraft will never reach the safety standards achieved with traditional aluminum aircraft. There is not much that can be done to improve on composite's famously low impact performance - with all composite aircraft the windows provide better impact performance than the plastic skin that gets easily damaged because aircraft are prone to impact through accidental collision with ground handling

equipment, tool damage, de-icer impact, moisture and rain, sand storm, runway debris, engine thrown debris, blade loss and rotor burst, hail stone, lightning strike shock wave, bird strike, meteorites, hard landing, busted tire debris and wheel threats – and even when walked on by mechanics and inspectors. Inspection is extremely complicated as is repair. Composites have also poor lightning strike resistance. Composites are insulators that do not readily conduct away the electrical currents when hit by lightning strike - contrary to traditional aircraft where some 50 tonnes of aluminum and other etals provide a perfect Faraday cage and enough metal for electromagnetic shielding of the electrical and electronic circuits. With all composite aircraft a couple of hundred pounds of copper and aluminium mesh that are inserted between the outer plies of the composite are supposed to provide a Faraday cage. Moreover, the 787 is a first more electrical plane stuffed with electrical and electronic equipment - all very sensitive - but there is only limited metal available for shielding and grounding. Boeing has tried desperately to provide the 787 with lighting strike protection similar to aluminium aircraft but failed. FAA now agreed to relax the specifications - aluminium aircraft are no longer benchmark. As a last line of defence the fuel tanks are provided withan inerting system that keeps the space above the fuel filled with nitrogen to hinder explosion. Although compulsory, inerting is seen by FAA as an enhancement to safety and not as an essential element of layered safety. This means that only one inerting system has to be installed - no back up system is required. Moreover, FAA allows for that lone system to be inoperative in case of malfunction for 10 days awaiting repair, allows that only the heated wing tanks have to be inerted and allows for maximum 12% oxygen in thetank instead of 9% that is generally deemed necessary to guarantee effective inerting.

An all-composite aircraft counters heavy turbulence during a storm when struck by large 50 mm hailstones. Several high tech titanium skin fasteners get damaged at a critical location near to a fuel tank together with it the copper foil surrounding these fasteners, creating exactly the non-conductive path and gap that were tried so desperately to avoid. Adding Murphy's Law, the inerting system malfunctioned already for some days and was to be fixed in three days - no nitrogen ullage. Then lighting strikes. No window of opportunity to avoid disaster, whatever damage tolerance methodology in place. That's the way real accidents do happen.

All composite aircraft are expected to provide much lower crashworthiness. In case the aircraft catches fire the composites adds effectively large quantities of fuel to the flames. With traditional aircraft it takes only minutes to knock down the exterior fire and some 10 to 15 minutes to extinguish the interior fire. When an all-composite B-2 bomber recently crashed the aircraft burned for 4 to 6 hours and smouldering and intermittent flaming continued for approximately 24-48 hours. Some 83,000 gallons of water were needed where a traditional aircraft would require typically some 10,000 gallons. Moreover, when the epoxy burns away, carbon fibres become exposed and subsequent oxidation leads to break up of the fibre and the release of large amounts of hazardous respirable fibrils. Research in this field that focuses on such materials as asbestos and glass fibre suggests that also respirable carbon fibres may lead to

pathological effects such as pulmonary fibrosis that can cause mesothelioma and asbestosis and increase the risk of long cancer. ***With traditional aluminium aircraft epoxy composites have been abandoned from the cabin interior - with all-composite aircraft the cabin is now completelysurrounded with just such composites, that are also used for the wings, fuel tanks and much more. Crashworthiness has to be awaited but is expected to be much less than with aluminum aircraft. Don't count on the ullage inerting system with a crash - when it cannot hinder the plane to catch fire or a fuel tank to explode. How to escape from a partly crumbled environment with sharp edged broken composite panels, hot softened plastic sticking to skin, hands and clothes, surrounded by thick combustion gases, soot particles and high concentrations of carbon dust that cause clogging of the lungs, choking and extreme eye irritation. The ones who manage to escape 'unhurt' might face long-term health problems - even cancer - because of inhalation of contaminated micro fibrils. Worth considering to provide passengers and crew next to oxygen mask and life vest also with a protective respirator gas mask and suitable gloves - or at least inform the passengers of the dangers of the composites surrounding them during the safety instruction before take off.***

The Dreamliner One that rolled out July 8 2007 was a hollow shell held together by temporary clamps, clips and fasteners - the Dreamliner One rolled out on May 3 2009 is still held together by numerous wrongly placed temporary fasteners and a provisionally strengthened wing box. Largely overweight Boeing already concedes that the first Dreamliners to be delivered to clients will also be substantial overweight - from plane 20 lower weight is promised, but will not be attained. NOTE - The *promised changes* after plane 20 may be a factor in the recent cancellation of the first flight (unless Boeing wants two models - HEAVY and LITE!)

Composed aircraft

The A380, one of the most amazing developments in aviation history, has set the trend for composed civil aircraft that will further develop - the next generation of aircraft - with hybrid structures composed partly out of traditional and modern metal alloys and partly out of composites. In particular aluminium reinforced composites that are already successfully applied for the roof of the fuselage of the A380 and presents a superior alternative for plain composites and monolithic aluminum. Aluminum reinforced composites combine the advantages of aluminium and glass fibre composites and cancel out the disadvantages experienced with plain composites - and provide unique properties that cannot be obtained with the materials on their own, including very good damage tolerance. Boeing and Airbus are urged to join forces and focus their last recourses on composed aircraft - others are waiting in the sidelines.

TO DOWNLOAD THE BOOK . . ..

Yours in Safety,

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