TRANSPORT AIRCRAFT TECHNICAL SERVICES COMPANY, INC.

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LIFE WAS SUPPOSED TO BE SIMPLER WHEN WE RELOCATED TO CALIFORNIA BUT . . . . . our current work load interferes with the timely writing of the NEWSLETTER! We will try to do better – we have some interesting aviation events in the near future.

CURRENT STATUS & OUR QUESTIONS RE THE B787 . . . According to today's Wall Street Journal . . . . ***Boeing on Track to Deliver 787 Plane in First Quarter.*** The article was based on a Boeing Conference Call earlier today[1]. Another publication stated . . . . ***The hour-long call was marked largely by the lack of specifics, either in the presentation or the questions from analysts or the media . . . . the call was disappointing.***

AT THE TOP OF OUR LIST OF QUESTIONS WE ASK . . . . IF THE AVERAGE DAYS BETWEEN ROLL OUT AND FIRST FLIGHT OF BOEING JET TRANSPORTS HAS BEEN 61 DAYS — AND TO CERTIFICATION A TOTAL OF — 349 DAYS[2] HOW DO THEY PLAN ON MAKING ANY CUSTOMER DELIVERIES IN 2008 WHEN THEY SAY *"POWER ON IS TARGETED AROUND THE END OF JANUARY"!* This (power on) will lead to problems/questions related to. . . .THE NEW SUBSYSTEMS — HYDRAULICS, PNEUMATICS, ELECTRICAL, FLIGHT CONTROL[3] and AUTOPILOT, to name a few. The earlier Boeing Jet Transports had very similar SUBSYSTEMS. It appears they have decided to clean the shelves of the *nice to have items* and incorporated them on the 787!

NEXT QUESTION PERTAINS TO THE FAA IMPOSED *SPECIAL CONDITIONS* — compliance is required for CERTIFICATION. You can find the SCs by *googling* "FR DOC E7-111153". Former Boeing structures engineer Vince Weldon submitted an 11 page document to the Notice of Proposed Rulemaking (NPRM) for the Proposed Special Conditions. Our comments will be in the January issue.

THE BROKEN AIRBUS A340-600 a.k.a. THE BEACHED WHALE . . . . THE REST OF THE STORY. A colleague "close to the folks at Airbus" told us that one of the engines on the A340-600 that "got away" during ground testing at the factory

[1] December 11
[2] See our August 2007 *NESLETTER.*
[3] The "comfortable ride" they talk about sounds like the ACTIVE AILERONS on the Lockheed Tri-Star's (is The Big Airplane Company borrowing ideas from the Large Software Company in nearby Redmond?).

1020 YATES WAY, STE. 229 – SAN MATEO, CALIFORNIA 94403-1597 -- 650-931-4326
e-mail jim@tatsco.com WEB SITE http:// www.tatsco.com

couldn't be shut down, so it just "laid on the beach with one engine running" until it ran out of fuel on Monday November 19th..

SPEEDNEWS[4] HAVE REFORMATED THEIR *HOME PAGE* — Go to *speednews.com* to see the differences.

THE NBAA REGIONAL MEETING AT KAISERAIR IN OAKLAND LAST MONTH WAS GREAT — 904 ATTENDEES — ALMOST END TO END PRESENTATIONS AND 24 DEMO AIRCRAFT. Our daughter, Beth, a Kaiser Vice President and the company coordinator for the event, was very happy. I ran into some guys I hadn't seen in 30 years. (I began my aviation career as a Marine Reservist aircraft crew chief at Naval Air Station Oakland — our old hangar is now known as Hangar 5 — in 1948 when I was a "little boy" — it was nice to be back.)

THE BOEING 787 . . . . WHEN WILL IT FLY? We lived in El Salvador from 1964 to 1968. We imported a lot of spare parts to use in our Cessna Dealership and we had to use a custom broker to retrieve the parts from customs. We were often told the parts would be available *manana.* When we pressured our broker the next day he would revert to . . . . *¿Ya viene . . . . pero no se cuando?* It appears that is the best answer to the question . . . . **When will the 787 be here . . . .?** ***It's coming . . . . . but we don't know when!*** **We have read in the Wall Street Journal . . . . an estimated first flight in *late spring* to . . . . *no se cuando!***

COMPOSITES . . . . With the 787 still in the holding pattern we have been doing research on composites in general and their use in aircraft construction. Simply stated — Composite materials are a combination of different components or "Two or more dissimilar materials which when combined are stronger than the individual materials."

Composites can be both natural and synthetic (or man-made). The oldest example is a tree — a natural composite: it is a combination of cellulose fiber and lignin. The cellulose fiber provides strength and the lignin is the "glue[5]" that bonds and stabilizes the fiber.

Man made composites can be traced back to the ancient Egyptians who manufactured Adobe bricks — the combination of mud and straw forms a composite that is stronger than either the mud or the straw by itself.

The 12th century Mongols made the advanced weapons of their day with archery bows that were smaller and more powerful than their rivals'. These bows were composites "structures" made by combining cattle tendons, horn, bamboo, and silk which bonded with natural pine resin. The tendons were placed on the tension side of the bow, the bamboo was used as a core, and sheets of horn were laminated to the compression side of the bow. The entire structure was tightly wrapped with silk using the resin adhesive. These 12th century weapons designers certainly understood the principles of

[4] Gil Speed's new e-mail address is . . . . gilspeed@aol.com
[5] Also known as the resin.

composite design. In recent times some of these 700-year old museum pieces were strung and tested. They were about 80% as strong as modern composite bows.

Plywood is a composite — it has been used on wood aircraft for as long as I can remember (too long!). Plywood "gussets[6]" hold wood structure joints together or it could have been the fuselage or wing "skin" — often covered with "dope and fabric" for weather protection. The "dope and fabric" covering used on pre-aluminum aircraft could also be considered a very simple composite[7].

On the commercial or building industry side of life we have — Concrete and steel combined to create structures that are rigid and strong. This is a classic composite material where there is a synergy between materials. In this case, synergy means that the composite (or combination) of materials is stronger and performs better than the individual materials. Concrete is rigid and has good compression strength, while steel has high tensile strength. The result is a structure that is strong in both tension and compression.

Another composite product with which we are all familiar is the rubber tire. A typical car tire is a combination of a rubber compound and reinforcement which has progressed from cotton (the Arizona town of Goodyear was the center of the tire company's cotton farm) to nylon, steel, aramid, or other fibers.

Composite automobiles have been in service since the Chevrolet Corvette was introduced in 1953. Many current production "18 wheelers" are made of composites — to reduce the empty weight and increase the payload.

COMPOSITES IN SPORTS . . . We estimate 95 % of equipment used in sports — both individual and team events — are made from COMPOSITES. Try to identify 5 or 6 sport items that aren't made from a composite — if you name the various "balls" you can do it but even some of them are composites. . . .

WHAT IS THE STRONGEST FEATURE OF THE DREAMLINER? The extensive use of COMPOSITES which will allow for an empty weight of up 20% less[8] than an aluminum aircraft: for example; 20% of the weight of a current production 737NG would be approximately 26,000 pounds — or the weight of 130 passengers weighing 200 pounds each. Lower fuel consumption or increased range will follow.

The second advantage would be less maintenance expense for corrosion protection treatment and repair. Skin cracking should be nil and accidental damage repair should be faster and less expensive because the repairs would be external — bonded in place.

COMPOSITES AND AEROPLANES . . . Composites have been in use since 1903 when the Wright Brothers flew their first aeroplane. "*Two eight-foot diameter propellers pushed (rather than pulled) the airplane forward. They were made of laminated spruce."* Plywood gussets were used in the wing and fuselage structure.

Airborne radar was introduced during World War II. The antenna covers (radomes) were composite honeycomb. Composite communication and navigation radio antennas were introduced about the same time.

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[6] structural member used to stiffen a framework

[7] Dope & Fabric aircraft burn brightly!

[8] Although the manufacturer has stated the first airplane is too heavy.

THE ENTIRE AEROPLANE . . . The late 1930s . . . . Metal shortage in the UK caused some ambitious engineers at DeHavilland and Rolls Royce to develop the twin Roll Royce Merlin engine powered Mosquito. It was a (take your pick) *high-speed day bomber (up to 40,000 feet) — fighter-bomber — night fighter — reconnaissance and it could a fly to Berlin with a full load of bombs and be back in time for an early dinner*. It carried 4,000 pounds of bombs — only 800 pounds less than the four engine B-17 — but with its light weight and fighter aircraft qualities it proved "wooden aircraft (plywood and a balsa wood core)" didn't have to "fade away". 7,781 Mosquitoes were produced by factories in the UK, Canada and Australia.

In this country there was the *Spruce Goose* — the brainchild of *Liberty ship* builder Henry Kaiser (patron of Kaiser Air when it was formed in 1958.) Kaiser hired Howard Hughes to *do the aeronautical engineering.* Only one aircraft was built . . . and it made only one flight — less than a mile. It was made entirely of laminated **birch** and designed to carry up to 750 troops or one Sherman tank. It had six 28 cylinder piston engines (the same as we had on the Pan Am Stratocruisers I flew on in the mid-1950s).

PLASTIC AIRPLANES . . . Several *plastic* light planes had been produced in post war Europe followed by activity in this country in the mid 1960s. DuPont plastic was used for the four place Windecker Eagle (Midland, Texas). Several were built and certified but they didn't enter into mass production or for homebuilt kits, but instead served as test beds for military stealth technology.

THE MORE WE READ THE MORE WE WERE IMPRESSED. We learned we were surrounded by composites and more new uses were being introduced every day.

THEN WE LEARNED THE *STUFF* BURNED, FIRE WITH SMOKE AND TOXIC ELEMENTS[9]! CAN'T BE, I THOUGHT. . . . THE *AUTHORITIES* WOULDN'T ALLOW IT. A RESPONSIBLE MANUFACTURER WOULDN'T PRODUCE SOMETHING THAT IS HARMFUL TO YOU OR YOUR FRIENDS AND FAMILY! WRONG — COME BACK TO US IN JANUARY AND WE WILL CONTINUE TO SHARE OUR FIFTY+ PAGES OF NOTES WITH YOU.

IN THE MEANWHILE SOMEONE, AT THE BIG AIRPLANE COMPANY OR THE *AUTHORITIES* SHOULD CONSIDER USING *FUSELAGE NUMBER 1*[10] AS A FULL SCALE BURN TEST SAMPLE . . . . DON'T FORGET TO OPEN THE DOORS AND EMERGENCY EXITS TO CIRCULATE THE *FST*

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A VERY MERRY CHRISTMAS & A HAPPY NEW YEAR — JIM & SHERRY

[9] The big boys call this *FST!*

[10] The fuselage with all of the *uninstalled parts*.