



The ThunderWord

Thunderbird Field EAA Chapter 1217

November, 2006

Scottsdale, Arizona

PRESIDENT'S CORNER

Greetings from my corner of the hangar. At the October meeting we had the opportunity to share in a great adventure. Sanders Achen put together a presentation on flying his R-44 helicopter from Casa Grande to just shy of the Artic Circle. After the R-44 got to Minneapolis, it was accompanied by four float planes for the journey north into Canada. The floatplanes were part of an aircraft rental program offered by Seaplane Adventures where they provide you with a plane and a guide as well as a well-briefed floatplan for your adventure. By renting their planes you don't need to have the astronomical expense of owning a floatplane as well as being able to use their guides to lead you to the best fly-in resorts and secret fishing spots. Having the helicopter tag along just added entertainment as well as a shuttle to fishing sights that were to remote for the floatplanes.

In an effort to provide information and education to our members as well as entertainment, this month's newsletter has an article on aircraft hardware that you will defiantly want to read.

I hope to see all of you at the November meeting.

Curtis



NOVEMBER MEETING

The November meeting of Thunderbird Field EAA Chapter 1217 will be held on Thursday, November 16th, in the Scottsdale Airport Terminal Building. The time is 7pm. This month's guest speaker will be Chapter 1217 member Tony Holden. Tony is going to give us a program on large-scale model aircraft aerobatics. After seeing the videos and looking at the huge size of these planes you will never fly near an RC airfield again! Remember guests are always welcome!

YOUNG EAGLES AIRLIFT

The Saturday after our October meeting was our annual Young Eagle airlift at the Casa Grande Airport. For the first time in the nine years we have been doing this event we had an overabundance of planes and pilots. The morning started off with a free breakfast for everyone involved that was sponsored by the Boy Scouts, no one went hungry. Chapter 1217 members and friends took 102 kids for rides as well as 16 of the leaders. It only took about two hours and everyone was flown and lots of life long memories were made.

A big thanks to those of you that helped out.



Continued on pg 2

Pilots and their planes:

Terry Peterson	Bonanza
Brian Ryckmen	Cessna 180
Brian Mitchell	Bell 47 helicopter
Terry Emig	Stearman
Tom Weidlich	Stearman
Bill Pabst	Cessna Skymaster
Carl Walburg	Cessna 150
Joe Oniel	Cessna 152
Mike Bergland	Kitfox Vixen
Billy Walker	Bellanca Constellation
Curtis Clark	Piper Cub
Roger Vanderwindt	Cessna 195
Dru Wyeth	Cessna 182
Jim Hudspeth	Cessna 182
Bill Unternaehrer	Super Cub

Hard working groundcrew:

Bill Unternaehrer	Sharri Schellenberger
Chrissie Clark	Brian Briggerman
Rusty Gavagon	Tom Weidlich Jr
Jim Berdick	Bill Prebeles
Cheryl Walker	
and the ramp rats Chance and Calvin.	

In keeping with tradition, a mass flyout invasion of the Hangar Café at Chandler for lunch was the capoff to the day's events.





TRAINING YOUR HARDWARE -- BAD BOLT

Skip Atwell moved to Wisconsin a few years back but he recently sent along this article off the internet.

Maintenance shops get their nuts and bolts from many sources - some of which are OK, some of which may not be OK! Have you ever taken a good look at the nuts and bolts used to put an aircraft together? Have you ever considered that, in many cases, lives may be hanging by a thread? How can we protect ourselves from sub-standard hardware? One way is to educate ourselves about standard hardware so that we can at least make thoughtful determinations as to the integrity and quality of the fasteners we are buying.

Fastener Strength

The strength of mating threads depends upon the depth and length of the thread engagement. The depth of the engagement is based upon the overlap of the threads determined by the major diameter of the bolt thread and the minor diameter of the nut thread. The length of engagement depends upon the thread length that supports the load.

Bolt stress and the transfer of loading through the threads into another component is a complex engineering problem that takes into consideration things such as the elasticity and plasticity of materials. As materials become less plastic due to heat treating and other processes, the need for quality and adherence to dimensions and specifications becomes increasingly critical.

Thread Categories

Threads generally fall into "fit" categories such as Class 1, Class 2, and Class 3. Class 1 is a sloppy fit and is hardly ever used on aircraft. Class 2 is sometimes used on aircraft, but is mostly used in automotive applications. Class 3 is mostly aircraft and, more than any other, approaches a "perfect fit" condition. There is very little tolerance between the high limit of the bolt and the low

HOLIDAY PARTY

The ninth annual Thunderbird Field EAA Chapter 1217 Holiday Party will be held on Saturday, December 16th, from 5pm until dawn. Ron Landon and his wife Sherrie will again host the party at their home in the Arcadia District, 4926 East Weldon. This year's event will feature live music, food, wine, and lots of holiday cheer. Watch for e-mail updates and a personal invitation with a map in December. Everyone is invited, and if you have out-of-town guests bring them along!

HELP WANTED

Chapter member Bill Maxey is now working with Cirrus Aero Accessories Inc. of Tempe Arizona. Cirrus is looking for someone interested in working part time servicing NiCad Aviation Batteries. If you are interested, please call me on my cell phone at 602-820-5722 or call Kevin Wehner at Cirrus, phone number:480-921-0480.

limit of the nut. They fit together, or should fit together, without any "play."

The specifications for most fasteners used on aircraft are generated by the military or large commercial manufacturers. They will be found in the Military Standard (MS), Air Force/Navy (AN), National Aerospace Standard (NAS), or Aerospace Standard (AS) documents. (These can be ordered free for the most part from the Department of the Navy, Publications Center, Tabor Avenue, Philadelphia, PA.)

All Class 3 threads are generated from the basic size of the "maximum material" condition of both the internal and external thread. (The internal thread is described as a Class 3B while the external thread is described as a Class 3A). Small tolerances of a few thousandths of an inch are applied to each. The limits of size of Class 3 threads are exact and must be maintained to ensure the integrity of the joint.

Preload

Fasteners work through a condition termed preload. For a joint to do the job for which it was intended it must be torqued to a proper value. This preloads the assembly and transfers the load to the tightened assembly. Obviously, if the nut comes loose from the bolt, the load will be transferred elsewhere and will cause failure. Incorrect preloading can cause static failure of the fastener, static failure of the joint, vibration loosening of the nut, fatigue failure of the bolt, joint separation, joint slip, etc.

Factors affecting proper preloading include tool accuracy, operator accuracy, external loads, preload relaxation, or the basic quality of the parts! Correct preloading cannot be achieved unless the parts are the right size, are hardened properly and are in good condition. If bolts are soft then they cannot be preloaded to the correct torque, and relaxation of the joint will be even worse.

Out-of-tolerance bolts can have catastrophic effects. What seems ridiculous is that it is

really easy to inspect for hardware imperfections. Only a few elements that can be gauged will tell us what kind of a part we have. We need to know just a little bit about basic thread geometry though.

Thread Geometry

All aircraft threads used in the United States are called "unified" and they all should have a 60-degree "included angle." The outside of the external thread is called the "major diameter" as is the unseen large diameter of the internal thread. The "minor diameter" is the root diameter at the base of the external thread while it is the visible hole in the internal thread. Again, the "pitch diameter" is that distance measured equally between the major and minor diameters. (The pitch diameter indicates the "minimum material" condition of the thread.)

A number of things can produce a thread oversize condition. Should the 60-degree angle vary, an oversize pitch diameter, a warped thread or an imperfect "lead" will occur. On the other hand, an undersize pitch will produce an undersize thread condition. Either is bad because an undersize thread will not preload properly and an oversize thread will not mate with the internal thread flanks properly and therefore will not transfer loads as needed.

For threads to be correct they must meet two criteria: minimum material condition (pitch diameter) and functional size. Functional size is defined as the size which includes the cumulative effect of variations in lead, uniformity of helix, flank angle, taper, straightness and roundness. Pitch diameter is defined as the diameter of the cylinder that passes through the thread profile of either an internal thread product or external screw thread in such a manner as to make the widths of thread ridge and thread groove equal on both sides of the thread and parallel to the axis. The pitch diameter is the measured value of the minimum material limit of size of either an internal or external thread.

If you are using threads that are classified as "J Form" such as a UNJF-3A, you can have further problems! (Most aircraft threads today are J Form by the way.) While the minor diameter of most threads can be either truncated (flattened) or sharp, J Form threads have a radius at the "root" or minor diameter. This radius is 1/16 on a side and was designed into the thread to specifically preclude "preload relaxation" (loosening) of the assembly. Many old style fasteners are floating around out there which were either "surplused" by the military or just could not be sold after the change took place.

Discovering Defects

How can we discover defective parts? There are generally three ways: failure, visually detecting a problem and quantitative measurement of dimensions. Obviously, quantitative measurement is the most desirable of the three.

Unless you want to invest in some \$5,000 worth of inspection equipment, you can try to follow some of these guidelines:

1. Whenever you purchase hardware that is the subject of AN, MS, NAS or AS specifications, ask the seller the origin. If he says that he bought it as military or commercial "surplus," walk away! It is untraceable material and you buy it at your own risk! No bargain is worth a life! If purchasing from a legitimate distributor, ask them to supply a copy of the original manufacturer's invoice. That invoice will contain, or should contain, a "certificate of compliance" on it attesting that the parts were produced properly. You can then contact the manufacturer and request a copy of the material certifications, process certifications, etc., that went into that part. You would be surprised what the manufacturer might give you.
2. Send a letter to the Naval Publications Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099 and get a free copy of thread specification MIL-S-8879. Read it carefully and you will find out all those elements that must be present in a proper

aircraft quality thread. It will tell you about tensile strength values, plating, gauging, dimensional limitations, etc. It will not make an expert thread inspector out of you but it will tell you what to ask the manufacturer or distributor when buying nuts and bolts. (You may be surprised to find that you know more than most of the people with whom you speak!)

3. When you have developed your list of fasteners needed, write again to the Naval Publications Center and request free copies of the standards you are going to use. Again, these will be AN and MS type documents. These are also mostly available on the Internet; Google "MIL-SPECS".
4. Invest in an inexpensive pair of dial calipers. Get someone knowledgeable to show you how to inspect nuts and bolts for basic dimensions. You may be surprised what you can find out with a simple set of calipers!
5. In critical cases you can enlist the services of any reputable inspection company. Many are listed in the phone book under "Inspection Services." I recommend that your wing attach bolts be X-rayed and verified to the specification with respect to hardness and plating before you use or reuse them. This is really an economical inspection at about \$50. In many instances these inspection companies can also perform a thorough thread inspection as well. They will document and certify the results.

Remember that you do not always get what you pay for! If you doubt the integrity of threaded fasteners you are probably correct! Start asking questions. If the seller keeps getting off the track, walk away! No bargain is worth a life!

Thunder Ads

FOR SALE

RV-4 PARTS

RV-4 tail kit, new in box, minimum work done \$650., RV-4 wing parts: leading edge skins, tank skins, tank baffles, and top and bottom wing skins, prepunched, new \$500. Mike 602-862-0699

PROP EXTENSIONS AND OTHER GOODIES

Prop extension, fits small Continental \$150., 0-200 starter \$150., Old cylinders for lamps \$50. each. One man Midget Submarine. \$2,500. Curtis Clark 602 953-2571

KITLOG SOFTWARE COMPANY

The KITLOG software company that provides a web based builder's log is for sale. It would be the perfect business for someone with good computer skills and a desire to travel to Fly-ins. Contact Chapter 1217 member Paul Besing at pbesing@yahoo.com

MISCELLANEOUS ENGINES, PARTS, ETC.

Continental A65 Disassembled, all parts included, needs overhaul, best offer. Franklin 150hp. 500 hours, hasn't been running for years, cylinders have been removed, but are included; best offer. Continental O-145. Encountered prop strike, disassembled and magnafluxed, cases & rods ok, bad camshaft & engine gears. 400 hrs since new Millennium cylinders. \$3,000. Spinner and backplate off Stinson 108. \$165.00. Metal wingtips off a Cessna 170 - undamaged. \$140.00 each. Dave Edmonds, Sharri Shelton's Dad, 209-533-0354

1972 G33 BONANZA

260 hp, 950 since reman engine and new 3-blade prop. King, Garmin 195 GPS, 3-Axis AP, Annual 1/06 \$99,900 obo. 602-441-0093 joseph.hobbs@cox.net

SHEET METAL TOOL KIT & RV-6/8 VIDEOS

REDUCED from \$1,500. to \$1,100. Never used. Cleveland Complete Sheet Metal Airframe Tool Package (I paid \$1670 2 yrs ago); C-Frame Table; Set of 4 "From the Ground Up" RV-8 construction videotapes (cost new \$80); Set of 10 George Orndorff RV-6/8 construction videotapes (cost new over \$200). \$1,100 for everything. Will sell videotapes and tool set individually. Contact Chapter 1217 member Denny Myrick 480-502-0547 or e-mail: dennymyrick@cox.net.

LYCOMING 0-235-C1

673 SMOH, Sky Tec starter, removed from Long Eze for 0-320 upgrade. \$6500. Mark Boram 520-883-0672

SKYBOLT PROJECT

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