EAA Chapter 1373 Newsletter
March 2020

Next Meeting: **Saturday, March 7th, 10:00 AM**
Graham's Hangar, Blake Field, Delta, CO
Speaker: Rick Jones, Retired Navy Pilot/Instructor

Congrats to Lowell and Dee Manary! He built and flew off the 40 hours! It is flight worthy and passenger ready.

Here's Bob Said, our newest honorary lifetime member.

Welcome pilots and friends! Please visit the new website. http://www.eaa1373.org/ Please Contact Us online or at the meeting if you have questions about our chapter or website. Private areas of our website are available only to members of EAA Chapter 1373. The private areas include the member directory, member profiles, and the forums.

If you don't know your password, or have never used it before, just put your email address in the box and click "Forgotten". Your password will be emailed to you.

If you get an error, then we might have the wrong email address for you. Contact the webmaster and include your new address.

Have you visited EAA National's homebuilding page for more inspiration?

http://inspire.eaa.org/category/homebuilding/

Chapter 1373 Annual membership dues for 2020 can be given to Secretary/Treasurer Chuck Clemen at the meeting. Checks payable to EAA Chapter 1373 for $24 or cash (exact change if possible) is appreciated.

FASTENER OPTIONS USING STRUCTURAL ADHESIVES

Jim Barnosky

For me, one of the enjoyable aspects of homebuilding an airplane has been learning about methods, tools, construction techniques and hardware that are not commonly encountered in everyday life.

Everyone in the homebuilt airplane world becomes familiar with using rivets to join two pieces of metal. But there are situations where the use of a rivet is not possible because of access problems, or because riveting can damage softer materials and therefore must be done with greater care to avoid damage to the underlying structure, or for other various reasons.

An example would be riveting a nutplate to a fiberglass, plastic or other non-metallic material. If too much pressure is used to squeeze the rivet, there is a risk of damage to the fiberglass hole that the rivet is placed in, or of the rivet elongating the hole and compressing itself all the way through the fiberglass and failing to join the pieces.

Typically, builders solve this by being extra careful when they squeeze regular rivets (AN-426AD series) into the fiberglass, or by using so-called “soft” rivets (AN-426A series).

Soft rivets take much less pressure to squeeze and are not usually specified for structural applications. Because of this, there is less risk of deforming the structure when they are set. According to the Aircraft Spruce catalog, “A” series “soft rivets” are 1100 alloy aluminum, with a tensile strength of 16,000 psi.

Regular “AD” series rivets are 2117 alloy aluminum treated to T4 condition, with a tensile strength of 38,000psi.

I started thinking about this when I installed the nutplates on the underside of the fiberglass wingtips of my RV-7 project to hold the position light lenses. After match drilling the holes for #6 screws, I became aware that rivetless bonded nutplates were available.

Everyone is familiar with consumer level adhesives like epoxy, and “crazy glue.” Those homebuilders working with composite materials become familiar with even a broader range of adhesives. In addition, there is a whole world of specialty structural adhesives that have been used in the aerospace, military,

nautical and construction industries. Specialty adhesives have been developed to bond metal to metal where welds or other joining methods are not desirable but equivalent strength is required, and also to bond low surface energy materials like certain plastics.

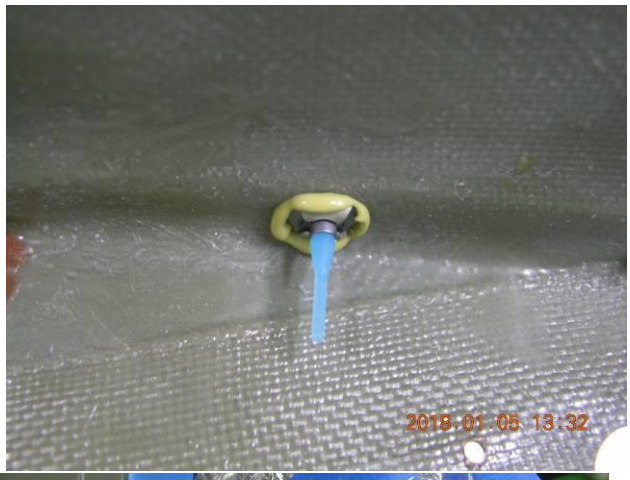
Bonded nutplates and fasteners of various types for aviation applications are manufactured by a company in Nevada called Click Bond. Widely used in commercial aerospace applications, they are also available to homebuilders from Aircraft Spruce and other online vendors. Click Bond nutplates are available in all the standard styles and sizes. They are bonded in place using a specialty structural acrylic adhesive that is similar to, but not quite the same, as the familiar "crazy glue".

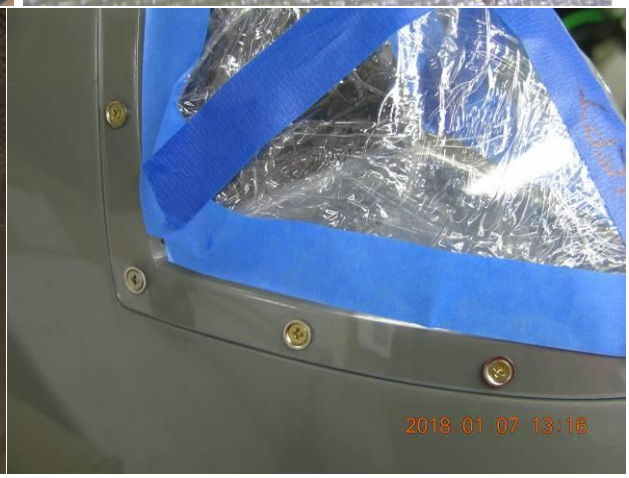
For the chemists among us, here is a digression on the subject of glue. The "crazy glue" we are all familiar with is a cyanoacrylate. Whatever. The important thing is that "crazy glue" instantly bonds a wide variety of materials, and dispenses easily from the familiar container with no premixing of separate components.

The structural acrylic adhesive used for Click Bond nutplates and other specialty applications is a methyl methacrylate adhesive. It cures quickly at room temperature, has full bond strength soon after application, and has superior resistance to shear, peel and impact stress (according to Google!). It is a two part adhesive that requires mixing before use like the two part epoxy that we are all familiar with.

Now, just to emphasize how methyl methacrylate adhesives can be used in critical structural applications, my better half Sue, a career operating room nurse, informs me that she already knew them well but by another name….bone cement. So she wanted to know why I was so excited when I told her I discovered something new. Methyl methacrylate adhesives are commonly used to secure knee, hip and other bone replacements in the medical world. In fact, she says my nutplate glue smells exactly like the bone cement she used to mix up for the orthopedic surgeons in the OR during a joint replacement. And to not disparage the lowly "crazy glue", she also informs me that there is a medical grade version of this used to close incisions.

The Click Bond nutplates I used on my wingtips have a silicone nipple (blue on the #6 size) that is used to secure the nutplate in the correct position while the adhesive sets. Before installation, you insure the surface where it will be bonded is clean, using conventional methods. After mixing the adhesive, you apply it to the nutplate. Then you insert the silicone nipple into the previously drilled screw hole, and pull on it to set the nutplate into position on the backside. The tension between the hole and the slightly oversized silicone nipple holds everything in place with positive pressure while the adhesive cures. The silicone nipple is a calibrated shape designed to "set" the nutplate with the proper "squeezeout" on the adhesive to insure a good bond. After the adhesive is cured, the silicone nipple is easily removed.

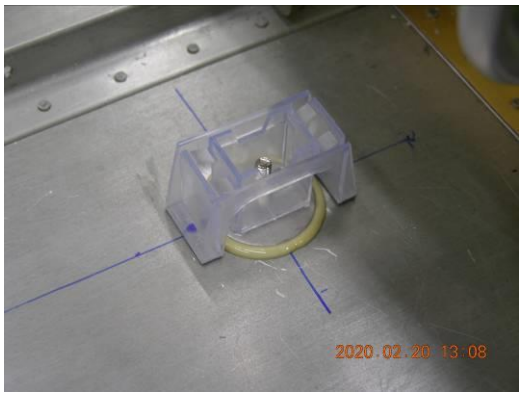


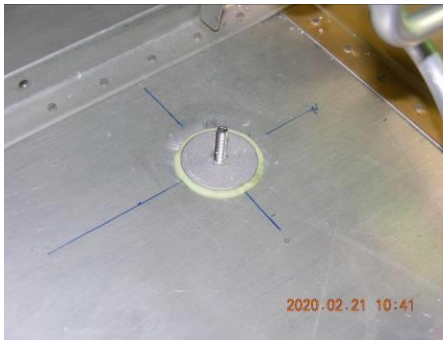



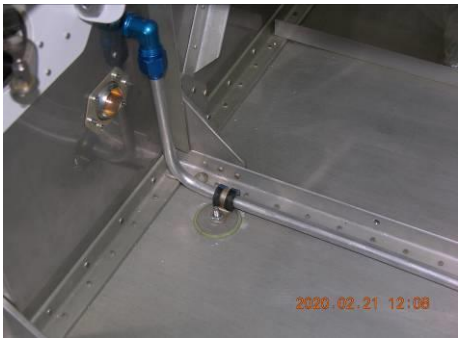
Adhesive bonded fastening solutions come in many versions for different aerospace applications. Other examples are cable tie mounts of varying types, standoffs, and studs.




These are more familiar to builders of composite airframes than they are to those of us building metal airplanes, since on a composite airframe, fasteners routinely need to be bonded in for various purposes. Most recently on my RV-7 project, I was looking for a method to use adel clamps to secure the rigid fuel line from the fuel selector valve to the firewall. The fuel line runs along the fuselage floor from the wing spar area to the firewall. A rivet or bolt in that area would require drilling holes in the exterior skin, which would not make sense for only an adel clamp (to me anyway). Click Bond studs proved to be a good solution. The bases are aluminum, and the stud itself is stainless steel. Weight-wise, they are equivalent to an AN bolt or screw. The studs are available in the standard aviation thread sizes and in varying lengths. They come in a plastic housing that serves the same purpose as the silicone nipple does on the nutplate, to position and secure the stud while the adhesive is curing. After applying the adhesive, the plastic housing is set in place. Double sided tape on the plastic legs holds everything in place. Then the raised plastic tab holding the stud is pressed down to push the stud into position with the correct tension to insure a good bond. After the adhesive cures, the plastic housing is easily removed and discarded.





(Yes I know those are hardware store nuts in the picture above…just a trial fit)

As another digression I will mention the similarity between the ClickBond adhesive dispenser, and the medical bone cement dispenser pictured earlier. Sue also chided me about not using proper sterile technique or latex gloves when applying the adhesive to the fuel line adel clamp studs. I responded by pointing out to her that I am not assembling a space vehicle in a NASA certified clean room.

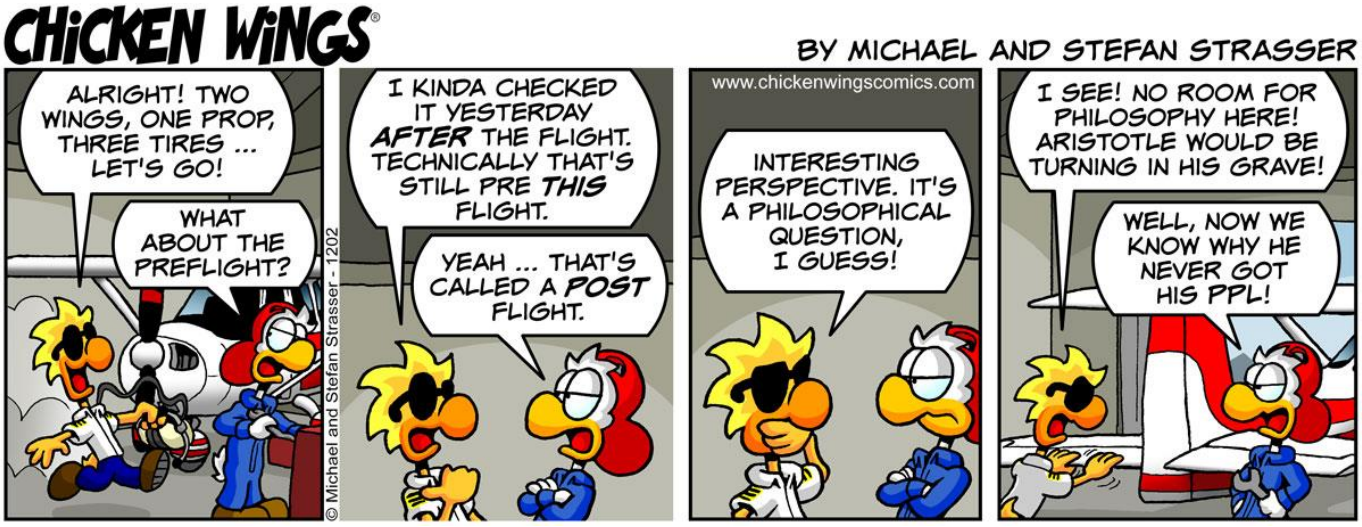
There are some disadvantages to using these bonded fasteners. They can be somewhat difficult to source with only a few vendors available online for small users like airplane homebuilders. Also they are more expensive than standard hardware or nutplates, especially considering shipping charges for small quantities. For that reason, I am leaning toward using conventional riveted nutplates and soft rivets for the fasteners to mount the fiberglass wingtips to the metal wings since there are so many required in that application.

The acrylic adhesive is also more expensive than conventional adhesives and has a shelf life limit much like the Pro Seal we use for fuel tank sealants. The adhesive is available in individual packets for small jobs, but on a per oz basis, those small packets are even more expensive. In my own case, I obtained an adhesive cartridge and applicator because I plan to use a few more Click Bond products as necessary throughout the fuselage to secure wire harnesses with adel clamps or cable ties. The applicator and cartridge automatically dispense the two components in the proper ratio and mix them in the nozzle before the adhesive exits the tip. The applicator itself is not proprietary. It can be used for a wide range of adhesives of varying brands. Applicators and nozzles can be inexpensively purchased on Amazon among other places.

When measured in standard Airplane Monetary Units as compared to other aircraft components, the cost of these specialty fasteners and the adhesive is somewhat more justifiable. And it is for sure compared to the cost of medical bone cement.

In any case, for areas where rivets or conventional hardware cannot be used, the wide range of bonded fasteners offers an ideal alternative.

Remember to “Spring Forward” on Saturday night and always preflight before you fly.



Anyone going to Sun ‘n Fun?

Sun ‘n Fun, Aerospace Expo, March 31 – April 5, 2020 – Lakeland, Florida https://www.flysnf.org/

Anyone looking for hangar space or forming a flying club?

Anyone looking to rent half of my hanger? If your airplane would fit, I would like to chat with you about it. I am out of the state half the year and have my hanger at Blake Field with space available and an airplane that has easily foldable wings.. Troy Ball 970 975 0704

Greg Arehart asked if anyone would be interested in joining him to form a flying club, possibly with an electric motor glider. Anyone interested should call Greg or reply to eaa1373news@gmail.com. All members contact information is available at http://www.eaa1373.org/mems_area_page/

What will be your passion in 2020? Whatever it is, please share it with the Chapter. Send a short update for the newsletter. Send pictures of your project. Give a trip report. Present a topic at a meeting. Invite a new member. Share your love of aviation!

EAA 1373 Newsletter Submissions are Welcome eaa1373news@gmail.com

Thanks to all for your newsletter submissions. We are happy to publish aviation-related pictures, articles and items to buy, sell or give away.

Effective February 1, 2020, Chapter members gladly voted to accept Ray Veatch's proposal to step down as Treasurer so that he can take on the role of Young Eagles Coordinator. Chuck Clemen has agreed to take over the Treasurer role in addition to his duties as Secretary. Thank You Ray for helping our Young Eagles! And Thank You Chuck for taking on additional responsibility!

http://www.eaa1373.org/mems_area_page/off_lead_page/

Chapter Board of Directors and Officers

Office	Names	Term E
President:	Clay Caywood	2021
Vice President:	Alan Collins	2021
Secretary/Treasurer:	Chuck Clemen	2021

Volunteer Leaders

Position	Names
Webmaster:	Alan Collins
Newsletter Editor:	Marc Waterman
Young Eagles Coordinator:	Ray Veatch
Tech Counselors:	Bob Trumpfheller Graham Meyer Lowell Manary