EAA 430 Flyer

Experimental Aircraft Association Chapter 430 Serving Sequim, Port Angeles and the Northern Olympic Peninsula.

Ducks!

Discussing this article with my editorial assistant Ruby. Ruby is Not a Duck.

Well, it's time for the good old' newsletter. Sure has been an exciting month for a lot of folks. Some more exciting than others. We have a big expo happening this weekend. The Puyallup Expo. Down near Thun Field, that's where you would fly into if you were to fly. I hope the weather cooperates. I went last year in the Bill Sheppard's Aero 145. Now that Bill got his medical back I guess I'll have to fly my airplane down. Just so you know the curtesy car from the airport might be full and is at times difficult to get a ride. But you could get a UBER.

This month I wanted to talk about airborne hazards. DUCKS, GEESE, EAGLES AND HAWKS to name a few. One of our local based airplanes got wacked by a pair of mallards the other day. Everyone was alright but the Ducks

This is a Duck. Or used to be…

ahhhh…the airplane suffered substantial damage to both wing leading edges.

It's a good thing it happened as they were over the runway and slowed up for landing.

All the fields are soaked and have standing water in them so be careful.

I've hit my share of birds. I've hit ducks on takeoff before. Hit a Swan at night in the 747 descending into Anchorage. I guess I've hit other birds on take-off that hit the windows and glanced off. Reeve had DC-3's that got wacked thru the cockpit window. Hit the Captain in the face. Reeve had a YS-11 get hit by

Got both wings!

seagulls and hit short of the runway and knocked the gear completely off the airplane.

So, anyone is able to get hit. Watch out.

Look for those ducks adjacent to the runways. If you can't land or think it might be a hazard, land on the other runway or go somewhere else. Just a few ideas. You never know which way a duck is going to go when it's on the ground and is getting airborne. I hit mine when they were landing and I was taking off on floats. I was slow and so were the ducks. I ducked also. The bird didn't damage the airplane but it sure messed up the duck. It hit the prop and bounced off the windscreen.

Now let's talk a little about Eagles. They think they own the sky. Seriously! Eagles DO NOT MOVE! They stay the course. We have Eagles around here also and they tend to go by my cockpit window as a surprise some of the time and sometimes I see them and maneuver to avoid.

Ducks, seagulls, and crows will 95% of the time dive. Do Not try to avoid them. Especially on landing or departure. You are too close to the ground and any evasive maneuver close to the ground is not good in my experience. Do what you want but this advice is one of those that's sound. You want to try something else…be my guest. Remember those Reeve Pilots I talked about previously. The First Officer pushed on the yoke. The Captain was flying. Not cool… Airplane hit short of the runway. The airplane slid to the other end of the runway and almost went into the water at the other end. The gear bounced so high and far it landed next to the terminal's front door. Ya, don't push the nose over close to the ground. Nothing good can happen.

Flocks of starling have brought down too many airliners. And Canada Geese. That's what Sulley hit. An Electra hit starlings in the same area many years ago. Crashed and killed everyone. So, since man has climbed in a plane for flight into the bird's domain we have been hitting birds. If you fly in "The Migratory Fly Ways" during Spring and Fall heed the migratory water fowl warnings on the ATIS, and watch for our feathered friends airborne. Some guys I flew with at Polar hit 26 Snow Geese on let down into JFK. It was at 9000 feet in the dark of night. Yes, Geese fly at night because it's cool. Temperature wise. Not because they like to see the city lights. They don't have transponders either. Many times, ATC controllers on the radar can pick them out. In Anchorage, Alaska the ATC Controllers would give us "weak" targets all the time during the migratory season. It would be huge flocks of geese. Sometimes we could pick them out; most of the time not.

On another note:

If you aren't already doing it you might want to review winter operating procedures in the Pilot Hand Book for your particular aircraft.

Some things to think about:

1. Pre-heat the engine. It pays dividends later on. 40 F degrees and below.

2. Think about the takeoff stopping distance when the runway is cluttered with slush and snow.

3. Use carb heat please. Every engine is susceptible to carb ice. Not just a little bit of carb heat…pull the knob out all the way. I hear it to this day. Oh, it makes the engine run rough. Ha that the ice in the carb melting. It will go away really quick. It's either that or get out the emergency landing checklist. Your choice.

4. Get the ice completely off your wings and flight control surfaces before Take-off. It's an FAR requirement. If you don't you're a test pilot.

5. Clear off the snow from the windows.

6. Be aware that if you take off in a little water/slush and go up in altitude the spray will freeze on the gear and you may have possible locked brakes upon landing.

7. If you land on a runway with deep snow the airplane may flip over. Happens every year.

8. Stopping distances on icy runways is not very impressive.

There's more but the idea is to get you to think about winter flying.

Get out there and enjoy the better performance and smooth clear air and go for a site see around the OP. Happy Safe Flying!…

Mike Radford

In This Issue

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On the Horizon: Calendar of Events

EAA Chapter 430 meets on the last Saturday of the month, in Hangar 10 at Sequim Valley Airport at 10:00 a.m. For directions and additional information about chapter programs, see the chapter website: http://www.eaa430.org

Date	Topic
February 24-25, 2018	Northwest Aviation Conference & Trade Show, Puyallup, WA (no local chapter meeting in February)
Saturday, March 31, 2018 10:00 a.m. Sequim Valley Airport	Monthly chapter meeting. Program will be on **Crash Survival Equipment**. Our speaker will be George Samples, who spent 17 years as an Air Force Survival instructor in Alaska and Washington. Agenda will include: Top 10 items to always have on your person as a pilot, and other nice things to have. George requests each attendee to bring to the meeting their favorite survival item

NRPM on Cessna's

The FAA this month proposed to issue a new airworthiness directive (AD) that would affect certain Cessna 172/182/206/207/210 airplanes. A report of cracks found in the lower area of the forward cabin doorpost bulkhead prompted this notice of proposed rulemaking (NPRM). This condition is determined to be the result of metal fatigue. If not addressed, it could lead to failure of the wing in operation, which could result in loss of control.

The AD would require repetitive inspection of this area for cracks and would require owners to make any necessary repairs in accordance with the applicable Cessna service kit. The FAA estimates that this proposed AD affects 14,653 airplanes of U.S. registry. For more details on the inspection and repair requirements of this NPRM, as well as instruction for submitting comments, go to https://go.usa.gov/xnsEA . The comment period closes on March 19, 2018.

Making Metal Behave: How we coax metal aircraft parts into doing what must be done

By Mike Busch, from February 1, 2018 AOPA Pilot

Metal is neat stuff. It's strong, hard, and tough. It's easy to form, work, shape, and machine. It's fireproof and can stand up to high temperatures. But these properties aren't unique to metal.

Ordinary cotton fiber actually has higher tensile strength than the aluminum alloys used to build airplanes, and Kevlar is stronger than even high tensile strength steel. Diamond and carbides (artificial diamonds) are harder than the hardest metals. Ceramics can withstand heat that would cause metal to melt. Wood is easy to shape and machine, and aviation-grade Sitka spruce is nearly as strong as aluminum alloy, if the stress is applied with the grain.

What makes metal so useful is that it exhibits all of these properties. You might say that metal is the Cessna Skylane or Piper Dakota of aircraft construction materials—it may not be the best at any particular thing, but it sure does a lot of things well.

Stress/strain, elastic/plastic

What primarily sets metal apart from other materials is how it deforms when a force is applied to it. Metallurgists call the applied force stress and the deformation it causes strain.

If a modest amount of stress is applied to a metal object, it deforms elastically—the object returns to its original shape and size when the stress is removed. This is obvious in the spring steel landing gear leg of a Cessna or the aluminum wing spar of a Boeing, but it's also true of metal parts like bolts and crankshafts, where the deformation is not so obvious.

During elastic deformation, strain is proportional to stress (Hooke's Law), so the stress-strain curve is a straight line. But if the stress is great enough, the crystalline structure of the metal starts to rip apart, and nonlinear things start to happen. This level of stress is called the elastic limit or proportional limit of the metal.

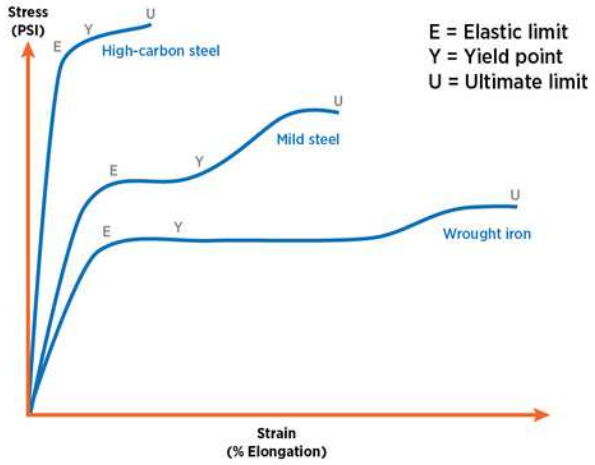
Stress beyond the metal's elastic limit causes plastic deformation—the deformation is permanent even after the stress is removed. This might sound bad, but it's one of metal's most endearing features. Metal's plastic properties are what allow us to bend, stamp, forge, extrude, roll, and otherwise coerce metal into complex shapes. In service, those same plastic properties are what permit an overloaded metal part to bend rather than break, a characteristic known as toughness.

Metal's ability to be elastic under moderate stress and plastic under high stress is what makes it so useful. Nonmetallic materials tend to have very different stress-strain curves. Hard, brittle materials like brick, concrete, and glass react to stress by shattering rather than deforming. Tough materials like rubber, leather, and softwood remain elastic all the way to rupture, and can't be cold-worked into a desired shape the way metal can.

Soft, hard, and tough

The simplest elemental metals such as iron and aluminum and copper are relatively soft and ductile. Their elastic limit is relatively low, so it doesn't take much force to deform them permanently. Where higher strength is required, the elemental metal is usually alloyed by adding a relatively small amount of one or more additional elements that strengthen the metal.

It doesn't take much. Adding just a few percent (by weight) of carbon turns soft iron into high carbon steel with 10 times the tensile strength. Adding about 4 percent copper to commercially pure aluminum creates 2024 aluminum alloy (the most common one used in aircraft) that's more than four times as strong. These alloying elements work their magic by invading the crystalline structure of the metal in a way that makes the resulting lattice of atoms much denser and harder to dislodge.



The graph above shows what happens to the stress-strain curve of iron when carbon is added to form steel. Notice how the linear portion of the curve gets much steeper, indicating that steel is much harder than iron—it can handle much greater stress without permanent deformation, and a given amount of stress causes far less strain.

But also notice that as more carbon is added to create high carbon steel, the well-defined "knee" at the yield point that is seen in iron and mild steel tends to disappear. This means that high carbon steel is more prone to sudden failure without warning—it's more brittle and can't bend much before it breaks.

In some applications—such as cylinder barrels, crankshaft journals, cam lobes, and tappets—hardness is all-important for maximum service life. In other cases—wing spars and landing gear legs, for example—toughness (the ability to bend without breaking) is crucial. Metallurgists spend a lot of their time coming up with the optimal tradeoff between hardness and toughness for each metal airplane part.

Iron also can be alloyed with chromium and/or nickel to form various flavors of stainless steel. These generally are not nearly as strong as

carbon steel, but they're much more resistant to heat and corrosion. These chromium and nickel varieties are often used in exhaust systems, heat shields, and firewalls.

Aluminum can also be alloyed with various elements to improve its structural properties. Copper is added to create the 2000-series alloys most commonly found in aircraft structures, providing excellent strength-to-weight ratio and good fatigue resistance. The biggest downside of this alloy is that it is far more vulnerable to corrosion than pure aluminum. Consequently, it is generally protected by an anodized finish or with a thin layer of pure aluminum (Alclad).

Other aluminum alloys used in aircraft include the 6000 series (containing magnesium and silicon) and the 7000 series (containing zinc)—the former is highly corrosion-resistant, while the latter is the strongest of all aluminum alloys.

Heat-treating

The strength, hardness, and toughness of alloys like carbon steels and aluminum-copper alloys can also be profoundly affected by heat-treating. Anyone who has built model airplanes probably is already familiar with this.

What makes metal so useful is that it exhibits all these properties. It may not be the best at any particular thing, but it sure does a lot of things well. Suppose you want to make a spring-steel landing gear for your model out of a length of high carbon steel "piano wire" available at any hobby shop. As it comes from the store, piano wire is springy and tough—perfect for a landing gear—but it's also extremely difficult to bend and form without breaking. The solution most modelers use is to heat the wire with a torch until it becomes a bright cherry red (about 1,400 degrees Fahrenheit), and then let it cool slowly. This is called annealing and transforms the steel wire into a soft, non-springy form that can easily be bent and formed to the desired shape.

Of course, the annealed wire is way too soft to be suitable landing gear material, but that can be easily rectified. Once the gear is bent to shape, the next step is to heat-treat the wire by heating it back up to bright cherry red and then plunging it into a bucket of water. This quenching transforms the wire into a very hard condition. In fact, the heat-treated wire is now so hard that it is quite brittle and would probably snap off in a hard landing.

The final step is to temper the wire back to somewhat reduced hardness to provide the required toughness and springiness. This is done by heating the wire back up to a medium blue color (about 750 degrees F) and allowing it to cool slowly. The final hardness is a function of temperature—the hotter the metal is heated during the tempering process, the softer, tougher, and less brittle it will be.

This same process—annealing, bending, heat-treating, and tempering—is precisely the way spring-steel landing gear legs on production aircraft are made.

How heat-treating works

The physics and chemistry behind heat-treating of carbon steel are complex, but the basic principle is this: At room temperature, the atoms of metallic iron are organized as a crystalline structure known as body-centered cubic. When iron is heated above its critical temperature of about 1,400 degrees F, the structure transforms into face-centered cubic.

Steel is iron with a few percent of carbon mixed in. When steel is heated to the critical temperature and the iron transforms from body-centered cubic to face-centered cubic, the carbon atoms migrate into the central position of the cubes formerly occupied by iron atoms, creating nonmagnetic austenite.

If this austenite is allowed to cool slowly (anneal), iron atoms migrate back into the center of the cubes and force the carbon atoms back out, resulting in a mixture of pure iron (Fe) and iron carbide (Fe3C), which is a soft steel known as pearlite.

n the other hand, if austenite is cooled quickly by quenching it in water or oil, the carbon atoms get trapped inside the crystalline structure to form a very hard, very brittle steel called martensite. This process is called heat-treating, and the result is too brittle for most uses.

The martensite may then be tempered by heating it back up to a temperature well below critical—typically 200 degrees F to 800 degrees F, depending on the final hardness desired. This allows some of the trapped carbon atoms out of their crystalline jail cells, and relieves some of the hardness and brittleness. In this way, varying degrees of hardness and toughness may be achieved. A steel cutting tool needs to be very hard, while a steel landing gear leg needs to be tough and springy.

Aluminum alloys can also be hardened through heat-treating and softened by annealing. The critical temperature is a lot lower (about 800 degrees F), but the principle is the same.

Strain hardening

Another way to harden metal involves pressure. When soft metal is compressed beyond its elastic limit, it becomes harder because the atoms in its crystalline structure are packed together more tightly. This is known as strain hardening or work hardening.

Sheet metal may be strain hardened by passing it between pressure rollers, either when cold (cold-rolling) or hot. The most common sheet metal used in aircraft construction is called “2024-T3 Alclad.” The 2024 refers to the aluminum alloy (approximately 4 percent copper plus small amounts of tin and zinc). The T3 means that the metal is heat-treated and then cold-rolled. The Alclad means it’s then plated on both sides with a very thin layer of commercially pure aluminum to provide corrosion resistance.

Another example of strain hardening is the humble rivet. The AD rivets most commonly used in aircraft construction are made of relatively soft 2017 aluminum alloy. When the rivet is driven with a rivet gun and bucking bar, the alloy is strain-hardened to form a strong joint.

For large parts like pistons, connecting rods, crankshafts, and camshafts, strain hardening often is accomplished by forging, in which a hot metal ingot is pressed into shape in a hydraulic press. Forged parts are stronger than cast parts because the forging process strain hardens the metal as it is being shaped.

Case hardening

Alloying, heat-treating, and strain hardening are all methods of hardening a metal part in its entirety—so-called “through hardening.” Sometimes, it’s desirable to harden only the surface (perhaps just one surface) of a metal part, while leaving the interior tougher and less brittle. Examples include cylinder walls, crankshaft journals, cam lobes, and tappets. The process of hardening only the surface of a part is known as case hardening, and it can be accomplished in two ways: mechanical and chemical.

Mechanical case hardening is commonly accomplished by cold-rolling or shot peening, both of which harden the metal surface by strain hardening. The two most common methods of chemical case hardening are carburizing and nitriding. Carburizing involves baking the part in a carbon monoxide atmosphere, causing additional carbon to be absorbed into the surface and converting a thin outer layer from mild steel to harder and stronger high-carbon steel. Nitriding is similar, but the part is baked in an

atmosphere of ammonia gas (NH3), causing the surface to absorb nitrogen atoms that make their way into the interstitial regions of the iron lattice much as carbon does. Both methods result in extremely hard and durable wear surfaces without embrittling the part's interior.

It's amazing what metal can be coaxed into doing. It's fascinating stuff.

Mike Busch is an A&P/IA

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EAA Chapter 430 Membership Meeting Minutes

Date: January 27,2017
Call to Order 1000_ Location: W28 #10

The meeting was called to order @ 1000 by President Mike Radford with the Pledge of Allegiance to the flag

- Introduction of Guests. 3 guests introduced themselves: Gary Davidson, Dave Goldfein, and Mr Hartman. New guests also included Doug Platton, Steve Wagner, and our guest speaker Dan Gase.
- Approve Minutes:
  - Revisions/Corrections Approved. No corrections
- Chapter Project: (members open forum)
  - Mike Radford returned from Chilliwack, BC in his newly painted and upholstered C180 with new windows and a carbon fiber cowl.
  - Colette Miller said she is almost done with her house on Diamond Point, and can focus on her Sonex project.
  - Dave Stallknecht said that Dennis Toepke is experiencing serious health issues, and Dave is helping to install a 180 hp engine on Dennis' Aeronca Chief. Dave encouraged people to contact Dennis.
- Reports:
  - Correspondence: None
  - Treasurer: Mike said the treasurer's report is in the member's only section of the EAA430 web site.
  - Membership: Bob Hicks said there were 33 members, plus 5 guests signed in for today's meeting.
  - Young Eagle: John Meyers offered 3 2018 dates for YE rallies: May 19 and August 11 at Sequim Valley Airport, and June 16 at Pt Angeles. September 15 will be designated as a rain date. If there are no conflicts, the dates will be finalized at the next board of directors meeting.

  - Merchandise: John Meyers is looking for a volunteer to sell items to benefit the chapter. It would be nice if someone took this on.
  - Programs / Actities: Lee Runion was not present.
- Member Presentations:
  - Keith McMinn said that he has petitioned the FAA for Acrobatic Box airspace over the Pt Angeles Airport from 500' to 4000'. He said the airspace would be activated by NOTAM and there would be a safety observer with radio communications when it is active. Keith explained why the location was selected, and that he expected to hear from the FAA within 60 days.
  - Allen Bernard said that he expects the approval of the Disaster Airlift Response Team (DART) plan from the County in 3 days. He said this is the 5th DART in the country, and the 1st in Washington State. This will be part of the emergency coordination plan, and will provide for local pilots to provide emergency transportation and assistance with access through areas of airspace restrictions. Allen thanked the pilots who had volunteered and received identification badges. He said there is a need for non-pilots to volunteer for the ground crew to assist with aircraft operations and loading. He encouraged spouses, friends, and family to get involved.
  - Wayne Pinger said that he had purchased the AV Sunglasses (with close correction on the bottom) and found them to be less than satisfactory.
  - Bud Davies commended the Young Eagle program. He said a thirteen year old boy was being honored at Rotary Club, and his most excitement was over the two YE flights he had taken, and plans to go again this year.
- Old Business: None
- New Business: None

Next month's meeting will not be held to allow the membership to attend the Northwest Aviation and Trade Show in Puyallup WA on 2/24-25 at the State Fair grounds. (Free parking Admission is $5.00)

- Close of the business meeting at 1035
  - Break – Coffee – conversation
- Resume social meeting for the presentation

Dan Gase was hired by Karen Goschen, Executive Director after the commissioners authorized the position, as a result of the FAA's proposal to reduce the 2022 funding of runway replacement to 3850 x 75 ft. Karen took the lead on working with Congressman Kilmer's office and the National Guard in order to offer extra motivation for the FAA to reconsider their runway length decision. The 5,000' decision is still subject to competing for discretionary funds at the time Through Dan's efforts and Kilmer's intervention to maintain the Olympic Peninsula's disaster relief airport, funding has been returned to the full 5000 feet of runway. Dan was subsequently hired by the Port for planning and to revitalize the airport. He described his efforts to see the best of airports in the Pacific NW and found he liked those that had good signs, a restaurant with airport view, trails and parks, aviation "yard art", and viewing areas.

Dan outlined actions that he has initiated:

- The vacant airport terminal is being renovated as the Airport Aviation Center, and Rite Brothers Aviation will be moving in as soon as March, 2018.
- The North Industrial Park will be renamed as a Business Park, and Dan discussed possible building projects on Port land.
- Responding to questions about the Lincoln Park trees, he said there are 4000 trees and 75 have been removed to allow continued use of the GPS approach at night. The Port has approved a resolution that allows for future tree removal as necessary.
- Aircraft "yard art" will be at the airport when Mel Rudin's donated Velocity fuselage and is put on display.
- There are plans to publish a seaplane lane in Pt Angeles harbor in front of the Red Lion Hotel. Future plans call for docking facilities and fuel service.
- The Port will sponsor a booth at the NW Aviation trade show with cool microfiber eyeglass cleaners with a picture of the airport on them to hand out. EAA430 members were the first to receive them!
- Dan wants to increase Port participation in the biannual "Wings of Freedom". The next event is scheduled for 2019.
- He is also exploring bringing an airshow to the airport.

Dan answered questions about the airport trail system, that no new hangars are planned, but land is available, and the weight limitations of the runway. Everyone seemed to appreciate the presentation and Dan's proposals were warmly received.
The presentation and meeting ended at 1138.

Respectfully,
Ray Ballantyne, Secretary

Note: General Membership meeting minutes are now included in the monthly Newsletter. Minutes of the monthly Board meeting are also available to chapter members via login at the *Members only* page of the chapter website: http://www.eaa430.org

If you are a chapter member and do not yet have a login to the Members page, you can register with your email address to create a login at the website.