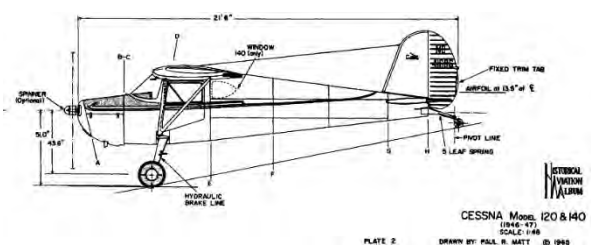
International Cessna 120/140 Association

Issue 422 Spring 2022 Feb/March/April

In this issue



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Marshall Burrows - Ski Flying in Canada

FIYF is my 1947 model 140. I have it based out of Canadian Rockies International Airport (CYXC) and have been searching for skis ever since I bought it. They seem to be either really expensive or really far away, so I was quite excited when my hangar neighbor mentioned his friend in Athabasca had a pair lying around that he was going to toss out.

I quickly contacted the gentlemen and offered to buy, trade or steal them. He graciously suggested an airport nearby I could fly to and told me they were mine for free. I flew out to pick them up and stuffed them in the back of FIYF. They are a matching set of Federal A-1500 skis.

Once home I started a plan to get them mounted to the plane. The skis had been rigged for a Tailorcraft with tapered axles, so I did some internet research and found that machining bushings out of nylatron was the best way to adapt the ski tube to the axle. I am fortunate that I work in industry and finding nylatron and a machinist was easy. The only issue that came up was how much clearance to machine into the bushings.
I wanted them to fit snugly into the ski tubes and slide easily on the axle. On my first try the snug fit in the tube compressed the bushing and made it tight on the axle.
I had the axle hole re-machined and was happy with the result.

While I was asking favors of machinists, I had four washers made that are larger than the tube diameter and a clearance fit on the axle to hold the skis in place.

I would recommend checking your axle as there is an AD requiring hollow steel or solid aluminum axles only be used for ski operations. Hollow aluminum is not permitted.

Next, I turned my attention to the ski bottoms. The skeg that runs down the middle was in rough shape, but the rest of the ski bottoms were good.

Editor's note;

I had to do a search to understand this term "SKEG". Below is a picture that I found on a Supercub forum that show a ¼" aluminum skeg attached on the bottom of a Federal 2000A ski. Snowmobilers know these metal strips as either ski runners, wear bars or skegs. While they do provide for some directional stability and aid in steering a snowmobile, our airplanes get most of their directional stability and steering from the vertical fin and rudder. Whether on snowmobiles or airplanes, skegs also provide wear protection if you were to encounter a patch of thin snow or even bare ground or ice.

Aluminum Skeg on the bottom of a Federal 2000A

Marshall says…

The internet consensus is that UHMW plastic is the ideal ski material, so I ordered in a sheet of 3/16th thick.
I removed the metal skeg, cleaned the base, filled the holes with epoxy and aluma-prepped the bottom.

I removed every second rivet and oversized the hole. I rough cut the UHMW sheet so it was easier to work with, then I started at the front with a bolt hole and draped the UHMW over the ski bottom. I attached weights to the other end and left it in my warm shop for a day. The UHMW doesn't deform much but I think it helped to have it form slightly to the ski. Working in 10 rivet sections I would drill the UHMW, countersink the bottom, and Cleco it in place. Once I had completed drilling a section, I would pull the Clecos and clean any plastic or aluminum from between the UHMW and the ski. I would then re-Cleco and pop rivet it in place.

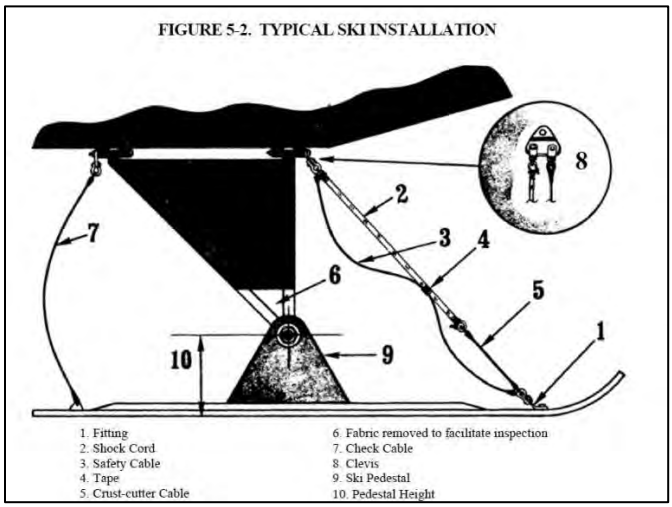
I chose to overhang the UHMW by one and one-half inches as we have fluffy powder and I wanted better floatation. I used a circular saw to cut the final shape of the skis and a rough file to finish the edge. I cut a one-inch strip of UHMW and followed the same procedure to mount it down the middle as a skeg.

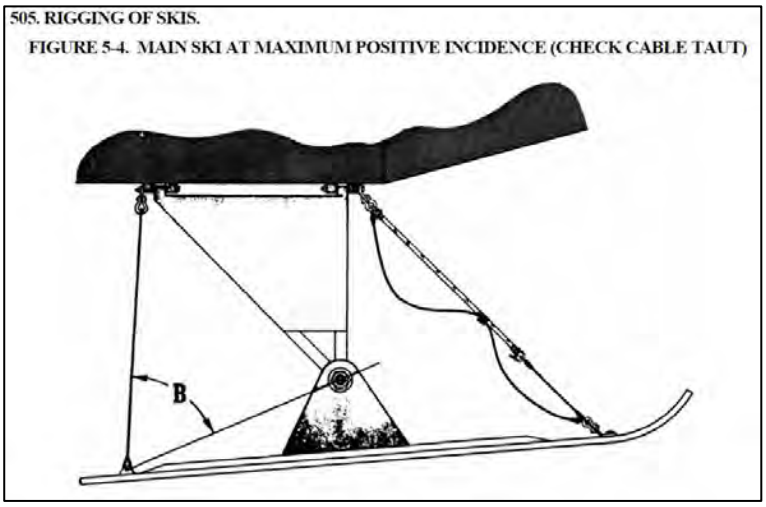
Bare bottoms with the epoxy filler in old skeg holes.

Working with the UHMW sheet plastic.

Attaching the UHMW sheet plastic in place prior to cutting and filing to final size.

With the bottoms complete I turned to rigging. I found AC 43.13-2B to be a very helpful document that specified what size bungee and cable was required and how to rig it appropriately. I was surprised at how long it took to get the rigging right. I Nico-pressed the cable and made several mistakes initially resulting in a lot of wasted cable. I think if I was doing it again, I would buy a roll of cheap cable and bungee and get the lengths right before cutting the mil spec stuff to size.





FAA Advisory Circular AC 43.13-2B ********* FOR REFERENCE ONLY *********

TABLE 5-1. RECOMMENDED MINIMUM CABLE AND SHOCK CORD SIZES

Ski Limit Load Rating (Pounds)	Single Safety Cable	Double Safety Cable	Single Crust-Cutting Cable	Double Crust-Cutting Cable	Single Shock Cord	Double Shock Cord
Less than 1,500	1/8"	1/8"	1/8"	1/8"	1/2"	1/2"
1,500-3,000	5/32"	5/32"	5/32"	5/32"	1/2"	1/2"
3,000-5,000	Do Not Use	5/32"	5/32"	5/32"	Do Not Use	1/2"
5,000-7,000	Do Not Use	5/32"	5/32"	5/32"	3/4"	3/4"
7,000-9,000	Do Not Use	3/16"	Do Not Use	5/32"	Do Not Use	3/4"

My home base is a paved and plowed runway so again I scoured the internet for dolly designs. We can count ourselves as fortunate to have relatively light aircraft, finding dolly wheels that can support at least 500lbs can be a challenge.

One issue that a friend had with his dollies is that the wheel was free floating along the axle and simply cotter pinned at the end. I designed my axle to have a nut that can be used to tighten the wheel bearings onto the axle. While I was building things, I also made brake spacers that fit into the brake calipers and hold the caliper on as well as preventing the piston from moving too far on the inevitable brake application.
By this point free skis have cost me 100 hours of labor.

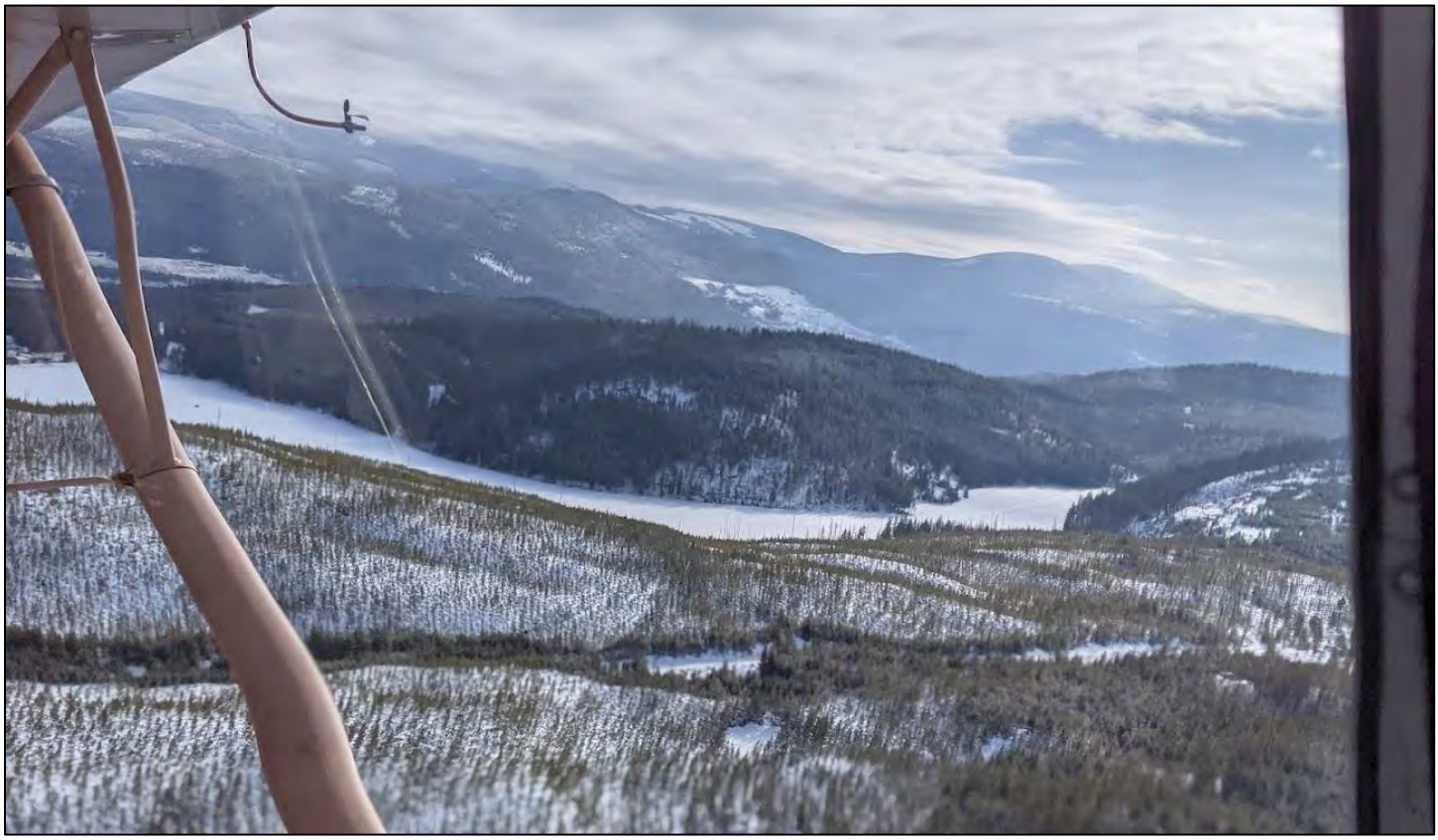
The wheel dollies support the aircraft when the bar is rotated forward, lowering the wheels. Note the extra width provided by the UHMW sheet plastic.

When that day arrived, my dollies worked perfectly as I taxied very slowly to the snow along the runway. I hopped out and pulled the dollies off. I taxied a bit to get the feel of the skis then decided I better stop and inspect everything one last time before takeoff. Everything looked great except when I jumped back in and gave it full power it didn't go anywhere! I had made the mistake everyone had warned me about. Don't stop without creeping ahead to prevent freezing down. I used my dollies to lift my skis and scrape them clean.

My first takeoff was uneventful. I headed to a lake that I had previously checked out and knew to have a good thick ice, no overflow and no windrows. I made several passes packing a runway in the snow and getting a feel for how they handle snow. After several touch and goes I committed to a landing. The conditions were ideal, 6 inches of light snow on top of an inch of icy snow on top of 8 inches of ice.

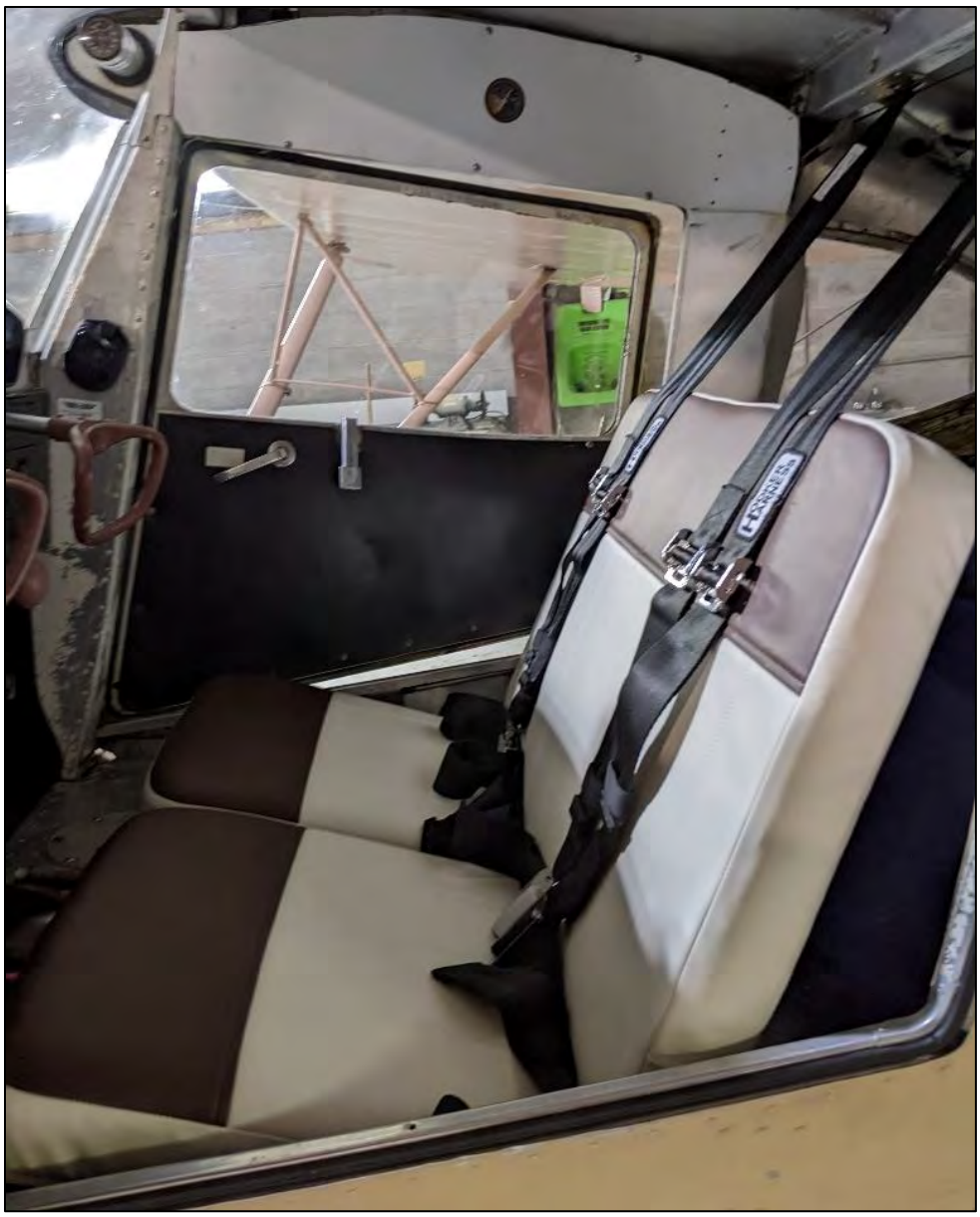
I spent an hour doing laps, high speed taxiing and turning trying to figure out the best way to maneuver.
I learned a few things; I can't turn unless I'm moving forward at least walking pace.
If there is room, turning with the tail up is best. Parking where the snow has been packed and blown away by the prop wash is best for starting back up.

I made several more flights before the snow melted. Some highlights included landing at a lake in a narrow canyon and visiting some ice fishing friends at a remote lake.




C-FIYF


C-FIYF



I had a local guy do the upholstery. As usual it turned out more complicated than I expected. Once the old foam was removed the pilot seat was bent pretty badly.

I straightened it out and reinforced it. I'm pretty happy with the result. Much more comfortable. Got to fly it before 24" of snow fell!

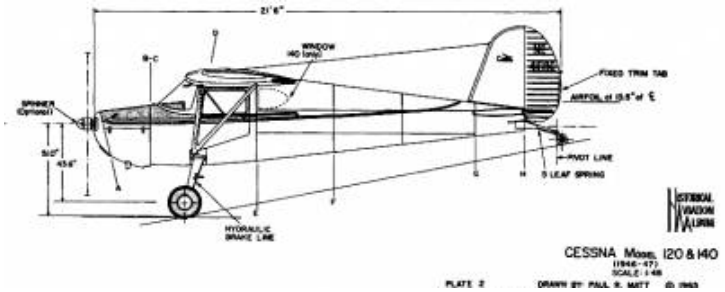
Marshall

International Cessna 120-140 Association

December 2019

2020 Wall Calendar

We are always looking for some good resolution photos for our calendar!!
Please send photos to
calendar@cessna120140.com



Tech Talk …by Christian Vehrs

Non-Destructive Testing (NDT)

Magnetic Particle Inspection

There was one segment of Ken and Lorraine's journey for restoring UNO (the prototype 140A model) that really intrigued me. It was the article in the Fall 2020 issue of our newsletter that documented the "Magnafluxing" of the gear legs prior to installation on the airplane. Below is the photo from that issue.

At the time that issue went to print, I had used a little bit of my *"Editor's license"* to mention that the term *Magnafluxing* was a bit of a slang term that is common in many industries when folks are mentioning Magnetic Particle Testing. *Magnafluxing* comes from the name of one of the dominant companies that manufactures the test equipment – Magnaflux Industries.

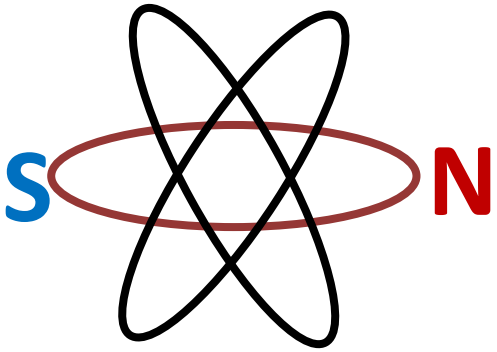
MAGNAFLUX
A Division of Illinois Tool Works Inc.

Some of the products have the term "magnaglo" on their labels – you might have heard that term too.

Magnaflux Industries also manufactures Liquid Dye Penetrant (another form of NDT) under the label "Zyglo". You might have heard someone say that they had their parts "*Zyglo-ed*". We'll clear that up in another installment of Tech Talk.

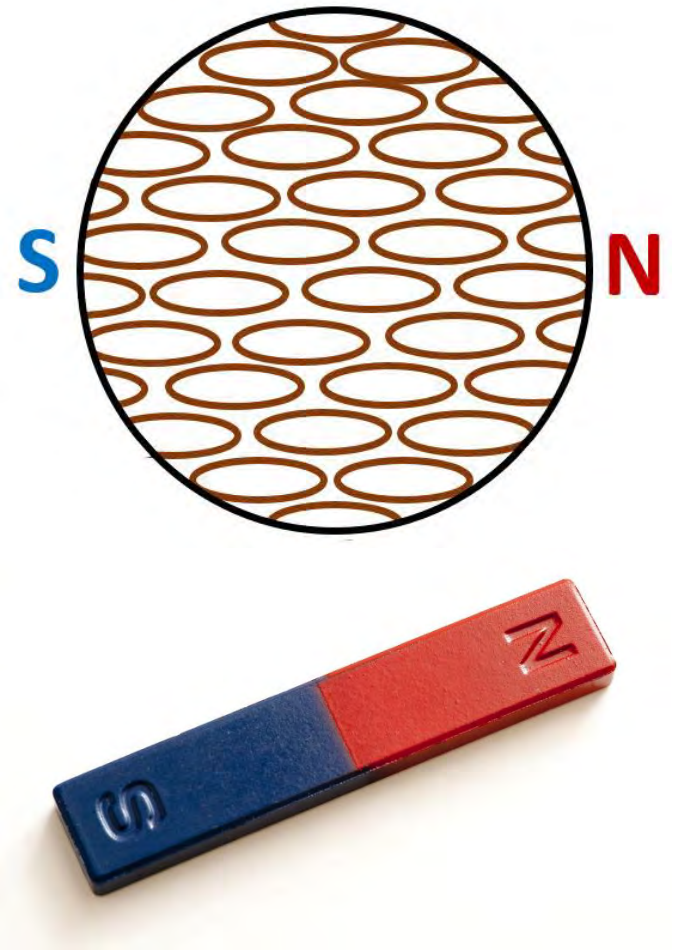
For this issue, I'd like to provide a deeper dive into what Magnetic Particle Testing is all about.

Materials that can be magnetized (ferromagnetic) possess atoms that group into magnetically saturated regions called *Magnetic Domains*. These domains have a positive and negative polarity at opposite ends.



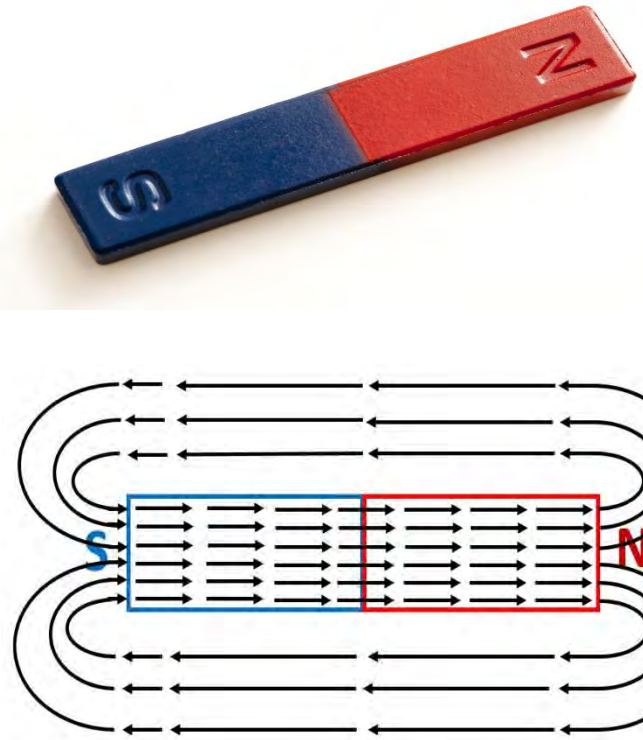
In unmagnetized material, these domains are randomly orientated, resulting in zero net magnetization.

When the material is subjected to a magnetic field, the domains align themselves parallel to the external magnetic field. If the material retains the magnetic alignment, it can now act as a magnet.



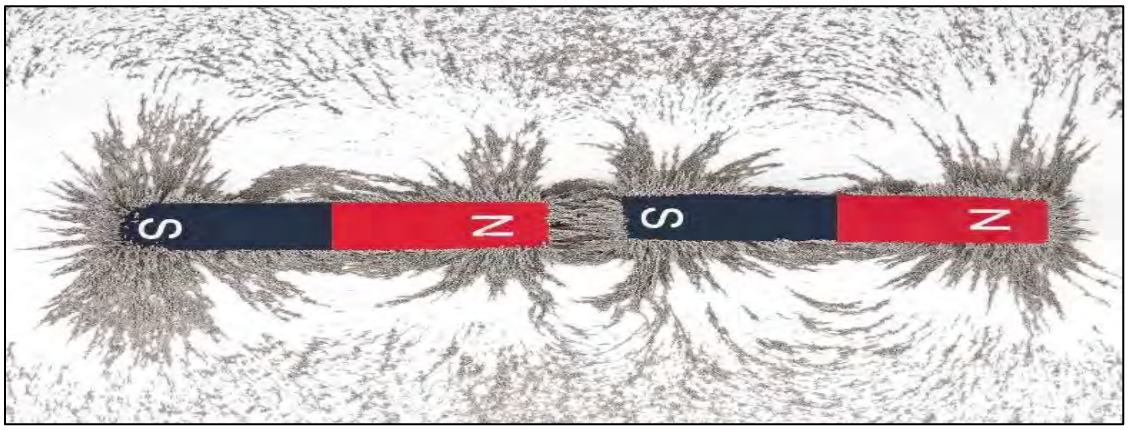
If the material cannot retain the magnetic alignment, or if the material undergoes a demagnetization process, the domains return to their random positioning.

If we create a magnet, then there are magnetic lines of flux constantly flowing in the magnet. The lines of magnetic flux exit at one pole and return to the opposite pole.

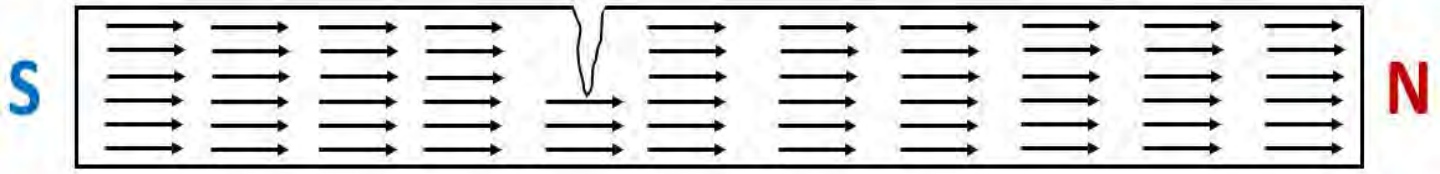


The poles (or flux leakage) are what cause the attraction properties that we can feel when we hold a magnet close to another magnet or a ferromagnetic object.

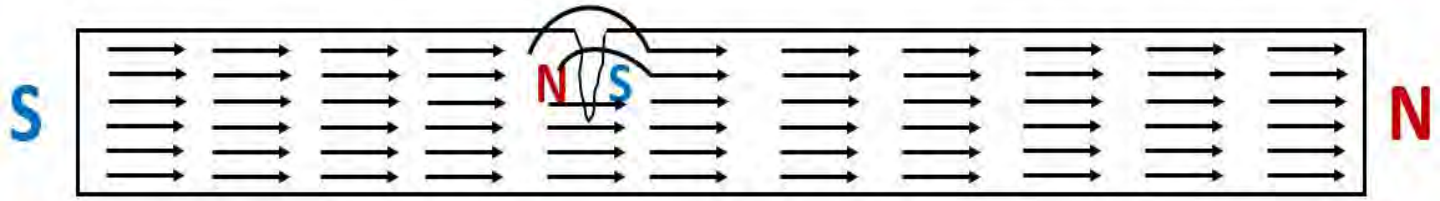
This magnetic attraction is not only felt, but can be seen when we apply tiny ferromagnetic particles to the surface of the magnet. The particles are dusted on using a puffer bulb. As they free fall to the magnet, they will line up along the lines of flux at the poles.



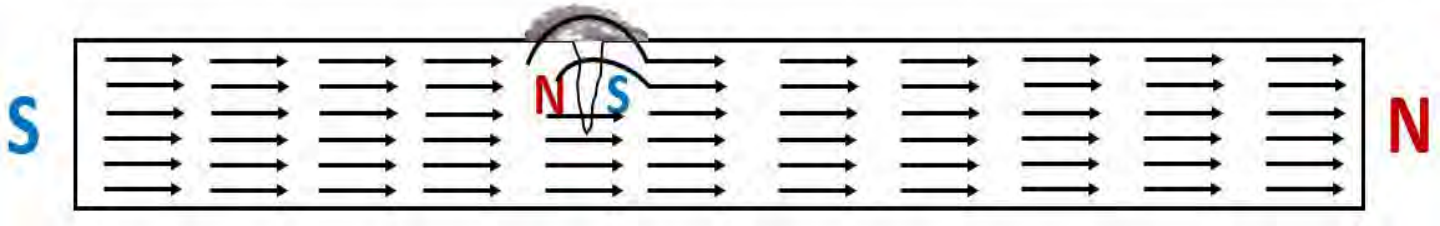
Now let's see how we can use this science to detect cracks in ferromagnetic parts. When a part is magnetized, magnetic lines of flux are running through the part from one pole to the opposite pole.



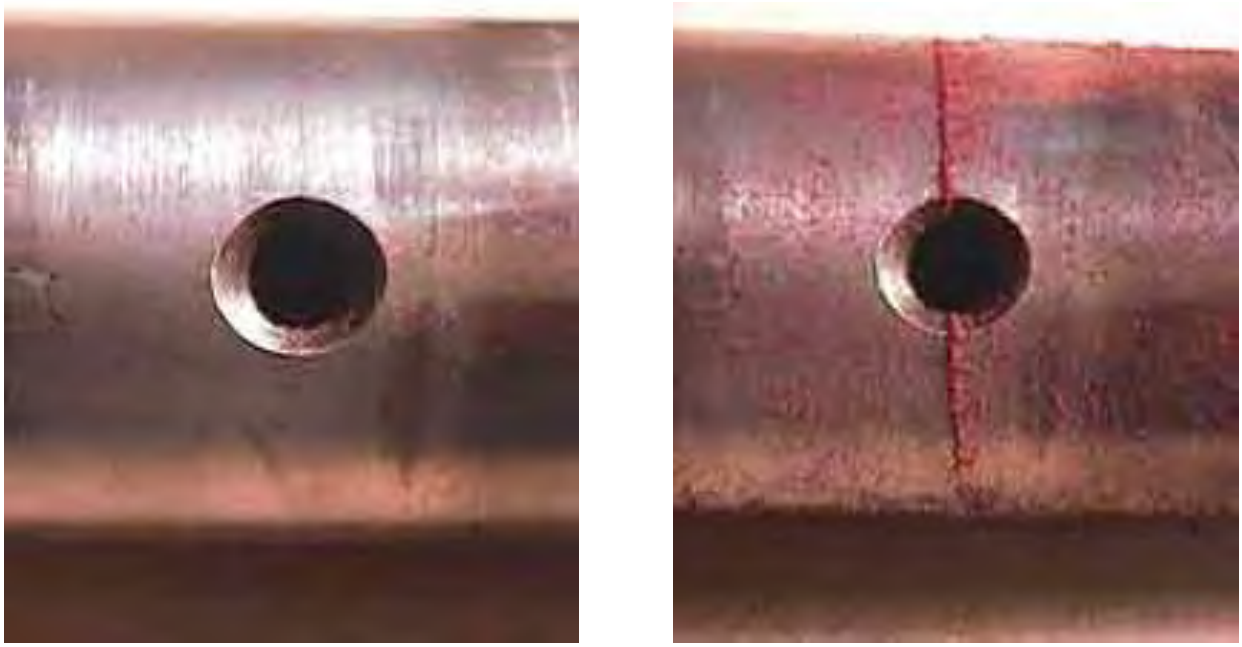
Magnetic poles are created each time the magnetic lines of flux leaks outside the part.



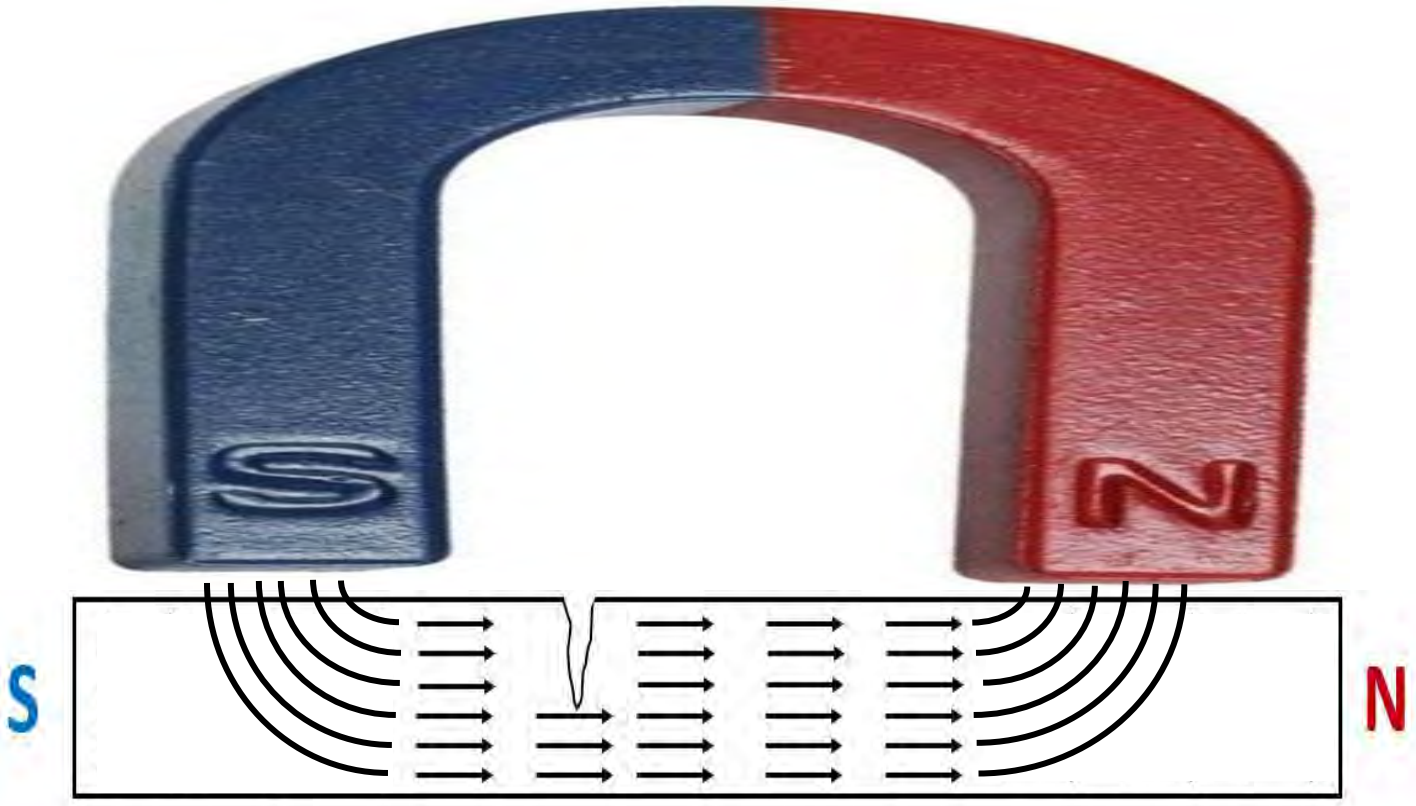
Since the particles are attracted to the lines of flux leakage (poles), they will line up on top of our crack, giving us an indication that is larger than the original crack, making it easy to see.



Here is a part that is cracked, but the crack is almost undetectable to the naked eye.
With the help of the magnetic particles, the crack becomes easily detectable.

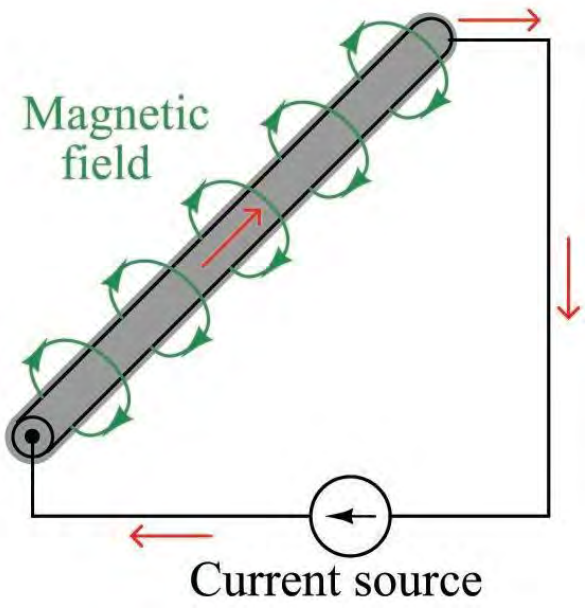


Now for the really fun part – how do we magnetize the items that we wish to inspect? We could simply put a magnet in contact with the part we wish to magnetize. The magnet lines of flux would enter the part and flow through the part back to the opposite pole of our magnet.



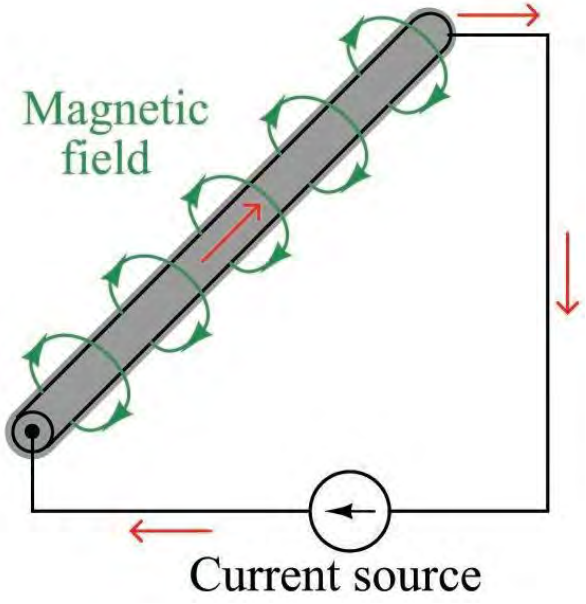
The problem is that the magnetic field is limited to the strength of the original magnet.
This will be very limited in strength and will not produce the results that we are looking for.

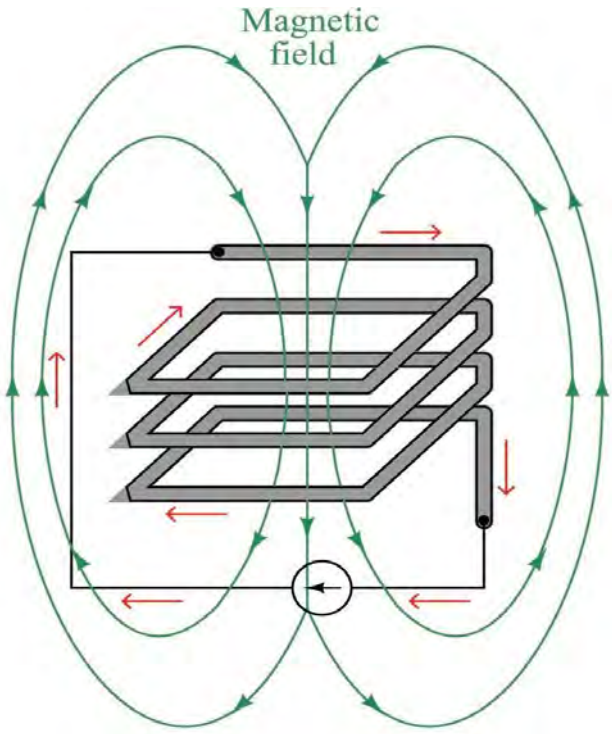
We can boost the strength of the magnetic field using a phenomenon called **Electromagnetic Induction.**



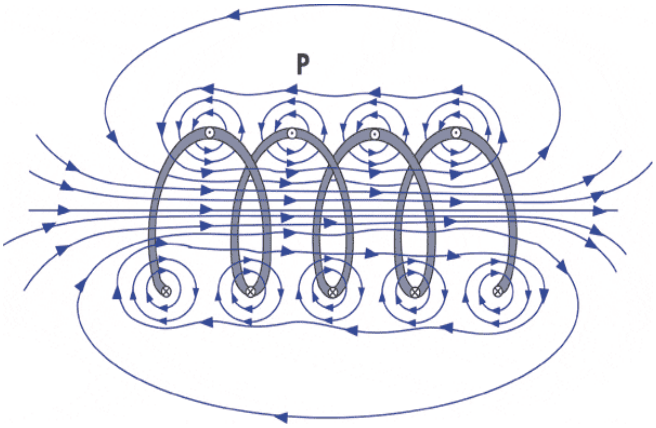
When electricity flows through a piece of wire or a conductive rod, a circular magnetic field is produced that is perpendicular to the direction of the current flow. Welding cable with current flowing creates a circular magnetic field. Iron particles on the floor allow us to see the magnetic field around this cable.

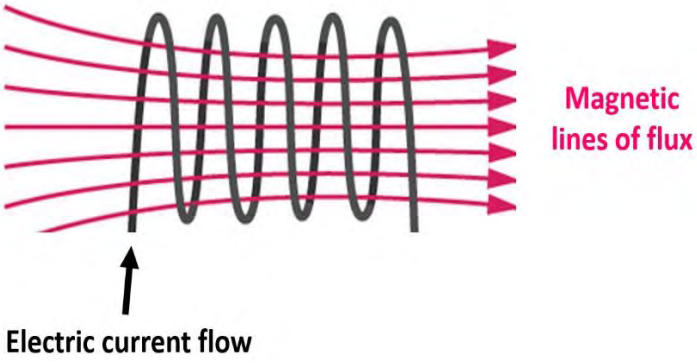
Any time current is flowing, magnetic fields are being produced. You might have even felt the strong magnetic fields produced around high voltage power lines.



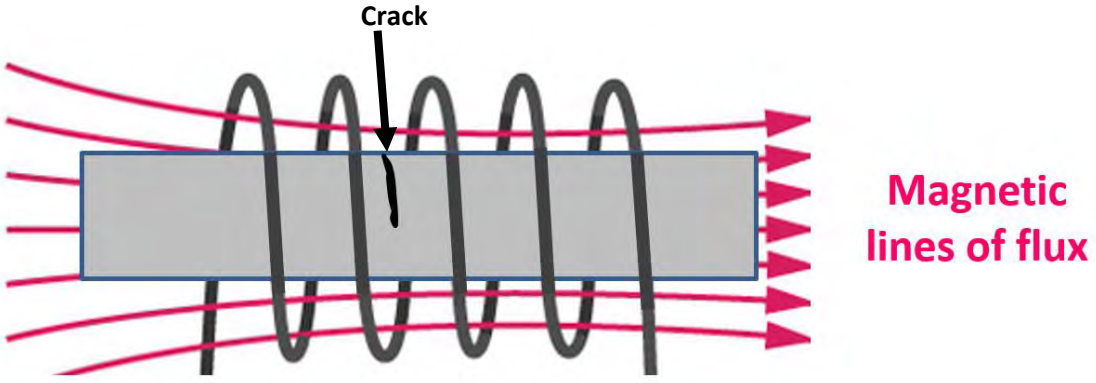


If we wrap our cable into a coil, we can produce an even stronger magnetic field. This is because the individual loops of the coil each have their own magnetic field, and these individual magnetic fields will combine with the magnetic fields of the adjacent coils.

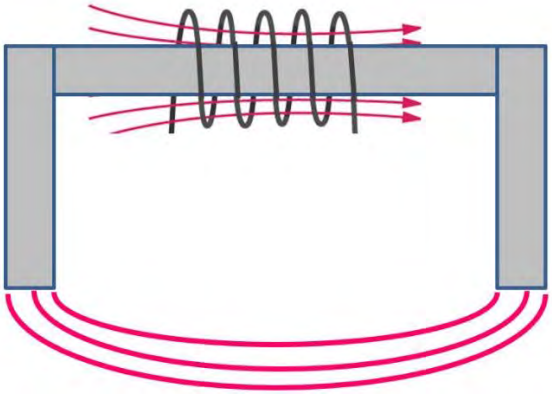




Now I can insert a test piece into my strong magnetic field. The magnetic lines of flux will flow through the part. Any crack in the part will create a flux leakage that will attract the magnetic particles to reveal the crack.



I can also use my new coil to make a Magnetic Particle Testing tool that will induce a strong magnetic field into a part that I place it in contact with. This is an example of a hand held yoke manufactured by Parker Industries that can be used for very quick and easy inspections.



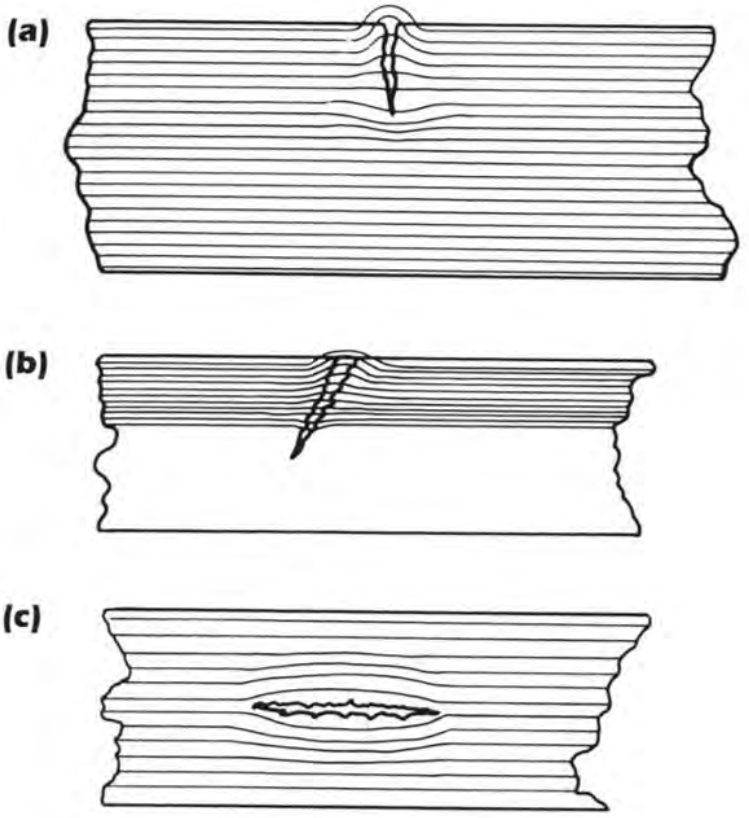
Thank you to David Lowe for donating a cracked Cessna 140 gear leg for our project. The magnetic particles are available in several colors so you can choose the color that provides the best contrast to the part being inspected.

One of the limitations of magnetic particle testing is that the defect must be orientated perpendicular to the magnetic lines of flux in order to provide the greatest flux leakage, resulting in the best possibility of detection.
In the three examples shown here,
Crack (a) will produce the greatest flux leakage field and will be the easiest to detect.

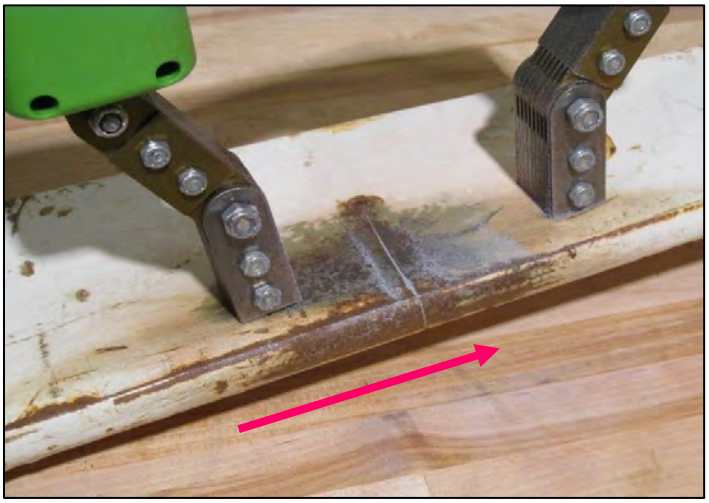
Crack (b) will have a reduced flux leakage field and might escape detection if the crack is too small.

Crack (c) will not produce a flux leakage field and will not be detected.

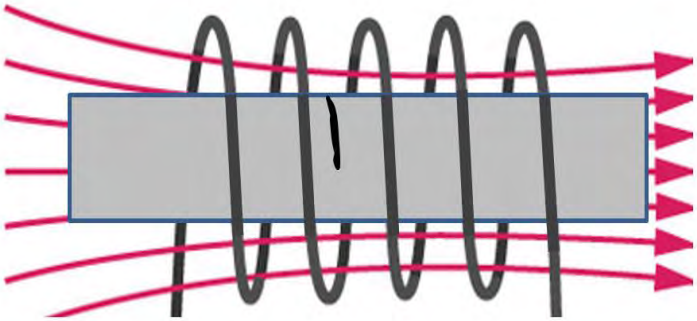
A complete inspection of any part will require it to be magnetized in two directions by inducing a longitudinal and circular magnetic field in the part.



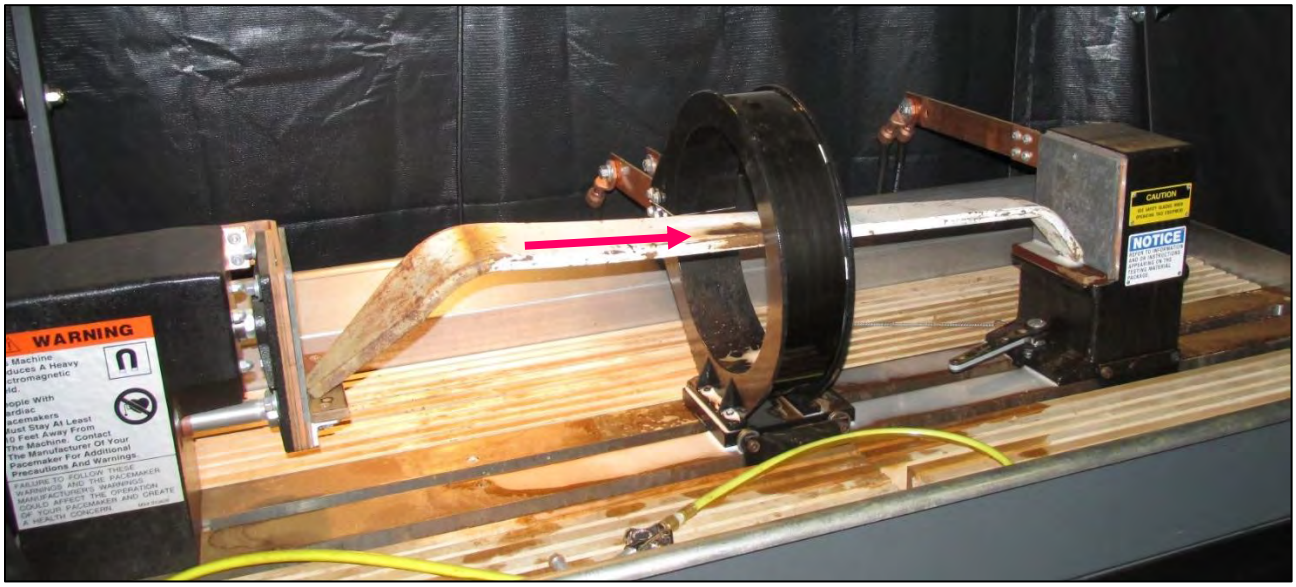
We have already seen one way to produce a longitudinal magnetic field by using the simple handheld yoke in direct contact with our part.



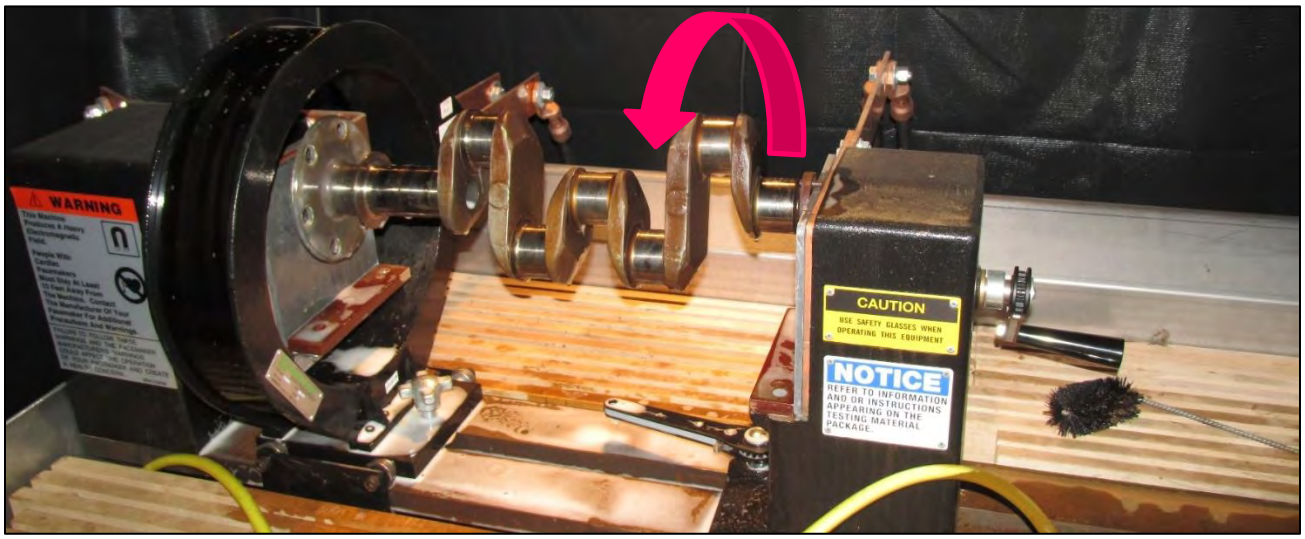
And we have looked at another way – placing our part inside an encircling coil.

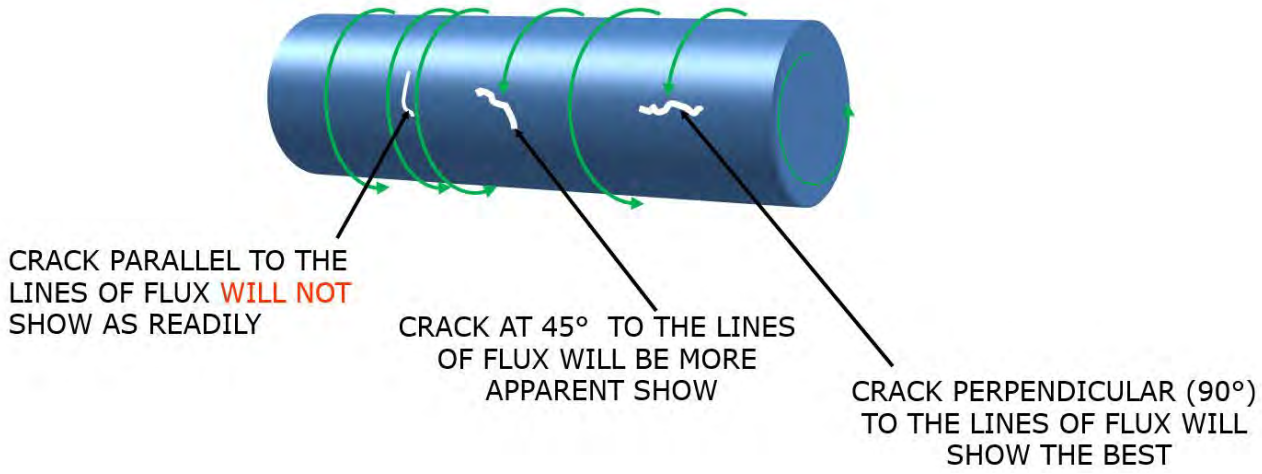


Here is that same gear leg placed inside an encircling coil. This technique will produce a longitudinal magnetic field in the gear leg and will detect those pesky cracks that come out of the step attach bolt holes.



Placing our test part (crankshaft) between the head and tail clamps of our test equipment will pass the electrical current through the length of the crankshaft and produce a circular magnetic field in the part.



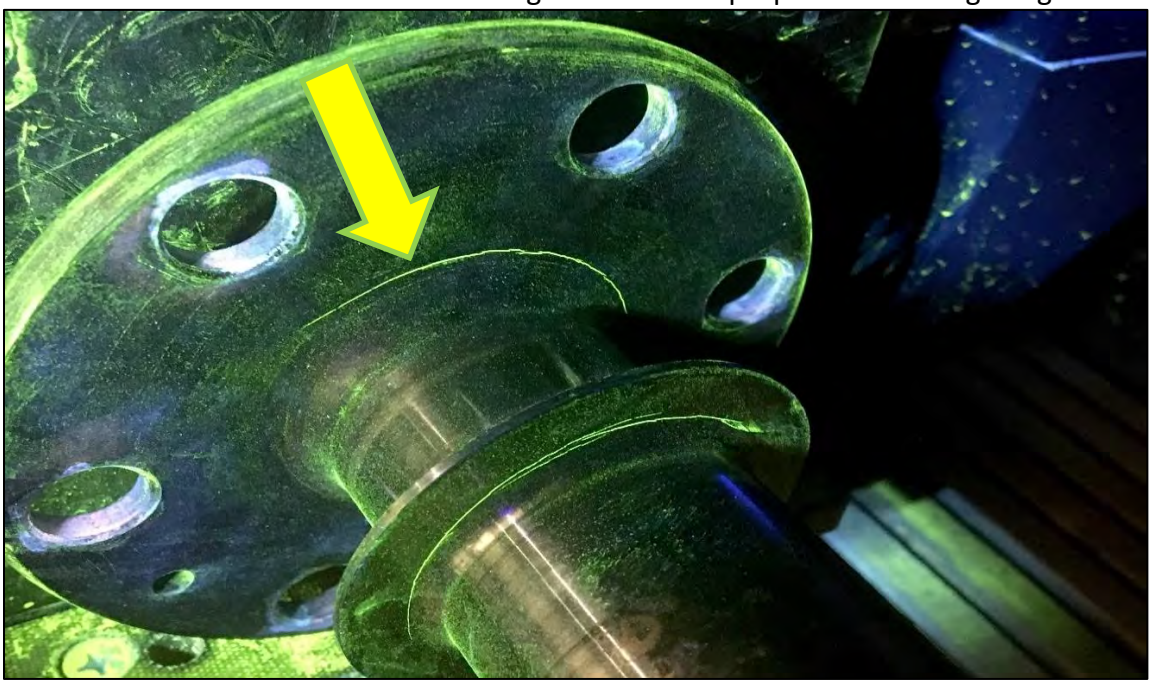


One more thing we should mention regarding Magnetic Particle Testing. We can increase the sensitivity of our examination in two ways. First, we can take those dry particles and suspend them in a wet bath of either water or oil. When we flow the particles onto the test part, they will be able to move more freely across the surface of the part and align themselves at the flux leakage field. When we do that, we say that we increase the mobility of the particles.

The second way to increase the sensitivity of our examination is to use a fluorescent dye in the particles. By using a darkened examination area and a high intensity blacklight, we can see smaller defects easier. This is where the “glo” part of the product name comes from (Magnaglo and Zyglo).

Here is our same gear leg using the fluorescent magnetic particle method.

And here is our crankshaft revealing a crack in the propeller mounting flange.



Stay tuned for our next Tech Talk article on Liquid Penetrant Inspection.

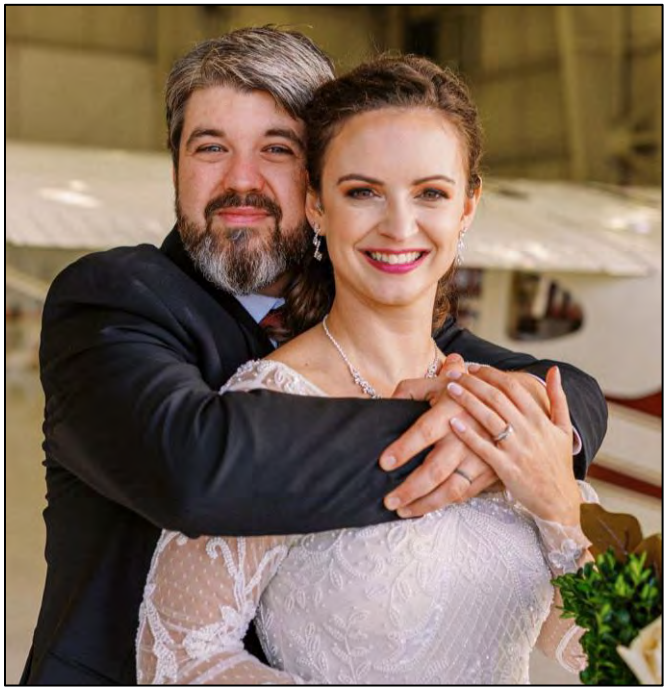
********** Upcoming Events **********

Vintage Days
Peachstate Airport (GA2)
Williamson, Georgia
Saturday June 4th

Our Georgia State Reps Christian and Heidi Vehrs invite you to join us for a whole day of vintage airplanes, cars, motorcycles and tractors.
Food and live music throughout the entire day.

Planning an Aviation-Themed Wedding

By Hannah Sue Lagno Abell

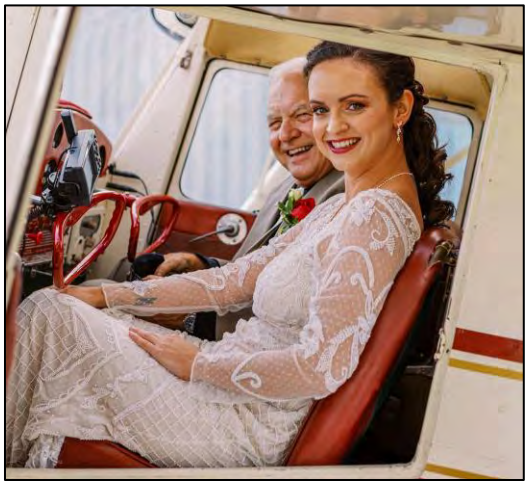


When my boyfriend proposed to me, my mom asked me, "*what is the most important thing you want at your wedding*?" My immediate response was "Floyd," our Cessna 140, NC4086N, which my parents, Sue and Fred Lagno (Maryland State Reps), purchased six months after they married in October, 1974.

Planning a wedding with an aviation theme would hardly be considered your usual wedding. We were fortunate to have several nice corporate hangars at our home airport to negotiate a wedding venue proposal. After much consideration we approached the owner of Trident Aircraft, who owns a beautiful 10,000 square foot facility. He was excited to accommodate our October 2021 wedding plans.

Decorating a hangar is much different than decorating a church or reception hall. We staged several of Trident's corporate jets, which delighted our guests to view up close. Our families set up the tables and chairs for our 110 guests. The place settings, tablecloths, flowers and arch were ivory, burgundy and gold, the colors of our 140. Guest place cards were fitted in gold airplane holders. Airplane thank you notes with aviation stamps followed a few weeks later.

My floor length ivory beaded gown was a reflection of the 1940's era. I taxied the 140 with Dad beside me to the wedding as it was also used as the backdrop for all the family photographs. Many guests were impressed at the age and condition of the plane and asked many questions throughout the night.



My dad taught me to fly Floyd, and I achieved my Flight Instructor rating, tailwheel endorsement and my Airframe & Powerplant certificate. I'm planning to earn my Inspection Authorization In June, 2022. As Jeff and I continued to dance with our guests at the reception, Dad taxied Floyd back to our hangar. I would fly him the following weekend and reflect on the incredible wedding we had with our 140 as the guest of honor.

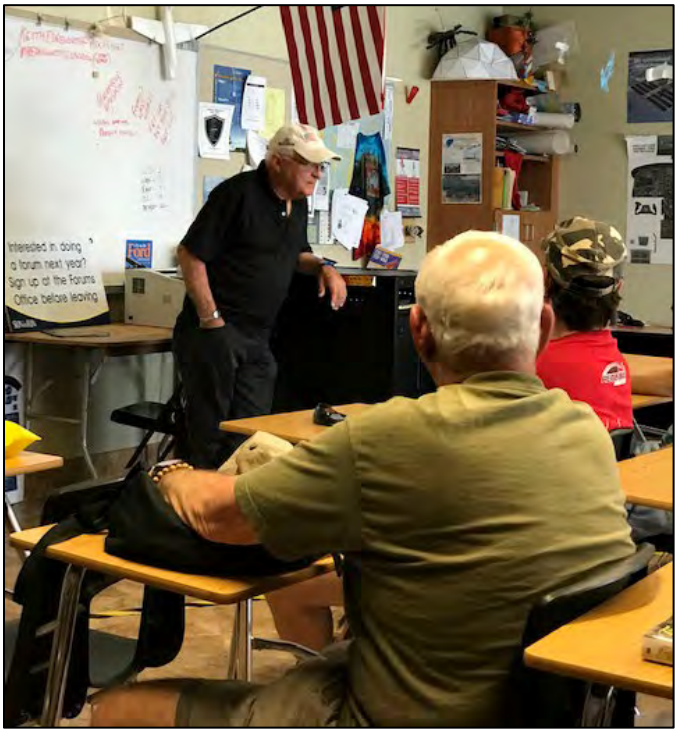
SUN 'n FUN
Aerospace Expo

International Cessna 120/140 Association
invites you to join us in
Lakeland, Florida
April 5-10 2022

Our President Jeff Tourt and his wife Cindy will join our many faithful members in the type tent for our annual get together at the Sun-N-Fun Aerospace Expo and Airshow again this year.

Look for Jeff and Cindy in the campground next to our good friends Scott and Linda Ross (Secretary/Treasurer). There should be some good home cooking and plenty of good time to catch up with friends old and new. You might even grab a Brat off the grill.

Make sure to swing by the type tent and get the latest updates on the maintenance forums, and social events for the week.



Make your plans for our 2022 convention in Sturgis South Dakota, hosted by our good friend and State Rep Bruce Bowen!

September 13-17, 2022

Sturgis is located on the western edge of South Dakota and is the gateway to the Black Hills National Forest.

Scenic Needles Highway

Badlands National Park

The airport (49B) is located 4 miles east of Sturgis at an elevation of 3,250 ft.

The Convention hotel will be at the Holiday Inn and Convention Center in Spearfish, South Dakota, approximately 15 miles West of the Sturgis exit, an easy drive down the Interstate with scenic views all the way.

Holiday Inn and Convention Center
305 N. 27th Street, Spearfish, South Dakota 57783
Reservations 1- (605) 642-4683

Special Room Rates $105/night

Be sure to stop by our ever popular hospitality suite every evening!

Rental cars will be available at the Sturgis Municipal airport for those flying in.
Stay tuned on our website for additional details.

Schedule of events

Tuesday 13th — Early Arrivals
Dinner at the Airport

Wednesday 14th – Thursday 15th
Flyouts and drive outs to be announced

Friday 16th — Breakfast at the airport, maintenance forum, flying games, dinner banquet and awards.

Saturday 17th — Departure

Bruce is planning group transportation for the possible flyouts/driveouts Wednesday & Thursday. Just like our convention last year in Atlanta, there is so much to do in South Dakota that folks will have to craft their plans from the wide array of attractions. Some of the possibilities include;

Historic downtown Deadwood

In 1876, the Wild West town of Deadwood was born when prospectors came across a gulch full of dead trees and a creek full of gold. Historic Deadwood, SD is just as wild today as it was when legends like Wild Bill Hickok, Calamity Jane and Seth Bullock roamed the streets. Casinos, breweries and wineries, historical tours and shopping await.

Mount Rushmore

Wall Drug- America's most famous tourist site

Take a tour of the many gold mines in the area including the Black Hills Mining Museum. Take home some real Blacks Hills Gold!

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