FSF Inc.

AVIATION

Mechanics Bulletin

50 YEARS

MAY - JUNE *1953*

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FLIGHT SAFETY FOUNDATION

Aviation Mechanics Bulletin

Dedicated to the aviation mechanic whose knowledge, craftsmanship and integrity form the core of air safety.

Robert A. Feeler, editorial coordinator

May–June 2003 **Vol. 51 No. 3**

On the cover: The cover is a reproduction of the cover of the first issue of *Aviation Mechanics Bulletin* in May–June 1953.

What's Your Input?

In keeping with the Foundation's independent and nonpartisan mission to disseminate objective safety information, FSF publications solicit credible contributions that foster thought-provoking discussion of aviation safety issues. If you have an article proposal, a completed manuscript or a technical paper that may be appropriate for *Aviation Mechanics Bulletin*, please contact the director of publications. Reasonable care will be taken in handling a manuscript, but Flight Safety Foundation assumes no responsibility for material submitted. The publications staff reserves the right to edit all published submissions. The Foundation buys all rights to manuscripts and payment is made to authors upon publication. Contact the Publications Department for more information.

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Foreword

In recognition of the 50th anniversary of the *Aviation Mechanics Bulletin,* this issue is a reprint of the first issue of the bulletin, published in May–June 1953, and selected articles from subsequent issues that year.

The *Aviation Mechanics Bulletin* was begun by Joseph M. Chase, a maintenance technician hired by Flight Safety Foundation founder Jerry Lederer as the first director of what was then the Foundation's maintenance and equipment division. Chase edited the publication until his retirement in 1972; he died later that year. Chase's goals — and those of the bulletin — were to foster the education, recognition and integrity of aviation maintenance personnel.

He intended for the bulletin to provide maintenance personnel not only with information from technical sources but also with lessons learned from analyses of mechanical failures and — although the term was not well known then — from human factors research.

Despite the passage of 50 years, the purpose of the *Aviation Mechanics Bulletin* today is the same as it was in 1953: to increase aviation safety by increasing knowledge, understanding and craftsmanship.

— FSF Editorial Staff

FLIGHT SAFETY FOUNDATION, INC.

MECHANICS BULLETIN

Editorial — For Mechanics

This is the first issue of the FSF *Mechanics Bulletin*, a publication beamed to the aircraft and engine mechanic. Our chief interest is safety, for our aims and purposes are those of the Flight Safety Foundation. But our *special* interest is the mechanic. That is because we know of no other single factor more important to air transportation.

So if you are a mechanic, this is for you — written for you and dedicated to you. It will bring you information you might not see otherwise, reprints and condensations of articles from the technical journals ordinarily available to only a few. It will bring you lessons learned from the study of mechanical difficulties, of failures and fires, lessons which concern you and your job but which too often do not reach you.

It won't be a news magazine, but it will carry announcements of awards to mechanics and citations for significant achievement. It won't fight your battles. Instead, it will stick to its own business of increasing safety by increasing knowledge and understanding and craftsmanship.

We start out proudly. Not that we confuse our importance with your importance. No one can share your portion of the final responsibility for air safety. But we are proud of our assignment, and we are proud to be working with you on a job that is as important as life itself.♦

— Joe Chase

Metal Fatigue — What It Is*

It is not crystallization. The crystals were there all the time.

—

by
Major P. L. Teed, A.R.S.M., M.I.M.M., F.R.Ae.S.
Deputy Chief of Aeronautical Research and Development
Vickers-Armstrongs Ltd.

During rather less than 5,000 years, man has worked and used metals. Until less than five generations ago, he seldom employed them to support other than static loads, and so he was happily all-unconscious of the deeper mysteries of the physics of metals. During the last century, however, he has learned that under the influence of fluctuating loads (cyclic stresses), often of very small magnitude in relation to their tensile stress[1] or even elastic limit,[2] pieces of metal suffer physical changes giving rise to decreases in mechanical strength.

What Is Fatigue?

Before a definition is given, let us examine two photographs, both of which are characteristic.

Figure 1 shows the failure, after many thousands of miles of running, of the steering drop arm of a popular motorcar. On the occasion on which it broke, the car was being driven at a moderate speed along a straight road having an excellent surface — that is to say, failure took place under normal conditions. It will be noticed that there appears to be dividing line across the fractured area. Reference will be made to this later.

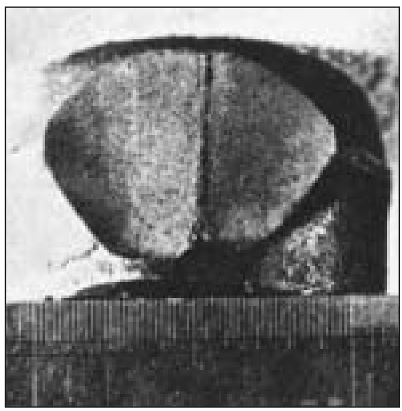


Figure 1. The fracture of the steering drop arm of a motorcar. The width of the arm is approximately one inch.

Figure 2 is a photograph of the fracture of a seven-inch-diameter mill shaft. This had run satisfactorily for a number of years under the loads for which it was designed. It broke when the mill was operating under perfectly ordinary working conditions. As was the case in the first photograph, the fracture is non-uniform in character, the center area being very different in appearance from the remainder.

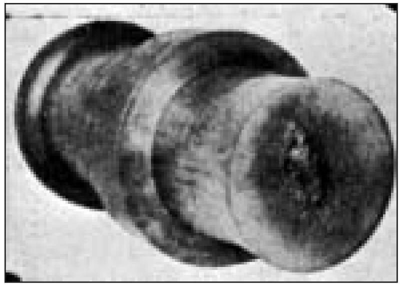


Figure 2. The fracture of a seven-inch-diameter mill shaft.

What causes these types of fractures? The answer is that the circumstances under which disintegration took place in the different areas were themselves different. The fractures in the smoother zones of both photographs occurred slowly, possibly very slowly indeed, over a long period of time. A crack spread progressively from the outside, or region of high stress, toward the middle — which, in a beam or rotating shaft, would be one of lesser stress.

Shining Facets

If the zone in which fracture has arisen by progressive cracking were to be examined, it would be seen that there were shining facets. In the center region, on the other hand, no reflecting surfaces would be observed. A hundred years ago, when our leading engineers first became painfully conscious of failure by fatigue, they were much impressed by the two types of fracture which have been put before you. They characterized the central zone of a shaft (such as has been shown in Figure 2) as being ductile. They did this because it was similar in appearance with that which could be observed over the complete fractured surface of a piece of the same material broken in tension. In such a test, as is of course well known, the specimen, unless that of a most exceptionally brittle material, elongates prior to ultimate failure — in other words, the amount of this elongation gives a measure of the ductility of the metal. Because of the sparkling facets in the other portion of the broken area, this, reasonably enough, got to be termed the area of crystalline fracture.

The story which has so far been told is wholly to the credit of our forerunners. Undismayed, though faced initially with a deep and perplexing mystery, they began to strip it of its veils. Not unnaturally, not every deduction from observation was correct. One error, curiously persistent even to this day, was early made. It is of a type which has, through the ages, abounded in the unfolding of our human story — cause and effect were confused. The presence of the so-called crystalline area in these strange fractures [was] wrongly explained. It was said that failure of this type, of parts which had long operated satisfactorily, arose from the originally ductile metal having become crystalline.

Crystals Always There

This is now realized as being wrong. We now know on most certain evidence that all metals are made up of crystals and that these crystals are made up of units or cells having their atoms arranged according to one of 14 different patterns or lattices. The progressive cracking, leading to ultimate fracture, largely takes place along trans-crystalline planes, which, being smooth, reflect light and so give the idea that the metal [has] become crystalline. The crystals had, however, been there all the time.

Now before we leave these fractures, let us again look at the fracture of the motorcar component. If one were to take the part which is shown and fit it to the other part, it would be found that with their centerlines in the same plane, there would be contact only over the central area. There would be a gap all the way round. The explanation of this is that the center region being one of *tensile failure*, the metal has here been drawn out. If, having established the existence of this plastic flow, this zone is ground down, then, when the two parts are fitted together, there will be reasonably good contact all over the area of so-called crystalline fracture. This is the region of *fatigue failure*, and our simple experiment has established that it occurs without any gross dimensional change. Under the influence of relatively small stresses repeated perhaps many, many millions of times, a ductile metal may fail, giving but little evidence of its ductility.

Photomicrographs of a specimen broken by repeated stresses of low magnitude, or as we can now say, by fatigue, show that the crystals are undisturbed. Such fractures take place by trans-crystalline cracking. On the other hand, similar examination of *tensile failures* clearly shows distortion of the crystals, accompanied by dimensional changes.

Alteration of Physical Properties

What happens when stresses, possibly very low in comparison with ultimate tensile, are repeated millions of times? Ewing and Humfrey demonstrated that when such stress is applied, slip planes (i.e., relative movement of planes parallel to one of the crystal axes) develop within a relatively few crystals or grains, [and] some nonreversible yielding takes place. The specimen as a whole has not been stressed beyond its crude elastic limit, but a few individual grains amongst the astronomically vast number have undergone permanent, though extremely small, deformation. Sometimes these changes are only measurable in terms of inter-atomic distances. *This generally minute structural change is a prerequisite of fatigue failure*.

Experimentally, it has been established that the creation of a slip band or plane produces a local hardening. The static strength of the metal is increased, but its ductility and its capacity to resist shock are reduced.

The Mechanism of Fatigue

To examine the formation of slip planes may aid in understanding the mechanism of fatigue. Due to the mechanical characteristics of a crystal, a slip plane is developed on the application of a certain stress. On the reversal of this stress, *slip does not take place on the same plane in the reverse direction*. Due to the local hardening, the slip will occur elsewhere — probably only a few atomic spacings from the original one.

As slip succeeds slip, the elastic limit of the grain (crystal) increases more rapidly than the ultimate tensile stress of the material. Thus the process is an embrittlement of the grain. When the elastic limit and ultimate tensile stress are virtually identical, a crack develops.

Summary

Fatigue is a progressive change in inter-atomic relationship having an extremely local origin.

Fatigue failure generally gives rise to two types of fracture. One is due to the fatigue process itself. The other is caused by the incapacity of the remaining area of continuous metal to withstand the instantaneous load imposed upon it.

Editor’s note: We regret that lack of space prevents the inclusion of the portions of Major Teed’s paper dealing with the engineering aspects of fatigue and some ways of reducing the incidence of fatigue. The following, however, is his summary of these topics:

(1) With the ferrous alloys and a few others, there is no limit to the number of stress cycles they will withstand, provided always the peak stress does not exceed a certain maximum. This is characteristic of the material and is called its fatigue limit.

(2) In contrast, all metals other than those which fall within the above group can ultimately be fractured by the repetition of any stress, however small, provided always the stress cycles are sufficiently numerous.

(3) The magnitude of the cyclic stress which can be withstood by metal, either in perpetuity or for several hundred million reversals, is small in comparison with its static ultimate tensile stress. Hence the increase in weight which results when structures have to withstand dynamic, rather than static, loads.

(4) The influence of stress concentrations on fatigue resistance depends on basic material characteristics, the degree of material homogeneity and the geometry of the specimen. Since only the last mentioned is capable of being expressed in concrete terms, it is impossible to forecast, *without prior experiment*, the fatigue-endurance of any specimen containing stress concentrations. (This emphasizes the importance of constant alertness to stress raisers. Watch for scores, scratches, nicks, small cracks.)

(5) Components made in conformity to the same drawings from material to the same specification do not necessarily have the same capacity to withstand the same number of cyclic stresses of the same magnitude.

(6) The capacity to endure cyclic stresses can often be very greatly increased by paying attention to surface finish and/or to the use of techniques giving rise to residual surface compressive stresses.♦

*Excerpts from a paper read before a meeting of the Society of Licensed Aircraft Engineers at Southampton University and printed in The *Journal of the Society of Licensed Aircraft Engineers*. This reprint is with the permission of *The Journal of the Society of Licensed Aircraft Engineers*.

Notes

1. Tensile stress is the internal stress exerted by the material fibers to resist the action of an external force tending to separate the material into two parts.
2. Elastic limit is the maximum stress to which a material may be subjected and still be able to return to its original form upon removal of the stress.

No Future in Pushing a Wrench?

Meet Branch Dykes, the mechanic who became president of Colonial Airlines

Yes, it took quite a while. He joined the U.S. Air Mail Service as a mechanic in 1921. This was after serving in the Army Air Force in World War I and doing a hitch in Naval Aviation. For the next six years, he worked as mechanic, crew chief, chief mechanic and field manager.

When commercial operators started flying the mail, Branch carried his tools and his knowledge of maintenance to National Air Transport (later part of [United Airlines]).

The years that followed were hectic with mergers and reorganizations. Branch took the changes in stride. Somewhere along the line, he laid off his coveralls, but he stuck to maintenance. After serving with Grey Goose and with one of American Airlines' ancestor companies, he joined Colonial in 1941 as superintendent of maintenance. Since then, he has been promoted only twice, to vice president of operations and to president.

Maybe he is slowing down. Still, that's quite a record for a lad with grease in his hair and an airline in his heart.♦

Tally-ho

Five Tips for the Man Who Expects to be Advanced to a Supervisory Position

There is an old story about an American who was a guest at an English foxhunt. He was a rather decent chap, don't you know, and he sincerely wanted to do the right thing, to comply with all the customs of the hunt and to be a credit to his host.

Finding himself galloping stirrup to stirrup with that gentleman, he asked, "How am I doing?"

"Quite well, quite well," the Englishman replied. "There was but one thing amiss. When you sighted the fox you should have sung out 'tally-ho' instead of 'there goes the [expletive].'"

All of which leads up to the fact that when you become a supervisor and someone sings out "tally-ho" as you cross the hangar floor, it means you haven't learned how to get along with people.

"Supervisor" and "[expletive]" need not be synonymous.

The way to get along with people when you are a supervisor is to start now. Here are five simple rules that will help:

1. Be careful about promises. It is better not to promise than not to come through.
2. Listen. The other fellow has ideas, too. And he wants to be heard. If you listen with real interest, you not only learn a great deal, but you convince folks you're a wonderful guy to work with.
3. Give your men credit for what they do and what they know. Others will like you to the extent that you recognize their worth.
4. Be generous in your praise. Lay off of flattery — underserved praise. But everyone has at least one attribute for which he deserves praise. Praise it.
5. Go easy on the orders. Ask people to do things, and remember to say "thanks."♦

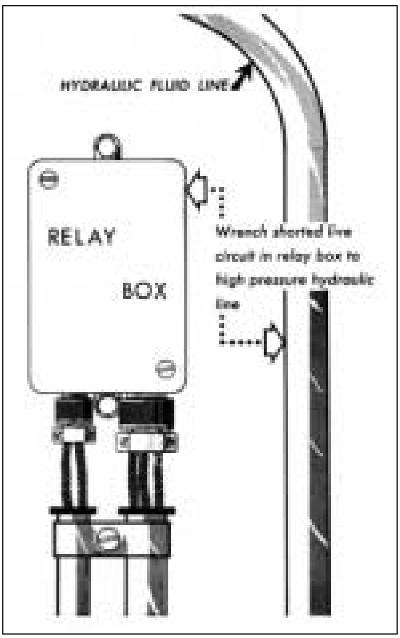
It Did Happen Here

The Situation

The interior of an airliner was destroyed by fire, and a mechanic was critically burned when an electrical short punctured a line carrying hydraulic fluid under high pressure.

The mechanic was removing a live relay. His wrench slipped, shorting the relay to the hydraulic line. The line burned through instantly. The flammable fluid was ignited and exploded, and the cabin was sprayed with a flaming mist.

In a similar incident, a wrench shorted an electrical circuit to a nearby control cable. The cable was deeply nicked and would have failed if the damage had not been discovered during a preflight.



The Hazard

Lines containing gasoline, alcohol, hydraulic fluid [and] oxygen should be protected from electrical short-circuiting as carefully as from damage by chafing, puncture or corrosion. Such incompatible systems can be extremely dangerous when in accidental contact with each other.

The Fix

Mechanics must be constantly aware of the danger of working on live circuits with metal tools. The hazard is eliminated if the circuit is opened and the circuit breaker tagged.♦

Based on a Design Note *prepared by the Daniel and Florence Guggenheim Aviation Safety Center at Cornell University.*

British Turbojets …

… feature simplicity, reliability and low weight in controls and fuel systems. American ideas differ on what constitutes "an adequate system."

—

based on a paper by C. S. Constantino, Curtiss-Wright Corp.

The basic difference between British and American turbojet engine controls lies in the interpretation of what constitutes an adequate system. The British hold that the pilot should assume responsibility for proper engine operation, while American thinking is that the pilot should be free to give his undivided attention to flying the plane. Another factor greatly influencing the British decision to keep controls simple is weight. They are acutely weight-conscious because weight so seriously affects the performance of jet aircraft. As a result, most British aircraft and accessory designs are generally lighter and more compact than the American equivalent.

The simplicity of existing British controls in no [way] means that there is inability to design and develop more complex systems. At the moment, there is some activity directed toward electric and electronic temperature limiters. These units are incorporated in secondary control circuits so that failure means only a loss of the automatic limiting feature and in no way interferes with the primary system. Furthermore, complete electronic systems have been designed, built and tested. Tests show that they are completely satisfactory. Still, the British aircraft industry is not prepared to accept more complex controls at this time.

Early American jet aircraft incorporated British-designed engines with controls functionally equivalent to the original design, but operational experience demonstrated that overly simple controls are unsatisfactory for large-scale operations. Numerous engine failures, frequently ending in loss of aircraft, were encountered. At that time, a great deal of effort went into rectifying the condition. Because time was limited, control companies unfamiliar with jet and aircraft design were called in for assistance, and the end result was inadequate designs and poorly manufactured units. Other difficulties arose from improper selection of the engine variable used to compensate the control.

Early American controls failed to incorporate temperature compensation, or if it was incorporated, the design was inferior. As a result, the operation of the engine was troublesome and required the pilot to exercise great care in the handling of the engine.

Inadequacy of the early systems contributed to the stringent control requirements in military engine specifications and to discussion of ways and means of rating controls to ensure incorporation of the best control on current engines.

It has now been demonstrated that with proper design and development of such components as carburetors and fuel-injection pumps, outstanding reliability and performance can be had. Some engine companies have put new hydromechanical and electronic controls in production, but the complexity of the new designs and the possibility of unreliability in service [are] causing some concern in the military powerplant laboratories. Obviously, care must be taken not to create new and more serious problems when designing to correct old deficiencies.♦

(Reprinted from January 1953 SAE Journal*, 29 West 38th St., New York 18, N.Y.)*

Notable Quotes

William L. Lewis, Cornell-Guggenheim Aviation Safety Center

"No amount of education will guarantee a man imagination, dependability, ingenuity, or give him a burning desire to do the best possible job under any set of circumstances. These qualities are needed by every person in the aviation industry."♦

Big Chop

Care to guess “what hoppin?” Here are six possible causes:

1. Improper parking of ground equipment.

    (a) Parked in the wrong place.

    (b) Parked without lights.

2. Premature salute to captain.

3. Inadvertent release of the aircraft brakes.

4. Confusion of signals.

    The tower’s message, “cleared to taxi,” misinterpreted on the flight deck to mean “cleared to leave the ramp.”

5. Inadequate rules for automotive traffic.

6. Failure to observe established rules for automotive traffic.

No. 6 was the cause of this particular accident, but whatever your guess, you might have been right. There have been similar accidents and similar pictures for every cause listed. If you missed, it was only because we chose the wrong picture.

There is no chance for mistake, however, about this: The big knives are too tough for man or equipment.♦

Mechanic's Creed

Upon my honor, I swear that I shall hold in sacred trust the rights and privileges conferred upon me as a certified mechanic. Knowing full well that the safety and lives of others are dependent upon my skill and judgment, I shall never knowingly subject others to risks which I would not be willing to assume for myself, or for those dear to me.

In discharging this trust, I pledge myself never to undertake work or approve work which I feel to be beyond the limits of my knowledge; nor shall I allow any non-certificated superior to persuade me to approve aircraft or equipment as airworthy against my better judgment; nor shall I permit my judgment to be influenced by money or other personal gain; nor shall I pass as airworthy aircraft or equipment about which I am in doubt, either as a result of direct inspection or uncertainty regarding the ability of others who have worked on it to accomplish their work satisfactorily.

I realize the grave responsibility, which is mine as a certified airman, to exercise my judgment on the airworthiness of aircraft and equipment. I, therefore, pledge unyielding adherence to these precepts for the advancement of aviation and for the dignity of my vocation.♦

— Jerry Lederer

Improper Maintenance Blamed For $700,000 Fueling Fire

Improper maintenance is credited by the National Fire Protection Association for the fueling fire pictured above. The flames gutted the aircraft and fused the skin of the fuselage. Structural members were warped and twisted by the heat. The wing sections and powerplants were relatively unaffected, but the direct damage amounted to $700,000, and the aircraft was out of service for eight months.

The following quotation is from the NFPA report:

> While fueling the left wing tanks of a Constellation from a tank truck, the gasoline hose of the fueling truck burst at a point just inside the truck's pumping compartment. The resulting fuel spill and fire involved about 150–200 gallons of gasoline.

Figure 2. Where fuel hose burst. Note short section of rigid iron pipe which placed strain on hose when reeled.

> Picture 2 shows a closeup of the broken hose. Note the short section of rigid iron pipe which was used to connect two 50-foot sections of the hose, both of which had female-type connections. It is easy to understand why the break occurred at this point, as continual winding and rewinding of the hose on its reel placed severe strains on the hose at this location.
>
> Improper vehicle maintenance, in broad terms, and improper hose maintenance, specifically, caused this $700,000 damage and cost the airline the services of the aircraft for eight months.

Vehicle maintenance and hose maintenance are not always the responsibility of airline mechanics. We do not want to believe that a *mechanic* could have devised the homemade coupling that proved so appallingly expensive. A lineboy or a well-digger perhaps, but *please*, not an A and E [airframe and engine mechanic].

However, an A and E's responsibility does extend to spotting and reporting any condition endangering the aircraft in his care.

Fire prevention, like flight safety, is everybody's job.♦

[FSF editorial note: This article originally appeared in the July–August 1953 issue of *Aviation Mechanics Bulletin.*]

Old Culprit Guilty of New Offense

Fuel contamination recently caused one throttle of a twin-engine transport to stick in the half-open position. Inspection disclosed water in chamber "D" of the carburetor and binding of the idle mixture unit. Overhaul showed that the binding was caused by the corrosion of the idle needle valve due to the water present.

The carrier considered it necessary to review the procedure for daily water checks with all personnel. All refueling stations were inspected, and all water found was removed. Also, carburetor "D" chambers are drained on each no. 4 inspection.♦

[FSF editorial note: This item originally appeared in the September–October 1953 issue of *Aviation Mechanics Bulletin.*]

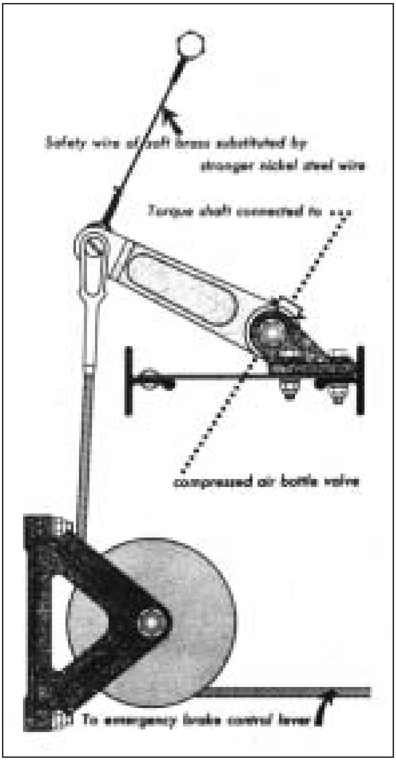
Substitute Safety Wire Prevented Using Emergency Brake System

The Situation

Loss of pressure in the hydraulic braking system necessitated use of the emergency air pressure to brake the landing run. When the pilot attempted to pull the air bottle valve control lever, he was unable to move it. Taking off again, the crew had time to apply the remedy, which was to snip the wire used to safety the emergency system operating handle. Examination showed that a stronger, nickel-steel, wire had inadvertently been substituted for the easily broken brass safety wire normally used.

The Hazard

Mechanics should keep in mind the fact that in some installations, safety wire is employed primarily to facilitate inspection, an unbroken wire indicating that the device has not been operated and that further inspection is not necessary. In the above case, it is possible that the man servicing the emergency braking system was unaware of the safety wire's purpose and unwittingly used whatever piece of wire was available at the time.



The Fix

Service replacements should be of the same material, quality, gauge and strength as the original.

Precept

Mechanics must remain alert to the possibility of making the mistakes permitted by the design. Designers should guard against design that permits other than the correct method of installation, operation or servicing.♦

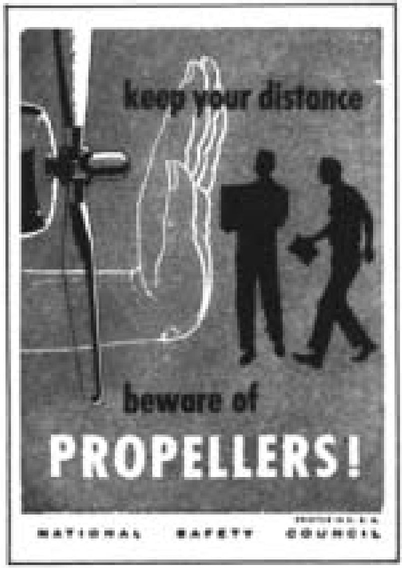
Based on a Design Note *prepared by the Daniel and Florence Guggenheim Aviation Safety Center at Cornell University.*

[FSF editorial note: This article originally appeared in the September–October 1953 issue of *Aviation Mechanics Bulletin.*]

Tool Mark Starts Fatigue Crack And Engine Failure

A tool mark on a piston skirt was the "stress raiser" that wound up a twin row engine on an air transport. The score induced a concentration of loads which caused failure.

Before the engine could be feathered, part of the skirt fell into the path of the crankshaft. All the rear-row cylinders and pistons were severly damaged, as were the rear master rod and center sections of the crankcase.



Engineers term tool marks, scratches, scores, nicks and notches stress raisers. They are particularly dangerous in components subject to reversible or cyclic loads (spars, gussets, propellers, reciprocating parts, etc.). They are best avoided by careful handling in the factory and during overhaul.

Don't toss parts around. Handle them gently.

Don't pile parts together. Protect them in individual racks, trays or shipping containers until assembly.

Don't drop or lay parts on abrasive surfaces such as cement floors.

Pad vise jaws with soft materials such as copper, brass, wood or fiber.

Before assembly, make certain that all parts are free from any grit, sand or particles of steel. Protect all moving parts from friction with a coating of oil.

Report promptly every tool mark, scratch, score, dent, nick, hairline crack. Even the mark of an indelible pencil has been known to act as sufficient stress raiser to cause failure.♦

[FSF editorial note: This article originally appeared in the November–December 1953 issue of *Aviation Mechanics Bulletin.*]

Iron Men — Then and Now!

Salt water folks like to talk about the old days of "wooden ships and iron men." Aviation has its record of "iron men," too — the mechanics of the period when engine reliability was little more than a hope.

The Air Mail Pioneers were recently reminded of those “old days” by F.B. Lee, administrator of civil aeronautics. Speaking at a meeting in Washington, Mr. Lee said, “In one of the early years (of the air mail) there were 260 forced landings, 105 due to weather and 155 due to engine trouble.”

“The next year,” he continued, “we made much progress. We carried more than a million pounds of mail and flew nearly 2 million miles. *But we had 1,764 forced landings.*”

The mechanics must have been iron men to have carried aviation through that difficult period.

Last year, the U.S. certificated domestic airlines flew 68,296,296 ton-miles of mail. The total mileage was 422,761,901. Forced landings? Yes, there were some. The C.A.B. [U.S. Civil Aeronautics Board] reported three that resulted in accidents. And so, without detracting one bit from the glory of the pacemakers, we salute *the iron men of today*, the mechanics who have done so much to make the forced landing a truly rare occurrence.

Note: There were other unscheduled and precautionary landings made by the airlines for different reasons, but they were a different breed of cats from the forced landings the old timers relate.♦

[FSF editorial note: This article originally appeared in the November–December 1953 issue of *Aviation Mechanics Bulletin.*]

Mechanics Sued

Two aviation mechanics and an inspector have been named codefendants with their employer in a suit for $204,253. The suit was brought by a commercial pilot who was injured in a crash nearly a year ago. He charges the defendants with improperly crossing the aileron cables in his airplane. The inspector issued the airworthiness certificate.♦

[FSF editorial note: This item originally appeared in the November–December 1953 issue of *Aviation Mechanics Bulletin.*]

Wright Flyer photo: U.S. National Aeronautics and Space Administration