AVIATION MAINTENANCE REPAIR & OVERHAUL BUSINESS ASSOCIATION, INC

AMROBA®inc

ADVOCATE OF THE AVIATION MRO INDUSTRY

Newsletter Date
5/5/2013

Volume 10, Issue 6
May – 2013

Failing the test of time

"The safety of the nation's wire systems is an issue of major importance to us all," noted a White House report issued in 2001. Apply this concept to aircraft and we have the same problem.

As today's aircraft age pass their teen years, some passing their adult years, some entering their veteran years and some reaching vintage status, the many kilometres of wiring buried deep within their structures begin to crack and fray. Once thought to be rare and benign, such faults are found by the hundreds in today's ageing aircraft. Unlike obvious cracks in a wing or an engine, a damaged wire is extremely difficult to detect, but the resulting arcing and electromagnetic emissions can be just as deadly. Think about the early Piper and Cessna aircraft that are still happily flying with their original equipment and wiring. Aircraft manufactured in the 60's are now 50 plus years old. The wiring installed in these aircraft was never designed to last that long.

Typically, a copper conductor (from 1 to 10 mm in diameter) is covered by a thin outer insulation (from 0.5 to 2 mm thick). Damaged insulation can expose the copper, giving rise to arcs, shorts, and electromagnetic emissions and interference. As the wire ages, the insulation may become brittle and crack. Chafes appear as wires vibrate against each other, a tiedown, or any other hard surface. Maintenance can also be hard on wires, as they may be nicked by workers' pliers, or bent beyond their tolerable radius, or screws being inserted into wiring bundles, or sprinkled with metal drill shavings, chemicals or water, or even used as stepladders in hard-to-reach places.

Even simple moisture condensation can spell trouble, particularly in conjunction with polyimide insulation, which breaks down when exposed to moisture and heat, not a good scenario for a vehicle that must contain drip loops in the wiring, because it is normally wringing wet after each flight. Moisture creating a short circuit between compromised wires can cause a tiny arc, gradually carbonise the insulation, and finally result in flashover and fire. And it isn't just old planes that have problems. In areas such as the wheel well, nearly 1/3 of all planes will have wiring faults within the first year.

The hazard of these pervasive "wet arcs" has prompted the development of arc fault circuit breakers. Ordinary circuit breakers are heat-sensitive bimetal elements that trip only when a large current passes through the circuit long enough to heat the element. This power may be on the order of 1000 percent of the rated current for 0.35 to 0.8 seconds. By comparison, a single arc fault may last only 1.25 ms, and a series of events may last 20–30 ms; too fleeting to trip the circuit breaker, these arc faults can nonetheless cause catastrophic local damage to the wire. Fires have been known to break out with the breaker still intact.

Wire troubleshooting is still very much a hands-on art that has changed little over the last 40 years. Among the techniques in current use are visual inspection, impedance testing, and reflectometry. Visual inspection is still the most common way to check for wiring failures. It entails accessing the cables and then carefully checking the insulation for holes and cracks, often no larger than the head of a pin. Whole sections of wiring never get inspected: chafed insulation can be hidden under clamps or around corners, or within multi-wire bundles, some consisting of 75 or more wires; and many wire bundles are built right into the structures of aircraft.

Another approach involves measuring the cable's resistance and/or capacitance. A low resistance means the cable is "good,"

and a high resistance means that it is broken. Capacitance is proportional to cable length. While these methods can locate a hard fault on a single (unbranched) cable, they cannot locate small faults or faults on branched networks.

Few wiring problems end in disaster. There is cause for concern, though, as the air fleet continues to age, and our reliance on air transport grows. While an aircraft's other major systems undergo preflight testing and regular inspection and maintenance, it's central nervous system–wiring–has been long neglected. Sorely needed are new maintenance methods that account for the aging of wires, as is done for aging structural and computer systems.

Diagnosis is good. Prognosis is better. And prevention is better still. The latter may require a new way of thinking for LAMEs, who tend to be more at home with obsolescence than geriatrics. Aircraft owners need to be educated to understand that wiring is not designed to last forever and that wiring must be replaced. If the owner is doing an upgrade to a system that has been in the aircraft for over 20 years, it might be a good time to replace the older wiring, rather than trying to save costs by re-using the older wiring. By trying to reuse older wiring they are actually creating a false economy and potentially leaving a dangerous situation in place.

Normal Maintenance findings

Findings include broken wires, cracked insulation, exposed conductors and breaches/shorts through the insulation. Other wire anomalies may include reportable significant conditions such as delaminated wire, severe embrittlement, burnt wires possible from flash-over, and "traumatic damage to wires" whatever you think that means. If we had the data to analyse trends, I expect we would find that each aircraft is unique. There probably wouldn't be any way to correlate hours, cycles, or age to the incidents of known problems.

CASA Transitional Problems

As the timeframe to transition to Part 42 and 145 fast approaches, does CASA have enough resources allocated, or do they have enough resources period.

This is a CASA created regulatory change and it is encumbered on CASA to resource the change process so that the least amount of disruption happens to commercial aviation in Australia.

Much of the problems have been expressed as industry issues but, from an industry viewpoint, most of the problems have been the lack of strategic management of this massive regulatory change.

The introduction of CAMOs has not been without pain. This creation of an independent certificate holder to manage an operator's airworthiness and maintenance control has not been well managed according to our members.

A better transitional change mechanism would have removed some of the confusion.

In reality, the task was being done by one or more personnel involved with the AOC. Separating those people and 'approving' them as an organisation has been a principle behind the regulatory change.

Many have become confused with the HAMC in the Act and a CAMO. The CAMO is another independent organisation that has contractual responsibilities to the operator. Section 28 of the Act includes key personnel of an AOC holder as:

(c) the head of the aircraft airworthiness and maintenance control part (if any) of the organisation; and

(e) any other position prescribed by the regulations.

Some members are quick to point out that every legislative change invoked has reduced the number of regional towns being serviced by air.

The major reason for the reduction of services is that the cost of air transport is increasing at a higher rate than other modes of transport. Some of those costs can be attributed directly to aviation regulations.

Regulatory development is no longer about creating regulations that will facilitate safe rural air transport, but creating a regulatory system that can be micro-managed.

Regional Australia will be the loser once these new rules are fully implemented.

Maintaining to Design Standards

When an aircraft comes into an AMO for maintenance, the maintenance workforce simply performs the routine and/or non-routine maintenance iaw the manufacturers' data and/or the modification/repair on-going maintenance data and NAA promulgated advisory material applicable to the task.

How many chief engineers, supervising LAMEs think about the aircraft's approved design standards?

There are instructions on how to do a maintenance task in the above data but to what standard is the maintenance performed.

The whole purpose of any maintenance is to keep the aircraft in an airworthy state. That airworthy state is the design standards that the NAA approved the aircraft to as specified in the aircraft's Type Certificate Data Sheet.

The TCDS clarifies that the aircraft is certified to a design standard and the specific standards under the design standards that have been applied.

When a LAME releases the aircraft to service, does he/she realise that he is signing to say the aircraft has been returned to its design standard with relation to the specific maintenance that has been performed.

What the LAME signs is that the aircraft continues to meet its design standards. In other words, the aircraft 'conforms' to its design standard.

Each aircraft can be slightly different even though they are all listed on the TCDS.

This happens because manufacturers are continually introducing "product improvements" during manufacture. Product improvements are traced by the manufacturer serial numbers. Each aircraft has a "build specification" that the manufacturer uses to ensure spare parts associated with the 'build specification' are supplied.

In some cases, the product improvements can be added to an aircraft post manufacture. This is normally done by the manufacturer issuing a SB, SL, etc. In some cases, these changes may also be mandated by the NAA.

Product improvements may also introduce or repeal some maintenance actions, so it is imperative that the aircraft records are properly maintained by the operator.

To ensure the aircraft continues to meet its design standards, chief engineers and supervisory LAMEs need to be fully conversant with aircraft and its equipment design standards before returning the aircraft to service.

For example, many aircraft markings standards only exist in the design standards—they are not always listed in the AFM or MM.

Or, how many spare fuses are carried within reach of the pilot is also specified in design standards and, in many cases, not in the AFM, MM, etc.

Rural Use of UAVs — The Future is Here.

Large corporate farms already use remote-sensing technologies like satellite monitoring, aerial photography and GPS coordinates to help keep track of their crops. But they've been looking for relatively inexpensive and semi-autonomous systems that can work in real time and help them inspect crops in greater detail.

Small and inexpensive drones can be flown unregulated over private land to take high-resolution images of crops. That would help farmers with issues like how to pinpoint treatments of fungal plant infections rather than spraying an entire field. Experts say an aging generation of farmers in the U.S. are struggling to keep up with the food needs of a growing global population. So these new agricultural drones could help them get the largest yields possible. And they may also create a new industry.

Imagine the lowering of costs and time to carry out fence inspections of rural properties in Australia.

The market for agricultural drones lies in the technology's ability to provide farmers with a bird's-eye view of their land. Historically, farmers have walked their land or used small aircraft to survey the land from the air, but the costs of an aircraft can quickly run into five figures, there's strong demand for cheaper alternatives — that is where drones come in.

Senate Aviation Accident Report — 5/2013

Available at: Senate Reports—Aviation

It is a sad indictment on our industry when this report has to make the following statement:

"*Finally, the committee notes that many submitters and witnesses provided evidence in camera due to fear of retribution, particularly from CASA, were they to go public with their concerns. Many who chose to give in camera evidence did so in the knowledge of protections provided by parliamentary privilege. The committee also notes that this reticence to speak in public has been apparent for each inquiry this committee has conducted in this area over several years, and finds this deeply worrying. Given the positive statements made about the inquiry by CASA Director of Aviation Safety, Mr John McCormick, the committee trusts that concerns about retribution are unwarranted. There is an obligation on CASA to allay these concerns that retribution could follow speaking out, which appear to be widespread within the aviation industry. The committee stresses that it takes the protection of witnesses under parliamentary privilege very seriously. Witnesses—whether public or in camera—should suffer no adverse consequences from providing evidence to the committee. Given the numerous concerns expressed, the committee will be monitoring this situation carefully.*

If Australia is to remain at the forefront of open, transparent and effective aviation safety systems, then the goal of this committee is to help our organisations to work transparently, effectively and cooperatively. Ensuring that a systemic approach to aviation safety is in place is the best way to maximise outcomes."

There are a number of recommendations contained within this report. Many are associated with ATSB and their methods and findings relating to the accident at Norfolk Island. Some relate to CASA and their involvement and what should be changed. Read the full report.

"Recommendation 7

4.87 The committee recommends that the Transport Safety Investigation Act 2003 be amended to require that the Chief Commissioner of the ATSB be able to demonstrate extensive aviation safety expertise and experience as a prerequisite for the selection process.

Recommendation 11

6.52 The committee recommends that CASA processes in relation to matters highlighted by this investigation be reviewed. This could involve an evaluation benchmarked against a credible peer (such as FAA or CAA) of regulation and audits with respect to: non-RPT passenger carrying operations; approach to audits; and training and standardisation of FOI across regional offices".

Recommendation 12

6.55 The committee recommends that CASA, in consultation with an Emergency Medical Services industry representative group (eg. Royal Flying Doctor Service, air ambulance operators, rotary wing rescue providers) consider the merit, form and standards of a new category of operations for Emergency Medical Services. The minister should require CASA to approve the industry plan unless there is a clear safety case not to. Scope for industry to assist as part of an audit team should also be investigated where standardisation is an issue. This should be completed within 12 months and the outcome reported publicly.

Recommendation 13

6.58 The committee recommends that a short inquiry be conducted by the Senate Standing Committee on Rural and Regional Affairs and Transport into the current status of aviation regulatory reform to assess the direction, progress and resources expended to date to ensure greater visibility of the processes.

Recommendation 26

10.35 The committee recommends that in relation to mandatory and confidential reporting, the default position should be that no identifying details should be provided or disclosed. However, if there is a clear risk to safety then the ATSB, CASA and industry representatives should develop a process that contains appropriate checks and balances.

FAA to Review FAR Part 23

The FAA will investigate possible changes to policy rulemaking for aircraft certified under FAR Part 23. As well as certification standards, the review is expected to encompass maintenance and operations. The review comes after a two-year study, based on the fact that, "The last thorough review of Part 23 requirements occurred more than 25 years ago," said the FAA. "These efforts will affect the next 20 years of small airplane design, certification and operations." Among the recommendations of the study is that design, certification and operational parameters should be based on the aircraft's performance and complexity, rather than the form of propulsion and weight as is the case now.

Become a Member

The adage "there is strength in numbers" is absolutely true when it comes to influencing government regulations and policy. No one company, no matter how big or successful, can keep up on all the regulatory issues directly impacting businesses.

AMROBA is dedicated to serving the businesses that are responsible for the in-service continuing airworthiness of aircraft and aeronautical products, including the manufacture of replacement parts for in-service aircraft. This segment of the industry has never had a dedicated advocate until now.

AMROBA membership form is available from the AMROBA website: http://amroba.org.au/become-a-member/

print the membership form http://amroba.org.au/index.php/download_file/view/15/

AVIATION MAINTENANCE REPAIR & OVERHAUL BUSINESS ASSOCIATION, inc

Postal Address:

PO Box CP 443
Condell Park
NSW 2200

Phone: 61 (0)2 9759 2715
Fax: 61 (0)2 9759 2025
Email:
amroba@amroba.org.au
inquiries@amroba.org.au
Website:
www.amroba.org.au

Protecting Assets

One of the realities of operating in a litigious society is the amount of actions that one has to take to protect one's assets. Some of our members have experienced being sued for damages based on their work, only to find that their hangar keepers insurance does not protect them and their assets, that are then liable to being included in any findings against them in a court.

A common form of asset protection is to ensure that those at risk do not own any assets. In the case of a business, this means the business is carried on in one entity and the business assets held in another entity, or at least the business premises being held in a separate entity. The asset owning entity can rent the assets to the business entity.

Personal assets should also be separated from business assets so that if the business gets into financial difficulty the personal assets are not at risk. Similarly, if an individual gets into financial difficulty the business assets can be protected if the individual does not own them. They can be put into a trust.

The basic function of a trust is to separate control and ownership. The result is that asset protection is possible and profits can be distributed in the most tax effective way.

What you need to get your head around is this: when you establish a trust of your own, you have both legal control *and* beneficial ownership. Most people don't separate the hats; they think they are one and the same.

Ownership plays a key factor in not just asset protection but within the tax system, too. This is why a 'player' will endeavour to own *nothing* and control everything!

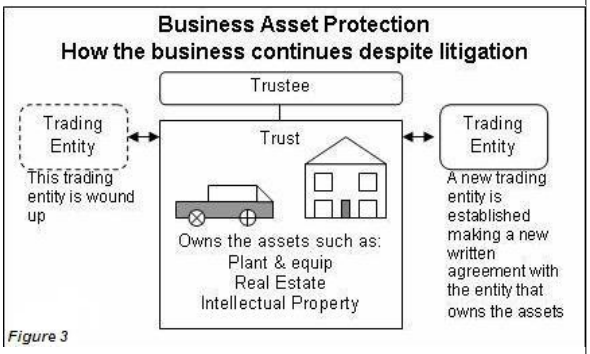

Figure 3

There are many benefits to structures such as companies and trusts and they are just one way that a person can use trusts to his or her advantage.

Hope this helps our members in deciding how they should protect their assets from the litigious society we live in today.

The Aircraft Maintenance Engineers/Technician Creed

Worth Remembering

"UPON MY *HONOR I swear that I shall hold in sacred trust the rights and privileges conferred upon me as a qualified aircraft maintenance engineer/technician. 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 qualified 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 qualified aircraft maintenance engineer/technician, 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."*