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A U.S. Army AH-64D Apache helicopter prepares to land aboard Afloat Forward Staging Base USS Ponce (AFSB(I) 15), during an exercise.

U.S. NAVY, JON RASMUSSEN



MILITARY

Military Maintenance Adapts to New Realities

The mantra "better, faster, less costly" is increasingly embedded in the way warfighters maintain their flying machines

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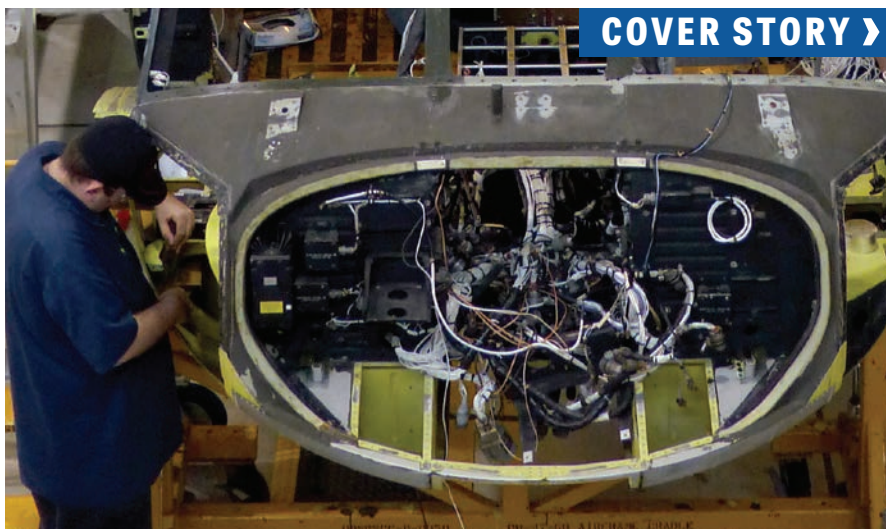
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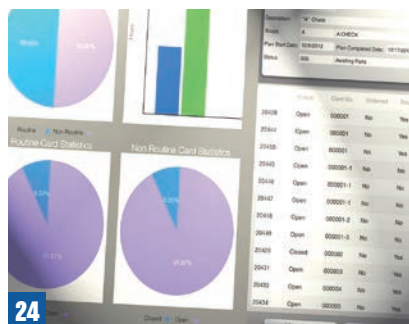
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The Need for New Tools

Today's tools come from a different toolbox and include awareness, continued education, and an understanding of new requirements

In this month's issue we look at several *tools* used in aircraft maintenance that are designed to make your operation more efficient. Kirk Baugher in his article titled *Mobile Applications Drive Advancements in MRO Productivity* describes how technology advancements have driven mobile apps to increase revenues, reduce costs, improve cycle times, and reduce the risks associated with adherence to compliance and quality mandates.

Paul Krupa describes how advances in abrasives technology with 3-D construction enables surface conditioning to fit into hard-to-reach places on aircraft in his article *Plight of the Contour*.

We also take a look at how visual inspection through modern day tools like videoscopes can enhance your inspection activity of hard-to-access areas and capture photos and video for future reference.



For questions, news tips, email comments, email ron.donner@AviationPros.com

Tools don't always come from the traditional toolbox these days. This month's cover story by Jerome Chandler takes a look at how the military has followed civilian maintenance philosophy through cost-conscious concepts such as condition-based maintenance — another tool in today's toolbox. His article titled *Military Maintenance Adapts to New Realities* describes how the mantra better, faster, less costly is increasingly embedded in the way military maintainers keep their aircraft flying longer and safer.

Last month's issue of *AMT* was focused on work force development, recruitment and hiring trends, and a few advancements in maintenance training. *AMT* is pleased at the positive responses received from readers further supporting the fact *AMT* is the resource for current and upcoming aircraft maintenance professionals. As an add on to this Jerome Chandler also describes some of the U.S. Army's initiatives (tools) to keep young maintainers or Millennials engaged in learning through use of virtual training aids.

On the business aviation front, Jim Sparks in his article *The Business of Maintaining a Business Aircraft* offers a flight department's aircraft need to be viewed as a corporate asset. As such these assets must be managed accordingly. It only makes sense that maintaining and managing this valuable asset is a responsibility of those responsible for continued airworthiness.

Neil Brackin, Director, Air Transportation for General Mills Inc., couldn't agree with Jim more. In this Corporate Flight Department profile, Brackin describes how aircraft technicians today have taken on the role and responsibilities of being an aircraft maintenance manager, requiring special skills (more tools) in the areas of maintenance planning, proposals and cost analysis, budgeting, and the very important involvement in managing an operator's safety program.

New responsibilities and changing roles mean new tools. The tools of many of today's maintainers come from seeking knowledge and continued education and *AMT* is another item in your toolbox.

Enjoy the issue, Ron

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Plight of the Contour

How new abrasives technology with 3-D construction enables surface conditioning to fit into hard-to-reach places on aircraft

By Paul Krupa

As materials science and manufacturing technology continue to advance by leaps and bounds, so too does product design. As a result, across various industries such as aerospace and automotive, more complex parts are being developed for enhanced performance. In aerospace, for example, passenger jets are being constructed with contoured and seamless parts using advanced metals and metal alloys chosen for their unique properties.

According to Boeing, advanced aluminum alloys are used in the wing and fuselage skins of airplanes such as the Boeing 777 for their strength, ability to form complex shapes, and relatively low weight. The contoured shape of the 777 wing allows for less drag, while raked tips offer increased aerodynamic efficiency. With similar performance goals, the automotive industry is using lighter and stronger metals that allow them to manufacture safer vehicles that also provide a high level of fuel economy. Automotive manufacturers are using an increasing amount of aluminum and aluminum alloys in contoured external body panels for durability and lighter weight. The new 2014 BMW i8, for example, features a lightweight aluminum frame contoured for reduced drag coefficient and increased speed.

In addition to performance benefits including increased lightweight and durability, these parts are having a cascade

effect across common industrial practices, including maintenance, repair, and overhaul (MRO). Take surface finishing, for example, a process that uses abrasives to change or improve the surface of a manufactured product to achieve a desired property. Surface conditioning discs are often used to perform tasks such as removing marks, burrs, and other imperfections that can occur during initial machining. Surface conditioning discs are also used to enhance performance, such as increased adhesion, solderability, and durability, as well as corrosion and chemical resistance.

However, contoured parts make it more difficult to reach all surfaces, and require additional products, tools, and process steps to complete a particular job. This complexity can lead to overall reduction of productivity and may require additional labor, overhead, and consumables costs. The good news is that surface finishing technology has caught up with advanced material and design, offering next-generation abrasives products that enable MRO shops to reach all contoured surfaces.

Game-changer

Like trying to fit a square peg into a round hole, contoured surfaces introduce what are referred to as “dead zones,” or areas that conventional surface conditioning materials simply cannot reach due to their inherent design limitations (See: Figure 1). In order to finish a job properly, an operator then needs to

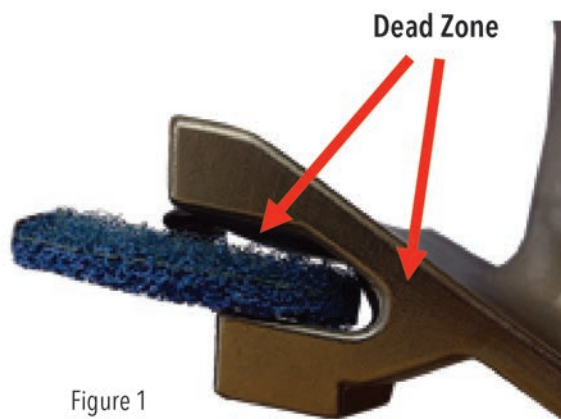


Figure 1

Conventional surface conditioning discs cannot conform to irregular surfaces, leaving “dead zones” unfinished and requiring additional process steps to complete.

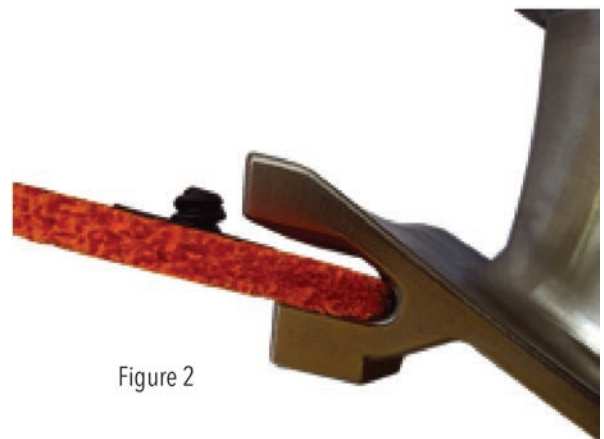


Figure 2

With 3-D construction, all three faces of the next-generation surface conditioning discs can be used to reach “dead zones” in one step.

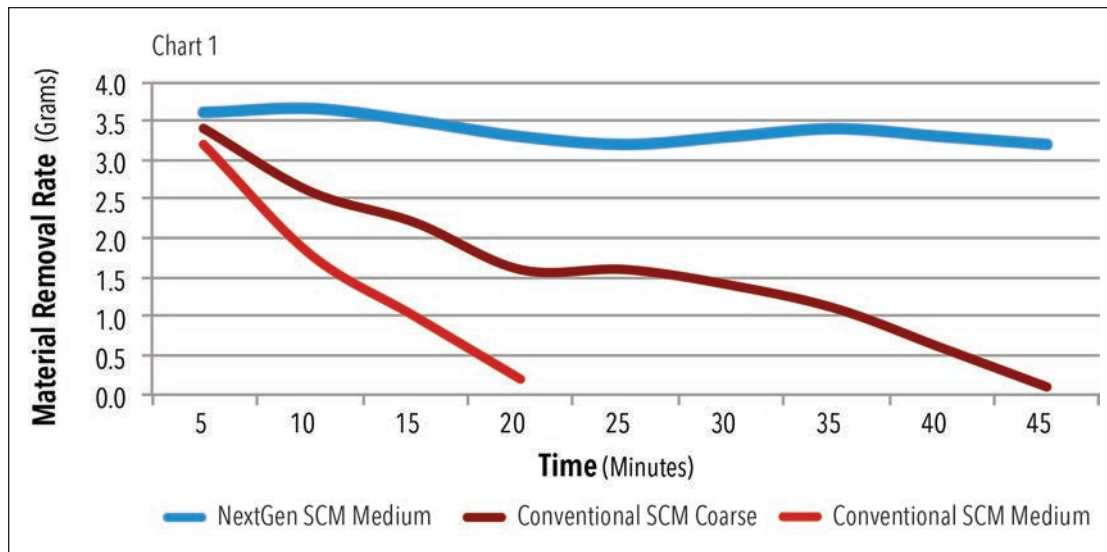


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Next generation abrasives technology generates consistent cut rates and RA Values from beginning to the end of useful life lasting up to 4X longer than conventional aluminum oxide SCM products.

insert another process step using additional surface conditioning products. This results in longer cycle-time, as well as increased labor and material costs. In these instances, next-generation, non-woven abrasives with three-dimensional (3-D) unified materials become a game-changer; allowing operators to reach all surfaces using one product and process.

How does it work? Materials science expertise and innovation in abrasive product design have combined to yield enhanced surface conditioning discs featuring a non-woven substrate impregnated with an aluminum oxide (A/O) aggregate grain, non-smear resin technology and the 3-D construction vital to getting into hard-to-reach places (See Figure 2). "Three-dimensional" means that all three faces or sides of a surface conditioning disc can be used during grinding to achieve results. An operator utilizing 3-D unified material can put all three faces of the product to work, accomplishing the task faster using only one product throughout.

In addition to 3-D grinding, these advanced non-woven abrasive products provide various additional performance benefits. With unique non-smear resin technology, MRO jobs can be accomplished without leaving behind any residue that requires a separate product and process step to clean. An open web structure also resists loading on relatively soft materials, such as aluminum – an important benefit when you

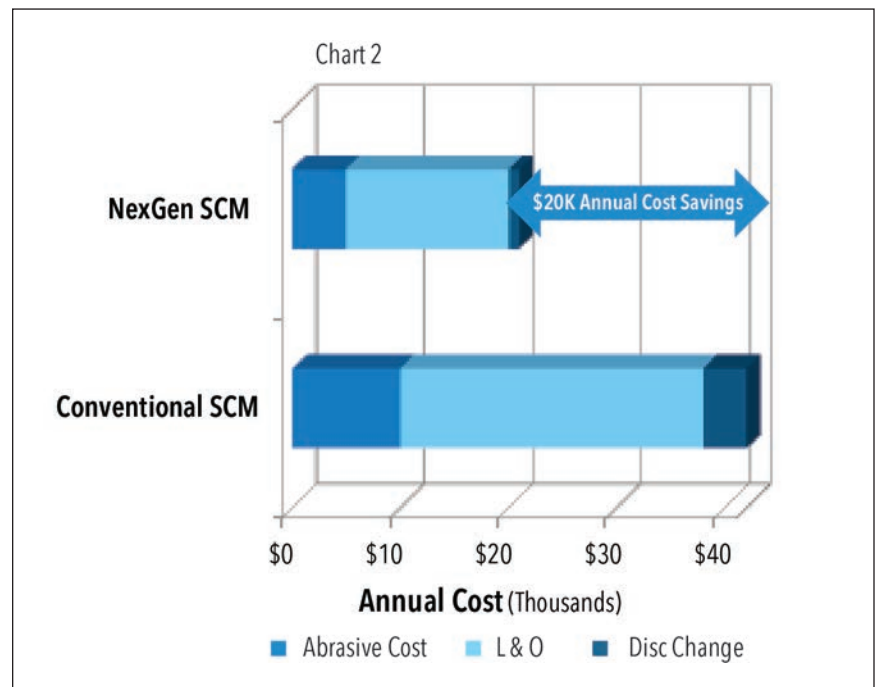
consider the increased use of aluminum and aluminum alloys in aerospace and automotive product design.

These breakthroughs provide upward of four times the performance in cut rate and surface coverage. Comparisons to conventional surface conditioning materials show a longer product lifecycle, consistent cut rate, and superior finish from beginning to end (See: Chart 1). This allows MRO shops to reduce or eliminate steps in a surface improve-

ment process for increased throughput without requiring additional resources.

Reduced labor costs

So how much can MRO shops actually save using next-generation abrasives? To provide a baseline for comparison, assume that an average MRO operation spends approximately \$10K a year on surface conditioning materials (aka "consumables"), and that labor and overhead is set at a \$50 hourly rate.



Next-generation abrasives maximize efficiency and cost savings with faster performance, reduced labor, overhead, and cycle time, reducing total costs by more than \$20K annually.

Using a right angle grinder on a piece of 1018 carbon steel 2" x 2" with heavy scale and corrosion, the operator uses as many conventional and next-generation non-woven quick change discs to prep the piece of metal. It takes the operator an average of 15 seconds to change out spent discs for new ones, using as many discs as needed to complete the task.

Field tests show that the next-generation material performs the work much faster with fewer disc changes, requiring significantly less labor and overhead. Extremely durable, the overall abrasive costs are also lower, as the operator does not need to change discs as often, performing more work with fewer consumables, reducing total costs by more than 50 percent, or approximately \$20,000 in annual cost savings (See: Chart 2).

Recent advances in aerospace and automotive materials and design

have resulted in seamless contoured parts providing much sought-after performance enhancements such as increased speed and better fuel economy. However, these contoured parts have proven difficult during MRO applications using conventional surface conditioning products finish. The irregular shapes of many complex parts create "dead zones" that conventional surface conditioning products simply cannot reach, requiring additional time, labor, and material costs in order to complete.

Next-generation non-woven surface conditioning discs with 3-D construction can conform to irregular shapes, performing in hard-to-reach places. Using three faces instead of only one, operators can finish a contoured piece in less time; requiring far fewer resources. In addition, these innovative surface conditioning products feature non-

smear resin technology, eliminating yet another process step – removing any residue left behind. Long-lasting, high-performance non-woven abrasives can reduce overall time, labor, and material requirements, increasing the productivity of any MRO operation, as well as their bottom line. **AMT**

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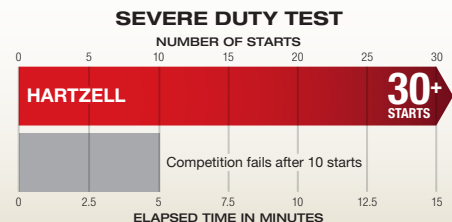


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The Business of Maintaining a Business Aircraft

By Jim Sparks

Just how do you end up with a small fortune in an aviation business? Many would say to start with a large fortune!

Business, by definition, is an organization involved in the trade of goods and/or services to consumers. They are prevalent in capitalist economies, where many are privately owned and in some cases do exist as not-for-profit. Well-run organizations have a plan and supporting structure, which enables them to achieve predetermined goals.

The business aviation community consists of companies of all sizes that rely on many different types of aircraft — from single-pilot types, to turbine aircraft that fly internationally, helicopters that survey rush-hour traffic, transport executives, or manage agriculture or game. There are also the support organizations such as the fixed-base operators and other services that support flight operations at the nation's 5,000 public-use airports. The vast majority of businesses utilizing aircraft are small- to mid-size companies.

Business aviation is considered the use of any general aviation aircraft for the purpose of conducting business and the FAA considers a general aviation flight to be anything not operated by the military or scheduled airlines.

Many employed in technical fields tend to shy away from business as it brings to mind thoughts of accountants, lawyers, and layers of bureaucracy. However, employing sound financial and managerial tendencies in day-to-day aircraft maintenance

Employing sound financial and managerial tendencies in day-to-day aircraft maintenance operations does make cents — as in, watching the pennies will allow the dollars to take care of themselves

operations does make cents ~ as in, watching the pennies will allow the dollars to take care of themselves.

Corporate assets

An aircraft needs to be viewed as a corporate asset and must be managed accordingly. While various companies employ unique strategies regarding treatment of their assets, it only makes sense that those responsible for continued airworthiness also be aware of preserving the value of the asset. In some cases companies will tend to keep equipment in service for a set number of years. This may align with warranty periods and even financial depreciation schedules. Some analysts recommend trading the aircraft at a specific age while others believe in reinvestment. Once paid for there is less debt and the cost of refurbishment may be only a fraction of a new acquisition. However, when the market for used business aircraft is weak, then decisions need to be carefully made regarding upgrades. It may not make good financial sense to invest in new avionics or cabin communications if the investment will never be recovered.

Corporate flight departments

Caring for a business aircraft is by no means standardized. Corporate flight departments have varying mission statements although most do concentrate on providing safe, reliable, on-demand transportation. In fact, the majority of member companies in the National Business Aviation Association (NBAA) do not have their own dedicated maintenance department. They depend on local maintenance organizations or indi-



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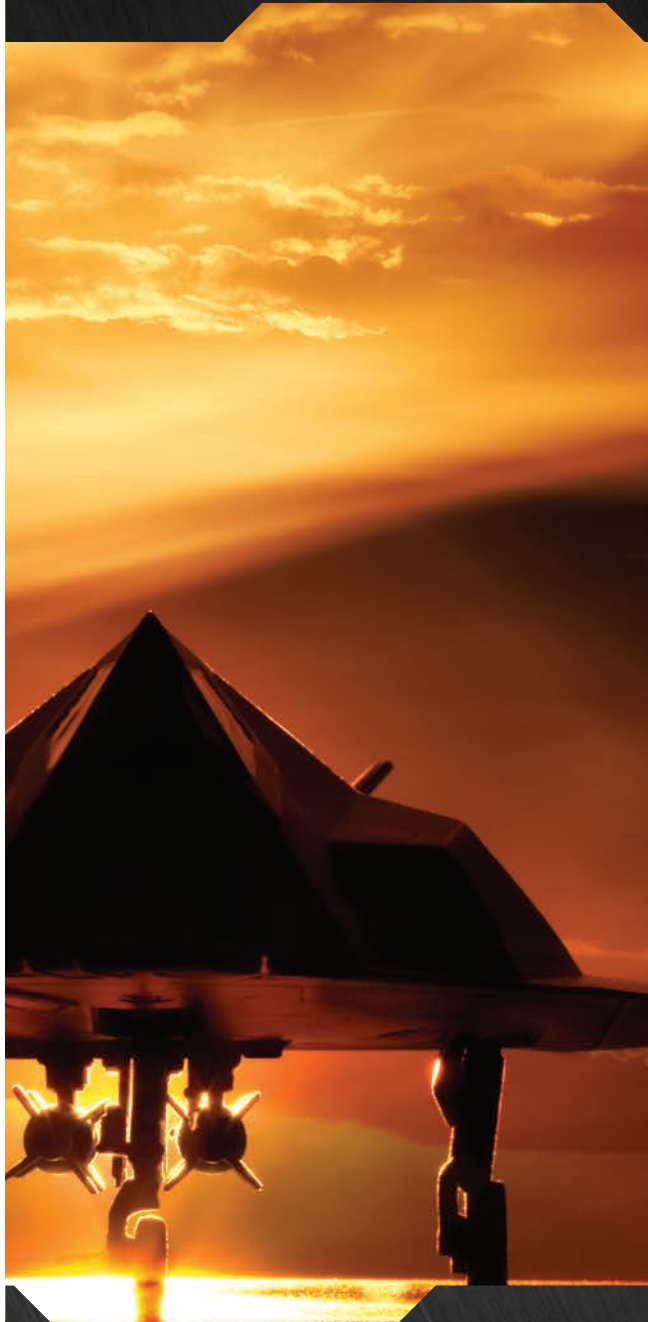
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viduals and service centers. Those operations that do include a maintenance department have varying capabilities starting with aircraft launch and recovery, correcting malfunctions, and scheduling inspections. There are also those that can be totally self-sufficient. Manpower in these departments often is the key to capabilities. In the world of corporate aviation the A&P endorsements literally mean "All Purpose" which means a routine day could involve anything from changing a tire to troubleshooting a digital high-speed data network.

The traditional "need to know" for the aviation technician is rapidly being replaced by a new repertoire of capabilities requiring a vastly expanded level of technology insight. Enabling technicians to gather this new knowledge is not an easy task or a quick process. Qualifying technicians in service centers or those working for manufacturers is another challenge. Getting the word out has been slow. In fact the NBAA has very recently partnered with organizations such as the Aircraft Electronics Association (AEA) to create a new standard for technicians entering the field: NEXTTECH for NEXTGEN.

In recent years the cabins of business aircraft have been transformed into a modern office in the sky where the basic machine has to be fit for flight, or airworthy, while the cabin must be fit for mission. This may include enabling the passengers' mobile communications devices to connect to the onboard networks.

Skill sets

What are the skill sets needed to succeed in the world of maintaining a business aircraft? First, the traits required in keeping the machine airworthy. These include many of the basic skills already known to the Airframe and Powerplant technician.

We are already recognized as craftsmen, mechanics, evaluators, and analytical thinkers. Most have learned we need to be communicators but the often unconsidered skills include: asset manager, negotiator and risk manager, cost analyst and in most cases with newer aircraft, network or IT manager.

When overseeing corporate assets such as a business jet and associated supporting equipment, value metrics are often applied. These include: passenger comforts, required dispatch reliability, aircraft availability, and operating costs. These metrics must be weighed depending on corporate culture. If dispatch reliability is essential then more preventative maintenance may be required along with a larger inventory of parts. This of course translates into higher operating cost. Having the aircraft available more demands performing ongoing maintenance around the prevailing schedule and may possibly require outsourcing work to service providers when the aircraft is on the road. Continuous inspection programs enable operators to accomplish segments or phases of inspections in either a flight hour block or a calendar block depending on predicted utilization. In a smaller flight department with an aggressive flight schedule this type maintenance can be a detriment to the personal lives of the technicians as it may require off-hour maintenance followed by normal launch and recovery operations.

Operating costs are measured differently based on corporate culture but mostly include: fuel burn, hull insurance and

engine reserves, maintenance costs, and crew expense. Other incurred costs such as hangar, line services, and catering may also be factored in.

Aging aircraft

Technology is another driving factor when it comes to managing an aircraft. As aircraft age, they tend to require more maintenance and repair. Inspections become more invasive and required downtime to return to service tends to become unpredictable. Another driving factor is whether the model aircraft is still in production. Often when a manufacturer discontinues a particular type there is less incentive to provide high levels of product support. In some cases within a few years of being discontinued, readily available parts inventories begin to diminish and costs escalate. Often the most effective tool in predicting long-term operating cost of an out-of-production aircraft is subscribing to a service such as Conklin & de Decker that collect industry data to provide insight for budget calculations. Predictability is a feature evolving out of MSG-3 maintenance programs and in the not-too-distant future it is anticipated many of today's unscheduled removals will be forecast.

Worldwide regulatory agencies also influence the viability of operating older aircraft. Advancing technology often mandates

new equipment. Unfortunately upgrading an aircraft manufactured 20 years ago will be both challenging and expensive. Investing funds in an aircraft that may already be devalued due to market conditions may make a newer aircraft more viable.

The most important asset in any flight department are the employees. They ultimately preserve and in fact increase the value in any aircraft operation. With the right mix of people, this human asset does not require management but leadership and guidance coupled with education, motivation, and congratulations.

Strange thing: how the companies with the happiest employees are most often the ones with profitability and longevity.

Strange thing, Business! **AMT**



JIM SPARKS has been in aviation for 30 years and is a licensed A&P. His career began in general aviation as a mechanic, electrician, and avionics technician. Currently when not writing for *AMT*, he is the manager of aviation maintenance for a private company with a fleet including light single engine aircraft, helicopters, and several types of business jets. You can reach him at sparks-jim@sbcglobal.net.

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A Look at General Mills' Corporate Flight Dept.

In operation for 64 years with 121,000 safe flying hours, it focuses on education and training, professional development, SMS, avionics upgrades, and more

By Barb Zuehlke



The General Mills corporate flight department in Minneapolis operates three Cessna Citation X aircraft and currently has five technicians with more than 93 years of combined experience.

"The majority of our maintenance is accomplished in house with our maintenance team," Neil Brackin, Director, Air Transportation, says, "but occasionally

The General Mills corporate flight department includes technicians Derek Popp, Houston Kirkeide, Brad Sharp, custodian Paul Gunderson, aviation director Neil Brackin, Eric Olson, and Steve Schlessler (not pictured).

we will send inspections to a MRO facility when the tooling and/or time required to accomplish them is not cost effective or efficient for our flight department."

General Mills has operated a flight department for 64 years and has accumulated 121,000 safe flying hours in

that time. The current fleet of Citation X's are flown primarily to destinations in North America with occasional trips to Europe or South America as required for the business.

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Custodian Paul Gunderson, Derek Popp, Brad Sharp, Eric Olson and Houston Kirkeide next to the IS-BAO registration poster.

rate flight maintenance staff to discuss current trends and topics important to them and business aviation as a whole.

Q: What factors do you use when choosing an MRO/maintenance provider?

A: Some of the things we look at when deciding on a MRO facility is quality of work, reputation within the industry, our relationship with the provider, capabilities, and of course cost.

Q: How do you keep your technicians trained?

A: The majority of our formal training comes from FlightSafety International, and all of our technicians attend the aircraft specific initial course within the first couple months of employment. Also since General Mills is so education positive, our technicians are encouraged to attend all of the aircraft specific courses that FlightSafety offers

so they can obtain the Master Technician Award. We also have a good amount of OJT within our facility. We are a certified repair station with an approved training manual and training program. Our OJT program revolves more around our processes and procedures within our CRS to keep our standards high.

Q: What are the most critical issues you face today? How are you tackling them?

A: To answer this question, it depends on what level of the General Mills aircraft maintenance department you look at. Looking from a high level, the most critical issue facing our industry is educating and training the next generation of skilled AMTs. With ever-changing technology, the young minds in A&P schools need to understand and troubleshoot complex avionics and satellite communication systems.

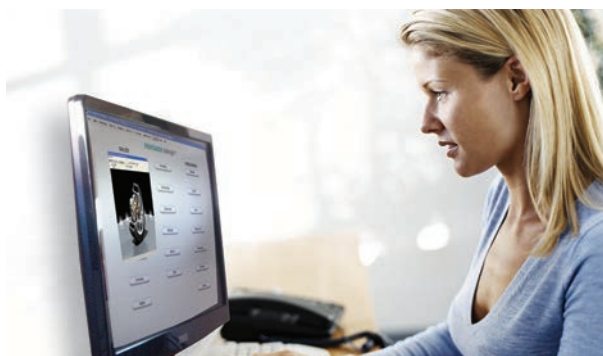
The General Mills maintenance team is involved with our community and state high schools in keeping kids interested in aviation and pursuing aircraft maintenance as a career.

Other levels of issues come in the form of operational, safety, and aircraft specific issues. The Citation 750 that the flight department utilizes is an extremely reliable aircraft and rarely does maintenance need to deal with an AOG situation. The dependability of the aircraft is a direct reflection of having an in-house maintenance staff, dedicated to keeping the aircraft in perfect order.

However, just like any other machine, sometimes they malfunction. This is the time when our mechanics come together with their years of experience and resolve the issue in the most effective way possible. That might mean a simple MEL procedure or a short notice road trip.



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Either way, the aircraft gets back in the air with little or no interruption to our passengers.

From an operational standpoint, I would say the most critical issues in the department are the changes happening in the repair station manual. The manual was functional for the repair station up to this point, however it is a living document that needs to change with the operation. There are some exciting and needed changes that will be occurring when the manual gets approved in the near future. It will then be everyone's job to make sure that the transition to the new manual procedures are seamless and effective.

Last (certainly not least), critical safety issues are handled by our SMS program that is in place for our technicians. Each safety or operational concern is documented with standardized procedures and resolved quickly with minimal "red tape" to cut.

Q: What are some of the critical issues you see the business aviation segment is faced with?

A: Having a shortage of properly trained skilled aircraft maintenance technicians (AMTs) to fulfill the industry requirements will probably be an issue. It seems that there are fewer young people making the career choice to become AMTs, which has resulted in A&P schools closing and this may eventually make the problem much harder to recover from. In addition, AMTs finding their way into the business aviation sector will need to develop special skills not normally included in A&P school curriculums.

The A&P mechanic has taken on the role and responsibilities of being an aircraft maintenance manager, and as such, he/she will require special skills in the areas of maintenance planning/evaluating proposals/cost analysis and budgeting/aircraft upgrade decisions, and managing the safety program to name a few. These skills usually require a self-motivated person to take advantage of work experience and industry training in these areas to become successful. Developing these skills and being a professional in the business aviation maintenance industry will be one of the greatest challenges for business aviation.

There is not a clear path for upgrading older aircraft to comply with the latest avionics and navigation systems being installed in most current production aircraft. The upgrades I am referring to are those that comply with FANS, WAAS, as well as many cabin and cockpit "latest and greatest" features. In some cases, the current installed equipment may not be upgradable and will require a completely different system to be installed, which could be very costly and may also result in a great deal of downtime for the aircraft. Accomplishing these upgrades of the avionics and navigation systems will be a challenge for aircraft maintenance service centers, as the volume may potentially be overwhelming.

Q: How involved are you in making aircraft upgrades? Who makes aircraft decisions. How do you find out about aircraft and/or interior/avionics upgrades?

A: The maintenance department is very involved in the decision-making process for aircraft upgrades. We ensure awareness of possible upgrades through discussions with peer companies within the industry, local avionics shops (such as MSP Aero), maintenance/avionics sales personnel, trade publications, trade shows (like Minnesota Business Aviation Association's annual meeting and Cessna's Customer Conference), and information via the internet. The possible upgrades are also discussed within the flight department to ensure decisions are made with all users.

We have not had many requests from upper management to install specific systems, but find it important to be knowledgeable and ready to answer questions about our industry.

Q: What best practices does your flight department employ?

A: Maintenance best practices within our department can be summed up with our certified repair station (CRS). The CRS is audited every year by the FAA, and forces us to follow well-defined procedures and processes for just about any maintenance event, big or small. Along with the CRS, our flight department's IS-BAO registration is a great tool for identifying areas of improvement in operations and overall safety.

Between these two tools, General Mills stays focused on delivering its mission statement to the organization: To operate in accordance with the highest safety standards while continually innovating to achieve time savings, excellent service, security, and flexibility. **AMT**

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Seeing is Believing: The value of visual inspection

By Lou Angora

As the only FBO at the Rochester International Airport, in Rochester, NY, USAirports maintains a very busy schedule, including the responsibility of conducting a wide variety of inspections on general aviation aircraft ranging from a single-engine Cessna to business jets, and also operates and maintains its own charter

visual inspection is an irreplaceable part of the process.

"Aircraft are mechanical and occasionally they break. We do our best to assist our customers," says Jim Thayer, USAirports' director of maintenance. "As an FAA certified repair station, we have the service manuals on file for whatever aircraft we work on. We also service the airlines with "on-call" maintenance.



Cooling holes are examined during a combustion chamber inspection using a Hawkeye V2 Videoscope.

GRADIENT LENS CORPORATION

department where aircraft readiness is paramount. That means the maintenance teams need to quickly diagnose any problems they might find and either begin repairs, or refer the client to specialized repair facilities. Fast, accurate,

If they have an issue we will go over and assist them. If we can fix it quickly we do. If the problem is more complex, or if they have to send parts, we will send mechanics and assist them as needed with support or tools, etc.," Thayer says.

Fast, reliable inspections

"Fast, reliable, visual inspection is essential to everything we do," Thayer says. "Often what we need to see is very hard to access. That's when we use a borescope. The portable Hawkeye V2 Videoscope we use gives us the ability to take the scope to any part of the aircraft. Even more valuable is the teardown time it saves us, often just to take a quick look at something. Visual inspection is 90 percent of what we do for inspection. We can insert a borescope and immediately have visual access to areas that we wouldn't be able to reach without some major disassembly," Thayer says.

"Sometimes there is no access other than a small drain-hole we can only get a 4 mm scope through," Thayer continues. "One example that comes to mind is the Beechjet. The horizontal stabilizer has an issue with the side roller brackets cracking. There have been issues with these over the years and there is a repetitive inspection for this. In order to get in there and do the inspection you really need some type of borescope. We use a 4 mm videoscope, which allows us to access some very small drain holes in the horizontal stabilizer. There is just no way to visually get in there unless you start drilling out rivets and removing skin. You could X-ray it and find the cracks, but that would be very expensive and time consuming."

Save time without disassembling

Engine disassembly, for purposes of visual inspection, can be the most prohibitive. Borescopes can be the only way to get in — especially inside turbine engines. Borescopes are also used in piston engines, on occasion, in order

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TOP USES FOR BORESCOPIES IN THE AVIATION INDUSTRY

If you are an IA or AP technician in the aviation industry, a good-performing, high-quality borescope is essential to your job. Whether your specialty is turbines, reciprocating engines, airframes, or avionics, you need a quality borescope in your toolkit that you can rely on.

Borescopes are used in all facets of the aviation industry, from helicopters to military fighter jets. There's a reason for that: borescopes are able to inspect confined areas where you cannot easily see to ensure safe and reliable operation of aircraft parts including

can occur if the compressor section gets too hot. Utilizing a borescope to inspect and maintain any type of engine helps to ensure that the aircraft is airworthy.

Turbine engines in helicopters, or rotorcrafts, are located near the main rotor blades, so in order to perform any sort of maintenance on them, professionals usually have to climb up scaffolding or a ladder; this is where the features of articulating borescopes are extremely beneficial. The compact, portable design and on-demand power make helicopter

just because a borescope is able to inspect many different parts of an aircraft does not mean that some areas should not be approached with caution.

"Special care should be taken when using a borescope to inspect fuel tanks, with proper grounding being very important," notes O'Connor. "Aside from fuel tanks, as long as the scope is liquid proof and resistant to the common fluids found in various aircraft systems, a borescope can safely be used anywhere."

Borescope technicians that are approved to sign off on annual inspections certifying airworthiness will have the proper Inspector Authorization (IA) certification; but making sure to be properly educated on safety precautions when doing any kind of inspection is extremely important.

Another important reason borescopes are crucial to aircraft inspections: they allow maintenance professionals to complete 100-hour FAA inspections, necessary for a majority of aircrafts, with confidence. 100-hour inspections require photographic evidence of internal aircraft structures, which are easily captured by an articulating video borescope. Without a



turbines, airframes, winglets, landing gear, and other confined space areas.

One of the essential uses of articulating borescopes is for turbine engine inspection. Turbine engines have many internal rotating sections, as well as combustion chambers, that can be inspected with an articulating video borescope. Borescopes, which can enter directly through an injector nozzle or access port and require no engine disassembly, are able to internally inspect these blades for corrosion, wear, or imperfections such as cracks, which

turbine inspections easy to be completed.

In addition to turbine inspections, borescopes have many other aviation-related uses. According to RF System Lab's general manager, Sean O'Connor: "Applications include inspecting airframes, flap tracks, wiring harnesses, and landing gear. Additionally, borescopes are used in corrosion inspections."

In fact, a borescope can be used on just about any piece of aviation equipment. Borescopes range in size, so finding a size to fit an access port is easily managed. However,

high-quality borescope to provide documentation, maintenance professionals could put their license and reputation on the line.

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to get a look down inside cylinders. Investigating possible scoring inside a cylinder is one common example of a need for visual inspection. Once inside, a flexible videoscope, with articulation capability, can “look back” almost 180 degrees to inspect the valves.

seen with customers, colleagues, or manufacturers. Videoscopes have the capability of capturing sharp pictures, or video footage, even when the scope is very close to the subject. That’s something that’s always an issue in engines and airframes. Images and video can be

“Another good example is the engine nacelle anti ice duct inspection on the Beechjets. We inspect the ducts periodically for cracks in the mounting welds. There are four welds on the bracket that we have to inspect and we are going to use the videoscope to do it.

“Without the videoscope the process is a lot more cumbersome. Two of the welds you can just look at with a flashlight, but there are two welds, because of the angle of them, you cannot get a mirror up in there. You have to get two mirrors up in there to see the backside welds. These welds have been known to crack. That is why this inspection has been stipulated every 200 hours. We have actually found cracked welds where we have had to replace the duct assembly. It is a very important inspection.”

Get inside engines

Visual inspection is, of course, also key to engine inspections. Typical engine inspections, for example, include oil filters, fuel filters, etc. The igniters are pulled and a general visually inspection of components is conducted. In addition, the use of a videoscope, gives the inspector the ability to look inside the combustion chamber quickly and easily. Fuel nozzles can be viewed to see if there is any streaking which can cause hot spots. Within the burner can itself, you can look for cracking in hot spots from nozzle issues, for cracks, erosion, or anything that might be detrimental to the burner can itself.

It appears clear that today’s videoscopes are lightweight, fully portable, and a key tool in any FBO or repair station. **AMT**

For more information visit www.usairports.com and www.gradientlens.com/V2.



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“In the past, we used different flexible fiber-optic scopes,” Thayer says. “However, today’s videoscopes have superior image quality, and still have the flexibility and articulation we were used to. The portability of today’s videoscopes is also a key factor. You don’t need any external lights or extension cords.

“One of our tenants had a Beechjet and they wanted to look at their side roller brackets in the horizontal stabilizer. They called me and asked me to come over with my videoscope so they could look at them. You just climb up the ladder and everything is right in your hands. You don’t have to worry about pulling cords with you. It is very convenient.”

Capture data

Today, a videoscope also allow users to capture still photos and record quality video footage. This allows maintenance teams to completely document an inspection, and review what they’ve

captured and emailed to engineers, if a maintenance team is looking for guidance in solving a problem. Photos and video can also be sent to engine manufacturers asking for help in clarifying what the onsite teams are seeing.

“To describe something verbally is one thing, but if you can send a photograph with it, it just makes things so much clearer,” Thayer says. “Photos and videos of inspections also allow maintenance teams to enhance trend monitoring. That becomes especially valuable for larger fleets.”

Closer inspections

“If you are looking at or doing an inspection on rudder pedal mounts, for example, typically you are pulling floor boards and having to crawl under an instrument panel and you still can’t really get in as close as you’d like. You can’t get a magnifying glass there, so videoscopes allow, closer, better inspection and evaluation,” Thayer says.



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Mobile Applications Drive Advancements in MRO Productivity

Mobile apps can lead to increased revenues, reduced costs, improved cycle times, and reduction of risks associated with adherence to compliance and quality mandates

By Kirk Baugher

The global MRO marketplace resembles an ecosystem; there are interconnected supply chains with a variety of repair stations to perform aircraft completions, interiors, modifications, conversions, heavy maintenance, line maintenance, paint, component repairs, teardown, part-out, and recycling. MROs are fundamental to the orderly operation of the aviation industry, and established in-house and independent third-party MRO organizations serve general aviation, commercial aviation, and defense sectors.

Historical role of IT

Information technology has a long history for providing critical support to MRO organizations over the years. Systems dating back to the days of computer punch cards provided automation for early adopters, and the era of green-screen terminals enabled logistics support and process control that still lives on today within many MRO shops. Stand-alone personal computers and spreadsheets enabled much-needed



automation for small shops and departments of larger enterprises, but the age of client/server computing and relational database applications introduced a whole new set of benefits by providing integrated functionality and enterprise-class business applications.

Competitive landscape

MRO providers operate in a highly competitive environment, so in order to survive and thrive, there is a never-ending quest to improve efficiency and effectiveness of operations. Lowering materials and labor costs are always a top focus, and improving turn-around times can provide a competitive advantage over rivals. Information technology is playing an expanding role in today's most successful MRO organizations in order to boost performance and gain competitive advantage.

Ever-increasing requirements

In order to succeed in a fast-changing and competitive marketplace, today's leading MRO firms have developed operating strategies that include lean supply chains, continuous quality improvement, and aggressive turn-around times. In best case scenarios, careful planning can ensure optimal performance; however, unplanned work and nonroutine tasks can lead to chaos for hierarchical organizations that are not equipped to handle adversity.

Today's interconnected supply chains

As companies move to implement and refine lean business processes, inventories have been sharply reduced, and reliance on key suppliers has become more vital. Electronic tools that provide supply chain visibility allow MRO

organizations to quickly locate and procure critical parts and components and prevent disruptions to tight schedules. MROs have become increasingly more dependent on the performance of their supply chains.

The empowered mobile work force

Just as inventories have been reduced in order to lower costs in pursuit of lean operations, a corresponding reduction in staff and overhead has also taken place within the industry. The days of monolithic purchasing departments and large dedicated planning staffs are gone and successful organizations are empowering their knowledge workers with applications and mobile devices to enable informed decision making and reduced cycle times.

New tools of the trade

With the recent proliferation of hand-held mobile devices such as tablets and smart phones, a new generation of mobile applications has emerged that provides expanded capabilities for today's aviation professionals. Mobile devices connected by secure WiFi and cellular networks are now commonplace in most industries, and a variety of devices are available that range from large tablets to pocket-sized phones. Specialized accessories are available to integrate bar code scanning and to support rugged operations under harsh conditions.

It's all about the apps

While flashy high-tech mobile devices have become an enabler today, it is the applications themselves that are making the true impact on business operations. And while stand-alone mobile apps can provide some productivity improvements in much the same way as stand-alone spreadsheets have done in the past, apps that are tightly integrated with enterprise MRO platforms provide exponentially larger benefits for an organization. Leading MRO software providers are providing a broad range of apps that have robust functionality, are quick to deploy, and

are fully integrated into its enterprise MRO application.

Customer service apps

It has been said that nothing happens until somebody sells something. While this may be an overstatement in many ways, there is no doubt that companies

that have a relentless focus on serving their customers are well positioned for the future. Newly developed apps are now available to allow a customer service rep who is sitting in a customer's office or walking the floor of their shop to check for price and availability for a part or repair service, place an order,

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Supply chain apps

When a new part or component repair requirement becomes evident, today's supply chain specialists no longer need to retreat to the confines of their office cubicle and log in to a computer. Handheld mobile apps are available to check stock and reserve material for critical repairs. When items are not in stock, apps are available to search leading locator

services such as ILS to identify sources and to place orders. As parts and components arrive at a repair station dock, apps are available to perform receiving and stocking bin updates. In order to ensure accurate and reliable inventory levels, apps are available to conduct inventory cycle counts on a perpetual or end-of-year basis. With these apps deployed across the MRO staff, for a mechanic under the wing or working in a machine shop, the supply chain has never been so close.

Labor collection and WIP accounting

For independent third-party MROs, in order to optimize profits, it is first necessary to optimize pricing. Prices that are set too high can lead to lost sales, and prices that are set too low can lead to lower margins. A key element required to optimize pricing is to fully understand one's true and actual costs. With the advent of electronic labor collection tools, mechanics can now record the time that they work on cards or tasks in order to maintain accurate WIP accounting.

In many environments, mechanics do not have quick and easy access to a com-

puter terminal or a time clock, so labor times are entered after the fact and often estimated or applied to generic activities. Utilizing handheld mobile labor collection apps allows mechanics to quickly and easily scan bar code router or traveler operations during the performance of their work. Small and lightweight devices such as Apple's iPhone or iPod Touch with a bar code sleeve can run labor collection apps while a mechanic is under-wing or at a workbench enabling very precise labor collection by operation and task. These apps can dramatically improve the accuracy of an organization's labor tracking and WIP accounting, and further benefits can be obtained by using the resulting aggregate data collection to refine future plan-times for better estimating of tasks and operations.

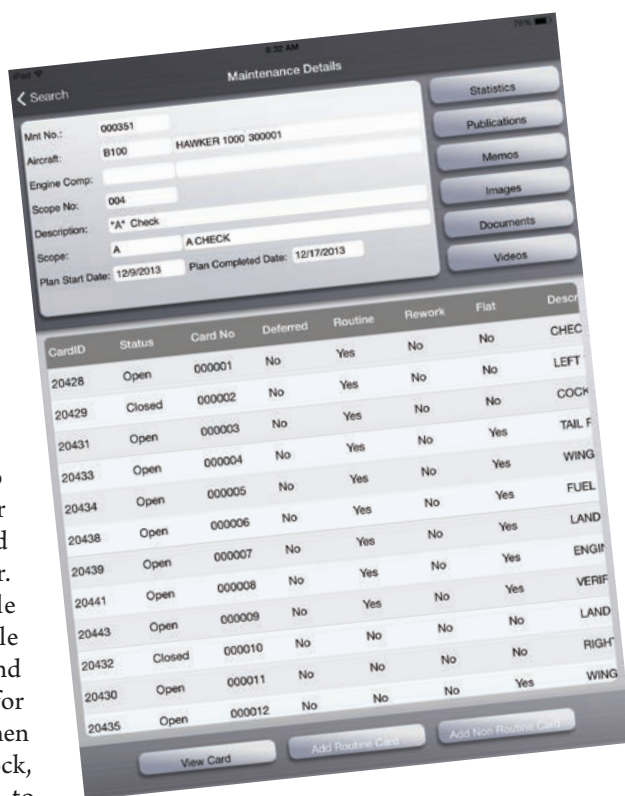
Work order traveler – the MRO "killer app"

Work order travelers and routers are critical tools for both planning and execution of MRO tasks. Engineers and planners maintain a set of templates and documentation that fully define various work scopes to be performed. Robust MRO systems have capabilities to

document templates containing bill of materials, cards and operations, prerequisite tasks, required skills and sign-offs, related technical publications, tooling, and other information that is critical to ensure conformance with quality standards and regulatory requirements.

Electronic tools allow MRO organizations to quickly locate and procure critical parts and components and prevent disruptions to tight schedules.

While detailed templates can be utilized to generate printed work order routers and travelers, once the data is printed to paper, it can be cumbersome to manage and problematic to update. Computer workstations deployed across a shop can allow more dynamic access to information and allow update capability,



but it is often not practical or affordable to deploy a network of workstations in every environment. A new generation of mobile apps provides an interactive electronic work order traveler that includes support for displaying and editing task cards listings, card details, requesting eligible parts, browsing technical publications and drawings, listing required tooling, capturing discrepancies, recording corrective actions, electronically signing off on tasks, and managing logbook entries. Capabilities for bar code input, labor collection, imaging, multimedia, quality management, regulatory support, and electronic sign-offs make the module a powerful addition for repair stations that need an interactive and compact mobile tool to support today's demanding aviation maintenance operations.

Business value

In the end, mobile MRO apps are a means to an end. Combined with expert implementation in the form of setup and training, mobile apps can lead to underlying business benefits in the way of increased revenues, reduced costs, improved cycle times, and reduction of risks associated with adherence to compliance and quality mandates.

MRO organizations today manage an increasingly complex set of processes and procedures in order to comply with business requirements, quality system constraints, and regulatory mandates. Driving inefficiencies and costs out of the business can often mean the difference between maintaining business or losing it to competition or an outsourcing firm. Enterprise MRO software systems provide critical functionality to support operations. And in order to drive additional productivity improvements while maintaining the highest level of quality

and process control, MROs are now equipping their staff with a new generation of mobile applications.

The operation of a repair station is a "team sport" where customer service, engineering, materials management, finance, planning, and other disciplines must be coordinated in concert. A range

of mobile applications has become available that integrate seamlessly with enterprise applications. This new breed of apps support critical customer service requirements and allow today's MRO firms to maintain a competitive advantage over rivals within the industry. **AMT**



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Military Maintenance Adapts to New Realities

The mantra “better, faster, less costly” is increasingly embedded in the way warfighters maintain their flying machines

By Jerome Greer Chandler

The traditionally conservative U.S. military may be a bit late to the party, but — beset by budget constraints — cost-conscious concepts such as condition-based maintenance (CBM) are starting to hold sway in key commands.

“Right now our efforts are focusing on CBM,” says an official of the

Army Aviation and Missile Command (AMCOM) at Redstone Arsenal, Alabama. He spoke on condition that we not use his name. “We see a lot of opportunity in CBM to help reduce overall operating costs [and] improve maintainability.

“If we can maintain ... it at the appropriate time and not overmaintain it, not

CBM+ technology has also been instrumental in reducing, and in several cases eliminating, time-consuming manual inspections and vibration checks. Automation of these tasks, along with the ability to bypass replacement of components until later maintenance phase periods, has empowered the U.S. Army helicopter maintainers to focus on other tasks that support readiness.

Condition Based Maintenance Plus (CBM+)

20+ Implemented
Maintenance
Changes

Extensions Range
from 250 to 11900
Additional Flight Hours

31% to 47%
+ Fewer Component
Demands

11.91 to 1 to 18.33 to
1 Return on Investment
(ROI)

Cost Wise
Readiness



only are we going to get better utilization of our time, we're not going to be spending as much time changing out parts that maybe haven't reached the end of their service life."

Striking the same chord is Coast Guard Commander Steve Walsh, the Medium-Range Surveillance Aircraft

product line manager at the U.S. Coast Guard's Logistics Center in Elizabeth City, NC. "We're now working through structural health monitoring systems to get to (CBM). Are we there yet? No."

So far, AMCOM's CBM+ efforts have seen some 20-plus maintenance changes wring out from 250 to 11,900

BARRY CONNORS, AVIATION CENTER LOGISTICS COMMAND



CH-47F in phase maintenance at Fort Rucker, Alabama's Hanchey Army Airfield.

additional flight hours for components. They accomplished the feat with a none-too-shabby return on investment of from 11.91 to 1 to 18.33 to 1.

Case-in-point: by installing a sensor on the oil cooler of a UH-60 Black Hawk, closely monitoring bearing vibration levels, they were able to extend the ubiquitous helicopter's formerly time-based five-year removal window.

A quick differentiator here between CBM and CBM+. AMCOM says, "In a CBM environment, operating platforms, embedded sensors, inspections, and other triggering events determine when restorative maintenance tasks are required based on evidence of need."

Contrast that with CBM+, which AMCOM defines as "a proactive equipment maintenance capability enabled by using indications to predict functional failure ahead of time and take appropriate action." The implications aren't trivial. The Army contends CBM+ "marks an evolution from the earliest applications of embedded health management."

Back to that Black Hawk oil cooler, the *further* implications of this brand

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of CBM, contends an AMCOM official, “highlight the fact ... you can actually look at the health of the drive train of a *system*, vs. just an individual component.”

Cut from the same cost-cutting cloth as condition-based maintenance are U.S. Air Force’s efforts at what it calls “cost-effective readiness.” Spokesman Micah Garbarino says once upon a time the Air Force would replace, rather than repair, certain fan blades on some engine components. After studying the issue it determined “that a percentage could be fixed instead of discarded; so we focused on recovery and repair.” The upshot: by using certified reconditioned blades the Air Force Life Cycle Management Center avoided some \$80 million in additional costs.

For all this CBMization that’s occurring in the U.S. military maintenance, the innate caution of the services hasn’t gone away. “We wouldn’t jump into anything maintenance-wise that could jeopardize our aircrew,” says the Coast Guard’s Walsh. “That’s clear ... We’ll accept a little higher

cost to assure that folks are safe while out in harm’s way.”

Quicker returns to service and additive manufacturing

The mantra “better, faster, less costly” is increasingly embedded in the way war-fighters maintain their flying machines.

Take the instance of an AV-8B Harrier aboard *USS Bataan*. After takeoff, the pilot couldn’t deploy the nose gear. Rigging a support cradle on the flight deck of the carrier the aviator was able to bring his VTOL (vertical takeoff and landing) Harrier to a hard, but controlled, landing.

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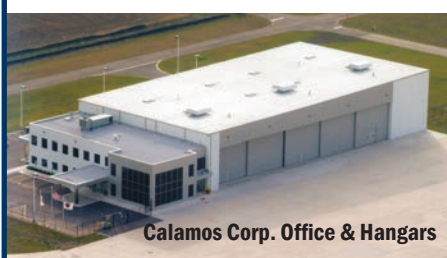
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UH-60 Black Hawk helicopters at Lowe Army Airfield, Fort Rucker, Alabama.

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But the airframe paid a price. “The hard landing had damaged a portion of the structural frames in the nose cone,” says Rich Bomhold, technical director of the U.S. Navy’s Fleet Readiness Centers. The OEM, working with a structural engineering analysis from the Fleet Support Team (FST), fashioned a 3-D CAD model of the offending frame.

Because only a portion of the frame was damaged, officials decided to cut out just that section and replace it with a matching section cut from a spare frame at Fleet Readiness Center East (FRCE). Sheet metal doublers would mate the new section of the frame with the aircraft. The strategy would eliminate the need to further dismantle the nose cone.

“The challenge for FRCE,” says Bomhold, “was to manufacture the reinforcement doublers and get them to the ship for the repair.”

Within 48 hours of getting the OEM’s CAD model FRCE’s additive manufacturing was underway. One forming tool took five hours to build; the other about 30. Computer-aided design and additive manufacturing meant one-week turnaround from the OEM model to finished part. The larger picture saw the AV8-B damaged June 7, 2014 and the newly formed part was on its way to USS *Battan* July 2.

Budget blues

This sort of fast turn is going to be increasingly important. “Repair, maintenance, and overhaul budgets are expected to be reduced over the coming years — while demand for aircraft, engines, and components will increase,” says the Fleet Readiness Centers’ technical director. “Additive manufacturing promises to be an innovative ... technology that can change aircraft maintenance business models in the future.”

It’s going to take a lot of innovative technologies and new approaches to help the U.S. military manage its maintenance needs for the rest of this decade and the next. Air Force Sustainment Center spokesman Micah Garbarino says,

"Without a doubt, the biggest single challenge to Air Force maintenance is our budget constraints and uncertainty." He says the USAF has still not fully recovered from the impact of 2013 sequestration, "and we are looking at a return to those same drastic cuts in fiscal 2016."

To that end, not only is the Air Force bringing new technology to bear, Garbarino says, but "We have focused on removing barriers to communication that existed when there was separate management at each [overhaul] depot." That's allowed them to "standardize and improve processes and partnerships, both public and private."

Those public/private partnerships encompass civilian third-party providers. In the Army the percentage of third-party contract maintenance depends on location. The AMCOM official at Redstone Arsenal says because the United States is limited as to the number of military personnel it can field in Afghanistan, there are a higher number of civilian maintainers overseas, in-theater. Stateside, the percentage is lower, "something in the neighborhood of 15 percent," he says.

Here in the United States, that means contract labor tends to maintain complex systems: electrical, armament, and such. A significant slice of composite repair also is outsourced.

More than budgetary considerations and specialized skills are driving outsourcing. So too is the readily available pool of seasoned military maintainers. "It takes us anywhere from five to seven years to take an individual that graduated

from TRADOC (Training and Doctrine Command) and mold them into journey-men," says an Army Aviation and Missile Command official. Some are lost to the civilian world, others elevated to supervisory positions within the military. The military is past master in rewarding good performance with promotion.

The upshot: "They're taken away from the aircraft in between that time that we grow the journeyman [into] the artisan," says an AMCOM official.

Confronted by the realities that beset aviation maintenance as a whole, the U.S. military is learning to adapt. And it's doing so fast. **AMT**



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JEROME GREER CHANDLER

is a two-time winner in the Aerospace Journalist of the Year competition's Best Maintenance Submission category; he won in 2000

and 2008. His best-seller 'Fire and Rain' chronicles the wind shear crash of Delta Flight 191 at DFW. Chandler's passion for aviation safety is more than professional. It's personal. Two of his relatives have perished on commercial airliners, one of them in the infamous Braniff Electra crash of 1959.

Windows of Opportunity

The importance of properly maintained windows

By Thomas Esposito

Every aircraft manufacturer recommends the owner exercise preventative maintenance, which in turn will greatly extend the life of both the cockpit and cabin windows. When overlooked or neglected, these components are not only expensive, but also require substantial downtime to replace.

Each aircraft serviced or maintained properly not only reflects on the ownership of the aircraft and their maintenance standards, but also adds to passenger confidence. Essentially, this service will immediately impact the appearance of the aircraft which in turn impacts the value of the aircraft. Most often the condition of the windshields and/or cabin windows becomes a squawk item during pre-buy inspections. Sooner or later it's a service that will be needed.

Consider the following options: Fully replacing your cockpit or cabin windows at significant cost, or utilizing a cost-effective restoration process alternative.

Based out of South Florida, Clear 4 Take Off, LLC (C4TO) has been in the aircraft windshield restoration business for more than 20 years, perfecting a system that achieves excellent results regardless of the type of aircraft. This process is accomplished with the windshield or cabin windows installed on the aircraft. On average, using C4TO's services will cost 10 to 20 percent of what it would cost to purchase and install replacement cabin or cockpit windows. Each panel serviced is measured for thickness using ultra sound and monitored during the restoration process. Upon completion, the panel is once again measured and recorded along with the manufacturer's acceptable tolerance criteria located in the maintenance manual.

As with any refurbished part, although not new it is a cost-effective solution to replacement.

The restoration process is accomplished by utilizing a variety of sanding discs specifically designed for aviation transparencies. The system has numbered each disc one through five, followed by polishing the surface with two rouges lettered A and B to consistently achieve excellent results.

New business venture

Having executed thousands of window repairs in South Florida, C4TO also offers a mobile service dispatching a road crew. The road crew service allows an aircraft to be repaired at the customer's base location offering additional savings and convenience to the flight department. The window refurbishment service can also be incorporated into routine scheduled



The aircraft windshield restoration process includes measuring each panel using ultrasound before and after to ensure it meets manufacturer's acceptable tolerances.

CLEAR4TAKEOFF

maintenance, paint, or interior refurbishment. As demand for this service continues to grow both domestically and internationally, C4TO has decided to take a unique approach to the business and share its methods and experience.

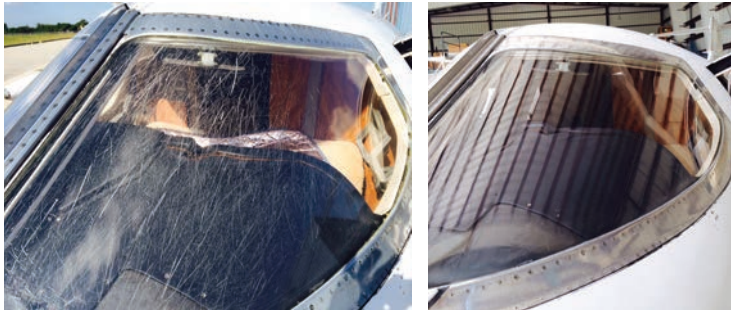
The window of opportunity is a comprehensive training period with all the necessary tools and supplies. Upon the completion of the five-day training program, each new location will receive all tools and equipment necessary to perform this task. This turnkey operation will include: an ultra sound measuring device, polishers, dual action sanders, work light, and enough repair material to completely recover the cost of the initial investment.

The training and support combined with the materials required to recapture the entire investment make this a very extraordinary and attractive business venture.

Ultimately, this service will address the issues of aging aircraft and educating the aircraft representative on the added value of this type of often overlooked service. It will also establish a network referral program which increases C4TO's outreach and capabilities, while decreasing response time. The business model includes partnering with established repair stations or



For additional information, contact C4TO or **THOMAS ESPOSITO** at (954) 415-9065, biz-opp@clear4takeoff.com, or www.clear4takeoff.com



Left: The before shot of a Lear 35 window in need of repair.
Right: The Lear 35 window after C4TO treatment.

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refurbishment facilities interested in adding an additional revenue stream to their bottom line, utilizing their existing facility and manpower. This business opportunity is also available to flight departments, charter companies, aircraft brokerage, and licensed A&P technicians.

Each business owner, chief pilot, director of maintenance, broker, or decision maker already knows his customers and their aircraft needs making this truly, a unique and natural addition to services already provided. Consider the simplicity of the

business model and the additional revenue generated by offering this service to new and existing customers. Strategically located, each location will complement existing territories.

The C4TO management team has extensive experience within the general aviation industry and will utilize its long-standing relationships to assist with each new location. With more than 75 years combined experience their vision to grow the C4TO brand has received a positive response.

C4TO will be establishing two new locations later this year, located at Chino Airport (CNO) and the other at Baltimore-Washington International (BWI). These new C4TO locations will utilize the Clear 4 Take Off brand and the C4TO network referral program. As the C4TO brand expands domestically and internationally, all promotions and advertising will include the additional locations and their point of contact information.

The current state of the economy has diminished the value of used aircraft and has also made the maintenance cost or expense more competitive, these factors alone contribute to the logic behind adding and providing this service at your shop or maintenance facility. **AMT**

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Learn Like They Live

The U.S. Army is using a digital approach to training to keep soldiers motivated and entertained

By Jerome Greer Chandler

United States Army Aviation isn't going against the current in training up young maintainers, it's moving *with* it – the virtual current that is – reaching them in the digital world in which they live.

"The soldiers of today are really bright," says Mark Jones, a retired Army maintenance officer, who's now deputy

to the commander of the 128th Aviation Brigade at Joint Base Langley-Eustis, Virginia. "The challenge is keeping them motivated ... While we educate them, we have to entertain them as well. You've got to keep their interest."

Real-world basics

While conceding Millennials possess "great thumb skills," skills honed on iPhones and video games, Jones says the Army Learning Model starts off in the real, not the virtual, world. In a traditional instructor-led conference "We teach them what [the] common tools are ... Most of them don't know an open-end wrench from a box-end wrench. They haven't worked on cars or bicycles like my generation did."

After instructors present basic concepts, concepts reinforced via dual-screen computers fed by a common server that perfuses curriculum changes throughout the system then, "We go into ... an 'immersive environment,'" says Jones.

Battle buddies

Army maintainers learn in pairs, with "battle buddies." Case-in-point: armament/avionics technician trainees for the AH-64 Apache attack helicopter. The setup consists of an Apache cockpit with a screen in front of it. While one student gets in the cockpit and runs through fault-isolation procedures, his or her battle buddy is outside the cockpit with the screen, on which are arrayed the



The 15Y Apache avionics/electrical/armament technician training takes 23 weeks, one of the longest; the shortest course for aviation maintainers is 13 weeks.

U.S. ARMY



Army maintainers learn in pairs, called battle buddies. The computers contain the aircraft systems and an interactive electronic tech manual.

U.S. ARMY TRADOC

aircraft's systems. The student also has an interactive electronic tech manual.

So armed, the soldier tackles the intricacies of the armaments bay, the virtual bay arrayed on the screen. The tech manual might call for him to replace a box. He chooses the right tool and replaces the component, first mastering the task in the virtual world. All the while the battle buddy is back in the cockpit running through a complementary task.

Then it's out to the hangar floor to "bust their knuckles for real," says Jones, where a slew of Apache training devices are lined up. That's where students do the deed for real. Pulling a box from a bay on a screen is one thing, actually



"pulling a box out above their head that weighs 3 pounds," adds heft to the lesson, says Jones.

Virtual training technique

The virtual angle has the added advantage of saving wear and tear on gear. "We remove and install things on our training devices," says Jones. On a given device, representing a particular aircraft type, that might be 300 times per year. Doing it virtually first eases the strain on real live equipment.

How's emphasizing the digital dimension working? Although Jones says he doesn't have data, "We've noticed the [first-time] pass rate seems to be higher." The technique doesn't shorten the training time so much as it "compresses the time" so the Army can "insert more critical tasks."

In this case, training a '15Y' Apache Avionics/Electrical/Armament Technician takes 23 weeks. It's one of the longest courses taught at Langley-Eustis. The Army's shortest course for avia-



The virtual training method doesn't shorten the training time as much as it compresses it so the Army can add more critical tasks. The first-time pass rate seems to be higher, as students are more engaged with the computers.

After soldiers master a task in virtual training, they use the portable computers to work on the real thing, here an AH-64 Apache helicopter.

U.S. ARMY TRADOC

tion maintainers is 13 weeks.

Tests are open-book affairs. "We don't want students to memorize torques, or anything else," says Jones. The Army wants them to refer to the book. That's because changes come at maintainers "so fast that sometimes we can't keep up with what's in the field."

Computer game to reinforce training

Subtly supplementing all this formal training is a computer game that reinforces what students learn in compelling fashion. They're given a mission to



recover a downed aircraft. Virtual characters on the computer screen have to draw their tools and weapons, and check with the maintenance unit's production control office. On their way to the helo at base they find the bad guys have breached perimeter security. There's a firefight, mimicking "the shooting games kids play now," says Jones. Finally, they head out to recover the aircraft. Competition is keen among young soldiers. "I don't

know of anyone who has gotten to the highest level."

Right now the game resides on desktop computers. The 128th Aviation Brigade is working with its parent unit, the Fort Rucker, AL-based United States Army Aviation Center of Excellence (USAACE), to try to migrate the game to tablet computers students can take with them back to barracks.

And so it is that the games go on, and — the Army hopes — the learning process as well.

"It's part of Training and Doctrine Command's (TRADOC) initiative to use ... technology in our training," says USAACE spokeswoman Lisa Eichhorn. "These kids are coming from the digital age." Eichhorn cautions that training is not all fun and games. "That's not the point of it," she says. "Our goal is really to teach this generation the way they [are accustomed] to receiving information."

According to TRADOC spokesman Major Harold Huff, the Army has 18 different aircraft maintenance and technician jobs, or MOSs (Military Occupation Specialties). As of mid-July 2014, some 23,652 soldiers were in the Aviation Career Management Field altogether. **AMT**

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The screenshot displays the AviationPros.com website interface. At the top, there's a navigation bar with categories: BUYER'S GUIDE, AIRCRAFT, AIRPORT PROJECTS, AOA, ENGINES & COMPONENTS, FBOS/TENANTS, GROUND HANDLING, GSE, RAMP OPS, and TOOLS & EQUIPMENT. Below this, the main content area is divided into several sections. On the left, there's a 'Latest News' section with articles like 'AMTSociety Supports the Aerospace Maintenance Association's Aerospace Maintenance Competition in 2014' and 'Heavy Duty Utility Gate'. In the center, there's a 'WELCOME' section with a 'Get Product info fast...' banner and a 'MEDIA CENTER' section with video thumbnails. On the right, there's a 'CribMaster RFID Solutions' section and a 'Ross Dickey Joins Universal Avionics' section. The bottom of the page features a large 'AVIATIONPROS.com' logo and three smaller logos: 'airport business', 'AMT AIRCRAFT MAINTENANCE TECHNOLOGY', and 'GROUND SUPPORT WORLDWIDE'.

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An International Perspective on Human Factors Challenges

A 2014 FAA survey indicates the top human factors challenges for the aircraft maintenance industry in the European Union and the United States are culture/leadership, using technical publications, and worker fatigue

By Dr. Bill Johnson

The author revisits the top maintenance human factors challenges comparing a 2010 ranking with one in 2014. U.S. and international aviation maintenance human factors specialists indicate that the major issues have not changed substantially. The No. 1 challenge, not mentioned in past studies, was a combination of two factors that combined to say that industry leadership is not demonstrating sufficient attention to the corporate safety culture.

The 2010 international rankings

In 2010, the FAA assembled a panel of maintenance human factors (Mx HF) subject matter experts to identify and rank the top human factors challenges. Participants included representatives from airlines, MROs, manufacturers, and government. The European Human Factors Advisory Group did the same drill in Europe. There was a 60 percent overlap in the top five challenges as shown in Table 1. The match-

ing challenges were worker fatigue, safety culture, and measuring impact of maintenance HF programs. This ranking reinforces the fact that humans are humans and have the same challenges no matter where they are working. One significant difference is that Europeans have

a selected sample of the maintenance industry, most of whom were involved in the 2010 ranking activity. Twenty-five percent were from Europe, the rest from the United States. Seventy-five percent of the Europeans and 60 percent of the U.S. sample responded within the allot-

The challenges are complex and ingrained in aviation maintenance. The challenges are part of the culture and “culture” takes a long time to build and a long time to change.

the challenge of 28 national regulatory authorities and many others, including the United States, with whom they have bilateral agreements (meaning that local Aviation Safety Inspectors enforce the EASA regulations).

The 2014 international rankings

A single web-based questionnaire provided the data in 2014. It was sent to

ted time frame. The end result was that 75 percent of the responses were from the States. The U.S. has a larger aviation industry so this representation is acceptable. The questionnaire was open-ended. The respondents did not pick from a list but merely wrote their own short description of the challenges.

Sixty-three percent (51 responses) maintenance human factors questionnaires were returned. That is a very respectable response rate to an open-ended survey with a short response window. Some respondents later told us that they queried their work force and managers before responding. We are certain that this sample size and number of responses yielded valid and reliable information.

The top five challenges represented 67 percent of the combined EU and U.S. responses. Table 2 shows the list of the top challenges that combines all respon-

Table 1: Top 5 EU-US Maintenance Human Factors Challenges in 2010

North America-US	Europe
Using Technical Publications	Measuring Impact of Mx HF Programs
Worker Fatigue	Expanding Mx HF across all European Countries
Safety Culture	Worker Fatigue
Voluntary Reporting	Safety Culture
Measuring Impact of HF Programs	Standardizing Regulatory Oversight

Table 2: Top 5 Maintenance Human Factors Challenges in 2014

Culture/leadership
Using Technical Publications
Worker Fatigue
Voluntary Reporting
Measuring Impact of HF Programs (tied with "HF Training")

dents. The combination of culture/leadership, using technical publications, and worker fatigue represented 50 percent and 54 percent of the votes in EU and U.S., respectively. The Europeans included "oversight and regulations" in their top five. In the United States there was a four-way tie for fourth place to include "HF training," "pressure/stress," "measuring impact," and "voluntary reporting." In other words, there was general agreement between EU and U.S.

The open-ended responses were high value. The author and Ms. Joy Banks, a psychology technician from the FAA Civil Aerospace Medical Institute, deliberated on the interpretation and categorization of the responses. The work was tedious but interesting. Table 3 shows examples of the information rich free-form challenge statements that were coded in to one of 21 categories.

Comparing the two surveys

The results between 2010 and 2014 are consistent, with a 75 to 80 percent overlap in identified challenges. Since it was extremely difficult to separate comments about culture vs. comments about leadership those categories were combined.



DR. BILL JOHNSON is the FAA Chief Scientific and Technical Advisor for Human Factors in Aircraft Maintenance Systems. Johnson is a member of the Human Factors Advisory Group to the European Aviation Safety Agency (EASA). Johnson is a pilot and an A&P for close to 50 years.

The result was that "culture/leadership" moved to the top of the list. The EU continues its struggle with consistent member states so that challenge remains in the EU top five. The United States identifies "HF training" and "pressure/stress," which are not in Europe's top five. The

should not be too alarming. The challenges are complex and ingrained in aviation maintenance. The challenges are part of the culture and "culture" takes a long time to build and a long time to change. The good news is that FAA and EASA have been actively addressing the

You must be proactive when you see something that is a likely hazard that contributes to overall safety risk. Your job, as a manager, is to take a leadership role in addressing these known challenges that are contributing to risk.

fact that there are more similarities than differences is significant. It means that EU and U.S. can share approaches to address the challenges.

The similarities from 2010 to 2014

challenges with applied research programs and proposed or enacted regulatory changes. Enactment and additional proposed SMS regulations in the EU are a step in the right direction. While



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Table 3: Example Challenges from Respondent's Comments

Leadership managing to outcomes rather than process - work forces tend to receive this message as "our procedures aren't important enough to adhere to."

Safety culture: Maintenance issues that cause accidents or perpetuate poor maintenance begin with management making a conscious decision to lower the bar ...

Application of just policy to lead a just culture for improved reporting

Failure to follow procedures/processes/policies

Fatigue/alertness: Company needs to develop and enforce a max duty time for AMTs

Complacency: Doing things on a routine basis and bypassing the maintenance manual. e.g. tire change

Integration of human factors principles into day-to-day operations

SMS was not addressed in the top five it is certainly an important corrective action to address many of the challenges. FAA SMS regulations, especially for airlines, are proceeding toward adoption. FAA Administrator Huerta has placed highest strategic priority on "risk-based

proposals (See EASA NPA 2013-1 and 2013-19) are suggesting new content for HF training, stricter HF knowledge requirements for HF trainers and ASI inspectors, and requirements for a fatigue risk management system for maintenance organizations.

Table 4. Sample information on FAA MxHF Website (www.humanfactorsinfo.com)

Maintenance Fatigue Web-based Training System

Fatigue Video titled "Grounded"

Calculate Return on Investment - Procedures and Software

Workshop reports on: Fatigue: Using Technical Documentation; Collecting and Using Voluntary Data

Line Operations Safety Assessment for Maintenance - Procedures and Software

The Operator's Manual for Human Factors in Maintenance

The Maintenance Human Factors Training Program - 150 PowerPoint Slides with 11 Videos

decision making." This process uses data-driven tools to make smarter, risk-based decisions about safety. Since human performance and human factors are among the highest risks in aviation one might expect increased attention to this high risk area.

Products and regulations to address the MxHF challenges

FAA and EASA have been addressing the top five challenges, even before the 2010 list was identified. Many of those efforts have been described in issues of *AMT Magazine*, *Ground Support Worldwide*, and other Cygnus publications. EASA created regulations for human factors training over 10 years ago. New EASA

FAA's robust MxHF program has created a variety of solutions for topics like Fatigue Risk Management, Measuring Impact of HF programs, HF training, and more. That information is available on the convenient web site address www.humanfactorsinfo.com. Table 4 shows a partial listing of products that are on the web site.

What you should do

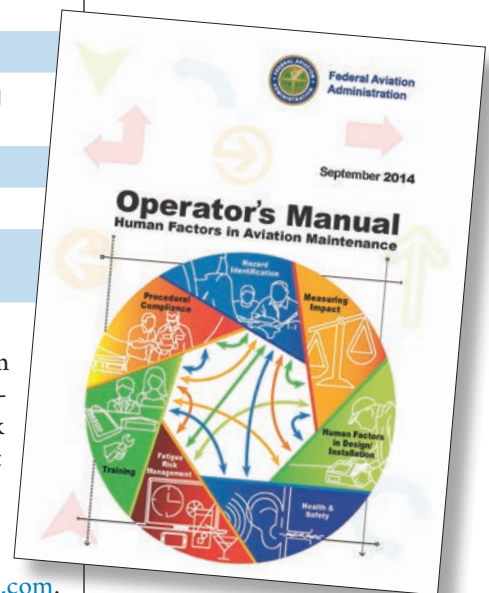
Responding to the survey and reading this article is helpful but is a mere start or continuation of your quest to tackle the challenges. The top five challenges are not new and many of the solutions are available. Your job, in industry, is to

**Your job, in industry,
is to convince your
managers to commit to
enacting the solutions
and to dedicate the
necessary resources.**

convince your managers to commit to enacting the solutions and to dedicate the necessary resources.

You must be proactive when you see something that is a likely hazard that contributes to overall safety risk. Your job, as a manager, is to take a leadership role in addressing these known challenges that are contributing to risk. You must encourage all workers to voluntarily report potential hazards. Tell everyone about such reports. Strive to alter the reporting culture.

Your job, as a regulatory inspector is to ask your airlines and repair stations



what they are doing to address the top five MxHF challenges in their organization. You may not be enforcing a specific regulation but you will be fostering a positive safety culture. In the meantime FAA, EASA, and other regulators must evolve and support the products that they created with their industry partners. Expect to see me, Bill Johnson, doing that! **AMT**

Know Your Aviation Insurance

The aviation insurance market is separate from the general commercial insurance market, due to the specialized and significant nature of aviation risk

When talk turns to insurance in the aftermarket industry, you might assume your peers are discussing liability insurance. But there are several different types of insurance that apply to our industry, with significant differences among them.

There are many types of policies in the aviation insurance market but the ones that most affect the aftermarket are aviation general liability, aviation products liability, and hangarkeepers.

Aviation general liability, or AGL, is very similar to your *commercial general liability policy*, or CGL. AGL policies cover you if a third party is injured on your property or by your actions. AGL policies are necessary because most commercial general liability policies will not cover aviation-related exposures. These AGL policies are mainly sold to companies that operate on airport property; they do include products liability coverage and completed operations, but do not typically cover grounding.

A straight *products liability* policy is necessary for businesses that are located away from airport property and already have a commercial general liability policy in place. This type of insurance gives you the aviation products liability coverage that is excluded by your CGL policy. This policy also often includes grounding coverage.

Grounding coverage comes into play if a product you supply causes the FAA to issue a grounding order for a fleet. You may be found liable if it is determined your product did indeed cause

the grounding. Remember that this coverage, by definition, only applies to FAA grounding orders, not other grounding issues. For example, some contracts with airlines mandate large amounts of penalty money if you delay



one of their aircraft by failing to supply a part on time. Grounding coverage will not help you in that instance.

Hangarkeepers insurance applies to companies that have the care, custody, and control of other people's aircraft. This coverage is necessary in case you should damage an aircraft while it is in your control.

What's more, while most aviation insurance carriers offer these policies, the underwriting companies that provide these types of insurance can vary dramatically in their appetite for risk.

As we've discussed before, the aviation insurance market is separate from the general commercial insurance market, due to the specialized and significant

nature of aviation risk. While a more limited number of insurance companies provide aviation insurance, compared to general commercial markets, we still see plenty of competition. At last count, 20 insurance companies write aviation policies. Of those 20, not all will write aviation products liability insurance policies. However, for the ones that do there is a great deal of competition between those companies for your business, which means savings for you once you determine which types of coverage are appropriate for your business among the options of AGL, CGL, products, grounding, and hangarkeepers.

These are just a few of the policies available in the aviation insurance market. As always, a skilled, knowledgeable broker will help you navigate both the differences between these policies and the differences between the underwriters that offer them, and determine the best fit for your aviation risk. **AMT**

Have an insurance question? Submit it to AMT and we can respond in a future article.



JAMIE BENTHUSEN is the director of aviation products liability for NationAir Aviation Insurance, one of the country's oldest and largest aviation insurance specialty brokerages. Benthusen has more than 15 years' experience in sales and manufacturing for airframe and engine products and test equipment.



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GA Awards Program Winners Recognized at EAA AirVenture



The 2014 General Aviation Awards Winners: Max Loyd Burnette, Richard Loren Stowell, Jr., David Brian Kocak, and Howard William Wolvington with FAA representatives.

The General Aviation Awards Program — started in 1963 — is a cooperative effort between the FAA and 38 GA industry partners. Each year it recognizes aviation professionals for their contributions in the fields of aviation, education, and flight safety. Applicants are evaluated against at least four required metrics: professional involvement, pro bono service to the aviation community, continuing education, and the strength of three letters of recommendation. The national winners are officially recognized during EAA AirVenture each year in July, which includes an all-expenses-paid trip to the world's greatest aviation celebration in Oshkosh, WI. AMTSociety Executive Director Ron Donner was there to offer congratulations. AMTSociety is a proud sponsor of the General Aviation Awards Program.

Max Loyd Burnette, Rockvale, TN, is the 2014 National Aircraft Maintenance Technician of the Year. Burnette is semi-retired after 50 years in aircraft maintenance and 25 years as an A&P mechanic. He began flying as a hobby in 1956 and remains an active pilot. In his semi-retirement, Max is currently doing a complete restoration of a 1941 Piper J-5 Cub



Max Loyd Burnette, Rockvale, TN, is the 2014 National Aircraft Maintenance Technician of the Year.

Cruiser. He has been an active member of EAA and AOPA since 1986.

David Brian Kocak, Guilford, CT, is the 2014 National Avionics Technician of the Year. Kocak serves as the avionics service manager, installation manager, and inspector at V.I.P. Avionics at Hartford-Brainard Airport, where he has been employed for the past 16 years. He holds a repairman's certificate with inspection authorization and a FCC General Radio Telephone Operator license.



David Brian Kocak, Guilford, CT, is the 2014 National Avionics Technician of the Year.

Howard William Wolvington of Issaquah, WA, is the 2014 National Certificated Flight Instructor (CFI) of the Year. Wolvington works as an independent CFI with the Boeing Employees Flying Association (BEFA) at the Renton Municipal Airport, and with private clients at airports in the Seattle area. He holds an ATP certificate and has more than 13,000 hours of flight time. As a Gold Seal CFI with instrument and multiengine ratings, he has given more than 10,000 hours of flight instruction and 8,000 hours of ground instruction.

Richard Loren Stowell, Jr., McCall, ID, is the 2014 National FAA Safety Team (FAAS-

Team) Representative of the Year.

Stowell is a full-time aviation educator specializing in spin, emergency maneuver, and aerobatic training since 1987. He owns and operates Rich Stowell Consulting and is an independent flight instructor, author, and speaker. Stowell has given more than 8,700 hours of flight instruction and performed more than 33,400 spins in 215 spin-approved aircraft.

The General Aviation Awards Program is currently accepting applications

for 2015:

- Flight Instructor of the Year
- Avionics Technician of the Year
- Maintenance Technician of the Year
- FAASTeam Representative of the Year

Instructions and new, helpful resources are available at www.generalaviationawards.org/nominations.

For more information visit www.generalaviationawards.org.

Dallas Love Field. Dallas Airmotive is a key component of BBA Aviation's Aftermarket Services Division which provides comprehensive turbine engine repair, overhaul and support services for more than 80 percent of the engines in use in the business and general aviation market. For more information visit www.dallasairmotive.com.

George T. Baker Aviation School

George T. Baker Aviation School is located near the Miami International Airport. The school is a public, tax-supported institution authorized by the Florida Department of Education and operated by the Miami-Dade County Public School System. It is accredited by the Council on Occupational Education (COE) and the National Center for Aircraft Technician Training (NCATT), and is certificated by the Federal Aviation Administration under Part 147 of the Federal Aviation Regulations. The mission of George T. Baker Aviation School is to provide training to persons interested in aviation maintenance, electronics, and avionics to become an integral part of the industry. The following programs are currently offered: Airframe Technician; Powerplant Technician; Avionics I Technician; and Avionics II Technician. For more information visit www.bakeraviation.edu.

Del Mar College

Del Mar College located in Corpus Christi, TX, was certified by the FAA as an Aviation Maintenance Technician School in 2006. It offers aircraft maintenance training in airframe and powerplant, avionics, and nondestructive testing. The Aviation Maintenance program prepares individuals for employment in the aircraft maintenance industry. Aircraft mechanics are employed by the airlines, aircraft manufacturing companies, repair stations, the United States military, and general aviation fixed base operators. Some mechanics specialize in work on a particular part of an aircraft, such as metal or composite surfaces, avionics equipment, hydraulic systems, landing gear, propellers or engines. Others, particularly those employed by the smaller fixed base operators, work on many different aircraft. For more information visit www.delmar.edu.

AMTSociety Education/IA Refresher Events

The next series of AMTSociety Education/IA Refresher training events are scheduled. Visit www.amtsociety.org to register.

Kansas City, MO

Oct. 8, 2014 (Wednesday)
Holiday Inn KCI Airport & KCI Expo Center
11728 NW Ambassador Dr.,
Kansas City, MO 64153

Denver, CO

Nov. 3, 2014 (Monday)
The Summit Conference and Event Center
411 Sable Blvd., Aurora, CO 80011

Tulsa, OK

Dec. 5, 2014 (Friday)
Tulsa Tech Riverside Campus
801 E. 91st, Tulsa, OK 74132

Atlanta, GA

Jan. 16, 2015 (Friday)
Hilton Garden Inn Atlanta Airport
Millennium Center
2031 Sullivan Rd.,
College Park, GA 30337

Some of the speakers and topics already confirmed are:

- FAA speakers from FSDO, FAASTeam, or the ACO will update attendees on numerous maintenance and safety related topics
- SMA Engines will provide attendees maintenance and operating information on Diesel Technology Engines
- Bell Helicopter Technical Representatives will present on Preventative Maintenance: Minutes and Pennies Now: Hours and Dollars Later
- Global Parts.aero will speak on the topic of Proper Removal, Installation, and Care of Pneumatic Deice Boots
- Cirrus Aircraft on Composite Repair
- Champion Aerospace on the Slick Magneto 500-hour inspection, and harness and spark plug maintenance
- Aircraft Electronics Association on An IA's Guide to Avionics
- NORDAM on Improving Maintenance Reliability on Nacelles and Thrust Reversers

Additional speakers and topics are being confirmed and some may change depending on location. Refreshments and lunch will be provided. Visit with exhibitors and don't forget about the door prizes!

Focus on AMTSociety Corporate and School Members

Dallas Airmotive

AMTSociety is pleased to have Dallas Airmotive as the newest corporate member. Dallas Airmotive operates three major overhaul facilities, 12 regional turbine centers, two parts sup-

ply companies, and one turbine engine controls company. It provides 24-hour technical support, every day of the year, AOG parts support and mobile response teams for emergencies virtually anywhere in the world, with a pool of more than 150 rental engines available. Dallas Airmotive has a long and rich history which began in 1932 as the Piston Engine Overhaul Company at

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Find ways to engage and encourage action to promote your industry; as they say, a rising tide lifts all boats



**Tell the story:
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maintenance is
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provides high-
paying careers
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An aviation maintenance work force crisis is looming. Business leaders are already reporting difficulty filling vacant positions even as they brace for the possibility of a million new openings over the next decade. Repair stations will have to find and grow new talent in order to meet current demand and survive in a rapidly expanding market — only 5 percent of the aviation maintenance population is under 30 and thousands of baby boomers become eligible to retire every day.

The entire industry must be actively involved to ensure a steady stream of future aviators. Tell the story: aviation maintenance is an innovative, dynamic, prestigious industry that provides high-paying careers with potential for lim-

itless growth. Technicians, specialists, and repairmen enjoy more than competitive pay and interesting work; they guarantee the safety of the flying public worldwide.

Opportunity knocks

The Federal Aviation Administration (FAA) is soliciting industry input on draft Advisory Circular (AC) 65-30B entitled “Overview of the Aviation Maintenance Profession.” Help the agency highlight the industry, introduce those who do its work, and describe what is needed to ensure its future.

The draft AC provides information and statistics regarding careers in aviation maintenance, including employer prospects, industry outlooks, certification requirements, and application pro-

cedures. The draft revises military occupation codes for those wishing to credit military aviation maintenance experience toward FAA mechanic certification.

While industry applauds the agency for initiating the change, the draft leaves much room for improvement. Woefully missing from the update are many present-day realities and resources that have come into existence since the AC’s original publication in 2001.

Commenting on the draft AC is one way for individual mechanics to “participate” in the regulatory process and help ensure sustained industry growth. Other opportunities include reaching out to your local schools, getting involved in the area chamber of commerce, or meeting with your congressional leaders. Find ways to engage and encourage action to promote your industry; as they say, a rising tide lifts all boats. **AMT**

Editor’s Note: As of the date this article was compiled, the comment period for AC 65-30 was set to close on Sept. 10. The Aeronautical Repair Station Association (ARSA) joined the Aviation Technician Education Council (ATEC), the National Business Aviation Association (NBAA), and AMTSociety requesting an extension for comment. Confirm the deadline for comment submission at http://www.faa.gov/aircraft/draft_docs/afs_ac/.



CRYSTAL MAGUIRE is ARSA’s Vice President of Operations and serves as managing associate for Obadal, Filler, MacLeod, & Klein. She advises clients in matters of aviation regulation and government affairs and carries a variety of operational responsibilities, including business management for the Aviation Technician Education Council. Ms. Maguire has been with the firm since 2004.

FAA Hangar-Use Policy

The FAA proposed a new policy on July 22, 2014, to address the nonaeronautical use of airport hangars. A summary of the proposed rule stated on the regulations.gov website reads, "Under Federal law, airport operators that have accepted federal grants and/or those that have obligations contained in property deeds for property transferred under various Federal laws such as the Surplus Property Act generally may use airport property only for aviation-related purposes unless otherwise approved by the FAA. Compliance inspections by FAA staff, as well as audits by the Government Accountability Office, have found that some hangars intended for aircraft storage are routinely used to store non-aeronautical items such as vehicles and large household items. The FAA is proposing a statement of policy on use of airport hangars to clarify compliance requirements for airport sponsors, airport manager, airport tenants, state aviation officials, and FAA compliance staff. This notice solicits public comment on the proposed policy statement."

Both the Commemorative Air Force and Experimental Aircraft Association requested an extension for comments. The original Sept. 5 deadline has been extended to Oct. 5.

Commemorative Air Force

The Commemorative Air Force's requests the policy clearly establish aviation museums/static aircraft displays, aircraft building/restoration, nonaviation historical/educational supporting artifacts, signs, and other museum support functions such as food and beverage operations, as an approved aeronautical purpose. "All of our hangars are used for storing, restoring and performing maintenance on our flying aircraft, as well as museum educational operations. Within some of the larger hangars, they maintain artifacts associated with the history of the airplanes, the wars and battles associated

with the era and use them to tell the story about the role of the aircraft and the men and women who flew them to preserve our peace and that of our allies. In some cases we maintain multiple hangars and buildings as a campus, some of which are for the interpretive displays and viewing of artifacts by the public. In all cases, the focus is on our educational mission, as a flying museum and we display the static elements as supporting and necessary elements of the total story and history."

EAA's points to consider

EAA is urging the FAA to replace the term "final assembly of aircraft" as a protected aeronautical use to "active assembly of aircraft." Prior to this policy draft, homebuilders had no protection as an allowed aeronautical use, although some builders had "gentlemen's agreements" with their local airport management. EAA believes this policy is the perfect opportunity to formally recognize all active aircraft building and restoration as a protected aeronautical use of hangars.

EAA recommends that the section explaining allowance for incidental nonaeronautical items in hangars be more defined than "an insignificant amount of hangar space." EAA contends that once an individual hangar reaches its designated capacity of aircraft as a protected aeronautical use, the remainder of the space should be available for nonaeronautical items.

EAA urges inclusion of community-based, not-for-profit aviation organizations to own and maintain hangars on airport property. This would continue facilities such as EAA chapter hangars and other aviation-related organizations on airport grounds as an acceptable aeronautical use.

Comments may be placed by visiting the following link: www.regulations.gov/#!documentDetail;D=FAA-2014-0463-0001.

Aircell rebrands as Gogo Business Aviation

Aircell, the company's business aviation division, has rebranded as Gogo Business Aviation. As Gogo continues to expand, its business and commercial aviation divisions now share a single, global brand. Operationally, the divisions will continue exchanging expertise and technologies while remaining solely focused on their respective markets. It will soon be relocating its headquarters near its existing location in Broomfield, CO.

NBAA releases 2014 Edition of Light Business Airplane Buyer's Guide

The publication provides an overview of new light business airplanes (LBAs) currently in production and is a valuable tool in helping business people who rely on or are looking to invest in light airplanes.

In assembling the guide, NBAA worked with aircraft manufacturers to provide extensive information about new single- and twin-engine piston aircraft, turboprops, very light jets, and light jets across eight categories.

To obtain a copy, visit www.nbaa.org/lba-buyers-guide.

Imperium and Barfield have distribution agreement

Barfield, a recognized leader in ground support test equipment, will be distributing Imperium's line of ultrasound cameras for non-destructive testing (NDT) usage. Headquartered in Beltsville, MD, Imperium sells handheld ultrasound cameras that generate real-time, high-resolution images of subsurface defects that are easily understood and interpreted. For more infor-

Malabar acquires DAE

Malabar has acquired DAE Industries. DAE is a manufacturer of engine stands and other ground support equipment, based in Louisville, KY. Malabar's network of international representatives will enhance and expand distribution of DAE products.

EASA sets new path

European Aviation Safety Agency (EASA) revealed on Sept. 1, 2014 a new organization which aims at preparing the agency for the challenges of the coming years.

A strategy and safety management directorate has been created in order to strengthen EASA's overall strategy and to promote

a data driven and performance-based approach to managing safety. All regulatory functions have been integrated across the different aviation domains and more homogeneity has been introduced to better enable the agency to speak with one voice. For more information visit www.easa.europa.eu.

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More business in Brazil

The Embraer Executive Jets Service Center, in São José dos Campos, São Paulo, has been named an authorized Rolls-Royce line maintenance center for the AE3007 engines in Brazil. The agreement allows Embraer to perform Rolls-Royce's warranty or Corporate Care program services, which covers the cost of replacement parts, labor, as well as scheduled and unscheduled maintenance. The ERJ 145 family of jets and the Legacy 600/650 use AE3007 engines.

Rockwell Collins do Brazil plans to double the size of its facility in São José dos Campos, Brazil. The company has maintained a presence in Brazil for 40 years supporting military and civil aircraft operators and manufacturers with avionics and aircraft system solutions, communications and electronic systems and services. It has increased its employee base in Brazil by 50 percent over the last three years.

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Hangar Rash: Key Steps to Prevention

The first step is to follow company procedures, second, check the equipment



PHOTO COURTESY OF AVIATION TRAINING ACADEMY

A lot of attention is paid in the news media when an airliner sustains ground damage, especially if it's significant, like the aircraft that rolled backwards into a building at an airport in Rome because it wasn't properly chocked. Not nearly as much attention is paid to general aviation and corporate aircraft when they sustain ground damage but, unfortunately, damage on the ground to aircraft of all types is much too routine.

And it can be very costly, time-consuming, and not great for the professional careers of those responsible. The Flight Safety Foundation, estimates that "27,000 ramp accidents and incidents — one per 1,000 departures — occur worldwide every year. About 243,000 people are injured each year in these accidents and incidents; the injury rate

is nine per 1,000 departures." Everyone involved in aviation plays a role but this article is about what maintenance professionals can do when the aircraft is under their custody and control.

Common scenario

A recent example that came to my attention illustrates a common scenario. A mechanic repositioning a corporate aircraft in a hangar struck an adjacent aircraft. In this case, the tug he was using to reposition the aircraft struck the other airplane in the fuselage just aft of the wing. On the surface, the damage did not look that bad. Unfortunately, the internal structural damage was significant and required the aircraft to be out of service for three months.

I don't know how that particular accident occurred, and I won't speculate here, but it highlights one of the

most common situations that can get mechanics in trouble: maneuvering in tight spaces. Of course, if he was maneuvering in a tight space under time constraints that just adds to the problem. And as we all know, it's a rare day that mechanics aren't under time pressure to get all their tasks accomplished.

So what can be done?

So, what can be done to prevent hangar rash? These are a few of my tips:

- Follow your company's procedures. Yes, we've all heard that before but it really is the first step in assuring safe movement of aircraft and preventing this type of ground damage.
- Check all the equipment that you will be using to ensure it's in good working order. Tow bars are notoriously neglected and abused and are known to fail.
- Check the brakes on any equipment you will be using, including the emergency brake. Even if you're not the first person using the equipment.
- In tight quarters, make sure you have enough people to see the four corners of the aircraft. Yes, this can be tough to do on a busy day but even a scratch to an aircraft's skin can result in mountains of paperwork and much greater delays. So if you don't have enough people and quarters are tight, don't move the aircraft.
- Watch Flight Safety Foundation's three-part video series "Best Practices for Safely Towing Aircraft". The videos are short, free, and great reminders of safety precautions that should be taken. They are available at: <http://flightsafety.org/archives-and-resources/ground-accident-prevention-gap>

AMT



JOHN GOGLIA has 40+ years experience in the aviation industry. He was the first NTSB member to hold an FAA aircraft mechanic's certificate. He can be

reached at gogliaj@yahoo.com.



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