Special Lubes For Special Purposes

Aviation technicians often have a need for a special purpose lubricant, but may use one lubricant for every purpose. It just doesn't work for every purpose and a special part may not receive its proper lubricant.

Kano Labs in Nashville, Tenn., U.S., is one of several manufacturers who recognize the need for a variety of products to meet wide-ranging needs of aviation technicians.

Cave man wrench twisters trying to free frozen fasteners, shafts, valves, joints, nuts and bolts will find salvation in the form of KROIL. Try it when lubricating your air-driven tools; it rejuvenates them like new, since the liquid creeps into spaces smaller than a millionth of an inch.

SILIKROIL is a variant of the product with silicone added to aid penetration, and increase lubricity, while being highly resistant to moisture and acting as a concentrated rust preventative. It is also recommended in the shop as a lubricant for cutting tools.

MICROIL is an engineered instrument oil specially refined and treated for lubricating the delicate bearings in precision instruments, clocks, gauges, and other similar applications. Developed specifically for precision use, it does not gum or congeal even at 50 degrees F. below zero.

Where a graphite-type lubricant may be required, PENEPHITE is a combination of oils and solvents containing colloidal graphite. This dry purpose lubricant possesses high penetrating qualities which carry graphite into infinately small spaces. Its purpose is to supply lubrication at locations where heat, dryness or cold makes lubrication difficult. Friction locations, such as fine leaf springs, locks, catches and such points are prone to require this type lubricant.

In an application where a tough but clear weatherproof coating for outdoor use is required, there is WEATHERPRUF. This product can be dipped, sprayed, brushed or rolled to produce a clear transparent coating drying in 30 minutes to 45 minutes and may be removed with mineral spirits.

FLOWAY is used as a detergent emulsifier cleaner for the fast removal of dirt, grease and other matter from engines or other parts. This product is sprayed onto the surface and allowed to work-in for about fifteen minutes, then washed off with high pressure water. This may be preferred over steam cleaning in many applications inside the shop and hangar.

EXRUST chemically combines with rust to neutralize the ferrous oxide. This chemical may be used in its concentrated

form in difficult cases, or diluted as necessary. After washing, the metal part is ready for coating or plating.

Referring To The Manual Could Drive You To Ruin

We constantly are instructed to refer to the maintenance and overhaul manual produced with much know-how by the manufacturer. But every once-in-a-while we run into printed instructions or illustrations that tax our patience. For example, I recently came across instructions for a bracket support that mounted another device. Problems in the field prompted additional instructions that included: "It will be noted that in attaching the bracket to the support, a special ambihelical hexnut is used. The application of this nut is rather unique in that any attempt to remove it in the conventional manner only tightens it. Because of this design, the nut must be fully screwed on before it can be screwed off." And so it goes!

Dye Penetrant Inspection Goes Fluorescent

Magnaflux has come up with a fluorescent penetrant kit that detects surface discontinuities in non-porous materials. (Zyglo ZA-59). Zyglo fluorescent materials are designed to detect cracks, porosity, leaks and other surface discontinuities in non-porous materials. Zyglo fluorescent materials are available in a broad range of sensitivity levels and processing characteristics.

The new Zyglo ZA-59 kit replaces the discontinued ZA-43 general purpose Zyglo test kit. The new kit features improved materials, lightweight carrying case and a high intensity 125 watt black light with flood and spot adjustments for sensitive applications. All materials are approved to MIL-I-12535 Revision D Specifications.

Zyglo fluorescent penetrant testing products are among the broad line of non-destructive testing equipment(s) manufactured by Magnaflux and so widely accepted and used in the aircraft industry for the past 50 years.

An In-Line Air Flow Meter

A new in-line air flow meter, specifically designed to monitor the performance of air compressors and pnuematic tools has been placed on the market by Hedland. The meter monitors pressure in flow ranges from 1-4 SCFM to 50-100 SCFB, under pressure from 50 psi at 70 degrees F. This control is needed when pneumatic tools are used and positive air flow must be carefully and accurately controlled. Riveting sensitive control surfaces or other metal applications, and the use of fastening tools on sensitive areas requires absolute air control and pressures.

The meters are available in four port sizes, from 1/4 inch through 1-1/4 inch NPTF, in 16 different flow ranges. This compact variable-area flow meter is easy to use, and features a simple multi-grid flow scale, precalibrated to indicate flow rates at various pressures on this built-in pressure gauge.

The unit is constructed of anodized aluminum, is easy to install, and can be placed in any position from vertical to horizontal without any special piping or flow straighteners needed. They are relatively insensitive to shock and vibration, and provide accuracy within plus or minus four percent of full scale.

Self-Locking Powerplant Nuts With A "Catch"

There is a specific nut used on the JT9D, CF650E, and CFM56 gearboxes that differs from the standard type nut. The existence of this nut, and also the way it must be treated is evident during stud replacement of a hydraulic pump pad. In addition, this self-locking nut is used on the JT9D hydraulic pump and the CFM56 generator to install the hydraulic motor pump on the gearbox. On CF650E engines, the adapters for the generator, constant speed drive (CSD) and hydraulic pumps are also fastened to the gearbox by these different type nuts.

Generally, during usual or standard line maintenance, these nuts will not be touched, since the components are installed on the adapters by QAD rings. On the CFM56, the generator is installed with the nuts, as is the QAD adapter for the hydraulic pump.

The nut in question has a groove around its circumference, is retained in a shell and welded to a washer. In some of them, flats have been made on the shell dimples, resulting in notches on the inner diameter.

When installing the nuts, the notches ride in the core groove of the nut and the assembly can easily be rotated. When the ring contacts the surface and the shell is tightened further, the nuts will move down and the shell notches move out of the core groove, compressing the nut into the locking position. An excellent means of locking is obtained, which prevents the nut from backing off as a result of vibration. It is also easy to install. Because of this feature, many components on engine gearboxes are mounted with these nuts, while most of the components are fitted with keyhole flanges, so backing off of the nuts for about three turns only will suffice.

There is a trick to the easy removal of the nuts without overtorquing the studs when the nut is "wrenched" off three turns. By tapping firmly on the shell, it will slide down and the shell notches will move into the core groove. The result is a free spinning nut. Studs probably have been broken because of overtorquing when nuts have been removed

without first releasing the locking feature.

Preflight Check Ground Locks

Generally, a carrier's preflight check sheet clearly details specific items that require inspection before flight. One important item is to check that the ground locks are removed.

A recent incident at a maintenance facility overlooked this important item and as a result the aircraft had to make a flight return for obvious reasons.

The aircraft had arrived several hours earlier, but the bay was required for other purposes. The aircraft was towed to another standoff bay and the ground locks were installed. Later in the day it was repositioned for an evening departure. The crew performing the preflight was unaware that the aircraft had been removed from the bay and did not check the ground locks.

Much Danger In Storing Oxidizers With Flammables

Check your storage area for the dangerous storage of oxidizers with flammables. This includes flammable liquids or gases with oxidizers in the same storage area. An industrial inspector recently found an operator storing several five-gallon containers of a corrosion resistant coating stored in the same room with a variety of other containers of industrial liquids marked "inflammable."

Alodine 1203 is a very potent oxidizer and if the container developed a seepage or leak, and mixed with one of the flammable liquids, the mixture could ignite and result in a tremendous reactive fire.

Industrial chemicals and gases should be contained in separate storage areas. (corrosives vs. flammables) Products containing Alodine used around aircraft include Alodine 1203, thixotropic liquid, and corrosion resistant coatings.

It is best to avoid storing large quantities of these industrial chemicals, but keep a minimum supply on hand. If extensive use of these chemicals is required, then separate storage areas, adequately protected, should be maintained.

Extra precautions in the handling of these chemicals by mechanics in the shop should also be observed to prevent mixing of inflammables and oxidizers.

Coating Thickness Gauge—An Anodizer's Dream Come True

Can you imagine a high tech instrument developed to measure nonconductive

coatings on any nonferrous metal, including stainless steel and graphite? I saw and handled that gauge at the recent AMTECH 88 aviation show in Dallas, Texas, U.S. It's called the Posi-Tractor 300 from Auhill Associates, Omaha, Neb., U.S. and comes from a respected thickness gauge manufacturer. It's a new concept for measuring any non-conductive coating on A1, Cu, Mg, Pb, Sn, Ti, Zn, and other types, including graphite and stainless steel.

The gauge is a one-hand operation, one point measurement, uses no dials, has no switches, and is always ready to use, requiring no calibration. In non-destructive work, it can be used in any position. It is adjustable to unusual substrata conditions, and the reading is unaffected by vibration.

This is all due to direct digital readout which holds the reading until the next measurement. It is pocket size or suitable for a tool box storage, running on a 9-volt Alkaline battery. It has a non-wearing ruby tip at its probe point and is insensitive to solvents, oil, water.

The principle of operation is based on Eddy current field comparator. This principle is not affected by aging, shock or temperature variations. There is a mil (inch) to metric conversion table printed on the side of the gauge. Technically, its range is 0-4 mils. Its tolerance is +/- 3 percent and +/- .00001 inches. Its weight is 3-1/4 ounces. Size is 4-1/2 inches X 21/8 inches X 1 inch. Probe pressure is 3-1/2 ounces.

I tested the instrument on a range of coatings on many surfaces, including composites, and the digital readouts came in the sequence used without any hesitation. Anyone doing non-destructive testing work or needing a thickness gauge can rely on this new instrument to do that job with little effort.

The manufacturer also has models to measure non-magnetic coatings - such as paint or plating, galvanizing-on steel, or a model to measure anodic or organic coatings on aluminum or copper, without the need to calibrate.

Aircraft Mechanics Specifications Handbook Available

The third edition of the *Aircraft Mechanics Handbook of Specifications* is now available. This reference manual should be available in the tool room of any FBO, or air carrier operator. The handbook contains all the basic hardware identification under an AN, NAS, & MS standard(s) with size charts, conversion factors, and with metric and decimal equivalents.

It is available from the Pittsburgh Institute of Aeronautics (205 pages) at a cost of $13.95. Their address is P.O. Box 10897, Pittsburgh, PA 15236-0897 U.S.

Alerts

Precautions In The Installation Of Flexible Hoses

Operators reported that installation problems caused by hose installers caused kinks in the hoses and resulted in component replacements. This includes several types and sizes of flexible hoses. These damaged hoses were not inherent to a particular size or aircraft system. There were kinked fuel, oil, and hydraulic hoses which generally resulted in failed hydraulic pumps, constant speed drives, and other associated components. In one case, several fuel controls were replaced for low fuel flow due to a kinked fuel hose.

Most of these hoses have end fittings at each end. They are recognizable by threads in the female portion. Some mechanics refer to this fitting as the "B" nut. Next to the "B" nut is a fitting called a nipple hex; its purpose is to allow the mechanic to place a wrench on it to prevent the hose from twisting while tightening the "B" nut.

To install a flex hose, it should remain relaxed without clamps attached by starting the "B" nut on the male nipple by hand. Next use a wrench on the nipple hex to hold the line stationary while tightening the "B" nut. After both ends have been torqued, install the hold-down clamps as required. Before installation, it would be beneficial to lay the hose on a flat surface and mark it with a straight line or reference to use for final alignment.

It may be well to note that most kinked hoses cannot be detected under the fire shield.

Caution Required Near Engine Intakes

During a recent engine wash operation on a JT8D engine, the nozzle on the end of the wash rig hose fell apart. The operator was holding the hose very close to the engine intake and the nozzle fell into the intake. Thankfully, it did not roll into the rotating fan blades. If it had, an expensive engine change due to Foreign Object Damage (FOD) would have been necessary.

The hose operator should be about 36 inches to 39 inches away from the blades. This puts the nozzle and operator well outside the engine intake and any hose failure at this distance is less likely to damage the engine. Also, check that the hose nozzle is serviceable before the wash begins and make sure that loose items (like pens or ID cards) are removed from the operator's pockets before starting this operation.

Remember that the operator should be in contact with the cockpit via a headset at all times during the wash.

Foreign Object Damage (FOD) Update

As the flight taxied from the terminal, FOD robbed the number one engine of its 1,200 hours of remaining operating time. The engine ingested loose, broken concrete from the taxi strip. If you happen to come across such loose debris on the line, pick it up and discard it promptly. It is difficult to imagine that loose concrete on the taxi strip can contribute to distorted flight schedules and increased maintenance expenses.

One air carrier reported that in 46.7 percent of all tires scrapped for mechanical failure, FOD was the villain. It also reported that the single and primary cause of premature engine removal is FOD. The average cost associated per FOD removal for a JT8D engine has been calculated to be (U.S.) $15,395.

A variety of foreign objects such as loose concrete, rocks, magnetic and non-magnetic metals, are among the most common objects causing this damage. One operator reported that accumulated or piled grass clippings aren't likely to cause engine or tire failure, but can cause significant problems with cooling duct overheat situations. (CFM-56 on the DC-8)

Crushed Between Landing Gear Doors—Again

A mechanic was crushed between the landing gear doors of a B-747 and suffered serious internal injuries.

The accident happened while carrying out landing gear retraction tests following replacement of one of the gears. Problems were experienced while removing the ground lock pin from the nose gear and to assist its removal, the gear was selected "down" with hydraulic power. This caused the undercarriage doors to close on the mechanic who had been trying to remove the pin. He suffered two broken ribs and sustained serious internal injuries.

As required by the operator, guards were placed in positions around the landing gear area, lookouts posted, and headset communication was established. But despite these precautions, there was a breakdown in the communications between the injured man and the rest of the team to the point whereby he was in a vulnerable position when the gear selection was made.

Properly following procedures should prevent this kind of accident. Communications must be established by all persons concerned at all locations.

Communications must be complete and prompt. The work area must be clear of unnecessary people and equipment. Every person concerned with the operation must be briefed beforehand. Nominate lookouts and ensure that they too are briefed on the operation. Use required protection equipment.

Remember that powered systems (hydraulic, pneumatic, electric) can produce massive forces. In this case, the landing gear doors are capable of exerting a force of 3 tons. With that amount of force, there is not much of a chance of escaping injury if a person is caught in it. Remember, too, that aircraft are fitted with stored energy sources such as accumulators, so that these systems can be operated without external driving forces.

It is so easy to get "wrapped up" in the technicalities of the job and neglect personal safety. Due to the challenging nature of their work, aviation mechanics are particularly prone to such distractions.

This is the second occurrence and both men are lucky to be alive.

DC-10 Dispatched With Open Access Panel

Upon dispatch from the gate, it was noted that an access panel was open on the forward part of the aircraft. The aircraft was contacted and directed to return to the gate. Two ramp servicemen were assigned to wait for the arrival of the aircraft with a belt loader to close the panel. About that time a radio equipped airport authority car came by, confirming that the two employees were awaiting the aircraft's return and the driver said, "Jump in and we will go out to the aircraft and close the panel." The airport authority car advised the aircraft to hold until they closed the panel.

When the car arrived at the aircraft, the car was positioned beneath the aircraft. One employee got onto the car roof while the other employee gave the crew a thumbs up signal. This signal by the employee was meant to advise the crew that they were going to close the panel. This signal was acknowledged by the crew but interpreted by them to mean that the panel had been closed. The employee who gave the thumbs up signal went over to the car and noted that the employee on the roof could not reach the access panel. *He then climbed onto the roof and onto the other employee's shoulders to reach the panel.*

The crew then advised the tower that the panel had been closed and requested clearance to taxi. As the aircraft began to taxi, the employee on the car roof lost his balance and fell. The employee who had been on his shoulders managed to hang on to the open access panel but eventually dropped to the ground. The aircraft ran over the airport authority car with the main gear flattening the

car.Fortunately, none of the three employees was injured.

The aircraft sustained minor damage, but the car was totaled.

Sounds like something that the Ritz Brothers or Laurel & Hardy could have used as a script for one of their comedies, but not something that aircraft line personnel should perform. Finally, the airport vehicle had "RAMP SAFETY" posted on its side panel!

B-767 Cowl Latches Not Locked

One operator has reported core cowl and thrust reverser cowl latches coming unlatched in flight. Improper rigging and adjustment of the latches was determined as the cause. This could result in a loss of the cowling in flight. Improper adjustment of the keeper eye bolt can result in the retention pin shearing off and allowing the keeper eye bolt to extend and lose latch tension between the latch hook and eye bolt.

To ensure that each of these cowls remain securely latched in flight, adhere to the following procedure, together with the B-767 Maintenance Manual recommendations. (71-11-05,07, 78-31-04)

1. Contact is required at the latch bearing pads at all latch locations when the latches are closed. This will prevent loss of latch tension due to thermal expansion, relative motion and vibration.

2. All hook latches must be adjusted to a latch handle closing force of 40 pounds to 60 pounds. Properly adjusted latches will open to a loud "pop".

3. Adjust latch closing force by turning the keeper adjustment star. *DO NOT BREAK OR SEPARATE THE EYE BOLT!* This will damage the turn keeper, and can result in improperly adjusted latches.

4. Replace broken or damaged latches and/or keepers immediately.

5. Readjustment of latch shim thickness and latch tension are required if fan cowl, core cowl, and/or thrust reverser are changed. When an engine is changed, a rigging check is required for all cowls. Periodic adjustment of latch tension may also be required.

DC-9 Wing Tank Fuel Leaks

Recently,there have been a number of reports concerning DC-9 wing fuel

leaks from around the fuel probe mounting plates. In many cases it was found that prior to the appearance of the leak, the probe had been removed in the process of trouble shooting a fuel quantity or similar problem. It is recommended that whenever a fuel quantity probe is removed for any reason, on re-installation a new packing ("O" ring) teflon retainer and shim should be used.

JT8D Engine Water Washing Precaution

Maintenance and ground personnel involved with carrying out water washes on JT8D engines are reminded of the importance of disconnecting the generator cooling air supply duct during the wash procedure. Expensive damage can occur due to water corrosion in both the generator and the constant speed drive if the duct is not disconnected.

B-767 Chafing of Wire Bundle

During climbout from the departure terminal, a B-767 aircraft experienced electrical arcing and smoke near the oxygen panel. A number of circuit breakers were found tripped. Approximately two hours later, more electrical arcing was heard and numerous additional circuit breakers on the left electrical bus tripped. The captain elected to divert to another airport and landed there without further incident.

Subsequent evaluation revealed that a wire bundle in the left cockpit sidewall behind the console had shorted to ground and that more than 70 wires required repair.

The incident was caused by aft movement and subsequent chafing of a wire bundle against a console mounting screw. The mounting clamp used to properly position and secure the wiring harness had failed, allowing harness movement, chafing, and an eventual electrical short circuit.

As a result, additional clamps have been added to the wiring run on all the operator's aircraft of this type to increase the security of the assembly.

This type damage rapidly cancels out the cost savings in fuel gained by washing the engine. Reconnection of the duct must be made after the wash procedure.

Troubleshooting Diesel-Powered Ground Support Equipment

We tend to forget that in the operation of diesel-powered aircraft ground support equipment, we cannot always use gasoline-powered troubleshooting logic. In a seminar at the recent AMTECH 88 aviation equipment show held in Dallas, Texas, U.S., the Perkins

Diesel Engine Company pinpointed causes of equipment failures. Poor engine installations, improper modifications to existing components and instrument misuse are frequent causes for the failure of aviation ground support equipment. The company pinpointed these three causes of equipment downtime during their seminar on "Troubleshooting Diesel Engines." These misuses of engines and equipment, which can lead to a long troubleshooting process, easily can be avoided if the equipment is used for what it is designed to do with an engine that fits the application, and modifications meet supplier recommendations.

"In any application, the engine must be capable of meeting the particular machine in the conditions in which it will have to operate," it was explained. "The engine must be matched and coupled to the driven load, securely mounted in a frame, protected from the elements, supplied with clean fuel, lube oil and air, maintained at the recommended operating temperature through a properly sized cooling system, and with the correct degree of engine throttle control."

Improper installations can occur in the field when a gasoline engine is replaced with a diesel or a worn engine is switched for a new engine.

It was noted that diesel engines are in their second generation of engineering as many advances have been made in technology over the past decade, particularly in combustion chamber, fuel injection and cylinder head design.

It was emphasized that diesel engines require four things for efficient operation: 1. good clean air in sufficient quantities; 2. correct cylinder pressure; 3. atomized fuel at the correct time; 4. unobstructed exhaust. If any one of these basic requirements are not on hand, the result will be a sick engine.

Gulfstream 690A Missing Roll Pin (PN MS 171528)

Landing gear failed to retract after takeoff. Investigation revealed that the roll pin in the gear control arm assembly had fallen out, disconnecting the gear handle from the control valve. Had the gear been retracted when the roll pin failed, the gear could not have been extended. The submitter advised that the pin is difficult to inspect without major disassembly. A new pin was installed and safetied. (Aircraft time - 6,000 hours).♦