



Maintenance Briefing Notes Best Practices Ground Support Equipment and Tools

I In the Beginning ...

In the East African plain 2.5 million years ago, driven by starvation and its desire for survival, desperate to feed on a whitened skeleton of what had already been the supper of large predators and hosts of scavengers, a small australopithecus chose a large flat stone to crush the larger bones and suck out the nourishing marrow.

Little did that creature know, but apart from guaranteeing survival of its species and propelling it far forward into Evolution, it had invented the Tool, a Tool which allowed unlimited access to food that no other species could reach.

Some generations later, its offspring would be designing and manufacturing stone tools of all shapes and sizes for a wide range of tasks, from cutting and crushing to ploughing and building. For almost each conceivable application, mankind would design tools to ease or often allow the task to be done:

The "specific" Tool was born ...



Whether one believes in the Theory of Evolution or not, one can only accept that the design, manufacture and use of tools is probably one of mankind's most ancient - and also most current- activities.

From the dining table to the aircraft maintenance hangar, tools are present and required everywhere, by everyone, at all times.

II Facing the Reality of Everyday Maintenance Operations

When talking to maintenance engineers, most of them can remember cases where use of a wrong, or inappropriate tool, has contributed to difficulties in maintenance operations, creating additional costs for corrections, or in the worst case, even to injuries.

The absence of reliable statistical figures in how often specific maintenance tools have been involved in maintenance errors could be explained by the fact that there are no specific reporting requirements for maintenance events involving tools as being at the origin of the event.

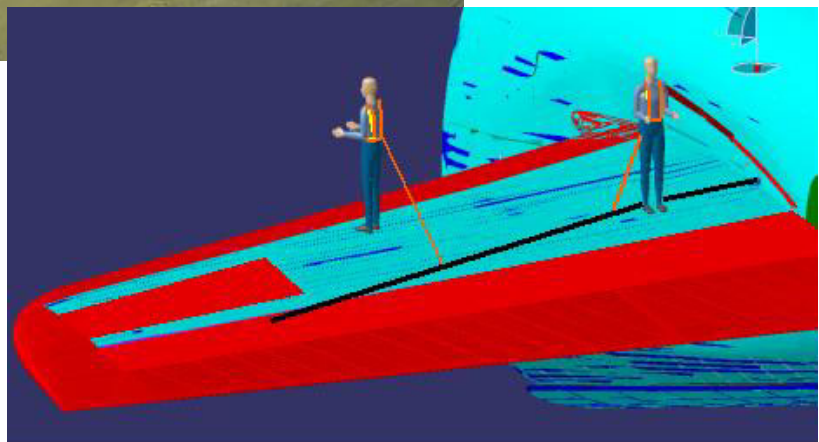
Also, the consequences may not be immediately evident in terms of aircraft dispatch indicators, or they may even have been deliberately obscured.

III Maintenance Considerations during the Design Process

An integral part of the Ground Support Equipment (GSE)/Tools design process are stringent international regulations, such as the "EC safety directives", contributing to maintenance personnel health and safety.

For example:

Definition and on-aircraft validation of safety rope provisions, enabling work on the horizontal tail plane



Once a new GSE/Tool has been designed, a prototype is then manufactured, and it's use is tested on aircraft under real maintenance conditions. This is to ensure that the tool fulfills its function, evaluate its function vis-a-vis health and safety regulations applicable to its design, and test specific scenarios for maintenance - induced errors.

Example :

Validation of the upper deck slide raft removal / installation GSE.



IV Use of Non Approved Aircraft Maintenance Tools

Depending on the level of the customized maintenance program selected, the investment in the required GSE/Tools can become significant.

That's why it has been observed that operators may buy the cheapest offered GSE/Tools from local suppliers, "round the corner", rather than approved or proprietary tools.

It has been repeatedly observed that Airbus proprietary tools, copied and manufactured by non- approved suppliers, do not conform to the Airbus technical specification, which is meant to control the design and manufacturing process.

There have been instances where tools have been made from incomplete, or out-of-date drawings, incorrect material, and/or according to wrong protection processes.

As a consequence, it is likely that these tools will not be of the appropriate quality, and may not perform their intended function in a safe and satisfactory manner.

It also has been seen that non-approved specific tools are being used on Airbus aircraft or it's components.

Such non-approved tools can be categorized into three main groups:

- Airbus and Supplier/Vendor tools manufactured and distributed by non-licensed companies based on non -controlled drawings, or even Tool Equipment Manual (TEM) illustrations.
- Copies of Vendor proprietary tools bearing the same part number but copied from the original by unauthorized companies; and,
- "Alternate" tool design sold as so-called "equivalents". These tools bear a part number different to the one given in the manufacturer's documentation.

Use of any of the above types of non-approved tools for maintenance could lead to aircraft or component damage and / or personnel injury.

If non-approved tools are used, the test result may not reflect that of the approved tool. Use of non-approved tools is not recommended and is done under the full and sole responsibility of the Operator or Maintenance Provider.

Airbus therefore recommends that Airlines and Maintenance Centers use only the specific tools called for in the Airbus and / or Vendor documentation, and that users ensure that they are manufactured by the approved manufacturer.

The Airbus Service Information Letter (SIL) reference 00-031 provides further information on this subject. This Service Information Letter is regularly updated, and provides also references to Airbus licensed tool manufacturers for Airbus proprietary tools.

V Case Study - Ram Air Turbine (RAT) Test Failure during Maintenance

Extract from an in-service occurrence report:

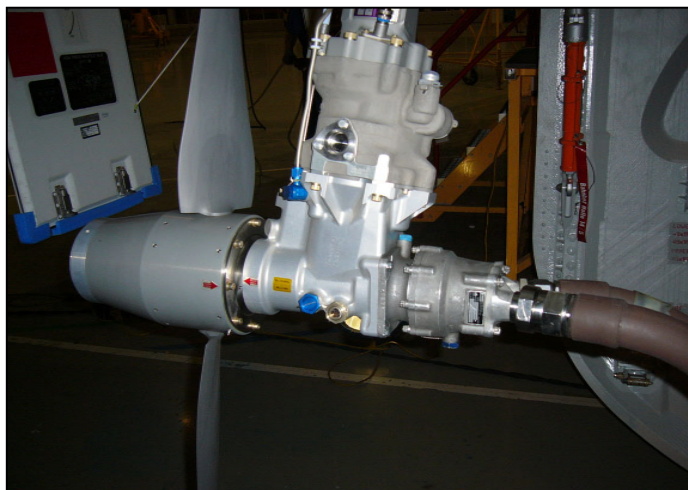
“ Due to the ongoing problem regarding the RAT test procedures, a RAT test was planned on August 15th, 2007. ... we could figure out a problem occurred with the back drive motor. Return and pressure connectors on test unit have been swapped and therefore the return pressure was too high.

After correction, all tests have been without finding the next day, but the RAT seal was damaged ...

The aircraft was for two days AOG to clarify if the RAT should be replaced, and also the spare parts that had to be ordered.”

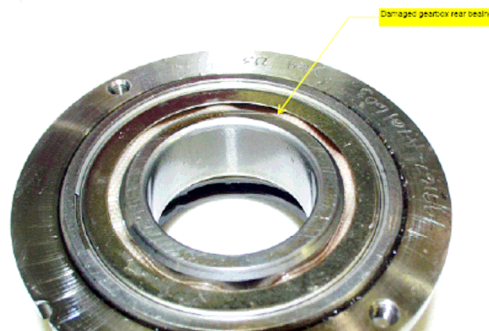
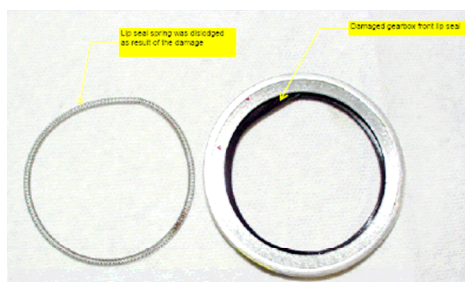
RAT ground test procedure:

Ground testing of the RAT requires that a hydraulic test motor be attached to the RAT, driving mechanically the RAT once supplied with hydraulic pressure from the hydraulic ground cart.



There have been cases where, further to a RAT ground test, a leakage was noticed at the rear side of the RAT, leading to the loss of the gearbox lubricant.

The leakage was caused by a damaged seal at the interface between the test motor and the RAT gearbox.



Such damage is typical of an over-pressurization of the back-drive motor.

An over-pressurization can be induced by either:

- a “kink” in the test motor hydraulic return hose
- a wrong hydraulic ground cart input pressure selection
- a cross-connection of the high pressure and low pressure ports at the level of the test motor.

The high and low pressure hydraulic hoses are normally fixed to the test motor using Loctite as second retention. However, contamination with other products can over time lead to the Loctite being dissolved.

In addition to the measures already in place and in provision of a further opportunity to detect possible maintenance errors during the RAT tests, the AMM ground test procedure was enhanced.

The following tasks were added in the AMM with Revision August 2007:

- Check the RAT ground test motor return line for kinks or blockage
- Inspect the RAT gearbox interface for leakages before and after performing the RAT ground test
- Check the RAT gearbox oil level

Further explanations and the revisions for the AMM were provided with the Operator’s Information Telex (OIT) SE 999.0066/07, issue date 14 June 2007.

This Maintenance Briefing Note (MBN) is part of a set of Briefing Notes that provide an overview of the applicable standards, techniques, best practices, human factors, suggested company prevention strategies and personal lines-of-defense related to major threats and hazards that may affect maintenance.

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