Safety first
The Airbus Safety magazine

Using Approved Tools and Ground Support Equipment for Maintenance

Special tools or Ground Support Equipment (GSE) may be required to perform some maintenance tasks. Airbus provides a list of approved suppliers for GSE or tools in the Tools and Equipment Manual (TEM). GSE or tools from suppliers that are not listed in the TEM may be offered to Operators and maintenance organizations as alternatives. However, these alternative GSE or tools may not always be designed or manufactured to meet the technical, quality, and safety requirements of Airbus.

This article describes events where the use of unapproved GSE or tools led to serious incidents. It explains why it is important to only use GSE or tools from approved suppliers to ensure safe aircraft maintenance and operations.

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CASE STUDY 1

Event Description

The engine of an A321 aircraft was being replaced. The maintenance team installed the engine bootstrap equipment that is used to hold and lower the engine during the removal task. When the engine was disconnected and separated from the pylon, the engine suddenly fell **(fig.1)**. Fortunately, nobody was injured. The engine pylon was damaged and needed to be partially replaced. The engine was damaged beyond economical repair.

(fig.1) Picture of the event

Event Analysis

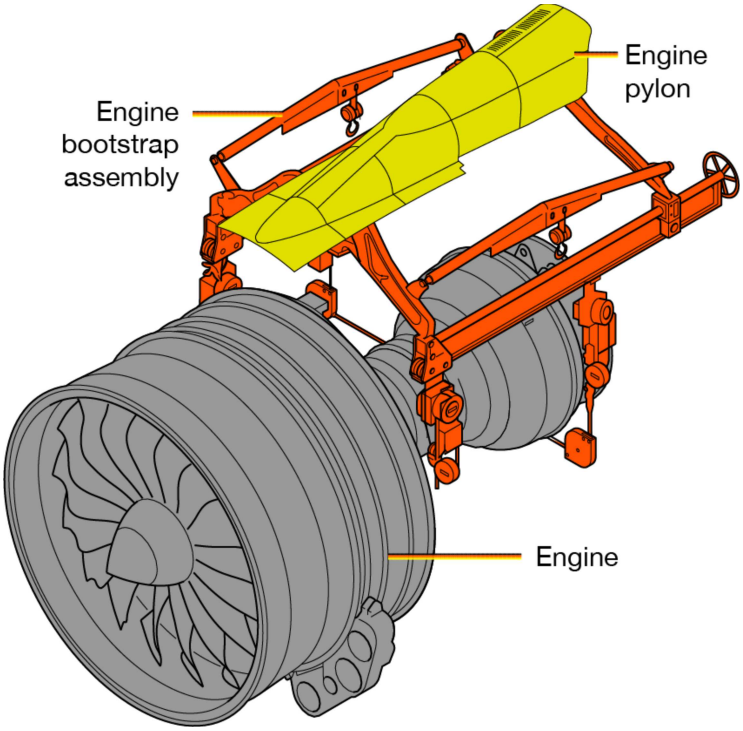
Rupture of a bootstrap attachment

Inspection of the bootstrap equipment on the hanging engine showed that one of its attachments had bent under the load of the engine and it eventually ruptured, which released the engine it was supporting, causing it to be damaged from the fall.

Unapproved bootstrap

The investigation found that the bootstrap equipment was not compliant with the Airbus technical specifications. The sizing and material of the attachments, which were a part of this equipment, were not correctly sized and this caused the equipment to fail.

The supplier of the engine bootstrap equipment was not listed in the Airbus Tools and Equipment Manual (TEM). The Operator had found the equipment supplier on the internet. The bootstrap equipment advertised on this supplier's website indicated the same part number as the one listed in the AMM, but its cost was significantly lower than the equipment available from approved suppliers listed in the TEM.



(fig.2) Example of an engine bootstrap for A320 aircraft

CASE STUDY 2

Event Description

An A319 aircraft was preparing for takeoff. During the takeoff roll, the PF initiated the rotation at around 138 kt. The aircraft responded with a high pitch rate, despite limited inputs by the PF, and the pitch angle quickly reached 14°. The flight crew continued the flight and landed safely. When back on the ground, the flight crew reported the unexpected high pitch rate experienced during the takeoff. The aircraft was kept on the ground for further inspection.

Event Analysis

A weight and balance analysis was performed, but no loading or balance issue was identified.

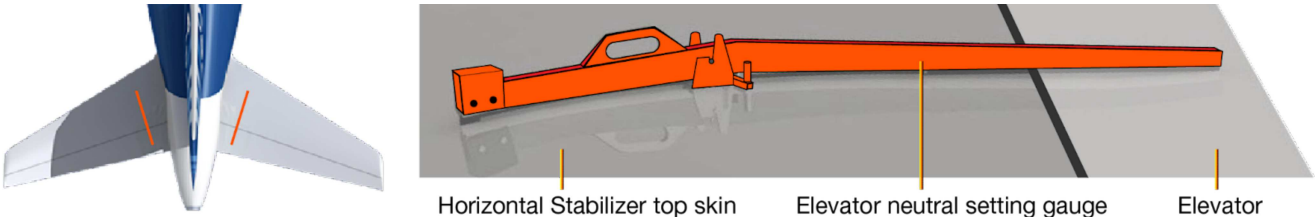
The flight data recorder confirmed that the aircraft had a dynamic rotation with limited stick inputs, as well as an unexpected center of gravity (CG) value from the Flight Augmentation Computers (FAC). This value was significantly different from the actual CG calculated during the aircraft weighing.

Too high pitch-up elevator setting

Inspection of the aircraft flight control surfaces revealed an incorrect setting of the elevators, which were set at a higher pitch-up position than expected. It explained the aggressive pitch-up during takeoff rotation and why the aircraft was 'trying to rotate' before rotation speed as reported by the flight crew.

Unapproved neutral setting gauge

The investigation revealed that the elevators were erroneously set using an unapproved elevator neutral setting gauge **(fig.3)**. The unapproved gauge was found to be a rough copy of the approved tool. The gauge used could not be correctly placed on the horizontal stabilizer skin due to its incorrect dimension and this led to an incorrect reference for the elevator neutral position being used for the setting of the elevators.



(fig.3) Illustration of the elevators neutral setting gauge

USING THE CORRECT GSE & TOOLS

Why using the approved GSE and tools is important

Approved GSE and tools are designed to meet specific needs

Approved GSE and special tools are designed so that they can precisely fit and sustain the loads that they will be exposed to when used. Specific materials, dimensions, and manufacturing processes for GSE and tools ensure that when used correctly, they will not fail in use, cause damage to the aircraft, or injure people.

Be vigilant when searching for GSE and tools online

Many suppliers selling unapproved GSE and tools can be found online and may propose alternative versions or part numbers. There is no guarantee that these tools meet the Airbus requirements and standards.

Types of unapproved GSE and tools

Unapproved GSE and tools can be categorized into three main groups:

- **Imitations of Airbus or vendor proprietary GSE and tools**
  This type of unapproved GSE and tools has the same part number as the Airbus approved items, but may not have the same characteristics due to differences in the material used, dimensions, and manufacturing quality.
- **'Alternate' tool designs sold as so-called 'equivalents'**
  This type of unapproved GSE and tools will not have the same part number as the approved items, but their suitability and quality cannot be guaranteed by Airbus.
- **Out of date second-hand market tools**
  These GSE and tools may initially come from an approved supplier and then be sold on the second-hand market. They may be of an older standard that does not comply with the latest specifications, therefore, making this GSE or tool not fit for the purpose anymore.

(fig.4) Example of approved tools

Risks when using unapproved GSE and tools

Airbus and its approved suppliers/vendors did not review, test or validate the unapproved GSE and tools. It is likely that these items may not be of the appropriate quality or may not perform their intended function in a safe and satisfactory manner. These items can cause injuries or damage to the aircraft, which may adversely impact maintenance and operations as demonstrated in the two events described above.

Golden rules to get an approved GSE & Tools

Maintenance documentation is the only source of information about the correct GSE or tools to be used to perform maintenance tasks on Airbus aircraft.

Operators and maintenance organizations must ensure that the GSE and tools used to perform a task have the same part number as the one listed in the AMM. However, since unapproved GSE and tools may exist with the same part number, Airbus recommends only purchasing or leasing the GSE and tools from one of the approved vendors referenced in the TEM **(fig.5)**.

(fig.5) Extract of the A320 TEM for the Elevator neutral setting gauge

Technical data related to a tool

Part No.	:	98D27309006000 (FAPE3)
Designation	:	GAUGE-ELEVATOR NEUTRAL SETTING
Description	:	This tool is used to set the neutral position of the elevator.
References	:	AMM 27-34-00

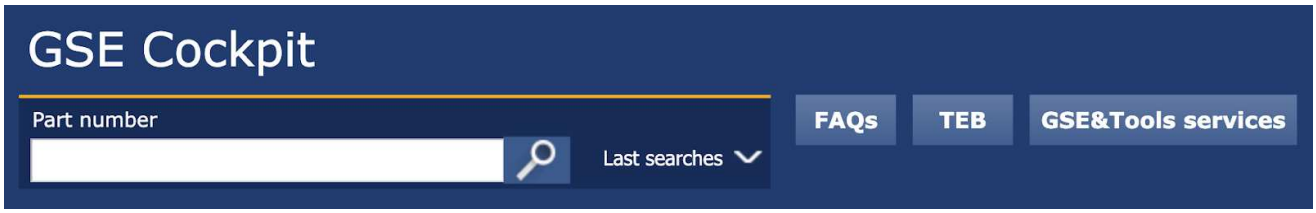
Figure 01 N_TE_273400_00_ANM0_01_00

Additional Information

Part Number	Keyword	Drawing	Dimension	Maintenance Manual	Vendor Code	Supplier Code
98D27309006000	GAUGE	NO	LENGTH: mm/2250 WIDTH: mm/370 HEIGHT: mm/510 WEIGHT: g/74000.000 (LENGTH: mm/2113 WIDTH: mm/210 HEIGHT: mm/144 WEIGHT: g/10000.000)		FAPE3	D4296
Optional Vendors Codes						

It is also the responsibility of the Operator or maintenance organization to consult the latest Tool Equipment Bulletin (TEB) on the GSE cockpit of *AirbusWorld* portal **(fig.6)** to check for information on GSE and tools. TEBs are issued when a new tool is introduced or deleted from the documentation. They also provide information about tool modifications. A TEB is applicable until the TEM and AMM includes the information it contains. Operators and maintenance organizations can subscribe to the TEB notification service in *AirbusWorld* and receive an alert by email for each new TEB publication.

(fig.6) Interface of the GSE cockpit available on the *AirbusWorld* portal



In case of any doubt about the origin, suitability, and approval status of GSE or tools, the Operator should contact Airbus or the original equipment manufacturer to confirm that it is an Airbus approved item.

KEYPOINT

- **Check for the correct GSE or tool part number** in the AMM
- Airbus recommends ordering GSE or tools only from **an approved supplier/vendor listed in the TEM**
- **Consult the latest TEB** for any new information about GSE and tools or any related modification, addition, or cancellation from the documentation.
- **If in doubt, ask Airbus to confirm that the item is an Airbus approved GSE or tool**

INFORMATION

Further information can be found in the following documents available on the *AirbusWorld* portal:

- **OIT 999.0047/21 & A220-OIT-00-00-011 NC** - Manufacturing and Sourcing Rules for Airbus Proprietary GSE and Tools
- **OIT AI/SE 999.0089/01** - Use of Non-Approved Aircraft Maintenance Tools
- **Frequently asked questions on GSE and tools** available on the GSE cockpit of *Airbusworld.*

Maintenance of GSE & Tools

GSE and tools require regular maintenance, as specified by the manufacturer, to operate correctly, prevent failure, and ensure safe aircraft maintenance and operations.

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Ground Support Equipment (GSE) and special tools are designed so that they can perfectly fit and sustain the loads and conditions they are designed to be exposed to when they are used. Unapproved GSE and tools provided by suppliers not listed in the TEM may not meet the Airbus technical specifications. They may not perform their intended function in a safe and satisfactory manner. Unapproved items can cause injuries to people working on or around the aircraft and damage to the aircraft and its components.

Operators should only use GSE and tools corresponding with the part numbers that are listed in the Aircraft Maintenance Manual and ensure that they are procured from the approved suppliers referenced in the Tool and Equipment Manual. Operators should also consult the latest Tool Equipment Bulletin for new information about GSE and tools or any new modification, addition, or cancellation from the documentation.

In case of any doubt about the origin of GSE or tool, Operators can contact Airbus to confirm that the GSE or tool is an approved item.

GSE and tools require regular maintenance. Adherence to the GSE or tool maintenance instructions will contribute to ensuring its safe operation during maintenance tasks without risk of failure.

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