



AEROSPACE RECOMMENDED PRACTICE

ARP5600™

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Disposition of Damaged Wheels
Involved in Accidents/Incidents

RATIONALE

ARP5600 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE:

- 1.1 This SAE Aerospace Recommended Practice (ARP) establishes a procedure for disposition of aircraft wheels that have been involved in accidents/incidents or have been exposed to overheat conditions or overload conditions from loss of adjacent tire pressure (paired wheels) or wheel tie bolts.
- 1.2 Recommendations in this document apply to main landing gear (braked) and nose landing gear aircraft wheels, manufactured from aluminum forgings or castings. The most common wheel material is 2014 or 2214 aluminum but other aluminum alloys are applicable to this document such as 2030, 7049, 7050 and 356 castings.

2. REFERENCES:

- 2.1 British Civil Aviation Authority Notice 97 (Issue 1, May 10, 1982) Return to Service of Aircraft Items Recovered from Aircraft Involved in Accidents/Incidents
- 2.2 SAE AMS-A-22771, Aluminum Alloy Forgings, Heat treated
- 2.3 SAE AMS-QQ-A-367, Aluminum Alloy Forgings
- 2.4 ASTM E 1417, Standard Practice for Fluorescent Penetrant Examination
- 2.5 ASTM E 1444, Standard Practice for Magnetic Particle Examination
- 2.6 SAE AMS-S-13165, Shot Peening of Metal Parts
- 2.7 AIR4403, Tapered Roller Bearings for Wheels
- 2.8 AIR4777, Nondestructive Inspection for Wheels and Brakes

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Documents

Standard Sharing Hub

2.9 T.O. 4W-1-61, Wheel General Maintenance and Overhaul Technical Order

2.10 T.O. 33B-1-1, Nondestructive Inspection Methods Technical Order

2.11 T.O. 44B-1-3, General Maintenance Instruction for Aircraft Wheel Bearings Technical Order

3. DEFINITIONS:

RESIDUAL STRESS: Stress present in a component that is free of external forces or thermal gradients.

RESIDUAL STRAIN: Plastic Deformation that remains permanently after removal of the load that caused it.

4. IDENTIFICATION OF DAMAGE:

4.1 Landing gear wheels involved in accidents/incidents can be classified under four different types as follows:

Type I: Severe Mechanical Damage - Wheels with visible severe mechanical damage (gouged, pierced, fractured, etc.).

Type II: Abnormal Heat - Wheels involved in abnormal heat (fire, frictional heat caused by an aborted take-off, extreme landing, dragging brakes), and damage resulting from a failed wheel bearing.

Type III: Visual or Dimensional Distortion - Wheels with visual or measureable dimensional distortion.

Type IV: No Visual or Measurable Defect - Wheels with no visible or measureable defect, but known to have been involved in an accident/incident (no heat damage).

These types of damage and their causes may or may not be identified in repair and overhaul manuals. This type of information is pertinent when determining the disposition required, therefore separate dispositions are provided for each type of damage. A damage assessment is essential to determine the applicable category. It is recommended that the returned wheel include a statement indicating why it is being returned from service.

5. DISPOSITION:

WARNING: Without a thorough investigation by properly qualified personnel, these wheels should not be returned to service. Retain all subcomponents if deemed relevant to the damage investigation such as bearings, tie bolts, seals, retainers, fuse plugs, inflation valves, etc.

CAUTION: Cleaning and handling of damaged components may obscure or discard evidence useful in the follow-on investigation. Reasonable effort should be made to photo document the subject and its adjacent and related parts to record the components' condition and location at the time of discovery and at subsequent stages prior to cleaning, disassembly and further study for investigation of the damage source.

5.1 Type 1 Severe Mechanical Damage:

These wheels should be considered scrap unless approved by a detailed evaluation by cognizant engineering office and the airworthiness authorities. However, if the wheels are to be returned to service, it is strongly recommended to follow procedures for Types II, III and IV below to ensure removal of harmful residual stresses.

5.2 Type II Abnormal Heat:

Type II damage will likely cause a reduction in strength, ductility, fatigue-life and stress corrosion cracking resistance, due to changes in material properties. The severity of the damage caused by intense heat must be accurately evaluated and approved by engineering personnel and the airworthiness authorities to ensure safe operation of the wheels before they may return to service.

It is essential that the initial investigation of wheels involved in accident/incidents be accomplished before removing any paint, primer or plating and that no chemicals are applied prior to the investigator viewing the wheel, or essential evidence may be lost.

Examination of coated surfaces for evidence of blistering and abnormal color change to primer and paint, together with accurate testing methods involving conductivity, hardness and non-destructive methods are recommended for proper assessment of wheel damage. Examination of other surfaces such as plated wheel drive keys or torque bars, for abnormal discoloration is essential. Unless a thorough investigation is performed, these wheels and wheel components should not be returned to service.