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Case Study:
Aircraft Damaged During De-jacking Operation

A human factors analysis of a maintenance incident involving improper aircraft de-jacking procedures

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Background: Initial Maintenance Activities

Primary Task: Pivot Pin Replacement

The aircraft was undergoing replacement of main landing gear pivot pins according to a Service Bulletin. During initial jacking, the air pump on the left-hand main jack was discovered to be defective.

The supervising engineer determined that minimal lift height was sufficient for the sufficient for the pivot pin work, so operations continued using the serviceable serviceable hand pump on the defective jack.

Secondary Issue Emerges

A leak on the main oleo required rectification, necessitating significantly higher jacking than the the pivot pin replacement.

The defective jack needed replacement or repair before the oleo seal could be changed.

The Decision to De-jack

01

Notification Received

Hangar superintendent notified the supervisor that the defective jack required removal for repair, with no specific deadline provided.

02

Supervisor's Decision

The supervisor decided to de-jack at end of shift, believing it would minimise disruption to other maintenance tasks.

03

Personal Factor

The supervisor was dealing with a domestic domestic situation that would cause him to to arrive late the following day, influencing his influencing his decision timing.

Team Concerns and Confusion

> "We questioned the timing of the de-jack. We had documentation to sign up, tooling to return, and it was close to end of shift."
> shift."
>
> — Leading hand and fitters interviewed post-incident

Multiple technicians expressed concerns about the timing of the de-jacking operation. There was a brief period of confusion when it was unclear whether the operation would proceed, during which some personnel began returning tools and completing end-of-shift documentation.

This uncertainty created a disorganised environment that would prove critical to the incident.

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Critical Safety Breakdown: The De-jacking

Missing Inclinometer Observer

No personnel were positioned at the inclinometer prior to lowering. The supervisor claimed he requested a fitter to fitter to observe; the fitter denied receiving receiving this instruction.

Miscommunication

The fitter identified by the supervisor stated he was asked to assist but was not allocated a specific task and was not present at the initial de-jack due to the earlier confusion.

Flawed Assumption

The supervisor believed the three-inch lowering distance was insufficient to classify as a proper de-jack, assuming no problems would occur and AMM requirements were unnecessary.

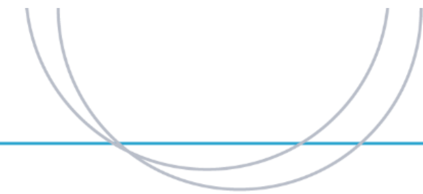
The Mobile Phone Distraction

Conflicting Accounts

Three jacking team members and one witness reported seeing the supervisor on a mobile phone during the aircraft lowering.

The supervisor denied this, claiming he received the call before the de-jacking de-jacking commenced. He acknowledged the call related to his ongoing ongoing domestic situation.

This distraction coincided with complete absence of communication between the supervisor and the tail jack team during the critical operation.



Operational Failures During De-jacking

1

2

3

Tail Jack Issue

The aircraft lowered only approximately approximately one inch at the tail. The lock The lock ring operator insisted the ring was ring was unlocked throughout; the valve valve operator confirmed the lowering lowering valve was open.

No Communication

Zero communication occurred between supervisor and tail jack team. Only one request was made to the left-hand main jack team to increase descent rate.

Post-De-jack Actions

The supervisor checked main jacks were clear, then visited the rear jacking point. Finding no pressure, he applied pressure to achieve a positive gauge reading, believing it needed to act as a steady.

Discovery of Damage

After completing end-of-shift tasks, the supervising engineer was clocking out when clocking out when another supervisor noticed the aircraft's condition and and immediately alerted him. The incident was reported to hangar management. management.

Aircraft Attitude

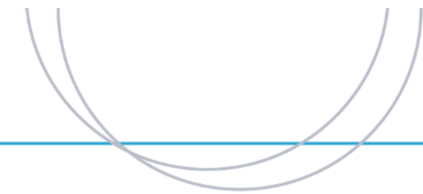
Three-degree nose-down attitude attitude discovered

Nose Gear

Nose oleo fully compressed, tyres tyres approximately half compressed

Main Gear

Main landing gear taking no significant load; all load applied through aircraft through aircraft structure via tail jack contact



Investigation Findings: Root Causes

1. Complacency
2. Workplace Distractions
3. Planning Deficiencies
4. Communication Breakdown
5. Procedural Non-compliance

The investigation identified five interconnected root causes, with systemic failures enabling individual errors. AMM Task 07-11-01-582-017 11-01-582-017 requirements were not followed: no inclinometer observer, no interphone communication, and inadequate jack monitoring. jack monitoring.

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Phase 1: Initial Investigation and Interview Development

Review the Case

MEDA team conducts comprehensive review of incident documentation, maintenance records, and preliminary findings to findings to establish complete timeline.

Document Key Facts

Record **Unsafe Outcome** (aircraft structural damage, unsafe nose-nose-down attitude) and **Unsafe Act** (de-jacking without inclinometer inclinometer observer, inadequate communication).

Simulate Interviews

Team Leader reviews existing interview transcripts as evidence base, identifying contradictions and gaps in accounts from supervisor and crew.

Develop Critical Questions

Create 5-8 non-blaming interview questions (Who, What, Where, Where, When) to clarify contradictions and uncover specific contributing factors.

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Phase 2: Root Cause Analysis

Identify Contributing Factors

Map immediate causes using MEDA Form categories: procedural, environmental, organisational.

Apply Five Whys

Drill down from surface errors to systemic failures through iterative questioning.

Pinpoint Organisational Failures

Identify the three most significant systemic failures enabling the error environment.

Phase 3: Corrective Action Plan Development

1

Develop SMART Actions

Create Specific, Measurable, Achievable, Achievable, Relevant, and Time-bound bound corrective actions addressing addressing each major root cause from from Phase 2 analysis.

2

Identify Action Areas

Categorise interventions: **Policy/Procedure** changes, **Training/Culture** initiatives for behaviour modification, **Equipment** improvements, and **Planning** process enhancements.

3

Create Prevention Plan

Develop comprehensive, actionable plan actionable plan preventing recurrence. recurrence. Focus on system improvements, not individual blame. blame. Ensure sustainability through through organisational ownership.

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Phase 4: Presentation of Findings

Preparation Phase

Duration: 15 minutes

- Team Leader structures final presentation
- Ensures all key findings included
- Prepares visual aids and supporting data
- Rehearses delivery of recommendations

Delivery Phase

Duration: 15 minutes

- Brief incident and damage summary
- Present three key root causes
- Detail SMART Corrective Action Plan
- Emphasise system focus, not individual fault

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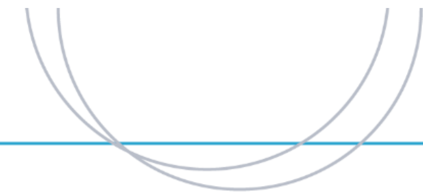

Notes