

## Learning From Experience #1

### Aircraft damaged during de-jacking operation

#### **Introduction**

This report has been raised to record the results of the investigation into incorrect de-jacking of a large jet aircraft in early 2006. The investigation included Maintenance Error Decision Aid (MEDA) interviews conducted to identify and record causal factors that were considered to have contributed to the maintenance error.

The error resulted in the aircraft coming to rest on a tail jack and the nose gear with minimal weight being taken on the main gears, causing fuselage skin deformation.

#### **Investigation Summary**

At the time of the jacking incident the aircraft was in the early stages of the maintenance input. A task being undertaken prior to the de-jacking incident was the replacement of the main landing gear pivot pins carried out to the requirement of a Service Bulletin.

During the jacking of the aircraft for the replacement of the pivot pins it became apparent that the air pump on the L/H main jack was defective. In the opinion of the Supervisor overseeing the pivot pin replacement, the aircraft only required to be lifted enough to get the weight off the wheels, therefore use of the defective jack was continued for the task of pivot pin replacement by using the serviceable alternative hand pump on the L/H main jack.

During the maintenance input, it was highlighted that a leak on a main oleo required rectification; this necessitated jacking the aircraft significantly higher than for the pivot pin change. As previously identified, the jack did not have a serviceable air pump; this resulted in the jack requiring replacement or repair prior to the oleo seal change.

On the day of the incident the hangar superintendent notified the Supervisor in charge of the pivot pin task that the jack was to be removed to be repaired, it was stated by the Supervisor in charge of the de-jack, that no time had been specified for jack rectification.

From the MEDA interviews it was established that the Supervisor took the decision to de jack the aircraft and the end of the shift to enable the L/H main jack with the defective air pump to be removed for repair. The Supervisor stated that he believed it to be a good time for the de-jack as it would not disturb too many other maintenance tasks at the end of the shift. The Supervisor also stated that he took the decision to have the aircraft de-jacked at this time as he was dealing with a domestic situation that would result in him being late in on shift the following day.

Interviews conducted with a leading hand and two fitters identified them as questioning the timing of the de-jack on being requested to assist, stating they had documentation to sign up and tooling to return and it was close to the end of their shift.

A fitter also stated that there was a conversation between the supervisor and another technician resulting in a short period when it was not clear if the de-jack was going to take place.

The de-jack took place when two personnel were positioned at the main and tail jacks. Interviews with two of personnel involved in the de-jacking identified that no one was present on the inclinometer prior to the lowering of the aircraft.

During the MEDA interview with the Supervisor he was stated that he had requested a fitter to be an observer of the inclinometers.

During the MEDA interview with the fitter who the supervisor identified as being requested to observe the inclinometer, the fitter denied being requested to do so. He did state that he was requested to assist with the de-jacking task but was not allocated a task and was not present at the initial de-jack. This was due to an element of confusion during a short period when it was not clear if the de jack was actually going to take place when staff were returning tooling and completing documentation for the end of shift.

The de-jack commenced on the supervisor's verbal command, for all jack positions to start the lowering. From the MEDA interview conducted with the supervisor it was noted that the distance he believed the aircraft was going to be lowered, approximately 3 inches, was not thought enough to be classified as a de jack and assumed there would be no problems.

As a result of his assumption he failed to ensure all AMM requirements were met including ensuring there was an observer for the inclinometer.

It was noted from MEDA interviews with the personnel on the tail jack that there was no communication between the supervisor and the tail jack team during de-jacking and there was only a request made to the L/H main jack team to increase the rate of descent to remain level with the other main jack.

During MEDA interview with the lock ring operator of the tail jack it was stated that the aircraft only lowered by about one inch on the tail during the de-jacking of the aircraft. The locking ring operative insisted during interview that he had the locking ring unlocked during the whole period of de-jack. The second person on the tail jack operating the lowering valve stated that the valve was open during the period of de-jack.

It was stated in MEDA interviews of 3 members of the jacking team and an interview with a witness that during the lowering of the aircraft the supervisor was seen on a mobile phone. During MEDA interview with the Supervisor the statement made by the jacking team personnel was denied, he stated that he was not on his phone during the actual de-jack as he had received the call prior to the de-jacking.

Interview with the Supervisor identified that the phone call he received related to an ongoing domestic situation he was having to dealing with.

On completion of the de-jacking the supervisor stated that he ensured the main jacks were clear of the aircraft and went to the rear jacking point. The purpose of visiting the rear jacking point was to ensure that the jack was contacting the aircraft as he believed the jack was needed as a steady. On his arrival there was no pressure evident on the gauge, so to ensure it was in contact he applied pressure to the jack to achieve a positive pressure reading.

On completion of the de-jack the supervisor carried out his end of shift tasks and travel and to assist in the domestic situation. It was while he was in the process of clocking out

that the condition to the aircraft was noticed by another Supervisor and brought to the attention of the supervisor who had overseen the de-jacking, the incident was immediately reported to the hangar management.

From interviewing the Supervisor who was not involved in the de-jacking, but who later carried out recovery of the aircraft, it was identified that the aircraft was found to be in a 3 degree nose down attitude with the nose oleo fully compressed and the nose tyres about half compressed. In addition the main landing gear was not taking any significant load, all other load being applied through the aircraft structure by contact with the tail jack.

### **Factors identified during MEDA investigation**

#### 1) Complacency.

The task of lowering of the aircraft was not undertaken to the requirements of the AMM or hangar manual, the requirements being to ensure the aircraft is lowered evenly by ensuring a person is positioned at the inclinometers with adequate communication and continuous monitoring of the jacks.

#### Root Cause:

The aircraft had only been lifted enough to take the weight off the wheels to carry out the pivot pin change. As the distance the aircraft was going to be lowered was stated by the technician to be only about 3 inches, it was taken for granted that there would be no problems and was not carried out to the full AMM requirements for a de-jack.

#### 2) Workplace distractions / interruptions during task performance.

The technician supervising the de-jack was stated by 4 persons involved in the operation as being interrupted by and accepted a mobile phone call during the jacking task.

#### Root Cause:

- a) The technician carrying out the supervision of the aircraft de-jacking was reported as receiving a mobile phone call during the task. The mobile phone call had been received relating to an ongoing domestic situation requiring his attention.
- b) It was identified that it has become a norm for personnel within the maintenance area to use mobile phones, introducing a cause for distraction and the possibility of interruption when conducting critical tasks.

#### 3) Deficiency in Planning / organisation of tasks.

The task of de-jacking was not adequately planned, to ensure personnel were available and briefed to understand their responsibilities during the de jack.

#### Root Cause:

- a) The task was not pre-planned for the end of the shift when the de jack took place. At the time of assembling the team, a number of personnel requested to assist were in the process of returning tools to stores and completing documentation before clocking out.
- b) The technician supervising the task did not ensure he had a complete jacking team who were adequately briefed.
- c) Failure to ensure that the jacking task was adequately planned, included ensuring the jacking team was complete and properly briefed for the task. This resulted from self

imposed pressure on the part of the supervising technician, as he was distracted in dealing with a domestic situation that meant he would be in late the following day  
d) No urgency was placed on the supervisor to remove the jack, but he decided to have the defective main jack removed for servicing at that time.

#### 4)Poor communication between maintenance crew and lead:

During the de-jacking operation no formal communication was established among the jacking team to ensure the task was being performed satisfactorily. Due to the mobile phone call the supervisor did not establish adequate communication between himself and all jack positions to ensure that all were lowering satisfactory and allowed himself to be distracted.

The jacking team on noting the absence of the inclinometer observer and realising that the supervisor was preoccupied with a phone call did not communicate their concerns to the jacking supervisor to stop the de-jack.

#### Root Cause:

a)The jacking supervisor did not communicate with all jacking positions to ensure they were all lowering together.

b)The lack of communication resulted from a level of complacency by the supervisor, as he did not regard the task as a true de-jack and the mobile phone call received regarding a domestic situation caused a significant distraction.

c)The staff observing that there was no one present at the inclinometer did not communicate their concern to the rest of the jacking crew, as they thought the supervisor had this task covered

d) It had become a common practice for technicians to use mobile phones in the hangar providing a cause of distraction during critical tasks.

#### **Conclusion**

The aircraft was de-jacked with little or no lowering of the tail jack, probably due to a failure of having the locking ring wound clear enough during jack retraction.

The lock ring operator of the tail jack reported that the aircraft lowered by about one inch on the tail during the lowering of the aircraft, it is still unclear why the tail jack operation did not lower satisfactorily. The locking ring operative insists he had the locking ring unlocked and the valve operator stated the lowering valve was open during the command to de-jack.

It has been assessed that the valve was likely to have been open when the supervising technician visited the tail jack post de-jack, there was no pressure evident on the gauge. This would be the case if the locking ring was down and locked with the lowering valve open depleting any pressure from the system.  
Post aircraft recovery, the tail jack was found to operate satisfactorily.

It is clear from the investigation that the task of the aircraft de-jack was inadequately planned and organised, considering that it took place at the end of a shift. In addition it was identified that communication and the lack of supervisory requirements were a significant factor, resulting in required aspects of the AMM and company procedures for the de-jacking not being undertaken.

The de-jacking requirements in the AMM Task 07-11-01-582-017 are to have one person positioned at a plumb bob and or inclinometers, there is interphone

communication between the jacking personnel, inclinometer observer and the jacking co-ordinator and continuously monitoring the jacks for load, these requirements were not carried out

Primarily, the failure to ensure there was an observer present on the inclinometers while the aircraft was de-jacking, to communicating the attitude of the aircraft to the supervising technician was a significant factor. This error was compounded by the technician in charge taking a personal phone call relating to a domestic situation resulting in him being distracted from de-jacking operation.

This was further compounded by lack of communication between the rest of the team who did not raise any concern on observing that the supervisor was on the phone and on observing that no one was positioned the aircraft clinometers.

### **Preventative actions**

Evaluate the current practice of personnel using a mobile phone in the maintenance area and the related possibilities of interruption during critical tasks/operations.

The importance of task planning and organisation of tasks is to be communicated to all Supervisors, by way of a lessons learnt memo written and placed in the departmental reading logs.

### **Action by Quality Department**

On completion of the MEDA investigation all personnel interviewed are to be given feedback on the result of the MEDA investigation.

Key learning points briefed to all staff via in-house reading log

The results of the MEDA are supplied to the Technical training department for inclusion in the Continuation/Technician training programme.

An audit of ground equipment maintenance is to undertaken, following the identification of the unserviceable jack as a causal factor