Does Your 145 Quality Adequately Address Root Cause – Consider the Following Example as a Case Study

Sofema Aviation Services (SAS) www.sassofia.com evaluates and comments on an example event and considers the exposures related to the described and other events

Comment by Steve Bentley CEO of Sofema who gained his AMEL in Feb 1976 “over the years I have either witnessed or been aware of multiple events which essentially need not have happened including in one very unfortunate event a fatality”

My personal take aways from decades involved one way or another in aircraft maintenance are basically an awareness of a cycle of repetition.

- Humans make mistakes and we always will unfortunately
- With Self Discipline we can limit our exposure (notice how some people make more mistakes than others)
- The organisation can and should build up defenses and safeguards (however these will not fully mitigate the lack of self-discipline and careless people will usually find ways to defeat the best systems.

The strongest system is where the individual is not just looking out for him self but also for his colleagues asking the questions

- Is everything good (The more you care the more you will find small things which are not as they should be (I promise)
- Is Everything Checked Carefully
- All tooling & equipment returned and checked

Case Study Introduction

For each event we need to understand

- The Root Cause or Causes as well as
- The Contributing Causes
- Also Consider we work in a system not in isolation and a question to be asked is what happens the next time, or could it happen it happen with the same circumstances to another person (or to answer the question This will not happen again because?)
- Additionally, what organizational systems enabled (or in some way facilitated) the event to take place and
- Also, which barriers where essentially disregarded and maybe need improvement (Consider Violations and whether they are Organizational / Personal)

Example Event - Tool forgotten on board of the aircraft

- ***While working on the forward cabin lavatory one spanner slipped under the forward r/h side cover and was forgotten there.***

Initial comment – Dropping or loosing a tool is a red flag event – anyone who loses a tool and does not place sufficient value on the occurrence, increases the risk exposure

As part of the Assessment to understand the reason it was forgotten

Note this is important as it is a fundament attribute of the culture and behavior of the individual within the system

Understand if this event occurred because the staff did not know he lost a tool (Careless Behavior) or He knew but forgot to recover because of other activities (willful neglect of responsibilities)

Either scenario is a concern as willful neglect can lead to catastrophic outcomes

- Note willingness to care about the maintenance role is a major factor and should form part of the assessment – sometimes is found a culture of care and sometimes the opposite.

So before considering any organisation system to act as a back- up – where is the self - discipline to take ownership of this event.

Note The human factor of distraction is a contributing factor rather than a root cause - there is always a “why” sitting behind each human factor

Why did it happen?

Tool was in an area with no visibility and I was distracted by the arrival of another aircraft.

The tool inventory was not properly performed.

2nd Comment regarding distraction

- Distractibility can occur in normal individuals who are tired or sleep-deprived, and it is also a symptom of certain medical conditions such as attention-deficit hyperactivity disorder (ADHD)
    - So, which is it in this case – to determine as part of the investigation?
    - Note EASA is introducing Fatigue Risk Management as part of SMS so to understand any relevant factors which impact this event.

3rd. Comment regarding Tool Inventory not properly performed

- Essentially there are two possible scenarios

- The technician was not aware of the requirement to check tooling in accordance with MOE Procedure 2.6 (see below) – if this is the case it leads to potential training standards and other training related issues

- The certifying staff was willing to rule break “violation” – in this case to explore why – to understand the rational – rule breakers are dangerous when observed in an individual – as part of a larger culture of not caring can be far more serious.

2.6 Use of Tooling and Equipment by Staff (including alternate tools)

Tools and equipment will only be used for the specific purpose for which they were originally designed and as specified in the Aircraft Maintenance Manual. Prior to use individuals are to inspect tools for serviceability and where doubt exists the tool is to be rejected.

Tooling and/or equipment booked out from line station tool stores is to be identified such that it traces the tool to an individual engineer and the aircraft or area he is working.

No tooling is to remain booked out at the end of a shift unless it is handed over to an oncoming engineer who is prepared to accept responsibility for the transfer.
Items of tooling that are lost or unaccounted for must be reported as soon as the loss is apparent to the Shift Supervisor who is to immediately instigate a search to find the missing tool.

If from the initial investigation, it is suspected that a tool has been lost on an aircraft, a search for the missing tool is to be carried out prior to the next flight.

Note: A lost tool is considered lost within aircraft/ aircraft component and constitutes safety issue.

In case of loss:

▪ The technician fills **Missing Tool** (Form XXXXX) and informs Supervisor.

▪ Supervisor is to carry out immediate investigation and inspection on related working areas prior to CRS issue.

▪ If needed, Supervisor forms a team of personnel to eventually find the lost tool.

If at the end of this search the tool has not been found a report is to be made giving details of the missing tool (description of the missing tool, date, time, area lost, actions taken to find etc.).
At the same time and prior to the next flight the matter is to be reported to the Customer/ Operator, the Flight Technical Manager and Quality Manager.

Dependent on discussions between the AMO and the operator, the aircraft may be released for flight and any follow up action agreed. Details of the aircraft release to service and any follow up action agreed with the customer/operator is to be notified to the Quality Manager by the Flight Technical Manager.

- If, following the initial investigation by the Shift Supervisor, the missing tooling can be positively identified as not being lost on an aircraft a search of the area where the tooling has been lost is to be carried out.
- If the missing tool cannot be found details of the loss are to be noted in the shift handover and passed by the Shift Supervisor to the Station Manager.
- Any lost tooling is to be positively identified as such within any storage cabinets or tool boxes to ensure that subsequent users can are made aware of the loss. Such tooling is to be replaced as soon as practical.

It is the responsibility of each individual in the maintenance organisation to keep the inventory of his / her assigned tools and equipment updated and to check the tool boxes against the inventory with the purpose to avoid the tools to be lost or forgotten in the aircraft.

Any losses are to be reported to the shift supervisor who is to take immediate recovery actions as above.

4th Comment – the final "bolded" comment should be moved to the top of procedure 2.6 and bolded to provide additional emphasis (recommendation – not finding)

Proposed corrective action

A more thorough check of the toolbox and tools control register before Signing the crs leaving the aircraft will prevent these events to happen again.

5th Comment

Trying to understand the difference between a normal check and a thorough check & I cannot unfortunately – you either do the check or not – if you do it properly you identify the missing tool so the proposed corrective action does not in anyway address the issue

Consider the following

- Based on the findings of the 3rd Comment – to determine an appropriate course of action – mitigation
- Without a full understanding of the factors related to this event it could happen again either to the same person or another person in similar circumstance

Identify Root Causes

The root cause of this occurrence is the lack of a quality control procedures by Shift supervisor during "Date" - night shift,

MOE Ch. 2.6, control of tools booked out of station store.

Mechanical toolbox P/N: xxxxx, marking number it is installed on xxxxx station service car.

This is the reason why on Tool control register Form xxxxx, it is not recorded when it was booked out/in from store and remain out of control.

6th Comment

The root cause was a failure of the certifying staff to follow the requirements of Procedure 2.6

- **It is the responsibility of each individual in the maintenance organisation to keep the inventory of his / her assigned tools and equipment updated and to check the tool boxes against the inventory with the purpose to avoid the tools to be lost or forgotten in the aircraft.**

- **Any losses are to be reported to the shift supervisor who is to take immediate recovery actions as above.**

Without further clarification this appears to be a clear violation of company requirements / procedures

Note – ref to the tool control register is a distraction from the cause of the event if a full tool box is issued to a line crew, they are totally responsible for end of task tool check nothing else will protect in these circumstances.

Identify Contributing Causes

The need to finish a maintenance task so aircraft can be put back into service.

Supervision misconduct from the certifying staff.

7th Comment

Neither of the above are contributing causes the first one is a standard operating procedure and the second one identified as misconduct is actually a root cause (see 6th comment)

Next Steps

Sofema Aviation Services (www.sassofia.com) and Sofema Online (www.sofemaonline.com provide Classroom, Webinar & Online Training as well as consultancy and support related to implementation & development – please email team@sassofia.com