Australian Government
Civil Aviation Safety Authority

Airworthiness Bulletin

AWB 02-052 Issue 6 - 14 July 2021

Wasp Nest Infestation - Alert

An Airworthiness Bulletin is an advisory document that alerts, educates and makes recommendations about airworthiness matters. Recommendations in this bulletin are not mandatory.

1. Effectivity

All aircraft and ground support equipment.

2. Purpose

This Airworthiness Bulletin is issued to advise operators, maintainers and pilots of the dangers associated with undetected wasp infestation in aircraft, and the circumstances under which they can occur.

3. Criticality of failure

Classification of failure conditions of various affected systems in accordance with FAA AC 23.1309-1E.

- Pitot tubes or static ports blocked (or even partially blocked) in flight can cause total loss of airspeed or altitude indication. This is classified as hazardous. Misleading and/or malfunction without warning can be catastrophic.

4. Background

CASA had been notified of the Key Hole wasp hazard (Pachodynerus nasidens), by the Department of Agriculture and Water Resources (DoAWR). This species of wasp has been monitored by the National Biosecurity Consultative Committee (NMBCC). This wasp was first identified in Brisbane in 2010. DoAWR advised CASA that these wasps are not as aggressive as paper wasps but would try to sting if they were physically removed.

Figure 1. Pachodynerus nasidens or Keyhole wasp
(Source; PaDIL Species Factsheet)

This species has nests that are so far isolated to Brisbane Airport. However, images of the wasp (without nesting) have been seen at Emerald Airport. As an adaptable and highly mobile species, the Keyhole wasp has the potential to spread from Brisbane to other parts in Australia where the climate is suitable, including via aircraft or shared ground support equipment.

CASA has been in discussions with all relevant stakeholders including Brisbane Airport Corporation (BAC) and Department of Agriculture. DoAWR is monitoring this situation as the wasps have been around since 2010 and eradication is not possible; however strategies for controlling their population are being considered. Brisbane Airport Corporation (BAC) regularly monitors this issue and have published a permanent notification in the Brisbane En-route supplement.

A report commissioned by BAC has revealed some background into this species' activities:

1. Construction of nests are based on alluvial sediments such as 'construction site' material rather than soil-based sediments.
2. Peak nesting occurs between November and May when average monthly temperatures are generally higher.
3. Day active insects, although airport lighting can extend their activities.
4. Nests are built cell by cell usually by the furthest point from the aperture and this can extend to 60mm from the opening.
5. Prey on spiders and caterpillars present.
6. Prefer open apertures of greater than 3.0mm.
7. Keyhole wasps are a 'tramp' species meaning it will hijack native nests.
8. Prefer nesting closer to natural habitats, particularly grass areas.

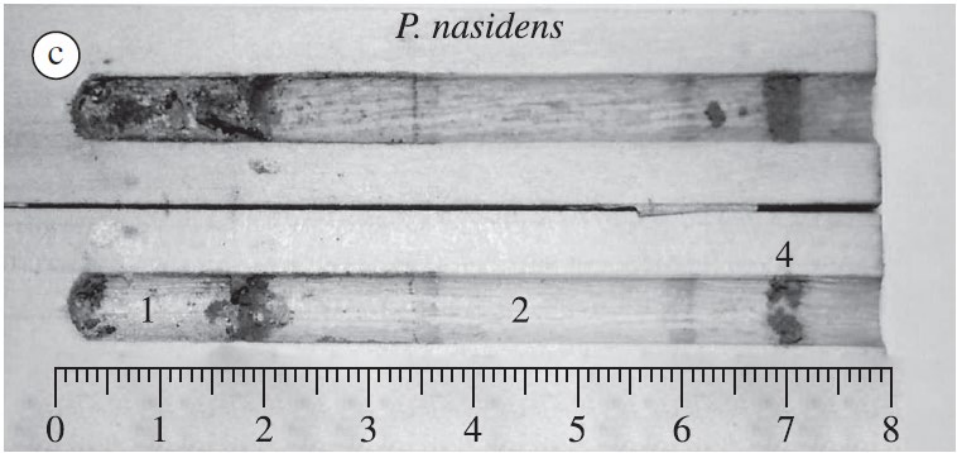

Figure 2. Keyhole wasp nest cell structure (1) Provisioned cell, (2) Vestibular cell, (3) Inter-calary cell and (4) Closure plug (Source Biologic aspects of different species of Pachodynerus (Hymenoptera; Vespidae; Eumeninae)

A wasp nest can completely block pitot tubes, fuel tank vents and drains.

Figure 3. Mud Dauber wasp emerging from an uncovered pitot tube.

(Source: backcountrypilot.org)

Figure 4. Australian Mud Dauber Wasp

(Source: BrisbaneInsects.com)

Figure 5.a.

Mud dauber wasps will build a nest in any available cavity.

Defect report investigation found several wasp nests inside the wing of a Cessna 182, in the cavity formed between the rear spar and the flap fairing (**Figure 5.a.**).

There was also one large wasp nest entirely suspended on the flight control cables in the rear fuselage.

Figure 5.b.

During visual inspection on the left and right elevator actuator/hinge area, a small mud wasp nest was found on the left side adjacent to the actuator (Figure 5.b.).

Figure 6.a.

Triplex fuel gauge in an Aerocommander 500s had a blockage in the external fuel vent line. The fuel pressure indication has a capsule which is ported overboard via this vent line. The vent line is common to both indications and because of the blockage both gauges indicated zero (Figure 6.a.).

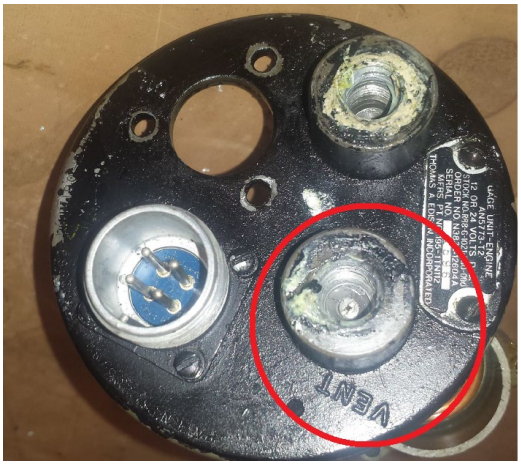

Figure 6.b.

Vent connection on rear of Triplex fuel gauge (Figure 6.b.)

Whenever the pitot-static system has been disconnected to clear a blockage, it requires tests for leaks when re-connected, and every 24 months thereafter, in accordance with the requirements of the current Amendment of CAO 100.5 Appendix 1.

Wasp nests and insect blockages in pitot tubes are not limited to small aircraft. Each year, CASA receives approximately 5 defect reports affecting various systems and types of aircraft. Overseas reports detail fatal accidents which have been attributed to wasp nests blocking the pitot tube, resulting in loss of airspeed indication.

A typical example occurred in 2013 when an Airbus A330 suffered a rejected take-off in Brisbane, due to an airspeed indication failure which was only detected during the take-off roll. Through the subsequent inspection, it was found that the Captain's pitot probe (Figure 7) was almost totally obstructed by an insect nest, consistent with mud-dauber wasp nest residue (Figure 5).

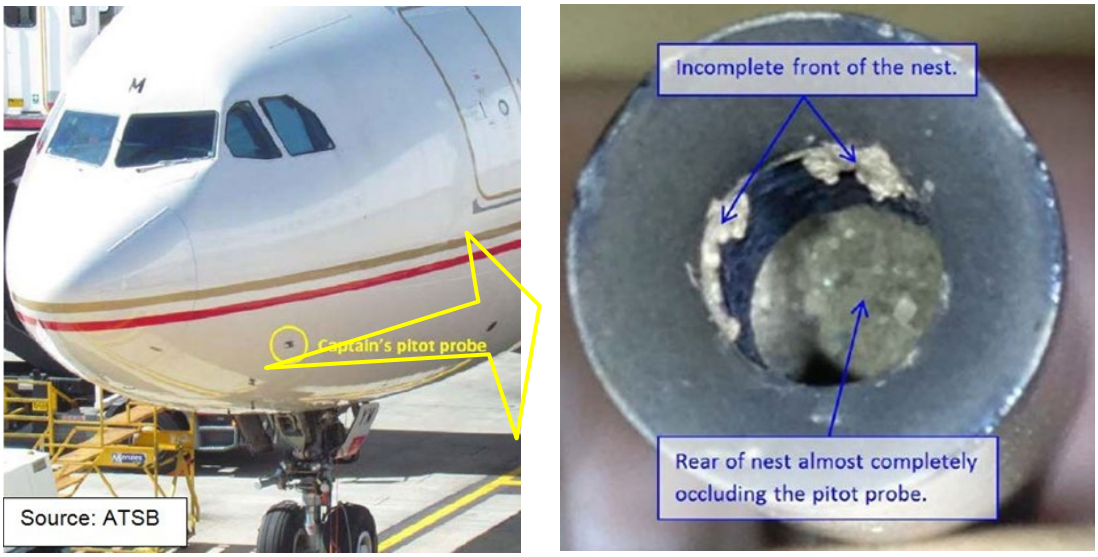

Figure 7. Airbus A330 Wasp Nest Partial Blockage of Captain's Pitot Probe

The residue was built up while the aircraft was on the ground over a two-hour period, while the aircraft was parked at the loading gate. The pitot probe covers were not installed by maintenance staff during this time.

While the ATSB Report AO-2013-212 in relation to this occurrence indicates that a mud dauber wasp nest can completely block a pitot tube inside two hours, CASA has received anecdotal evidence which indicates that the wasps can begin to build a nest rapidly and within 20 minutes, can significantly block a pitot tube by applying a closing plug of mud. The BAC sponsored study also reiterates that wasp nests do not need to be complete to pose a danger to aircraft. The first addition of mud or introduction of the first prey item can impede air flow enough to cause anomalous airspeed readings.

Regardless of whether the aircraft has only a short turn-around time or remains on the flight line, approved protective covers should be used. It is important to use the manufacturers approved probe cover which are a part of the flight kit for each aircraft. Other manufacturers' covers may not fit correctly nor offer complete protection.

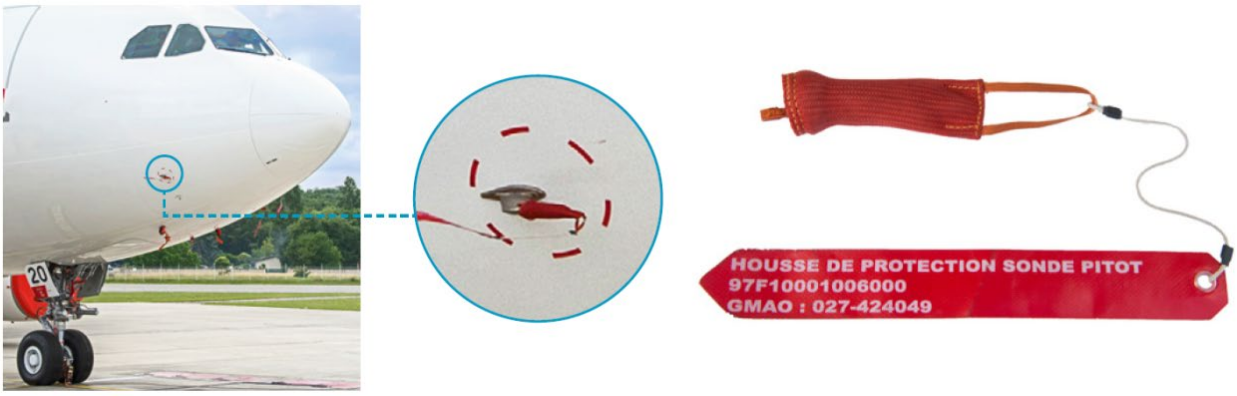

Figure 8. Aircraft pitot probe protective cover: Source Airbus

Protective covers can be installed usually 30 minutes after engine shut down to allow the probes to cool sufficiently. After a period of 15 minutes the probe tip cools down to 70°C and 15 minutes after will reach ambient temperature.

There are newer design pitot probe covers fabricated from materials such as Fibreglass or Nomex which have a greater ability to cope with higher temperatures.

It should also be noted that aircraft equipped with Built-In Test Equipment (BITE) may only check the various computers associated with critical flight instruments during pre-take-off testing, and may not check for clear passages in the pitot head or static vents. The investigation of any anomalies flagged by such systems should include a careful inspection for pitot tube blockages, including visual inspection and pitot static testing.

Ground support equipment and other ground structures can provide nesting areas for wasps.

Figure 9. Wasp nest found in stairs

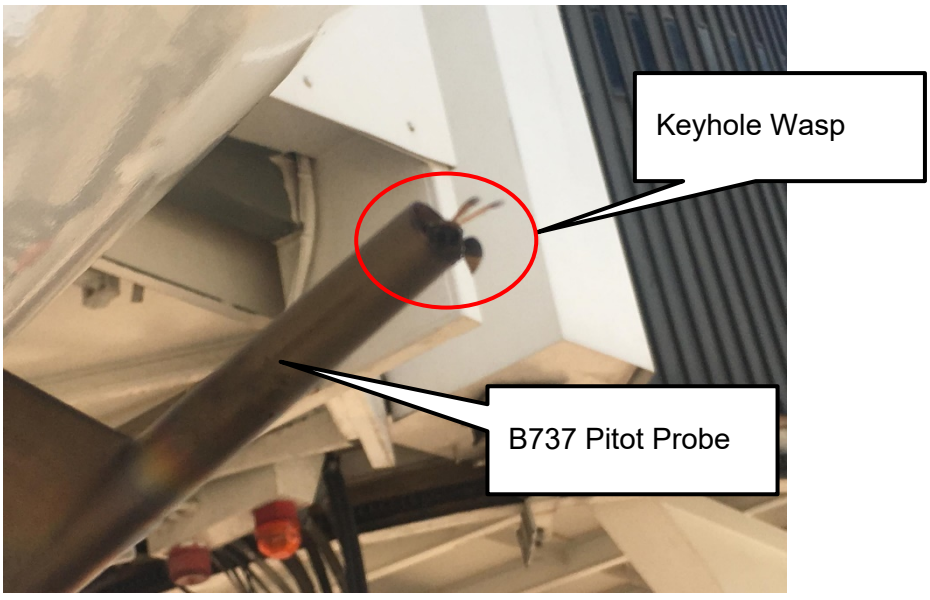

Figure 10. Keyhole Wasp seen leaving a B737 Pitot Probe

Figure 11. Wasp nest in catering truck panel holes

Figure 12. Keyhole Wasp on bay equipment

Airport authorities should have a wildlife hazard management plan which should include what mitigations are in place to detect or manage insect activity. Operators should report instances of in-service incidents to the local airport authority to help determine root causes to prevent further occurrences and track any trends of obstructions of pitot probes on ground.

Simulation pitot probe panels have been installed at some areas at Brisbane airport to check for the presence of wasp nests, as part of the BAC sponsored study. The probes are regularly checked by Ecosure and/or BAC staff. The wasps are then sent to Queensland Museum for identification.

Figure 13. Simulation Pitot probe panels

The following may provide preliminary background information to assist in any further investigations:

1. Type of wasp (if known) or image.
2. Food sources - Are wasps picking up insects on the undercarriage leading edges, ground support equipment or any other areas?
3. Time of Day - At what time were the wasps the most active?
4. Type of Light - Are the wasps active under artificial lighting at night?
5. Weather Conditions - What were the weather conditions?

4. Recommendations

CASA recommends that owners, persons responsible for continued airworthiness and operators review their procedures against the manufacturer's maintenance instructions and recommendations regarding parking, storage of aircraft and support equipment.

In addition:

1. **Install pitot / static and vent covers any time the aircraft is parked. Be aware of cool down times. This recommendation is included in the additional information in the Brisbane Aerodrome En-Route Supplement.**
2. Regularly check probe covers for damage.
3. Consider installing approved fuel vent screens or removable drain/vent covers and engine compartment blanks, as well as installing tight fitting pitot / static vent covers.
4. In instances where the aircraft has been stored long term in the open air, remove inspection panels before flight as required to inspect unsealed wing and fuselage cavities and any other open orifices etc.
5. Check engine temperature or pressure ports.
6. Continually monitor and remove any wasp nesting sites in the general area where aircraft are stored or maintained in accordance with appropriate insect control procedures.
7. Collaborate with local airport authorities to assess risk of probes being blocked by wasps, insects or other foreign object damage (FOD).
8. Be aware that on-ground pre-flight air data module BITE tests and/or computer checks will usually not test pitot probes or static vents for physical blockages.
9. Check ground support equipment regularly. Grease has been temporarily used to block cavities such as roll pins. Wasp nest can exist behind or within structures.
10. If possible, switch off lighting on unattended bays and aircraft.
11. Do not attempt to physically remove wasps due to risk of wasp stings.
12. **Ensure all pitot / static and vent covers are removed prior to flight.**

6. Reporting

It is recommended to report all wasp nest and / or insect infestations and any associated defects or operational difficulties to CASA via the defect reporting system. The report should include details of the insect type.

7. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link email address:

AirworthinessBulletin@casa.gov.au

or in writing, to:

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