

**Airbus A321-211,
G-POWN**

**London Gatwick
Airport**

26 February 2020

Serious Incident

Investigation Synopsis

As part of scheduled maintenance overseas, G-POWN underwent a biocide shock treatment on its fuel system, using Kathon biocide, to treat microbial contamination. Once the maintenance was complete, the aircraft returned to the UK on 24 February 2020.

In the 24 hours preceding this serious incident, there were abnormalities with the operation of both engines across four flights. On the flight before the incident flight, the crew reported momentary indications of a No 2 (right) engine stall. After the aircraft landed, this was investigated using an inappropriate procedure obtained from an aircraft troubleshooting manual not applicable to G-POWN, but no fault was found.

On the incident flight the aircraft took off from London Gatwick Airport Runway 26L at 0009 hrs on 26 February 2020 but, at around 500 ft above ground level, the No 1 (left) engine began to surge. The commander declared a MAYDAY and turned right downwind for an immediate return to the airport but, shortly afterwards, the crew received indications that the No 2 engine had stalled. The crew established that the engines were more stable at low thrust settings and the thrust available at those settings was sufficient to maintain a safe flightpath. They continued the approach and the aircraft landed at 0020 hrs.

Safety Recommendation 2021-018

Justification

As this serious incident and previous events have demonstrated, biocide treatment of aircraft fuel systems contains the potential to adversely affect the fuel quality supplied to, and therefore the thrust available from, all of an aircraft's engines. This fundamentally undermines the redundancy provided by multiple engines. It is clear, therefore, that the biocide treatment of aircraft fuel systems should be classified as a critical maintenance task because this classification would require an error-capturing method to be implemented. However, the existing EASA Part-145 and Part M regulations do not specifically require this classification and therefore the following Safety Recommendations are made:

Safety Recommendation 2021-018

It is recommended that the European Union Aviation Safety Agency amend the Acceptable Means of Compliance AMC2(a)(3) for regulation Part-145.A.48(b), Performance of Maintenance, to include the treatment of aircraft fuel systems with biocide additives as an example task that is to be considered as a critical maintenance task.

Date Safety Recommendation made: 27 April 2021

LATEST RESPONSE

Response received: 28 October 2025

The European Union Aviation Safety Agency (EASA) assessed the contents of the referenced Acceptable Means of Compliance (AMC) and considers that the best approach would be to include in the list of data sources used to identify critical maintenance tasks (see point (b) of AMC2 145.A.48(c)(2)), the item 'safety publications from authorities'; while in point (a) of the same AMC, the maintenance of fuel tanks and systems will be quoted as an example of a maintenance task with an impact on safety under those that can affect the propulsive force of the aircraft. This regulatory amendment will be addressed under rulemaking task RMT.0735, which addresses miscellaneous non-controversial topics and identified issues to ensure that Regulation (EU) No 1321/2014, its AMC, and Guidance Material (GM) remain fit for purpose. The Terms of Reference (ToR) for RMT.0735 were published in December 2023 and a Notice of Proposed Amendment (NPA) is planned for Q4 2025.

Safety Recommendation Status Open

AAIB Assessment Partially Adequate

Action Status Planned Action Ongoing Update Due 30 September 2026

Feedback rationale

EASA proposes to include 'maintenance of fuel tanks and systems' as an example of a critical maintenance task. The AAIB considers that biocide treatment of fuel would not fall under this classification and should be its own line item, which was the intent of the Safety Recommendation. The response is therefore classified as Partially Adequate, acknowledging that a Safety Information Bulletin on biocide treatment will be included in the list of data sources used to identify critical maintenance tasks. An update on the Notice of Proposed Amendment is requested by the end of Q3 2026. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

Response received: 22 March 2024

The European Union Aviation Safety Agency (EASA) assessed the contents of the referred Acceptable Means of Compliance (AMC) and considers that the best approach would be to include in the list of data sources used to identify critical maintenance tasks (see point (b) of AMC2 145.A.48(c)(2)) relevant authority publications such as EASA Safety Information Bulletin (SIB) 2020-06, which deals with biocide treatment. This regulatory amendment will be addressed under rulemaking task RMT.0735, which addresses miscellaneous non-controversial topics and identified issues to ensure that Regulation (EU) No 1321/2014, its AMC, and Guidance Material (GM) remain fit for purpose. The Terms of Reference (ToR) for RMT.0735 were published in December 2023 and a Notice of Proposed Amendment (NPA) is planned for Q3 2024.

AAIB Assessment – Adequate Open

Response received: 31 July 2021

Paragraph 145.A.48 of Annex II (Part 145) of Commission Regulation (EU) No 1321/2014 intentionally allocates the responsibility for classification of tasks as "critical maintenance task" to the maintenance organisation for the following reasons.

First of all, regulation is never able to catch up with new technology and recent design, so any list of examples given in acceptable means of compliance (AMC) / guidance will always lack the latest ones and require constant updating.

Therefore, not specific examples but a list of higher level criteria is given which is considered to apply to any new technology as well.

Secondly, the criticality of a task cannot fully be determined at such a high level, it is partly depending on the exact environment in which the task is performed and on the actual equipment used. In this specific example dosing and mixing the biocide manually makes the task much more critical than using a fuelling cart which has a biocide dosing capability. As such the decision whether a task is critical or not can only be appropriately taken at a level where the full information about how the task is performed and the equipment used is available.

Currently AMC2 145.A.48(b) does give a list of high level examples (e.g. "tasks that may affect the control of the aircraft") which is not compatible with the very specific treatment of aircraft fuel systems with biocide additives.

The European Union Aviation Safety Agency (EASA) therefore disagrees that explicitly adding biocide treatment to AMC2 145.A.48(b) (a)(3) would be an appropriate action, and assumes that giving high level criteria and sources of information to identify critical maintenance tasks is more appropriate than giving specific examples.

EASA will however review the AMC2 145.A.48(b) (a)(3) wording for the possibility of amending it at a higher level.

EASA also recognizes that the list of data sources used to identify critical maintenance tasks in AMC2 145.A.48(b) (b) could be amended, to cover publications like EASA SIB 2020-06 dealing explicitly with biocide treatment.

EASA will include these considerations into the next updating exercise of the rules for Continuing Airworthiness.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2021-019

Justification

As this serious incident and previous events have demonstrated, biocide treatment of aircraft fuel systems contains the potential to adversely affect the fuel quality supplied to, and therefore the thrust available from, all of an aircraft's engines. This fundamentally undermines the redundancy provided by multiple engines. It is clear, therefore, that the biocide treatment of aircraft fuel systems should be classified as a critical maintenance task because this classification would require an error-capturing method to be implemented. However, the existing EASA Part-145 and Part M regulations do not specifically require this classification and therefore the following Safety Recommendations are made:

Safety Recommendation 2021-019

It is recommended that the European Union Aviation Safety Agency amend the Acceptable Means of Compliance AMC1(c) for regulation M.A.402(h), Performance of Maintenance, to include the treatment of aircraft fuel systems with biocide additives as an example task that is to be considered as a critical maintenance task.

Date Safety Recommendation made: 27 April 2021

LATEST RESPONSE

Response received: 28 October 2025

The European Union Aviation Safety Agency (EASA) assessed the contents of the referenced Acceptable Means of Compliance (AMC) and considers that the best approach would be to include in the list of data sources used to identify critical maintenance tasks (see point GM M.A.402(h)), the item 'safety publications from authorities'; while in point (c) of the AMC1 M.A.402(h), the maintenance of fuel tanks and systems will be quoted as an example of a maintenance task with an impact on safety under those that can affect the propulsive force of the aircraft. This regulatory amendment will be addressed under rulemaking task RMT.0735, which addresses miscellaneous non-controversial topics and identified issues to ensure that Regulation (EU) No 1321/2014, its AMC, and Guidance Material (GM) remain fit for purpose. The Terms of Reference (ToR) for RMT.0735 were published in December 2023 and a Notice of Proposed Amendment (NPA) is planned for Q4 2025.

Safety Recommendation Status Open

AAIB Assessment Partially Adequate

Action Status Planned Action Ongoing Update Due 30 September 2026

Feedback rationale

EASA proposes to include 'maintenance of fuel tanks and systems' as an example of a critical maintenance task. The AAIB considers that biocide treatment of fuel would not fall under this classification and should be its own line item, which was the intent of the Safety Recommendation. The response is therefore classified as Partially Adequate, acknowledging that a Safety Information Bulletin on biocide treatment will be included in the list of data sources used to identify critical maintenance tasks. An update on the Notice of Proposed Amendment is requested by the end of Q3 2026. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

Response received: 22 March 2024

The European Union Aviation Safety Agency (EASA) assessed the contents of the referred Acceptable Means of Compliance (AMC) and considered that the best approach would be to include in the list of data sources used to identify critical maintenance tasks (see GM M.A.402(h)) relevant authority publications such as the EASA Safety Information Bulletin (SIB). This regulatory amendment would be addressed under rulemaking task RMT.0735, which addresses miscellaneous non-controversial topics and identified issues to ensure that Regulation (EU) No 1321/2014, its AMC, and Guidance Material (GM) remain fit for purpose. The Terms of Reference (ToR) for RMT.0735 were published in December 2023 and a Notice of Proposed Amendment (NPA) is planned for Q3 2024.

AAIB Assessment – Adequate Open

Response received: 31 July 2021

Paragraph M.A.402 of Annex I (Part M) of Commission Regulation (EU) No 1321/2014 intentionally allocates the responsibility for classification of tasks as "critical maintenance task" mentioned under paragraph M.A.402(h) "performance of maintenance" to the maintenance organisation which ultimately performs the task, and not to the Continuing Airworthiness Management Organization (CAMO) which plans it.

Currently AMC1 M.A.402(h) does give a list of high-level examples (e.g. "tasks that may affect the control of the aircraft") which is not compatible with the very specific treatment of aircraft fuel systems with biocide additives.

EASA therefore disagrees that explicitly adding biocide treatment to M.A.402(h) (c) would be an appropriate action, and assumes that giving high level criteria and sources of information to identify critical maintenance tasks is more appropriate than giving specific examples.

EASA will however review the AMC1 M.A.402(h) (c) wording for the possibility of amending it at a higher level.

EASA also recognizes that the list of data sources used to identify critical maintenance tasks in AMC2 M.A.402(h) could be amended.

EASA will include these considerations into the next updating exercise of the rules for Continuing Airworthiness.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2021-020

Justification

As this serious incident and previous events have demonstrated, biocide treatment of aircraft fuel systems contains the potential to adversely affect the fuel quality supplied to, and therefore the thrust available from, all of an aircraft's engines. This fundamentally undermines the redundancy provided by multiple engines. It is clear, therefore, that the biocide treatment of aircraft fuel systems should be classified as a critical maintenance task because this classification would require an error-capturing method to be implemented. Since the NAAs of EASA Member States are responsible for performing safety oversight and audit of CAMOs and AMOs at the national level, the following Safety Recommendation is made:

Safety Recommendation 2021-020

It is recommended that the European Union Aviation Safety Agency (EASA) conduct safety promotion with the National Aviation Authorities of EASA Member States to promote the classification of biocide treatment of aircraft fuel systems as a critical maintenance task.

Date Safety Recommendation made: 27 April 2021

LATEST RESPONSE

Response received: 19 December 2024

The European Union Aviation Safety Agency (EASA) has implemented two safety promotion actions on this topic as key aspects of preventing maintenance error and mitigating risks coming from this domain.

Specifically:

- an article was published in the Conversation Aviation Magazine 1-2024, published at:
<https://www.easa.europa.eu/community/topics/conversation-aviation-1-2024-dirty-dozen-edition> (Page 23) on 29 February 2024.

- the topic was also covered in a specific article 1 July 2024 with an article on Preventing Maintenance Error, published at <https://www.easa.europa.eu/community/topics/preventing-maintenance-error>.

The topic has also been discussed in the Safety Promotion Network that is the collaborative group with EASA and the National Aviation Authorities (NAAs) that coordinates safety promotion across Europe. This is to ensure that the NAAs are also aware of the work carried out and promote it to both their own staff and maintenance organizations in their jurisdiction.

EASA plans to launch another safety promotion initiative specific to the biocide topic in Q1 2025.

EASA Status: Open

Safety Recommendation Status

Open

AAIB Assessment

Partially Adequate

Action Status

Planned Action Ongoing Update Due 19 June 2025

Feedback rationale

The AAIB acknowledges the EASA's response and requests an update by 19 June 2025. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

Response received: 31 July 2021

The European Union Aviation Safety Agency (EASA) is currently working on identifying the best way to promote the topic highlighted by the safety recommendation.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2021-021

Justification

As this serious incident and previous events have demonstrated, biocide treatment of aircraft fuel systems contains the potential to adversely affect the fuel quality supplied to, and therefore the thrust available from, all of an aircraft's engines. This fundamentally undermines the redundancy provided by multiple engines. It is clear, therefore, that the biocide treatment of aircraft fuel systems should be classified as a critical maintenance task because this classification would require an error-capturing method to be implemented. As the classification of critical maintenance tasks is defined at the organisation level by the planners, supervisors and certifying staff in an AMO or a CAMO, the following Safety Recommendations are made:

Safety Recommendation 2021-021

It is recommended that the European Union Aviation Safety Agency, during future audits of Continued Airworthiness Management Organisations and Approved Maintenance Organisations for which it is the Competent Authority, include a check that consideration has been given to the classification of biocide treatment of aircraft fuel systems as a critical maintenance task.

Date Safety Recommendation made: 27 April 2021

LATEST RESPONSE

Response received: 31 July 2021

The requirements for the performance of critical maintenance tasks, when dealing with complex motor-powered aircraft, are primarily addressed in point 145.A.48(b) of Annex II (Part-145) to Commission Regulation (EU) No 1321/2014.

The European Union Aviation Safety Agency (EASA) makes use of compliance check lists as part of its audit, reflecting the implementing regulation requirements and including a specific check on 145.A.48 (b) requiring the maintenance organisation to establish a procedure to ensure that an error capturing method is implemented after the performance of any critical maintenance task.

This check item covers the verification that the maintenance organisation has established a list of critical maintenance tasks as specified in the acceptable means of compliance (AMC) material "AMC 2 145.A.48(b) Performance of maintenance", the detail of which is fully the responsibility of the organisation and to be customised to the scope of the approval held.

The safety recommendation addresses an expectation for an additional level of detail, to record evidence that the competent authority verifies that biocide treatment is classified as critical maintenance task. This approach has the potential to jeopardise the role of the competent authority, which is intended to verify that the organisation is compliant with regulatory requirements and has implemented a quality system able to monitor such compliance on continuous basis, rather than performing specific quality control activities as suggested in the safety recommendation.

In particular, EASA believes that the suggested level of detail would move the focus of the competent authority's inspection away from primary aspects of compliance verification thereby having a negative effect on safety.

EASA Status: Closed – Disagreement

Safety Recommendation Status

Closed

AAIB Assessment

Not Adequate

Action Status

Planned Action Completed

Feedback rationale

The AAIB does not agree with the argument that the Safety Recommendation could potentially have a negative effect on safety. Nevertheless, in light of EASA's response, the recommendation is closed. (EU Regulation 996/2010 article 18 refers).

RESPONSE HISTORY

N/A

Safety Recommendation 2021-022

Justification

As this serious incident and previous events have demonstrated, biocide treatment of aircraft fuel systems contains the potential to adversely affect the fuel quality supplied to, and therefore the thrust available from, all of an aircraft's engines. This fundamentally undermines the redundancy provided by multiple engines. It is clear, therefore, that the biocide treatment of aircraft fuel systems should be classified as a critical maintenance task because this classification would require an error-capturing method to be implemented. As the classification of critical maintenance tasks is defined at the organisation level by the planners, supervisors and certifying staff in an AMO or a CAMO, the following Safety Recommendations are made:

Safety Recommendation 2021-022

It is recommended that the Civil Aviation Authority (CAA), during future audits of CAA-approved Continued Airworthiness Management Organisations and Approved Maintenance Organisations, include a check that consideration has been given to the classification of biocide treatment of aircraft fuel systems as a critical maintenance task.

Date Safety Recommendation made: 27 April 2021

LATEST RESPONSE

Response received: 23 July 2021

The Civil Aviation Authority (CAA), as part of its future audit oversight programme for Continued Airworthiness Management Organisations and Approved Maintenance Organisations, will review the use of critical maintenance task methods and procedures highlighting to organisations, including the classification of biocide treatment of aircraft as indicated within the AAIB Report. This will include the need to follow the guidance material as set out in GM M.A.402(h) or AMC2 145.A.48(b) for data sources used for the identification of critical maintenance tasks which includes accident reports.

As an additional mitigation the CAA will amend its guidance material on the creation and amendment of Aircraft Maintenance Programmes to include additional guidance on identification of critical maintenance tasks highlighting the above mentioned regulatory references and the need to place additional focus on biocide treatment of aircraft.

As the regulatory framework within the UK is now separated from that of the EU, the CAA will also instigate a rulemaking task to amend the AMC as indicated in safety recommendation 2020-018 and 2020-019 for the UK legislation.

Safety Recommendation Status	Closed
AAIB Assessment	Adequate
Action Status	Planned Action Completed

RESPONSE HISTORY

N/A