ENGINEERING CONTROLS

1. Responsibility

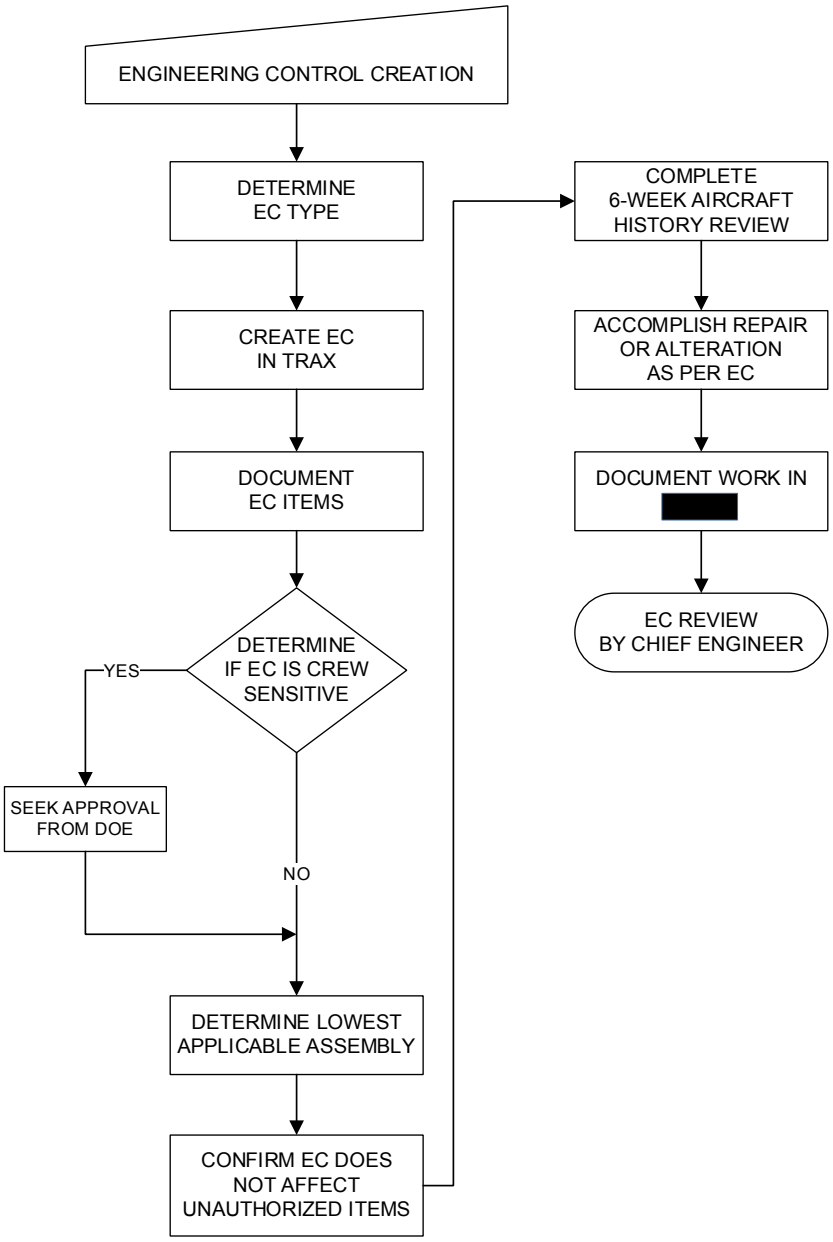
The Director of Engineering is accountable for the implementation and the quality of the Engineering Control process.

2. Authority

The Director of Engineering has the authority to establish and modify the Engineering Control process.

3. Flowchart

The flowcharts that follow provide an overview of the Engineering Control creation process.



4. Details

This section outlines the procedures for creating and managing Engineering Controls (ECs).

A. General

1. Alaska Airlines Engineering Controls (EC) will be created in ▮▮▮▮. Engineering Controls (EC) will be reviewed, approved, and tracked in ▮▮▮▮.

2. All repairs and modification designs must be in accordance with the same standards as the certification basis for the aircraft (defined in the aircraft type certificate).

3. All repairs or modifications that are not specified in the manufacturer's manual are to be approved by Alaska Airlines Engineering and documented and authorized by Engineering Controls.

4. All cabin interior repairs, cargo compartment ceiling and sidewall repairs, and modification designs must be in accordance with the same standards as the certification basis for the aircraft (defined in the aircraft type certificate).

5. All repairs categorized as Major must be approved by a DGAC Repair Approval Sheet, an ▮▮▮▮-▮ or by a FAA form 337. All alterations approved by FAA Form 8110-3, FAA Form 337 or STC must be approved and authorized by Alaska Airlines Engineering via Engineering Control before aircraft release.

6. Engineering Controls as defined in the Alaska Airlines Manual System may be comprised of any of the following:

A. Engineering Control

1. Engineering Controls (EC) are written and released in the ▮▮▮▮ system. As of June 1, 2010 all new Engineering Controls shall be created and released as EC’s.

B. Engineering Order

1. Engineering Orders (EO) are written on Form VA.TO.▮▮▮▮▮▮▮▮, revision date 20080107 or later. As of January 9, 2008, all new Engineering Orders shall be created and released as an EO. As of June 1, 2010 no EO’s will be created and released as an EO using form VA.TO.▮▮▮▮▮▮▮▮, However, it is acceptable to revise an existing EO for a minor update.

C. Fleet Campaign Directive

1. Fleet campaign Directives (FCD) are special engineering orders written on Form VA.TO.GMM.107, revision date 20080410 or later. FCD's may be used to draw extra attention to the tracking and accomplishment of aircraft inspections, repairs or modifications that have a short compliance time, and / or may be of a safety or legal compliance nature. As of June 1, 2010, no new FCD will be issued.

D. Interim Engineering Order (IEO)

1. Interim Engineering Orders (IEO) are written on Form VA.TO.▮▮▮▮▮▮▮▮, revision date 20070824 or earlier. IEO's were the process of creating and releasing Engineering Orders from inception until January 8, 2008. As of January 9, 2008, all new Engineering Orders shall be created and released as an EO using form VA.TO.▮▮▮▮▮▮▮▮, revision date 20080107 or later. As of January 9, 2008 no new IEO's will be created, However, it is

acceptable to revise an existing IEO for a minor update.

7. Engineering Controls may be revised, but will not specify any retroactive action.

NOTE: Where retroactive action is required, a new Engineering Control will be issued. For example, if the OEM has issued a Service Bulletin that Alaska Airlines has already embodied under an Engineering Control, but subsequent in-service experience has shown the modification to be ineffective, the OEM may issue a revised modification under a new revision to ▮▮▮▮ ▮▮▮▮▮▮▮▮ ▮▮▮▮▮▮. When this happens, Alaska Airlines will issue a new Engineering Control if there is additional work to be accomplished as a result of the revised service bulletin modification.

NOTE: Engineering Controls (EC) pertaining to an Alternate Method of Compliance (AMOC) must reference the AMOC and have the signatures of the designated official listed in the AD and the concurrence of the CHDO. For any changes in compliance time or if the aircraft is to be operated differently than as listed in the AD, ACO concurrence must also be obtained.

8. Many Service Bulletins or Airworthiness Directives consist of multiple actions that will be handled as follows:

A. Inspection:

- For inspections that are a result of a Service Bulletin, a Task Evaluation and Disposition Form (TED) shall be created and issued to add an inspection or an on-going maintenance task to the Alaska Airlines maintenance program. In this case, the Inspection / on-going maintenance task will be issued as a unique Task Card (TC). This Task Card will be assigned for aircraft accomplishment in accordance with the Work Package preparation process found in GMM ▮▮▮▮▮-▮▮▮.

NOTE: If an AD requires an inspection to be performed at a threshold of less than 60 days (may be estimated from utilization) then the initial inspection will be authorized and performed by an Engineering Control.

B. Repair

- Any repair will be issued as an Engineering Control.

NOTE: Prior to January 9, 2008 an Interim Engineering Order (IEO) was an acceptable method of issuing an engineering order for a repair.

NOTE: Between January 9, 2008 and June 1, 2010 an Engineering Order (EO) was an acceptable of issuing an engineering order for a repair.

- If the repair is terminating action for the inspection, then the engineer will coordinate with the Chief Engineer or designee to set up that logic in the ▮▮▮▮ system.

C. Modification

- Any modification will be issued as an Engineering Control.

NOTE: Prior to January 9, 2008 an Interim Engineering Order (IEO) was an acceptable method of issuing an engineering order for a modification.

NOTE: Between January 9, 2008 and June 1, 2010 an Engineering Order (EO) was an acceptable of issuing an engineering order for a modification.

- If the modification is terminating action for the inspection, then the engineer will coordinate with the Chief Engineer or designee to set up that logic in the ▮▮▮▮ system.

9. Engineering Controls will be set up against the lowest applicable assembly. For example, a modification to a door, where the door could be moved between aircraft, will be set up against the door P/N and S/N in the ▮▮▮▮ system rather than against the airframe.

10. The following will be documented on all Alaska Airlines Engineering Controls:

- Problem description.
- Solution description.
- Instructions.
- Instructions for Continued Airworthiness
- Major/Minor Classification.
- Damage Tolerance assessment requirements (if applicable).
- Effectivity.
- Failure Mode and Effects Analysis (FMEA).
- Technical Justification.
- Applicable 14 CFRs and / or other regulations and guidance material considered in the repair or modification.

NOTE: Alaska Airlines will use the Summit Aviation Database or FAA.gov to research all applicable CFR and FAA materials.

- Weight and Balance Changes.

NOTE: Weight changes greater than 10 pounds must be identified on EC. Weight changes greater than 10 pounds will be entered into the ▮▮▮▮ ▮▮▮ ▮▮▮▮▮▮ ▮▮▮▮▮ ▮▮▮ database. If the aircraft is being weighed after modification it is not required to record weight on EC.

- Electrical Load Analysis Changes

1. Any change, addition or removal of electrical load on any AC or DC bus shall be entered into the ELA ▮▮▮▮▮▮▮▮ ▮▮▮▮ database. The following information is required:

a) Service Bulletin or STC reference number
b) Engineering Control number
c) Effectivity
d) Bus type (AC or DC)
e) Circuit Breaker - Function Identification Number (FIN)
f) Circuit breaker location - Panel, Row, Column
g) Busbar
h) Nominal Power (removal of load shall be designated with a hyphen "-" prefix)
i) Electrical Load Delta

- Changes to MEL requirements as a result of an alteration.

  NOTE: Changes to the MEL must be FAA approved.

- Determination of whether the repair or alteration is crew sensitive.

  NOTE: If the repair or alteration is deemed as being crew sensitive, the EC must be approved by the Director of Engineering, or his designee prior to implementation. The Director of Engineering will send email to EC author with his approval or denial. The Director of Engineering email must be attached to EC.

  NOTE: The EC author should consider releasing a TBN describing the crew sensitive repair or modification if there is a benefit to the maintainability or coordination if those changes are deemed more complex or require a significant change to the method of maintenance or use. In addition, due to the nature of crew sensitive modifications, it is advisable to coordinate with the Director of Planning to add the project to the high visibility tracked projects as published in the ORB weekly report.

- Aircraft Configuration Changes including control of RNP AR, CAT III ▮▮▮▮▮▮▮▮ Program and RVSM.

- Definition of any follow-up required by the Engineering Control, such as:

  1) Changes to Maintenance, Fight Operations or In-flight manuals.

  2) Changes to Maintenance, Fight Operations or In-flight training software or device.

     NOTE: Any alterations that affects the flight deck must be coordinated and accomplished on Alaska Airlines Training Simulators as well as aircraft.

  3) Items that must be added to the CAMP. For Example: Changes or revisions to CAT III Autoland Program, RVSM Program, ECM program, etc.

  4) Changes to drawings.

  5) Service Bulletin Reporting with Airbus.

- Disposition of removed parts and materials (if applicable).

11. The following are not to be authorized by Alaska Airlines Engineering Controls:

- Changes to an Airworthiness Directive compliance, unless: an Alternate Method of Compliance (AMOC) is referenced and attached per CAMP ▮▮▮▮▮.▮▮▮.
- Changes to Minimum Equipment List (MEL) requirements or deferral limits related to a repair unless approved by the FAA.
- Changes to the Configuration Deviation List (CDL) or limits.
- Changes to Certification Maintenance Requirements (CMRs).
- Changes to Alaska Airlines Maintenance Program limits.

NOTE: Changes to Alaska Airlines maintenance program are only accomplished via the Task Evaluation and Disposition (TED) process as defined in the change process defined in GMM ▮▮▮▮▮.▮▮▮

12. The following provides a guideline for pertinent investigative efforts with regard to the aircraft in the event of an unsuccessful approach or chronic aircraft troubleshooting in which an Engineering Control may be utilized.

A. Complete review of all aircraft history for previous 6 week period:

- Class 1 Trending Faults
- Class 2 Trending Faults
- Class 3 Trending Faults

B. Review of corresponding Airbus Trouble Shooting Manual.
C. Review of corresponding Airbus ECAM System Logic Data.
D. Review of flight data for irregularity:

- Auto Pilot
- Flight controls commands and actuation
- Flight Management System Flight Modes
- Wind data
- Auto Thrust or TLA Commands
- Engine Response (magnitude, time, etc)
- GPS data (latitude, longitude)

E. Review of ACMS report data for irregularity
F. Review of installed S/N component (shop) history

13. The following are required for all repair or modification to all Principal Structural Elements (PSEs- as defined in SRM 51-11-12) required on aircraft certified to 14CFR 25.571 (Damage-tolerance and fatigue evaluation of structure).

A. Determination of satisfactory static strength.

NOTE: This analysis can be performed quickly, and will allow installation of the repair waiting damage tolerance assessment.

B. Determination of satisfactory damage tolerance capability for repairs.

NOTE: This analysis may be complicated, but must be performed by Airbus within 6 months or by the OEM within one year with the following possible outcomes:

1) The design is not damage tolerant critical and no further action is required.

2) The design is damage tolerant critical, and Airbus or OEM will provide a FAA/DGAC/EASA approved RAS or 8110-3 outlining applicable required inspections.

3) An EC or a watch item will be created to track the 6 month or 1 year DTA analysis follow-up limit. If the DTA analysis is not completed within the 6 months or 1 year limit, the aircraft will be grounded until it is complete.

C. Upon receipt of, the Airbus or OEM Damage Tolerance Assessment (DTA) RAS or ▮▮▮▮-▮ for a structural repair, a new Engineering Control (EC) will be created to track the follow-up supplemental inspections and repetitive intervals, if any, specified in the DTA report. The new DTA EC shall be created by the Chief Engineer or designee, and it shall use the DTA designation in its number.

D. Determination of satisfactory damage tolerance capability for Alterations:

1. For existing alteration data developed and approved before the effective date of 14CFR 26.45 and 26.47, the TC or STC Holder must make available to the operator DTI for its alteration by December 18, 2009. Alaska Airlines will have until December 20, 2010, to incorporate a means to address alterations into their maintenance programs for compliance with 14CFR 121.1109.

2. For alteration data developed after the effective date January 11, 2008 of the rule, the TC or STC Holder must perform a DTE and develop DTIs (if required) for the affected FCBS and any FCAS before the alteration is approved. The DT Data must be submitted to the FAA Oversight Office to support FAA approval of the alteration data.

NOTE: Upon receipt of the Airbus or OEM Damage Tolerance Assessment (DTA) report for structural alterations, engineering will create a TED per GMM▮▮▮▮ to revise the Alaska Airlines A320 Scheduled Maintenance and Inspection Program (SMIP) to incorporate the required structural inspections.

14. All ECs will be checked using the SSE process in GMM ▮▮▮▮▮▮,▮▮. The reviewer will complete the review of each Alaska Airlines EC to:

- Ensure all required information is present.
- The technical basis is sound and in compliance with regulations.
- The information is appropriate and accurate.
- Applicable RII items are identified.

B. Plan the EC and determine the type of EC to be issued, then issue the EC.

1) Gather the information required to determine if the EO is an Engineering Control, an Engineering Order, a Fleet Campaign Directive, or an Interim Engineering Order (IEO). As of 1 June 2010 all new Engineering Control documents shall be released under EC or FCD process with the exception of revisions to existing IEO or EO where necessary. Engineering Orders (EO) are written on Form VA.TO.GMM.▮▮▮▮, revision date 20080107 or later. Engineering Orders are an EC Category to be used to accomplish non-AD related service bulletins, service letters, or other actions to aircraft or components. Fleet campaign Directives (FCD) are special engineering orders written on Form VA.TO.GMM.107, revision date 20080410 or later. FCD's may be used to draw extra attention to the tracking and accomplishment of aircraft inspections, repairs or modifications that have a short compliance time, and/or may be of a safety or legal compliance nature. Interim Engineering Orders (IEO) are written on Form VA.TO.GMM.▮▮▮▮, revision date 20070824 or earlier. The IEO process was superseded by the EC and FCD processes as of 1 June 2010.	Engineer
2) Conduct a review of the EC by the Director of Engineering or Chief Engineer prior to release as per GMM ▮▮▮▮.▮▮. A record of this review will be maintained in the ▮▮▮▮ system.	Chief Engineer / Director of Engineering
3) Create the EC in ▮▮▮▮.	Engineer
4) Document the following items on the EC: • Problem description. • Solution description. • Instructions. • Instructions for Continued Airworthiness • Major/Minor Classification. • Damage Tolerance assessment requirements (if applicable). • Effectivity. • Failure Mode and Effects Analysis (FMEA). • Technical Justification. • Applicable 14 CFRs and/ or other regulations and guidance material considered in the repair or modification. • Weight and Balance Changes. • Electrical Load Analysis Changes 1. Any change, addition or removal of electrical load on any AC or DC bus shall be entered into the ▮▮▮▮ ▮▮▮▮▮▮▮▮ ▮▮▮ database. The following information is required:	Engineer

a) Service Bulletin or STC reference number b) Engineering Control number c) Effectivity d) Bus type (AC or DC) e) Circuit Breaker - Function Identification Number (FIN) f) Circuit breaker location - Panel, Row, Column g) Busbar h) Nominal Power (removal of load shall be designated with a hyphen "-" prefix) i) Electrical Load Delta • Changes to MEL requirements as a result of an alteration. • Determination of whether the repair or alteration is crew sensitive. • Aircraft Configuration Changes including control of RNP AR, CAT III Autoland Program and RVSM. • Definition of any follow-up required by the Engineering Control, such as: 1. Changes to Maintenance, Fight Operations or In-flight manuals. 2. Changes to Maintenance, Fight Operations or In-flight training software or device. NOTE: Any alterations that affects the flight deck must be coordinated and accomplished on Alaska Airlines Training Simulators as well as aircraft. 3. Items that must be added to the CAMP. For Example: Changes or revisions to CAT III ▮▮▮▮▮▮▮▮ Program, RVSM Program, ECM program, etc. 4. Changes to drawings. 5. Service Bulletin Reporting with Alaska Airlines.	
5) Determine if the EC is crew sensitive. NOTE: If the repair or alteration is deemed as being crew sensitive, the EC must be approved by the Director of Engineering prior to implementation.	Engineer / Director of Engineering
6) Determine the lowest applicable assembly that the EC will apply to. For example, a modification to a door, where the door could be moved between aircraft, will be set up against the door P/N and S/N in the ▮▮▮▮ system rather than against the airframe.	Engineer
7) Gather the information required to determine that the EC does not affect items that are not authorized to be changed by Alaska Airlines Engineering Controls: • changes to the Airworthiness Directive compliance • changes to the MEL/CDL • changes to the CMRs • changes to Alaska Airlines Maintenance Program limits NOTE: Changes to the Alaska Airlines maintenance program are only accomplished via the Task Evaluation and Disposition (TED) process.	Engineer

8) Complete a review of all aircraft history for the previous six-week period, including: • Class 1 Trending Faults. • Class 2 Trending Faults. • Class 3 Trending Faults. • Review of corresponding Airbus Trouble Shooting Manual. • Review of corresponding Airbus ECAM System Logic Data. • Review of corresponding Airbus ECAM System Logic Data. • Review of flight data for irregularity: 1) Auto Pilot 2) Flight controls commands and actuation 3) Flight Management System Flight Modes 4) Wind data 5) Auto Thrust or TLA Commands 6) Engine Response (magnitude, time, etc) 7) GPS data (latitude, longitude) • Review of ACMS report data for irregularity. • Review of installed S/N component (shop) history.	Engineer
9) Accomplish the repair or alteration and document the work in ▮▮▮▮.	Engineer
10) All ECs will be checked using the SSE (Second Set of Eyes) process in GMM▮▮▮▮ by the Director of Engineering or the Chief Engineer. The reviewer will complete the review of each Alaska Airlines EC to: • Ensure all required information is present. • The technical basis is sound and in compliance with regulations. • The information is appropriate and accurate. • Applicable RII items are identified.	Chief Engineer

5. Forms
Engineering Order (AB-▮▮▮▮)
Fleet Campaign Directive (AB-▮▮▮▮)
Task Evaluation and Disposition Form
▮▮▮▮ Repair Approval Sheet
Damage Tolerance Assessment
Statement of Compliance with Airworthiness Standards (FAA ▮▮▮▮-▮)
Major Repair & Alteration (FAA 337)

6. Interfaces
None