AIRWORTHINESS DIRECTIVES

Process Review Technical Report

A review of the Title 14, Code of Federal Regulations, part 39 airworthiness directives process for commercial airplanes

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Prepared for
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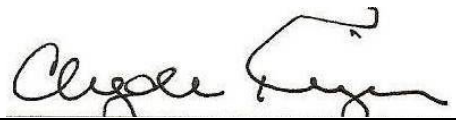

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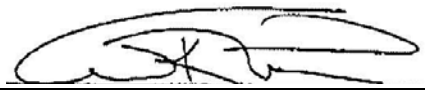

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EXECUTIVE SUMMARY

General

In early March and April 2008, events of suspected noncompliance to airworthiness directives (AD) prompted the Federal Aviation Administration (FAA) Acting Administrator Robert A. Sturgell, to establish and direct the AD Compliance Review Team (Team) to review the events that caused a major disruption to airline schedules. The Team, consisting of FAA and industry subject matter experts, was tasked to review: (1) compliance issues related to AD 2006–15–15[1] and (2) the general process for developing ADs.

The Team's task 1 review and subsequent report addressed the immediate activities accompanying the FAA's special emphasis validation of AD oversight of AD 2006–15–15. From this review, it became clear that while the events that created such massive disruptions were an anomaly, there were areas where system improvements could be made to mitigate such major disruptions in the future.

For task 2, the Team reviewed the process of developing and implementing ADs and ensuring compliance. The findings and recommendations in this report will enhance the process but do not propose fundamental changes to the process. In addition, the Team found overriding observations that may be beyond the objectives of this report but should be viewed in light of the overall oversight and effectiveness of the AD system. There may be a need to clarify some recently amended provisions of Title 14, Code of Federal Regulations (14 CFR) part 39, Airworthiness Directives, to more accurately state the FAA's original intent and to facilitate the accomplishment of some of the report's recommendations.[2]

Decisionmaking

A significant finding in the Team's task 2 review is that the overall system of AD compliance works well and has functioned effectively throughout the history of the air transport industry. As with any human endeavor, processes and systems require the application of good judgment (based on training, education, and experience) for the system to operate effectively and efficiently. The Team's findings in task 1[3] indicated instances where good judgment was not exercised.

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[1] AD 2006–15–15: Airworthiness Directives; McDonnell Douglas Model DC–9–81 (MD–81), DC–9–82 (MD–82), DC–9–83 (MD–83), DC–9–87 (MD–87), and MD–88 Airplanes mandates inspection and installation tasks for wiring bundles in the wheel well of MD–80 series airplanes (71 FR 43035, July 31, 2006).

[2] 14 CFR part 39, Airworthiness Directives was amended on July 22, 2002. Amendment No. 39–9474; 67 FR 47998.

[3] See "Airworthiness Directive 2006–15–15, Process Review Technical Report: A review of the development, implementation, and compliance determinations associated with AD 2006–15–15," dated June 3, 2009.

The Team learned in task 2 that the FAA's Aircraft Evaluation Group (AEG) was not fully participating in the AD process. The AEG is a technical branch of the FAA's Flight Standards Service (AFS) tasked to assist in developing ADs, provide technical consultation to FAA certificate management offices (CMO), liaise with the aircraft certification office (ACO), and serve as an intermediary between original equipment manufacturers (OEM) and CMOs for distribution of service instructions and maintenance alerts.

Although the AEG's tasking allows it to provide support to CMOs on ADs, aviation safety inspectors (ASI) apparently do not recognize the AEG as a resource for assisting with AD compliance determinations in cases where noncompliance is not clear. The Team recommends that the FAA develop a decision guidance tool to assist ASIs with initial compliance determinations. Part of the decision enhancements include ASI training on making compliance determinations and emphasizing that the role of the AEG is not only to interface with the ACO but to act as a liaison between the ACO and CMO on implementing the AD.

Alternative Methods of Compliance (AMOC)

The AMOC process as prescribed in part 39 is an essential tool for implementing a solution to a safety concern. During the events that precipitated this review, FAA administration of the AMOC process was reported to be inconsistent. A point existed where the approval and application of this vital technical process was suspended because of perceived political concerns.

The Team believes that regardless of conflicting influences, FAA personnel must be consistent in the review, approval, and application of the processes under their responsibility. If there are concerns for any influence exceeding the experience, training, or scope of the assigned responsibility for any individual or organization, the individual or organization must seek guidance from the appropriate authority to address these concerns. FAA policymakers must ensure individuals responsible for controlling the AMOC processes are fully aware of the scope of their responsibilities, as well as the available recourse guidance where appropriate. This will ensure proper and prompt technical resolution of problems. The FAA and industry should review communication, coordination, concurrence, delegation, and staffing issues.

Collaboration

One of the most important outcomes of the Team's AD process review is confirming that the process must be collaborative and closely coordinated. The FAA issues approximately 250 ADs annually. The majority are developed and implemented without a problem. The Team found that information flow from airlines to OEMs to the FAA that is free from obstruction or constraint is crucial to identifying and correcting potential safety problems.

The collaborative process among the FAA, OEMs, and air carriers is essential because the safety of the air transport industry is dependent, in large measure, on—

- The timeliness and quality of reported discrepancy data (predominately by airline technical organizations);
- A collaborative response from the regulatory agency;
- The analysis of discrepancy and reliability findings by the FAA, OEMs, and air carriers; and
- The collective actions taken to correct resulting technical difficulties.

In reviewing the AD process, the Team noted that there are numerous "touch" points or interfaces among air carriers, OEMs, and the FAA. The Team concluded that one entity, acting independently, cannot ensure safety; a collaborative effort is critical to its success. Improvement to the collection, analysis, and dissemination of crucial technical information can enhance the safety of the air transport industry.

Service Instructions

OEM service instructions are a critical element supporting AD action to correct an unsafe condition and, in some cases, are found to contribute to air carrier confusion, resulting in AD noncompliance. The Team noted that first and foremost, service instructions should explain the safety intent of the instructions. The Team provided numerous recommendations for user-friendly and "AD-friendly" improvements. User-friendly features will help air carriers better understand and implement AD compliance actions. AD-friendly characteristics will improve the clarity and consistency of AD requirements with the referenced OEM service instructions. As a best practice, more joint OEM, FAA, and air carrier validation of service instructions is needed before general release. This will reduce air carrier AMOC and AD compliance date extension requests.

Lead Airline Process

The Airworthiness Concern and Coordination Process specified in ATA Specification 111, also known as the Lead Airline Process, was established to provide air carrier input in developing service instructions that may be incorporated in an AD. The Team found that the process often was not being initiated as specified in ATA Specification 111 because of coordination and resource issues with OEMs, the FAA, and air carriers. The Air Transport Association of America (ATA) should periodically review the Lead Airline Process to ensure the process is effective and, if initiated, select the lead airlines according to qualifications, capability, and commitment to the process. The Team recommends that ATA Specification 111 be updated to accommodate current practices and OEM fleet support processes, and be expanded to address air carrier AD compliance planning.

Air Carrier AD Compliance

Air carriers have well-defined internal processes, controls, and actions for AD compliance planning, implementation, and monitoring that can be categorized into the following areas: Planning, Engineering, Provisioning, Executing, and Recording. The Team described the processes, controls, and actions within each area and identified benchmark processes.

The Team found that air carrier manuals and FAA guidance and policy should (1) identify the elements for effective AD compliance planning and implementation, (2) specify the processes and tasks that comprise the elements, and (3) identify those persons with authority and responsibility for those elements. The Team recommends the FAA and ATA jointly develop a policy to have the CMO participate in the air carrier AD compliance planning process. The Team also recommends that the CMO participate in AD prototyping. When implemented, these recommendations should serve to reduce the number of AMOCs and noncompliance questions.

Unique Status of AD Configuration Requirements

The Team noted that determinations of compliance with AD configuration requirements may be made differently than determinations of compliance with the requirements of other elements of airworthiness. Certain minor deviations from configurations specified in the aircraft type certificate are managed through maintenance programs, minimum equipment lists, or other programs, and do not result in a determination of noncompliance with applicable operating rules. Conversely, AD configuration requirements may be viewed as absolute. Any deviation can result in a determination that the aircraft is not compliant or airworthy, and, if the aircraft has been operated in that condition, the air carrier is noncompliant with the AD.

Several recommendations in the Team's task 1 and task 2 reports address vulnerabilities to ASI determinations of noncompliance with an AD that would have no affect on safety. The recommendations emphasize and call for tools that would facilitate attaining a goal cited by U.S. Secretary of Transportation Mary E. Peters for a regulatory "sweet spot" in which compliance was ensured without overly strict determinations of compliance.[4] Key among them are recommendations on (1) the use of professional judgment to determine whether noncompliance exists, (2) adding clear statements of the safety intent and identifying critical tasks in AD service instructions, (3) measures to check easily demodified configurations, and (4) improved compliance planning. In addition to emphasizing the relevance of these recommendations to the current regulatory environment, the FAA should verify and clearly state the precise intent of the recent amendment to §§ 39.7 and 39.9.

[4] Wall Street Journal, April 16, 2008, *FAA to Continue Strict Safety Crackdown*, Christopher Conkey.

Conclusion

The AD processes within the FAA and within the manufacturing and air carrier industry have worked well over the years. A critical component of this success has been the technical collaboration of all interested parties, thereby taking advantage of the expertise in all relevant segments of government and industry. This technical collaboration has been highly effective in correcting and mitigating unsafe conditions. However, during this review the Team uncovered areas where improvements can be made to service instructions and AMOC processes; FAA oversight, procedures, and decisionmaking; lead airline participation; air carrier AD compliance planning and monitoring; and part 39. The recommended improvements in these areas will enhance AD development, implementation, and compliance, and ease the process.

The Team recommends that, where appropriate, the FAA and/or industry charter a working group or working groups to urgently address the recommendations upon release of this report.

1.0 INTRODUCTION

1.1 Background

In March 2008, the Federal Aviation Administration (FAA) discovered an air carrier's overflight of a structural inspection airworthiness directive (AD). As a result, the FAA conducted a two-phase special emphasis validation of AD oversight[5] of all air carriers operating under part 121 of Title 14, Code of Federal Regulations (14 CFR)[6]. For Phase I, the FAA Director of Flight Standards Service (AFS) instructed aviation safety inspectors (ASI) with oversight responsibility for air carriers to—

- Sample 10 ADs applicable to each fleet of airplanes, by model, used by each air carrier.
- Inspect the appropriate management records and work instructions to determine whether the air carrier had complied with the ADs.
- Examine the complete work package for at least one airplane for each of the ADs selected.

Additionally, during the second phase of the audit, inspectors were to continue the AD review until 10 percent of the ADs were sampled on all fleet types. This resulted in a total of 5,628 ADs reviewed during both phases of the audit. While the audit indicated a very high compliance rate of 98 percent, nonetheless some issues arose which highlighted a need for improvement in the AD process.

During the special emphasis audit, inspectors discovered compliance issues with AD 2006–15–15. This AD mandates inspection and installation tasks for wiring bundles in the wheel well of MD–80 series airplanes. These suspected compliance problems caused approximately 3,450 airplane flight cancellations from the end of March 2008 through mid-April 2008. The cancellation issues related to conflicting interpretations of work instructions, unclear original equipment manufacturer (OEM) service bulletin (SB) instructions, workmanship, and a few cases of noncompliance with the AD.

Subsequent to the oversight audit, the FAA Acting Administrator Robert A. Sturgell formed the AD Compliance Review Team (Team) and tasked it to conduct a two-part review: a review of AD 2006–15–15 and a review of the entire AD process for commercial airplanes.

[5] See FAA Notice N 8900.36, Special Emphasis Validation of Airworthiness Directives Oversight, dated March 13, 2008.
[6] 14 CFR part 121 contains the operating requirements for domestic, flag, and supplemental air carrier operations.

The task 1 review and the Team's findings and recommendations are documented under separate cover in "Airworthiness Directive 2006–15–15, Process Review Technical Report: A review of the development, implementation, and compliance determinations associated with AD 2006–15–15," dated June 3, 2009. Task 2, the Team's review of the AD process for commercial airplanes and recommended process improvements, is contained in this report.

1.2 AD Compliance Review Team Composition and Activity

The Team members have direct, indepth experience with the AD process. The Team is composed of the following:

- FAA AFS personnel;
- FAA Aircraft Certification Service (AIR) personnel;
- Industry representatives from air carriers, airline associations, and aircraft OEMs; and
- Independent aviation subject matter experts.

The Team met July 22 through July 24, 2008, in Seattle, Washington, to begin its review of the AD process for commercial airplanes. Representatives from Boeing Commercial Airplanes, AIR, and the FAA's Aircraft Evaluation Group (AEG) presented their roles and responsibilities in the SB and in the AD development and implementation process for commercial airplanes. Team members also presented their insights. Based on these presentations and a review of current documented processes and related material, the Team identified areas where changes to the AD process are needed, and recommended process improvements. The Team completed its process review on December 18, 2008.

1.3 Scope of This Report

This report is divided into four sections. This section presents the background of the Team's tasking and composition and scope of the report. Section 2.0 describes the key points of the AD process. The process description includes the roles and responsibilities of the OEM, FAA, and air carriers during the AD development and implementation process for commercial airplanes. Although the Team focused on the AD process relating to commercial airplanes, the findings and recommendations contained in this report can be applied to all ADs. Section 2.0 also includes a discussion of the AD process for foreign aviation authorities. Section 3.0 contains a summary table of the Team's findings and recommendations, and section 4.0 is the conclusion.

This report also contains appendixes that provide supplemental information. Appendix A contains a list of acronyms related to this report. Appendix B contains the relevant statutes and regulations associated with the AD process. Appendix C contains an enlarged map of the Team's suggested ASI compliance decision flowchart for ease of viewing. Appendix D contains an enlarged generic chart of an air carrier's AD compliance planning, implementation, and monitoring process.

2.0 AIRWORTHINESS DIRECTIVES PROCESS

2.1 General

ADs are regulations issued by the FAA under 14 CFR part 39 to correct an unsafe condition.[7] The AD process has many interfaces that are interdependent and require close coordination of actions by OEMs, the FAA, and affected air carriers.

As part of the AD process, the OEMs, FAA, and air carriers carry out actions that include, but are not limited to, the following:

- OEMs monitor and notify the FAA of failures, malfunctions, or defects in products they manufacture; develop design changes to correct any condition the FAA determines to be unsafe; and incorporate corrective action in future production of their products and inservice airplanes.
- The FAA monitors products manufactured in the United States and foreign countries for unsafe conditions and issues ADs when needed.
- Air carriers continuously collect and analyze operational data to identify safety concerns. In most cases the operational data is the source of the concern prompting the OEM and the FAA to develop a service document and/or AD. When an AD is issued, air carriers develop (if necessary) and implement systems and procedures to ensure compliance with all ADs that apply to their aircraft.

This section discusses the AD process interfaces and presents the Team's findings and recommendations.

2.2 Key Components of the AD Process

During its review of the AD process, the Team identified the following areas as key elements of the process: airworthiness concern identification and risk assessment; AD development; AD notice of proposed rulemaking (NPRM) and final AD issuance; AD implementation; and continuous compliance. Each key area has been subdivided into the salient topics that surfaced during the Team's process review.

[7] See appendix B to this report for a detailed discussion of relevant statutes and regulations related to ADs.

2.2.1 Service Problems — Airworthiness Concern Identification and Risk Assessment

Introduction

The growing use of safety management systems within the aviation industry, in conjunction with the shared safety culture and collaborative environment among the FAA, foreign national aviation authorities, OEMs, air carriers, and maintenance providers have significantly reduced airplane accidents and incidents in our global commercial air transportation system. The primary objective of the AD process is to correct or manage, through repetitive inspection, unsafe conditions found during the airplane's service life cycle to ensure continued airworthiness.

Airworthiness Concern Identification Process

***Service Data*.** During the service life cycle of an airplane, unanticipated discrepancies may be discovered involving the airplane's structure, systems, components, or operational and maintenance documents. The first step in the AD process is the timely detection and identification of those problems having a potential adverse effect on airworthiness. Service data from the airplane fleets are continuously monitored and compiled by air carriers; airframe, engine, and component manufacturers; and national aviation authorities.

The FAA and other national aviation authorities require mandatory reporting, by airplane manufacturers, of product malfunction, defect, and failure events meeting certain FAA-defined criteria.[8] Information on events typically comes to the attention of the OEMs through their customer support relationship with air carriers, including fleet reliability data.

Additionally, the FAA and national aviation authority regulations require air carriers to report inservice difficulty events meeting certain criteria. Service difficulty reporting by air carriers alerts the aviation industry of inservice problems (for example, engine shutdown, flight control malfunctions) that result in significant operational events, such as a diversion, air turn back, or other event that may endanger the safe operation of the airplane.[9]

One OEM implemented a process to provide global air carriers a communication tool for collaboration on airworthiness concerns. Known as "Fleet Team Emerging Issues (FTEI)," the process facilitates a rapid gathering of facts and data on potential root cause, fleet frequency, and potential industry mitigating actions. The FTEI process complements the Lead Airline Process (ATA Specification 111) discussed in section 2.2.2. Under the FTEI process, authorized air carriers can comment in an interactive "blog" format on a secure, Web-based bulletin board. The OEM

[8] See discussion of service reports in 14 CFR § 21.3 contained in appendix B to this report.
[9] See discussion of service reports in 14 CFR § 121.703 contained in appendix B to this report.

considers these air carrier responses, in conjunction with Lead Airline input, when developing its service instructions.

In addition to these data sources, there are other sources of inservice events employed by aviation industry. These include —

- FAA's Accident/Incident Data System (AIDS);
- FAA's National Aeronautics and Space Administration (NASA)-managed Aviation Safety Reporting System (ASRS);
- World Aircraft Accident Summary (WAAS), produced on behalf of the British Civil Aviation Authority by Airclaims Limited;
- Aviation Safety Network (ASN), produced by the Flight Safety Foundation;
- Client Aviation System Enquiry (CASE), produced by Airclaims Limited; and
- National Transportation Safety Board (NTSB)'s Aviation Accident and Incident Data System.

Because of the multitude of databases containing aviation safety information, the FAA is developing the Aviation Safety Information Analysis and Sharing (ASIAS) program. This program will enable users to perform integrated queries across multiple databases, search an extensive warehouse of safety data, and display pertinent elements in an array of useful formats. The FAA is continuing a phased development approach with additional data sources and capabilities becoming available. Those data sources will provide expanded access in the integration, analysis, and sharing of aviation safety data and information. The end result will be a global industry system promoting open exchange of safety information for continuous monitoring and improvement of aviation safety.

***Evaluation*.** The aviation community works together to identify and resolve service problems that may have potential adverse effects on the safety of airplanes, passengers, and flight/ground crews. Typically, air carriers resolve minor inservice problems internally through their continuing analysis and surveillance process. Air carriers coordinate major service problems or those with fleet implications with the OEM and the national aviation authority to perform a formal technical evaluation. This review process requires a detailed engineering determination of the service problem's root cause; a thorough understanding of product behavior, performance, and operating environment; and inservice experience.

Risk Assessment

In a formal technical evaluation, national aviation authorities and OEMs employ a traditional risk assessment methodology, considering both the likelihood and severity of potential outcomes. Risk assessment tools typically use a quantitative (numeric) evaluation, whenever possible, to characterize the statistical probability that an undesired event will occur, and a qualitative appraisal to validate assumptions of the contributing elements. National aviation authorities and OEMs typically conduct risk assessments independently to preclude repetition of errors in the analysis that could result in faulty conclusions.

In addition, global commercial airplane manufacturers and their national aviation authorities typically have formal safety review boards composed of technical and operational aviation experts. The safety review boards share results from the different risk analyses and discuss contrasting outcomes to reach agreement on the level of risk and potential consequences. These boards each determine whether an unsafe condition exists.

An OEM safety review board also authorizes corrective action to resolve the unsafe condition, and the equivalent FAA Continuous Operational Safety board approves proceeding with development of an AD. In most instances, these respective boards have open attendance by both the national aviation authority and OEM representatives.

Team's Observation

The Team found that there is a robust and effective process in place to collect, share, and evaluate service data, including the use of risk assessment tools by OEMs and authorities. These tools help determine whether an unsafe condition exists that must be addressed and how urgently the action must be taken. The Team fully supports continuing national aviation authority voluntary disclosure reporting programs. The Team also supports cooperative industry initiatives to enhance current data collection, sharing, and evaluation processes for improved collaboration on safety-related issues and trends. Without this type of collaboration, safety could be compromised.

2.2.2 AD Development

Service Instruction Development

General. Manufacturer service instructions can be issued to provide instructions to correct an unsafe condition, offer design improvements to air carriers, or provide instructions for accomplishing an air carrier purchased alteration. Service instructions supporting ADs may include SBs, maintenance manual and flight operations manual revisions, and/or service letters; or may be defined directly in the AD. The OEM may recommend, but cannot require, air carrier accomplishment of service instructions. The FAA may mandate the accomplishment of service instructions by incorporating them into an AD.

In the United States, all OEMs are required[10] to provide service instructions to accompany an AD. In many cases, the mitigating actions may have been made available through an OEM service instruction long before an AD is published. Air carriers may elect to accomplish these service instructions ahead of AD publication, but they must consider possible future revisions to the OEM service instructions or additional mitigation requirements within the issued AD.

AD compliance errors may result from errors or inconsistencies in OEM service instructions, a misunderstanding of the service instructions, or incorrect correlation of service instructions to the governing AD language. The industry recognizes that manufacturer service instructions should be more user-friendly. User-friendly service instruction attributes include the following:

- Clear, concise, and unambiguous technical instructions that minimize the possibility of omission, error, or extensive judgment.
- Differentiation between critical tasks requiring exact instructions, and flexible advisory instructions allowing use of industry standards or air carrier approved practices.
- Easy conversion and translation to air carrier engineering work order documentation through the use of standardized electronic formatting and structuring of instructions.
- Clear, detailed illustrations appropriate to the task to aid understanding of accomplishment and sequencing of complex task steps, and consistent with the text of the instructions.

Joint OEM, FAA, and air carrier validation of service instructions before general release verifies user-friendliness and should be considered a best practice.

[10] 14 CFR § 21.99, Required design changes. See appendix B to this report.

***"AD-Friendly" Service Instructions*.** Service instructions should be "AD-friendly" in addition to being user-friendly. Recently, the FAA and a commercial transport airplane manufacturer formed a joint initiative team to improve the quality of service instructions referenced in an AD. Implemented as "AD-friendly service bulletins,"[11] this new form of service instruction enhances usability, minimizes differences between the manufacturer's service instructions and the AD, and addresses barriers to accomplishment. The benefits are—

- Less regulatory effort to produce ADs,
- Less work for air carriers to correlate service instructions to the AD,
- Easier compliance determination for both the air carrier and national regulatory authority, and
- Overall fewer questions and deviations/exemptions requiring an AMOC.

Finding No. 1: The Team found that in some cases, service instructions were not sufficiently user-friendly and complete. These incomplete instructions resulted in widespread air carrier confusion because of the differences in the referenced service instructions and AD instructions. These deficiencies in service instructions have led to an increased demand for AMOCs and AD time extensions and/or exemptions. This has strained limited national aviation authority resources. The Team found that there is an opportunity for expanded use of the FTEI process within the OEM industry. Use of this process will ensure air carrier's review proposed mitigating actions and make user-friendly inputs to draft OEM service instructions.

Recommendation No. 1: The Team acknowledges the benefits of current AD-friendly service bulletin improvements, but recommends more focus on user-friendly improvements in service instructions as follows:

- *Critical task differentiation*. Service instructions should explain the safety intent of the instructions. They should differentiate the critical tasks and task sequences requiring exact conformance from flexible advisory instructions for tasks that are common acceptable air carrier procedures. This differentiation will allow improved understanding of crucial AD requirements and consistent judgment in AD compliance.
- *Simplified format*. Service instructions can be written in a simplified format that allows easy translation into an air carrier's work instructions. Standardizing service instruction format will facilitate user effectiveness by repetition in knowing where critical information is referenced.

[11] See "Agreed Principles and Practices on AD Friendly Service Bulletins Between the Seattle Aircraft Certification Office (SACO), Los Angeles Aircraft Certification Office (LAACO) and Boeing Commercial Airplanes," dated March 31, 2006.

- *Maintaining airworthiness*. Service instructions should be written and traceable to avoid situations where previous AD compliance requirements are inadvertently undone or modified through normal air carrier routine maintenance practices. (Refer to class 2 issues in section 2.2.5, finding and recommendation No. 11, for additional information regarding this issue.)
- *Flexibility as appropriate*. When compatible with the corrective action intent of the AD, service instructions should incorporate general notes providing air carriers latitude to use (1) acceptable alternative materials and approved internal procedures without requesting an AMOC on each deviation or (2) where applicable, the option to use their engineering authority[12].
- *Standard practices*. The aviation industry has many processes for performing maintenance and modifications that have been standardized and proven to be very effective. Service instructions should refer to these standard practices in which air carriers have experience, confidence, and training.
- *Corrective action decision guidelines*. In some situations, alternative corrective actions are provided to the air carrier for compliance with the AD. Incorporating logic-based decision diagrams in service instructions would assist air carriers in choosing the best corrective action path, such as continued repeat inspection or termination repair, based upon the discovered condition and compliance time period.
- *Detailed instructions*. Service instructions must make clear whether a figure or drawing is the authoritative instruction or only an installation aid. Service instruction text and drawings must be in agreement with each other to avoid subjective misinterpretation. In addition, service instructions should no longer contain ambiguous terms, such as "approximately", to define allowable tolerance ranges and performance criteria.

Aircraft Evaluation Group (AEG)

The AEG is an AFS organization responsible for the operational suitability determinations of newly certificated and modified aircraft.[13] The AEG plays a critical role in pilot qualifications, flightcrew training, minimum equipment lists, and continuing airworthiness requirements. The AEG is instrumental in reviewing and determining the operational suitability of ADs by providing consultation, coordination, and assistance to certification project managers who develop ADs.

[12] 14 CFR § 43.13: Performance rules (general) allows air carriers to use maintenance instructions in their manual in place of the OEM maintenance instructions when performing maintenance, alteration, or preventive maintenance. See appendix B to this report.
[13] See FAA Order 8430.21A, Flight Standards Division, Aircraft Certification Division, and Aircraft Evaluation Group Responsibilities, March 3, 1986.

The AEG's assigned AD process responsibilities include (1) participating in developing ADs related to operation or maintenance of aircraft; (2) providing technical consultation to the FAA certificate management offices (CMO); (3) liaising with the ACO; and (4) acting as an intermediary between OEMs and CMOs for distributing service instructions and other forms of alerts (for example, All Operator Letters, and Maintenance Alerts).

Finding No. 2: The Team learned that the AEGs were not playing a significant role in either the AD review process or the operational suitability determinations. This was confirmed through interviews with AEG personnel as well as FAA principal inspectors. The Team recognizes the key role the AEG can play in the review and implementation of an AD.

Recommendation No. 2: Strengthen the role of the AEG in developing and implementing ADs. Ensure ASIs know that the AEG is a resource for reviewing the air carrier's AD installation instructions and that the AEG acts as the liaison between the CMOs and the ACO on AD implementation issues. When questions arise, make the AEG part of these processes to make compliance with the AD as seamless as possible. This approach will help to prevent future disagreements between the FAA and the air carrier.

Lead Airline Process (ATA Specification 111)

The Lead Airline Process is a key communication and coordination tool among the FAA, OEMs, and air carriers. Each is invested in monitoring airworthiness concerns, identifying unsafe conditions, and developing and implementing effective corrective actions to maintain the trust of the traveling public. Each has a unique perspective on the safety performance of the industry.

Objective. In 1992, the Air Transport Association of America (ATA) published a report on the Lead Airline Process.[14] The current version of the document is ATA Specification 111, Airworthiness Concern Coordination Process, which states—

> A primary objective of the process is to develop, to the greatest extent possible, original equipment manufacturer (OEM) service bulletins (SBs) or other approved service instructions that fully support the technical, maintenance, logistic and other requirements of Airworthiness Directives (ADs), and the needs of air carriers in implementing those requirements.[15]

The Lead Airline Process may be used in various kinds of and at different stages of AD rulemaking. However, it should be emphasized that the process should be initiated in time for air carriers to complete their participation in the development of service instructions before these instructions are proposed as an AD in the *Federal Register*.

[14] ATA Report AC-92, August 3, 1992.
[15] ATA Specification 111, Revision 2000.2, October 19, 2000, page 5.

Organization and Scope. The ATA Airworthiness Committee maintains ATA Specification 111 and designates lead airlines for airplane and engine models. The ATA's Web site posts specification and contact information for lead airlines and other participants in the Lead Airline Process at the FAA, OEMs, and air carriers. The site limits access to process participants.

The FAA and OEMs have established internal procedures for interfacing with the Lead Airline Process, such as Boeing's FTEI Web site discussed in section 2.2.1. Although not a signatory, the FAA supports and interfaces with this process by notifying ATA when the ACO initiates internal AD activity. The Lead Airline Process is equipped to address airplanes operated by ATA-member airlines, which typically include all commercial models having more than a 75,000-pound maximum takeoff weight (MTOW).

Process Description. The Lead Airline Process can be divided into two parts — the preliminary assessment of an unsafe condition, followed by the lead airline participation. The process is as follows:

> *Preliminary assessment.* In the Preliminary Assessment phase of the Lead Airline Airworthiness Concern Coordination Process, the FAA and OEM gather and exchange information on airworthiness concerns as discussed in section 2.2.1. If the FAA or OEM decides that further research or corrective action may be required, the ATA initiates the Lead Airline Process. The process also is initiated if, at any time, the FAA determines that an unsafe condition exists and that corrective action (that is, an AD) will be required.
>
> Once the FAA decides to publish an NPRM or final rule, the lead airline's communications are limited by the ex parté policy under the Administrative Procedure Act (APA)[16]. Communications generally are only responses to FAA requests for information or data. In addition, while the air carriers provide data to support the OEM and FAA risk assessments, they are not participants in those risk assessment processes.
>
> *Lead airline participation*. The OEM typically is best positioned to request the ATA or the lead airline to activate the Lead Airline Process; however, any process participant can make a request.[17] The lead airline for a particular event normally is as designated in ATA Specification 111, but may be assigned as circumstances dictate. ATA notifies its network of air carrier and OEM contacts to begin gathering information to assess the extent of the issue and evaluate potential corrective or mitigating action. The OEM fleet team communications process often contributes substantially to these efforts.

[16] Administrative Procedure Act (APA); Rule making, 5 U.S.C. § 553. The APA governs the way in which administrative agencies of the Federal Government, such as the FAA, may propose and establish regulations. The process of "notice and comment" rulemaking is referred to as informal rulemaking.
[17] ATA Specification 111, Revision 2000.2, October 19, 2000, pg. 9, states that "…the Lead Airline and the manufacturer will determine the need for a conference call. However, any cognizant FAA, manufacturer, or operator contact may request ATA to arrange a conference call at any point in the process."

> A key step of the process for the lead airline is prototyping the proposed service instructions on an inservice airplane. Although prototyping is essential for challenging corrective actions, all service instructions should be validated and assessed for their accuracy, clarity, alternatives, and practicality regarding maintenance and logistic factors. The conclusion of the Lead Airline Process is the production of service instructions or SBs. Air carriers would have minimal need to comment on these service instructions or SBs after the FAA proposes they be incorporated into an NPRM. In addition, air carriers would have less of a need to apply for an AMOC after the FAA issues the service instructions or SBs as an AD.

Business Environment. The environment of the aviation industry has changed since the Lead Airline Process was published over 15 years ago. Air carriers rely more on maintenance, repair, and overhaul (MRO) providers, turnkey operations, and parts manufacturer approval (PMA) suppliers. The rate at which ADs are adopted increased by nearly a factor of two in the late 1990s (about the same time ATA Specification 111 underwent its last revision). For the last 10 years, part 39 rulemaking for large airplanes has remained fairly consistent at about 500 actions per year (225 to 275 NPRMs and 200 to 250 ADs). Additionally, the proportion of foreign-manufactured airplanes in the U.S. inventory has increased and includes a new set of foreign models.

Adaptation of the Process. In theory, a Lead Airline Process should be conducted in advance of the publication of each AD proposal (225 to 275 NPRMs annually).[18] However, in practice, manufacturer fleet team forums and Web-based communications often manage the bulk of coordination communications, leaving the lead airline processes to focus resources on the more problematic issues. The depth of lead airline process evolutions (including the depth of prototyping and the involvement of lead airline networks) has been proportional to the lead airline's initial estimate of risk and impact factors. Such factors include the practicality and complexity of the anticipated action, the compliance period, and economic impact.

The Lead Airline Process is intended to minimize the need to comment on an NPRM; however, if comments are required or if an AD is published, the same individuals who perform lead airline processes typically would develop or address the comments. They would also perform the AD compliance planning if an AD is issued. In this environment, industry has moved resources to the end of the Lead Airline Process, that is, to a point after a regulatory proposal has been defined and published, or an AD has been adopted and requires planning and compliance. For example, the ATA notifies the applicable lead airline network 100 percent of the time an NPRM or AD is published. The ATA also often conducts an after-the-fact Lead Airline Process that, depending on risks and impact, may include prototyping to develop comments to NPRMs. Looking forward, the Lead Airline Process should be adapted to better achieve its objectives in the current environment, and may require lead airlines to redouble their commitment to the process.

[18] Because some airworthiness concerns ultimately are addressed or mitigated through other means, such as maintenance program guidance, about 250 to 300 lead airline processes should occur each year.

Finding No. 3: The Team found the Lead Airline Process supports industry collaboration objectives, but may need to be updated to reflect today's OEM and air carrier supporting internal processes. As the aviation industry business environment has changed, the impact thresholds for activating full network coordination and full-scale prototyping have increased.

The Team also observed that the ex parté policy may not be well understood by the FAA and air carriers. Many in the FAA and the industry believe that ex parté communications are restricted to data requests from the FAA after an NPRM is published in the *Federal Register*. The Team noted that the FAA can communicate with the lead airline after NPRM publication; however, the FAA must document all communications and place them in the rulemaking docket. [19]

Recommendation No. 3: The ATA should review and update ATA Specification 111 to address issues brought forward in this report with emphasis on the following items:

- A goal of the Lead Airline Process should be to contribute to clear and accurate service instructions that avoid prescriptive processes where standard practices are available and applicable. Ideally these instructions contribute to effective implementation by a technician. The process should lend particular attention to developing service instructions involving previous overlapping ADs or a series of ADs or SBs on (1) the same component, (2) wiring and other actions dependent on workmanship, and (3) class 2[20] type actions that are easily reversible in future maintenance. In these cases, prototyping of proposed service instructions on inservice airplanes is particularly important, and OEM participation should be considered. The process should—
  - Identify differences in airplane configurations relevant to the proposed service instructions.
  - Ensure lead airlines are selected according to qualifications, capability, and commitment to the process.
  - Predispose service instructions to support AD compliance planning objectives cited in the two bullet points directly below.
- The ATA should periodically review the Lead Airline Process to ensure the continuing effectiveness of the process.
- The ATA should coordinate the update to ATA Specification 111 with the OEM. This will help to streamline and better integrate the Lead Airline Process with OEM fleet support processes.

[19] See discussion on Ex Parte Contacts, page 6, FAA Airworthiness Directives Manual, dated January 23, 2007; FAA–AIR–M–8040.1.
[20] This type of AD requires a configuration change that, after implementation, potentially has a higher vulnerability of being undone through the air carrier's standard maintenance practices or operations. See section 2.2.5, Continuous Compliance, for a discussion of class 2 ADs.

- The ATA should add to ATA Specification 111, or develop a new specification to address (upon adoption of an AD) AD compliance planning that includes the following industry guidelines:
  - Invite the ASI to air carrier compliance planning sessions and AD compliance prototyping for better understanding of issues.
  - Ensure the accuracy and clarity of the engineering order (EO) or other implementation document. The air carrier should consider silent prototyping where a technician prototypes the EO without verbal or other assistance.
  - Augment air carrier compliance planning with an AD verification program.
- The ATA, in coordination with the FAA, should takes steps to clarify to the industry and FAA personnel that ex parté communications can take place if the communications are fully documented and placed in the rulemaking docket for public review.

2.2.3 AD NPRM/AD Issuance

Synopsis of FAA Internal Process

The FAA manages the AD process through several FAA orders and its AD policy manual.[21] These documents describe the FAA's authority and assign the responsibility for determining unsafe conditions and developing and issuing ADs and AMOCs in accordance with applicable statutes, regulations, and FAA policy.

For ADs, the FAA's ACO works with the OEM to approve service instructions and when necessary, develops and issues an AD as described in sections 2.2.1 and 2.2.2. Often the OEMs service instructions are incorporated by reference into an AD making the service instructions mandatory.[22] For U.S. products[23], the FAA applies the standard publication and comment period for NPRMs and final rules to proposed and final ADs. The ACO reviews comments submitted on AD NPRMs and may adjust the final AD based on comments received. Comments on NPRMs typically address compliance deadlines and an air carrier's ability to integrate the AD's requirements into its maintenance program before the AD's compliance date. Issues with service instructions also are addressed.

Finding No. 4: The Team found systemic problems in the AD process as follows:

- Multiple ADs affecting airworthiness in the same area of the airplane resulting in overlapping and confusing mandates for air carriers. This can lead to inadvertent noncompliance or reversal of previous AD actions.
- Occasionally, the OEM's service instructions are not available when the AD NPRM is issued. In addition, copies of service instructions are not included in the Government's electronic regulatory docket system. In either case, this prevents air carriers from having the full comment period to comment on the specifics of the service document.
- ADs generally have an aggressive installation timeline. Because of the urgent nature of AD tasks and the need for planning to minimize aircraft out-of-service time, air carriers frequently accomplish service instructions ahead of the AD issuance date. This creates an exposure to noncompliance when there are changes in the final AD that differ from the originally released service document.

The Team noted that as part of a process improvement effort, in 2006 the FAA signed a working agreement with Boeing Commercial Airplanes on Agreed Principles and Practices for AD-friendly service bulletins related to the Boeing transport fleet. The agreement was developed as part of a joint effort by the FAA

[21] FAA Order 8040.1C, Airworthiness Directives, dated October 3, 2007; FAA Order 8110.103, Alternative Methods of Compliance, dated September 28, 2007; FAA Order 8040.5, Airworthiness Directive Process for Mandatory Continuing Airworthiness Information, dated September 29, 2006; and FAA–AIR–M–8040.1, Airworthiness Directives Manual, dated January 23, 2007.
[22] See appendix B to this report for a discussion of incorporation by reference.
[23] Products are aircraft, engines, propellers, and appliances.

and an OEM to identify and implement improvements to the format and quality of service instructions and ADs. The Team acknowledged that the joint effort is a major step in improving the FAA's AD process, provided that certain recommendations in section 2.2.2 regarding service instructions are incorporated to simplify air carrier implementation.

Recommendation No. 4: The Team recommends the following related to AD development:

- Charter a joint team made up of representatives from the FAA, OEM, and air carriers to resolve finding No. 4. The overarching goal is to ensure that the AD development process is effective and efficient and results in a compliant product for air carriers.
- OEMs should streamline service instruction development and revision processes to expedite release to air carriers.
- OEMs should review Intellectual Property and Export Compliance policies to allow easier public access to NPRM- and AD-referenced service instructions via the electronic regulatory docket system.
- At a minimum, the first compliance deadline should always be stated in the NPRM and AD.
- For situations involving multiple structural service documents and ADs, the FAA should explore innovations in AD tracking and management (for example, a zonal approach, where tasks are compiled covering all AD requirements for a given area).
- Air carriers must have a process in place to continually verify AD accomplishment. (Also see discussion in recommendation No. 3 above and section 2.2.4).

Mandatory Continuing Airworthiness Information

Mandatory continuing airworthiness information (MCAI) are ADs issued by the aviation authority of an export country (also referred to as the State of Design Authority). Annex 8 of the Convention of International Civil Aviation (Annex 8) lists the responsibilities of these export countries regarding MCAIs.

The export country's State of Design Authority issues an MCAI when it identifies an unsafe condition and calls for corrective action. The authority provides MCAIs (including the referenced service instructions) to all other export countries with an affected product on their registry and provides an opportunity for comment. The European Aviation Safety Agency (EASA), for example, provides air carriers a comment period of up to 30 days on its proposed MCAIs (known as proposed airworthiness directives (PAD)). However, U.S. air carrier experience is that the comment period for PADs often is on the order of 12 calendar days.

The State of Design Authority is the lead authority and the FAA rarely issues an AD before an MCAI. The FAA is involved in advance issuance of an MCAI only in emergency situations.

Under Annex 8, the FAA is required to assess the information received and take appropriate action regarding MCAI. Thus, the FAA receives an MCAI and gives it an AD classification (NPRM, immediately adopted rule, or a final rule after notice). The MCAI then is processed as specified in the FAA's AD manual, or a new AD is drafted if necessary. The FAA usually adopts the MCAI as drafted; it is then submitted for technical and legal review and is issued according to the process in the AD manual. The FAA currently is working on a process to only reference the MCAI and issue the rule; instead of redrafting the MCAI as an AD.

The Team recognized the following four anomalies associated with the MCAI process:

- Proposed NPRMs based on an MCAI are published with a 30 calendar day comment period per FAA policy. This policy provides a period for U.S. air carriers to comment on MCAIs that is approximately 15 days less than for the majority of AD NPRMs developed by the FAA.
- Foreign OEMs sometimes do not follow the MCAI process and change the airworthiness limitation items (ALI) after airplanes are in service; this typically applies to structural issues. The FAA subsequently issues an AD based on the ALI. The Team learned that EASA has recently instituted a policy to mandate ALI revisions through the MCAI process for more restrictive changes. The Team noted that there is no experience with the new policy to judge its effectiveness but welcomes the implementation of a more orderly and open process.
- It is unclear whether foreign national aviation authorities have a process comparable to the Lead Airline Process because this Team did not conduct an indepth review of foreign processes.

- MCAIs have required the use of materials that are banned from use in the United States. Existing AD development processes typically have not identified these issues, which then require resolution through AMOCs.

Finding No. 5: Overall, the Team found that the MCAI process works well. However, the Team noted that addressing the anomalies above will further enhance MCAI effectiveness.

Recommendation No. 5: In view of foreign authorities' AD rulemaking processes (for example, foreign national aviation authorities' apparent lack of a comparable Lead Airline Process and reduced comment periods for proposed MCAIs), the FAA should extend the typical comment period for MCAI NPRMs. The comment period should be extended from 30 days to 45 days, the standard for noncontroversial FAA NPRMs. In addition, the FAA and foreign national aviation authorities should work to harmonize AD processes.

2.2.4 AD Implementation

Air Carrier Implementation

For an air carrier, there are many distinct internal processes, controls, and actions necessary to effective AD compliance planning, implementation, and monitoring. The following discussion describes the common processes and practices undertaken by air carriers to manage ADs. They can generally be categorized into the following five areas as described below:

- Planning
- Engineering[24]
- Provisioning
- Executing
- Recording

Planning. The AD compliance planning process ensures cross-functional awareness and responsibility for AD requirements, including engineering, materials, scheduling, recordkeeping, maintenance execution, quality control, and quality assurance.

Benchmark processes can include an AD Compliance Control Board meeting or equivalent where predefined potential actions are reviewed and confirmed. Use of a checklist is recommended. The meeting helps ensure all affected areas are aware of their responsibilities, and acknowledgement is recorded.

The specific requirements of the AD are reviewed at this meeting, with particular focus on any unique aspects of the AD. It is during this meeting that the risk of demodification should be discussed, with appropriate mitigation strategies determined, including potential physical marking of the AD area. Other considerations include (1) previous accomplishment of service instructions (that is, before AD issuance) and (2) the existence of previous modifications and how any air carrier-specific rework (for example, repairs, supplemental type certificates (STC)) in the AD affected area may affect compliance.

Another consideration in a benchmark process is (1) determining the need for specific labor classification/skills (for example, avionics, structures) and (2) possible restriction of AD accomplishment to site-specific locations (based on the need for specialized skills or need for limiting variation by utilizing a "center of excellence" approach). A "second set of eyes" requirement at the point of execution and audit plans are determined within the Control Board group as well as required prototyping of the AD.

[24] Note that air carrier organizations may range from having no in-house engineering capability to employing a full engineering staff. Those air carriers that are structured without engineers on staff still would have personnel responsible for coordinating and monitoring technical documentation associated with an AD.

Decisions regarding ongoing validation and appropriate documentation are made during the Planning stage for AD accomplishment. This validation can range from (1) no validation required, as with structural repairs with low risk of demodification, to (2) physical validation at lower order or D-check level visits for those ADs at higher risk of demodification such as class 2 ADs. Finally, benchmark practices include the active participation of the FAA in Control Board/AD planning meetings.

Engineering. The responsible engineering personnel produce documentation (including planning and maintenance instructions) that clearly addresses all actions specified by the AD.

Benchmark processes clearly show the method of compliance with each requirement of the AD, from modification or procedural/operational (Airplane Flight Manual (AFM)) revision to the need for an AMOC. The engineering review could include the requirement for a side-by-side, paragraph-by-paragraph listing of all AD requirements and the associated air carrier engineering authorization (EA)[25] compliance actions.

Engineering confirmation of forecasts and schedules to accomplish the work, and confirmation of work instructions are provided to Maintenance for execution. This will ensure EA instructions are not lost and/or revised in the conversion to job instructions/tasks for maintenance. To avoid a single point of failure risk, an independent review of the EA should be accomplished.

When possible the authoring engineer performs prototyping assistance and monitoring, thereby providing direct input from the maintenance organization to engineering. Silent prototyping (witnessing a technician accomplish the EA without providing assistance) is recommended. Requirements for ongoing EA validation are also originated for inclusion in maintenance programs as necessary.

Provisioning. Materials and Scheduling/Planning departments are responsible for ensuring the materials specified in the AD and EA are provided. Those departments also must plan for adequate capacity and time to accomplish the AD in appropriate work environments with the required maintenance personnel.

Benchmark processes include the kitting of all AD required parts and materials. The kit contents should be confirmed by a second set of eyes, possibly including technical personnel, and validated through the prototyping process. Special attention must be paid to ensuring that no part or material substitutions are made without written engineering approval.

The air carrier's plans can include the scheduling of the affected fleet's compliance before the AD's compliance deadline. This will help facilitate (1) confirmation that 100 percent of the work and the required original records have been completed before the AD's compliance period expires and (2) reaccomplishment, where necessary, before the deadline.

[25] An engineering authorization (EA) is equivalent to an engineering order (EO).

Executing. Maintenance personnel (the air carrier's internal staff or the MRO provider) are responsible for precisely accomplishing AD work instructions and attending to detail with execution.

Benchmark processes include consideration of maintenance technician qualifications and training before AD accomplishment. This can include skill-specific training for particular ADs, for example, using avionics-qualified technicians for wiring-related ADs. Also considered would be site-specific restriction of accomplishment. These considerations would either limit the variability introduced by accomplishment across a system and/or leverage the use of available center-of-excellence capabilities.

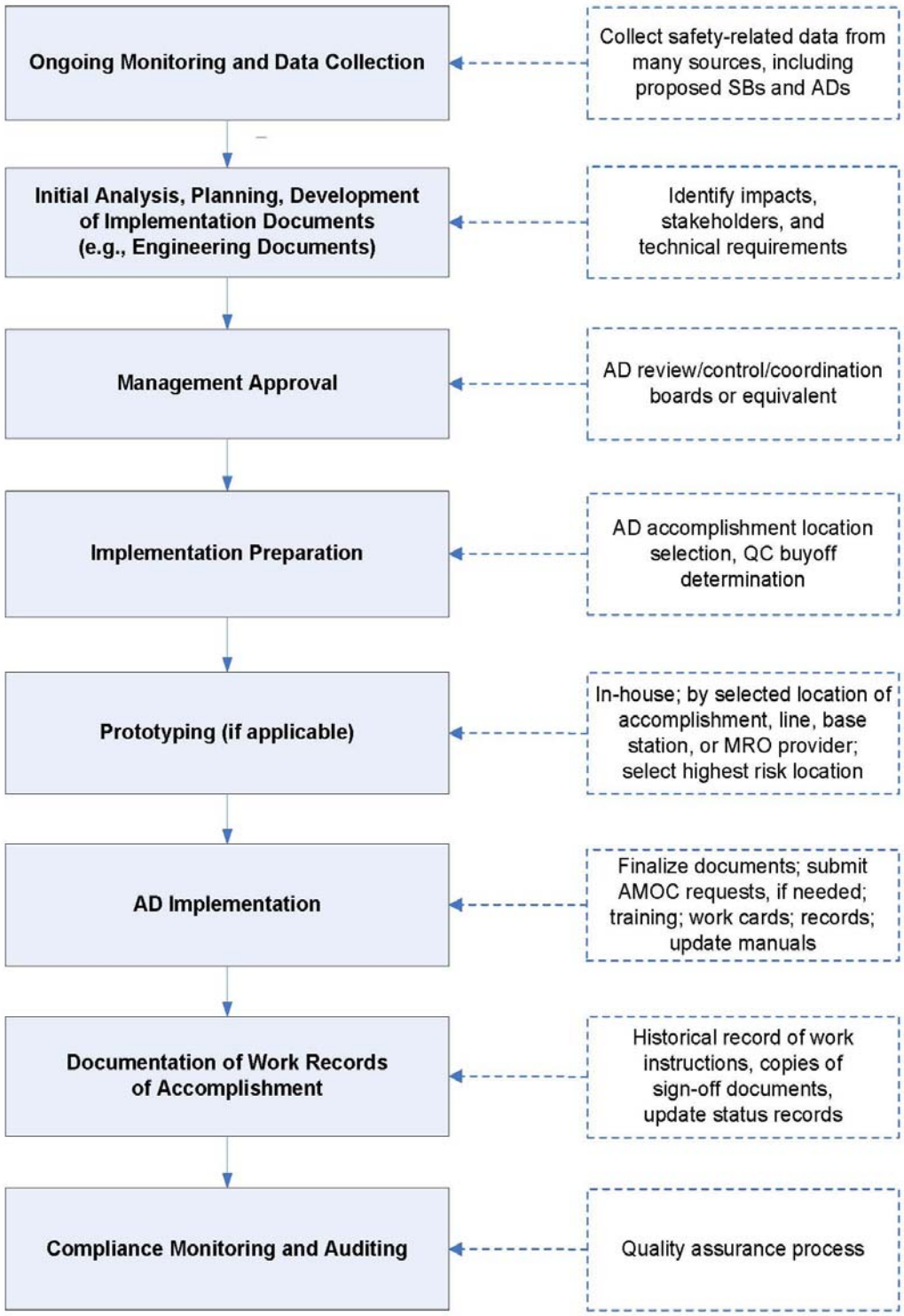
Prototyping in conjunction with engineering also is completed by: (1) using average skilled technicians from the accomplishing entities and (2) identifying any compliance improvements that should be made before production incorporation. (Silent prototyping may be done as discussed in "Engineering" above.) Validation of initial and continued AD compliance is accomplished at intervals determined by the AD Compliance Control Board (see "Planning" above).

Recording. AD records are maintained in accordance with regulatory requirements and include verification of 100 percent capture of compliance records. Documentation is retained for all decisions made during the AD compliance planning process, and any associated checklists are archived.

Benchmark processes include the option of archiving all planning, engineering, provisioning, and execution documentation such that the entire process can be recreated. Any validation audits are also captured and retained in the air carrier's archives. Records are confirmed for affected fleet incorporation at a date before the AD compliance deadline.

Figure 2 below depicts the Team's view of a generic AD compliance process for air carriers.

Figure 2 — Generic Air Carrier AD Compliance Process



Finding No. 6: The Team found that it is important to identify the following through air carrier manuals and FAA guidance material and policy: (1) the elements for effective AD compliance planning and implementation, (2) the specific associated processes and tasks that comprise these elements, and (3) the individuals with authority and responsibility for the elements.

Recommendation No. 6:

- The FAA should revise the Air Transport Oversight System (ATOS) guidance material for ASIs to align these tools with the above discussion as appropriate.[26]
- ATA should review the primary elements for airline internal compliance planning discussed above and disseminate like information to the industry. (See above discussion of the Lead Airline Process under section 2.2.2, AD Development.)
- The FAA and ATA jointly should develop a policy for CMO participation during the air carrier's AD compliance planning process. CMO participation during the process will educate the ASIs on the air carrier's AD compliance plan recommendations. However, the CMO should not perform a quality control function or require a signoff. Currently, FAA principal inspectors are invited to reliability board meetings at some air carriers but otherwise are not involved in developing EAs. The intent of advance CMO participation is to obviate the need for AMOCs and reduce paperwork violations and infractions.
- CMOs should participate in AD prototyping. However, this monitoring should not require a signoff from the CMO or be a required step to completing any work.

AEG Involvement

As stated in section 2.2.2 of this report, the AEG should be involved at an earlier stage in the AD process with the CMO principal inspectors. This will help to address any inconsistencies or difficulties in complying with an AD.

[26] FAA Safety Attribute Inspection (SAI) Data Collection Tool, 1.3.6 AD Management (AW) and the FAA Element Performance Inspection (EPI) Data Collection Tool, 1.3.6 AD Management (AW).

Finding No. 7: During the interviews with principal inspectors, it was clear to the Team that the FAA field offices[27] do not communicate with the AEGs on AD issues. In addition, the field offices do not consistently communicate with the ACOs when AD compliance issues arise.

Recommendation No. 7:

- The FAA should establish a formal notification and coordination policy on how to handle issues where compliance is unclear. The policy should clearly delineate the AEG's role in assisting with noncompliance determinations, specify who has decision authority, and provide guidelines for elevating issues of disagreement for resolution. (Also see recommendation No. 8 below). Such a policy will enhance overall coordination efforts and help the AEG to better coordinate with the ACO.
- The FAA should consider an organizational and procedural change to ensure FAA field offices have a direct link to the AEG. This will help the CMOs obtain technical advice on ADs and all issues concerning certificate management.

AMOCs

General. The FAA recognizes that a safety problem addressed by an AD may be approached in different ways to resolve the safety concern.[28] Some alternatives might not be recognized by the FAA at the time the AD is developed and issued. As affected parties further analyze the issues and the proposed solution, they may discover equal or better ways to address the underlying safety problem. The regulations allow these alternative methods to be proposed to the FAA for approval. If approved, they are considered AMOCs[29].

Air carriers may make AMOC requests to the CMO and may simultaneously submit a request to the manager of the FAA office identified in the AD, typically an ACO. The ACO is responsible for coordinating the AMOC request with the appropriate AEG.[30] Air carriers normally request an AMOC before the AD compliance deadline. While the AMOC process is still valid after the AD compliance deadline, the air carrier may be subject to FAA enforcement action if mitigation (according to the original AD or an earlier AMOC) was not accomplished by the original deadline.

[27] FAA field office refers to (1) the CMOs that specialize in the certification, surveillance, and inspection of major air carriers and part 142 training centers and (2) the Flight Standards District Offices (FSDOs) that conduct certification, surveillance, and investigation of all other types of aircraft operations.
[28] 14 CFR § 39.19: May I address the unsafe condition in a way other than that set out in the airworthiness directive?
[29] See appendix B to this report for a discussion on AMOCs.
[30] FAA Order 8110.103, Alternative Methods of Compliance, dated September 28, 2007.

Before an AMOC is approved by the FAA, the FAA must determine that the safety outcome is acceptable for the associated basic AD. An AMOC is not an exemption from the AD requirements but is an alternative way to satisfy the requirements. The safety standards applied to an AMOC are the same as those applied to the basic AD.

Over the many years that AMOCs have been issued and applied, they have proved very effective in providing a better solution for different circumstances. The AMOC process is essential as a means for air carriers to correct technical problems. In many instances, materials, dimensions, procedures, or timing must be adjusted to address availability, configuration differences, or access issues.

It is possible that an AMOC can provide a technical resolution superior to that offered by original FAA/OEM instructions in terms of effectiveness and efficiency. It is crucial to the regulatory compliance and operational service requirements of the industry that the process be properly controlled for technical excellence and promptly applied to avoid unnecessary service interruption.

Finding No. 8: The Team found that during the events precipitating this review, FAA administration of the AMOC process was reported to be inconsistent and sound technical judgment did not always govern decisions.

Recommendation No. 8: Under all circumstances, FAA technical personnel must be consistent in reviewing, approving, and applying the processes under their responsibility. If there are concerns regarding outside undue influence, the affected party must seek guidance from organizations having the appropriate level of ability and authority to provide the guidance required to address the concerns.

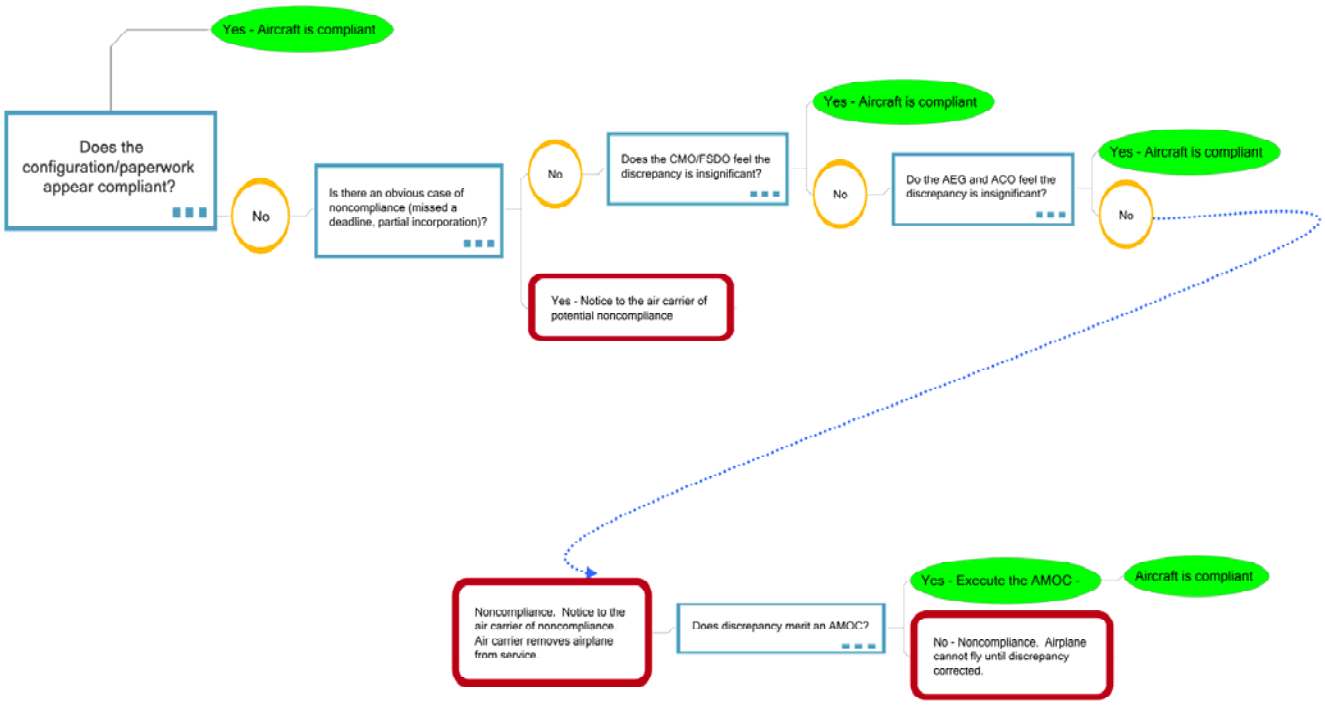
FAA policymakers must ensure individuals responsible for the control of the AMOC processes are fully aware of the scope of their responsibilities. They should also be aware of the available recourse for appropriate management guidance where required. Educating these individuals will help ensure proper and prompt technical resolution of problems. Specifically, the Team recommends the following:

- The FAA should, in coordination with industry, charter a working group to review and develop a means to strengthen the AMOC process. The group's charter should include a review of the following:
  - Communication channels.
  - Simultaneous coordination of an AMOC with the ACO and the CMO.
  - Concurrence (that is, ACO expeditiously receives concurrence from AEG on the AMOC, and AEG advises CMO).
  - Further delegation to designated engineering representatives (DER) and authorized representatives (AR), to include AMOCs that address issues in the systems and equipment, payloads, and airplane performance areas.
  - Delegation of AMOCs to other ACOs.
  - Staff availability on a 24/7 basis (ACO, AEG, and CMO).

- The Independent Review Team[31] made a recommendation that "[i]nspectors should not be required or expected to conduct any type of risk-assessment before taking action on AD non-compliance." The Team agreed with this finding as supporting the necessary enforcement needed once an airplane has been determined to be noncompliant. However, the Team developed a supplemental process to help the ASI first coordinate a valid determination of compliance in cases where the condition is not obvious. The Team recommends that the FAA:
  - Develop further guidance and training to assist FAA staff in correctly determining noncompliance.
  - Develop a formal policy regarding ASI decisionmaking. The policy should emphasize the technical authority of the ACO and the FAA's position on the authority of ASIs to use professional judgment when determining compliance. To eliminate single-person determinations, the policy should address any conflicts that arise on an AD or AMOC by requiring the CMO to elevate its concerns first to the AEG for resolution.
- The FAA should develop a decisionmaking flowchart as a guide for ASIs making compliance determinations. The following ASI decision flowchart is provided to demonstrate the notion the Team wishes to convey.

[31] On April 18, 2008, the U.S. Secretary of Transportation tasked the Independent Review Team (IRT) to evaluate the FAA's implementation of the aviation safety system and its culture of safety, and to develop recommendations for improvements. The IRT submitted its findings and recommendations to the Secretary in a report titled "Report of the Independent Review Team, Managing Risks in Civil Aviation: A review of the FAA's Approach to Safety," dated September 2, 2008.

Figure 3 — ASI Decision Guide – Post AD Compliance Deadline



Global AMOCs. The FAA uses global AMOCs to approve an AMOC for multiple owners/operators of U.S.-registered aircraft. If the FAA's ACO expects to receive multiple requests for the same AMOC to an AD, it can issue a global AMOC to cover the entire range of products cited in an AD.

Instead of applying only to a specific air carrier, a global AMOC applies to the product and is normally transferable with the product. In addition, global AMOCs to an AD are shared with Transport Canada and EASA under the terms of bilateral agreements.[32]

Global AMOCs may be requested by air carriers or OEMs, or may be initiated by the FAA. The ACO sends a copy of AMOC approval letters to the appropriate principal inspector for global AMOCs. However, air carriers are responsible for notifying their CMO before implementing a global AMOC approved by the ACO. CMO approval for use of a global AMOC by an individual air carrier is not required once the AMOC has ACO approval.

> **Finding No. 9**: The Team noted that air carriers and CMOs often are not aware of applicable global AMOCs that the FAA has approved. Some air carriers and CMOs misinterpret the requirement that air carriers notify their CMO before implementing a global AMOC as a requirement to gain approval from the CMO.

[32] Global AMOCs are also known as AMOCs of General Applicability in some bilateral agreements.

Recommendation No. 9: The FAA and industry should develop a process to approve all AMOCs as global unless the requesting air carrier specifically states that it does not want the AMOC shared. The global AMOCs would be posted on OEM Web sites accessible to all air carriers in a way that protects the intellectual property rights of the OEMs and the air carriers where appropriate. The industry and the FAA also should ensure that CMOs do not require air carriers to gain their approval to implement a global AMOC.

Crisis Communication

During the confusion surrounding the flight cancellations involving AD 2006–15–15, the cognizant engineers of the OEM provided the most effective communication node for the majority of affected parties. The OEM was the most common source for addressing the technical compliance questions of air carriers, and for exchanging information with and advising the ACO.

Finding No. 10: The Team found that although air carriers had access to the ACO, the ACO found it more efficient to collectively address the volume of air carrier issues through the OEM. The ACO often was occupied and not available to individual air carriers. As a result, the OEM was the best positioned to develop an overall picture of developments. In effect, the OEM operated a "war room," orchestrating conference calls for air carriers, CMOs, and ACOs.

Recommendation No. 10: Responsive communication and industry collaboration are essential in crisis situations involving widespread AD compliance issues affecting air carriers. The ACO and OEM should develop contingency procedures and disseminate them internally in advance of future events. This will ensure that points of contacts are established for air carrier use in expediting resolution of fleet wide issues. The ATA may facilitate this process provided that air carriers immediately advise the ATA of a significant compliance issue that may be widespread and newsworthy.

2.2.5 Continuous Compliance

AD Classes

During its task 1 review, the Team determined that ADs broadly fall into two major classes, which the Team named and designated as class 1 and class 2 as follows:

Class 1: This type of AD requires a configuration change that easily can be controlled by normal air carrier processes after implementation. This class typically includes the following:

- Component modifications that an air carrier can control through its materials management and receiving inspection processes to prevent demodification.
- Structural modifications that can be controlled through structural repair manuals and the air carrier's engineering approval processes.
- Configuration changes clearly identified in an illustrated parts catalog or other manual.

Class 2: This type of AD requires a configuration change that, after implementation, potentially has a higher opportunity (than class 1 ADs) for being undone through the air carrier's standard maintenance practices or operations. This class of ADs includes requirements for maintenance tasks that are either more specific than, or otherwise different from, those described in an air carrier's standard maintenance program.

Finding No. 11: The Team found that unless otherwise directed, maintenance technicians working in the vicinity of the class 2 installations anytime after the AD is implemented, typically employ standard maintenance practices. This raises the risk of inadvertently taking the airplane out of compliance with elements of the AD.

Recommendation No. 11: Air carriers should develop practices to address normal maintenance or other actions that could possibly demodify an AD configuration, particularly class 2 ADs. These could include the following:

- Process enhancements or physical marking of AD installations for nonstructural ADs. This alerts mechanics to the presence of an AD installation in the area where they are working.
- Quality assurance sampling of AD projects to verify the correct setup, and/or a sampling program that physically verifies demodification has not occurred.

Unique Status of AD Configuration Requirements

The Team noted that determinations of compliance with AD configuration requirements may be made differently than determinations of compliance with the requirements of other elements of airworthiness.[33] Certain minor deviations from configurations specified in the aircraft type certificate are managed through maintenance programs, minimum equipment lists, or other programs, and do not result in a determination of noncompliance with applicable operating rules. Conversely, AD configuration requirements may be viewed as absolute. Any deviation can result in a determination that the aircraft is not compliant or airworthy, and, if the aircraft has been operated in that condition, the air carrier is noncompliant with the AD.

Carried to its extreme, the unique status of AD configuration requirements means that every element of the configuration requirements of every AD applicable to an aircraft must be in the mandated configuration without deviation throughout every flight. The regulations provide no exception for elements that, after the air carrier installs the AD, deviate from the mandated configuration as a result of servicing, maintenance, modification, damage, wear, flight cycles, landing cycles, or any other cause. This regulatory environment was highlighted in a recent event wherein a duct clamp migrated out of the orientation mandated in an AD, likely due to landing cycles, and compliance by several air carriers involved came under question. This environment also can treat differently, identical deviations from identical configurations having the same relevance to safety of flight wherein the sole difference is that one configuration is mandated by AD. Again, any deviation from the AD is viewed as noncompliant, whereas the other deviation may be addressed under the continuous airworthiness maintenance and inspection or other programs required of the air carrier.[34]

The current regulatory environment is reinforced by a 2002 amendment to 14 CFR §§ 39.7 and 39.9.[35] The amendment transitioned part 39 requirements to plain language and incorporated standard provisions of ADs into the regulations so those provisions would not have to be reiterated in each AD. However, the final rule language appears to have shifted the determinant of AD compliance from a matter of operator action to one specifically determined by aircraft configuration. Former § 39.3 stated "No person may operate a product to which an airworthiness directive applies except in accordance with the requirements of that airworthiness directive." Now, § 39.7 states "Anyone who operates *a product that does not meet* the requirements of an applicable airworthiness directive is in violation of this section" (emphasis added). The FAA should clarify the precise intent of the amendment regarding its apparent meaning that any deviation from an AD-specified configuration is a violation of part 39.

[33]The concept of airworthiness may be derived from 49 U.S.C. § 44713 and 14 CFR §§ 3.5 and 21.41. See appendix B to this report.

[34]14 CFR § 43.13 addresses the maintenance of the design features of aircraft, including those critical to safety.

[35]Amendment No. 39–9474, effective August 21, 2002, revised 14 CFR §§ 39.7 and 39.9.

Several of the Team's recommendations in the task 1 and task 2 reports would reduce vulnerabilities to ASI determinations of noncompliance with an AD that would not adversely affect safety. The recommendations emphasize and call for tools that would facilitate attaining a goal cited by U.S. Secretary of Transportation Mary E. Peters for a regulatory "sweet spot" in which compliance was ensured without overly strict determinations of compliance.[36] Key among them are (1) the Team's recommendations from the task 1 report on the use of professional judgment to determine whether noncompliance exists, (2) recommendation No. 1 of this report on clear statements of the safety intent and the identification of critical tasks in AD service instructions, (3) recommendation No. 11 of this report regarding checks of easily demodified configurations, and (4) recommendation No. 6 of this report on compliance planning. In addition to emphasizing the relevance of these recommendations in relation to the current regulatory environment, the FAA should verify and clearly state the precise intent of §§ 39.7 and 39.9.

Finding No. 12: The Team found that the amended regulatory language in §§ 39.7 and 39.9 could be interpreted as requiring every element of every applicable AD to be in strict compliance with the mandated configuration on every flight. This finding adds emphasis to (1) the need for ADs and service instructions incorporated by reference in ADs to clearly state the safety intent and instructions essential to meeting that intent, (2) the use of professional judgment in compliance determinations, and (3) measures to better plan and monitor AD compliance.

Recommendation No. 12: The FAA should review §§ 39.7 and 39.9, and, if necessary, revise those sections to clarify that AD compliance is an action required of the operator; it is not necessarily determined by a strict comparison of the aircraft to AD-specified configurations.

[36] In an April 16, 2008, interview with U.S. Secretary of Transportation Mary E. Peters, Mr. Christopher Conkey of the Wall Street Journal reported that Secretary Peters said, "The goal is to find a regulatory 'sweet spot' that is tough enough to ensure compliance but not 'too strict' that it causes unnecessary disruptions to airline service." Wall Street Journal, April 16, 2008, *FAA to Continue Strict Safety Crackdown*, Christopher Conkey.

3.0 FINDINGS AND RECOMMENDATIONS

Finding No. 1	Recommendation No. 1
The Team found that in some cases, service instructions were not sufficiently user-friendly and complete. These incomplete instructions resulted in widespread air carrier confusion because of the differences in the referenced service instructions and AD instructions. These deficiencies in service instructions have led to an increased demand for AMOCs and AD time extensions and/or exemptions. This has strained limited national aviation authority resources. The Team found that there is an opportunity for expanded use of the FTEI process within the OEM industry. Use of this will ensure air carrier's review proposed mitigating actions and make user-friendly inputs to draft OEM service instructions.	The Team acknowledges the benefits of current AD-friendly service bulletin improvements, but recommends more focus on user-friendly improvements in service instructions as follows: • *Critical task differentiation*. Service instructions should explain the safety intent of the instructions. They should differentiate the critical tasks and task sequences requiring exact conformance from flexible advisory instructions for tasks that are common acceptable air carrier procedures. This differentiation will allow improved understanding of crucial AD requirements and consistent judgment in AD compliance. • *Simplified format*. Service instructions can be written in a simplified format that allows easy translation into an air carrier's work instructions. Standardizing service instruction format will facilitate user effectiveness by repetition in knowing where critical information is referenced. • *Maintaining airworthiness*. Service instructions should be written and traceable to avoid situations where previous AD compliance requirements are inadvertently undone or modified through normal air carrier routine maintenance practices. (Refer to class 2 issues in section 2.2.5, finding and recommendation No. 11, for additional information regarding this issue.) • *Flexibility as appropriate*. When compatible with the corrective action intent of the AD, service instructions should incorporate general notes providing air carriers latitude to use (1) acceptable alternative materials and approved internal procedures without requesting an AMOC on each deviation or (2) where applicable, the option to use their engineering authority[37].

[37] 14 CFR § 43.13: Performance rules (general) allows air carriers to use maintenance instructions in their manual in place of the OEM maintenance instructions when performing maintenance, alteration, or preventive maintenance. See appendix B to this report.

Finding No. 1 (continued)	Recommendation No. 1 (continued)
	• *Standard practices*. The aviation industry has many processes for performing maintenance and modifications that have been standardized and proven to be very effective. Service instructions should refer to these standard practices in which air carriers have experience, confidence, and training. • *Corrective action decision guidelines*. In some situations, alternative corrective actions are provided to the air carrier for compliance with the AD. Incorporating logic-based decision diagrams in service instructions would assist air carriers in choosing the best corrective action path, such as continued repeat inspection or termination repair, based upon the discovered condition and compliance time period. • *Detailed instructions*. Service instructions must make clear whether a figure or drawing is the authoritative instruction or only an installation aid. Service instruction text and drawings must be in agreement with each other to avoid subjective misinterpretation. In addition, service instructions should no longer contain ambiguous terms, such as "approximately", to define allowable tolerance ranges and performance criteria.
Finding No. 2	**Recommendation No. 2**
The Team learned that the AEGs were not playing a significant role in either the AD review process or the operational suitability determinations. This was confirmed through interviews with AEG personnel as well as FAA principal inspectors. The Team recognizes the key role the AEG can play in the review and implementation of an AD.	Strengthen the role of the AEG in developing and implementing ADs. Ensure ASIs know that the AEG is a resource for reviewing the air carrier's AD installation instructions and that the AEG acts as the liaison between the CMOs and the ACO on AD implementation issues. When questions arise, make the AEG part of these processes to make compliance with the AD as seamless as possible. This approach will help to prevent future disagreements between the FAA and the air carrier.

Finding No. 3	Recommendation No. 3
The Team found the Lead Airline Process supports industry collaboration objectives, but may need to be updated to reflect today's OEM and air carrier supporting internal processes. As the aviation industry business environment has changed, the impact thresholds for activating full network coordination and full-scale prototyping have increased. The Team also observed that the ex parté policy may not be well understood by the FAA and air carriers. Many in the FAA and the industry believe that ex parté communications are restricted to data requests from the FAA after an NPRM is published in the Federal Register. The Team noted that the FAA can communicate with the lead airline after NPRM publication; however, the FAA must document all communications and place them in the rulemaking docket.[38]	The ATA should review and update ATA Specification 111 to address issues brought forward in this report with emphasis on the following items: • A goal of the Lead Airline Process should be to contribute to clear and accurate service instructions that avoid prescriptive processes where standard practices are available and applicable. Ideally these instructions contribute to effective implementation by a technician. The process should lend particular attention to developing service instructions involving previous overlapping ADs or a series of ADs or SBs on (1) the same component, (2) wiring and other actions dependent on workmanship, and (3) class 2[39] type actions that are easily reversible in future maintenance. In these cases, prototyping of proposed service instructions on inservice airplanes is particularly important, and OEM participation should be considered. The process should— o Identify differences in airplane configurations relevant to the proposed service instructions. o Ensure lead airlines are selected according to qualifications, capability, and commitment to the process. o Predispose service instructions to support AD compliance planning objectives cited in the two bullet points directly below. • The ATA should periodically review the Lead Airline Process to ensure the continuing effectiveness of the process. • The ATA should coordinate the update to ATA Specification 111 with the OEM. This will help to streamline and better integrate the Lead Airline Process with OEM fleet support processes.

[38] See discussion on Ex Parte Contacts, page 6, FAA Airworthiness Directives Manual, dated January 23, 2007; FAA–AIR–M–8040.1.
[39] This type of AD requires a configuration change that, after implementation, potentially has a higher vulnerability of being undone through the air carrier's standard maintenance practices or operations. See section 2.2.5, Continuous Compliance, for a discussion of class 2 ADs.

Finding No. 3 (continued)	Recommendation No. 3 (continued)
	• The ATA should add to ATA Specification 111, or develop a new specification to address (upon adoption of an AD) AD compliance planning that includes the following industry guidelines: o Invite the ASI to air carrier compliance planning sessions and AD compliance prototyping for better understanding of issues. o Ensure the accuracy and clarity of the engineering order (EO) or other implementation document. The air carrier should consider silent prototyping where a technician prototypes the EO without verbal or other assistance. o Augment air carrier compliance planning with an AD verification program. • The ATA, in coordination with the FAA, should takes steps to clarify to the industry and FAA personnel that ex parté communications can take place if the communications are fully documented and placed in the rulemaking docket for public review.

Finding No. 4	Recommendation No. 4
The Team found systemic problems in the AD process as follows: • Multiple ADs affecting airworthiness in the same area of the airplane resulting in overlapping and confusing mandates for air carriers. This can lead to inadvertent noncompliance or reversal of previous AD actions. • Occasionally, the OEM's service instructions are not available when the AD NPRM is issued. In addition, copies of service instructions are not included in the Government's electronic regulatory docket system. In either case, this prevents air carriers from having the full comment period to comment on the specifics of the service document. • ADs generally have an aggressive installation timeline. Because of the urgent nature of AD tasks and the need for planning to minimize aircraft out-of-service time, air carriers frequently accomplish service instructions ahead of the AD issuance date. This creates an exposure to noncompliance when there are changes in the final AD that differ from the originally released service document. The Team noted that as part of a process improvement effort, in 2006 the FAA signed a working agreement with Boeing Commercial Airplanes on Agreed Principles and Practices for AD-friendly service bulletins related to the Boeing transport fleet. The agreement was developed as part of a joint effort by the FAA and an OEM to identify and implement improvements to the format and quality of service instructions and ADs. The Team acknowledged that the joint effort is a major step in improving the FAA's AD process, provided that certain recommendations in section 2.2.2 regarding service instructions are incorporated to simplify air carrier implementation.	The Team recommends the following related to AD development: • Charter a joint team made up of representatives from the FAA, OEM, and air carriers to resolve finding No. 4. The overarching goal is to ensure that the AD development process is effective and efficient and results in a compliant product for air carriers. • OEMs should streamline service instruction development and revision processes to expedite release to air carriers. • OEMs should review Intellectual Property and Export Compliance policies to allow easier public access to NPRM- and AD-referenced service instructions via the electronic regulatory docket system. • At a minimum, the first compliance deadline should always be stated in the NPRM and AD. • For situations involving multiple structural service documents and ADs, the FAA should explore innovations in AD tracking and management (for example, a zonal approach, where tasks are compiled covering all AD requirements for a given area). • Air carriers must have a process in place to continually verify AD accomplishment. (Also see discussion in recommendation No. 3 above and section 2.2.4).

Finding No. 5	Recommendation No. 5
Overall, the Team found that the MCAI process works well. However, the Team noted that addressing the anomalies above will further enhance MCAI effectiveness.	In view of foreign authorities' AD rulemaking processes (for example, foreign national aviation authorities' apparent lack of a comparable Lead Airline Process and reduced comment periods for proposed MCAIs), the FAA should extend the typical comment period for MCAI NPRMs. The comment period should be extended from 30 days to 45 days, the standard for noncontroversial FAA NPRMs. In addition, the FAA and foreign national aviation authorities should work to harmonize AD processes.
Finding No. 6	**Recommendation No. 6**
The Team found that it is important to identify the following through air carrier manuals and FAA guidance material and policy: (1) the elements for effective AD compliance planning and implementation, (2) the specific associated processes and tasks that comprise these elements, and (3) the individuals with authority and responsibility for the elements.	• The FAA should revise the Air Transport Oversight System (ATOS) guidance material for ASIs to align these tools with the above discussion as appropriate.[40] • ATA should review the primary elements for airline internal compliance planning discussed above and disseminate like information to the industry. (See above discussion of the Lead Airline Process under section 2.2.2, AD Development.) • The FAA and ATA jointly should develop a policy for CMO participation during the air carrier's AD compliance planning process. CMO participation during the process will educate the ASIs on the air carrier's AD compliance plan recommendations. However, the CMO should not perform a quality control function or require a signoff. Currently, FAA principal inspectors are invited to reliability board meetings at some air carriers but otherwise are not involved in developing EAs. The intent of advance CMO participation is to obviate the need for AMOCs and reduce paperwork violations and infractions. • CMOs should participate in AD prototyping. However, this monitoring should not require a signoff from the CMO or be a required step to completing any work.

[40] FAA Safety Attribute Inspection (SAI) Data Collection Tool, 1.3.6 AD Management (AW) and the FAA Element Performance Inspection (EPI) Data Collection Tool, 1.3.6 AD Management (AW).

Finding No. 7	Recommendation No. 7
During the interviews with principal inspectors, it was clear to the Team that the FAA field offices[41] do not communicate with the AEGs on AD issues. In addition, the field offices do not consistently communicate with the ACOs when AD compliance issues arise.	• The FAA should establish a formal notification and coordination policy on how to handle issues where compliance is unclear. The policy should clearly delineate the AEG's role in assisting with noncompliance determinations, specify who has decision authority, and provide guidelines for elevating issues of disagreement for resolution. (Also see recommendation No. 8 below). Such a policy will enhance overall coordination efforts and help the AEG to better coordinate with the ACO. • The FAA should consider an organizational and procedural change to ensure FAA field offices have a direct link to the AEG. This will help the CMOs obtain technical advice on ADs and all issues concerning certificate management.
Finding No. 8	**Recommendation No. 8**
The Team found that during the events precipitating this review, FAA administration of the AMOC process was reported to be inconsistent and sound technical judgment did not always govern decisions.	Under all circumstances, FAA technical personnel must be consistent in reviewing, approving, and applying the processes under their responsibility. If there are concerns regarding outside undue influence, the affected party must seek guidance from organizations having the appropriate level of ability and authority to provide the guidance required to address the concerns. FAA policymakers must ensure individuals responsible for the control of the AMOC processes are fully aware of the scope of their responsibilities. They should also be aware of the available recourse for appropriate management guidance where required. Educating these individuals will help ensure proper and prompt technical resolution of problems. Specifically, the Team recommends the following:

[41] FAA field office refers to (1) the CMOs that specialize in the certification, surveillance, and inspection of major air carriers and part 142 training centers and (2) the Flight Standards District Offices (FSDOs) that conduct certification, surveillance, and investigation of all other types of aircraft operations.

Finding No. 8 (continued)	Recommendation No. 8 (continued)
	• The FAA should, in coordination with industry, charter a working group to review and develop a means to strengthen the AMOC process. The group's charter should include a review of the following: o Communication channels. o Simultaneous coordination of an AMOC with the ACO and the CMO. o Concurrence (that is, ACO expeditiously receives concurrence from AEG on the AMOC, and AEG advises CMO). o Further delegation to designated engineering representatives (DER) and authorized representatives (AR), to include AMOCs that address issues in the systems and equipment, payloads, and airplane performance areas. o Delegation of AMOCs to other ACOs. o Staff availability on a 24/7 basis (ACO, AEG, and CMO). • The Independent Review Team[42] made a recommendation that "[i]nspectors should not be required or expected to conduct any type of risk-assessment before taking action on AD non-compliance." The Team agreed with this finding as supporting the necessary enforcement needed once an airplane has been determined to be noncompliant. However, the Team developed a supplemental process to help the ASI first coordinate a valid determination of compliance in cases where the condition is not obvious. The Team recommends that the FAA: o Develop further guidance and training to assist FAA staff in correctly determining noncompliance.

[42] On April 18, 2008, the U.S. Secretary of Transportation tasked the Independent Review Team (IRT) to evaluate the FAA's implementation of the aviation safety system and its culture of safety, and to develop recommendations for improvements. The IRT submitted its findings and recommendations to the Secretary in a report titled "Report of the Independent Review Team, Managing Risks in Civil Aviation: A review of the FAA's Approach to Safety," dated September 2, 2008.

Finding No. 8 (continued)	Recommendation No. 8 (continued)
	o Develop a formal policy regarding ASI decisionmaking. The policy should emphasize the technical authority of the ACO and the FAA's position on the authority of ASIs to use professional judgment when determining compliance. To eliminate single-person determinations, the policy should address any conflicts that arise on an AD or AMOC by requiring the CMO to elevate its concerns first to the AEG for resolution. • The FAA should develop a decisionmaking flowchart as a guide for ASIs making compliance determinations. An ASI decision flowchart is provided to demonstrate the notion the Team wishes to convey. (See appendix C to this report.)
Finding No. 9	**Recommendation No. 9**
The Team noted that air carriers and CMOs often are not aware of applicable global AMOCs that the FAA has approved. Some air carriers and CMOs misinterpret the requirement that air carriers notify their CMO before implementing a global AMOC as a requirement to gain the approval of the CMO.	The FAA and industry should develop a process to approve all AMOCs as global unless the requesting air carrier specifically states that it does not want the AMOC shared. The global AMOCs would be posted on OEM Web sites accessible to all air carriers in a way that protects the intellectual property rights of the OEMs and the air carriers where appropriate. The industry and the FAA also should ensure that CMOs do not require air carriers to gain their approval to implement a global AMOC.

Finding No. 10	Recommendation No. 10
The Team found that although air carriers had access to the ACO, the ACO found it more efficient to collectively address the volume of air carrier issues through the OEM. The ACO often was occupied and not available to individual air carriers. As a result, the OEM was the best positioned to develop an overall picture of developments. In effect, the OEM operated a "war room," orchestrating conference calls for air carriers, CMOs, and ACOs.	Responsive communication and industry collaboration are essential in crisis situations involving widespread AD compliance issues affecting air carriers. The ACO and OEM should develop contingency procedures and disseminate them internally in advance of future events. This will ensure that points of contacts are established for air carrier use in expediting resolution of fleet wide issues. The ATA may facilitate this process provided that air carriers immediately advise the ATA of a significant compliance issue that may be widespread and newsworthy.
Finding No. 11	**Recommendation No. 11**
The Team found that unless otherwise directed, maintenance technicians working in the vicinity of the class 2 installations anytime after the AD is implemented, typically employ standard maintenance practices. This raises the risk of inadvertently taking the airplane out of compliance with elements of the AD.	Air carriers should develop practices to address normal maintenance or other actions that could possibly demodify an AD configuration, particularly class 2 ADs. These could include the following: • Process enhancements or physical marking of AD installations for nonstructural ADs. This alerts mechanics to the presence of an AD installation in the area where they are working. • Quality assurance sampling of AD projects to verify the correct setup, and/or a sampling program that physically verifies demodification has not occurred.

Finding No. 12	Recommendation No. 12
The Team found that the amended regulatory language in §§ 39.7 and 39.9 could be interpreted as requiring every element of every applicable AD to be in strict compliance with the mandated configuration on every flight. This finding adds emphasis to (1) the need for ADs and service instructions incorporated by reference in ADs to clearly state the safety intent and instructions essential to meeting that intent, (2) the use of professional judgment in compliance determinations, and (3) measures to better plan and monitor AD compliance.	The FAA should review §§ 39.7 and 39.9, and, if necessary, revise those sections to clarify that AD compliance is an action required of the operator; it is not necessarily determined by a strict comparison of the aircraft to AD-specified configurations.

4.0 CONCLUSION

As the Team focused on the general processes for developing and managing ADs, it reached some general conclusions that led to the identification of desired improvements. The Team recommends that the FAA and/or industry charter a working group or working groups as appropriate to urgently address the recommendations upon release of this report. The Team's conclusions are as follows:

- The AD processes within the FAA and within the manufacturing and air carrier industry have worked very well over the years. A critical contributor to this success has been the technical collaboration of all interested parties, which has taken advantage of the expertise that exists in all relevant segments of government and industry. Throughout the AD process, the technical collaboration among the FAA, manufacturing, and air carrier personnel has proven to greatly enhance the ultimate product (service instructions and/or AD) and the related safety improvement. Interfering with or otherwise limiting such collaboration would be a significant step backwards. This collaboration, if done properly, has not and should not interfere with FAA responsibilities or infringe on its authority.

- Some of the confusion that has occurred when air carriers have attempted to comply with an AD can be traced back to the language (and in some cases, the format) of the underlying service document. Efforts are already underway to address this issue. The Team noted that service instructions should prominently state the safety intent of the instructions. The Team concluded that these efforts are very important and that making the instructions clearer to the installation technicians, as well as to FAA inspectors, will improve the AD process.

- The Lead Airline Process was not consistently initiated as specified in ATA Specification 111 because of coordination and resources issues with OEMs, the FAA, and air carriers. The ATA should periodically review the Lead Airline Process to ensure the process is effective. The Team recommends that ATA Specification 111 be revised to reflect current practices on prototyping, OEM fleet support processes, and air carrier AD compliance planning.

- An effective element of the AD regulatory process is the request for and approval of AMOCs. The Team recommends communication improvements associated with AMOC requests. In addition, determining when an AMOC is appropriate needs to be less confusing and more consistently applied throughout the industry.

- The role of the AEG in practice was less than anticipated. As the key interface between the certification and flight standards elements of the FAA, the AEG should play a supporting role in developing and implementing an AD. The AEG should also support the process for requesting and approving an AMOC. The Team concluded that there are several process steps where the AEGs should be more involved.

- One of the major contributing causes to the AD problems and, in some cases flight cancellations, was the confusion as to what constitutes an unairworthy aircraft or a noncompliance with an AD. It has long been the practice for ASIs to use sound professional judgment to determine if a minor deviation from a basic requirement constitutes a noncompliance. The Team reviewed this issue in some depth during task 1 and concluded that the common sense that should govern such judgments was not always used. As indicated in the Team's task 1 report, the FAA's Office of the Chief Counsel has confirmed that ASIs can use their professional judgment to determine whether or not noncompliance with an AD has occurred. In addition, the Team believes that in the non-AD-context judgment can and should be used and that an airplane can be airworthy despite minor deviations from type design.

- There is a wide variation in FAA regulatory ideologies existing between various regional CMOs and individual ASIs. The recent IRT report also identified this as an issue that should be addressed. Therefore, AFS should develop internal employee training targeting consistent national oversight by (1) applying good judgment in AD compliance determinations and (2) systematic management control of large scale fleet AD noncompliance issues.

- Air carriers have well-defined internal processes, controls, and actions for AD compliance planning. Air carrier manuals and FAA guidance and policy should identify the elements of effective AD compliance planning, implementation, and monitoring. Participation by the CMO in the air carrier AD compliance planning process and AD prototyping may obviate the need for AMOCs and reduce noncompliance issues.

- The FAA revised part 39[43] in 2002 to incorporate standard provisions previously included in ADs into the regulations. The Team found that the FAA's revision of part 39 was designed to make it easier for users to focus on safety concerns and place the regulatory text in plain language. However, in doing so, the FAA may have unintentionally revised the original rule language from requiring operators to comply with ADs to requiring aircraft to be in compliance with all elements of all applicable ADs throughout all flights. The Team recommends the FAA review part 39 and, if necessary, clarify its apparent meaning that any deviation from an AD-mandated configuration is a violation of part 39.

[43] 67 FR 47998, July 22, 2002.

APPENDIX A — ACRONYMS

ACO	aircraft certification office
AD	airworthiness directive
AEG	Aircraft Evaluation Group
AFM	airplane flight manual
AFS	Flight Standards Service
AIDS	Accident/Incident Data System
AIR	Aircraft Certification Service
ALI	airworthiness limitation item
AMOC	alternative method of compliance
APA	Administrative Procedure Act
AR	authorized representative
ASI	aviation safety inspector
ASIAS	Aviation Safety Information Analysis and Sharing
ASN	Aviation Safety Network
ASRS	Aviation Safety Reporting System
ATA	Air Transport Association of America, Incorporated
ATOS	Air Transport Oversight System
AW	airworthiness
CASE	Client Aviation System Enquiry
CMO	certificate management office
DER	designated engineering representative
EA	engineering authorization
EASA	European Aviation Safety Agency
EO	engineering order
EPI	element performance inspection
FAA	Federal Aviation Administration
FSDO	flight standards district office
FTEI	fleet team emerging issues
MCAI	mandatory continuing airworthiness information
MRB	maintenance review board
MRO	maintenance, repair, and overhaul

MSG	maintenance steering group
MTOW	maximum takeoff weight
NPRM	notice of proposed rulemaking
NTSB	National Transportation Safety Board
OEM	original equipment manufacturer
PAD	proposed airworthiness directive
PMA	parts manufacturer approval
SAI	safety attribute inspection
SB	service bulletin
TC	type certificate
TSOA	technical standard order authorization
U.S.C.	United States Code
WAAS	World Aircraft Accident Summary

APPENDIX B — RELEVANT STATUTES AND REGULATIONS

14 CFR Part 13 — Investigative and Enforcement Procedures

Compliance with an airworthiness directive (AD) is the responsibility of the affected entity, and any violation of an AD subjects that entity to enforcement action by the Federal Aviation Administration (FAA). Section 13.19 of Title 14, Code of Federal Regulations (14 CFR) states, in pertinent part, that the Administrator may reinspect any civil aircraft, aircraft engine, propeller, or appliance, and suspend or revoke any Certificate of Aircraft Registration for any cause that renders that aircraft ineligible for registration.

In addition, if the Administrator determines that the public interest and safety in air commerce requires it, he or she may issue an order amending, suspending, or revoking, all or part of any type certificate (TC), production certificate, airworthiness certificate, or air carrier operating certificate.

14 CFR Part 39 — Airworthiness Directives

Part 39 provides a legal framework for the FAA's system of ADs. ADs are legally enforceable rules that the FAA issues for a product, such as an aircraft, aircraft engine, propeller, or appliance, when it finds that—

- An unsafe condition exists in the product, and
- The condition is likely to exist or develop in other products of the same type design.[44]

An AD amends and becomes a part of the product TC.

ADs specify inspections that must be carried out, conditions and limitations that must be complied with, and any actions that must be taken to resolve an unsafe condition. The regulations specify that anyone who operates a product that does not meet the requirements of an applicable AD is in violation of § 39.7[45] each time that entity or person operates the airplane or uses the product.

Each AD specifies a compliance period by which the entity must accomplish the corrective action for the unsafe condition. The original equipment manufacturers (OEM) and the FAA establish these compliance periods based on risk management methods.

[44] Type design is defined in 14 CFR § 21.31 below.
[45] Section 39.7, What is the legal effect of failing to comply with an airworthiness directive?

Airworthiness

The concept of airworthiness may be derived from § 44704(d) of Title 49 of the United States Code (49 U.S.C.) and 14 CFR §§ 3.5 and 21.41.

Section 44713 of 49 U.S.C. states that the Administrator shall issue an airworthiness certificate when the Administrator finds that the aircraft conforms to its type certificate and, after inspection, is in condition for safe operation.

Section 3.5, Statements about products, parts, appliances and materials, defines airworthy as when an aircraft conforms to its type design and is in a condition for safe operation.

Section 21.41, Type certificate, states that each type certificate is considered to include the type design, the operating limitations, the certificate data sheet, the applicable regulations of subchapter C (subchapter C includes part 21 through part 49) with which the Administrator records compliance, and any other conditions or limitations prescribed for the product in subchapter C.

Alternative Methods of Compliance

Part 39 provides a process whereby anyone can request the FAA's approval for an alternative method of compliance (AMOC) to an AD, or a change in the AD's compliance time if the change would provide an acceptable level of safety. Examples of AMOCs include the following:

- Use of different parts, procedures, or service instructions;
- Use of procedures that negate errors in service instructions; and
- Extension of compliance deadlines.

To initiate the process for obtaining an AMOC, the requester submits the AMOC proposal to their aviation safety inspector (ASI) and includes the proposed specific actions to address the unsafe condition. The ASI may add comments and then forwards the request to the manager of the office identified in the AD, typically the manager of the cognizant ACO. That ACO also can provide information about alternatives it has already approved.

The requester may send a copy of its proposal to the ACO manager and the ASI simultaneously. Those requesters that do not have an assigned ASI, such as a design approval holder, may send the proposal directly to the designated manager. The proposed alternative method may be used only if the manager finds that the proposal provides an acceptable level of safety and grants approval.

Incorporation by Reference of a Service Document

Section 39.27 states that an AD may incorporate by reference an OEM's service instructions. In these cases, the service document becomes part of the AD. In some cases, the specifications in the AD differ from those in the service document. In either case, the specification of the AD must take precedence.

14 CFR Part 43 — Maintenance, Preventive Maintenance, Rebuilding, and Alteration

14 CFR § 43.13, Performance Rules (general)

Paragraph (a) of this section states: Each person performing maintenance, alteration, or preventive maintenance on an aircraft, engine, propeller, or appliance shall use the methods, techniques, and practices prescribed in the current OEM's maintenance manual or Instructions for Continued Airworthiness prepared by its OEM, or other methods, techniques, and practices acceptable to the Administrator, except as noted in § 43.16. He shall use the tools, equipment, and test apparatus necessary to assure completion of the work in accordance with accepted industry practices. If special equipment or test apparatus is recommended by the OEM involved, he must use that equipment or apparatus or its equivalent acceptable to the Administrator.

Paragraph (c) of this section contains special provisions for holders of certain operating certificates to use the methods, techniques, and practices contained in the air carrier's maintenance manual or the maintenance part of the manual as an acceptable means of compliance in place of the OEMs maintenance instructions when performing maintenance, alteration, or preventive maintenance on an aircraft, engine, propeller, or appliance, unless otherwise notified by the Administrator,

49 U.S.C. § 44713 — Inspection and Maintenance

Section 44713a of Title 49 of the United States Code (49 U.S.C.) requires an air carrier to make, or cause to be made, any inspection, repair, or maintenance of equipment used in air transportation as required by this section or regulations prescribed or orders issued by the FAA Administrator under this section. A person operating, inspecting, repairing, or maintaining the equipment must comply with those requirements, regulations, and orders.

Section 44713b requires the FAA Administrator to employ inspectors who inspect aircraft, aircraft engines, propellers, and appliances designed for use in air transportation, during manufacture and when in use by an air carrier in air transportation, to enable the Administrator to decide whether the aircraft, aircraft engines, propellers, or appliances are in safe condition and maintained properly; and advise and cooperate with the air carrier during that inspection and maintenance.

Section 44713c states that when an inspector decides that an aircraft, aircraft engine, propeller, or appliance is not in condition for safe operation, the inspector must notify the air carrier in the form and way prescribed by the FAA Administrator. For 5 days after the air carrier is notified, the aircraft, engine, propeller, or appliance may not be used in air transportation or in a way that endangers air transportation unless the Administrator or the inspector decides the aircraft, engine, propeller, or appliance is in condition for safe operation.

The statute provides that the FAA may authorize its inspectors to ground an aircraft (or engine, propeller, or appliance) if it is not "in condition for safe operation". The statute does not alter the position of the cognizant aircraft certification office (ACO) as the authority for determining whether an aircraft is in technical compliance with an AD.

Note: Air carriers directed the flight cancellations associated with AD 2006–15–15. The cancellations were not the result of FAA groundings.

Service Reports

14 CFR § 21.3, Reporting of failures, malfunctions, and defects

Each holder of a TC, parts manufacturer approval (PMA), or technical standard order (TSO) authorization or the licensee of a TC must report to the cognizant ACO (within 24 hours of the occurrence) any defect in any product, part, or article manufactured by it that has left its quality control system and that it determines could result in certain failures, malfunctions, or defects.

14 CFR § 121.703, Service difficulty reports

Each certificate holder must report the occurrence or detection of certain failures, malfunctions, or defects to the FAA in Oklahoma City, Oklahoma, within 24 hours of the occurrence.

14 CFR § 121.705, Mechanical interruption summary report

Each certificate holder must submit to the FAA before the 10th day of the following month a summary report for the previous month detailing flight interruptions caused by certain difficulties or malfunctions not reported in § 121.703, premature engine removal, and certain propeller featherings.

Type Design

14 CFR § 21.31, Type design

The type design consists of—

(a) The drawings and specifications, and a listing of those drawings and specifications, necessary to define the configuration and the design features of the product shown to comply with the requirements of that part of this subchapter applicable to the product;

(b) Information on dimensions, materials, and processes necessary to define the structural strength of the product;

(c) The Airworthiness Limitations section of the Instructions for Continued Airworthiness as required by parts 23, 25, 26, 27, 29, 31, 33 and 35 of this subchapter, or as otherwise required by the Administrator; and as specified in the applicable airworthiness criteria for special classes of aircraft defined in § 21.17(b); and

(d) For primary category aircraft, if desired, a special inspection and preventive maintenance program designed to be accomplished by an appropriately rated and trained pilot-owner.

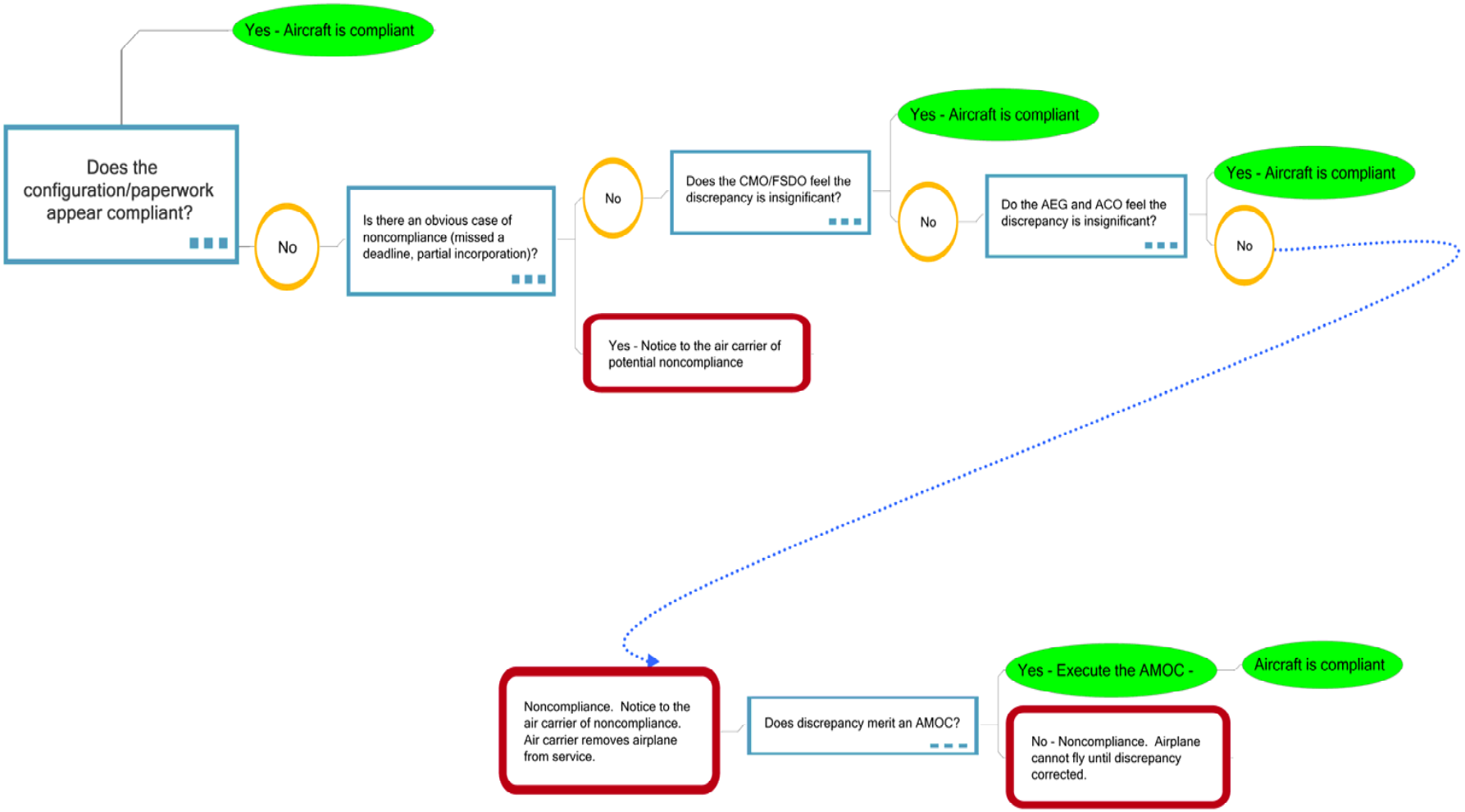
(e) Any other data necessary to allow, by comparison, the determination of the airworthiness, noise characteristics, fuel venting, and exhaust emissions (where applicable) of later products of the same type.

Type Design Changes

14 CFR § 21.99, Required design changes

When an AD is issued under part 39, the TC holder for the product concerned must submit appropriate design changes for approval if design changes are necessary to correct the unsafe condition of the product. Upon FAA approval of the design changes, the TC holder must make available the descriptive data covering the changes to all operators of products previously certificated under the TC.

APPENDIX C — ASI COMPLIANCE DECISION FLOWCHART (ENLARGED)



APPENDIX D — GENERIC AIR CARRIER AD COMPLIANCE PROCESS (ENLARGED)