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Aviation Safety: FAA's Oversight of Outsourced Maintenance Facilities

Statement of
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Mr. Chairman and Members of the Subcommittee:

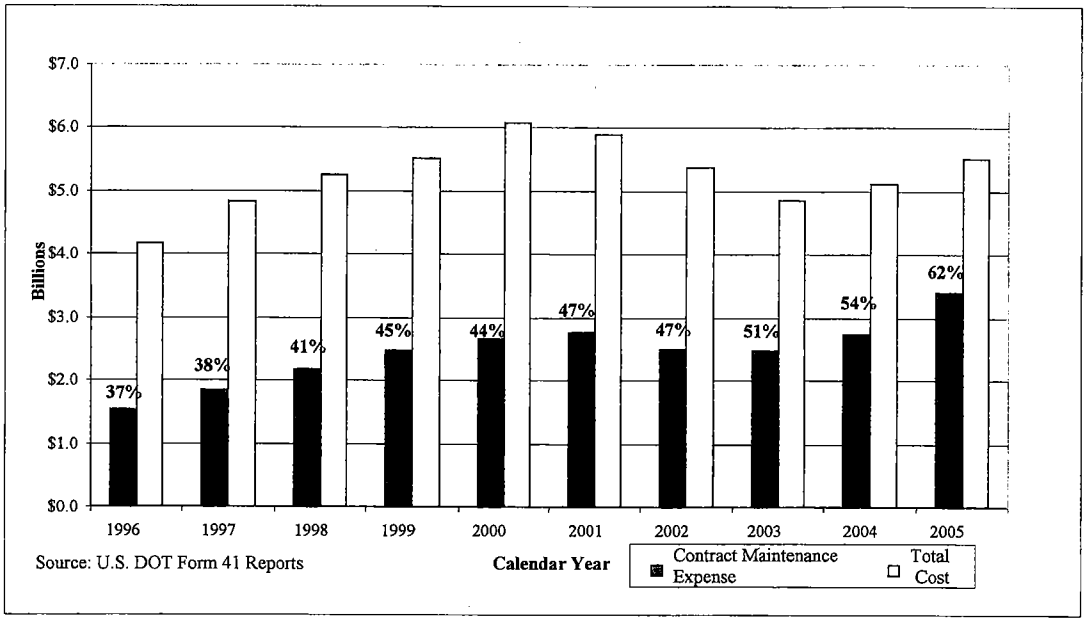
We appreciate the opportunity to testify on the Federal Aviation Administration's (FAA) oversight of outsourced air carrier maintenance. Our testimony today is based on a number of our previous reports as well as our ongoing work. At the outset, it is important to note that while the United States has the most complex aviation system in the world, it is also the safest. Multiple layers of controls in air carrier operations and maintenance processes, along with FAA's oversight, are largely responsible for the high level of safety that we have seen in the last 5 years.

This safety record is a remarkable accomplishment given the many changes occurring within the industry. For example, as air carriers continue to struggle for profitability, they are aggressively working to cut costs by reducing in-house staff, renegotiating labor agreements, and increasing the use of external repair facilities.

Today's aviation environment continues to evolve. Since 2001, eight commercial air carriers have filed bankruptcy, two major air carriers have merged, and one has ceased operations. While four of the eight air carriers have emerged from bankruptcy, fuel prices continue to climb; this makes cost control a key factor in not only sustained profitability but overall survival of an airline. Personnel and aircraft maintenance are significant cost areas within an air carrier's operations. Outsourcing maintenance has been a primary tool that air carriers have used in recent years to reduce costs.

Air carriers have outsourced maintenance for years because external repair facilities can complete repairs for less cost and provide services in areas such as engine repair that would otherwise require air carriers to have specialized expertise and staff. However, in recent years, use of external repair facilities has become more pronounced. As shown in figure 1, from 1996 to 2005, while total maintenance costs have fluctuated, air carriers continued to increase the percentage of costs spent on outsourced maintenance from 37 percent to 62 percent, or nearly $3.4 billion of the $5.5 billion spent on maintenance. During the first three quarters of 2006, the amount of outsourced maintenance increased to 64 percent.

Figure 1. Percentage Increase in Outsourced Maintenance Expense for Major Air Carriers[1] From 1996 to 2005



It is important to note that the issue is not where maintenance is performed but that maintenance requires effective oversight. Our past reports have identified challenges in FAA's ability to effectively monitor the increase in outsourcing. For example, in July 2003, we reported[2] that FAA had not shifted its oversight of aircraft maintenance to the locations where the maintenance was performed. Although air carriers were using external repair facilities to perform more of their maintenance work, FAA still focused most of its inspections on the maintenance work that air carriers performed within their own facilities.

FAA has taken a number of steps to improve its oversight, and we will discuss some of those improvements today. However, the continuous growth in outsourcing underscores the need for FAA to remain vigilant in its efforts to continually improve its oversight.

Today, I would like to discuss three areas, as we see them, for strengthening FAA's oversight of outsourced air carrier maintenance:

- **Advancing FAA's risk-based oversight systems:** During the past 8 years, FAA has taken important steps to move its safety oversight for air carriers and repair stations to risk-based systems. FAA's new oversight system for repair stations is designed to help FAA inspectors focus their outsourced maintenance oversight on

[1] Alaska Airlines, America West Airlines, American Airlines, Continental Airlines, Delta Air Lines, Northwest Airlines, Southwest Airlines, United Airlines, and U. S. Airways.

[2] OIG Report Number AV-2003-047, "Review of Air Carriers' Use of Aircraft Repair Stations," July 8, 2003. OIG reports and testimonies can be found on our website: www.oig.dot.gov.

areas that pose the greatest safety risks. FAA is clearly on the right path; however, the risk-based systems are not yet at an end state. FAA's risk-based system for air carriers needs to be more flexible and comprehensive, and FAA needs to ensure that inspectors are effectively using the new system for outsourced maintenance.

- **Determining where the most critical maintenance is performed and how it should be monitored:** FAA cannot effectively implement a risk-based system for oversight of aircraft maintenance if it does not know where the maintenance is performed. In July 2003 and December 2005,[3] we reported that FAA did not have good systems for determining which repair facilities air carriers were using to perform their most critical maintenance. FAA has developed new inspector guidance and air carrier processes to address this problem, but these efforts still fall short of providing FAA with the information it needs. For example, FAA has developed a voluntary process for air carriers to report the top 10 critical maintenance providers used each quarter. However, as long as the process is voluntary, FAA cannot be assured that it is getting the accurate and timely information needed to determine where it should focus its inspections.

- **Ensuring inspectors are well-positioned and properly trained to adequately oversee maintenance outsourcing:** FAA has approximately 3,865 inspectors located in offices throughout the United States and in other countries. FAA inspectors must oversee both domestic and foreign aspects of air carriers' maintenance operations—a task made more difficult by the rapidly changing aviation environment. The pace of these changes makes it imperative for FAA to maintain a sufficient number of inspectors to perform safety oversight. By 2010, 44 percent of the workforce will be eligible to retire. However, maintaining an adequate workforce is only one of the challenges FAA faces with its inspectors. For example, FAA does not have a process to determine the number of inspectors needed and where they should be placed. Until FAA develops an effective staffing model, it will not be able to make the most effective use of its resources. FAA must also ensure that its safety inspectors are sophisticated database users with knowledge of system safety principles and an analytical approach to their work.

Now, I would like to discuss in more detail some of the changes occurring in the industry; I will then turn to the areas I would like to focus on this morning.

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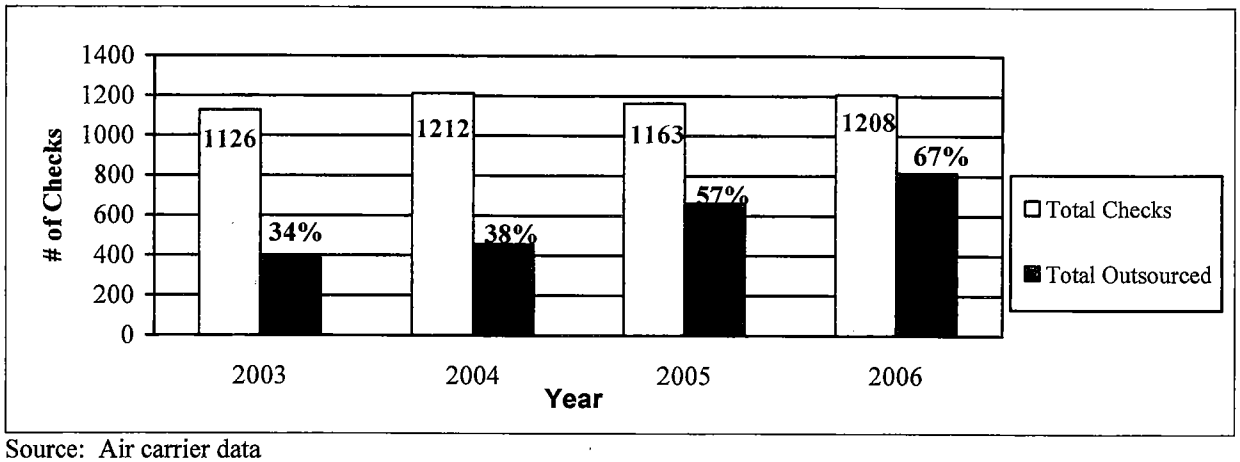
[3] OIG Report Number AV-2006-031, "Review of Air Carriers' Use of Non-Certificated Repair Facilities," December 15, 2005.

Recent Trends in Outsourcing

At the request of this Committee, we are conducting a review of the type and quantity of maintenance that air carriers are outsourcing. We plan to issue a report on this review later this year. We are finding that the amount, or quantity, of maintenance that air carriers outsource to domestic and foreign repair facilities has continued to climb. Further, the work that U.S. air carriers outsource includes everything from repairing critical components, such as landing gear and engine overhauls, to performing heavy airframe maintenance checks, which are a complete teardown and overhaul of aircraft. As shown in figure 2, nine major air carriers[4] we reviewed increased the percentage of heavy maintenance they outsourced to certificated repair stations from 34 percent in 2003 to 67 percent in 2006.

Figure 2. Percentage of Heavy Airframe Maintenance Checks Outsourced for Nine Major Air Carriers From 2003 to 2006



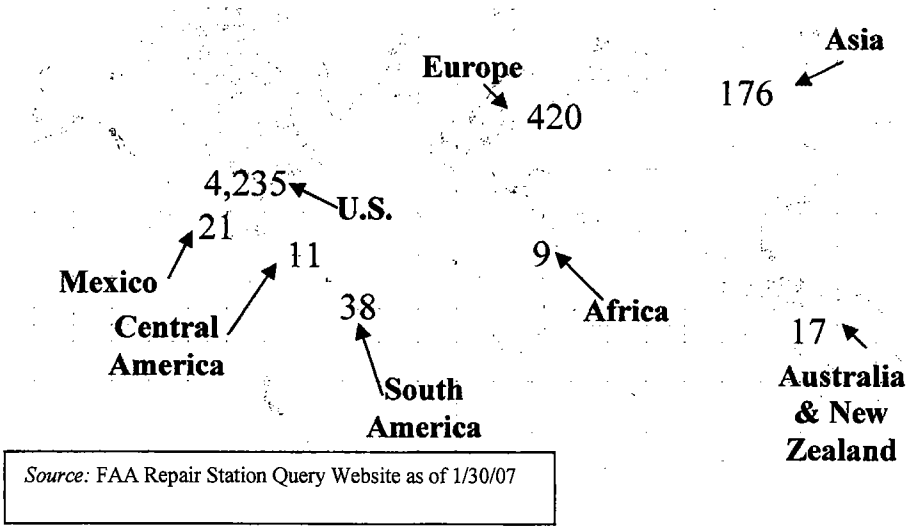
Source: Air carrier data

Of the heavy maintenance outsourced by the nine carriers in 2006, 35 percent was sent to foreign outsourced maintenance providers, up from 21 percent in 2003. The trend in outsourcing is significant and underscores the need for FAA to ensure that it has accurate information on where critical maintenance is performed so it can target its inspection resources.

[4] The carriers represent a cross-section of nine of the largest network and low-cost air carriers and included AirTran Airways, Alaska Airlines, America West Airlines, Continental Airlines, Delta Air Lines, JetBlue Airways, Northwest Airlines, Southwest Airlines, and United Airlines. Because American Airlines, the largest U.S. air carrier, has retained its heavy maintenance as opposed to making a significant shift to outsourcing, we did not include it in our review.

As shown in figure 3, external repair facilities certified by FAA are located worldwide. A facility can obtain an FAA certificate when FAA has verified that the facility has the equipment, personnel, manufacturers' maintenance instructions, and inspection systems necessary to ensure that repairs will be completed using FAA standards. These facilities are referred to as repair stations. There are currently 4,235 domestic and 692 foreign FAA-certificated repair stations available for use by U.S. air carriers.

Figure 3. Locations of FAA-Certificated Repair Stations



Source: FAA Repair Station Query Website as of 1/30/07

In addition, there are approximately 900 repair facilities in Canada that could be used by U.S. air carriers. Under a reciprocal agreement with the United States, Canadian officials certify and monitor operations at these facilities. FAA provides oversight of work performed on U.S. aircraft. At least two major U.S. carriers use Canadian facilities to perform heavy airframe maintenance. As discussed later in our testimony, air carriers also use domestic and other foreign non-certificated repair facilities to perform aircraft maintenance.

FAA has assigned a portion of its inspector workforce to verify that foreign facilities used by U.S. air carriers continue to meet FAA standards. As shown in table 1, FAA has 103 International Field Office inspectors. Of these 103 inspectors, approximately 66 inspectors are located abroad (i.e., Germany, England, and Singapore).

Table 1. FAA International Field Office Inspectors and Their Areas of Responsibility

International Field Office (IFO)	Number of Inspectors	Area of Responsibility	Number of Foreign Repair Stations
Dallas IFO	4	Mexico	21
Frankfurt IFO	17	Europe (excluding the United Kingdom), Africa, and the Middle East	294
London IFO	45	United Kingdom	163
Miami IFO	13	South America, Central America, & The Caribbean	49
San Francisco IFO	20	Australia, New Zealand, Japan, Korea, Philippines, Fiji, Taiwan, and other Asian-Pacific Island Nations	62
Singapore IFO	4	China, Hong Kong, India, Indonesia, Malaysia, Singapore, Thailand, and other Asian-Pacific Nations	103
TOTAL	**103 Inspectors**		**692 Repair Stations**

Source: FAA; data are as of January 30, 2007.

FAA recognizes the challenges it faces with the increased use of aircraft maintenance repair facilities and has taken a number of steps to improve its repair station oversight. For example, beginning in September 2006, FAA brought on-line an automated risk-based oversight system for these facilities. This is a noteworthy accomplishment; however, more work needs to be done if FAA is going to make the most effective use of this system and its inspection resources.

FAA must continue its efforts to implement risk-based oversight systems. The trend toward outsourcing is not limited to aircraft maintenance. Aircraft and engine manufacturers are increasingly implementing their own form of outsourcing. Rather than build the majority of their aircraft within their own facilities using their own staff, manufacturers now have large sections of their aircraft built by domestic and foreign part suppliers. For example, 1 major U.S. manufacturer uses major parts and components from close to 1,200 domestic and foreign suppliers to manufacture its aircraft. In fiscal year 2003, FAA recognized the changes occurring in the aviation manufacturing industry and revised its oversight to a more risk-based approach. However, the system was not designed to address the increasingly prominent role that

aircraft part and component suppliers now play in aviation manufacturing. We plan to report on this important issue later this year.

Advancing FAA's Risk-Based Oversight Systems

FAA has taken important steps to move its safety oversight for air carriers and repair stations to risk-based systems. These systems are designed for inspectors to use information obtained from analysis of data to focus oversight on areas posing the greatest safety risks. Since 2000, we have monitored and reported on FAA's progress in implementing these systems. Risk-based oversight should significantly enhance FAA's ability to focus its inspections; however, we have identified a number of concerns that FAA must address to continue advancing the programs.

FAA's Risk-Based Oversight Approach for Air Carriers Needs To Be More Flexible and Comprehensive

FAA introduced its risk-based oversight system for air carriers, the Air Transportation Oversight System (ATOS), in 1998. We have always supported ATOS because the essential design of the system is sound. In using ATOS, inspectors are to focus oversight on areas posing the greatest safety risks based on analysis of data, such as air carrier operations and maintenance information.

ATOS was a major shift from FAA's old inspection programs, which focused more on compliance with regulations and inspections in designated areas regardless of the level of risk. For example, in FAA's old oversight process, inspectors could conduct hundreds of inspections of one air carrier even if no significant problems were found. With ATOS, inspectors can obtain analyses on air carriers' in-service maintenance failures. Using this data, inspectors can focus their inspections on the specific areas that led to the maintenance problems, such as engine failures, rather than performing multiple inspections of the air carriers' fleet.

FAA initially implemented ATOS at the 10 largest air carriers and did not expand the program beyond this group of carriers until 2003. When first implemented, inspectors did not widely accept ATOS as the best way to conduct oversight. In particular, inspectors were concerned that under ATOS they were unable to spend enough time on-site at air carriers. Also, inspectors thought that the ATOS inspection checklists were too broad to provide useful information for risk analyses. In June 2005, we reported[5] that FAA inspectors had difficulty using ATOS to respond to rapid changes that air carriers were making to reduce costs, such as the increased use of external repair facilities. We found that FAA needed to improve the following processes:

[5] OIG Report Number AV-2005-062, "Safety Oversight of an Air Carrier Industry in Transition," June 3, 2005.

- Monitoring and conducting trend analysis of major air carrier changes—most network air carriers were making similar changes, but FAA only focused on those that were in or near bankruptcy.

- Identifying risks in air carrier systems, prioritizing inspections, and shifting inspections to areas of greater risks. At the time of our review, inspectors for five air carriers did not complete 26 percent of their planned inspections—more than half of those not completed were in areas where inspectors had identified risks.

Events during the August 2005 Northwest Airlines mechanics strike underscored the need for FAA to strengthen the flexibility and comprehensiveness of ATOS to permit inspectors to respond to air carrier changes. Northwest's mechanics initiated a strike against the airline rather than agree to newly proposed contract terms. In response, Northwest hired replacement mechanics and increased its use of outside (contract) mechanics and maintenance facilities; however, it only hired approximately 1,400 mechanics to replace its previous internal staff of about 4,400 mechanics and relied more extensively on outside maintenance providers.

FAA responded quickly in developing a plan to monitor the impact of these changes. However, rather than use ATOS, FAA inspectors abandoned the system in favor of a more simplified checklist, which they believed could be used to more quickly gather the information needed to identify risks associated with the strike. Early inspection reports disclosed deficiencies in replacement mechanic training—FAA inspectors identified at least 121 problems related to replacement mechanics' lack of knowledge or ability to properly complete maintenance tasks and maintenance documentation.

However, these problems were documented in more than 800 individual, manually prepared inspection reports rather than in the automated ATOS database. The manager of the FAA office responsible for oversight of Northwest told us that the ATOS data collection tools (checklists) were not specific enough to capture the data that inspectors needed. In addition, he stated that parts of the ATOS process, such as evaluating data quality, would be too time consuming. This demonstrates that FAA inspectors did not see ATOS as flexible and comprehensive enough to meet their oversight responsibilities during significant air carrier changes.

In March 2006, FAA issued new inspector guidance to aid inspectors in evaluating air carrier changes and reviewed field office risk assessments to ensure that inspectors were using ATOS to prioritize inspections. FAA must continually monitor inspector compliance with this new guidance. By the end of this year, FAA plans to complete ATOS implementation at all air carriers—currently, only 57 of the 118 commercial air carriers are subject to this oversight system. As more air carriers are added to the system, effective use of ATOS to prioritize inspections will become even more critical.

FAA Must Ensure That Inspectors Are Effectively Using Its New Risk-Based Oversight System for Repair Stations

In July 2003, we reported that FAA oversight had not shifted to where the maintenance was actually being performed. Instead, inspectors continued to focus inspections on in-house maintenance. For example, inspectors completed 400 inspections of in-house maintenance at 1 air carrier but only 7 inspections of repair stations. This occurred even though this carrier contracted out nearly half of its maintenance that year.

Further complicating FAA's ability to perform oversight of repair stations is the fact that two groups of FAA inspectors monitor aircraft repair stations; however, at the time of our review, neither group placed adequate emphasis on these facilities as part of their surveillance. FAA's district office inspectors have primary responsibility for conducting repair station inspections but they typically only inspect repair stations once or twice a year. Although FAA's certificate management office inspectors periodically inspect repair stations as part of their responsibility for oversight of their assigned air carriers, these inspections are infrequent and do not include a review of the work the repair station performs for other customers. In addition, we found instances where district office and certificate management office inspectors did not share the inspection results with each other.

We also reported that 138 repair stations in Germany, France, and Ireland were not inspected by FAA at all. Under a bilateral agreement with the European Joint Aviation Authorities, FAA permits foreign authorities to inspect FAA-certificated repair stations on its behalf to prevent duplicative inspections and reduce the financial burden on foreign repair stations. However, FAA did not have an adequate method to monitor the surveillance performed by other authorities. For example, most of the inspection files we reviewed that FAA received from the foreign authorities were either incomplete, written in a foreign language, or otherwise difficult to comprehend.

Since our 2003 report, FAA officials have worked closely with the aviation authorities of other countries to improve the surveillance they perform on FAA's behalf. However, we are concerned that FAA is still not regularly visiting the facilities in the countries where agreements exist with other aviation authorities. For example, FAA inspectors for 1 air carrier had not visited a major foreign engine repair facility even though the repair station had performed maintenance on 39 (74 percent) of the 53 engines repaired for the air carrier. In addition, the FAA international field office inspectors for this facility had not conducted any spot inspections of this facility in 5 years.

Nevertheless, FAA has made significant progress in improving its repair station oversight. The most important improvement is development of a risk-based oversight approach for FAA-certificated repair stations. FAA cannot provide continuous

oversight of every maintenance facility. The new risk-based system was developed to assist inspectors in targeting resources for both repair station oversight and for oversight of air carriers' maintenance outsourcing programs. For example, inspectors are now required to review 15 areas within repair station operations to obtain a baseline assessment of the facility. Using the information from this inspection, inspectors can focus their inspections on risk areas identified at the facility. Further, the information generated from this oversight will be available for review by all FAA inspectors to assist them in targeting their inspections more effectively.

Under FAA's old inspection system for repair stations, inspectors were instructed to perform one inspection of each facility per year and could review any aspect of the facility's operations. Inspectors were not required to provide detailed information on the areas they inspected or the issues identified. As shown in table 2, FAA has initiated a number of other efforts that will enhance its oversight of FAA-certificated repair stations.

Table 2. FAA Repair Station Initiatives

Initiative	Description	Status
Enhanced Repair Station Oversight System*	A risk-based, standardized oversight system for repair station and air carrier outsourcing surveillance.	**Completed** (beginning in fiscal year 2007)
Quarterly Utilization Report*	Reports that identify maintenance providers that air carriers and repair stations use for the majority of their critical repairs.	**Completed** (This was implemented as a voluntary reporting program in fiscal year 2007; however, because the reports are not mandatory, this does not fully address our recommendation.)
Team Inspections*	Annual in-depth repair station inspections conducted by FAA repair station inspectors and air carrier inspectors.	**Completed** (beginning in fiscal year 2006)
Rulemaking on Air Carrier Manuals for Outsourcing	This rule would require specific language in air carriers' manuals pertaining to outsourced maintenance, such as policies, procedures, and instructions for maintenance completed by external repair facilities.	**FAA is developing the rule.**
Proposed Rulemaking on Repair Stations	This rule would revise the repair station ratings and require repair stations to establish a quality program. It also specifies instances in which FAA can deny a repair station certificate (e.g., when a company has had one revoked).	**Comment period extended to April**

**Initiated as a result of our 2003 report.*
Source: FAA

However, these initiatives are either recently implemented or still in development. To avoid repeating the types of implementation problems experienced with ATOS, FAA needs to ensure that its inspectors are well-trained on the new systems and initiatives for repair stations. Furthermore, FAA will need to verify that inspectors are effectively implementing the new processes; however, FAA cannot effectively implement a risk-based system for oversight of aircraft maintenance if it does not know where the maintenance is performed.

Determining Where the Most Critical Maintenance Is Performed and How it Should Be Monitored

In 2003, we reported that FAA inspectors did not have effective procedures for determining which FAA-certificated repair stations air carriers were using to perform maintenance that could impact the airworthiness of the aircraft. Air carriers are required to provide, and FAA must approve, a list of substantial maintenance providers, which are repair stations that can conduct major repairs on their aircraft. These procedures are designed to provide inspectors with information on where air carriers intend to send their substantial maintenance.

However, the information that air carriers provide may not represent the facilities the carrier actually uses or show the quantity of work the carrier sends to each facility. For example, we identified one foreign repair station designated as a substantial maintenance provider for a major U.S. carrier that had not conducted any significant maintenance work for the air carrier in almost 3 years. FAA's surveillance should be better targeted to those repair stations that carriers use regularly. The air carriers' information also does not include the non-certificated facilities that they use.

In December 2005, we reported that FAA was unaware of air carriers' use of non-certificated repair facilities to perform critical maintenance.[6] These facilities are not covered under FAA's routine oversight program and do not have the same regulatory requirements as repair stations that obtain certification from FAA.

FAA's New Process for Identifying Certificated Repair Stations That Air Carriers Use To Perform Maintenance Is Not Effective

In response to our July 2003 report, FAA implemented a system in fiscal year 2007 for both air carriers and repair stations to submit quarterly utilization reports. These reports are supposed to show the quantity, or volume, of critical repairs that maintenance providers perform for air carriers and repair stations. However, submission of this information is not mandatory. FAA's Flight Standards staff advised us that a new rule would be required to make volume reporting mandatory

[6] In our December 2005 report, we identified critical repairs as those repairs categorized as Required Inspection Items by each air carrier. Required Inspection Items are mandatory maintenance activities that, due to the importance to the overall airworthiness of the aircraft, must be independently inspected by a specially trained inspector after the work is completed.

and that they believed air carriers would provide the requested information voluntarily. The first reports were due to FAA by December 31, 2006. Our review of FAA records for nine air carriers showed that as of March 23, 2007, seven of the nine air carriers had submitted quarterly utilization reports. FAA must ensure that air carriers continue to file these reports in a timely manner.

Our primary concerns with the reports are that air carriers do not include all repair stations that provide critical component repairs and that FAA does not validate the information provided. Air carriers are only requested to report the top 10 substantial maintenance providers used—the ones most frequently used per quarter. The reports do not have to include repair stations that perform high-volume, critical component repairs on parts such as wheels and brakes because FAA's definition of substantial maintenance does not include component repairs.

In addition, FAA inspectors are not required to validate air carrier data. Without some form of data verification, FAA cannot be assured that air carriers have provided accurate and complete information. If the reports are to be an effective means for FAA to track and accurately target those repair stations that carriers use the most, a more thorough process will be needed.

FAA Needs To Develop a Mechanism To Identify Non-Certificated Repair Facilities Performing Critical Maintenance for Air Carriers

In December 2005, we identified air carriers' use of repair facilities that have not been certificated by FAA to perform critical and scheduled[7] aircraft maintenance and reported that FAA was unaware of this practice. Air carriers have used non-certificated facilities for years, but it was widely believed that these facilities principally performed minor aircraft work on an as-needed basis.

Prior to our review, FAA officials advised us that non-certificated repair facilities only performed minor services, such as welding of parts or changing tires. However, we determined that non-certificated facilities can and do perform the same type of work as FAA-certificated repair stations, including both scheduled and critical maintenance. We identified 6 domestic and foreign facilities that performed scheduled maintenance and 21 that performed maintenance critical to the airworthiness of the aircraft.

We are especially concerned that air carriers rely on non-certificated facilities to perform scheduled maintenance tasks that the carriers can plan for well in advance. For example, we identified an air carrier's use of a non-certificated facility to perform work on three aircraft that was required for compliance with an FAA Airworthiness

[7] This is maintenance that is required to be performed at regularly scheduled times, such as inspections required after the aircraft has flown a designated number of hours (e.g., inspections of crew and passenger oxygen, aircraft fuselage, wings, and engines).

Directive. Other critical repairs we found included adjustments to flight control systems and removal and replacement of an engine.

FAA does not know how many non-certificated maintenance facilities air carriers currently use because it does not maintain a list of the facilities. We sampled 19 air carriers, and all 19 were using non-certificated facilities to some extent. We identified over 1,400 non-certificated repair facilities performing maintenance, and more than 100 of these facilities were located in foreign countries.

Permitting non-certificated facilities to perform critical maintenance is an important issue that FAA must address. To do so, FAA must first determine which non-certificated facilities perform critical and scheduled maintenance and then decide if it should limit the type of work these facilities can perform.

FAA Cannot Rely on Air Carrier Oversight and Training Programs for Non-Certificated Repair Facilities

FAA permits air carriers to use non-certificated facilities as long as the work is approved by an FAA-certificated mechanic. However, this is not an adequate substitute for an FAA-certificated repair facility because non-certificated facilities do not have the safeguards and controls for maintenance repair and oversight that is required at FAA-certificated facilities. Differences in FAA requirements between these two types of maintenance operations are illustrated in table 3.

Table 3. Differences in Requirements for FAA-Certificated Repair Stations and Non-Certificated Facilities

FAA Requirement	Certificated Repair Station	Non-Certificated Repair Facility
Annual FAA Inspections	Required	Not Required
Quality Control System	Required	Not Required
Reporting Failures, Malfunctions, and Defects	Required	Not Required
Designated Supervisors and Inspectors	Required	Not Required
Training Program	Required	Not Required
Facilities and Housing*	Required	Not Required

*If authorized to perform airframe repairs, certificated repair stations must have facilities large enough to house the aircraft they are authorized to repair.

Source: OIG analysis

We found that air carrier quality systems under which these repairs were performed were not as effective as they should have been. This was particularly true in the areas of mechanic training and oversight of these facilities.

Non-certificated repair facilities are not required to employ designated supervisors and inspectors to monitor maintenance work as it is being performed. Relying solely on the expertise of an individual mechanic to ensure that repairs are completed properly is an inadequate control mechanism. In our view, this is the reason FAA requires added layers of oversight, such as designated supervisors and inspectors, in its certificated facilities.

The importance of this issue became evident in the aftermath of the January 2003 Air Midwest crash in Charlotte, North Carolina. Independent contract mechanics, certificated by FAA and working for a non-certificated company, completed maintenance on the aircraft the day before the accident. The mechanics incorrectly adjusted a flight control system that was ultimately determined to be a contributing cause of the crash—this work was approved by an FAA-certificated mechanic employed by the non-certificated company. The National Transportation Safety Board determined that contributing causes of the accident included Air Midwest's lack of oversight of the work performed by mechanics working for the non-certificated entity and lack of FAA oversight of Air Midwest's maintenance program.

In our December 2005 report, we also stated that neither FAA nor the six air carriers we visited provided adequate oversight of the work performed at non-certificated repair facilities. The air carriers we reviewed relied primarily on telephone contact to monitor maintenance performed at these facilities rather than conducting on-site reviews of the actual maintenance work. In contrast, as an added level of quality control, air carriers often assign on-site representatives to monitor the work performed at certificated repair stations.

Despite the differences in quality controls and oversight that exists between certificated and non-certificated maintenance entities, there are no limitations on the scope of work that non-certificated repair facilities can perform. For example, we looked at critical repairs performed under special authorizations at 1 air carrier and found that over a 3-year period, 14 of the 19 (74 percent) repairs were performed at non-certificated repair facilities. Examples of the work performed include landing gear checks, lightning strike inspections, and door slide replacements. In contrast, repair stations that are certificated by FAA are limited to completing only the specific maintenance tasks that FAA has determined the facility is capable of performing.

Air carrier training programs for mechanics working at non-certificated facilities are not adequate. FAA regulations require air carriers to have mechanic training and oversight programs for work performed by external maintenance facilities. However, we found significant shortcomings in air carrier training and

oversight programs for non-certificated facilities. As shown in table 4, mechanic training ranged from a 1-hour video to 11 hours of combined video and classroom training; one carrier only required mechanics to review a workbook.

Table 4. Air Carrier Training*

Carrier	Training Provided
A	Less than an *1 hour* of video training
B	*1.5 hours* of classroom training
C	*11 hours* of combined classroom and video training
D	*3.5 hours* of combined classroom and video training
E	Maintenance procedures provided in a *workbook* that had to be signed and faxed back to the air carrier
F	*3 to 4 hours* of combined classroom and video training
G	*4 hours* of classroom training
H	*3.5 hours* of classroom training

*Training information obtained either from air carriers' or non-certificated facilities' records.

FAA agreed that it needs to place more emphasis on the training and oversight that air carriers provide to non-certificated facilities and that it needs to gather more information on the type of work these facilities perform. FAA's efforts in this area are still underway. If FAA is to achieve the planned improvements in oversight of outsourced maintenance, it will need to obtain definitive data on where air carriers are getting the maintenance performed, including critical and scheduled maintenance work done at non-certificated repair facilities so that it can focus its inspections to areas of greatest risk.

Ensuring Inspectors Are Well-Positioned and Properly Trained To Adequately Oversee Maintenance Outsourcing

In June 2005, we reported that FAA needed to ensure that its inspection workforce was adequately staffed. Currently, FAA has approximately 3,865 inspectors located in offices throughout the United States and in other countries. As shown in table 5, these inspectors are responsible for a vast network of operators and functions.

Table 5. FAA Inspectors' Workload

Commercial Air Carriers	118	Flight Instructors	90,555
Repair Stations	4,927	FAA Designee Representatives	11,000
Active Pilots	744,803	Aircraft	347,326
Approved Manufacturers	1,738	FAA-Licensed Mechanics	320,293

Source: FAA

FAA will never have enough inspectors to oversee every aspect of aviation operations. However, FAA faces challenges in balancing potential inspector retirements with the number of inspectors it is able to hire. This year, 28 percent (or 1,085 of the 3,865) of the current inspector workforce will be eligible to retire. By 2010, 44 percent of the workforce will be eligible to retire. To counter this trend, FAA requested funding to hire an additional 203 aviation safety inspectors in its fiscal year 2008 budget submission. In 2006, FAA hired 538 inspectors, but lost 226 (181 to retirements and 45 for other reasons). However, even if FAA receives funding and is able to hire additional inspectors, it will need to know where to place inspectors to make the most effective use of its resources.

FAA Needs a Process To Determine Inspector Placement

Maintaining an adequate workforce is only one of the challenges FAA faces with its inspectors. FAA does not have a process to determine the number of inspectors needed and where they should be placed. FAA has made at least two attempts to develop a staffing model to determine the number and best locations for its inspectors. However, neither of the two models provided FAA with an effective approach to allocate inspector resources. At the request of this Subcommittee, in September 2006, the National Research Council completed a study of FAA's current methods for allocating inspector resources.[8] This study validated the concerns that we have expressed in many of our past reports—that FAA's current method of allocating inspectors is antiquated and must be redesigned to effectively target inspectors to those areas of higher risk.

During our review of FAA oversight of financially distressed and low-cost air carriers, we found inconsistencies in the way inspectors were allocated among field offices. For example, two FAA offices had the same number of inspectors assigned to

[8] Study completed by the National Research Council of the National Academies, "Staffing Standards for Aviation Safety Inspectors," publicly released September 20, 2006.

oversee the air carriers in their geographic areas even though one of those carriers had twice as many aircraft and 127 percent more flights than the other.

We also found that inspectors were not assigned to the locations where they were needed most. For example, FAA currently has 1 operations inspector assigned to Des Moines, Iowa, where his assigned air carrier averages only 6 flights per day but does not have an operations inspector assigned to Chicago, Illinois, where the same air carrier averages 298 flights each day.

Conversely, there are other FAA inspectors that have substantial workloads. For example, in 2003, we identified 1 inspector that was assigned oversight for 21 repair stations, 21 agricultural operations, 12 service–for-hire operators, 3 general aviation operators, 2 helicopter organizations, and 1 maintenance school. At that time, inspectors in the 9 field offices we reviewed were responsible for oversight of an average of 9 repair stations and 14 other operations.

Until FAA implements the Council's recommendations and develops an effective staffing model, it will not be able to determine where inspectors should be placed to make the most effective use of its resources. The Council reported that the changing U.S and global aviation landscape has important implications, which are expected to be key drivers of future inspector staffing needs. For example, outsourcing of aircraft maintenance, FAA's shift to a system safety oversight approach, and the attrition and retirement of safety inspectors are all important changes that must be considered in determining staffing needs.

Further, the Council stressed that FAA must ensure that it has safety inspectors that are sophisticated database users with knowledge of system safety principles and an analytical approach to their work. This is a different skill set from the one that supports on-site inspections of air carrier, aircraft maintenance, and aircraft manufacturers operations.

FAA advised us that it fully intends to implement the Council's recommendations but that it must first procure the services of an independent contactor to obtain the most effective staffing mechanism. However, completion of this process is likely years away.

Mr. Chairman, that concludes my statement. I would be pleased to address any questions you or other Members of the Subcommittee might have.