ARE THE PLANES WE FLY MORE AT RISK?

'They can't outsource responsibility'

Inspections *from 1A*

"I'm here to tell you there's an awful lot of work to be done in the maintenance community," said Gary Eiff, a Purdue University professor and certified mechanic who has studied airline maintenance.

Experts suggest specific steps the industry needs to take, including:

- Strengthen oversight of contract repair stations by the FAA and airlines.
- Broaden training for mechanics.
- Improve and standardize written maintenance instructions.

The Observer found that since 1994, maintenance problems have contributed to 42 percent of fatal airline accidents in the United States, excluding the Sept. 11 terrorist attacks.

That's up from 16 percent the previous decade. The majority of the 180 most serious unscheduled or emergency landings during the first six months of 2003, the investigation also found, had causes often related to maintenance.

U.S. Rep. Robin Hayes, R-N.C., a pilot and a member of the aviation subcommittee, said he has tried to focus attention on maintenance at a time when there is so much attention on homeland security measures.

"I don't want us to take time, money, energy, people from tracking day to day safety," Hayes said. "... We have to make sure our procedures and rules and regulations are appropriate."

Hayes said he would ask the NTSB for a briefing on its investigation into US Airways Express Flight 5481, which crashed in Charlotte on Jan. 8.

Maintenance on the plane had been outsourced to a shop in West Virginia, where an FAA inspector had visited just twice in 2002.

Two nights before the crash, a mechanic reset the elevator cable tension that controls the pitch of the plane.

The mechanic had never done that work on a Beech 1900D, and the man who trained him also inspected his work.

Airlines, Hayes said, must oversee outsourced work as carefully as they oversee maintenance in their own hangars.

"They can't outsource responsibility," said John Lauber, vice president of safety and technical affairs for aircraft manufacturer Airbus, and a former member of the National Transportation Safety Board.

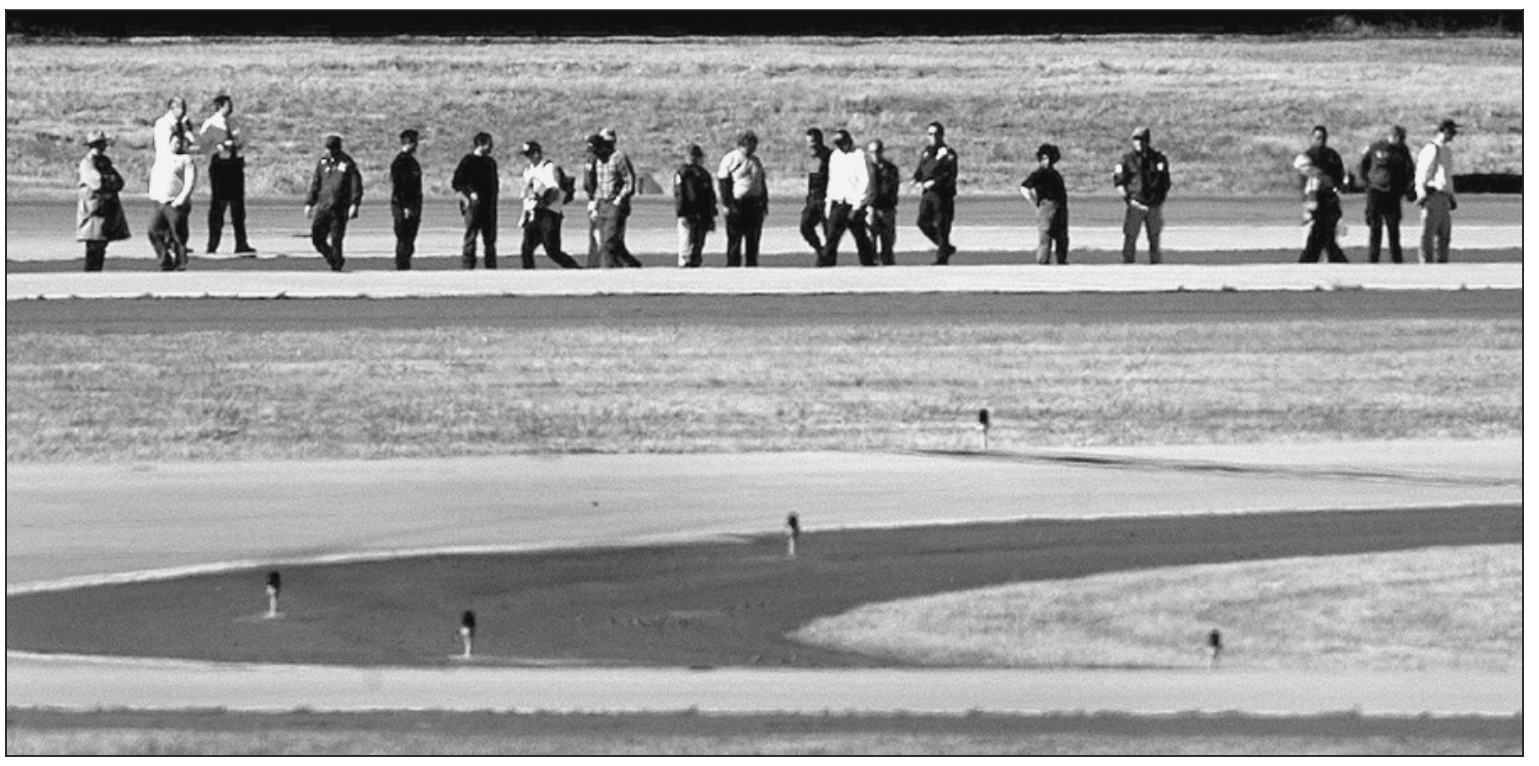
If necessary, said U.S. Rep. Sue Myrick, R-N.C., Congress must intervene to ensure that the FAA provides airlines with the proper regulations and oversight. Outsourcing, Myrick pointed out, is likely to continue as airlines continue to cut costs.

"It definitely needs to be looked into if the smaller shops don't have the oversight from the FAA," Myrick said. "... The biggest problem they probably have is a lack of people to go out and do it because these places are spread around."

Tereasa Shepherd lost her daughter Christiana, 18, in the crash of Flight 5481. She has four other children and says one of the hardest things has been helping them cope with Christiana's death.

"I just wish those who make cost-cutting decisions for airline maintenance could see what the kids go through," Shepherd said. "That would take care of this whole problem of safety."

— STAFF WRITER TIM FUNK CONTRIBUTED TO THIS REPORT.



OBSERVER FILE PHOTO

Investigators examine a runway at Charlotte/Douglas International Airport for clues on Jan. 9, the day after US Airways Express Flight 5481 crashed, killing all 21 aboard. Safety experts and lawmakers say improvements must be made in the oversight of outsourced maintenance.

Recommendations for solving maintenance problems

How to increase airline safety

The Observer interviewed dozens of aviation safety experts, airline mechanics and industry officials. Here are some of their recommendations on how airline maintenance can be improved.

Improve training for airline mechanics

PROBLEM | Mechanics aren't required to receive "human factors" training, which seeks to create an environment where mistakes are less likely. Such training is required for pilots. The training teaches teamwork and how to recognize personal problems that may impede performance.

RECOMMENDATIONS | Human factors training should be required for mechanics, said John Lauber, vice president of safety and technical affairs for Airbus and a former NTSB member.

"I think it is time," he said. "The data shows we are having the desired effect on (pilot performance) ... and the evidence suggests maintenance-related accident rates are increasing. That suggests we need to focus our attention."

Lauber said mechanics need to be trained to better share information when shifts change about what work remains to be done.

Most European countries require maintenance human factors training.

Beef up FAA maintenance surveillance

PROBLEM | For more than 15 years, watchdog groups have faulted the Federal Aviation Administration for failing to monitor airline maintenance closely enough. Many experts think the FAA has not adequately kept tabs on contract maintenance shops that do work for airlines. The Observer found that the FAA inspects airline maintenance shops almost three times as often as contract repair stations, even though the contract shops now do about half of all maintenance.

RECOMMENDATIONS | Hire more FAA inspectors to oversee maintenance, particularly at third-party shops. U.S. Rep. Peter DeFazio, D-Ore., who serves on the aviation subcommittee, says an increase is overdue.

"What they had five, 10 years ago was not adequate," DeFazio said. "What they have now is not adequate. They have not hired what I believe is necessary. I think we could make hundreds more inspectors very busy."

Also, in a 2003 review of air carriers' use of third-party repair stations, the U.S. Department of Transportation inspector general's office recommended that the agency identify and target repair stations that are performing critical safety repairs, develop a standardized approach to repair station surveillance, and set up a system to adequately monitor foreign repair stations.

Watch contract maintenance work more closely

PROBLEM | The FAA holds airlines responsible for maintenance on their airplanes. But critics say many airlines don't monitor third-party maintenance as closely as that done by their own mechanics.

At the Huntington, W.Va., hangar where contract mechanics worked on a Beech 1900D two days before it crashed in Charlotte, a manager for Air Midwest usually worked days, while mechanics mostly worked at night.

RECOMMENDATION | Many experts believe airlines should improve their supervision of work at third-party repair stations. Most airlines do have people at repair stations now, but experts say they need more. FedEx Express has more than a dozen employees assigned permanently to Mobile, Ala., where a third-party contractor maintains many of its planes.

Improve written maintenance instructions

PROBLEM | Studies have found that inaccurate, misleading or poorly written maintenance instructions are a frequent problem. Problems with maintenance instructions were cited in two airline crashes this year. After two Colgan Air pilots were killed in an Aug. 26 crash off Cape Cod, Mass., investigators found that an illustration in the Beech 1900D maintenance manual was backward. Air Midwest officials also pointed to problems in the Beech 1900D maintenance manual following the Jan. 8 crash of their plane in Charlotte. They told the NTSB that the maintenance manual lacked explicit instructions for adjusting the Beech 1900's elevator cables.

"(Poor maintenance instructions) don't typically cause a crash on their own, but they contribute in so many," said Colin Drury, professor of industrial engineering at the State University of New York at Buffalo.

RECOMMENDATIONS | Experts recommend that manufacturers and airlines improve the accuracy and design of maintenance instructions. Studies by researchers at SUNY Buffalo found evidence that improving the design of documents reduces errors. Standardizing the format of maintenance instructions used by airlines would help, the researchers found.

Limit the hours that mechanics work

PROBLEM | Mechanics too often work excessively long shifts, studies have found. A recent study done for the United Kingdom's Civil Aviation Authority pointed to widespread international concern over the implications.

"There is very good evidence that the likelihood of mistakes or errors increases when individuals are fatigued," wrote the study's author, Simon Folkard, of the University of Wales Swansea.

At the Huntington, W.Va., hangar where adjustments to flight control cables on a Beech 1900D were done two days before the plane crashed in Charlotte on Jan. 8, the mechanic worked a 14-hour day and his supervisor worked a 15 ½-hour day.

RECOMMENDATIONS | The UK study recommended limits on hours in a shift, days worked in a year, and number of successive night shifts. It said that shifts should be limited to no more than 13 hours, that there be at least 11 hours between the end of one shift and the start of the next, and that breaks be scheduled at least every four hours.

Recruit young people to airline maintenance

PROBLEM | Many experts predict there will be a shortage of skilled airline mechanics when the industry rebounds from its current financial slump. A wave of airline mechanics who began working after the Vietnam War is starting to retire. And many technically skilled youths are finding better pay and working conditions in other professions, such as the computer industry. Enrollments in schools that train airline mechanics are down significantly since 2001.

RECOMMENDATIONS | Airlines, aircraft manufacturers, mechanic training schools and others in aviation must better market the profession. "We've got to compete as an industry with other industries for a technical brain trust," said Brian Finnegan, president of the Professional Aviation Maintenance Association. The airline industry must define a career path for mechanics and make sure its training schools have up-to-date equipment, he said.

Compile safety data in one place

PROBLEM | Some mechanical problems are not reported at all. Others are logged in a variety of databases kept by the FAA or the NTSB. No single database integrates all the data, so airlines and regulators have a hard time seeing larger trends – and how scattered incidents may be related.

"What I think you get is research going to the most recent accident, and not necessarily what is the highest risk in the aviation industry," said Nick Lacey, former FAA flight standards director.

The FAA has proposed creation of a global aviation information network, which would integrate worldwide safety data in an effort to improve safety. Though it was first proposed years ago, GAIN has not yet been implemented. "There's a resistance on the part of the industry that the database will get misused and cause costly regulatory actions," Lacey said

RECOMMENDATION | Many experts believe GAIN, or a similar program, should be implemented.

Spend more on research

PROBLEM | Only a fraction of federal research money for aviation safety has gone into maintenance. The FAA usually spends about $150 million a year on research, engineering and development. About $1 million of that typically goes toward research aimed at preventing maintenance mistakes.

Purdue University professor Gary Eiff, a certified mechanic and aviation expert, calls the amount of money available for maintenance research "woefully inadequate." After a series of crashes linked to pilot error in the 1960s, '70s and '80s, the industry took many steps to avert the problem. "We have not seen a parallel in maintenance," Eiff says. "There hasn't been the same pressure for errors reduction."

RECOMMENDATION | Spend more on studies to determine how maintenance mistakes could be prevented.

Solutions compiled by staff writers Ted Reed and Ames Alexander.

Special Report | A Summary

TODAY | Aviation safety experts and members of Congress say it's time for the airline industry to focus on maintenance. They say the airlines and the Federal Aviation Administration that regulates them must do a better job overseeing outsourced service work and repairs.

Despite the trend toward farming out maintenance, documented in an Observer investigation published this week, the airlines remain responsible for the work that's performed.

"They can't outsource responsibility," said John Lauber, vice president of safety and technical affairs for Airbus and a former member of the National Transportation Safety Board.

In the past, the airline industry has been successful at focusing on a problem and solving it. The number of crashes caused by pilot error and weather have dropped dramatically because of better technology, design and training.

SUNDAY | Maintenance mistakes increasingly play a role in fatal airline accidents, but the industry hasn't made fixing the problems a priority.

MONDAY | The crash in Charlotte of Flight 5481 illustrates much of what can go wrong in the maintenance safety system.

TUESDAY | Mechanics say cost-cutting pressures make it harder for them to do their jobs right.

Special Report Staff

REPORTERS
Ames Alexander (704) 358-5060
aalexander@charlotteobserver.com
Ted Reed (704) 358-5170
treed@charlotteobserver.com
Elizabeth Leland (704) 358-5074
eleland@charlotteobserver.com

DATABASE EDITOR
Ted Mellnik (704) 358-5028
tmellnik@charlotteobserver.com

COPY EDITOR | Shelly Shepard
DESIGNER | Michael Tribble
NEWS GRAPHICS EDITOR | Wm. Pitzer
PHOTO ILLUSTRATION | L. Mueller
RESEARCH | Sara Klemmer
EDITORS | Cheryl Carpenter, Marion Paynter (research), Tom Tozer, Peter Weinberger (photography).
PROJECT EDITOR | Gary Schwab

On the Web

Read the previous installments of this special report online at:
www.charlotte.com/mld/charlotte/news/special_packages/planes/