

Pylon-Related Bulletins Issued Earlier

By Jeffrey M. Lenorovitz

Los Angeles—Engine pylon attach points on the McDonnell Douglas DC-10 have been the subject of several bulletins issued by the aircraft manufacturer in recent years. These pylon-to-wing attachments for the Douglas transport's No. 1 and 3 wing-mounted engines have become the center of attention in the investigation of last month's American Airlines DC-10 crash at Chicago.

Service bulletins are notifications issued by the aircraft manufacturer that usually detail design changes or modifications for a particular aircraft type. They generally outline action—either optional or mandatory—that should be carried out by airlines operating the equipment.

A Douglas Aircraft Co. service bulletin dated Oct. 31, 1975, discussed replacement of the pylon aft bulkhead attachment monoball bearings on the DC-10's wing-mounted engines. The pylons attach to the aircraft's wings at three points, and the aft attachment affected by this particular service bulletin is the farthest aft of the three.

At the time the bulletin was issued, seven operators had reported 11 instances of cracks in the left and right wing pylon aft bulkhead monoball bearings. According to the bulletin, cracks were detected in bearings on aircraft that had logged 1,500-8,000 flight hours.

The notification stated that continued operation with a cracked monoball could result in further damage to the wing-eyon aft bulkhead attach structure.

"Replacing the monoball bearing with a

redesigned bearing having a thicker ball hub and a ball made from a more ductile material will minimize the possibility of bearing cracks," the bulletin stated.

The monoball bearing is not a true ball-type bearing, but rather a spherical section with a hole in the middle through which a metal bushing is placed. A bolt then is inserted through the bushing, with retainers on either side of the bushing to hold the bushing in place inside the monoball bearing. The monoball bearings allow a small amount of movement to provide a single point load transfer regardless of the direction of the loads, according to McDonnell Douglas engineers.

If damage to the aft bulkhead was detected, the bulkhead's monoball mounting holes should be enlarged and a new oversize bearing installed, the 1975 bulletin said.

An FAA official at the agency's Western Region said modifications outlined in the bulletin had been accomplished on the American DC-10 that crashed near O'Hare International Airport shortly after takeoff May 25 following separation of the left engine and pylon assembly from the wing (AW&ST June 4, p. 12).

The 1975 notification stated that the service bulletin was FAA approved and compliance with the outlined action was optional, based on the operator's experience.

Total time required for the replacement/modification was estimated at 130 man hours, or an elapsed time of 17 hr.

The bulletin recommended that operators perform the modification during engine removal, and it listed several steps involved in the process on the assumption that the engines were removed from the pylon before the modification was begun.

This service bulletin superseded an earlier notification that also concerned the pylon aft attach fittings. The earlier bulletin, dated Mar. 18, 1975, covered the inspection of the monoball in the aft attach fitting and of the fitting's attach bolt journal bearing.

The March bulletin said inspections

McDonnell Douglas Criticizes Grounding

Long Beach, Calif.—McDonnell Douglas Corp. officials quickly responded to the Federal Aviation Administration's suspension of the DC-10 type certificate last week, calling the move an "extreme and unwarranted act" and reaffirming their faith in the integrity of the aircraft's design.

A statement issued by McDonnell Douglas' Douglas Aircraft Co. said the cracks in the DC-10 Series 10 engine pylons "have been found only on aircraft operated by airlines whose past procedures for removal and reinstallation during maintenance of engines and pylons as a unit have been contrary to McDonnell Douglas recommended procedures. These airlines are now conforming to the recommended procedures."

A section of the DC-10 aircraft maintenance manual includes a series of 44 steps for removal of the engine mount pylons, including step 6A, which calls for removal of the engine and refers operators to another section in the manual that gives specific steps for engine removal.

There have been 275 DC-10s delivered for use by eight domestic and 33 foreign airlines since the first delivery to American Airlines and United Airlines during July of 1971. The FAA awarded a type certificate authorizing commercial operation of the DC-10 the same day.

Prior to the FAA's suspension order last week, there were 110 Series 10 aircraft in service with seven airlines and 134 Series 30 with 33 predominately foreign air carriers. More than half of the 110 Series 10 DC-10s delivered have been purchased by United and American Airlines. There have been 31 Series 40 aircraft delivered.

The FAA suspension order stated that McDonnell Douglas could appeal the action within 10 days from its receipt by filing a notice of appeal with the National Transportation Safety Board's (NTSB) Office of Administrative Law Judges, but that the suspension would remain in effect pending any proceedings before the NTSB.

John Brizendine, President of McDonnell Douglas' Douglas Aircraft Co., broadcast a message to Douglas employees here over the firm's public address system after the FAA issued its suspension order. "This action on the part of the FAA is unprecedented in the history of our industry and is totally unwarranted based on all of the facts available to us," he said.

Production of the DC-10 continued at the Douglas Long Beach plant last week. The company planned to produce 41 DC-10s this year and had delivered 18 prior to receipt of the FAA suspension.

Initial assembly has begun on the first USAF/McDonnell Douglas KC-10 advanced tanker cargo aircraft (ATCA). The military derivative of the DC-10 convertible freighter transport is to be built on the DC-10 commercial aircraft production line, and is intended to serve as an air refueling aircraft and cargo carrier.

Douglas officials said they are continuing engineering efforts on stretch versions of the DC-10 and have discussed sale of the aircraft with various airline officials. Three stretch versions envisioned are a 40-ft. domestic stretch designated the Series 61, a 26.7-ft. international stretch called the Series 62, and a 40-ft. international stretch, the Series 63.

should be made every 3,000 flight hours or until the bearing is replaced with a new monoball bearing.

This notification also contained instructions for operators if a single crack was detected in the monoball bearing.

"If one crack is evident, conduct repetitive inspections per paragraph 1 (outlining the visual inspection procedure) at intervals not to exceed 1,000 flight hours for additional cracks. Bearings may be continued in service for a period not to exceed 3,000 flight hours," the bulletin said.

Crack Development

When the bulletin was issued, five DC-10 operators had reported six instances of crack development in the monoball. These cracks were visible on the forward side of the bearing in the 3-5 o'clock position, the bulletin said. The aircraft on which cracks were found had logged approximately 6,800 flight hours.

Based on evaluations conducted after issuances of the March, 1975, bulletin, Douglas followed up with the October, 1975, notice that recommended replacement of the bearings.

A separate service bulletin—issued in February, 1978—discussed the lubrication of the upper and lower monoball bearings on the forward attach point of the pylon assembly.

According to the notification, eight operators reported unsatisfactory performance of the dry lubricant used on these monoball bearings.

"This condition is due to the wear of the dry lube finish on the surface of the monoballs and the pressure of corrosion pits on the surfaces which lose the dry lube finish," the bulletin said.

"Corrosion pits have developed on bearings having logged 2,000 flight hours. If not corrected, the corrosion problem would continue to be a maintenance problem and the bearings could possibly seize," according to the bulletin.

Monoball Bearings

At the time the notification was issued, some aircraft had been fitted with dry lube monoball bearings on the forward attach point, and the bulletin recommended these bearings be hand pack lubricated as the first phase of a two-step compliance procedure.

In the second phase, the plugs for the two monoball bearings were to be modified by the addition of lubrication fittings, and the dry lube or Teflon-lined monoball bearings were to be replaced with lubricated bearings.

According to the 1978 bulletin, the Phase 1 action was accomplished on some aircraft prior to their delivery by Douglas, but these particular transports still required the Phase 2 action.

The bulletin—which had FAA approval—recommended the modification work be accomplished at the operator's convenience.

Continental Using Special Removal Procedure

Los Angeles—Special procedure for the removal and replacement of the McDonnell Douglas DC-10 wing-mounted engine and pylon as a single component has been used by Continental Airlines maintenance personnel.

Methods used by DC-10 operators in the removal and replacement of the aircraft's No. 1 and 3 engines became a point of contention last week in the wake of the FAA's suspension of the DC-10 type certificate.

The Continental removal procedure was formulated after the aft bulkhead mount on the pylon was cracked in separate instances during ground handling of the engine and pylon as a single unit. The first occurred last December, according to the airline.

Based on this experience, Continental's shop personnel designed an alignment fixture to prevent a recurrence of the incident.

Before the alignment device could be manufactured, the airline had to remove another engine and pylon. When they were removed as a single unit, the aft pylon fitting again was cracked in the process—even though maintenance personnel exercised extreme care in the process, the official said.

"This crack was repaired and we then decided not to perform any such additional changes without the alignment fixture—which was expedited out of the shop for use by our personnel," the official said. "We have changed seven since then without any problems. Our procedure is just as good as the one developed by Douglas."

A forklift fitted with sensitive load cells has been used by Continental in the engine/pylon removal procedure.

DC-10 Grounding

Canceled Flights Disrupt Air Service for 70,000

Second grounding of 138 McDonnell Douglas DC-10s in the U. S. transport fleet caught airlines off guard last week, forcing cancellation of an estimated 400 flights and disrupting air service for as many as 70,000 travelers June 6. The grounding was the result of FAA revocation of the DC-10 type certificate.

The latest dislocation was expected to be costly for airlines that own DC-10s.

Eliot M. Fried, analyst with Shearson Hayden Stone, Inc., said the airlines were losing traffic and stood to lose profitability because their overhead costs were remaining at the same level while being spread over fewer units.

Markets most deeply affected by loss of service were Hawaii, major coastal cities and Chicago, frequently a midway stop on transcontinental flights.

Still, the airlines found it relatively easy to cope with the loss of the DC-10 from their fleets since, for the two previous months, they had been moving the estimated 800,000 travelers per day in the U. S. without the service of then-struck United Airlines, the nation's largest carrier, with its fleet of 340 aircraft.

United, back in service 10 days, canceled 90 of its 1,600 flights June 6. Its 37 DC-10s, used primarily on the airline's medium- to long-haul flights, were parked in scattered locations around the U. S.

Included among them was the DC-10 Series 10 in one of which, on May 28, United mechanics found "severe, significant" damage to the pylon web that led to the first grounding May 29 at the order of Langhorne Bond, administrator of the Federal Aviation Administration (AW&ST June 4, p. 12). The aircraft was released

for flight June 5 after repairs were completed in Chicago.

Loss of the DC-10 also was hurting National Airlines, which flies its 16 DC-10s on 44 of its 280 daily flights. The overnight FAA grounding order did not give National sufficient time to consolidate or reroute other flights, forcing cancellations through the day.

Without the DC-10s, National was faced with the possible cancellation of its Miami-Zurich inaugural flight scheduled for June 24. As of last week, National had no other plans to use any aircraft other than the DC-10 Series 30 for the trip.

Northwest Airlines, with its 22 DC-10 Series 40s, also canceled flights as a result of the blanket grounding. The carrier placed Boeing 747 and Boeing 727 aircraft in service to replace DC-10s on several flights.

A Northwest spokesman said examination of the pylons in its DC-10 Series 40 aircraft had turned up none of the defects that were reported in the DC-10-10s.

"The DC-10 Series 40 is a heavier aircraft, with an added set of landing gear in the middle, and is powered by Pratt & Whitney engines instead of GE [General Electric] engines," a spokesman said.

The grounding caught Trans International Airlines with one DC-10 en route