

# **PTI Technologies Inc.**

January 8<sup>th</sup>, 2009

Ms. Lorenda Ward  
Investigator In Charge  
National Transportation Safety Board  
490 L'Enfant Plaza, SW  
Washington, DC 20594

Subject: PTI Technologies Party Submission for NTSB Investigation DCA07MA310

Ref: 1) American Airlines Flight 1400, Boeing MD-82 N454AA, St. Louis, MO, September 28<sup>th</sup>, 2007, Engine Fire investigation, NTSB Investigation ID: DCA07MA310  
2) NTSB Tech Review Teleconference Meeting, November 19<sup>th</sup>, 2008  
3) Powerplants 8 – Factual Report of Group Chairman – Addendum 1 – Engine Starting System  
4) Maintenance Records 11 – Factual Report of Group Chairman  
5) NTSB Laboratory Factual Report, Number 08-049  
6) Maintenance Records 11 – Attachment 12 Left Engine Fuel & Filter – Clean/Replace Work Card 7751, dated 3/16/2006  
7) Maintenance Records 11 – Attachment 13 Right Engine Fuel & Filter – Clean/Replace Work Card 7752, dated 3/16/2006

Dear Ms. Ward,

PTI Technologies (PTI) would like to thank the NTSB for the opportunity to participate as a party member in the Reference (1) investigation. As requested during the Reference (2) technical review, please find incorporated herein PTI Technologies' submission on the subject accident.

## **Investigation Role**

In support of the National Transportation Safety Board (NTSB) investigation of the Ref (1) accident, PTI, as the Air Start Valve Filter manufacturer, acted as technical advisor on the aforementioned component. In support of this role PTI provided to the NTSB all relevant and/or requested technical documentation relative to its design, development and qualification. PTI provided production build procedures and lot records. PTI conducted supportive testing and inspections and published all findings to the NTSB.

In support of Party member requests; PTI supported the expedited production needs of American Airlines to accommodate a fleet replacement effort and addressed all questions directed to it by American Airlines as well as other party members directly.

## **Air Start Valve Filter**

PTI Air Start Valve Filter, PTI P/N 11-10579, was designed, qualified and approved for use against the requirements of DAC specification 7958540-1 for use on the DC-9 aircraft. During the 40 plus years subsequent to this approval:

- The component received expanded eligibility for use on MD-80 series aircraft.
- PTI has manufactured the component on a consistent basis, for both Douglas/Boeing and/or end user consumption, with more than 7600 units being produced over the last 20 years.
- PTI is unaware of any similar filter damage reports from any end user on any of the platforms for which it is eligible.

Examination of the Air Start Valve Filter from this accident and others received from American Airlines, Reference (3, 5), indicate that the Filter may be experiencing fatigue damage in the filter media material. This damage, if allowed to propagate over time, is evidenced as resulting in the eventual disintegration and separation of the filter material from its associated hardware.

## **Maintenance**

PTI has since December of 1989 published a Component Maintenance Manual (CMM) with Illustrated Parts List for PTI P/N 11-10579, with the latest release being Revision Number 4 dated May 2000. All

501 Del Norte Boulevard • Oxnard, California 93030-7983 • (805) 604-3700 • Fax: (805) 604-3701  
filters@ptitechnologies.com • www.ptitechnologies.com

An ESCO Company



Certified to ISO 9001:2000, TS 6949:2002, AS9100:2004

revisions of this document have been submitted for review and comment to Douglas/Boeing. Summary recommendation in this document has been to:

1. Disassemble the filter element from the filter case.
2. Discard the metal seal.
3. Clean and dry the filter element and case.
4. Visually examine all components for signs of damage or inadequate cleaning.
5. Repair or replace parts failing the visual check.
6. Assemble components with new seal and lockwire to complete assembly.

The evidence presented from the accident leads PTI, based its expertise of this and similar products, to conclude that American Airlines' maintenance practices were inconsistent with the practices outlined above and as cited PTI CMM, as well as those of References (6, 7). The basis of this conclusion is two fold:

1. The extent of damage incurred by the Air Start Valve Filter removed from the accident was extensive, Reference (3, 5), and was likely the result of the Filter remaining in a damaged state for a significant period of time. The recommendation for disassembly of the filter assembly to facilitate cleaning would have, to a qualified mechanic, resulted in the rejection of the filter for this gross level of damage, even without an inspection criterion, and thus had an outcome requiring replacement. Thus PTI can only conclude that American Airlines did not follow the disassembly recommendation of the PTI CMM nor those of References (6, 7).
2. Further to the above point; the recommendation for inspection, post cleaning, for the presence of damage would have, to a qualified mechanic, resulted in a repair or replace disposition for the Filter removed from the Reference (1) accident. It is surmised that this disposition would have occurred at the evidenced damage level and most probably would have also occurred much earlier at a much less severe level of damage if such procedures had been followed. Thus PTI can only conclude that American Airlines did not follow the inspection recommendation of the PTI CMM.

## **Conclusion**

As it pertains to the Air Start Valve Filter, PTI concludes the following:

1. The Filter may be experiencing fatigue related damage of as yet determined cause, Reference (3, 5).
2. At the time of the accident, the maintenance practices of American Airlines were inconsistent with those recommended by PTI and those of American Airlines and PTI believes that these inconsistencies contributed to American Airlines' inability to determine probable root cause and take the necessary corrective actions relative to the Filter, Reference (4).

## **Actions**

As a result of the investigation, PTI will:

- Cooperate with Boeing in any continued evaluation of the evidenced Air Start Valve Filter failure mode and will, under the direction of Boeing, implement any corrective actions that result from these evaluations.

If you have any questions regarding this submission and/or the material provided herein, please do not hesitate to contact me directly.

PTI Technologies Inc.

Sincerely,



Rowland Ellis  
VP, Engineering  
805-604-3877

[rellis@ptitechnologies.com](mailto:rellis@ptitechnologies.com)