

In-Service Data Program Helps Boeing Design, Build, and Support Airplanes

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The Boeing In-Service Data Program (ISDP) allows airlines and suppliers to securely share fleetwide reliability data with other ISDP members. The program allows Boeing to better support member airlines by using airline data to locate and resolve issues specific to each operator. Additionally, the ISDP enables Boeing to improve the entire fleet by closely analyzing issues such as early component removals.

ISDP began in 1994 as a way to gather in-service data for the Boeing 777 airplane after its initial delivery in May 1995. The ISDP-collected data helped verify the reliability of the new airplane's systems and components. What began as a standalone Boeing database expanded into a shared system with the realization that this data would also be extremely valuable to suppliers and 777 airlines. Today, ISDP covers all Boeing airplane models.

This article provides an overview of the ISDP, explains how the program works, describes how Boeing uses ISDP data to support both individual airlines and the fleet in general, and outlines the overall benefits of the program.

OVERVIEW OF ISDP

ISDP was designed to gain insights into the performance and maintenance requirements of the 777 as it went into service. The concept was to electronically exchange airplane maintenance data, including component removal, repair, and shop teardown data that each company collected, and place it into a common database for all the participating companies to access and share.

After its initial implementation on the 777 program, operators, suppliers, and Boeing recognized the value of extending the ISDP to other airplane models and increasing the number of participating members (see fig. 1). Now more than 50 airlines and more than 30 suppliers participate in ISDP, providing data on all Boeing models. The program is available at no charge to all participating airlines and suppliers.

ISDP provides access to data only to authorized users within each member company. Each must sign a proprietary information agreement prior to participating in the program and accessing data. Each participating company has separate secure network access to the data and agrees to use the data for reliability purposes only. Views of data are tailored to the account type or actual user. Suppliers cannot view other suppliers' components. Airlines can view all other airline and supplier member data.

HOW ISDP WORKS

All of the companies participating in the ISDP gather similar airplane, component, and system reliability data (see fig. 2). A "Data Dictionary" containing standardized record layouts for each data subject enables data

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PERCENTAGE OF BOEING FLEET IN ISDP

Figure 1



from the different companies to be exchanged and stored in a common format in the database.

Each month, suppliers and airlines send raw data for each pertinent data subject to Boeing for processing. Boeing then screens the suppliers' and airlines' files for errors, places the processed data into an NCR Corporation Teradata enterprise data warehouse at Boeing, and stores it in a relational database.

ISDP's Data Dictionary, which defines data exchange record layout and data element definitions, was used as the baseline by the Air Transport Association (ATA) in the creation of a new SPEC2000 chapter: Chapter 11, Reliability Data Collection/Exchange Standard. Chapter 11 of the SPEC2000 e-business system is the industry standard for reliability data collection and exchange using an extensible markup language (XML) format.

Access to the processed data is provided through the Web portal MyBoeingFleet.com, using a Boeing-developed Web-based data extraction and reporting tool called Fleet Reliability Statistics, and BI Query, an enterprise-strength query and reporting application from Open Text Corporation. The data can also be accessed using any software that has an open database connectivity interface compatible with Teradata.

Standard reports are available for management visibility and trend analyses. These reports — which can be accessed by operators through MyBoeingFleet.com and by suppliers through the Web portal Boeing Partners Network — contain monthly flight hours and landings, schedule interruptions, line maintenance action rates, removal rates, failure rates, shop findings, component rejection rates, and other data, all of which are critical in monitoring the reliability performance of the airplane fleet (see fig. 3).

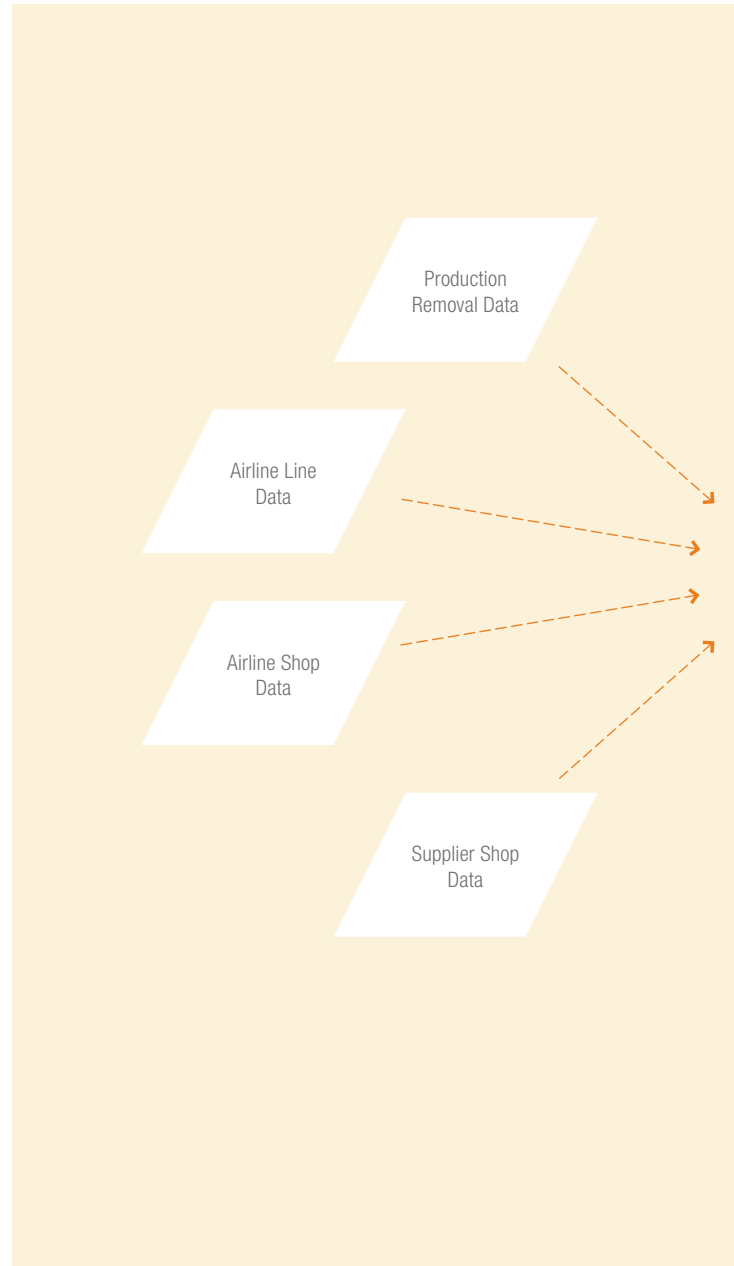
In addition to line maintenance data, ISDP is now able to collect base maintenance records, such as scheduled maintenance and service bulletin

DATA PROVIDED BY AIRLINES	DATA PROVIDED BY SUPPLIERS
Aircraft hours and landings Aircraft events (Schedule interruptions) Logbook Line replaceable unit removals Scheduled maintenance Service bulletin Shop findings (component repair)	Shop findings from: <ul style="list-style-type: none"> ■ Airline-returned components ■ Boeing factory- and receiving-rejected components ■ Components returned for modification

ISDP DATA PROVIDED BY AIRLINES AND SUPPLIERS

Figure 2

How ISDP component removal data improves the reliability of in-service airplanes



ISDP DATA-DRIVEN PROCESS

Figure 3

ISDP allows cost, trend, root-cause, and other analyses to be performed using the same data resource.

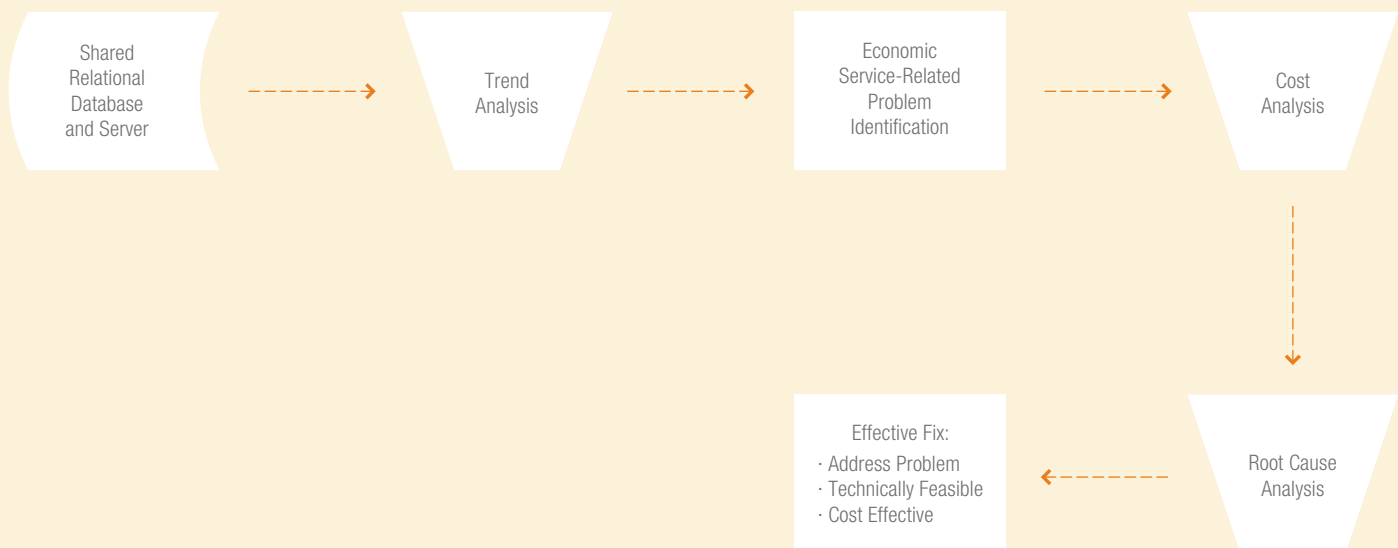
ISDP can identify potential reliability improvement areas by highlighting unusually high component removal rates.

For example, an excerpt of ISDP component removal data for a one-year period showed that an integrated drive generator (IDG) had 76 removals. This could be an indication of poor maintenance practice, extreme operational conditions, poor troubleshooting, or poor component or system reliability.

Shop findings showed that the IDG had a 100 percent justified removal rate (i.e., no no-fault-found [NFF] findings), indicating the problem was with the component itself.

The data excerpted also showed that later configurations of the IDG had low removal rates. The latest reconfiguration of the IDG had 11 removals with no NFFs.

Given this information, one recommendation to operators for improving IDG performance was to upgrade to a newer part configuration. Another option was for operators to make improvements (as outlined in the Component Maintenance Manual) to the IDG currently being used to bring it up to the level of the newest configuration.



Prior to ISDP, most airlines provided only flight hour and schedule interruption data, which limited the support Boeing could provide. The additional logbook and removal data provided through participation in this program allows more complete support for member airlines and the entire fleet.

incorporation. This additional data will provide complete visibility to all aspects of maintenance activities and enable Boeing engineers to become more proactive. For example, Boeing maintenance program engineers are planning to use this comprehensive data to optimize the scheduled maintenance requirements for the Boeing fleet. This would enhance safety and reliability of commercial airplanes, improve airplane availability, and achieve maintenance cost efficiencies.

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HOW BOEING USES THE ISDP DATABASE

Boeing uses the ISDP database in two major ways:

- *Trend monitoring* to track routine airplane performance using these parameters: flight hours and landings, component removals and failures, component NFFs, airplane schedule reliability, and maintenance action rates. The processed data is also used to understand, in greater detail, what is driving the high-level trend data. For instance, if there is a change in the mean time between unscheduled removal for a particular component, the user can find out why by accessing data for that specific component as illustrated in figure 3.
- *New airplane development*, including system improvements and requirement setting. For example, ISDP fault analysis information has helped Boeing design the new 787 Dreamliner by providing historical data about various components. ISDP data was also instrumental in creating technical performance measurements for schedule reliability and maintenance costs allocations for the 787.

Boeing uses the database to perform analyses as well. For quality assurance, Boeing uses the data to compare factory functional test results with actual in-service removal and failure results. Boeing also uses the database to understand airline and airplane in-service performance as well as spares allocations.

BENEFITS OF ISDP

The ISDP enables Boeing and airlines to:

- Determine whether specific problems are unique.
- Assess whether a mean time between unit replacement is normal.
- Compare NFF rate among airlines.
- Compare repair and removal data to determine which modification has a better payback.
- Perform contingency planning for failures that might occur in the future.
- Efficiently review the same data by multiple parties.
- Develop benchmarks for operations.

ISDP data is used to identify component problems, enabling Boeing to be more proactive with suppliers and engineering groups to solve these problems, instead of driving corrective action following airline feedback.

ISDP component removal data is provided to Boeing production quality teams monthly. This data helps these groups prioritize their investigations for early component removals in the factory, improving overall delivery quality.

ISDP can also be used in a self-service manner to compare specific component removals by an airline to the entire fleet, allowing the airline to investigate the cause.

SUMMARY

The Boeing In-Service Data Program allows Boeing to better support member airlines by using airline data to locate and resolve issues specific to each operator as well as fleetwide issues. It also enables airlines to securely share fleetwide reliability data with other member airlines. The program is available to any airline or supplier with a need for reliability information. Data is available for all Boeing airplane models.

For more information, please contact John Kneuer at john.a.kneuer@boeing.com. [A](#)

How to join ISDP

1 Sign the proprietary information agreement.

To become an ISDP member, an airline must first sign a proprietary information agreement controlling the use of other members' data in the system, which can be obtained by contacting John Kneuer at john.a.kneuer@boeing.com.

2 Complete computing access and account paperwork.

Boeing provides operators with computing access and account forms that need to be completed to allow access to the data file transfer application (Data Upload Service) and to the database via the data extraction tool.

3 Map airline data to ATA SPEC2000 Chapter 11.

Identify where the data fields in the ATA SPEC2000 Chapter 11 standard are located in the airline maintenance database to ensure that all required fields are available.

4 Create test data file.

Create an extended markup language (XML) formatted test data file for each data subject according to the ATA SPEC2000 Chapter 11 standard and submit the file to Boeing for testing.

5 Resubmit a corrected file, if necessary.

After validation testing, make any necessary corrections to the file according to Boeing's feedback and resubmit the file to Boeing.

6 Obtain reporting tool access.

After all test data files pass validation, the airline begins providing monthly data files and Boeing provides access to the data via the Fleet Reliability Statistics tool on MyBoeingFleet.com.