

Maintenance Performance Toolbox

by Rex Douglas, Product Manager,
Maintenance Performance Toolbox

THE TOOLBOX IS DESIGNED
TO HELP OPERATORS IMPROVE
SYSTEM TROUBLESHOOTING
AND REDUCE REPAIR
TURNAROUND TIMES.

The Boeing Maintenance Performance Toolbox is an online system that provides operators with up-to-date fleet maintenance information using intelligent documents and visual navigation methods. The Toolbox is designed to improve the performance of technical operations staff responsible for airplane system troubleshooting, structural repair record management, parts management, task card management, content authoring, and training. The Toolbox is available through subscription to a hosted service delivered via the Web portal MyBoeingFleet.com, and is built on an industry-standard J2EE architecture to ensure maximum security, availability, reliability, and scalability.

Operators today have the substantial task of creating, managing, distributing, and accessing vast amounts of maintenance information. This task is complicated by the composition of today's fleets, which often comprise both purchased and leased airplanes. The Boeing Maintenance Performance Toolbox uses two-dimensional (2D) and three-dimensional (3D) graphical user interfaces, combined with advanced data mining and search capabilities, to increase operators' efficiency and effectiveness in locating and accessing relevant maintenance information. It also allows operators to deploy maintenance performance solutions that meet their specific needs at lower cost to their in-house maintenance organization or external service providers.

For example, Maintenance Performance Toolbox facilitates the:

- Organized documentation of structural damage and repair.
- Communication of structural damage and repair situations with external service providers and Boeing.
- Reuse of repair information for similar structural incidents.
- Identification of systemic structural issues and problems within a fleet.
- Transfer of structural incident information during lease transfers.

MANAGING MAINTENANCE INFORMATION

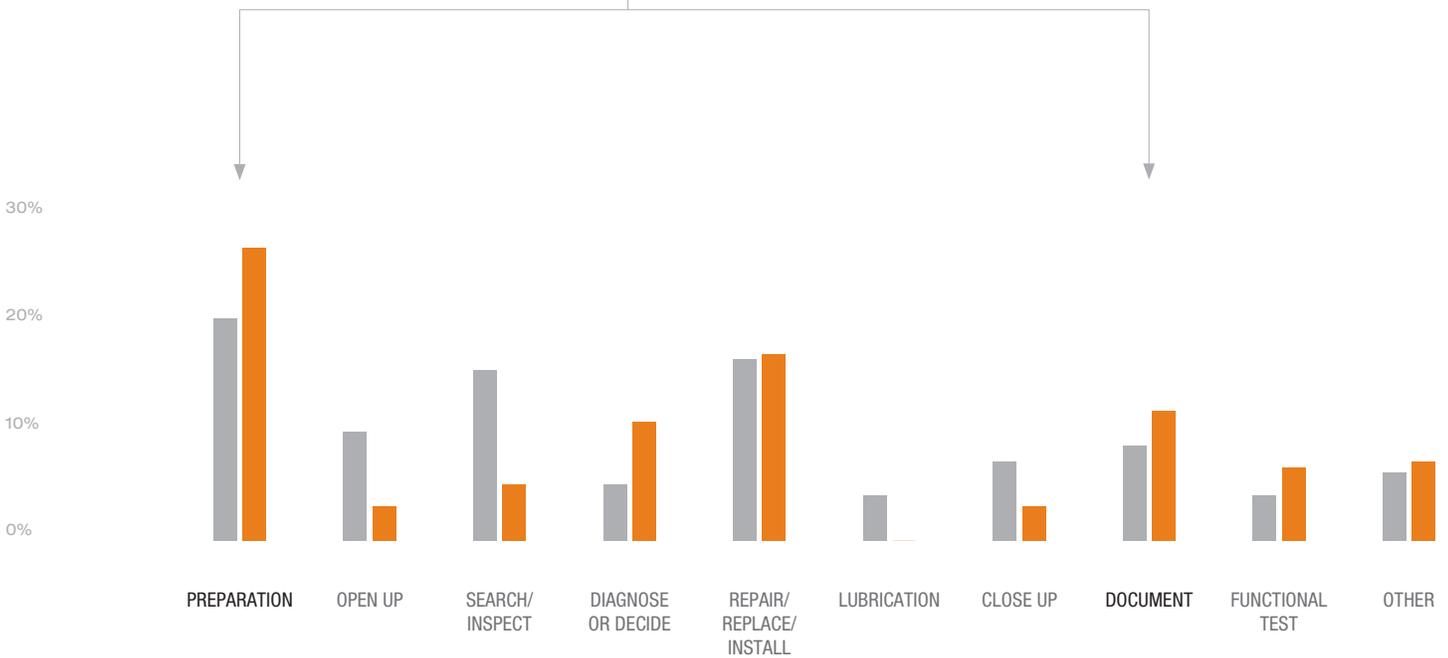
Figure 1

- EXPERIENCED EMPLOYEE
- EMPLOYEE

Boeing research shows that maintenance personnel spend about 30 to 40 percent of their time researching and documenting maintenance activities.

30% Experienced Employee
40% Employee

Cumulative % of time in both preparation (research) and documentation activities



IMPROVING MAINTENANCE PERFORMANCE

Even with electronic data and document management systems, the time required to research and document maintenance information is a significant percentage of maintenance work. Boeing discovered that maintenance personnel spend as much as 30 to 40 percent of their time researching and documenting information (see fig. 1).

Because CD-ROMs and document management systems are unable to provide maintenance information in a format that optimizes maintenance performance for operators, Boeing’s goal in developing the Maintenance Performance Toolbox was to increase efficiencies and help operators become more effective. The Toolbox:

- Uses 2D schematics of airplane systems as “graphical” tables of content that enable point-and-click access to all information related to a specific airplane location or component.
- Uses advanced data-mining techniques and search capabilities to ensure that all relevant information (e.g., fault code lookup, repair history, maintenance procedures, part numbers, maintenance tasks) is part of the troubleshooting process.
- Automates the workflow required to review and approve documentation revisions and changes, while providing real-time editing tools that allow maintenance personnel to create and add their own documentation and notes.
- Integrates on-demand training within the maintenance information so it is available for reference and review where and when it is needed.
- Delivers capabilities as a managed, hosted service — securely accessible globally — and eliminates the costs associated with information technology (IT) infrastructure and data distribution.

The Maintenance Performance Toolbox uses intelligent graphical user interfaces to streamline access to specific maintenance information and improve the efficiency and effectiveness of maintenance and engineering staff.

SPECIFICALLY DESIGNED TO IMPROVE MAINTENANCE PERFORMANCE



A new maintenance support solution to improve the efficiency and effectiveness of maintenance and engineering staff

Tools deployed stand-alone or combined to create “solutions” that meet specific operational needs

Delivered as a hosted service, securely accessible globally

Intelligent graphical user interfaces to streamline access to specific maintenance information

INTELLIGENT, GRAPHICAL USER INTERFACES STREAMLINE ACCESS TO SPECIFIC MAINTENANCE INFORMATION

The Maintenance Performance Toolbox uses 2D schematics of airplane systems that enable point-and-click access to all of the information related to a specific airplane location or component (see fig. 2).

This intelligent graphical user interface allows maintenance personnel to quickly locate information about the exact area of the airplane that requires maintenance. For instance, instead of spending time searching manually or electronically through the Fault Isolation Manual to troubleshoot the problem and then through the Airplane Maintenance Manual (AMM) for repair information, maintenance personnel can click on 2D airplane system diagrams to retrieve line-replaceable-unit information, including maintenance procedures, troubleshooting information, parts data, wiring diagrams, maintenance tips, in-service activity reports, and service letters.

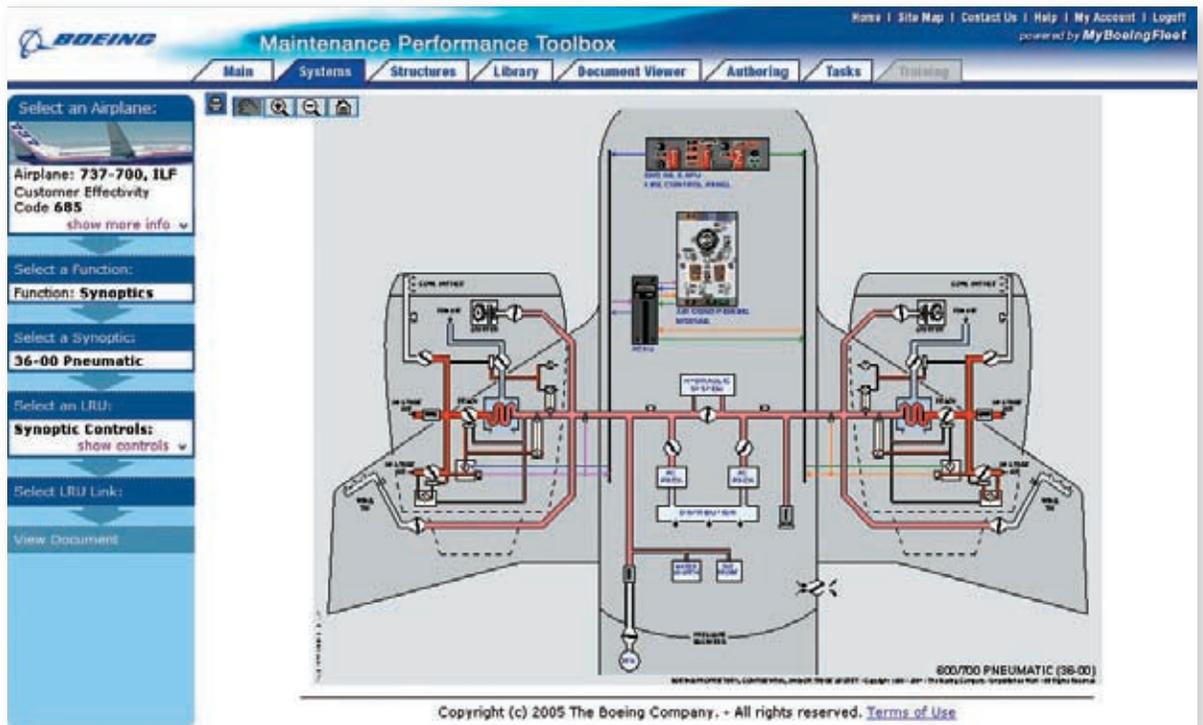
This same system can be used to locate troubleshooting information associated with central-maintenance-computer messages, fault codes, cabin faults, and flight deck effects. It also enables retrieval of part information directly from the airplane Illustrated Parts Catalog (IPC).

The location of structural damage can be indicated graphically on a 3D airframe model (see fig. 3). Clicking on a plotted “incident” provides information about that particular incident. Repair information is structured to standardize record contents and format. This enables operators and maintenance organizations to:

- Comply with recordkeeping requirements of regulatory authorities.
- Retain airplane values during transfers of airplane ownership by having proof-of-repair records.
- Share repair information for teams in different geographic locations in real time.

Because the Maintenance Performance Toolbox emphasizes a role-based design, it aligns with work activities (such as structures, maintenance control, engineering, and maintenance planning) to meet operators’ information needs. The graphical user interface streamlines access to information across all documentation. And the intuitive user interface and common look and feel minimize user learning curves.

Figure 2



ADVANCED DATA-MINING TECHNIQUES AND SEARCH CAPABILITIES LOCATE ALL RELEVANT INFORMATION

The vast amount of historical and engineering information available for Boeing commercial airplanes provides maintenance personnel with virtually everything they need to diagnose and repair most maintenance issues. However, the sheer quantity of information can make it more difficult to locate needed information in a timely manner.

The Maintenance Performance Toolbox uses advanced data-mining techniques and search capabilities to ensure that all relevant information — such as fault code lookup, repair history, maintenance procedures, part numbers, and maintenance tasks — from all documentation sources is part of the troubleshooting process. The Toolbox provides a common information repository for each fleet type and enables free text search across the entire document set.

These tools enable maintenance personnel to locate and use information sources that they may not otherwise have had time for. At the same time, the tools encourage visualizing and understanding airplane systems from a global perspective instead of viewing them simply in terms of their parts.

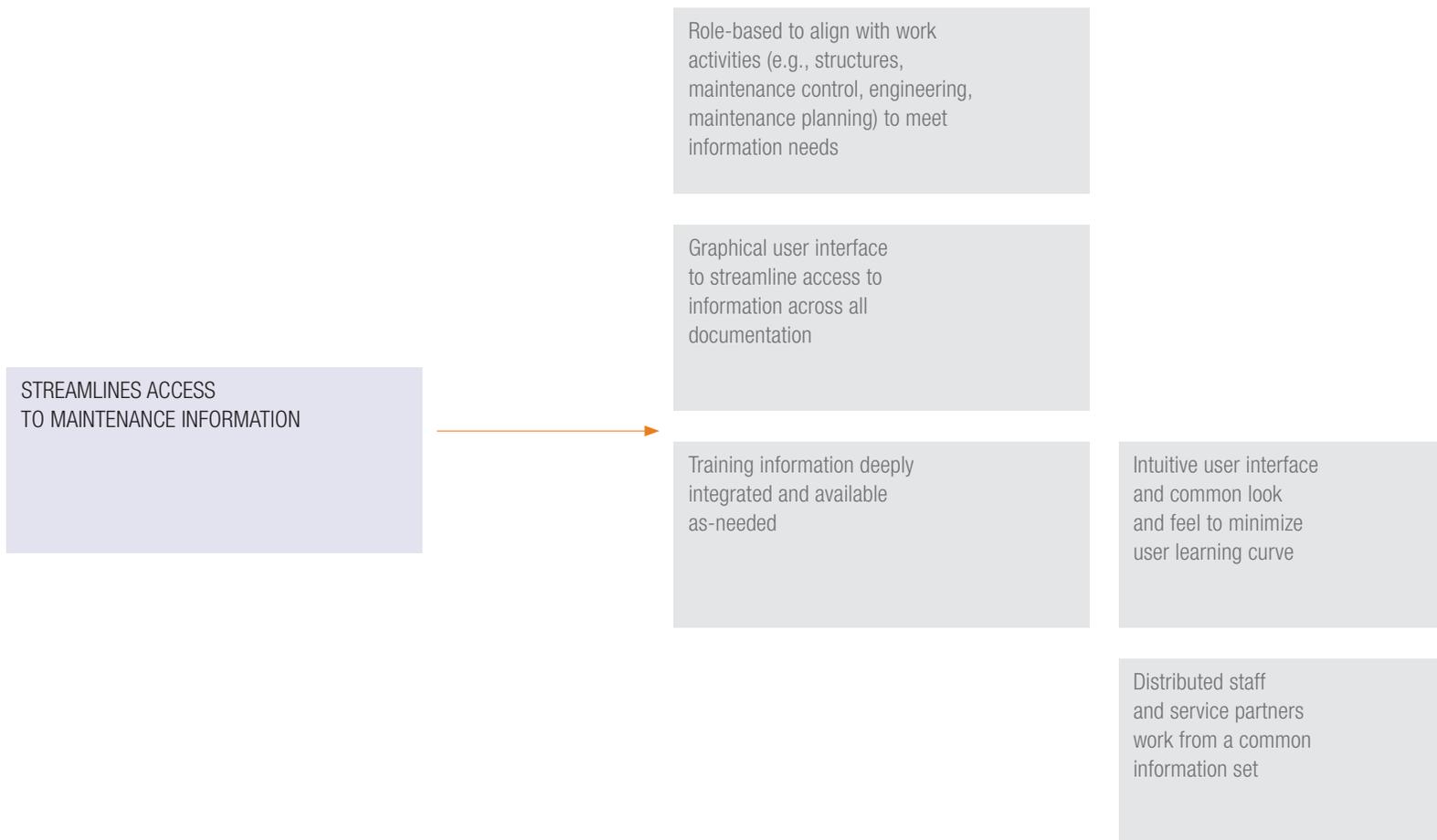
AUTOMATES WORKFLOW AND ALLOWS MAINTENANCE PERSONNEL TO CREATE AND ADD DOCUMENTATION AND NOTES

Operators need to be able to revise maintenance information for their specific operations and to distribute it to their workforce. The Maintenance Performance Toolbox automates the workflow required to review and approve documentation revisions and changes, while providing real-time editing tools that allow maintenance personnel to create and add their own documentation and notes, as well as online authoring of structured extensible markup language (XML) data.

The system enables editing of:

- Original equipment manufacturer's publication revisions.
- Airline documents.
- Airline revisions.
- Data supplements.

Three-dimensional airframe models make it easy to document and research structural incidents. Incidents can be plotted graphically to show exactly which part of the airframe was affected. Clicking on an incident brings up detailed information about it.



Operators can create and customize maintenance documentation sets to capture and reuse best practices and defined procedures. The Toolbox also includes the ability to manage documentation revisions and approval processes and allows for the configuration of promotion and publishing rules.

The Toolbox may also be used to automate task cards. It can:

- Keep task cards in synch with AMM revisions.
- Maintain complete audit trails for regulatory compliance.
- Organize and maintain task card collections to support maintenance program requirements.
- Create and assign task cards to specific airplanes, locations, and schedules.
- Transmit task cards.

INTEGRATES ON-DEMAND TRAINING

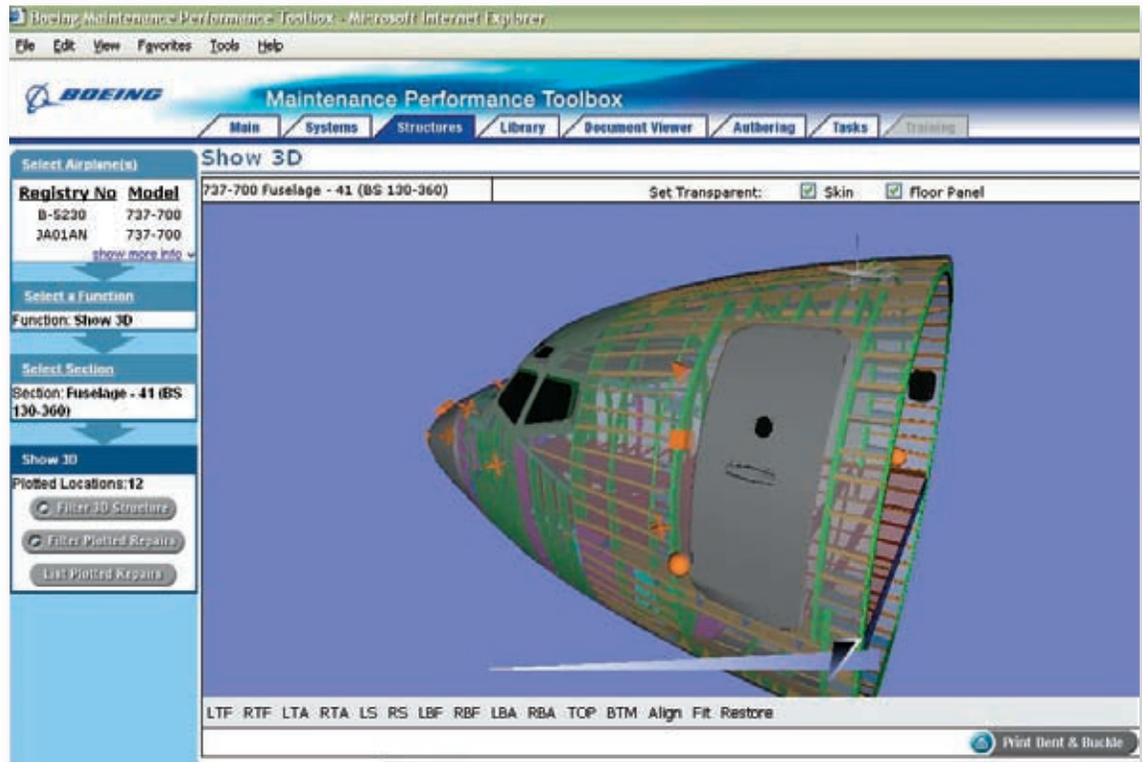
Future plans call for the Maintenance Performance Toolbox to integrate on-demand training within the maintenance information, making it available for reference and review where and when it is needed.

The Toolbox will provide direct access to up-to-date training information and offer access and navigation to existing and new training media. Additional training functionality will include links to desktop simulations.

A SECURE, MANAGED, HOSTED SERVICE

The Maintenance Performance Toolbox eliminates the costs associated with IT infrastructure and data distribution because it is a managed, hosted service — securely accessible globally — through MyBoeingFleet.com.

The Toolbox is available to operators as individual tools, providing operators the ability to deploy tools individually, or in combination, to match changing requirements.



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All tools are hosted on Boeing's highly reliable and secure infrastructure. This approach offers operators lower initial infrastructure costs, reduced ongoing IT maintenance burden, quicker deployments, and the most current, approved maintenance information.

SUMMARY

The Maintenance Performance Toolbox is designed to go beyond CD-ROMs and document management solutions to provide maintenance information in a format and functionality that helps operators optimize their maintenance performance. Its graphical interfaces, combined with advanced data-mining and search capabilities, reduce the time required to access and use maintenance information. The functionality it provides allows operators to effectively control and customize their maintenance information. The Toolbox can help operators improve airplane system troubleshooting, reduce repair turnaround times, eliminate redundant tasks, and maximize knowledge transfer and retention. The entire system is delivered as a secure, highly reliable hosted service that allows operators to deploy flexible maintenance performance solutions at lower cost. For more information, contact Rex Douglas at rex.b.douglas@boeing.com. **A**