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Paper Title: Improving Maintenance Operations Using Structural Data Visualization, Organization, and Archival Software

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Abstract: Maintenance activities rely strongly upon clear communication between the fleet, production, and engineering as well as upon the relative efficiency of each branch. To date, all in-service repairs (ISRs) and maintenance and production-generated requests for engineering disposition on the F/A-18 platform utilize antiquated and inefficient reporting procedures including such processes as hand-drawn mylar sheets, time-consuming PowerPoint presentations, x-y coordinate mapping, hand-drawn paper-based figures and tables, and even simple text-based email descriptions. Furthermore, the tools utilized by engineering to minimize the remedial and redundant workload required to effectively meet the fleet demand for damage evaluation and repair are similarly lacking in efficiency. These inefficiencies lead to longer than necessary turn-around-times (TATs) and, overall, more aircraft out of reporting status.

In order to revolutionize the damage reporting and engineering evaluation process, software was developed under a Small Business Innovative Research (SBIR) project that can capture damage locations and sizes in a model-based format from a simple picture taken of the damaged component with any commercially available digital camera. Rather than requiring artisans and fleet personnel to create time consuming and comparatively inaccurate hand drawings to depict damage location, the artisans need only take a single picture to give the engineer almost everything that is needed for evaluation, thereby reducing the artisan's reporting requirements and reducing hours of engineering workload down to minutes.

Currently, engineers must search for previous damage analyses in large paper-based file cabinets or, at best, folder-based PDF archives. These archived files are categorized by date and can potentially require hours of blind research by the engineer in order to determine if a previous analysis might be applicable to the current condition. However, the software also automatically archives all historically mapped damages in a model based format that becomes searchable by any tracked criteria that the engineer may find pertinent. Similarly, the software can use these archived damages to automatically generate trend reports for use in maintenance efforts including but not limited to: frequency of damages, damages accumulated within a specified time and frequency of damage locations in order to locate potential weak areas of the aircraft.

Prior to the use of this software, locating damages was tediously completed by hand measurements and best-guess work on the part of the artisans and engineers. Likewise, engineers were often unknowingly generating redundant workload due to the lack of a powerful archiving system that would allow for comprehensive damage evaluation. The software was developed in order to lay a more robust foundation for maintenance activities that helps to provide a more accurate and efficient maintenance

program; this leads to reduced costs to the fleet personnel, reduced engineering cost, reduced TAT, increased accuracy of analyses, and improved evaluation of aging aircraft to proactively handle damage "hot spots". Ultimately, this software helps to reduce the maintenance costs of the platform as a whole while simultaneously increasing the number of aircraft in active service.

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