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Next Generation FIS

Sierra Data Systems has been producing Flight Inspection Systems since 1975. The first computerized Flight Inspection System was delivered in 1984 and although it has continued to evolve, the overall functionality has remained unchanged. In the 18 years that have elapsed, technology has progressed at a staggering rate and features that seemed impossible to incorporate just a decade ago are today not only possible but readily available and is being offered to new and existing customers as part of our products.

Providing a Comprehensive FIS Solution

Sierra's original Flight Inspection System provided a text-based user interface and was really no more than a sophisticated data collector that had been specialized to calculate flight inspection results and compare them against tolerances. Although this remains the core responsibility of the system, additional features are being added to provide a more a comprehensive system that will aide the Flight Inspector in performing day-to-day tasks as well as providing an easy-to-use windows-based user interface that will be instantly familiar to operators.

One of the tasks that an inspector is required to perform is to determine which facilities need to be inspected and to provide a plan for completing the work. The new system has an advanced mission planning capability that will aid in the scheduling of inspections. This feature will store standard inspection parameters to allow for the streamlining of the inspection process while airborne. It will also track which facilities need to be inspected based on scheduled events or can be modified with custom parameters added by the operator. The inspection process will also keep track of all checks required in accordance to the FIS standard being used (ICAO, FAA, or user defined/local).

Another task is the creation of the facility inspection report that is usually filed with the regulatory agencies. The system provides a flexible final report feature that will allow the operator to customize the final report format and determine what data is to be included in the final report. The final report will be available for printing or archiving to a removable media for later use. If the appropriate data link equipment is available in the aircraft, the final

report could be uploaded automatically to a website thereby making it available instantaneously to ground station personnel.

Finally, the Flight Inspector may be required to perform data mining, a process in which the results of previous inspections are examined to identify patterns and establish relationships. The system provides sophisticated functionality that allows the operator to analyze data easily from previous inspections allowing the Flight Inspector unprecedented ability to view the historical performance of the facility.

CAPE

At the heart of Sierra's next generation system is the Common Acquisition and Processing Environment (CAPE) [1]. CAPE is a component-based software framework that was jointly developed by the FIS alliance over the last three years. It allows for the Alliance companies to design and develop their proprietary algorithms and positioning systems while using a common software framework. It provides members ability to share resources between the companies and provide a more stable software base. CAPE was developed to be platform independent, allowing the companies to respond easily to changes in the computer industry.

The initial CAPE development was concluded at the end of 2001. Sierra's implementation of its next generation system is in its early development stages and is using the CAPE software kernel. Although prototyping the system has begun requirements continue to be refined. One of our main goals is to provide an affordable way for our existing customers to upgrade to the new technology while providing a new modern flight inspection system option to future customers. Most customers that have one of Sierra's computerized flight inspection systems can be upgraded to the new technology by replacing the 68xxx processor with a new PowerPC processor (unless the system already has a PowerPC processor), replacing the graphics processor with a secondary Intel processor, and replacing the keyboard and monitor. This offers the customer a significant technology upgrade with a minimum impact to spare inventory, cost and minimum disruption to operations.

Future of Flight Inspection

The rapid growth of technology makes ideas that were once scoffed at more than just a possibility it makes them a reality.

Computer graphics processors have been pushing the envelope of 3-D graphics since the 1990's. Today's graphics processors can render near-photo quality images at 30 frames per second. Real-time 3-D visualization would allow the standard tabular display to be supplemented by a 3-D representation of the flight inspection aircraft and the facilities under inspection giving the flight inspector a unique view of the inspection. In this bird's eye view, the aircraft's path could leave behind trace marks in the shape of

small globes. These trace marks are color-keyed to indicate in-tolerance and out-of-tolerance conditions. When an out-of-tolerance condition occurs the operator could select the globe and independently analyze the section as the inspection continues.

Voice recognition is becoming more prevalent and is being used in many applications throughout the world including machine shops, emergency rooms, and fighter aircraft. In a Flight Inspection System it could allow the operator to use the system without a keyboard, mouse, or other manual input device. After a brief training period for, speaking select command phrases into a noise-canceling microphone can be used to operate common system functions. This training can compensate for different accents within the English language for each user of the system. This can provide the operator a unique way to control the system when conditions restrict or limit the use of other input devices.

Flight inspection soon will be able to be done remotely. One can imagine a system in the not so distant future that includes an aircraft instrumented with a satellite communication link being able to collect data and transmit the data to a base station on the ground or directly to a central flight inspection center that could provide the flight inspection capability for an entire region or even the entire world.

Other futuristic scenarios include using drone aircraft to perform data acquisition and allow flight inspectors to perform the inspections from a ground location. Periodic inspections maybe also be augmented with hands off automatic systems using commercial airlines to perform the data collection and analyzing the data to allow for the early detection of potential problems, especially for RNAV and GPS-based systems that are difficult to monitor continuously.

Although predicting the future is difficult, the technology that CAPE and the new system that is being built positions Sierra to quickly and cost effectively respond to the changing needs of our upgrade and new system customers.

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[1] "Office In The Sky – The Next Generation Flight Inspection System" by Stefan Jageniak and Uwe Schramm published in the Proceeding of the 11th International Flight Inspection Symposium.