

When the FAA initiated a study aimed at modernizing the SDR system, they reviewed the MMIR system as a prospective candidate, and awarded a grant to HAI for system validation, with results that were very encouraging. The MMIR has reached a level of maturity and acceptance throughout the industry. Users can now send data directly to an HAI computer, where it is archived and disseminated to the FAA and other authorized entities.

Based on a preliminary cost benefit analysis, which HAI agrees to be conservative, the discounted benefit for the helicopter industry in 10 years, would be in excess of \$350 million. This figure represents the helicopter industry cost savings for 10 years from: increase in part useful life, reduction in maintenance, and downtime.

The untapped potential of MMIR to enhance aviation safety is tremendous, and is just now being recognized.

### INDUSTRY COOPERATION:

Senior representatives of BFGoodrich Aerospace (BFG), who were familiar with the MMIR system, contacted HAI and proposed a joint effort to couple the MMIR system with BFG's advanced, on-board Condition Monitoring System (CMS). This would essentially interconnect two tried and proven systems: HAI's MMIR, which provides archiving and analyses, and BFG's CMS which is an advanced version of the on-board Health Usage Monitoring System (HUMS).

The concept was briefed to senior FAA officials, who immediately saw the benefit of linking these two systems. A partnership was established, with the FAA, HAI and BFG agreeing to work together to develop and prove this new system. HAI and BFG cooperated on a proposal to extend HAI's FAA grant. HAI and industry partners have pledged \$530,000 of in-kind contribution to this grant over the next 3 years.

### PROJECT OVERVIEW:

BFG's CMS is already in use in several models of civilian and military helicopters. It is a modular system, and can be expanded in steps as the user learns the system's functionality. It includes a comprehensive ground station capable of usage trending and advanced mechanical diagnostics.

The CMS collects usage data, including regime recognition for tracking of mechanical and structural life. It provides in-flight, real-time performance and reliability analysis of engines, lift systems and power trains. These data are stored in a transfer card and periodically downloaded to a ground station for analysis. Also, parts are tracked when installed and while in inventory. All data are held in the ground station with the expectation that they will be periodically transferred to a central computer (server) for fleet-wide applications.

The MMIR software package at HAI's headquarters will be expanded so it can function as the central server for helicopter usage from around the world. The MMIR functionality will be integrated into ground station(s) at various locations for each helicopter company. Additional usage report formats and software capabilities will be developed to ensure that the data held in the ground stations can be periodically transferred to the HAI headquarters server.



Screen shot of the MMIR database located on the internet

The new program will start with a limited scope, e.g., a fleet of civil rescue helicopters based in Switzerland. These helicopters already have the BFG equipment installed, and the pilots have some experience with the system. As soon as feasible, additional helicopter models will be included to record the variation in usage relating to different types of missions. Collectively, these differing applications and environments will be used to monitor the effects of stress on the aircraft caused by various flight envelopes. Analysis of the resulting data will prove the concept and justify continued expansion of the system to include additional aircraft models and usage monitoring systems.

### MAJOR PROJECT AREAS TO BE ACCOMPLISHED:

- ❑ Create an Intranet/Internet-Web-based version of MMIR.
- ❑ Integrate the MMIR software with the BFG Ground Station.
- ❑ Expand MMIR to include an International Helicopter Parts Tracking System with attached usage files.
- ❑ Install a BFG ground station in HAI's headquarters to be a server for the expanded MMIR Parts Tracking System.
- ❑ Establish a demonstration network around one or more service station(s). Connect this service station to the HAI server.

- ❑ Establish networks with additional operators that have a sufficient number of aircraft to justify ground station software.
- ❑ Improve the transition of data to the SDR system.

### PARTNERSHIP TEAM:

Under the leadership of the FAA, highly qualified specialists from BFGoodrich Aerospace, and HAI, this research project, aimed at enhancing and ensuring aircraft safety, continues. Because BFG's equipment is already in use in several military aircraft, there will be coordination and



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cooperation with elements of the Department of Defense (DOD) as well. The team of HAI, BFG, DOD, and FAA consist of computer experts, aviation engineers and pilots, analysts, and managers. The entire team is dedicated to developing a practical, affordable system that will serve aviation safety in a wide range of applications.



Photo courtesy of Petroleum Helicopters, Incorporated

### ACCOMPLISHMENTS:

❑ HAI has made the data available to all participants via the World Wide Web on the Internet. By pointing a web browser to [www.mmir.com](http://www.mmir.com), participants can query any part number to see if it has been previously reported and retrieve detailed information on the part.

❑ Since the MMIR software was incorporated in 1992, the software has been distributed to over 700 operators and several manufacturers. Due to an overwhelming response, there are now approximately 50,000 completed report parts in the MMIR central database at HAI headquarters. Part number analysis reports can be run 24 hours a day at the HAI's MMIR web site. HAI is receiving about 400 MMIR reports per month, with about half submitted electronically.

❑ The large number of reports is due to increased usage by members and non-members alike. Petroleum Helicopters, Incorporated has been able to expedite SDR/MMIR data entry with less personnel, due to the effectiveness of the computerized MMIR program; one person spends a quarter of their time doing the data entry that used to occupy two people full-time. Weyerhaeuser flight department has experienced the same kind of efficient changes. The computerized program has allowed them to send their data on disk and saves time entering into two different computer systems.

❑ The above are examples of operators and the affect the MMIR has had on their maintenance operations. Other operators such as Blue Hawaiian, Tennessee Valley Authority, ERA Aviation and Western Helicopters have also experienced the same increase in productivity and efficiency.