Use of Flight Data Monitoring in SMS

The aviation community has made significant strides in advancing safety through a forensic approach, reviewing and learning from accidents. In contrast, Flight Data Monitoring (FDM) programs provide a proactive and prognostic capabilities to help identify risks before accidents occur. This data can prove to be an integral component to your operation’s Safety Management System (SMS).

With the ability to routinely collect flight data, operators can gain objective insight into the risk factors/hazards affecting daily operations. Once analyzed this data can be used to drive safety strategy and facilitate sound decision making. Performance data gathered from the aircraft can be filtered and grouped into useful metrics that can highlight pre-cursors to issues like loss of control, controlled flight into terrain, weather concerns or specific system failures.

With the numerous flight data, image and audio recording solutions in the marketplace, operators should assess what specific data is most important for their operation. It is recommended that you collaborate with other operators about the strengths and weaknesses of the various flight recording systems used and how they analyze the data. Different types of available recording devices provide several advantages such as the ability to observe crew actions using video, recognizing acoustic factors with audio and identifying performance parameters from avionic data. The capture and storage of this critical information can be essential in both proactive safety programs and in helping post-accident/incident investigations.

The NTSB urges aircraft owners and operators to install crash-resistant data, audio/voice, and image recorders. Recorders are readily available and can be easily installed in such a way as to “survive” a crash and provide investigators with useful information.” However, it should be noted that most light aircraft data recorders are not “crashworthy” and may easily be consumed in post-crash fire. As technology continues to develop it’s foreseeable that some flight data streams may be sent via satellite.

The benefits of recorders are many, and both regulators as well as operators should do more to understand these technologies in all their forms in each aircraft category/class to improve aviation safety. As an example, the FAA is requiring air medical aircraft to be outfitted with data recorders by the spring of 2018. Additionally, there is more interest within the GA community to add data recorders as the technology becomes more available.

While post-accident/incident investigation is a valuable use for FDM the greatest value comes from utilizing this data within your organization’s SMS for Hazard Identification, Continuous Improvement or Safety Assurance processes in an aggregate format. This type of analysis will objectively quantify the amount and severity of “event” occurrences over a given period. At a basic level of analysis, flight data can provide near instant measures of operational compliance amongst your flight crews. At deeper levels you can begin to understand how work (flying) is being done in the real world and what gaps exist between what is written in policy and what is conveyed during training.
Are you maximizing the return on investment from your SMS? Do you know how you can tell? As a senior manager this, would of course be helpful to know. Particularly when senior management’s involvement with an SMS is cited as a key role to the program’s success. Yet articulating what makes the program “successful” can be difficult to do, especially when talking to the boss.

Take the financial scenario of proposing the acquisition of new equipment: Have you ever considered using SMS outputs to make the case? You see statements all the time in marketing campaigns: “This widget will immensely increase your level of operational safety” ... but how? Take Night Vision Devices...these are not cheap acquisitions, but they are advertised as “greatly increasing the level of safety in the night time environment”. However, you can’t manage your return on investment (ROI) if you can’t track the data. Understanding the baseline and subsequent margin will likely prove the device’s value (or not). The outputs (if supported by strong inputs) of an SMS can readily assist in making the case for investments simply through objective data. The executive’s role is to encourage meaningful SMS inputs which allow for more informed, objective decisions.

Flight Data Monitoring can be a great source of information about the operation and capturing details about potentially serious pre-cursors to an incident. Examples are:

- Loss of tail rotor effectiveness
- Unstabilized Approach
- Autorotation
- Tailstrike
- Abnormal Runway Contact
- Ground Collision Proximity Warning/Controlled Flight Into Terrain
- Flight Control System Failures
- Instrument Failures
- Engine Failures
- Rotor Shaft Failures
- Excess Loading (G-Forces)
- Outside the Flight Envelope

Data also strongly contributes to increased flight safety and operational efficiency by:

- Improved operational insight: providing the means to identify potential risks and to modify pilot training programs accordingly (ex. FOQA).
- Flight data can be viewed and used for pilot performance support. Pilots can be recognized as operating aircraft in an industry best practices manner thus encouraging peers to perform in a positive manner. Initial and recurrent training can be adjusted and positively affected.
- Reduction in unnecessary maintenance and repairs: FDM and HUMS data can be used to help reduce the need for unscheduled maintenance, resulting in lower maintenance costs and increased aircraft availability.
- Support risk mitigation efforts through the SMS program of an operator.

The FAA’s Rotorcraft Aviation Safety Information Analysis and Sharing (ASIAS) FDM Safety Research Project is another step in the right direction to obtain and analyze data in order to alert operators to unsafe acts and afford them the opportunity to identify and eliminate these hazards. The use of FDM equipment and participation of willing operators is integral to helping the program succeed.

For more information on Rotorcraft FDM contact Keith Cianfrani at keith.ctr.cianfrani@rotor.org or visit https://www.pegasas.aero/index.php.

This document is a peer reviewed publication by an expert panel of the USHST SMS Working Group. More information about the USHST/IHST, their reports, safety tools, and presentations can be obtained at the web site: www.IHST.org.