THE 10-YEAR HELICOPTER ACCIDENT REDUCTION INITIATIVE

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The International Helicopter Safety Team (IHST) was formed because helicopter operators agreed that the number of worldwide helicopter accidents had to be reduced. The IHST was tasked with a goal of reducing the helicopter accident rate by at least 80 percent by 2016. A very lofty goal, yet achievable even when considering that helicopter operations are so varied, unlike airline operators who take off from a smooth, prepared surface and return to one every time.

The IHST then formed the Joint Helicopter Safety Analysis Team (JHSAT) to analyze helicopter accident history and provide recommendations to reduce the accident rate and the Joint Helicopter Safety Implementation Team (JHSIT) to develop cost-effective strategies and action plans to reduce accidents.

Last year, the JHSAT analyzed helicopter accidents that occurred in 2000. The team analyzed 197 helicopter accidents from the database and found that a major contributing factor in most of the accidents was the failure to adequately manage known risks. Due to the lack of a systematic process, including leadership and accountability, operators did not adequately prioritize and address the risks that lead to most accidents.

As a result of this effort, the JHSAT created and recommended a safety management system, or SMS Toolkit. This year, the JHSAT analyzed 174 accidents from the NTSB's 2001 accident database. This time, significant changes were made in the methodology to improve the results of the analysis.

TEAM MEMBERS

The JHSAT is comprised of knowledgeable and experienced individuals from the Federal Aviation Administration, NASA, Helicopter Association International (HAI), various airframe and engine original equipment manufacturers and safety representatives from several large offshore and emergency medical operators. I was invited to be the law enforcement representative for the team.

When I was recruited, the plan was to meet every quarter, analyze the accidents and then meet in the fall to write a final report. That idea was quickly abandoned. The team instead met for four consecutive days, once a month, and as of late October, the team was still composing the final report for the JHSIT.

METHODOLOGY

The IHST recognized that a unique analytical approach was needed to tackle the helicopter accident problem. The methodology implemented by the IHST was adapted from the U.S. Commercial Aviation Safety Team (CAST), which set out to substantially reduce fatal accidents worldwide in commercial airlines by proactively addressing common accident causes. The JHSAT adapted the process to fit the vast array of helicopter operations.

"Having established what we would examine, we developed a methodology that included development of standardized problem statements (SPS) corresponding to the events or links in the safety chain that were

considered to have contributed to the causes of the accidents or our ability to define those causes (missing data),” said Jack Drake, HAI Safety, former NTSB lead engineering investigator and JHSAT co-chair member. “Having defined the problems, we developed a set of corresponding interventions that were thought to be appropriate mitigations for the SPSs. When data was insufficient to define exactly why an event occurred, we still attempted, based on our collective experience, to determine how the problem or accident might have been prevented. We did not rely on probable cause determinations and

typically arrived at more problem statements and interventions than would be found in the conclusions of the NTSB reports.”

Much of the process was ironed out in the first analysis year, with the analysis being broken down into types of operation or mission (e.g., private, commercial, law enforcement, logging, etc.). After completing the first report, the team discovered that this approach was not as beneficial to the JHSIT as originally intended. The team then considered the accident sequence-of-events categories used by NTSB and others but decided instead to adapt a modified version of the CAST International Civil Aviation Organization (ICAO) Common Taxonomy Terms, which is a list of accident types.

GROUPING BY TYPE

Each accident was categorized again this year based on its primary operation or mission, but also by accident type. By assigning up to three levels of accident types to each accident, the team was able to group accidents according to where the accident happened, what the pilot or crew was doing, the result and the environmental conditions under which the accident occurred. Each of the following were used to describe different accidents:

Where: Aerodrome (ICAO term for heliport or airport), LZ - Prepared or Unprepared Landing Site (new for helos), Platform, Fixed Helipad or Mobile Helipad, Ramp Area

What: Abrupt or Abnormal Maneuver, Forced or Practice Autorotations, Fuel Problems, Part/Systems Failures, External Load Operations

Result: Abnormal Runway Contact, Loss of Control,* CFIT – Controlled Flight Into Terrain, Fire, Ditching, Object Strike

Environment: Continued VFR Flight into IMC Conditions,** White Out & Brown Out,
Encounters with Flat Light or Glassy Water, Loss of Visual Reference or Horizon, Ice or Thunderstorm Encounters

* Includes dynamic rollover, emergency procedures, exceeded operating limits, interference with controls, loss of tail rotor effectiveness, performance management issues, tie-downs/hoses and settling with power.

** A very deadly accident type.

By writing up groups of accidents according to their type and operation/missions, the team hopes to provide a more productive analysis of the 2001 data to the JHSIT.

THE ANALYSIS PROCESS

Each accident docket includes at a minimum a probable cause statement, factual report and NTSB Form 6120.1, the “Owner/Operator Aircraft Accident Report.” Dockets may also include witness statements, pilot statements, photographs, drawings or diagrams and other pertinent documents. There were 4,000 items in the 2000 database.

Each team member was assigned a certain number of accidents, and it was the job of each to read through all the documents, photos or diagrams included in the accident docket, then assign standard problem statements SPSs (what caused the accident) and suggest intervention recommendations (solutions to prevent the accident from happening again). More complicated accidents generally required more SPSs and recommended interventions.

At the group meetings, each team member presented findings to the entire team after the others were given time to browse the docket. The presentations were followed by group discussion. Seldom would the SPSs and intervention recommendations by each team member survive the scrutiny of the entire group, and changes were made based on the group’s input.

SPS ANALYSIS

When all the accidents in the 2001 database were analyzed, the team had selected a total of 1,043 distinct SPSs and recommended 1,082 interventions. The SPSs and interventions are a three-tier rollup system that makes it possible to create illustrative tables and graphs. Fourteen categories are included in the SPS level 1 selections, and level 2 selections comprise 50 categories. The level 3 selections are specific to the upper tiered selections, so unless a specific SPS level 3 is selected multiple times, it generally gets lost in the data. Interventions also use the three-tiered system, with eight main level 1 categories and 36 level 2. It is the intervention recommendations that drive the structure of the final report.

The majority of accidents in the 2001 data set (the 2000 data showed a similar trend) were directly attributed to some sort of pilot judgment and action error (SPS level 1, selected a total of 312 times or at least once in 145 accidents, or 85 percent). The second most frequently selected SPS was lack of data in the report (SPS level 1, selected 190 times). This issue is not directly related to the accident itself, but if an investigation is found to be inadequate, incomplete or information is missing or inconsistent, it makes the analysis of the case challenging.

In many cases, it was impossible for the analysis team to discriminate between cases in which the information had never been available to the investigator from those in which it had been available but was not included in the narrative report. The lack of data or inadequate information in the report was noted at least once in 138 (79 percent) of all 2001 accidents. The analysis team identified two primary types of data issues: inadequate information available to the investigators (69 accidents) and inadequate information in the investigation report (49 accidents). Other standard problem statement data issues accounted for the remaining 20 selected accidents.

RECOMMENDED INTERVENTIONS

I volunteered to author the data issues write-up for the report. The most common intervention recommendation that came out of the analysis in this area (recommended 109 times) was for the installation of cockpit video and audio recording devices or some sort of data recording or trending device. The second most frequently selected intervention (recommended 81 times) was to improve the quality and depth of the NTSB investigation and reporting.

In 98 accidents (or 56 percent of the 174 accidents in 2001), the team recommended that some type of cockpit recorder would have helped to document exactly what occurred in the cockpit during the accident sequence and why it happened. A cockpit recording device cannot only help the investigator determine what happened during the accident sequence, but also enables the helicopter owner, chief pilot or safety/risk management representative to see on a daily basis how the helicopter is being flown and if the machine is being operated within flight manual limits and within company operations guidelines. Voluntary installation of these devices could become an integral part of a company's SMS to monitor performance and adherence to company procedures.

Author's Note: The JHSAT's Year 2000 and 2001 Reports are available for viewing on the IHST website at www.ihst.org. A great deal of work has gone into producing these reports, and we hope that pilots around the world will take the time to read them. We hope our analysis will save lives and prevent more needless and costly helicopter accidents.

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