International Helicopter Safety Symposium 2005
September 26-29, 2005, Montreal, Quebec, Canada

Final Report

Executive Summary:

Approximately 265 representatives of the helicopter design, manufacturing, military and civil operators, and international regulatory communities participated in the International Helicopter Safety Symposium 2005 during September 26-29, 2005 at the Omni Mont-Royal Hotel in Montreal, Canada. The purpose of the meeting was to discuss the need for an international collaborative effort to reduce both civil and military accidents in the vertical flight industry. The Planning Committee for the symposia had previously set the goal of reducing the industry-wide accident rate by 80 percent within ten years. The committee considered this goal to be challenging but achievable.

What is the helicopter accident rate? Mike Kriebel, senior vice president of Aviation Underwriters Association, offered several benchmarks. Based on 2004 U. S. rates (an estimated 2,225,000 total flight hours), the U.S. civil helicopter accident rate per 100,000 flight hours is 8.09 (fatal accident rate is 1.48). The U.S. civil turbine helicopter accident rate is 5.11 (the fatal accident rate is 1.21). The "on demand" (Part 135) air taxi accident rate is 2.21 (the fatal accident rate is 0.78.) Mr. Kriebel observed that insurance rates for the helicopter industry are high because the accident rate is high. And many insurers will refuse altogether to cover what they perceive to be high-risk helicopter operations.

By comparison, the U.S. Air Carrier (Part 121) accident rate is only 0.159 (the fatal accident rate is 0.011). Another relevant comparison is that of 2004 U.S. general aviation accident statistics to civil helicopter statistics. These show that the G.A. rate is 6.22 as opposed to 8.09 for helicopters (in other words, the helicopter accident rate is 30 percent higher). If we are to reduce the helicopter accident rate by 80 percent, we must bring it down to 1.62 / 100,000 flight hours.

In the view of the organizers, the single most significant achievement of IHSS 2005 was (a) acknowledgment by all participants that the helicopter accident rate is excessive and unsustainable over any longer period of time, (b) an understanding that "business-as-usual" is no longer good enough, and (c) a commitment by all representatives of industry, the operator community and the international regulatory agencies to work together in a voluntary Civil Aviation Safety Team (CAST) – like environment crafted specifically for the rotorcraft community to achieve a reduction in the accident rate by 80 percent.

Supporting this goal will be AHS International, representing the helicopter designer and manufacturing community; Helicopter Association International (HAI), representing the civil operator community; the Association of Air Medical Services (AAMS), representing 85 percent of the world's helicopter EMS community; as well as the regulatory community, including the Federal Aviation Administration (the FAA), Transport Canada, and the International Civil Aviation Organization (ICAO). Individual companies, such as Bell Helicopter Textron and Sikorsky Aircraft, announced they too would support the goal of reducing the helicopter accident rate by 80 percent within ten years.

Meeting Structure:

Attendees devoted the first day, Monday, September 26, to a discussion of safety management tools and training sessions. The U.S. Department of the Navy and the U.S. Army offered a day-long session on **"Joint Services Approach to Helicopter Safety Management for Military and Civilian Operations."** Transport Canada and the Federal Aviation Administration provided a session on **"Safety Management Systems in a Civil Environment."** Finally, HAI personnel provided a session on **"Developing a Safety Culture in the Maintenance Environment."**

The planners devoted second day, Tuesday, September 27, to **Keynote Speeches and Invited Presentations.** Conference Chairman Somen Chowdhury provided an introduction. He, in turn, was followed by AHS International Chairman Dr. Bud Forster and Roy Resavage, President of HAI. In his remarks, Dr. Forster noted that the conference agenda, while ambitious, was one which all attendees must address. He added, "Simply put, there is no issue of greater importance to the world rotorcraft community than improving helicopter safety."

"Our challenge is four-fold:

"First, we must devise a practical plan to reduce the rotorcraft accident rate. Second, we must find ways and means to implement the plan. Third, we must have a feed-back loop to assess progress and refine the plan. And, fourth, we must continue to execute the plan and its revisions. . . . This will not be a one-shot effort that provides "near-term gratification" – it will be a life-work because lives are dependent on our success."

Dr. Forster and Mr. Resavage were followed by a series of keynote presenters, including:

- Marinus Heijl, Deputy Director, Air Navigation Bureau, ICAO
- BG Joseph Smith, US Army, Director of Army Safety/ Commanding General, U.S. Army Combat Readiness Center
- Charles Simpson, Chairperson, Transportation Safety Board of Canada (TSBC)
- Merlin Preuss, Director General, Transport Canada Civil Aviation (TCCA)
- Steven B. Wallace, FAA, Director, Office of Accident Investigation and Chief Engineer, Aviation Systems Safety
- Paul Russell, Boeing Commercial Airplanes Group, Co-Chair, CAST
- Paul Arslanian, Bureau d'Enquetes et d'Analyses pour la securite de l'aviation civile (BEA)
- Steve Finger, President, Sikorsky Aircraft Corp.
- Mike Blake, Executive Vice President and Chief Operating Officer, Commercial Products, Bell Helicopter Textron, Inc.
- Richard Healing, Former Member of the National Transportation Safety Board (NTSB)
- Bob Sheffield, Managing Director, Shell Aircraft International
- Sylvain Allard, President and CEO, CHC Helicopter Corp.
- Tom Judge, President, AAMS
- Werner Marty, Flight Safety Officer and Pilot, Swiss Air Ambulance (REGA)

The third day, Wednesday, September 28, focused on **technical papers and presentations** in five arenas: (1) Military Missions, moderated by Lt.Col. Mac MacCartney, US Naval Safety Center; (2) EMS and Other Missions, led by Ken Knopp, FAA, and Matt Rigsby, FAA; (3) Human Performance,

led by Dan Dugan, NRTC, and Training, led by Marty Wright, Bell Helicopter Textron; (4) Maintenance and Design, led by Bill Taylor, Transport Canada; and (5) Accident Investigation & Regulation and Management & Economics, led by Roger Baker, Safety Focus Group, LLC, and Management & Economics, led by Dave Downey, FAA.

More than 50 papers were presented, ranging from Military Airworthiness, Crashworthy Design of Military Aircraft and Brownout Situational Awareness; to US Civil Helicopter Emergency Medical Services Accident Analysis and Night EMS Operations; to Closing Two Major Safety Gaps in Helicopter VFR Flight, Risk Awareness: Improving Aircrew Knowledge and Civil Aviation Use of NVGS; to Maintenance Malfunction Information Report (MMIR) and Event Reporting; to The History of Helicopter Safety, Lessons Learned from TSB Investigation of Accidents and Miniature Flight Data Recorders. Attendees also heard about Integrated Mechanical Diagnostic Systems, CFIT Accidents in Helicopter EMS and Offshore Operations and Implications of Handling Qualities in Civil Helicopter Accidents Involving Hover and Low Speed Flight.

Panel Discussions/Wrap-Up:

Attendees devoted the fourth day, Thursday, September 29, to panel discussions and a wrap-up plenary session. These included:

- Accident/Incident data and investigations, led by Nick Stoss, TSBC
- Human Performance Issues, led by Leo Donati, TSBC
- Economics of Safety, led by Bob Sheffield, Shell Aircraft International
- International Regulatory Aspects of Safety, led by David Downey, FAA
- Training, led by Marty Wright, Bell Helicopter Textron

The **Accident/incident investigation panel** offered the following recommendations:

- Advocate increased investigation of incidents;
- Lobby ICAO for increased accessibility and standardization of data;
- Lobby ICAO for helicopter-specific definition of incidents and accidents;

- Encourage state agencies to provide better feedback to the commercial industry with respect to operational risk areas;
- Establish a baseline description of an accident in order to measure success towards 80 percent reduction;
- Encourage investigative agencies to provide early feedback to the operational community with respect to (a) factors related to the accident (lessons learned) and (b) factors not related to the accident (eliminate safety fears);
- Encourage allocation of more resources for trend analysis in order to be more proactive with respect to accident prevention;
- Encourage early provision of digital photos to enhance manufacturer's ability to support assessments and the investigation;
- Encourage state agencies, etc., to employ more trained helicopter investigators;
- Develop methodology for sharing lessons learned (regulators, investigation agencies; manufacturers and operators);
- Lobby state regulators to make onboard recorders mandatory (HUMS, FDR, CVR);
- Encourage investigative agencies to provide early feedback to the operational community with respect to factors related to the accident;
- Encourage establishment of websites to improve amount of safety information available;
- Promote greater interaction with manufacturers during the investigation process;
- Encourage investigators to be better prepared to deal with investigations involving cockpit automation;
- Encourage manufacturers to provide investigators with (a) information on systems memory capability and (b) data conversion and read-out tools; and
- Encourage the development of a repository of information on various products so that investigators have ready access to what types of data may be available on a given aircraft or equipment;

The **Human / Performance Issues panel** offered several recommendations relating to fatigue, automation and technology insertion, and human factors in maintenance:

Fatigue:

- Need for training and education at all levels;

- Need for tools and guidance (fatigue assessment, for crews and management, go / no go assessment tool, and specific needs for single helo operators);
- Need to set a requirement floor (tailored to industry sector / nature of operation), must be in regulation, based on best practices everywhere; and level of delegation TBD;
- Fatigue-sensitive culture must be established (at all levels of organization, endorsement and enforcement by management; training delivery);
- All above applies to operations and maintenance;
- Search for and prioritize best practices everywhere.

Automation/ New Technology Insertions:

- Apply automation to leading accident causes, e.g., brownout, loss of tail rotor effectiveness, rollover.
- Expand training scope (training / fam on automated systems, increase realism, surprise, stress, increased recurrent training on automated systems, increase focus on abnormal and emergency procedures).
- Develop methods to accelerate introduction of new and automated technologies;
- Improved acceptance of automation technologies;
- Improve abnormal and emergency procedures associated with automated systems;
- Design automated systems to prevent person-out-of-the-loop situations;
- Improve standardization of information display and controls (converge at best practices as they emerge);
- Use automation to make helos easier to fly and reduce workload (more time for situational awareness).

Maintenance:

- High similarity with fatigue issues;
- Transition to flight crew culture with standards (current culture is do whatever it takes to dispatch; will require some level of regulation);
- Consistent communication of cultural message (analogy: MADD)
- Change the measures of performance for mtce personnel (away from dispatch only, e.g., add safety record, etc.);

- Help management understand the culture in their organization, e.g., whitecap non-punitive ext. audit, info gathered from working level, limited disclosure and no adverse consequences).

The **Economics of Safety panel**, chaired by Bob Sheffield, offered several general observations:

- We need to measure serious injuries as well as fatalities and focus on efforts that will do the most good for the least money;
- Which types of helicopters should be included in the goal, e.g., turbine only, pistons? Attaining the goal will be much more difficult for the more challenging missions, such as EMS.
- We need to analyze each major type of operation and determine top causes.
- We need to identify the best risk reduction measure for each type of operation.

High priority steps to achieve the goal might include:

- Get buy-in for the goal from all stakeholders, e.g., manufacturers, operators, insurance companies, etc.
- Establish voluntary accreditation programs to encourage private (GA) operators to improve safety.
- Address rule-breaking, use HFACs or HOMP processes, and establish a program for voluntary reporting.
- Monitor the equipment (HUMS, VHM, FDR) and its usage.
- Improve maintenance human factors and work processes.
- Establish operating standards in high risk areas, e.g. adverse weather policy, go-no go guidelines, operational controls for mission-specific hazards, pilot certification for high risk tasks.
- Work with regulators to establish a baseline for new aircraft certification that requires all practicable risk reduction measures.
- Establish a universally accessible common database for accidents and incidents and for sharing best practices, safety alerts, trends, etc.
- Establish fit for purpose Safety Management Systems. Share best practices.
- Establish accountability for safe practices.
- Improve crash survivability.
- Reduce pilot workload.

- Challenge the insurance industry to provide incentives or at least cost consequences for various levels of safety.
- Use CAST model for moving forward.
- Promote industry research on methods to reduce the cost of key risk reduction measures, e.g., FDR, HUMS, EGPWS, TCAS, crashworthy seats and fuel tanks. Engage the military service branches.

Key points for the plenary session included:

- Establish expert subcommittee to determine and document top causes of fatal accidents by operations type, e.g., EMS, offshore, seismic, logging, etc.
- Establish an expert subcommittee to determine and document the most effective risk reduction measures for these causes, including potential application of new technology.
- Have committee quantify costs and benefits of each risk reduction measure.
- Develop a global strategy to influence those who control the regulations and funds necessary to promote and implement best risk reduction measures.

Finally, Mr. Sheffield recommended:

- This symposium has been an excellent step toward establishing awareness and cooperation among all stakeholders in the helicopter industry.
- Some organization should take ownership of this initiative to ensure it moves forward.
- There should be follow-up symposiums on helicopter safety; they should engage more manufacturers, more operators, and especially smaller operators.
- Develop a "road-show" presentation for all participants to take this message to other organizations; reach out to public safety organizations.
- AHS and HAI should co-chair an industry collaboration effort. Establish helicopter risk reduction as a standing session at all AHS/HAI conferences.
- Establish a helicopter safety technical committee within AHS to sponsor technical sessions and briefings. Publish good papers in journals or the web.

- Establish a project plan with process/project owners and milestones and an overall project manager.

With respect to the **Training panel**, Mr. Wright reported:

- Establish training objectives.
- Review present flight requirement standards and minimum requirements (review international regulations; review inadvertent IFR training requirements)
- Explore distance learning instruction possibilities.
- Increase use of synthetic, simulator-based training, especially for autorotations.
- Emphasize IFR training.
- OEMs might develop training standards that should be verified by audit process.
- Create incentives for operators to adopt safety guidelines.
- Consider Medallion program and similar programs (HAI platinum) for possible roadmap; encourage membership in such programs.

Dave Downey reported on recommendations discussed by the **Regulations Session**:

- In order to sell safety, one needs to explain the pay-off.
- Identify the operational expectations for various operational segments, e.g., EMS, external loads, etc.
- Develop a concept of operations. What are the expectations, risks, mitigation of risks, etc., and identify what kinds of equipment or safety procedures should be used for each segment.
- Educate all to install a safety culture in each segment – operators and customers.

Mr. Downey made the point that if we are to achieve our safety goals within ten years, it is vital that industry undertake some form of joint and voluntary effort. Government agencies, such as the FAA, will support industry every step of the way but to expect that we can "legislate" safety is inappropriate, particularly given the length of time required to formulate new regulations. A voluntary undertaking by government and industry is essential.

Summary & A Plan for Going Forward:

Ed Newton, Vice Chairman, HAI Board of Directors (and Honeywell Chief Pilot Corporate Flight Operations), and Rhett Flater, AHS Executive Director, provided a summing up and a proposal for going forward. First, it was agreed that industry would engage in a collaborative, joint effort to identify the main causes of the high helicopter accident rate and ways and means to reduce that rate by 80 percent. AHS, HAI and the FAA would assume leading roles in this effort. Second, our effort would be modeled after the successful Civil Aviation Safety Team initiative supported by Part 121 (large commercial transport) operators, manufacturers such as Airbus and Boeing, and the FAA. A small team of experts drawn from attendees at this safety symposia would begin, immediately to create the terms of reference for an International Helicopter Safety Team (IHST), with a vision and mission statement and charter.

Mr. Newton emphasized the need to address the inaccurate reporting of flight hours. An accurate reporting system ensures the creation of an appropriate metric to measure our progress in promoting safety.

The IHST would be independent of any existing organization, though membership on the committee would represent all facets of the helicopter community. Subcommittees would be created to address specific areas of interest, e.g., a Joint Safety Analysis Team to examine and analyze data; a Joint Safety Implementation Team to consider implementation and recommend specific interventions to achieve the safety goal; and finally a Joint Implementation Measurement Data Analysis Team to draft a master safety plan, enhance effectiveness and identify future areas of study. An internet site will be established exclusively for the safety initiative and the outcome of these studies will be posted on this site to keep industry members informed. Additional IHSS symposia will be hosted at appropriate intervals. The goal is to have a process in place to address an 80 percent reduction in helicopter accidents. The organizers hope to be ready to make some key announcements in February at Heli-Expo (Dallas, February 26-29) and in May at the AHS Annual Forum (Phoenix, May 9-11).

To support this process, Mr. Flater announced that every attendee would soon receive a CD-ROM with the conference proceedings containing nearly all presentations given during the event. In the meantime, AHS International has prepared this "interim report" on the International Helicopter Safety Symposium 2005 for distribution to all attendees and posting on the Society's website at www.vtol.org.

- M.E. Rhett Flater
  AHSI Executive Director
  October 7, 2005, Alexandria, VA

Appendix 1

What is the Civil Aviation Accident Team (CAST)?

Comprised of NASA, the FAA and a number of industry organizations making up the Commercial Aviation Safety Strategy Team (CASST), the Civil Aviation Safety Team (CAST) agreed in 1997 to develop and implement a common safety agency that would be driven by data and focused on safety benefits. The CAST framed this agenda with the challenge in a report to the President calling for an 80 percent reduction in the commercial aviation accident rate in the following ten years. The safety agenda undertaken by CAST would have to produce significant safety benefits in the near and mid-term, but would have continuing effects for the long term.

The CAST initially chartered a Joint Safety Analysis Team (JSAT) to develop a process for analyzing data in order to identify "interventions" with a high likelihood of improving aviation safety. The CAST elected to limit the JSAT's first efforts to the analysis of accidents caused by Controlled Flight Into Terrain (CFIT), the number one cause of air carrier fatalities worldwide. The JSAT reported its findings and its recommended interventions in a Results and Analysis document. The CAST then chartered a Joint Safety Implementation Team (JSIT) to consider implementation and to recommend a specific disposition for each of the interventions named by the JSAT. The JSIT consisted of experts from each of the parent organizations whose representatives comprise the CAST.

The goals of the first JSIT were:

1. To develop and document a process that would serve as a guide in addressing the interventions recommended by any JSAT chartered by the CAST.
2. To develop detailed implementation plans for those interventions projected to be highly effective and feasible with respect to CFIT accident reduction.
3. To demonstrate that government and industry can work on aviation safety issues more productively as partners than as separate entities.

To address these goals, the JSIT developed a process by which related interventions recommended by the JSAT were first prioritized, then grouped into safety enhancements for implementation.

As a third step in the process, CAST created the Joint Implementation Measurement and Data Analysis Team (JIMDAT) to provide additional prioritization based on the relative ranking of safety enhancements for potential risk reduction. JIMDAT was tasked specifically to develop a process with respect to gaining final approval from the CAST for project implementation, prioritizing implementation plans among the different JSITs, and subsequent tracking of the projects that were selected for implementation.

During the disposition of interventions recommended by a JSAT, CAST members gave consideration to interventions pertaining to research activities. As research solutions tend to be longer-term actions, care was taken not to discount these prospective interventions because of potential low short-term effectiveness and feasibility ratings. Research interventions, which can have potentially high future safety leverage were considered separately and included in the final JSIT recommendations to the CAST.

Industry		Government
	Commercial Aviation Safety Team (CAST)	
Joint Safety Analysis Teams (JSAT)	Joint Safety Implementation Teams (JSIT)	Joint Implementation Measurement Data Analysis Team (JIMDAT)

CAST's industry members include AIA, Airbus, ALPA, APA, ATA, NACA, Boeing, P&W, RAA, FSF, IATA, AAPA and ATAC. Government members include DoD, ICAO, NATCA, FAA, NASA, JAA, and TCC.