HELICOPTER ACCIDENTS: Statistics, Trends and Causes

Prepared by Helicopter Safety Analysis Team of IHSTI-CIS

IHST Regional Partners Panel
March 2, 2016, Louisville, Kentucky, USA
Registered Accidents and Fatal Accidents

- Accidents: 136
- Fatal accidents: 65
- Fatalities: 312

Commercial air travel and aerial work
Commercial air travel and aerial work

Accident Rate per 100,000 hours

Reduction of accidents by 9.5%
Reduction of fatal accidents by 24%
Commercial air travel and aerial work

Percentage of Accidents by Activity

- Training: 14.60%
- Positioning/ferry: 7.62%
- Air travel: 5.10%
- Agricultural work: 3.20%
- Passenger/Cargo (aerial work): 1.30%
- External load: 0.65%
- Aerial observation: 5.10%
- Air tour/sightseeing: 1.30%
- Emergency medical services: 3.20%
- Utilities patrol: 1.30%
- SAR: 7%
- Other: 38.20%

Commercial air travel and aerial work
Commercial air travel and aerial work

Percentage of Accidents by Immediate Cause

- Violations: 33%
- System failure: 22%
- Errors: 38%
- Other: 7%
Percentage of Accidents by Error

- Misassessment of weather: 18.20%
- Misjudgment of landing area: 8%
- Not going around: 4%
- Flight below minimum safe altitude: 21%
- Overload: 2.80%
- Not considering wind: 2.80%
- Inadequate pilot judgment: 34.70%
- Poor circumspection: 8.50%

Commercial air travel and aerial work

Commercial air travel and aerial work

Percentage of Accidents by Violation

- Violation of minimum safe altitude: 55%
- Violation of weather minima: 30%
- Other: 15%

Commercial air travel and aerial work
Commercial air travel and aerial work

Percentage of Accidents by System Failure

- Engine failure: 75.90%
- Main gear box fire: 3.40%
- Tail rotor blade breakage: 3.40%
- Directional control failure: 3.40%
- Pitch control failure: 3.40%
- Tail boom breakage: 3.40%
- Tail rotor pylon breakage: 3.40%
- Trimming failure: 3.40%
commercial air travel and aerial work

causes of errors and violations

• Absence of effective SMS
• Superficial approach to selection of flight personnel for commissioning as PIC
• Deficiencies in training and not transfer of skills, professional care and the ability to make decisions
• Shortcomings in interaction between simulator training centers and flight management of helicopter companies
• Insufficient experience of instructors
• Lack of attention to the training in decision-making for departure with taking into account the possible complications of flight conditions
• Low requirements of PIC to crew members, failure to keeping work technique
• Inadequate use of FDR/CVR data for flight quality control
• Weak safety culture
Registered Accidents and Fatal Accidents

Accidents 57
Fatal accidents 25
Fatalities 51

Note:
Due to lack of accurate flight hour information, it is not possible to estimate accident rate per 100,000 hours with acceptable confidence level.
For these reasons, there were approximately 24% of accidents of CFIT category, 17% due to inadvertent flight from VFR to IMC, 6% due to collision with power lines, 20% due to system component failures, initiated by flight or technical personnel.

There have been some accidents resulted from deliberate violations of flight rules by pilots such as maneuvering at extremely low altitudes and transfer of the aircraft controls to outsiders.
General aviation

SYSTEMIC DEFICIENCIES ADVERSELY AFFECTING SAFETY:

- Imperfection of legislation regulating the GA activities
- Lack of supervision over GA operators
- Failure to identify and illuminate the causes of accidents
- Poor quality of pilot training
- Imperfect aircraft certification system
- Lack of control for maintaining the aircraft airworthiness
- Inadequate safety ensuring at landing sites
- Inadequate meteorological support
- Insufficient experience of training personnel
- Low effectiveness of search and rescue system
- Pathological safety culture
Light helicopters

Registered Accidents and Fatal Accidents

Accidents 93
Fatal Accidents 36
Fatalities 81

Note:
- Not all accidents are registered
- Commercial and non-commercial flights are not separated
- Light helicopters are mainly operated in GA sector and by private owners
Light helicopters

Accident rate per registered aircraft

Reduction of accidents by 30%

Reduction of fatal accidents by 44%
### Fleet losses (2006 - 2014)

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Civil aircraft register</th>
<th>Destroyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robinson</td>
<td>443</td>
<td>35 (1:13)</td>
</tr>
<tr>
<td>Eurocopter</td>
<td>151</td>
<td>8 (1:19)</td>
</tr>
<tr>
<td>Bell Helicopter</td>
<td>40</td>
<td>3 (1:13)</td>
</tr>
<tr>
<td>Aerospatiale</td>
<td>26</td>
<td>2 (1:13)</td>
</tr>
<tr>
<td>AgustaWestland</td>
<td>16</td>
<td>2 (1:8)</td>
</tr>
<tr>
<td>MD Helicopters</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Aerocopter</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Schweizer</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>711</strong></td>
<td><strong>50 (1:14)</strong></td>
</tr>
</tbody>
</table>
In ¼ of fatal accidents pilots were under the influence of alcohol.
Light helicopters

Every second accident occurred in VFR flight in instrument meteorological conditions!

- All – on helicopters not certified for IFR:
  - R-44 (11), R-66 (1), Bell-407 (2), AS-350/355 (3), AW-119 (1), MD-600 (1), EC-120 (1)
- Causes:
  - “return home syndrome”
  - pressure on pilot by customer
  - the complexity of instrument piloting
  - erroneous transfer of experience gained on Russian made helicopters
  - disorientation in reduced visibility (night, featureless terrain, soft background)
  - inability to recognize entering into instrument MC
  - whiteout
  - snow whirlwind at takeoff

Every third accident occurred due to the loss of control in visual meteorological conditions!

- Causes:
  - aggressive maneuvering
  - main rotor speed decay
CONCLUSION

- In the commercial sector, safety performance for the period of 2005-2015 experienced a gradual improvement, but it was unstable.

- In GA and aircraft owner sectors, where light helicopters are the most widely used, registered accident number for the 2005-2015 period has been showing an upward trend and tend to increase. Number of accidents per registered aircraft for the period from 2009 to 2015 had been decreasing and tend to decrease.

- The current state of safety does not satisfy the professional community and the public both in Russia and in other CIS countries.

- The causes of the accidents with helicopters that took place in Russia and the CIS in the 2005-2015 period, are basically the same as the causes identified by JHSAT and EHEST.

- Recommendations for accident and fatal accident prevention developed by U.S. JHSAT and EHEST, contained in their records, are universal and basically coincide with the recommendations proposed by the analytical group of IHST-CIS.
SUGGESTIONS

- In the absence of reliable data on flight hours in GA and aircraft owner sectors, we suggest to calculate helicopter accident rate per number of registered aircraft and to use this rate as an additional criterion for assessing safety performance trend in these sectors. At the same time, we believe that it is possible and appropriate to make the necessary changes to aviation rules, establishing airworthiness procedures, that would allow to collect and process information ensuring calculation of accidents per 100,000 flight hours.

- In connection with systemic differences in the organization of commercial aviation, GA and aircraft owner sectors, the root causes of accidents and fatal accidents in these sectors also differ, even in respect of the same types of helicopters. In this regard, we believe that it is appropriate to specifically focus preventive work in each of the sectors in accordance with their characteristics. For example, in Russia these sectors could be specified according to the requirements in respect of certain categories of operators: FAR-246 for commercial air transport, the FAR -249 for aerial work, FAR 147 for general aviation, chapters 1 and 3 of FAR-128 for operators of light and ultralight helicopters.
THANK YOU FOR YOUR ATTENTION