U.S. Rotorcraft Accident Data & Statistics

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Overview

- Accident Data and Trends
- Industry Sector Analysis
- Analysis by NTSB Finding Code
- Recent Concerns
- IHST Review
- SPSs, IRs, Occurrences
- U.S. JHIMDAT Current Actions
- Questions and Answers
U.S. Rotorcraft
Accident and Fatal Accident Counts

![Graph showing accident and fatal accident counts from 2001 to 2012.](image-url)
U.S. Rotorcraft Accident & Fatal Accident Rates

*Rates estimated using flight hours from the FAA's GA & Part 135 Activity Survey
Current Accident Rates vs. IHST Goal

IHST’s U.S. Goal by 2016: 1.8 accidents per 100,000 flight hours
Measuring Significance of Improvements

- 5 Year Snapshots by Month
  - Plotted average accidents by month 2001-2005
    - Superimposed lines for 2 x standard deviation
  - Observed progress based on 5 year increments
    - Plotted 2006-2010
    - Plotted 2011-2015
Average Accidents/Month: 2001-2005
Average Accidents/Month:
2001-2005 with 2 x Standard Deviation
Average Accidents/Month: Comparing 2001-2005 with 2006-2010

5 Yr Avg: CY01-05

+ 2 Std Dev

- 2 Std Dev

5 Yr Avg: CY06-10

Industry Sector Analysis
IHST Industry Analysis:

- Personal/Private: 18.5%
- Instructional/Training: 17.6%
- Aerial Application: 10.3%
- Emergency Medical Services: 7.6%
- Commercial: 7.5%
- Law Enforcement: 6.5%
- Air Tour / Sightseeing: 5.9%
- Business: 4.8%
- Aerial Observation: 4.2%
- Offshore: 4.2%
- Firefighting: 3.6%
- Logging: 2.7%
- External Load: 2.7%
- Patrol/Construction: 2.1%
- Electronic News Gathering: 1.7%
- Utilities: 0.0%

IHST Industry Analysis:
FAA Follow Up On Industry Analysis:
2010-2012: 411 Accidents

- Aerial Application 17.0%
- Law Enforcement 6.3%
- Law Enforcement 6.3%
- Emergency Medical Services 6.6%
- Business 3.6%
- Aerial Observation 4.1%
- Aerial Application 17.0%
- Commercial 4.9%
- Law Enforcement 6.3%
- Aerial Observation 4.1%
- Utilities Patrol / Construction 3.9%
- External Load 3.2%
- Offshore 2.2%
- Utilities Patrol / Construction 3.9%
- Business 3.6%
- Personal/Private 24.6%
- Emergency Medical Services 6.6%
- Aerial Application 17.0%
- Instructional/Training 19.7%
- External Load 3.2%
- Firefighting 0.7%
- Logging 0.5%
- Electronic News Gathering 0.5%
- Air Tour / Sightseeing 2.2%
- Offshore 2.2%
- Personal/Private 24.6%
IHST Industry Analysis

- Personal/Private: 22.6%
- Instructional/Training: 8.3%
- Firefighting: 8.3%
- Emergency Medical Services: 11.9%
- Commercial: 8.3%
- Aerial Observation: 7.1%
- Law Enforcement: 6.0%
- Offshore: 4.8%
- Logging: 4.8%
- Aerial Application: 4.8%
- Utilities: 3.6%
- Patrol/Construction: 3.6%
- Electronic News Gathering: 3.6%
- Air Tour / Sightseeing: 3.6%
- Business: 2.4%
FAA Follow Up On Industry Analysis:
2010-2012: 69 Fatal Accidents
Accident Rate Estimates (per 100,000 flight hours)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Personal/Private</td>
<td>31.99</td>
<td></td>
<td>25.71</td>
<td></td>
</tr>
<tr>
<td>Instructional/Training</td>
<td>7.84</td>
<td></td>
<td>4.96</td>
<td></td>
</tr>
<tr>
<td>Aerial Application</td>
<td>11.35</td>
<td></td>
<td>16.99</td>
<td></td>
</tr>
<tr>
<td>Helicopter EMS</td>
<td>3.70</td>
<td></td>
<td>1.87</td>
<td></td>
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</table>


2. Flight hours from CYs 2011 and 2012 estimated using historical flight hour increase of 3% per year over CY 2010 hours.
# Fatal Accident Rate Estimates
(per 100,000 flight hours)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Personal/Private</td>
<td>6.27</td>
<td></td>
<td>5.60</td>
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<tr>
<td>Instructional/Training</td>
<td>0.60</td>
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<td>0.31</td>
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<tr>
<td>Aerial Application</td>
<td>0.84</td>
<td></td>
<td>1.46</td>
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<tr>
<td>Helicopter EMS</td>
<td>0.93</td>
<td></td>
<td>0.55</td>
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</tbody>
</table>


2. Flight hours from CYs 2011 and 2012 estimated using historical flight hour increase of 3% per year over CY 2010 hours.
NTSB Findings from 2008-2012

• NTSB Methodology
  – Assigns multiple “Findings” to each accident
  – Each 2 digits in the code drills down to a more specific factor
    • For example:
      \[\text{0303403582}\]
      - 03: Environmental issues
      - 03: Physical environment
      - 40: Terrain
      - 35: Snowy/icy
      - 82: Effect on operation
  – Analyzed most frequently used “Finding Codes”
    • Codes in place for 479 of the rotorcraft accidents from 2008-2012
    • May show best opportunities for improving safety
Top 2 digit “Finding Codes”

- **Personnel Issues:**
  - Cited in 77% of accidents

- **Aircraft:**
  - Cited in 71% of accidents

- **Environmental Issues:**
  - Cited in 40% of accidents
Top 10: 4 digit “Finding Codes”

<table>
<thead>
<tr>
<th>2 Digit</th>
<th>4 Digit</th>
<th>Frequency of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>Aircraft oper/perf/capability</td>
<td>43%</td>
</tr>
<tr>
<td>Personnel issues</td>
<td>Task performance</td>
<td>43%</td>
</tr>
<tr>
<td>Personnel issues</td>
<td>Action/decision</td>
<td>35%</td>
</tr>
<tr>
<td>Environmental issues</td>
<td>Physical environment</td>
<td>24%</td>
</tr>
<tr>
<td>Environmental issues</td>
<td>Conditions/weather/phenomena</td>
<td>19%</td>
</tr>
<tr>
<td>Personnel issues</td>
<td>Psychological</td>
<td>18%</td>
</tr>
<tr>
<td>Aircraft</td>
<td>Aircraft power plant</td>
<td>12%</td>
</tr>
<tr>
<td>Aircraft</td>
<td>Aircraft propellor/rotor</td>
<td>10%</td>
</tr>
<tr>
<td>Not determined</td>
<td>Not determined</td>
<td>9%</td>
</tr>
<tr>
<td>Aircraft</td>
<td>Aircraft systems</td>
<td>6%</td>
</tr>
</tbody>
</table>
## Top 10: 6 digit “Finding Codes”

<table>
<thead>
<tr>
<th>2 Digit</th>
<th>4 Digit</th>
<th>6 Digit</th>
<th>Frequency of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft</td>
<td>Aircraft oper/perf/capability</td>
<td>Performance/control parameters</td>
<td>41%</td>
</tr>
<tr>
<td>Personnel issues</td>
<td>Task performance</td>
<td>Use of equip/info</td>
<td>30%</td>
</tr>
<tr>
<td>Personnel issues</td>
<td>Action/decision</td>
<td>Action</td>
<td>28%</td>
</tr>
<tr>
<td>Personnel issues</td>
<td>Psychological</td>
<td>Attention/monitoring</td>
<td>15%</td>
</tr>
<tr>
<td>Environmental issues</td>
<td>Physical environment</td>
<td>Object/animal/substance</td>
<td>14%</td>
</tr>
<tr>
<td>Environmental issues</td>
<td>Conditions/weather/phenomena</td>
<td>Wind</td>
<td>10%</td>
</tr>
<tr>
<td>Not determined</td>
<td>Not determined</td>
<td>(general)</td>
<td>9%</td>
</tr>
<tr>
<td>Personnel issues</td>
<td>Action/decision</td>
<td>Info processing/decision</td>
<td>8%</td>
</tr>
<tr>
<td>Environmental issues</td>
<td>Physical environment</td>
<td>Terrain</td>
<td>8%</td>
</tr>
<tr>
<td>Aircraft</td>
<td>Aircraft propellor/rotor</td>
<td>Main rotor system</td>
<td>5%</td>
</tr>
</tbody>
</table>


Recent Trends: 2012 closes poorly

- Oct-Dec 2012
  - Accidents
    - 60% higher than same period in 2011
    - Highest Oct – Dec total in 5 years
    - Tied, 2nd highest Oct – Dec total last 10 years

  - Fatal Accidents
    - 57% higher than same period in 2011
    - Highest Oct – Dec total in 5 years
    - Tied, highest Oct – Dec total last 10 years

- Mitigation efforts by FAA, HAI, AOPA, and IHST
  - Mass media effort in mid October after 4 fatal accidents in 8 days
Recent Trends: 2013 starts poorly

• January 2013
  – Record setting accident pace during first 9 days
    • 7 accidents, 3 fatal accidents, 11 fatalities
    • If sustained, pace was for 24 accidents, 9 fatal accidents, 38 fatalities
    • Projection would have far exceeded highest total for any January the last 30 years
  – Accident pace slowed during mid month
    • Still projected to have a high total, but not record setting
What has changed?

• 5 years of steady progress
  – Consistent improvement, despite lagging the IHST’s desired 80% accident rate reduction

• 4 consecutive months of regression
  – Especially concerning since we are in the traditionally “lower accident” months
Recent FAA Safety Alert for Operators (SAFO)

• Increased manual handling errors for Air Carrier pilots

• Effects of modern aircraft technology
  – Pro: Enables precision, improves workload management
  – Con: Continuous use can lead to degraded pilot ability to quickly recover the a/c from an undesired state

• Recommendations:
  – More training on when to use automated systems
  – More exercise of manual flying skills

• Lesson:
  – Technology and Training must compliment each other
  – Cockpit advances should facilitate (not replace) basic pilot skills/decisions
IHST Review
US-JHSAT: Past Efforts

• Data set – NTSB Accident Dockets
  – U.S. civil registered helicopters
  – Type certificated (amateur built helicopters excluded)
  – Includes ‘Public Use’ and restricted category

• Total of 523 helicopter accidents analyzed
  – CY2006 - 152 accidents (Report issued IHSS 2010)
  – Compendium Report – 3 year roll up/summary (Report issued 2011)
US Accidents by SPS Lvl 1 - Compendium

Standard Problem Statements (SPSs) Level 1

- Pilot judgment & actions: 84%
- Data issues: 73%
- Safety Management: 43%
- Ground Duties: 37%
- Pilot Situational Awareness: 31%
- Part/system failure: 28%
- Maintenance: 20%
- Mission Risk: 19%
- Post-crash survival: 13%
- Regulatory: 9%
- Communications: 9%
- Safety Systems and Equipment: 7%
- Infrastructure: 5%
- Personnel - Non Crew: 2%

Note: Each of the 523 accidents analyzed typically had multiple Standard Problem Statements.
US Accidents by IR Lvl 1 - Compendium

Intervention Recommendations (IRs), Level 1

Note: Each of the 523 accidents analyzed typically had multiple Intervention Recommendations.
US Accidents by Occurrence Types - Compendium

Accidents by Occurrence Category

- Data: 74%
- LOC - Loss of Control: 41%
- AUTO - Autorotation: 32%
- SCF - System Component Failure: 28%
- STRIKE: 16%
- VIS - Visibility: 11%
- ARC - Abnormal Runway Contact: 8%
- FUEL: 8%
- LZ - Landing Zone: 7%
- UNK - Unknown/Other: 7%
- FIRE: 6%
- EXTL - External Load: 5%
- AMAN - Abrupt Manuever: 4%
- CFIT - Controlled Flight into Terrain: 3%
- DITCH - Ditching: 2%
- ADRM - Airport: 2%
- ICE - Icing: 1%
- RAMPS: 1%
- WSTRW - Windshear/Thunderstorm: Less than 1%

Percentage of Accidents (523 Total)
Loss of Control Details - Compendium

Loss of Control Occurrence Category (227 Total Accidents)
Note: 29 Fatal Accidents in Red, 198 Non-Fatal Accidents in Yellow

- PM - Performance Management: 5
- DR - Dynamic Rollover: 3
- OL - Exceeding Operating Limits: 6
- LTE - Loss of T/R Authority: 21
- INT - Interference with Controls: 1
- UNK - Unknown: 6
- GR - Ground Resonance: 5
- TD - Tie-downs/hoses: 4
- SP - Settling w/ power: 3

Total: 227 accidents, 29 fatal, 198 non-fatal.
Intervention Recommendations - IR3
Top 10 from “Compendium” Report

1. Install cockpit recording devices
2. Improve quality and depth of NTSB investigation and reporting
3. Autorotation Training Program
4. Follow ICA procedures with confirmation of compliance
5. Simulator Training - Advanced Maneuvers
6. Personal Risk Management Program (IMSAFE)
7. Training emphasis for maintaining awareness of cues critical to safe flight
8. Better Mx QA oversight to ensure adherence to the ICA/Manual
9. Mission Specific Risk Management Program
10. Enhanced Aircraft Performance & Limitations Training
Current JHSIT Toolkits
“Addresses” 8 of the Top 10 IRs

• Helicopter Flight Data Monitoring Toolkit
  – Install Cockpit Recording Devices

• Training Toolkit
  – Training Emphasis for Maintaining Awareness of Cues Critical to Safe Flight
  – Autorotation Training Program
  – In-flight Power/Energy Management Training
  – ADM Training

• SMS Toolkit
  – Mission Specific Risk Management Program
  – Establish mission Specific SOP and Flight OPS Oversight Program

• Maintenance Toolkit
  – Follow ICA Procedures with Confirmation of Compliance
From JHSAT to JHIMDAT

• Goals of analysis evolved in 2011
  – JHSAT complete: Identified problems and recommended interventions
  – JHIMDAT initiated: Measure progress of implementation actions

• Economic realities = more resource constrained effort
  – Economic downturn resulted in reduced industry participation
  – Original meetings of once/month reduced to 3-4 times annually

• Detailed analysis on every accident not performed
  – Time consuming process not feasible with more limited meeting times
  – More strategic effort toward specific targeted areas

• Industry may need to lead in areas where deeper study is desired
Current US JHIMDAT Analysis Efforts

• Assess Progress by Analyzing Recent Years
  – Data set from CY2009 – 2011
  – High level analysis has categorized:
    • Industry where a/c is used
    • Activity being performed when accident occurred
    • Occurrence/Sub-Occurrence Code defined “What Happened?”
  – Compare CY09-11 results to data in Compendium
U.S. JHIMDAT Future Efforts

• Targeted Industry Outreach
  – ALEA
  – Ag Ops

• NTSB Finding Codes
  – Compare findings from recent accidents to Compendium

• Improved tracking of System Component Failures
  – Classify system failures using established taxonomies
    • Air Transport (ATA)/Joint Aircraft System/Component (JASC)
  – Update to Compendium, compare recent accidents
IHST Upcoming Action Items

• Launch Regional Teams
  – North America Helicopter Safety Team (NAHEST)
Questions?
Back-up IHST Slides
US Accidents by Operation

- Part 91
- Part 137
- Part 135
- Part 133
- Public Use
- Other

Year:
- 2000
- 2001
- 2006
US Accidents by Mission
US Accidents by IR Lvl 1

Percentage of Accidents

- Training/Instructional
- Data/Information
- Safety Management
- Systems and Equipment
- Regulatory
- Maintenance
- Infrastructure

Year:
- 2000
- 2001
- 2006