Analysis of Civil Helicopter Accidents in India
Scope of the Presentation

1. Profile of the Industry
2. Usage of Helicopters & Challenges
3. Safety Performance
4. Analysis of Major Helicopter Accidents
5. Findings & Recommendations
Profile of Indian Civil Helicopter Industry
Profile of Indian Rotorcraft Industry

➢ There are around 256 commercial and over 600 military turbine helicopters in India.

➢ While the military Helicopter strength will more than double in the next 3 – 5 years, the civil fleet is expected to grow at about 15% annually.

➢ HAL manufactures commercial and military helicopters. Several private companies of late have become component manufacturers for major OEMs.
Growth of Commercial Helicopters in India (Turbine)
Types of Operators & Fleet Strength

- Private - 28
- NSOP - 186
- Govt./PSUs - 17
- ParaMilitary - 13

Operator Strength:
- Total NSOP = 66
- Private = 19
- Govts/PSUs = 17
- ParaMilitary = 1

Total registered helicopters-256 (Around 200 are in commercial use). 90 per cent of commercial operators have a small fleet of six or less than six machines.
Types of Commercial Helicopters in India

- AgustaWestland (9 Models), 23
- Bell Helicopters (17 Models), 104
- Eurocopter (20 Models), 76
- Kazan, 8
- MD Helicopters (4 Models), 6
- Enstrom (1 Models), 3
- Sikorsky (2 Models), 3
- Robinson (2 Models), 9
- Schewizer (3 Models), 4
- HAL (3 Models), 18
- AgustaWestland (9 Models), 23
Usage of Helicopters & Challenges
Civil Helicopters Fleet in Various Commercial Usages

- Of 200 Commercial Helicopters, around 75% are Used Non scheduled passenger service. Around 16% are Used Logistic air support to offshore Rigs. In 2013 commercial helicopters flew a total of 79,881 hrs.
- Hardly any HEMS, ALE, ENG, Aerial Work etc.

Hours Flown during 2009-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Hours Flown</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>72068 hrs</td>
</tr>
<tr>
<td>2010</td>
<td>71771 hrs</td>
</tr>
<tr>
<td>2011</td>
<td>73627 hrs</td>
</tr>
<tr>
<td>2012</td>
<td>74156 hrs</td>
</tr>
<tr>
<td>2013</td>
<td>79881 hrs</td>
</tr>
</tbody>
</table>
Safety Performance
Worldwide:
Accident Rate Trend Toward the IHST 80% Reduction Goal

Yearly Accident Count
401 451 383 392 377 382

Trend = 5.7
Short of Goal = 3.8
Goal = 1.9

Civil Helicopter Accidents/100,000 Hours

2001 to 2005 (Baseline)
2006
2007
2008
2009
2010
2011
2012
2014
2016 (Goal)
Accident Rate of Civil Helicopters in India (2007-2014)

- 2007: 12.92 per 100,000 hours of flying - (8/61994)
- 2008: 2.50 per 100,000 hours of flying - (2/80549)
- 2009: 2.80 per 100,000 hours of flying - (2/72068)
- 2010: 4.17 per 100,000 hours of flying - (3/71771)
- 2011: 6.79 per 100,000 hours of flying - (5/73627)
- 2012: 6.74 per 100,000 hours of flying - (5/74156)
- 2013: 6.25 per 100,000 hours of flying - (5/79881)
- 2014: Nil

Major unresolved problem is getting accurate flight hours to calculate the accident rate.
Civil Helicopter Accidents 2005-2014

- Non Fatal: 24 (66.66%)
- Fatal: 12 (33.33%)
Civil Helicopter Accidents 2005-2014
Contd...

- Single Engine: 19 (52.77%)
- Twin Engine: 17 (47.22%)

Single Engine
Twin Engine
Analysis of Major Helicopter Accidents
Civil Helicopter Accidents During 2005-14
Causative Factors of Accidents

Non-Fatal - Total 24
Fatal - Total 12
## Causative Factors For Major Civil Helicopter Accidents During 2005-14

| Occurrence Categories | Loss of Control - (10) +(01)  
Loss of Visual Reference - (07)  
Maintenance Error - (06) +(02)  
Ground Accident - (02) +(01)  
Struck Object - (03)  
Misc - (01) +(01)  
Structural failure - (01) |
|-----------------------|--------------------------------------------------|
| Standard Problem Statement | Pilot Judgment & Actions  
Pilot situational awareness  
Maintenance Action  
Ground duties  
Safety culture |
| Intervention Recommended | Safety Management  
Training, Systems (including Equipment & Information)  
Maintenance  
Regulatory & Infrastructure |
## Mi-172 Helicopter

<table>
<thead>
<tr>
<th>PRIMARY MISSION &amp; NUMBER OF CREW &amp; PASSENGERS</th>
<th>LOCATION</th>
<th>DATE</th>
<th>A/C TYPE &amp; REGN &amp; CONDITION</th>
<th>FATAL/SERIOUS INJURIES</th>
<th>CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERSONAL / PRIVATE C-3 Pax-20</td>
<td>ARUNACHAL PRADESH</td>
<td>19-APR-11</td>
<td>Mi-172 VT-PHF Totally Destroyed</td>
<td>FATAL Injured -1 Killed - 19</td>
<td>Pilot Error</td>
</tr>
</tbody>
</table>

**How it happened? & Contributory Factors**

The helicopter undershot the helipad by about 27 meters and sank below the height of the helipad by about a meter. Impact with terrain caused the left oleo leg to shear off. During the recovery from the sink, the helicopter got into a dynamic roll. Subsequently, it caught fire and was totally destroyed.
Human Factors Analysis

Mi-172 on 19-April-2011, Killed - 19, Injured -1
Helicopter Totally Destroyed

- **Violation of Safety (SOPs)**: Landing at a helipad 50 m x 50m against required helipad of 250m x50 m at a elevation of 9,000 ft amsl. Gross Weight was 200 kg more than permitted. No pre-flight medical check up not adhering to duty time limitations.

- **Perceptual Error**: The pilot made an undershooting approach to the limited size helipad as another helicopter was already parked on one side.

- **Skill Based Error**: when one wheel struck the embankment of the helipad on the approach, the pilot mishandled controls which led to dynamic roll resulting in the crash.

- **Decision Error**: To operate in the region after 1200hrs when other operators avoid the area owing to severe turbulence.
Findings & Recommendations
Findings & Mitigating Actions

- There were 11 Accidents during 2005 – 13 owing to Loss of Control (LOC).
- In all the cases, pilot judgment errors were evident. In most cases, the pilots simply failed to maintain control of the Helicopter while landing, indicating improper technique and low skill levels.
- Operators were asked to step up role training of their pilots (especially Mountain Flying). Supervisory interventions were stepped up in respect of Flt Op Mgt. Training Courses on Safety Culture & Risk Assessment were introduced.
## AS 350 B3 Helicopter

<table>
<thead>
<tr>
<th>PRIMARY MISSION &amp; NUMBER OF CREW &amp; PASSENGERS</th>
<th>LOCATION</th>
<th>DATE</th>
<th>A/C TYPE &amp; REGN &amp; CONDITION</th>
<th>FATAL/SERIOUS INJURIES</th>
<th>CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERSONAL / PRIVATE C-2 Pax-3</td>
<td>ARUNACHAL PRADESH</td>
<td>30-APR-11</td>
<td>AS 350B3 VT-PHT Totally Destroyed</td>
<td>FATAL Injured - Nil Killed - 5</td>
<td>Pilot Error</td>
</tr>
</tbody>
</table>

**How it happened? & Contributory Factors**

During a Flight from Tawang to Itanagar with CM Arunachal Pradesh on board, the helicopter while negotiating through weather crashed into the mountains. The probable cause of the accident is inadvertent controlled flight into terrain in inclement weather.
Human Factors Analysis

AS 350 B3 on 30 April 2011, Killed - 5, Injured - Nil
Helicopter Totally Destroyed

- **Perceptual Error**: The pilot entered IMC at 16,500 feet amsl and was unable to negotiate the weather.
- **Decision Error**: The pilot opted to follow direct route by climbing over 15000 feet amsl. He undertook the route despite being cautioned about severe weather enroute.
- **Violation of Safety (SOPs)**: Violated route stipulated for the mission. Did not have the stipulated rest before the flight. No supervisory guidance.
- **Skill Based Error**: The pilot could not cope with IMC.
Findings & Mitigating Actions

- In all the seven loss of visual reference fatal accidents the pilot lost situational awareness and inadvertently flew the aircraft into terrain because of lack of external visual references. **Operators were asked to step up Instrument Flying Training of pilots.**

- In many cases, pilot judgment errors were evident. Thus we needed to improve pilot decision making abilities through education. **We introduced a number of Ground Training courses for pilots to educate them in avoiding CFIT.**

- The designated flight examiners conducting IR tests were asked to provide effective feedback to the Op Managers to help them task their pilots according to their abilities. **Instrument Rating Tests of Pilots were more stringent.**

- The Regulator was requested to instil confidence in the pilots by allowing pilots to abort the flight in case of bad weather and if the pilot does a safe forced landing, he was not to be penalised. This step had helped pilots to abort flights into bad weather.
Maintenance
Findings & Mitigating Actions

In sum, there were eight maintenance failure and structural failure accidents. These were attributed to non-adherence to strict norms for exercising the privileges of AME license holders.

Immediate intervention was recommended in the following areas:

- Safety Audits were stepped up to ensure strict adherence to Instructions for Continued Airworthiness, Confirmation of Compliance (Quality Control or QC, qualified co-worker).
- Actions were taken to ensure SMS, training, Quality Assurance (QA), and adherence to OEM’s maintenance schedule.
# Ground Training Courses Conducted by RWSI since September 2004

<table>
<thead>
<tr>
<th>SI</th>
<th>Course Name</th>
<th>DGCA Approval No</th>
<th>Course Validity</th>
<th>No of Courses Conducted</th>
<th>No of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Special VFR Ground Training</td>
<td>AV 22031/29/2012-FSD</td>
<td>Once in a Year</td>
<td>61</td>
<td>1048</td>
</tr>
<tr>
<td>2</td>
<td>Recurrent Training</td>
<td>JDG (PKC)/Misc./2007</td>
<td>Once in Two Years</td>
<td>49</td>
<td>1269</td>
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<tr>
<td>3</td>
<td>Safety Management System</td>
<td>AD15029/MISC/2011-AS</td>
<td></td>
<td>14</td>
<td>349</td>
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<tr>
<td>4</td>
<td>Accident Prevention</td>
<td>AD15029/MISC/2011-AS</td>
<td></td>
<td>07</td>
<td>33</td>
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<tr>
<td>5</td>
<td>Accident Investigation</td>
<td>AD15029/MISC/2011-AS</td>
<td></td>
<td>06</td>
<td>32</td>
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<tr>
<td>6</td>
<td>Adverse Weather – Monsoon Operation</td>
<td>Ops Circular 9 of 2010</td>
<td>Once in a Year</td>
<td>27</td>
<td>542</td>
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<tr>
<td>7</td>
<td>Human Factors Training</td>
<td>DAW/Misc/2014</td>
<td></td>
<td>03</td>
<td>48</td>
</tr>
<tr>
<td>8</td>
<td>Crew Resource Management</td>
<td>AV 22031/28(MISC)/2012-FSD</td>
<td>Once in a Year</td>
<td>17</td>
<td>238</td>
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<tr>
<td>9</td>
<td>Dangerous Goods Regulations</td>
<td>No 8/28/2012-IR</td>
<td>Once in Two Years</td>
<td>17</td>
<td>168</td>
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<tr>
<td>10</td>
<td>Procedures Training</td>
<td>AV-22036/26/Heli/2014-FSD(VolIII)</td>
<td>Once in a Year</td>
<td>05</td>
<td>49</td>
</tr>
</tbody>
</table>

**TOTAL**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>206</td>
<td>3776</td>
</tr>
</tbody>
</table>
Civil Helicopter Accident Rate Trend in India

Accidents per 100,000 hrs of flying

- 2007: 12.92
- 2008: 2.5
- 2009: 2.8
- 2010: 4.17
- 2011: 6.79
- 2012: 6.74
- 2013: 6.25
- 2014: 0
- 2016: 1.9

Avg: 5.27

Short of goal by 3.37
Nil
Accidents in 2014 & 15
Aim of RWSI is to create Safety through Education

Office Accommodation in ITHUM Tower, 62, Noida
Thank You