Runway Safety Programme – Global Runway Safety Action Plan

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Runway Safety Action Plan Working Group (RSAP-WG)

- Established February 2017
- Comprised of experts nominated by Runway Safety Programme partners
- Objectives:
  1) Review runway related accident and serious incident data;
  2) Conduct a safety risk assessment of runway safety accident occurrence categories;
  3) Identify the runway safety risk priorities and high risk accident categories;
  4) Identify appropriate global mitigation actions; and
  5) **Develop a Global Runway Safety Action Plan.**
RSAP-WG Risk Analysis Process

Weighting analysis of RS occurrence categories

Risk assessment and tolerability

Risk mitigation for each priority category

Global Runway Safety Action Plan

Using runway safety metric from the FAA to evaluate risk of each RS occurrence category.

Is the risk level of each RS occurrence category acceptable or not based on the risk index grouping?

If the risk level is not acceptable, determine actions for the global action plan by analysis and group brainstorming.
Safety Risk Tolerability

- **Catastrophic**
  - Action: Risk priority. Identify actions to include in the Global Action Plan.

- **Major**
  - Action: Continue with existing mitigation safety programmes.

- **Minor**
Runway Safety Risk Index

• Developed by the FAA
• Use modeling to assign risk weights to all kinds of outcomes.
  – Weighted outcomes include fatalities, injuries, damage, and each type of runway occurrence
  – Weights are based on outcomes’ “proximities” to fatality and are ordered based on SME input \([\text{Injury} \rightarrow \text{Damage} \rightarrow \text{Incident}]\)
  – For accidents, weighting gives some credit for saving lives and minimally-damaged aircraft
Incident Type | Red | Yellow | Green | Total Risk Weight | Average Risk Weight
--- | --- | --- | --- | --- | ---
RE: Runway excursion | 48 | 288 | 70 | 390.6605123 | 0.962218011
GCOL: Ground Collision | 10 | 118 | 23 | 64.68188334 | 0.428356843
ARC: Abnormal runway contact | 20 | 274 | 22 | 60.65670508 | 0.191951598
USOS: Undershoot/overshoot | 13 | 32 | 6 | 57.6776441 | 1.130934198
CTOL: Collision with obstacle(s) during take-off and landing | 6 | 16 | 0 | 32.92302258 | 1.496501026
LOC-G: Loss of control - ground | 6 | 57 | 15 | 9.812887685 | 0.125806252
RI: Runway incursion - vehicle, aircraft or person | 1 | 7 | 78 | 0.867738317 | 0.010089988

- Data normalized with traffic data
- 1100 occurrences
- 44 events with fatalities
- 446 fatalities
Coordination with the GASP-SG

- Current edition of the Global Aviation Safety Plan identifies **runway safety** as a **global priority**
- GASP and ICAO Annual Safety Report defines runway safety into the following occurrence categories:
  - Abnormal Runway Contact
  - Bird Strike
  - Ground Collision
  - Ground Handling
  - Runway Excursion
  - Runway Incursion
  - Loss of Control on the Ground
  - Collision with Obstacle(s)
  - Undershoot / Overshoot
  - Aerodrome
Recommendations

- Is Runway Safety still a global priority? **Yes**
- If so, what category(ies)?

**Runway Excursion**
- Highest total risk weight
- Highest number of events
- Harmonized with international organizations (e.g. IATA)

**Runway Incursion**
- High number of incidents
- 1 incident report per day
- High fatality risk
## Top Contributing Factors – Runway Excursion

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<thead>
<tr>
<th>Contributing Factor</th>
<th>Description / Examples</th>
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<tbody>
<tr>
<td><strong>Latent Conditions</strong> – Conditions present in the system before the accident and triggered by various possible factors.</td>
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</table>
| Flight Operations: Standard Operating Procedures and Checking | Inadequate or absent:  
  - Standard Operating Procedures (SOPs)  
  - Operational instructions and/or policies  
  - Company regulations  
  - Controls to assess compliance with regulations and SOPs                                                                                               |
| Flight Operations: Training systems                      | Inadequate training of flight crews.                                                                                                                                                                                   |
| Regulatory Oversight                                     | Inadequate regulatory oversight by the State.                                                                                                                                                                         |
| Safety Management                                         | Absent or ineffective:  
  - Safety policy and objectives  
  - Safety risk management (including hazard identification process)  
  - Safety assurance (including Quality Management)  
  - Safety promotion                                                                                                                                      |
| **Threats** – An event or error that occurs outside the influence of the flight crew, but which requires crew attention and management if safety margins are to be maintained. | **Mismanaged threat: A threat that is linked to or induces a flight crew error.**                                                                                                                                 |
| Meteorology                                              | Includes thunderstorms, poor visibility/Instrument Meteorological Conditions (IMC), wind, wind shear, gusty wind and icing conditions                                                                                     |
| Airport Facilities - Contaminated Runway/Taxiway         | Poor braking action as a result of contaminated runways/taxiways.                                                                                                                                                     |

**Flight Crew Errors (Active Human Performance)** – An observed flight crew deviation from organizational expectations or crew intentions.  
**Mismanaged error:** An error that is linked to or induces additional error or an undesired aircraft state.

<table>
<thead>
<tr>
<th>Flight Crew Errors (Active Human Performance)</th>
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<tr>
<td>Failure to go-around after Destabilisation during Approach</td>
<td>Flight crew does not execute a go-around after stabilization requirements are not met.</td>
</tr>
<tr>
<td>Manual Handling/Flight Controls</td>
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</table>
  - Hand flying vertical, lateral, or speed deviations  
  - Approach deviations by choice (e.g., flying below the glide slope)  
  - Missed runway/taxiway, failure to hold short, taxi above speed limit  
  - Incorrect flaps, speed brake, autobrake, thrust reverser or power settings |
| Standard Operating Procedures (SOP) Adherence           |  
  - Intentional or unintentional failure to cross-verify (automation) inputs  
  - Intentional or unintentional failure to follow SOPs  
  - Pilot flying makes own automation changes  
  - Sterile cockpit violations |
## Top Contributing Factors – Runway Incursion

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<td><strong>Latent Conditions</strong> – <strong>Conditions present in the system before the accident and triggered by various possible factors.</strong></td>
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<td>Training</td>
<td>Includes inadequate training for air traffic controllers, pilots or airside vehicle drivers.</td>
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<tr>
<td>Procedures</td>
<td>Inadequate, inappropriate or absent procedures.</td>
</tr>
<tr>
<td>Regulatory Oversight</td>
<td>Inadequate regulatory oversight by the State.</td>
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<tr>
<td>Safety Management</td>
<td>Absent or ineffective safety management.</td>
</tr>
<tr>
<td>Aerodrome Design</td>
<td>Complex or inadequate aerodrome design such as the complexity of the layout of roads and taxiways adjacent to the runway, intersecting/crossing runways, insufficient spacing between parallel runways, departure taxiways that fail to intersect active runways at right angles, and no end-loop perimeter taxiways to avoid crossings. Inadequate or poorly maintained visual aids (including signs, marking and lighting). Poorly maintained runways (friction etc.).</td>
</tr>
<tr>
<td>Workplace Conditions</td>
<td>Covers issues such as the ‘sterile cockpit’ environment when pilots are taxing. For air traffic controllers human-machine interface and ergonomics affecting their ability to maintain, as far as practicable, a continuous ‘heads up’ visual scan of the aerodrome with unimpeded visual ‘lines of sight’ or the use of surveillance systems such as A-SMGCS.</td>
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<td><strong>Active Human Performance</strong> – <strong>Human Performance Limitations (directly related to OSF and CC)</strong> including false perceptions; memory lapses; and reduced situational awareness.</td>
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<td>Pilot Factors</td>
<td>Includes inadvertent non-compliance with ATC instructions, in particular take-off or landing without clearance.</td>
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<tr>
<td>Airside Vehicle Driver Factors</td>
<td>May include not obtaining a clearance or non-compliance with ATC instructions.</td>
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<tr>
<td>Air Traffic Controller Factors</td>
<td>May include clearing aircraft to land/depart on an occupied runway, not monitoring aircraft position on approach to intersecting runways and clearing aircraft to cross runway with aircraft on departure/landing roll.</td>
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<tr>
<td>Communication Errors</td>
<td>A breakdown in communications between air traffic controllers and pilots or airside vehicle drivers often related to the read-back/hear-back procedure.</td>
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<td><strong>Threats</strong> – <strong>An event or error that occurs outside the influence of the flight crew, but which requires crew attention and management if safety margins are to be maintained.</strong></td>
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<td>Meteorology</td>
<td>Includes poor visibility, rain, snow and icing conditions (that may obscure visual aids).</td>
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</table>
Recommended Actions - ICAO

- Enhance Assembly Resolution, SARPs and existing guidance material for Runway Safety
- Develop recommended practices for prevention of runway excursions
- Develop guidance to States on State Runway Safety Programmes
- Enhance ICAO runway safety related training
- Deploy the Global Reporting Format for assessing and reporting runway surface conditions
Recommended Actions – Runway Safety Programme

- Continue to **collaborate** on the **monitoring** of runway safety related **data**, conduct **analysis** and **identify** appropriate mitigations
- Continue to **support** the establishment of **effective Airport RSTs** with RST Go-team missions
- Organize a **global** runway safety event at least every **six years**
**Recommended Actions – Regional Groups**

- **Collect** and analyze regional safety data
- **Develop** and **implement** regional action plans
- **Monitor** and **manage** regional action plans
- **Offer support** to States that need it
Recommended Actions – State CAAs and Industry

- **Collect and analyze data** and develop/implement **action plans**
- **Participate** in Aerodrome RST activities
- **Implement** Safety Management
- **Ensure** runway safety training is part of **initial and recurrent training** for relevant operational staff
- The GRSAP Includes recommendations for each stakeholder and each Runway Safety priority

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>State Civil Aviation Authorities, Aircraft Operators, Air Navigation Service Providers, Aerodrome Operators, Aircraft Manufacturers</th>
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<tbody>
<tr>
<td>Runway Safety Priority</td>
<td>Runway Excursions, Runway Incursions</td>
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<tr>
<td><strong>Actions</strong></td>
<td><strong>Related Contributing Factor (if applicable)</strong></td>
</tr>
<tr>
<td>1.</td>
<td>Ensure all infrastructure, radio-telephony phaseology, practices and procedures relating to runway operations are in compliance with ICAO, Regional and State provisions.</td>
</tr>
<tr>
<td>2.</td>
<td>Ensure that information is collected on all runway incidents/accidents and perform analyses and risk assessments to identify risks and contributing factors. These activities should be reviewed and conducted on a recurrent basis to reassess risks.</td>
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<tr>
<td>3.</td>
<td>Develop and implement action plans to mitigate identified risks and monitor the implementation/effectiveness of those action plans.</td>
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<tr>
<td>4.</td>
<td>Actively participate in aerodrome local runway safety team (RST) activities. Note: Aerodrome Operators shall establish and lead RST's. Not applicable to Aircraft Manufacturers.</td>
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<td>5.</td>
<td>Ensure that the GRSAP training is part of initial and recurrent training for relevant operational staff.</td>
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<tr>
<td>6.</td>
<td>Implement the elements of Safety Management and ensure the implementation of Safety Management Systems is in accordance with the applicable ICAO provisions.</td>
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<td>7.</td>
<td>Make use of available resources such as the ICAO Safety Management Implementation Toolkit and its safety management tools.</td>
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<td>8.</td>
<td>Ensure appropriate Safety Management training of staff and make use of available training such as the ICAO Safety Management Training Programme (SMTTP).</td>
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<td>9.</td>
<td>Ensure runway safety training (e.g. runway excursion/incursion prevention) is part of initial and recurrent/refresher training regimes for all relevant operational staff. Joint training sessions between different stakeholder groups (e.g. pilots and controllers) should be encouraged.</td>
</tr>
</tbody>
</table>

**References**
- ICAO Annex 14 Vol I - Aerodromes
- ICAO Annex 19 – Safety Management
- ICAO PANS-Aerodromes (Doc 9881)
- ICAO Safety Management Manual (Doc 9859)
- ICAO Runway Safety Team Handbook Second Edition
What’s Next?

• Publish on the ICAO runway safety website and Runway Safety Implementation Kit (I-Kit).
• Promotion by the runway safety programme.
• RASGs to support regional implementation of the plan.
• The Runway Safety Programme to continue to monitor and analyze runway safety data which may result in enhancements and additional revisions.
• The recommendations will be reflected in the GASP 2020-2022 edition.
• Runway Safety Panel at the ICAO Safety and Air Navigation Symposium (SANIS).