Fatigue Risk Management in Practice

Phil Barton : Head of FRMS
About easyJet...

1995

1 base
3 airports
2 routes
2 leased aircraft
Virtual airline!

2013

23 bases
137 airports
29 countries
611 routes
216 aircraft
60 million pax
7500 crew
Fatigue and Crew performance

- ICAO Definition of Fatigue:

  “A physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member’s alertness and ability to safely operate an aircraft or perform safety related duties.”

- Everyone carries some level of tiredness and fatigue risk.
- It is the point that fatigue degrades crew performance to unacceptable levels that must be managed by FRMS.
Prescriptive regulation is not enough

- Historically, control of fatigue has been achieved by prescriptive rules – in the UK based upon CAP371.
- This provides a simplistic illusion of safety management:
  - within the limits you are safe and outside the limits you are unsafe
  - “one size fits all” – one set of rules can cover all operational situations.
- Improved understanding of fatigue and crew performance is encouraging a more scientific approach to flight time limitations based on the analysis of data specific not only to the operator but individual characteristics such as fleet, base and schedule.
- The Safety argument is endorsed by the regulators: ICAO, EASA, FAA, CAA.
- Operators who have demonstrated responsible and comprehensive management of their fatigue-related risks through a mature FRMS are not prevented from gaining its full benefits by unnecessarily restrictive constraints.
- FRMS is the means by which easyJet can deliver sustainable flexibility, efficiency and high productivity in an appropriately risk controlled environment.
When did fatigue management begin at easyJet?

- In 2003 easyJet identified increased operational risk arising from fatigue.
- There was a realisation that despite being compliant with CAP371 easyJet remained exposed to the risk of roster related fatigue.
- This initiated a fundamental review of rostering practices and philosophies which in turn led to the creation of a Fatigue Risk Management System.
6 & 3 and ‘Project Blue’

**Project Blue**

- A basic human factors study correlating FDM/ASR data against duty day on 6 & 3.

- XXX EEELLL XXX EEELLL XXX

- Driven by requirements of prescriptive legislation
6 & 3 and ‘Project Blue’

Project Blue
• Results helped negotiate a prototype 5452 pattern that went beyond the limits of CAP 371. It demonstrated the application of objective scientific data to reinforce and evidence legal rules in a collaboration with crews and the UK regulator.

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• Fewer “wasted” duty days: “flexi-days” repackaged as days off.
• Lower risk of cumulative limits being a constraint.
• Reserve periods to “absorb” disruption.
• Increased productivity.
• Lower sickness rates.
• Higher retention rates.
Development of the easyJet FRMS

• Rulesets evolved: 5453 (November 2006) and non fixed pattern variation (March 2009).
• FRMS capability evolved: October 2005 programme for the use of predictive software (FAID).
• September 2006 availability of online FRF reporting.
• October 2006 rollout of crew computer based FACT.
• December 2007 inclusion of FRMS into CAA approved FTL scheme.
• November 2008 drafting of comprehensive FRMS procedures manual.
• July 2009 coding of FRMS guidelines into optimised rostering systems.
• 2010: Development of HFMP methodology in partnership with NASA Ames, Imperial College and ONERA.
• January 2011 completion of first formal regulator FRMS specific audit.
• December 2011: Four year extension of the NASA Space Act Agreement collaboration.
• 2012: Second generation FACT training and SAFE contract agreement.
• 2013: Expansion of HFMP
2013: EASA Sub Part-Q

- EASA SPQ – reconciling national differences has led to the definition of an outer envelope of prescriptive regulation.
- However ORO.FTL.110 “Operator Responsibilities” makes it clear that assignments shall be “planned in a way that enables crew members to remain sufficiently free from fatigue so that they can operate to a satisfactory level of safety under all circumstances”.
- SMS/FRMS is a logical means of delivery.
FRMS – Dynamic Risk based approach

FRMS uses a ‘risk based’ approach to manage fatigue. This offers easyJet flexibility to operate within a ‘Safety Space’, where limits are not hard. Operating at the outer limits of the safety space requires the risk be dynamically assessed and mitigated.

Dynamic risk assessment enabled by SMS/FRMS works to maximise opportunity when we need it most…
The State shall approve an operator’s FRMS:

- Policy and documentation,
- FRM processes,
- FRMS safety assurance processes,
- Effective reporting,
- FRMS promotion processes,
- Parameters;
  - Hard
  - Soft
Utilises the same processes as SMS

Risk Assessment including ERC

Safety Meeting Structure

Event Risk Classification: How bad could it be? How close did it get?
Components of easyJet FRMS

1. Fatigue Reporting Process (FRF) – FRMS processed 5500 reports in 2012
2. Through SafetyNet, FRMS taps into all forms of safety data, trend, analyse
3. Analysis reported through 3-levels of Safety Action Group (SAG)
4. Rosters are analysed using bio-mathematical modelling techniques (SAFE/FAID)
5. Operational staff and all crew undergo initial/recurrent FACT training
6. We undertake easyJet specific research with NASA and Imperial College annually
7. The 2013 study currently underway is designed to test demanding summer roster characteristics at easyJet’s largest base, Gatwick, whilst the NASA element correlates fatigue with aircraft performance decrement.

- 4 week specially designed schedule
- 44 Pilot participants
- New technology – PVT and surveys undertaken on iPod Touch
- Melatonin testing employed for the first time.

<table>
<thead>
<tr>
<th>Degree of Fatigue</th>
<th>Score</th>
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<tbody>
<tr>
<td>Fully alert, wide awake</td>
<td>1</td>
</tr>
<tr>
<td>Very lively, responsive, but not at peak</td>
<td>2</td>
</tr>
<tr>
<td>Okay, somewhat fresh</td>
<td>3</td>
</tr>
<tr>
<td>A little tired, less than fresh</td>
<td>4</td>
</tr>
<tr>
<td>Moderately tired, let down</td>
<td>5</td>
</tr>
<tr>
<td>Extremely tired, very difficult to concentrate</td>
<td>6</td>
</tr>
<tr>
<td>Completely exhausted, unable to function, effectively</td>
<td>7</td>
</tr>
</tbody>
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Challenges of FRMS

• Legacy and inertia reinforced by the comfort of binary legislation. Legal = safe. Illegal = unsafe.
• Demands increased soft coding and penalties in optimiser systems.
• Requires increased level of understanding as to the science behind roster construction techniques.
• A new generation of more highly skilled staff supported by powerful systems and complemented by adaptive and dynamic processes. Demands a change in “the knowledge base and skill sets” required.
• Flexibility brings choice, responsibility and a tension with the perception of complexity.
• Potential for abuse and misappropriation: independence and credibility.
• Reconciling the principle and the problem to the benefit of all stakeholders.
Benefits of FRMS

• Reduces operational risk by mitigating against fatigue related crew error.
• Promotes crew effectiveness, lifestyle sustainability and retention.
• Underpins improved actuarial rates – key component of the company Safety Management System.
• Operational flexibility including derogation from the prescriptive FTL rules that have to be observed by non FRMS carriers.
• Provides the organisation with increased and more wide ranging rostering opportunities.
• A regulator approved FRMS allows for greater levels of corporate self governance.
• Promotes informed decision making by the business enabling the balancing of commercial drive and safety oversight.
• Opportunity for stakeholders to unite and facilitate a visionary improvement in fatigue management practices.
The road ahead

• FRMS reflects the volatile and changing nature of fatigue risk. Our experience and research continues to open up areas of interest:
  • Cumulative fatigue – Impact of intense schedules over longer time periods (years to entire careers).
  • Individual differences – How to consider and tailor FRMS processes to individual crew members e.g. chronotype, experience, commute, personal circumstances.
  • Sector workload – The impact of consecutive, sector intense schedules.
  • Complacency – Training, automation and adherence to SOPs
  • Pilots and Cabin Crew – The different considerations for each crew group given tasking demands.
  • Expansion into other business areas – engineering and ground operations.

• **The principle is continuous safety and operational performance improvement in support of business objectives.**
Enabling Production and Protection in Harmony