Continuous Pilot Training, Urgencies and Realities
(What are we waiting for?)

ICAO Next Generation Of Aviation Professionals Symposium
March 1-4, 2010
Introductions

Captain Jean-Michel Bigarré
CEO & President
ETOPS Aviation Services
A division of MWC

Mark Dransfield
Senior Director Business Development & Strategy
Mechtronix Systems
A division of MWC
Context – What’s being reported?

Flight International Editorial
21-27 July 2009

Global airline safety has stopped improving for the first time in aviation’s history….

It is not possible to come up with a single reason why improvement has stalled…...All of them (accidents) demonstrate flaws in pilot recurrent training.

Flight Safety Foundation, July 2009

“...If we continue at this pace, we’ll be turning the clock back 10 years in safety,” said Bill Voss, President Flight Safety Foundation

UK CAA Global Airline Safety Analysis 2009:

- Crew-related issues dominate accident causal factors, featuring in 75% of fatal accidents

Flight International 14th September 2009 edition
(Asia Pacific Aviation Training Symposium)

- Major Regulators urged to rethink full-flight simulator training requirements
- Flight training executives are calling for certification authorities to rethink their regulations to allow the industry to reduce its dependence on highly expensive full-flight simulators in favour of cheaper alternative devices.

Flight International Editorial
23 – 28 February 2010

Pilot handling was a contributory factor in 30% of airline accidents globally in 2009, according to the International Air Transport Association analysis of accident rates for the period...

...It is pressing industry to embrace its IATA Training and Qualification Initiative, which it describes as “a push for harmonising a competency-based approach to training real skills”, rather than just airline compliance with the minimum regulatory requirements for pilots to gain and maintain a pilot licence.
Questions to be answered

1) Challenges for Airlines and pilot training

2) Industry initiatives that are reviewing..
   - Pilot ab-initio and recurrent training methods
   - Flight Simulation Training Device (FSTD) requirements

3) Technological advances in FSTDs

4) How do 2) and 3) above address the Challenges in 1)
Numerous challenges are calling today for a review of the training programs designed by airlines with their authorities.

1) CHALLENGES FOR AIRLINES AND PILOT TRAINING

- World air traffic to grow by 20% per year worldwide by 2025
- World commercial fleet to reach 35000 a/c by 2025 (from 17000 today)
- Increasing sophistication of cockpits
- Increasing airspace congestion
- Lack of ab initio schools
- Annual need of 18,000 pilots (commercial, business jet, cargo)
- High pilot turnover / poaching
- "We cannot be as selective as we used to be" [Chief Pilot, Asian airline]

Source: Roland Berger analysis
1) CHALLENGES FOR AIRLINES AND PILOT TRAINING

The costs and complexity of a classical FFS can sometimes represent major obstacles for airlines

### Initial investment
- Purchase cost of a FFS
- Difficulty to obtain a financing for simulators, which do not benefit from the same asset-backed solutions as aircraft
- Large % of costs driven by aircraft OEM data package license fees and cost for instruments, parts and avionics

### Initial set-up
- Long process: manufacturing, shipping, set-up, certification = up to 2 years altogether
- Expensive process: need for a specific high ceiling building

### Running costs
- Maintenance cost: Power and facility costs
- Operating costs: typically 3 full-time technicians are required (no economies of scale for airlines owning only one FFS)
- Spares: expensive aircraft parts

### Maintenance and operation complexity
- Quality process: need to ensure on a regular basis that the systems are still fully operational (well set up visuals, active motion)

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Required utilization rate to be economically viable: ~ 3000 hours per year
(corresponds to a fleet of 20 large commercial aircraft of the same type, whereas most Tier-2s and Tier-3s\(^1\) operate fleets of 5 to 20 LCA or 5 to 30 regional jets and turboprops)
1) CHALLENGES FOR AIRLINES AND PILOT TRAINING

The use of remote third-party training centers is a source of significant direct and indirect costs.

Example of costs incurred by an average European airline for 1 OPC for 1 crew:

**Direct costs**
- **Simulator time**
  - $4,000 for FFS dry rental

- **Transportation**
  - $1,000 (for airlines not operating flights to the center)

- **Accommodation**
  - $1,000 for hotel and per diem allowance for two pilots over 2 nights

  - The idle **away crew** needs to be replaced for flying operations
    - Europe airline: 2 days\(^2\) of flying missed for 4 hours of FFS
    - Latam airline: 3 days flying missed for 4 hours of FFS

  - Additional cost of the instructor (SFI, TRI, TRE), away from operations as well during the training sessions

**Indirect costs**

- **"Away cost" of trainees**
  - Slots are difficult to **reschedule**
    - when a crew misses the slot
    - when a crew fails the training
    - when the FFS is down

**Case study: Tier-3 airline in the South Pacific**

- Closest FFS for aircraft type located in **Bangkok**
- Overall time required for 4 hours of simulator in Bangkok: **4 to 5 days** (incl. rest)
- Consequence: the national authority allows both recurrent training and checking to be conducted on the **aircraft** for the fleet
- A device based at home base will significantly improve the quality of training, hence the **safety** of the airline

1) Average based on European Tier-2 airlines' feedback
2) training + travel + briefing/debriefing + rest

*Source: Interviews, Roland Berger analysis*
2) INDUSTRY INITIATIVES

INCREASE TRAINING = USE MORE SIMULATION = BUT DO NOT INCREASE COST

• Pilot ab-initio and recurrent training methods
  – ICAO MPL (ref Dieter Harms presentation)
  – IATA ITQI (ref Mike Varney presentation)
    Developing global standards and best practices for (amongst others):
    • MPL implementation
    • Type Rating and Recurrent training
    • Transition into Competency based training

• Flight Simulation Training Device (FSTD) requirements
  – Royal Aeronautical Society International Working Group (IWG)
    • Harmonization of FSTD Requirements – a global standard
2) INDUSTRY INITIATIVES

Royal Aeronautical Society International Working Group

- A $10m industry effort to harmonize the technical requirements for FSTDs and how they might be used in flight crew member training based on a detailed training task analysis

Analysed all the training tasks required to be performed from EASA/ICAO/FAA training task lists:
- MPL1,2,3,4 Multi-crew Pilot License
- IR Initial Instrument Rating
- PPL Private Pilots License
- CPL Commercial Pilots License
- CR Class Rating
- TR Type Rating
- RL Recurrent License (Training & Checking)
- RO Recurrent Operator (Training & Checking)
- Re Recency (Take-off and Landing)
- CQ Continuing Qualification
- IO Initial Operator

ICAO 9625 Edition 3

- Provides a means to evaluate any age/type of FSTD based on training task analysis, not technology standards
3) **FSTD TECHNOLOGY ADVANCES**

The new-generation fixed based simulators use state of the art technology to provide an excellent training experience.

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<td><strong>Sending stimuli to the pilots' brain to recreate sensations for pedagogical purposes, rather than imitate the aircraft</strong></td>
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| **Visual cues** | • Collimated display recreating the visual environment of a pilot (moves of the aircraft conveyed to the pilot through the visual moves)  
• Full replication of the systems for complete review of the pilot's visual path |
| **Sound cues** | • High-fidelity sound system  
   – To replicate the sound interfaces of the avionics systems  
   – To recreate an environment of noise stress |
| **Smelling cues** | • Smoke generator to announce important mechanical failures |
| **Proprioceptive / motion cues** | • Force feedback based on the aircraft data loop  
• Seat with integrated motion (3 axis acceleration) and vibrations to generate pilot reactions (e.g. in case of touch-down, landing gear extraction...) |
3) FSTD TECHNOLOGY ADVANCES

High Performance fixed - base simulators now closer to traditional Full Flight Simulators

Numerous NAAs across the globe have already individually granted their airlines the authorization to use the new generation fixed-based simulators for recurrent training.

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BACKING OF THE NAAs
Propio vs control loading as per FFS

UK and other updated on OPS checks
Xavier Hervé, 1/03/10
4) ADDRESSING THE CHALLENGES

— Put the pieces of the jigsaw together...

- New training initiatives
  - IATA ITQI
  - ICAO MPL

- New FSTD Qualification Standards
  - RAeS IWG
  - ICAO Doc 9625

- Cost Effective FSTDs
  - (FFS, FFT)

- More training time within current budgets, = Better trained pilots

- Train at home for continuous training
4) ADDRESSING THE CHALLENGES - A NEW SOLUTION FOR A NEW SITUATION

The evolution of the airline landscape, which is calling for a new approach to continuous training, in order to improve global safety

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| **Most airlines today are facing a conjunction of challenges to the skill level of their pilots**  
  • Increasing number of aircraft to be flown  
  • Increasing complexity of operating aircraft systems  
  • Increasing congestion of air traffic  
  • Scarcity of trained pilots leading to a high turnover  
  • Lack of entry-level skills and pilot experience | **Against these challenges, the classical approach to simulator training presents certain airlines with considerable drawbacks and heavy costs**  
  • Cost pressure on Tier-2 and Tier-3 operators  
  • Unfavourable economics of classic simulation and third-party training  
  • Remoteness of the training centres | **Under the approval of national authorities, one new way of training has been devised and tested to address this need, with high-performance fixed-based simulators installed at the airline home base**  
  • High performance training tool  
  • Backing from numerous NAAs  
  • Optimized cost and maintenance  
  • Continous training at home: more, deeper and customized |

**Need to compensate the initial shortcomings through more [continuous] training**

**Need for an alternative solution that would make economic sense for more airlines to conduct continuous training at home**

**Need to give the national authorities sufficient flexibility to enable continuous training at home**
Thank you