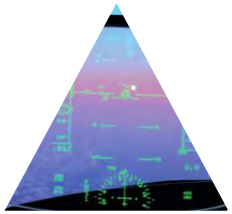
ECAIR Aviation
European Center for Advanced Inflight Recovery

**Upset Recovery Training**
*Ground theory, Inflight experience, simulator consolidation.*



**Audit & Consulting**
*How implementing UPRT courses for your crews*

**Sharing**
*Expertise to improve Airmanship & Aviation Safety.*

# UPRT ET SIMULATEURS

## SEMINAIRE DGAC 19 JUIN 2014

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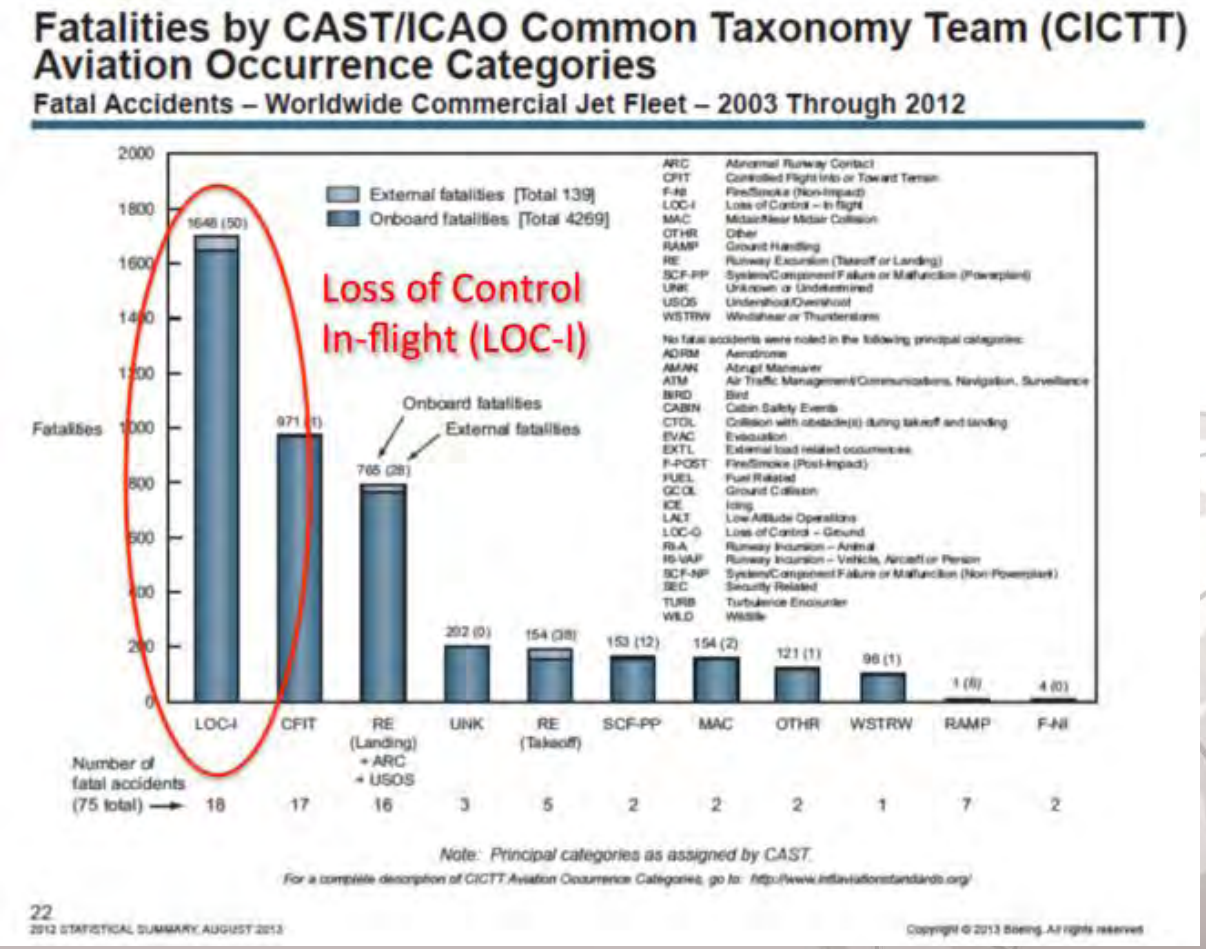
# UPRT ET SIMULATEURS

- QU' EST CE QUE L'UPRT?
- REGLEMENTATION ET UPRT
- QUELS BESOINS DE SIMULATEURS POUR L'UPRT?

# ❑ UPSET PREVENTION AND RECOVERY TRAINING (UPRT)

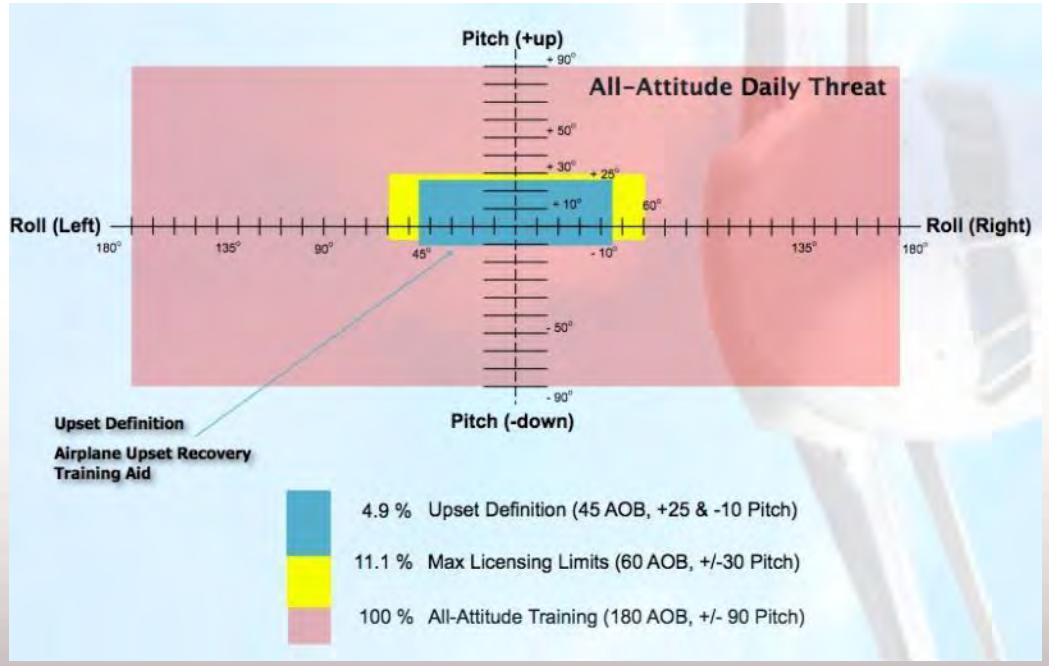
## POUR PREVENIR OU RECUPERER LA PERTE DE CONTRÔLE EN VOL (LOC-I)



- QU'EST-CE QU'UN UPSET??….

**FAA / EASA ➔:**

- PITCH ATTTUDE GREATER THAN 25°, NOSE UP
- PITCH ATTITUDE GREATER THAN 10°, NOSE DOWN
- BANK ANGLE GREATER THAN 45°
- WITHIN THE ABOVE PARAMETERS BUT FLYING AT AIRSPEEDS INAPPROPRIATE FOR THE CONDITIONS




**EN DEHORS DU DOMAINE COURANT D'ENTRAINEMENT DES PILOTES EN VOL ET FSTD….**

# ❑ DEROULEMENT D'UNE PERTE DE CONTRÔLE EN VOL SUITE A UN UPSET

VOL NORMAL

➢ *CAUSE:*

➢ HUMAINE

➢ TECHNIQUE

➢ ENVIRONMENTALE

*UPSET:*

- ATTITUDE
- AOB
- SPEED/MACH

DETECTION ET CORRECTION

NON DETECTION ET NON CORRECTION

LOC-I

NON RECUPERATION

RECUPERATION

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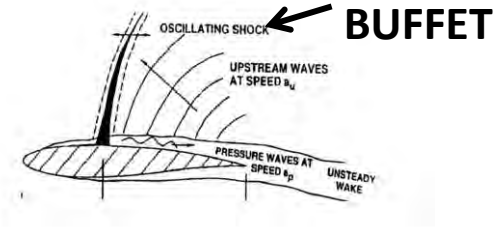
## *NOTRE METHODE*

## ***PACKAGE SUR TROIS PILIERS:***




1. **THEORIE**

2. **EXPERIENCE EN VOL**

3. **CONSOLIDATION SUR SIMULATEURS**

- QU EST CE QUE L'UPRT?
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- **REGLEMENTATION ET UPRT**


**B/1**
**Mieux informer et former les équipages pour réduire le risque de perte de contrôle en vol**

***Les principaux axes de travail s'articulent autour de la sélection initiale des pilotes, de leur capacité à réagir face à l'imprévu et de l'amélioration de la formation (et des outils correspondants) à l'identification, l'évitement et à la récupération des pertes de contrôle et plus particulièrement des situations de décrochage.***

- **REGLEMENTATION ET UPRT**

**ICAO**

- *Procedures for UPRT*— Training *(PANS-TRG, Doc 9868).*
- *Guidance for UPRT-* Manual on Aeroplane Upset Prevention and Recovery Training *(Doc 10011)*

**EASA**

- SIB 2010-33 Automation policy
- SIB 2013-02 Stall & Stick Pusher

**FAA**

- Airplane Upset Recovery Training Aid (2008)
- SAFO 13002 on manual flight operations((01/04/14)
- AC 120-UPRT (Part 121)
- AC 120-109 Stall & Stick Pusher training

- **REGLEMENTATION ET UPRT**

ICAO

- Amendment 172
  - ANNEX 1: applicable 13/11/14
- Amendment 38
  - ANNEX 6: applicable 13/11/14

# FSTD Training

## ICAO Doc 10011 *Manual on Aeroplane Upset Prevention and Recovery Training*

**The use of FSTDs for the delivery of UPRT during type-rating training and commercial air transport flight crew training** complements the application of knowledge and techniques introduced through on-aeroplane UPRT at the CPL(A) or MPL licensing level.

**FSTD capabilities permit training in operational areas that are otherwise unsafe or impractical in actual aeroplanes (such as low altitude or very high altitude upset encounters or flight during rapidly deteriorating situations involving adverse weather or icing conditions).** Additionally, FSTDs can allow for practical skill development in upset prevention and recovery in **a crew environment** and with aeroplane-specific systems, instrument indications, control response and procedures.

FSTD UPRT programme design recommendations are based upon the understanding that:

a) simulation training will be conducted using **the highest level of FSTD fidelity available** utilizing flight test data for the design of the simulation model whenever possible;

a) when flight test data simulation modelling is not available, other appropriate engineering data may be used provided the simulation is then validated using appropriately qualified personnel which may include test pilots;

a) validation of simulation modelling must be completed in context of the training curriculum for which the device is being used.

- **REGLEMENTATION ET UPRT**

EASA

- RMT 0581 & 0582 (2013-2016)
  - Publication date of the NPA: 2014/Q4
  - Publication date of the Opinion:2015/Q3
  - Publication date of the Decision:2016/Q3

# UPRT ET SIMULATEURS

- QU EST CE QUE L'UPRT?
- REGLEMENTATION ET UPRT
- **QUELS BESOINS DE SIMULATEURS POUR L'UPRT?**

# QUELS BESOINS POUR UN SIMULATEUR EN UPRT:

- REPRESENTATIVITE DE L'AVION UTILISE POUR METTRE L'EQUIPAGE DANS SON ENVIRONNEMENT DE TRAVAIL
- CRÉER NEANMOINS DES UPSETS LIEES AUX FACTEURS HUMAINS (EFFETS DE SURPRISES ET EFFETS TUNNELS )
- POSSIBILITÉ DE GÉNÉRER DES SCENARII CONDUISANT À DES UPSETS LIEES A L'ENVIRONNEMENT ET PANNES MÉCANIQUES <u>IMPOSSIBLES A REALISER EN VOL SUR UN AVION STANDARD</u>

- REALISME EN BORDURE DE DOMAINE DE VOL:
  - STALL: BUFFET+ ÉCHAPPÉES EN ROULIS
  - HAUTE VITESSE: BUFFET
- REALISME DANS LES MANŒUVRES DE RÉCUPÉRATION DE DÉCROCHAGES: DÉCROCHAGE SECONDAIRE, REDUCTION DE L'INCIDENCE MAXIMALE À HAUTE VITESSE ET HAUTE ALTITUDE


- REALISME DANS LES MANŒUVRES NEZ HAUT ET NEZ BAS EN TERMES DE COUPLES CABREURS , DE PERTE D'ÉNERGIE

# ❑ QUE DIT LA DOC 10011 OACI ?

## *Fidelity Requirements for UPRT and Stall Training*

- Most FSTDs can be used satisfactorily for AOA-related training and for a significant portion of upset training **not involving full stalls.**

- However, **most current FSTD models are deficient in adequately representing the aeroplane in the post-stall regime.**

- **The development and utilisation of a "type-representative post-stall aerodynamic model"** to support demonstration of a stall past the critical angle of attack (full aerodynamic stall or post-stall regime) **is recommended.**

- An effective and comprehensive aerodynamic stall training programme necessitates improvements in the flight model dynamics, aeroplane performance model and the FSTD cueing systems. ..

## ❑ DOC 10011 OACI

*« Recovery from stall* ***(NON SPECIFIC TYPE FSTD)***

*With due regard to* ***fidelity limitations of the FSTD*** *in use, this portion of the training would normally be performed* ***as a demonstration exercise only*** *highlighting the following:*
*i) Recovery training from an aerodynamic stall should focus on developing the awareness of stall-related cues such as buffet, degradation of control responsiveness in the pitch and roll axis, as well as the inability to arrest descent.*
*ii) The recovery portion of the training should constantly* ***stress the primary importance of a smooth and deliberate reduction in the angle of attack sufficient to break the stalled condition*** *and* ***completing the recovery in compliance with aeroplane specific recommended techniques,*** *with due consideration of the effect of thrust on pitch control in aeroplanes with under slung engines. The maintenance of a wings level condition during the recovery is secondary to the reduction in the angle of attack."*

# QUELS BESOINS POUR UN SIMULATEUR EN UPRT: *CONSTATS ECAIR:*

- ***DIFFICULTÉ À GÉNÉRER DE MANIÈRE FLUIDE DES UPSETS NEZ HAUT OU NEZ BAS (GEL, VARIATION CENTRAGE…)***
- ***IL EST POSSIBLE DE GÉNÉRER DES UPSETS MÉCANIQUES OBLIGEANT L'ÉQUIPAGE À UTILISER DES MODES DE PILOTAGE INNOVANTS (EX: RUDDER HS, SPOILER BLOQUES, DOUBLES PANNES…) MAIS LIMITATION SELON MODELES DE FSTD***
- ***POSSIBILITÉ DE CRÉÉR DES EFFETS DE SURPRISES , EFFETS TUNNELS***
- ***COMPORTEMENT EN BORDURE OU HORS DOMAINE DE VOL : NÉCESSITÉ D'ÊTRE PLUS REALISTE : BUFFET ++, ÉCHAPPÉES EN ROULIS++ POUR METTRE L'ÉQUIPAGE EN CONDITIONS DEGRADEES (SANS ÊTRE FORCÉMENT REPRESENTATIF EXACTEMENT DU MODÈLE AVION)***
- ***DIFFICILE DE GENERER DES DÉSORIENTATIONS VESTIBULAIRES OU VISUELLES***
- ***PAS DE SENSATION DE FACTEUR DE CHARGE (UNLOAD, G>1, CALIBRAGE DES RESSOURCES…)***

# ❑ FORMATION DES INSTRUCTEURS FSTD

## DOC 10011 ICAO: UPRT Instructors & FSTD Instructors

- An essential component in the effective delivery of UPRT is **a properly trained and qualified instructor who possesses sound theoretical and operational knowledge relevant to the UPRT content.**

- **Understanding the capabilities and limitations of the specific FSTDs used for UPRT;**
- Understanding the valid training envelope (VTE) of the device in use

# DOC 10011 ICAO

| UPRT Instructor Training Elements | UPRT Academic Instructor | UPRT Aeroplane Instructor | UPRT FSTD Instructor |
|---|---|---|---|
| *Comprehensive knowledge of all applicable training elements (refer to Table 2-1) | • | • | • |
| Training platforms (aeroplanes & devices) | | | |
| i. Limitations of training platform | | • | • |
| I. Operation of instructor operating station (IOS) and de-briefing tools | | | • |
| Review of LOC-I accidents/incidents | • | • | • |
| *Energy management factors | • | • | • |
| Disorientation | • | • | • |
| Workload management | • | • | • |
| Distraction | • | • | • |
| *OEM recommendations | • | | •* |
| *UPRT recognition and recovery strategies | • | • | • |
| How to do a flight risk assessment (aeroplane) | • (as applicable) | • | |
| Recognition of trainee errors | • | • | • |
| Intervention strategies | | • | |
| *Aeroplane type-specific characteristics | • | • | • |
| Operating environment | • | • | • |
| How to induce the startle factor | | • | • |
| Value and benefits of demonstration | • | • | • |
| How to assess pilot performance using core competencies if conducting CBT (refer to the Appendix) | • | • | • |

# CONCLUSION

- L'UPRT SERA, DES 2014, INCLUE DANS L'ANNEXE 6 OACI. CETTE FORMATION SERA IMPOSEE REGLEMENTAIREMENT PAR L'EASA DES 2015/ 2016 : ELLE DOIT ETRE PRISE EN COMPTE POUR LES SIMULATEURS
- NECESSITE D'UTILISER AU MIEUX LES FSTD ACTUELS EN FORMANT LES INSTRUCTEURS POUR ADAPTER LES SCENARII ET OPTIMISER L'EXISTANT
- POSSIBILITE D'INSERER DES MODELES PLUS REALISTES EN BORDURE DE DOMAINE DE VOL POUR CERTAINS FSTD
- DEVELOPPEMENT D'INTERFACES ADAPTEES A L'UPRT POUR FACILITER LA GENERATION D'UPSETS (ENVIRONNEMENT, MECANIQUE, FH…)

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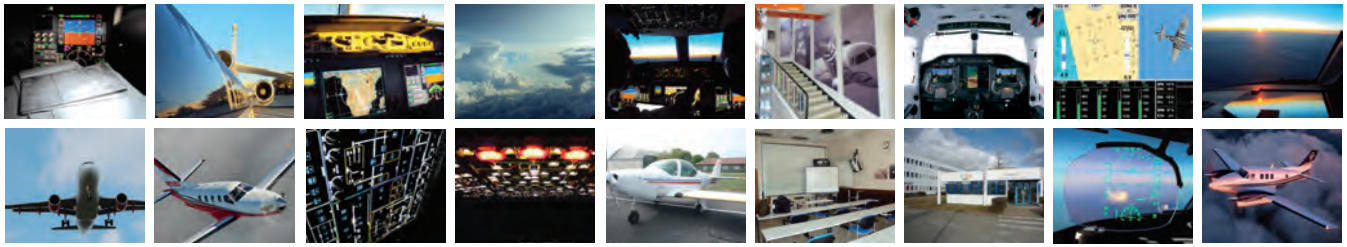

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