

Practical STAMP

Checklist Design
Hazard Constraints

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Something to think about

- Safety is Action **NOT** a Possession
 - HF version
- Action = Safety \neq Possession
 - Engineering version

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The Set

- System change
- “Flap set” procedures
 - Unconstrained Hazard (flaps not set for TO)
- Checklist and associated Procedures Change
 - New constraint for the Hazard

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Going to look at System Change and Hazard constraint. Hazards surrounding Flap system and Take-off flap setting procedures.

How constraining one unconstrained hazard broke a hazard constraint in a different part of the system.

System Change

- Longstanding Flap Twist AD
- Re-engineering solution
- Constraining winter Flaps Fail Hazard
 - Exposes unconstrained Floating Checklist Hazard
- STAMP Systems perspective

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Long Standing AD required outside visual check of Flaps setting with no twist. Use of Human procedure to constrain flap twist hazard on take-off.

Manufacture re-engineering solution to constrain flap twist hazard. Allowed procedure change to constrain Flap fail hazard from freezing deice fluid in the flap mechanism. (flaps could be deiced in the retracted position which seals flap drive screws from contamination during deice process). Associated procedures exposed hazard of floating “taxi check” on the checklist.

Flaps Set!?

STARTING ENGINES

PAPERS/MANIFEST COMPLETE
 FUEL QTY REQ'D ON BOARD
 V-SPDS/T.O. DATA SET FOR FLAPS
 DOORS CLOSED
 BEACON ON
 FUEL PUMP(S) ON
 -----PUSHBACK-----
 PARKING BRAKE ON
 ENGINE(S) STARTED
 Starting Engines Checklist COMPLETE

BEFORE TAXI

ANTI-ICE AS REQUIRED
 NOSEWHEEL STEERING ARMED
 Before Taxi Checklist COMPLETE

TAXI

BRAKES CHECKED
 FLAPS SET INDICATING
 FLIGHT CONTROLS CHECKED L & R
 TRIMS ENGAGED, ZERO & SETTING
 Radar/Terrain Display AS REQUIRED
 Taxi Checklist COMPLETE

BEFORE TAKEOFF

Second Engine STARTED
 Anti-Ice CHECKED/AS REQUIRED
 Hydraulics CHECKED
 Aprt ARMED
 Fms RWY / DEPARTURE
 Thrust Reversers ARMED
 Auto X-Flow MANUAL
 Ignition AS REQUIRED
 Altimeters / /CROSS-CHECKED
 Pre-takeoff Announcement COMPLETE
 Cabin Report RECEIVED
 CAS CHECKED & CLEAR
 Before Takeoff Checklist COMPLETE

LINE-UP

Transponder ON
 Packs & Bleeds AS REQUIRED
 -----Cleared for Takeoff-----
 Anti-Ice AS REQUIRED
 Lights SET
 Takeoff Configuration OK
 Line-up Checklist COMPLETE

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Cues-Associated need to be unique and consistent in all world variations. Was not unique crews left to develop their own technique. Hazard of not having the flaps set for Take-off was constrained by the flaps set for walk around visual confirmation before each leg that the flaps were not twisted. Floating "taxi" check hazard was unconstrained and unknown for almost a decade. The new procedures enacted after re-engineer exposed this unconstrained hazard and led to attempted take-off without the flaps set.

Linear thinking solutions(?)

- Campaign of Ops notes, Posters, training
 - Pilots viewed as: having poor checklist discipline
 - Complacent
 - Rushing
 - Exhibiting Procedural non compliance
- Ineffective Hazard constraint
 - ASAP reports continued unabated!

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Hazard discovered because of the ASAP information feed back loop in the system. If this feedback loop had not been in the system the hazard would have likely contributed to a catastrophic accident off the end of the runway. Likely blaming pilot error for not following the check list.

Systems STAMP Perspective

- Hazard is in the System
 - “human error” Symptom of ineffective hazard constraint
- Inappropriate for Pilots to Constrain this Hazard
- Change the System!

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STAMP used by ALPA HF Safety rep to uncover the unconstrained Checklist Hazard. Systems perspective was used to point out the Hazard and why the recent procedures surrounding the larger Flap setting and checklist elements contributed to the stream of No Flap Take-off attempts. The Floating Checklist hazard is inappropriate for pilots to constrain. Using the pilots to constrain this hazard requires them to rely on know HF weaknesses of inconsistent checklist initiation cues.

Checklist & Procedures Change

STARTING ENGINES	BEFORE TAKEOFF
PAPERS/MANIFESTCOMPLETE	Second Engine..... STARTED
>> FUEL QTY..... REQ'D ON BOARD	Anti-Ice.....CHECKED/AS REQUIRED
>> V-SPDS/T.O. DATA..... SET FOR FLAPS	Hydraulics CHECKED
DOORS CLOSED	Apr ARMED
BEACON ON	Fms RWY / DEPARTURE
FUEL PUMP(S)..... ON	Thrust Reversers..... ARMED
-----PUSHBACK-----	Auto X-Flow MANUAL
PARKING BRAKE..... ON	Ignition AS REQUIRED
ENGINE(S) STARTED	Altimeters / /CROSS-CHECKED
ANTI-ICE AS REQUIRED	Pre-Takeoff Announcement COMPLETE
NOSEWHEEL STEERING..... CLEAR/ARMED	Cabin Report RECEIVED
BRAKES CHECKED	FLAPS..... CONFIRMED FOR RWY
>> TAXI BRIEFING COMPLETE	CAS CHECKED and CLEAR
TRANSPONDER AS REQUIRED	Before Takeoff Checklist..... COMPLETE
Starting Engines Checklist.....COMPLETE	
	LINEUP
	-----Before Taking Runway-----
	Transponder.....ON
	Packs and Bleeds..... AS REQUIRED
	Takeoff ConfigurationOK
	-----Cleared for Takeoff-----
	Anti-Ice..... AS REQUIRED
	Lights..... SET
	Line-Up Checklist COMPLETE
TAXI	
>> FLAPS ...SET INDICATING for RWY	
>> TRIMS.....ENGAGED, ZERO and	
FLIGHT CONTROLS.....CHECKED L and R	
Radar/Terrain Display..... AS REQUIRED	
Taxi ChecklistCOMPLETE	
>> Runway Change Checklist.....COMPLETE	

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Checklist and associated procedures were changed. Consistent cue for “taxi” check now is “starting engines checklist COMPLETE” aircraft is not taxied till “taxi checklist COMPLETE” Well almost consistent--Inconsistent hazard constraint during:
 Winter deice ops introduces new cue, checklist floats upon return to no deice ops
 Cue broken if have to taxi to deice pad for deice. So after several deice sequences the aircraft would be started to taxi after the “starting engines checklist COMPLETE” call because that is what had been most recently done. Confirmation of this behavior was a result of the FOQA program feedback loop to the system.

Conclusion

- Flaps set before T/O
- ASAP reports ceased
- FOQA Data confirmed:
 - Checklist float during winter ops
 - Hazard still unconstrained in certain conditions

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