ASOS RESEARCH BRIEF

Research Request:

What are some of the dangers of complacency in the cockpit, and solutions to this problem?

Research Response:

In our research, we sampled 50 ASRS reports that cited complacency as a factor in a resulting event. The data was separated into: phase of flight, reason for complacency, resulting event, automation issue (if any), and pilot experience level in total flight hours. The levels of experience were derived from the most experienced crewmember. Therefore, the experience levels for all of the reports were predominantly more than 3000 hours of total time, with the exception of one report. Four reports had an undetermined experience level. Surprisingly, there were very few reports that indicated automation was a factor in complacency. This may have been because many of the reports were older, and glass cockpit technology was not as prevalent as it is currently. While it is not practical to draw any definitive conclusions about complacency from this data, some interesting correlations are evident.

Flight Phase

As expected, the majority of complacency issues resulted either during the approach, the departure, or the taxi phase of flight. This is primarily due to the high workload experienced during these phases; so therefore the potential for error is greater. The total amount of events that occurred during the approach and departure phases was nearly the same (16 for departure and 17 for approach). Frequently, these events reportedly occurred during these phases of flight as a result of a long duty day, as well as repeatedly flying to the same airport. Also during these events, fatigue may begin to set in, and complacency seems to increase because the crew is so fatigued. In the following report, the crew of a Falcon 20 failed to meet a crossing restriction after a 16-hour day, and described the following:

I BELIEVE THAT FATIGUE WAS A CONTRIBUTING FACTOR TO THIS ALT RESTR. CREWMEMBERS WERE FERRYING ACFT HOME AFTER COMPLETING A SIX-

TEEN HR DAY WHICH RESULTED IN A COMPLETE NIGHT'S SLEEP LOST THE PREVIOUS NIGHT. I FEEL THAT MY FATIGUE LED ME TO BE SLIGHTLY COMPLACENT AND NOT REACT WITH THE SHARPNESS THAT I NORMALLY DEMONSTRATE IN THE COCKPIT.

Reasons for Complacency and Resulting Events

Familiar Airport

The largest reason for complacency observed was the crew's operation in a familiar airport environment. This reason was significantly greater than the rest, with 18 out of 50 reports of complacency attributed to operations at a familiar airport. After flying into an airport numerous times over several years, it is not difficult to envision a complacent crew making a mistake at a familiar airport. Many of the events that resulted in the familiar airport environment included: altitude deviations, track deviations, taxi errors, and runway incursions. There were even reports of crew's landing on the wrong runway or landing without a clearance. In the following example, a crew positioned the aircraft for take-off on a runway without a clearance, causing another aircraft to go-around. The crew misinterpreted ATC's instructions, and assumed they were cleared to take-off. The report states:

PLT'S COMPLACENCY IN EXECUTING CLRNC WHICH IS VERY FAMILIAR AND OFT-REPEATED AT HOME ARPT. CORRECTIVE ACTIONS: IMPROVED CREW VIGILANCE. SPECIFIC CLRNC TO BE ANSWERED SPECIFICALLY. THIS SCENARIO IS A REMINDER THAT MISTAKES ARE POSSIBLE WHEN TRYING TO MAINTAIN A TIGHT SCHEDULE IN A TASK SATURATED ENVIRONMENT, COMBINED WITH COMPLACENCY BROUGHT ON BY MANY REPETITIONS OF VERY SIMILAR CLRNCS.

The aforementioned example also illustrates the significance of actually verifying call-outs between the crew and the read-backs given to ATC. There were a few instances where the crew would make a call-out, but not actually perform the appropriate task associated with the call-out. They would also reply with a correct readback to ATC, and then perform a task they were accustomed to executing. In this example, the crew was so used to departing from runway 9L, that when they were issued an instruction to taxi to and position and hold on runway 4L, they actually went to runway 9L. The resulting event was an aircraft had to go-around. The report states:

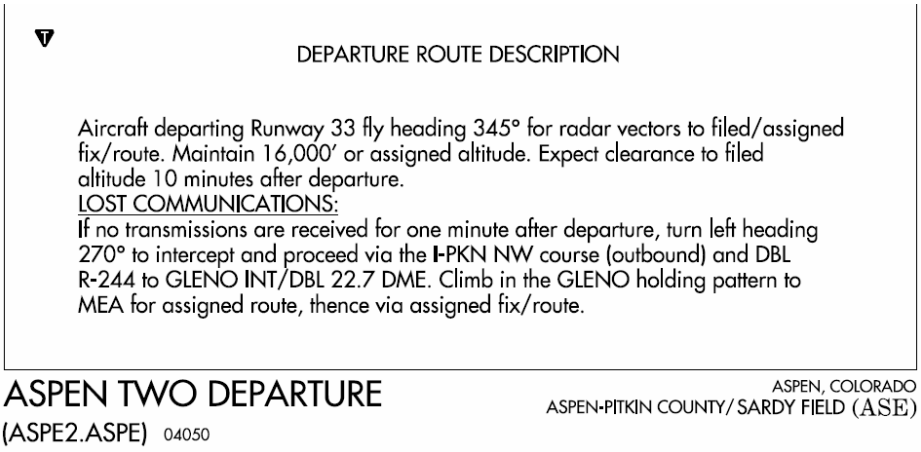
PLT'S COMPLACENCY IN EXECUTING CLRNC WHICH IS VERY FAMILIAR AND OFT-REPEATED AT HOME ARPT. CORRECTIVE ACTIONS: IMPROVED CREW VIGILANCE. SPECIFIC CLRNC TO BE ANSWERED SPECIFICALLY. THIS SCENARIO IS A REMINDER THAT MISTAKES ARE POSSIBLE WHEN TRYING TO MAINTAIN A TIGHT SCHEDULE IN A TASK SATURATED ENVIRONMENT, COMBINED WITH COMPLACENCY BROUGHT ON BY MANY REPETITIONS OF VERY SIMILAR CLRNCS.

In another example given by a pilot we interviewed, a crew was on arrival to an airport they have repeatedly flown to numerous times. In their experience, the same crossing restriction was given every time they flew to the airport, and the crew always descended a pre-determined distance away to meet that crossing restriction. Unfortunately, this time a strong tailwind was prevailing, and the crew failed to meet the crossing restriction. This event is a clear example of complacency because the crew was accustomed to descending at the same altitude, and never re-calculated the distance.

Familiar SID's (Standard Instrument Departure)

Many of the ASRS reports cited a familiarity with the SID's at the airport, resulting in a deviation from an altitude or track. These occurrences may have been due to simple improper pre-flight planning. In this report, the pilot was looking at the incorrect RMI during the SID, causing a track deviation.

COMPLACENCY WAS THE BIGGEST FACTOR THAT INFLUENCED THIS ERROR. WE WERE FAMILIAR WITH THE SID AND THE ARPT, AND TOOK FOR GRANTED THE TIGHT TURN THE SID REQUIRED. BEING THE PIC, I SHOULD HAVE STOPPED THE TKOF ROLL AND MADE CERTAIN WE WERE SETUP AND BRIEFED ON THE SID PRIOR TO DEPARTING.



DEPARTURE ROUTE DESCRIPTION

Aircraft departing Runway 33 fly heading 345° for radar vectors to filed/assigned fix/route. Maintain 16,000' or assigned altitude. Expect clearance to filed altitude 10 minutes after departure.

LOST COMMUNICATIONS:

If no transmissions are received for one minute after departure, turn left heading 270° to intercept and proceed via the I-PKN NW course (outbound) and DBL R-244 to GLENO INT/DBL 22.7 DME. Climb in the GLENO holding pattern to MEA for assigned route, thence via assigned fix/route.

ASPEN TWO DEPARTURE

(ASPE2.ASPE) 04050

ASPEN, COLORADO

ASPEN-PITKIN COUNTY/ SARDY FIELD (ASE)

Experienced Crews

In many of the ASRS reports, there were two experienced crewmembers in the cockpit. The result of this was one pilot would rely on the other one because they were highly experienced. This was the next highest reason for complacency, with nine reports. For example, a captain would assume because he/she is flying with a highly experienced co-pilot, the co-pilot is unlikely to make a mistake; therefore the captain is not as alert and becomes complacent. In the following report, the roles were reversed and complacency resulted due to the co-pilot's familiarity with other crewmembers. The co-pilot

was flying with an unfamiliar captain, and was looking at a chart while they were taxiing. Suddenly ATC responded, “Hold short you are on the runway.” The captain had taxied past the hold short lines inadvertently while the co-pilot was heads down in the cockpit, experiencing a runway incursion. The co-pilot had thought the captain acknowledged the clearance and expresses his regret for not paying attention here:

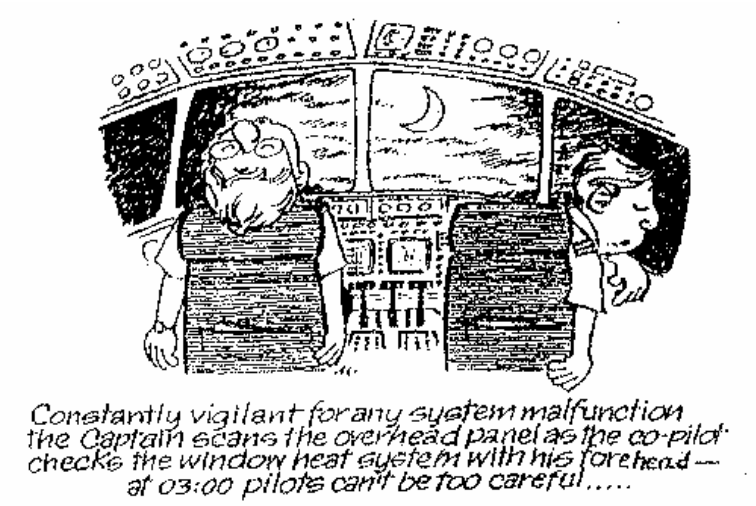
I SHOULD NOT HAVE BEEN LOOKING AT A CHART WHILE WE WERE TAXIING TO AN INTXN. EXPERIENCE FLYING WITH PLTS I KNEW BETTER HAD MADE ME COMPLACENT. LOOKING DOWN THE RWY AT THE AIRPLANE NOW HOLDING SHORT FOR US AS WE TAXIED ACROSS THE RWY MADE ME THINK, 'WHAT IF IT HAD BEEN A FEW SECONDS LATER AND THAT ACFT HAD BEEN ON ITS TKOF ROLL AND THE VISIBILITY HAD BEEN LESS?' I NOW MORE FULLY UNDERSTAND THAT TAXIING ON AN ARPT IS A CRITICAL PHASE OF FLT.

“I thought *YOU* put the gear down.”

Operations at Slow Airports

Another interesting reason for complacency was observed during operations at a “slow” airports, or airports experiencing minimal traffic. The alertness level of the crew may be reduced, and their guard is often let down. ATC may even become complacent in their duties in combination with the pilots. There were a few reports where the crew simply forgot to switch from approach frequency to tower, and landed without a clearance. In this report, the crew landed without clearance, as described here:

AFTER LNDG AND SLOWING DOWN, I WENT TO TURN OFF THE RWY AND NOTICED THAT THE COM RADIO WAS STILL SET TO THE APCH CTLR'S FREQ. AT THAT SAME MOMENT, MY COPLT REALIZED WE HADN'T BEEN CLRED TO LAND…. I BELIEVE THE SMALL VOLUME OF TFC TO BE A SIGNIFICANT CONTRIBUTING FACTOR AS BOTH PLTS IN THE AIRPLANE, AS WELL AS THE APCH AND TWR CTLR WERE PROBABLY A LITTLE MORE LAID BACK THAN WE WOULD HAVE BEEN HAD THERE BEEN MORE ACTIVITY OVER THE RADIOS



Automation Issues

Surprisingly, there was a low amount of reports that included an issue with automation in correlation with complacency. Most of the reasons for resulting events indicated in the reports included entry errors by the crew. The resulting events ranged from traffic conflicts to altitude deviations. In this report, the crew was solely navigating by the FMS (Flight Management System) that failed, and did not have the VOR set as a back-up. A vigilant controller directed them away from a live-fire restricted area.

EVEN THOUGH BOTH CREW ARE EXPERIENCED WITH THIS TYPE FMS AND THE REQUIRED STEPS TO ENTER THE DATA ARE SIMPLE. OUR COMPANY'S SOP DICTATES THAT 1 CREW MEMBER HAS REGULAR VOR/DME TUNED IN AT ALL TIMES TO BACK UP THE FMS, BUT THIS MORNING WE WERE COMPLA-CENT AND DISTR BY OTHER DUTIES DURING THE CLBOUT AND HADN'T YET SETTLED INTO THE ROUTINE. IN SUMMARY, I RECOGNIZE THE IMPORTANCE OF BACKING UP THE FMS WITH NORMAL VOR/DME NAV, EVEN UNDER ROU-TINE CIRCUMSTANCES, A LITTLE DOUBLECHKING WOULD HAVE PREVENTED TOSSING THE PAX INTO A STEEP, UNPLANNED TURN.

In this example, the pilots of a Citation X incorrectly performed a hold with right turns, when the pub-lished hold was in fact for left turns. The captain had reached for the charts to verify the direction of the hold prior to entry; however, the FO stated all of the holds were already stored in the FMS and he did not need to check. The captain trusted the FO, due to his extensive experience using the FMS. As they entered the hold, the auto-pilot began turning to the right, and ATC informed the crew of their er-ror. The crew's reliance on the FMS, and failure to back up with charts contributed to this deviation.

THERE WERE NO CONFLICTS WITH OTHER TFC THAT WE WERE AWARE OF. CONTRIBUTING FACTORS WERE AS FOLLOWS: 1) I SHOULD HAVE KEPT THE ARR CHART IN FRONT OF ME, 2) VERIFY EVERYTHING, PLTS ARE HUMAN AND WE MAKE MISTAKES, 3) START THE DSCNT SOONER AND AT A SLOWER SPD WHILE ON THE ARR, 4) LATE CLRNC ISSUANCE, AND 5) UNFAMILIAR WITH THE COMPLETE USE OF THE FMS UNITS. IN THE FUTURE I WILL REQUIRE THAT ALL CHARTS ARE OUT FOR THE DURATION OF THE FLT, AND NOT ALLOW COMPLACENCY TO FACTOR INTO OUR FLYING.

Dependence on automation may lead to a loss of situational awareness. This is especially apparent in emergency situations. Frequently pilots rely on the automated systems to alert them of potential emergencies/issues with the aircraft. This reliance on automation leaves a pilot complacent, and they may not cross-check instruments periodically. Likewise, reliance on navigational equipment may lead to complacency. The crew may face a navigational failure, and not know their exact location. Complacency further exacerbates the situation, by producing a loss of situational awareness. Another good point to consider with automation is the loss of hand-flying skills associated with automation. As technology has advanced, there is a decreased amount of hand flying accomplished by the crew. This could lead a crew to be complacent due to their experience with the aircraft, and they may not even realize their basic instrument flying skills may have deteriorated. In the event of an automation failure, a pilot could be left in a challenging position.

Pilot Experience

The experience levels ranged from 3,000-20,000 hours total time in the examined ASRS reports. The only obvious indication from these results, is pilot's with an experience level of 2 seemed to have a significantly greater number of reports citing complacency than the rest of the group. The following data is merely for reference, and is not designed to draw any definitive conclusions, just observations.

Experience Level	Range in Total Flight Time	Number of Reports (50)
Level 1	3000-3999	5
Level 2	4000-4999	14
Level 3	5000-5999	6
Level 4	6000-6999	7
Level 5	7000-7999	3
Level 6	8000-8999	1
Level 7	9000-9999	2
Level 5	10000+	8

Suggested Solutions:

While complacency may be a difficult issue to combat, there are some preventative measures you may implement. For example, for complacency during crewmember call-outs– a company may perform sim training emphasizing the importance of actually performing the task, rather than just making the call-out. In the experience of the pilot we interviewed, the sim instructor would give an erroneous engine gauge indication such as a high oil pressure during a call-out that required checking the engine gauge. Many pilots would complete the call-out, but would not actually check the engine gauges. This was simply out of habit and complacency. The idea is to come up with scenarios particular to your operation, and incorporate them into the sim training. This may be accomplished by using familiar routing, airports, and ATC instructions. It may be a valuable tool in identifying complacency.

To combat complacency during flight, the crew may perform various tasks to stay alert in the aircraft. These tasks may be geared towards "staying ahead" of the aircraft. They may include:

- Calculate descent distances
- Verify fuel quantities/ fuel burn
- Calculate landing distances for alternate airports
- Determine weather at alternate
- Cross check navigation instruments
- Determine the closest airports in the event of an emergency
- Go over emergency procedures such as depressurization, wing fires, electrical fires, engine-out, etc.

The crew may quiz each other on these items to not only occupy time during long legs, but also increase situational awareness. Emergency procedure review is especially important because emergencies happen so rarely. Ultimately the goal is to not let complacency create a hazardous situation.

Century CRM

To aid in our research, we consulted with Mr. Gary Rower, founder of Century CRM, LLC, a leading CRM (Crew Resource Management) training organization. Mr. Rower has extensive experience as an Air Force Instructor Pilot, a captain at Delta Airlines, and a published aviation safety author. Century CRM offers a few courses in CRM training at various locations and following this report is a brochure with more information. Their website is: http://www.centurycrm.com/index.htm

ASOS RESEARCH BRIEF

Complacency

Complacency has been described as excessive reliance on a highly reliable system. Note the highly reliable system. We tend to monitor more closely those items and systems that are less reliable thereby maintaining an acceptable level of safety. It is those things that work exceptionally well that we take for granted, sometimes with disastrous results.

1. Complacency is a word we may only hear during training and safety briefs. It is the animal that will kill us when we stop thinking about our jobs and ignore the risks. No matter how many times we train or how many times we have done the job, when we stop thinking and go on mental autopilot, myriad things can happen to us.
2. Paradoxically, it can be more of a hazard to highly experienced pilots, than to lesser experienced ones.

a. If you think your experience puts you beyond worrying about it, you are a prime candidate for it
b. If you find yourself skipping checklists, or not following SOP's, etc, because "you know your operation like the back of your hand", you are exhibiting classic signs of complacency
c. Familiarity with a specific aircraft or route can lead to specific expectations. When these do not happen as expected, you may not be ready to handle them.
d. Complacency can cause you to operate with pre-conceived or out-dated Situational Awareness. Examples are using an older weather briefing to save time, rather than updating it, or "hearing" a clearance as you expect it to be given, rather than how it was actually transmitted.
e. Over-reliance on technology / automation can lead to complacency through "diffused responsibility" or lack of monitoring.
f. It is important to take time to preview our tasks and to give them our full attention; after all, just because a task has become routine, doesn't mean it is not potentially dangerous.
g. In a highly successful operation, the potential for complacency increases, due to its insidious nature. After a time, that success may breed a false sense of security, increasing your exposure to an accident or incident.
h. Complacency does not always come from a lack of attention; it may be caused by diverted attention. While distractions themselves are not classic examples of complacency, it can still occur if your focus does not remain on the primary task.
i. During long haul and extended night operations to include transoceanic flights, fatigue can lead to complacency. Some techniques to fight this situation are:
j. For night operations – Bring cockpit lighting full up. Do not sit in the dark. Our bodies react positively to illumination.
k. For all long haul operations conversation can help fight fatigue. During extended over-water operations, where radio use is limited, a healthy discussion can keep the blood flowing, avoid confrontation.
l. Allowing one crew member to take a break while the remaining crew member takes on the responsibility of both monitoring systems and handling radios is a technique used with positive results. Obviously this would take place during periods of low workload.
m. NASA has done extensive sleep and sleep deprivation studies. Where feasible, a brief rest break not to exceed 30 minutes can substantially improve performance.
n. Nothing takes the place of cockpit discipline and compliance with first rate standard operating procedures (SOP). Just acknowledging complacency can be an aid in fighting it.

Aviation Research Group/U.S. Inc
U.S., Inc. 212 W. 8th Street Cincinnati, OH. 45202
215-345-6782

CENTURY CRM, LLC

Air Agency Certificate
CIIS871K

A Century of Experience

A Millennium of Solutions

CREW RESOURCE MANAGEMENT FOR ALL FACETS OF AVIATION

Century CRM training was developed for pilots, by pilots. We give flight crews concrete ways to break the error chain and change two individual pilots into a professional crew and an effective team.

The Century CRM Approach

Century CRM training focuses on usable techniques that translate directly into the cockpit, rather than the psychological theory used in traditional CRM programs.

In Single Pilot Operations, no one offers more usable techniques for threat and error management, situational awareness and decision making.

Where others get into assertive-nurturing models, we give inexperienced co-pilots concrete ways they can get a point across to an experienced captain without creating conflict.

www.centurycrm.com

Why CRM/SPRM

80% of today's aircraft accidents are directly attributed to human factor errors.

- **"In the accident that took the life of Senator Paul Wellstone, the NTSB cited inadequate CRM training as a causal factor."** (NTSB Accident Report #AAR-03/03)
- **Part 135 on-demand jet charter statistically remains the highest accident rate per 100,000 flight hours…**
- **"The most common factors to emerge from research into GA accidents and incidents are those of poor judgment or decision making." "The panel concluded that the delivery of CRM training would result in…an overall reduction in accidents and incidents."** (Fourth Australian Aviation Psychology Symposium, Manly, 1998)
- **Crew Resource Management training is now required for airlines in 185 countries.**

In the area of risk assessment and risk management, training from Century CRM offers more return on investment than any other resource management program.

"In 1989, the three-person crew flying a United Airlines DC-10 flight from Denver to Chicago responded as a model team to imminent disaster." The crew had been trained in crew resource management.
(United 232, Sioux City, IA)

www.centurycrm.com

Why Century CRM

- **Century CRM is the only CRM and SPRM program designed specifically for business aviation.**
- **Century CRM is the only stand-alone CRM/SPRM program certified by the FAA for all Part 91, 121, 125 and 135 operations.**
- **Century CRM is taught at your facility on the days your crews are available saving you time and money.**
- **Century CRM's three partners contribute over 100 years of operational experience and over 50,000 hours of flight time to the training.**

Gary Rower
Founder and Senior Partner
gary@centurycrm.com
(678) 463-4797

Steve Hopkins
Senior Partner and Chief Instructor
steve@centurycrm.com
(678) 485-5162

Carl Carmichael
Senior Partner and Director of Marketing
carl@centurycrm.com
(404) 449-5852

Century CRM, LLC
770-486-8810

105 White Oak Trail
Peachtree City, GA 30269

The Courses

Century CRM's two-day initial and half-day recurrent CRM and SPRM courses include:

- **Team Building**
- **Briefing/Planning**
- **Time & Workload Management**
- **Passenger Relations**
- **Communications & Decision Making**
- **Error Management**
- **Pilot Flying / Pilot Monitoring (CRM)**
- **Situational Awareness**
- **Individual Factors & Stress Reduction**
- **Cultural Issues**
- **Accident Analysis**

- Additional programs covering VLJ operations and SOP human factor reviews are available.

www.centurycrm.com