

Flight Test Safety Fact



Published for the Flight Test Safety Committee

Accidental First Flights

January 20 was the 45th anniversary of the first flight of the [General Dynamics YF-16 Fighting Falcon](#), but this certainly was not the first or the last time that an unsuspecting pilot discovered the aircraft was airborne during a taxi test. At least two such taxi tests turned into first flights in the waning months of 2018, but there is an even older historical precedent.

[Flying Car Destroyed in Accidental First Flight](#) On December 14, 2018, the Detroit Flying Cars WD-1 took off unexpectedly during its third taxi test of the day at Willow Run Airport, near Detroit, Michigan. The crash destroyed the vehicle and injured the pilot, Sanjay Dhall, co-founder of the company, who said this: “This accident was the result of an error of judgement on my part. No taxi testing should ever be undertaken without setting the C.G. in the appropriate zone.”

[“XP-82 Takes Accidental First Flight”](#) A restored Twin Mustang conducted a high speed taxi test on December 31, 2018, and it turned into an unexpected first flight. Comments from the pilot indicate a lack of forethought and test discipline.

[Historical Precedent](#) These kinds of documented accidental first flights extend as far back as July 27, 1955, when Tony LeVier found himself airborne during a U-2 taxi test. The incident ended with minor damage to the aircraft. Whether or not other first flights were accidental is still an open question.

Flight Test Safety Committee President, Tom Huff, recommended that when engaging in these kinds of taxi tests, “First flight readiness—including vehicle preparation, TM room, chase and emergency response—should be employed.” Incidentally, the FTSC maintains a list of recommended practices, including one for First Flight here: http://flighttestsafety.org/images/Flight_Readiness_Review_FRR_2-2012.pdf. These incidents highlight the importance of this endeavor, of telling others about the Flight Test Safety Committee and its resources, like the Recommended Practices and other resources maintained at flighttestsafety.org.

It also raises an important question: how do we ensure that these products are useful? **We need to hear your voice.**

Flight Test Safety Committee

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It Didn't Work

“It didn't work for 412 TW Test Safety, but it was worth the exercise.” That was the conclusion presented by Lowell Bishop (412th Test Wing Test Safety) and Capt Michael “T-Rex” Tibbs (419th Flight Test Squadron) at the 2018 SFTE Annual Symposium. In their presentation, Systems Theoretic Process Analysis (STPA) Applied to the Air Force Test Safety Process, they built on the foundation of previous work done by LtCol Montes, USAF TPS, which he discussed at the 2017 SFTE Annual Symposium.

STPA is a hazard analysis technique that implements a top-down systems engineering approach to create traceable safety requirements and mitigations. The STPA models the safety process with control and feedback loops. The basic process of using the STPA follows six steps.

1. Define the system (drives scope of effort)
2. Identify system accidents and hazards: Undesired and unintended effects
3. Draw functional control structure
4. Identify unsafe control actions
5. Identify accident scenarios (context)
6. Create design & safety requirements or constraints

According to Bishop, the AFTC sought ways to innovate and improve its existing process, but they needed to mitigate the risk of the new method. A software block upgrade (regression test) on the B-1B provided a convenient test case. Since software block upgrades are familiar, the traditional test safety process was simple to prepare. The test team used the STPA process in parallel with existing, approved safety procedures. The STPA process required approximately 80 hours of analysis and planning, compared to 8-16 hours for the existing method.

The test team had several significant findings in addition to this difference in required man-hours. The STPA process did not include an explicit step for the assessment of overall risk, and the test team had to use existing procedures. Additionally, the STPA did not discuss corrective actions after a hazard occurred. Overall, the current method produced similar results in less time, but they speculate whether this was due to familiarity with the test and plan to continue experimenting with the method.

This cannot be overstated. The importance of this experiment was the deliberate effort to innovate the AFTC test safety process. In particular, they believe that implementation of the process earlier in the acquisition cycle may identify design features that may contribute to hazards and should allow for redesign, if necessary.

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11 Feb Deadline for FTSW Abstracts

The Flight Test Safety Committee released its call for papers for the 2019 Flight Test Safety Workshop: “Data To Assure Success – the key enabler to Safety Assurance in Flight Test. Besides a test point that is “within tolerance,” how do we really know we’re executing our tests safely? The 2019 edition of the FTSW aims to explore processes, methods and data to “close-the-loop” on safety management and enable safer and more efficient test execution.” Deadline for abstracts is 11 Feb 2019.

Come join us in the Low Country for a deep dive on Safety Assurance in flight test. Arguably one of the more challenging aspects of a robust Safety Management System (SMS), the FTSW will provide a comprehensive look at methods to validate the effectiveness of risk mitigations – developed in planning and employed in the conduct of test. The tutorial will lay the foundation, to include a review of SMS voluntary standards and the means by which flight test organizations should incorporate recommended practices to monitor the effectiveness of safety risk controls. Subject matter experts will also share their experiences with reporting tools and how to audit for success; these can help participants shape or enhance their Safety Management Systems. We’ll also touch on data that helps keep us safe and efficient. To complement and reinforce the theme, we’d like to hear from test teams on their SMS Safety Assurance journey. Specifically, what discoveries (hazards) were made in test that were – or were not – sufficiently identified and risks not adequately mitigated. What metrics do your organizations use to measure safety performance and most importantly, provide critical feedback and awareness to the entirety of the test organization for continuous improvement? As a bonus, we will kick-off the FTSW with a training module on emergency response and finish with a tour of the Boeing Dreamliner production facility.

Presentations should be limited to 25 minutes. Please send presentation/briefing proposals to the 2019 Flight Test Safety Workshop Chairman, Pete Donath via Susan@setp.org.

If you should have any questions regarding submitting an abstract please contact FTSC member Pete Donath at pete.h.donath@gmail.com.

Visit the workshop website to reserve a hotel room at the special rate: <https://www.setp.org/symposium/meetings/workshop/> A limited block of rooms is available. Please reserve by April 15.



It Didn't Work

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LtCol Daniel “Mirf” Montes said this:

“This is great and I appreciate the opportunity to share our progress with the larger community. Since the SFTE symposium, we’ve briefed our projects more in depth to the AF test center commander, Gen Azzano. The B-1 software block upgrade was 1 of 10 studies done across four test wings. We discovered a lot about the more and less appropriate uses of STPA depending on the scope, maturity, and complexity of the projects being analyzed. Gen Azzano approved the center to gradually implement STPA (where appropriate) across its wings/complexes based on our combined findings throughout the last year.

“Going forward, the 412th commander, Gen Teichert, is working with test pilot school, Col Wickert at the Pentagon, and of course 412 TW Test Safety to identify the next appropriate test program on which to flesh out STPA, using the team’s experience to identify a large project in which to apply the lessons highlighted (one being to apply STPA in early project development in cooperation with the program office and designer/contractor). I just want readers to understand the full picture, as the SFTE presentations were just snapshots (in time and scope), and the bigger story is worth sharing.”

Special thanks to all three individuals for sharing their slides with our readers. [Download the presentations here.](#)

Feedback – *FTSF* 19-01

The inaugural edition of the Flight Test Safety Fact (*FTSF*) reached around the world, first heading east to our colleagues who flight test the Airlander. In response, they asked the FTSC to add their flight test mishap to the list published and maintained by the FTSC. They raised an important question about what criteria we use to include incidents, a discussion we still need to have. A dataset that contains publically released information about each incident now exists on [Github](#), and any reader can formally request modifications to this list using Github’s pull request function. Users can also suggest modifications or improvements to the format of the file: <https://github.com/flighttestfact/flighttestfact.github.io/tree/master/data>.

The newsletter then headed south and west to Australia, where the folks Down Under asked for a method to “subscribe” to future editions, a feature the FTSC plans to implement in the near (but indeterminate) future. It also reached “test engineers” on Florida’s Emerald Coast. The term “flight test engineer” has fallen out of favor at Eglin AFB, which creates an additional challenge for reaching a demographic of test professionals who do not identify as “flight test” professionals. This is similar to feedback from “flight sciences” engineers (also known as performance and flying qualities); in particular, it affects those who may not be an organic part of the flight test group in civilian Original Equipment Manufacturers (OEMs) in the Southeast region. We ask you to continue sharing and to provide feedback, both on distribution and content.

Share this newsletter and help us Reach Everyone.