

Flight Test Safety Fact



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Wichita workshop Recap

Stuart “Chia” Rogerson

The 2023 Flight Test Safety Workshop was hosted by Textron Aviation in Wichita, Kansas from May 2nd to May 4th. The first day of the workshop was held at the Textron Aviation Activity Center with a tutorial on System-Theoretic Process Analysis (STPA) theory. The tutorial covered general theory of STPA and then went into an example of conducting STPA on a flight test scenario. STPA has been a “buzz” word for some time, but this tutorial really helped reveal the practical steps in conducting the analysis. For those that have been wanting to get a basic understanding of STPA or are ready to conduct their first deep dive, watching this tutorial is a must.

Just after lunch at the tutorial, the attendees were able to participate in a technical tour of the Beech Field flight test facilities and look at numerous Textron Aviation experimental test aircraft and one of the telemetry rooms. Aircraft on display included their latest new product, which is currently under development, the Beechcraft Denali prototype as well as the recently certified Cessna SkyCourier, Latitude and CJ4 prototypes, an AT-6, Scorpion, Cessna 182 and the Pipistrel Velis Electro.

Day two and three of the Workshop were held at the Drury Plaza Hotel Broadview with eleven papers presented as well as a once in a lifetime chance to be part of the Art “Turbo” Tomassetti’s next Flight Test Safety Channel Podcast that was recorded Wednesday afternoon. It was also fantastic to see three international papers presented at the workshop from Korea Aerospace Industry, Leonardo and Pipistrel / Amazilia Aerospace GmbH. Paper topics were quite varied ranging from “Challenges in Flight Testing New eVTOL Designs” to “Exploring the Visual THA.” The professional educational opportunities for all 150+ attendees were invaluable and the lessons learned that can be brought back to their home organizations will certainly help the Flight Test Safety Committee meet its objective of promoting flight safety, reducing the risk of mishap, promoting risk reduction management and continually improving the profession's communication and coordination.

Wednesday’s dinner was also held at the Drury Plaza Hotel and featured Frank Berry from Doc’s Friends. Frank is an historian and Flight Engineer on Doc, one of only two flyable B-29s in the world. Frank gave a great presentation on the history of the B-29 and how Doc was returned to flight status after being recovered from a desert bombing range near China Lake.

The Dave Houle Award for Best Flight Test Safety Workshop Presentation (sponsored by Bombardier) was presented to Textron Aviation’s Dan Hinson and Stuart Rogerson for their paper “Unconventional Use of the C-H Rating Scale in King Air Stall Characteristics Testing.” The paper covered a recent program for Textron Aviation Defense & Special Missions which involved several external shapes that changed the outer mold line of a King Air 350 aircraft, requiring a comprehensive test program including stall characteristics testing. Throughout the course of repeating specific stall characteristics, it became apparent that the test pilots were becoming better at flight

control manipulation and timing. This factor needed to be neutralized to ensure validity of test, so the flight test team began using the Cooper-Harper Handling Qualities Rating Scale to further characterize each stall and stall recovery to define an area of compliant characteristics while varying some of the dependent variables such as weight and CG.



If you weren't able to attend, most of the presentations and the tutorial were recorded and will be available online soon at www.flighttestsafety.org and hopefully we will see you next year in Seattle.

Stuart "Chia" Rogerson
Textron Aviation

2023 Flight Test Safety Workshop Chairman

Future FTE Survey

Jeff Canclini

What skills do FTEs need? How should they be developed? What are the biggest challenges? Add your perspective! Complete a 5-minute survey about future FTE skills, education, and challenges: <https://www.surveymonkey.com/r/VQP36SP> .

Finding the Future FTE

*Jeff Canclini and
Ben Luther*

I had the chance to eavesdrop on a conversation between Ben Luther and Jeff Canclini discussing the kinds of skills the future Flight Test professional might need. Here is their conversation.

JEFF: So, we need to figure out how to train the new staff in flight test engineering. But I'm thinking that it isn't simply a case of repeating what we've done in the past. There are uncrewed systems, new challenges.

BEN: Ah, the future of flight test in providing assurance for decision making. I'm seeing an abstraction of the FTE role and expansion of opportunity beyond aviation.

JEFF: Interesting. Where are you going with that?

BEN: Well, as you started, the advent of uncrewed systems. With autonomous flight the aspect of handling qualities is removed, leaving only performance in the traditional P&FQ syllabus. But aviation is a reasonably mature science, with the physics of sub-sonic flight being well understood. So that takes out much of the P from a P&FQ syllabus for T&E. Sensor performance and aspects around the utility of air platforms remains an area of testing, but this is indicative of the drift away from aviation-specific testing to more general assurance.

JEFF: I see. So, to borrow the HBR analogy, T&E becomes the grudge purchase when what they really want is assurance as input to a decision. T&E is how you get the assurance you really want.

BEN: Exactly. As test professionals, we use T&E as a tool, but our value proposition is the provision of assurance. That is universal, with utility beyond aviation. Many of us are becoming involved beyond aviation, in the manner spearheaded by USAF TPS with their focus on training Test Professionals.

JEFF: Yeah. So, if you had to pick one new skill for FTEs, what would it be?

BEN: The assurance of complexity. First, we need to differentiate between complicated and complex. Complicated has one best answer that is stable over time. Learn that answer and apply it – that is what we do now. But complex systems are dynamic, and consequently, knowledge is perishable. We need to test the boundary conditions instead, to assure the controls on the system, rather than assess the performance of the system.

JEFF: That's a good point. Because for something that has artificial intelligence, we can't know ahead of time what the output is going to be. That's the whole point of the AI!

BEN: Exactly. Things like propulsion systems are complicated, and the need for those skills is not going away. But we need to add to our tool bag. With a nod to the SFTE members who published their work on batteries, take that class on electric propulsion. It is so fundamentally different when the bottom 10% of your tank of electrons performs differently from the top 10% of your tank. Obviously, that is not the case for liquid fuels where we assume that any litre of fuel is equal to any other. But things like autonomous control systems are likely to be complex. They require M&S.

JEFF: Revisit M&S – Modelling and Simulation. Traditional T&E is expensive in time and dollars, and there won't be time or dollars to test complex systems using traditional approaches: development cycles are too fast and the dynamic nature of the system will result in an expansive, and expanding, test program. For complex systems, validating the model is the answer.

BEN: Validating the model raises the question of "to what level of certainty?" Traditional T&E assumed that the answer was always provided with negligible uncertainty, or trivial variance in the answer. That is no longer the case. FTEs need to get comfortable with elevated levels of uncertainty in the answer they are providing their client.

JEFF: And we need to get smart about new tech so that we can recognize it and communicate with the people creating it. FTEs will maintain their role as the communicators between the clever people creating the tech and the user community.

BEN: Exactly. No change there. We'll also need to add STAT techniques to handle big data approaches when we have a black box model.

JEFF: What do you think is the greatest challenge we face?

BEN: The same as the old one – selling our value to the project. But now we can communicate that value as provision of assurance. How about you – what do you think is the greatest challenge FTEs face?

JEFF: Flight test is getting broader. There are other aspects to be considered both technical and non-technical.

Turbo Talk

Art “Turbo” Tomassetti

Toto we are not in Kansas anymore... But last month we *were*—for the North American Flight Test Safety Workshop. My sincere thanks to all of those who helped to make this event a success starting with our Workshop Chairman Stu Rogerson and including presenters, SETP staff, and of course all of you who attended. This year’s workshop included a tutorial on STPA (Systems Theoretical Process Analysis), a tour of Textron’s hangar and flight line full of aircraft, and two days of presentations. If you were not able to attend, most of those presentations are available as videocasts on our website. <https://www.flighttestsafety.org/2023-wichita-ks>

There were a few other highlights: a very successful 150 person roll call, a mass podcast recording (which you will hear later this month), and a post-event visit to see “Doc,” one of two remaining restored, flying B-29s. Here’s a short video from inside the aircraft:

<https://youtube.com/shorts/EJcU70Kij8c>

This was a great event and, I think, supported our mission of promoting flight test safety and improving the profession's communication and coordination. While there is a lot we can do digitally and virtually there is something more that happens when we have face to face engagements like the Workshop.

Benefits on a professional level

- the opportunity to have dialogue with authors beyond the presentation content
- to hear comments and ideas from others
- to make and maybe reestablish connections.

Benefits on a personal level...well that’s personal to each individual but for me attending the workshop is reinvigorating. For someone no longer directly involved in flying aircraft it recharges my Test Pilot battery a little. Hearing what is happening in the profession, the advances, the accomplishments, and the challenges is wonderful. I think knowing that with those advances and on the way to those accomplishments challenges still happen inspires me to keep finding ways I can contribute to upping the game for everyone. There were several ideas and suggestions that came up during the 3 days in Wichita that the Committee and I will be discussing at our next meeting. Two I am very interested in developing are establishing a formal mentorship program and possibly developing some new ideas for Crew Resource Management (CRM) training. For the latter check out Rod Huetes videocast from the event as that presentation started the discussion on CRM. If you weren’t able to attend this year, save the date on your calendar for next year 31 Aug - 2 Sep 2024 and join us in Seattle, WA.

Until next time: Be Safe, Be Smart and Be Ready.

Turbo



Latest Podcast

Art “Turbo” Tomassetti

This month, you can listen to part 2 of an interview with Ken Katz and hear about his book about the B-1 Bone.



Subscribe to the Flight Test Safety Channel podcast in iTunes, Spotify, Podbean, Google Play, and Amazon Music’s FTSCChannel. <https://flighttestsafety.org/ftsc-news/flight-test-safety-podcast-channel>.

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