

## HUFF AND PUFF

From a system safety standpoint the engineer is tasked to design his product with safety in mind. It is a well quoted axiom that a system safety engineer designs out the hazards while the new widget is still in a paper and design prototype phase.

To help him in his judgments concerning the new widget he will utilize a 200 -20 crystal ball, engineering experience and tools of his discipline such as Failure modes analysis, Failure Modes and Effect Analysis , Fault Tree Analysis, and Lessons Learned Studies. It is far better to predict and eliminate hazard than to discover hazard as a result of an accident investigation. Fault Tree, Failure Modes and Effects studies are all, to an extent based on supposition, Lessons Learned are as a result of understanding a historical tragedy.

In the law a manufacturer may be given latitude and some relief from extensive testing if the newly designed widget is substantially the same as an older one where testing was complete and safety seemed inherent, This precept is true for copy cat drugs, for certification of aircraft and for many designs of most widgets.

The converse is the case when the widget is a departure from the SOTA ( Art) or SOTI ( Industry). Now if all we are going to do is switch an automobile from an aspirated engine to a fuel injected engine and by so doing achieve 10 extra horsepower, we may not have to test the entire vehicle again.

It is when you totally depart from the State of the industry and attempt to introduce a new and radical design. It is then that you as a manufacturer have a duty of full testing and even unique testing. This new product requires stringent analysis and test. Part of that duty to test includes researching the State of the Art, (SOTA) which requires a look at Lessons learned from previous but similar designs or applications.

Cessna, a manufacturer of General Aviation Aircraft introduced a radical new aircraft in the mid 1960.s It was a twin engine, twin boom aircraft with high mounted wings and retractable landing gear. Mounted facing forward was a center line reciprocating engine. Aft of the passenger compartment was another rearward facing engine with a pusher propeller.

The wonderful simplicity of this aircraft, as advertised by the manufacturer, was the idea that if a general aviation pilot loses a wing mounted engine the aircraft yaws at low take off speeds and novice pilots had their hands full. Cessna advertised their plane with words similar to:

*THE CESNA 337... Every Man's P-38, Lose an Engine, It is a Piece of Cake, with the center line mounting there is no yaw, so continue straight ahead like any single engine airplane."*

This seemed a good idea except that there were several incidents and accidents where the pilots had attempted take offs with failed rear engines, In the civilian design the engine instruments were not optimum design or location and the pilot by design would not feel the loss of an engine with Yaw. Moreover the location of the engine made it difficult to hear loss of power or see prop rotation stop.

Moreover some theorized the rear engine housing design was such that engine failures due to air circulation and intake problems seemed greater in the rear than the front engine.

In our lawsuit we suggested that because of the poor instrument design and layout, and because of the inability pilot to see or feel the loss of a rear engine. We suggested that the airplane should be equipped with a rear engine out warning lamp. Our expert Instrument Designers suggestion (an Aviation Psychologist from Wright Air Development Center Dr. Walter Grether) was that the aircraft be equipped with an aural warning a master red warning light and a red light within a feathering switch for the effected engine, Cessna maintained that this was not needed.

I was on layover from flying an airline trip when I visited a bookstore in Ann Arbor Michigan. It was there I found a book with a picture of a NAZI fighter plane on the cover. It was a piston powered Dornier 335 Pfeil (Anteater) Aircraft. The amazing thing about this aircraft was the fact that it had one engine mounted in the nose and another pusher engine and propeller in the tail.

As I picked the book up I realized this was the only other centerline mounted prop plane in existence. We had a half jet -half prop plane called the Ryan Fireball. This then was the genesis of the centerline thrust -low drag machine that Cessna was replicating. I paid 15 bucks for the book and took it back to the hotel.

To my amazement I read that a very early prototype had crashed due to a test pilot attempting a take off with a failed rear engine. It was a fatality. Nothing more was said about that pilot or that accident. and I decided find out what the state of the Art was in 1942 and whether Cessna should have known.

I called the Smithsonian Air Museum and they said they indeed had the only 335 in existence, but that I better hurry because they were getting ready to ship it back to Dornier for a restoration and then it would reside in the Luftwaffer museum for ten years.

I called Adolph Galland - then President of the Luftwaffe fighter Pilot's Association and the all time worlds leader fighter pilot ace. He placed me in contact with a former test pilot Adolph Knocke in Brazil and I learned an amazing story about the aircraft AFTER THE FIRST FATAL ENGINE OUT TAKEOFF the Nazis designed and subsequently installed an engine out warning light called a FUEHRER Warning Lamp. Dornier in 1942 had learned the hard way what Cessna had not.

An Interesting story -Yes, But how to tie it to Cessna. As it turned out after the war Cessna was as part of the rebuilding process was to help Dornier re enter the aviation marketplace. Cessna engineers were interfacing with Dornier's people at their factories. And the numbering system for the push pull Cessna's seemed awfully coincidental. The Dornier number was 335 and Cessna chose out of sequence the Numbers 336 for their fixed gear push pull aircraft and 337 for their retractable gear HUFF and PUFF.

CESSNA settled our case, and we suspect that a Lesson that should have been learned came back from a 1942 accident and reminded them to be ever vigilant in not forgetting lessons learned.