

EXAMINATION

The following pictures are from the examination:



Figure 1: Fracture Surface

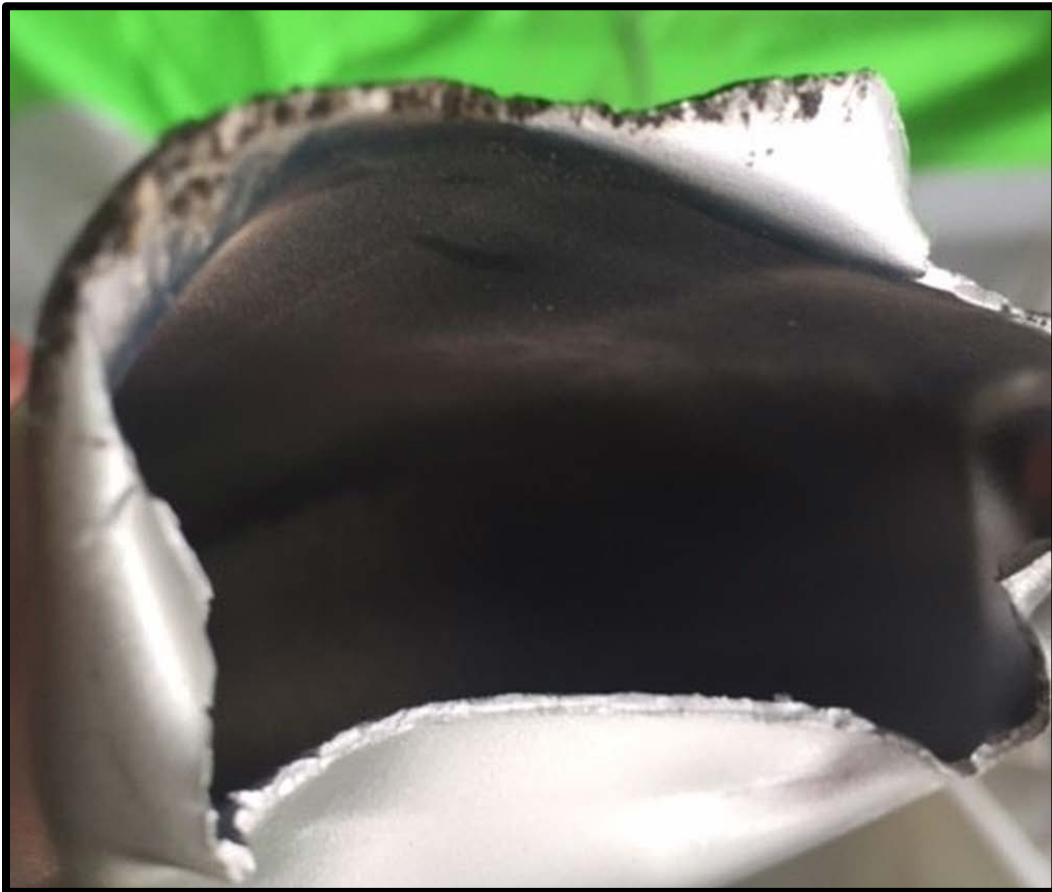


Figure 2: Alternate View of Fracture Surface



Figure 3: Fracture Upper Surface

EXAMINATION NOTES FROM MECHANIC NEIL BUNGARD

Inspection of Airborne XT-912 Mustang III 19 meter wing (N107PW) at Deer Valley Airport. The Inspection of the Airborne XT-912 Mustang 19 meter wing at Deer Valley Airport revealed some interesting results. I will outline several issues that could have contributed to loss of control of the aircraft and offer my opinion of the most likely cause.

WING/CARRIAGE COMPATIBILITY

The carriage appeared to have about 560 hours total time and the wing was new with maybe only a few hours of total operation. In addition, the wing was a Northwing 19 meter Mustang III which is not manufactured by Airborne, the carriage manufacturer. This means that the wing and carriage flight characteristics were not matched by the aircraft manufacturer and a Phase 1 flight test would need to be accomplished to establish the compatibility of the wing/carriage combination. The phase 1 is also required by regulation when switching wing types on an experimental light sport trike.

Permission to proceed to phase 1 was granted by FAA in October of 2016 by the Scottsdale FSDO. There is no logbook record placing the aircraft into phase 1 or back into phase 2. It appears that 2.6 hours have been flown on the aircraft in the last two years. I would conclude that those hours were flown without phase 1 flight testing being accomplished and flight characteristics of the wing/carriage combination could not be known.

ENVIRONMENTAL CONDITIONS

The aircraft accident occurred at around 6:30 am near the Lake Pleasant Airport. I trained at this airport and the katabatic flows at this time of the day can make landing tricky. In particular, the katabatic flows will establish a wind

gradient such that you will experience no wind speed on the ground and 25 mph at 200 ft. A person familiar with the accident indicated that the winds were calm on the ground and there was significant flow at altitude.

Performing an approach in these conditions can easily be mismanaged because it is possible stall during approach as your headwind diminishes with altitude. Proper reaction to a stall on approach in this condition is opposite to your intuition. The pilot should allow the stall condition to occur and not try to arrest the stall with an abrupt bar forward motion. As the trike descends (assuming you have altitude) it will begin to fly normally, your control bar will be established in a rearward position, and you will be left with stored energy in the wing for rotation and flair. If you attempt to arrest the stall condition with a bar forward motion you will slow the trike and when the trike begins normal flight upon descending, your control bar will be full forward and no energy will be available for rotation and flair resulting in loss of control and possibly uncontrolled contact with the ground.

More to the point of this particular accident, if you accomplish a descending, turning approach in these conditions and do not manage the wind gradient properly, the resulting accident would be exactly as described in the pilots report given by the pilot. Weight Shift Control movements appear opposite to those in airplane and in my 17 years as a weight shift CFI, low time trike pilots with airplane background experience always reverse control when under stress! This would result in a decent command when the pilot intended to climb.

AIRCRAFT INTEGRITY

The Northwing Mustang III was a new wing with very few hours flown and was in a new condition. Much of the metal structure was bent from the impact of the accident and of particular interest were the outboard leading edges which were completely broken off. Before discussing the outboard leading edges, I will discuss a condition that has lead to other crashes of this nature. Unlike an airplane, a trike must be tied down in the presence of any wind. If a trike is left unattended and not tied down, even a slight wind can cause the wing to lift and the aircraft will rotate around the rear wheels and place the wingtips of the wing on the ground with the front wheel pointing straight up.

This accident appears benign and usually the pilot just pulls the front wheel back to the ground, dusts off the wingtips and goes flying. However, this accident is capable of creating a condition that will eventually result in a catastrophic failure of the leading edge of the aircraft. Each leading edge of a Weight Shift aircraft consists of two long aluminum tubes. The inboard tube is closer to the nose of the wing and is larger in diameter than the outboard tube. The outboard tube, being smaller, is inserted into the inboard tube to make one long leading edge. If the aircraft is rotated back on the wingtips as described in the accident above, a plastic deformation can occur at the junction where the outboard and inboard tubes meet. This deformation crystallizes the aluminum imperceptibly and in a location that is not accessible to a preflight inspection. The tubes in a Weight Shift control wing constantly bend and flex during flight and the deformation will evolve into a crack as the metal is work hardened. Once this happens, the outboard leading edge separates and control of the aircraft is not possible. The aircraft will descend rapidly in a spiral motion with no recovery.

The left outboard leading edge was clearly 'snapped' off as a result of impact but the right outboard leading edge showed signs that indicate that it stayed intact long enough to create wear to the fractured edges. In addition, the fractured edges had material embedded in its structure which is consistent with a rubbing motion against some other material. The cloth at the fracture site of the right outboard leading edge appeared to be frayed rather than torn which is consistent with the fractured edge of the tube rubbing the cloth to failure.

Reports from both the pilot and the mechanic that accomplished the condition inspection and test flew were that the wing was not flying correctly just prior to the accident. The problems appeared to be issues with roll control which is consistent with a leading edge failure. As I explained this failure mode during our meeting at Deer Valley airport, a person familiar with the aircraft indicated that he recalled that there was some problem with the wing that had to be repaired as a result of some incident that damaged the wing. If proper maintenance logs were maintained on this aircraft there may be information in those logs that can collaborate any damage to any part of the wing structure.

After reviewing the aircraft records, there is no indication of any maintenance being done on the aircraft for its 560 hour life, including any maintenance on the Mustang III wing.

CONCLUSION

In offering my opinion for the loss of control in this accident, my observations are consistent with the failure of the right outboard leading edge. As best that I can determine there is no information collaborating any prior damage to the wing. But evidence suggest that the right outboard leading edge failed resulting in a spiral accident on approach and landing. Other mitigating circumstances in this case cannot be ignored. Wing/carriage incompatibility, inexperience in type of aircraft, and mismanagement of wind gradient conditions could have easily contributed to this accident.