

**National Transportation Safety Board**  
Office of Research and Engineering  
Washington, D.C. 20594

## Airplane Performance Study

**Specialist Report**  
**Timothy Burtch**

### **A. ACCIDENT**

|              |                                                                |
|--------------|----------------------------------------------------------------|
| Location:    | Burns Flat, Oklahoma                                           |
| Date:        | August 6, 2016                                                 |
| Time:        | 0820 CDT (1320 GMT)                                            |
| Airplane:    | Experimental Amateur-Built Wilson Bugatti-DeMonge 100P, N110PX |
| NTSB Number: | CEN16FA307                                                     |

### **B. GROUP**

No vehicle performance group was formed.

### **C. SUMMARY**

On August 6, 2016, about 0820 central daylight time (CDT), an experimental amateur-built Wilson Bugatti-DeMonge 100P airplane, N110PX, impacted terrain during takeoff from runway 35L at the Clinton-Sherman Airport (CSM) near Burns Flat, Oklahoma. A subsequent ground fire occurred, and the airline transport rated pilot was fatally injured. The airplane was destroyed by impact forces and fire.

A witness at the airport reported that the airplane lifted off, and, during the climb-out, banked to the right and then to the left. The left bank eventually steepened, and the airplane descended nose-down until impacting terrain in an inverted attitude.

The airplane<sup>1</sup> was registered to Le Reve Bleu LLC and was operating as a 14 Code of Federal Aviation Regulations 91 test flight. Day visual meteorological conditions prevailed in the area at the time of the accident. The flight was operating as a local flight, and a flight plan had not been filed.

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<sup>1</sup> See Figure 1 for a picture of the accident airplane. Figures 2 and 3 highlight other aspects of the original Bugatti-DeMonge 100P airframe, engine, and driveshaft.

#### **D. PERFORMANCE STUDY**

The accident airplane was not equipped with a Flight Data Recorder or Cockpit Voice Recorder; however, N110PX did have numerous “Go Pro” audio and image recorders that were installed in the cockpit and that were recovered in the wreckage. See the On Board Image Recorder Group Chairman’s Factual Report for detailed information on the recorders.

The video group reviewed the video recordings in the NTSB Vehicle Recorder Laboratory and was able to document the pilot’s actions. This included his flight control and engine inputs as well as his head movements and general area of focus. In addition, the group tabulated instrument readings as a function of camera elapsed time. This included indicated airspeed (VIAS), indicated angle-of-attack ( $\alpha$ ), left/forward and right/rear engine throttle lever angles (TLA), and the corresponding engine speeds (RPM).

Figure 4 is a plot of the tabulated TLA’s, RPM’s, and VIAS’s as a function of camera elapsed time. The data show that the engine speed for the forward engine began increasing from 6,000 RPM about seven seconds into the recording without any apparent TLA input from the pilot. The pilot responded by reducing TLA for the forward engine at 31 seconds into the recording, about two seconds before the forward engine reached its red line of 9,500 RPM.

The pilot continued to reduce TLA to a minimum of about 40° for the forward engine until, at about 38 seconds elapsed time, he increased the forward TLA by 10°. This was likely in response to the airplane’s decaying airspeed. The forward engine reached red line for a second time at about 42 seconds elapsed time.

The input TLA and engine RPM for the right/rear engine appear more consistent than for the left/forward engine; however, it too has an anomaly. The RPM for the rear engine remained at approximately 5,800 RPM<sup>2</sup> for most of the recording until, at 31 seconds elapsed time, the pilot began increasing the rear engine TLA by 7° over about ten seconds. During this time, the rear engine RPM remained constant despite the 7° increase in TLA. The RPM on the right engine reduced to about 4,500 RPM after the pilot pulled the TLA back to 45° at 41 seconds elapsed time<sup>3</sup>.

The airspeed plot in Figure 4 shows that the airplane decelerated below the published stall speed of 70 KEAS (based on a gross weight of 2,850 lb and a normal load factor of 1.0<sup>4</sup>) about 41 seconds elapsed time and remained below the stall speed for the remainder of the recording. An aerodynamic stall is also consistent with the witness statement.

Using the tabulated airspeed (VIAS) and an approximate gross weight of 2,650 lb, the airplane lift coefficient ( $C_L$ ) for the Bugatti-DeMonge 100P was extracted from the data as a function of indicated angle-of-attack. (Figure 5 highlights the location of the digital angle-of-attack indicator in the cockpit.)

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<sup>2</sup> Note the split throttles between the engines at the beginning of the flight: 6,000 RPM for the forward engine and 5,800 for the rear.

<sup>3</sup> Advancing the TLA on the right/rear engine could have reduced or eliminated the airspeed decay. It is unclear if there were other factors that prevented the pilot from adding power to the rear engine.

<sup>4</sup> The stall speed reduces to about 68 KEAS with a gross weight of 2,650 lb.

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$$C_L = L/(qS)$$

where,  $L \approx$  gross weight  $\approx 2,650$  lb (assuming straight and level, unaccelerated flight)

$$q = \text{dynamic pressure} = 1/2 \rho_0 V_E^2 \approx 1/2 (0.002377) V_{IAS}^2$$

$$S = \text{wing area} = 127.576 \text{ ft}^2$$

Figure 6 shows the lift coefficient as a function of angle-of-attack that was extracted from the accident data as well as the lift derived by the Le Reve Bleu team using computational fluid dynamic methods. Despite a few outliers at the end of the flight (where indicated angle-of-attack was unavailable), the lift from the accident compares well with design estimates.

Figure 7 is a plot of the indicated angle-of-attack from the image recorders.

## E. SUMMARY AND CONCLUSIONS

This was the third flight for the Bugatti-DeMonge 100P, N110P. The airplane went off the runway on the first flight (due to a right brake hydraulic line failure) and flew around the airport traffic pattern on the second. The airplane appeared to have an engine or powertrain problem from the beginning of the third flight.

Data recovered on the third flight from the installed “Go Pro” audio and image recorders indicate that the left/forward engine speed was surging despite the pilot’s efforts to reduce power on that engine. The right/rear engine input corresponded better with engine RPM; however, there appeared to be a delay in the engine response.

Lift data extracted from the accident data compares well with engineering estimates for the airplane. This lends some credibility to the stall speeds published for the Bugatti airplane.

The data and calculations are consistent with the airplane stalling shortly after take-off. The recorded video indicates that the pilot was responding to an engine and/or powertrain issue. (One possible scenario is that the clutch for the forward engine was slipping).

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National Transportation Safety Board

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### F. Figures



Figure 1: Accident Airplane N110PZ, an Experimental Bugatti-DeMonge 100P, N110PX

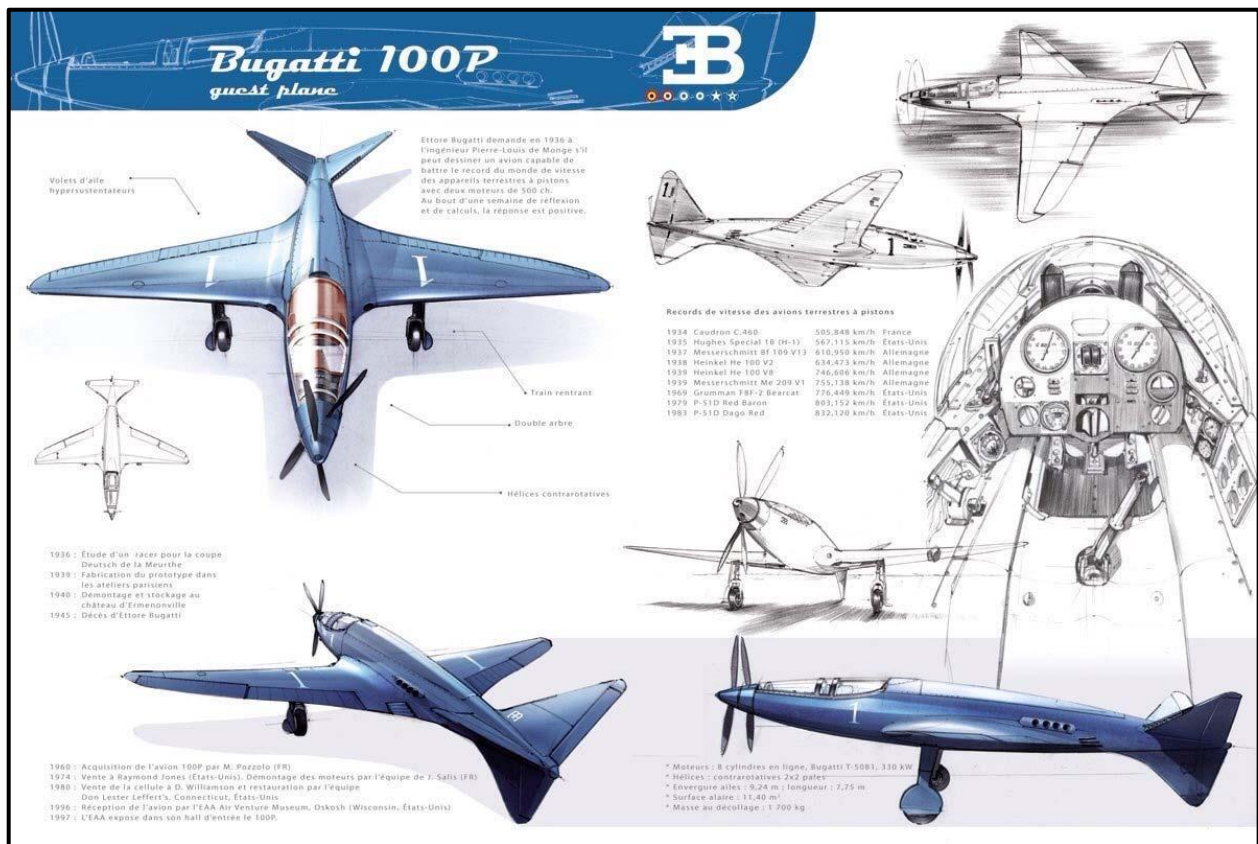
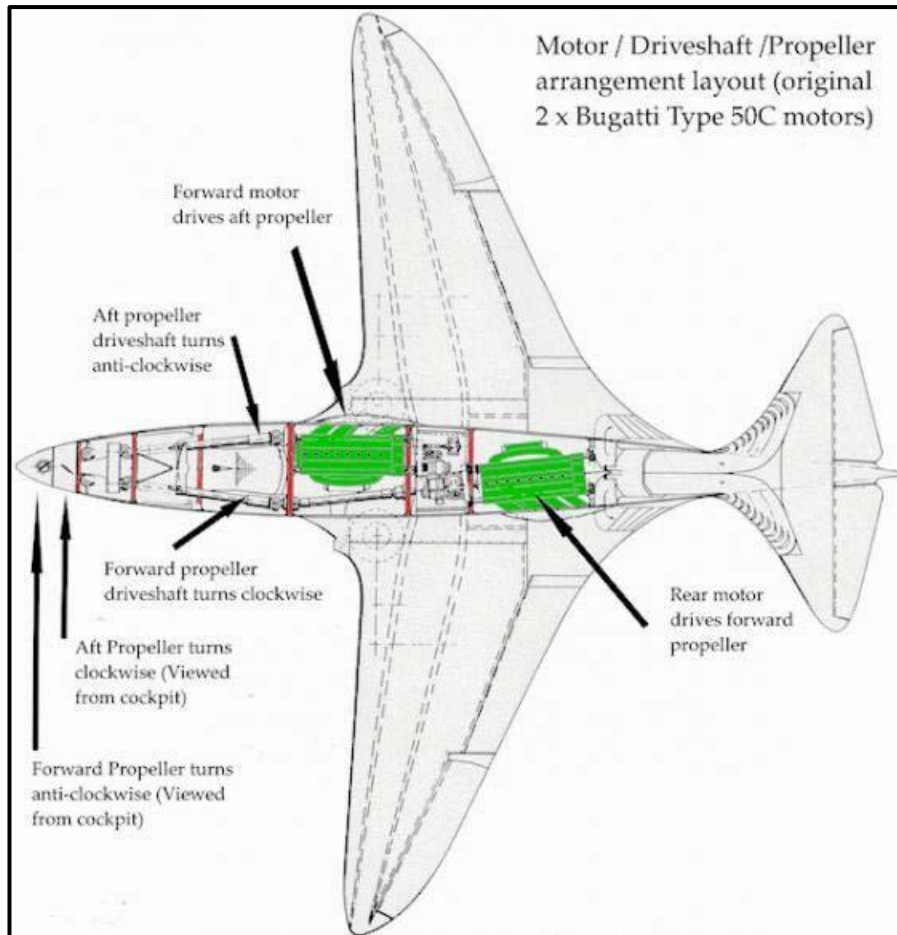


Figure 2: Bugatti-DeMonge 100P Brochure



**Figure 3: Bugatti-DeMonge 100P Propulsion System**

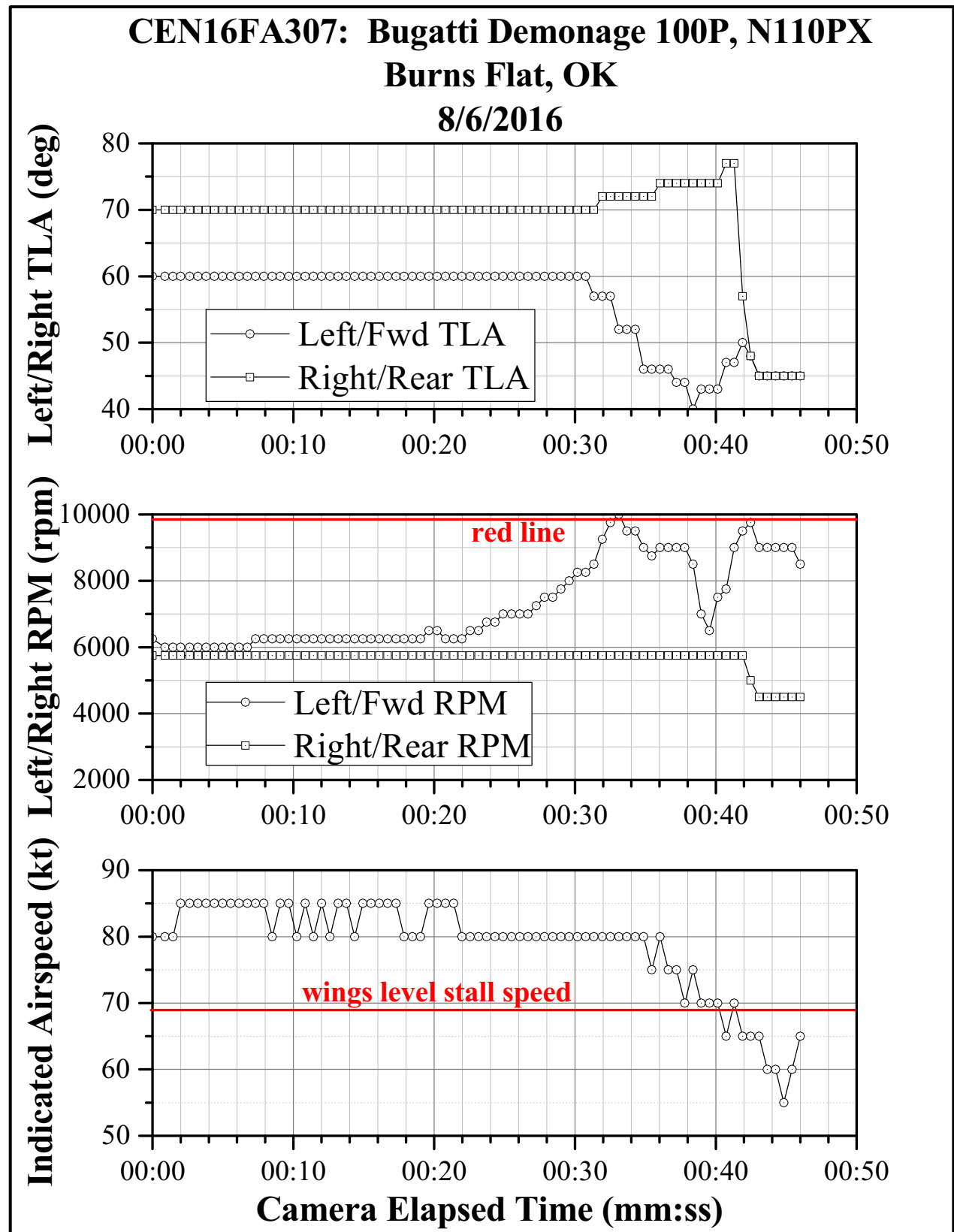


Figure 4: Throttle Lever Angle, Engine RPM, and Speed Based on Cockpit Video



Figure 5: Instrument Panel of Accident Airplane

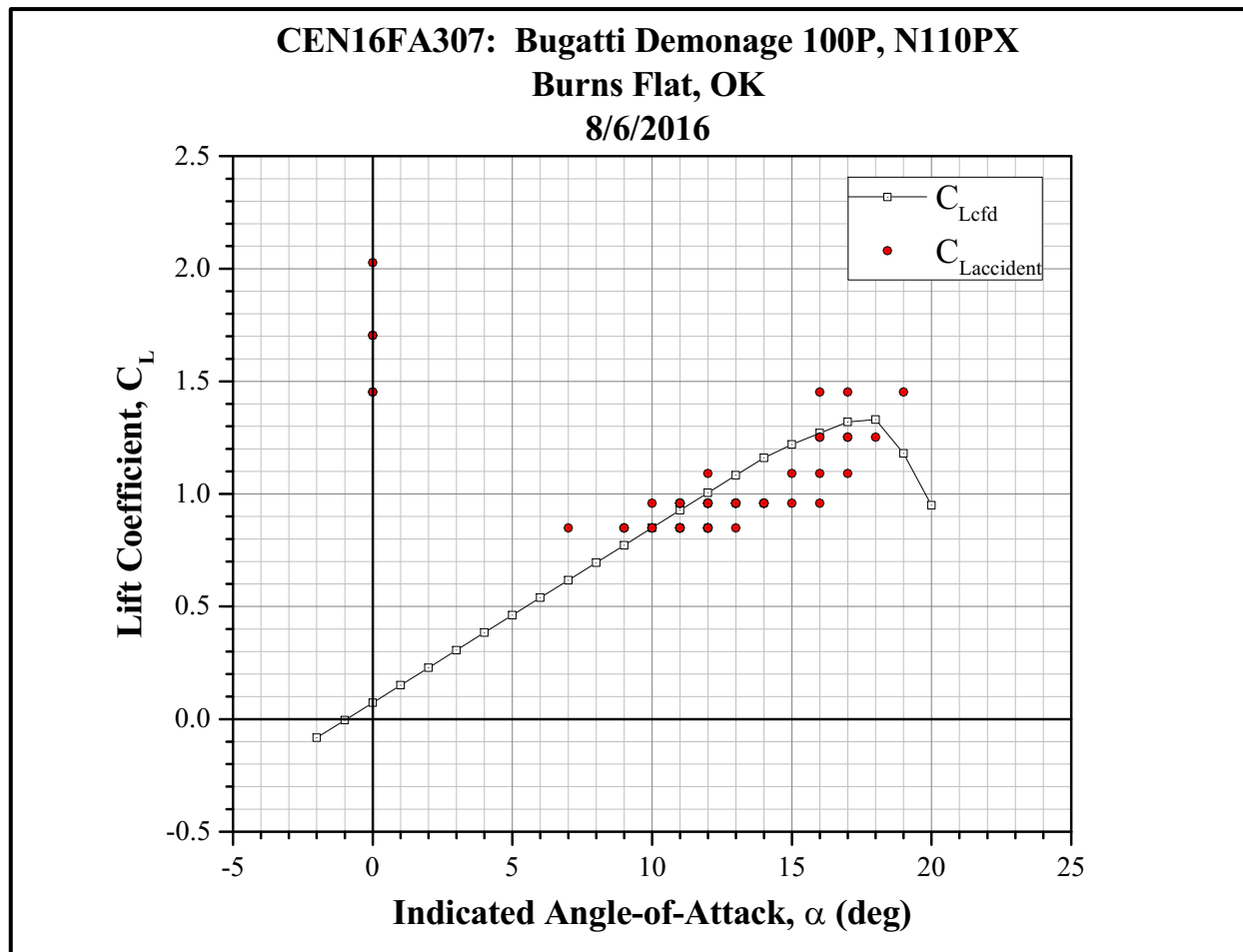
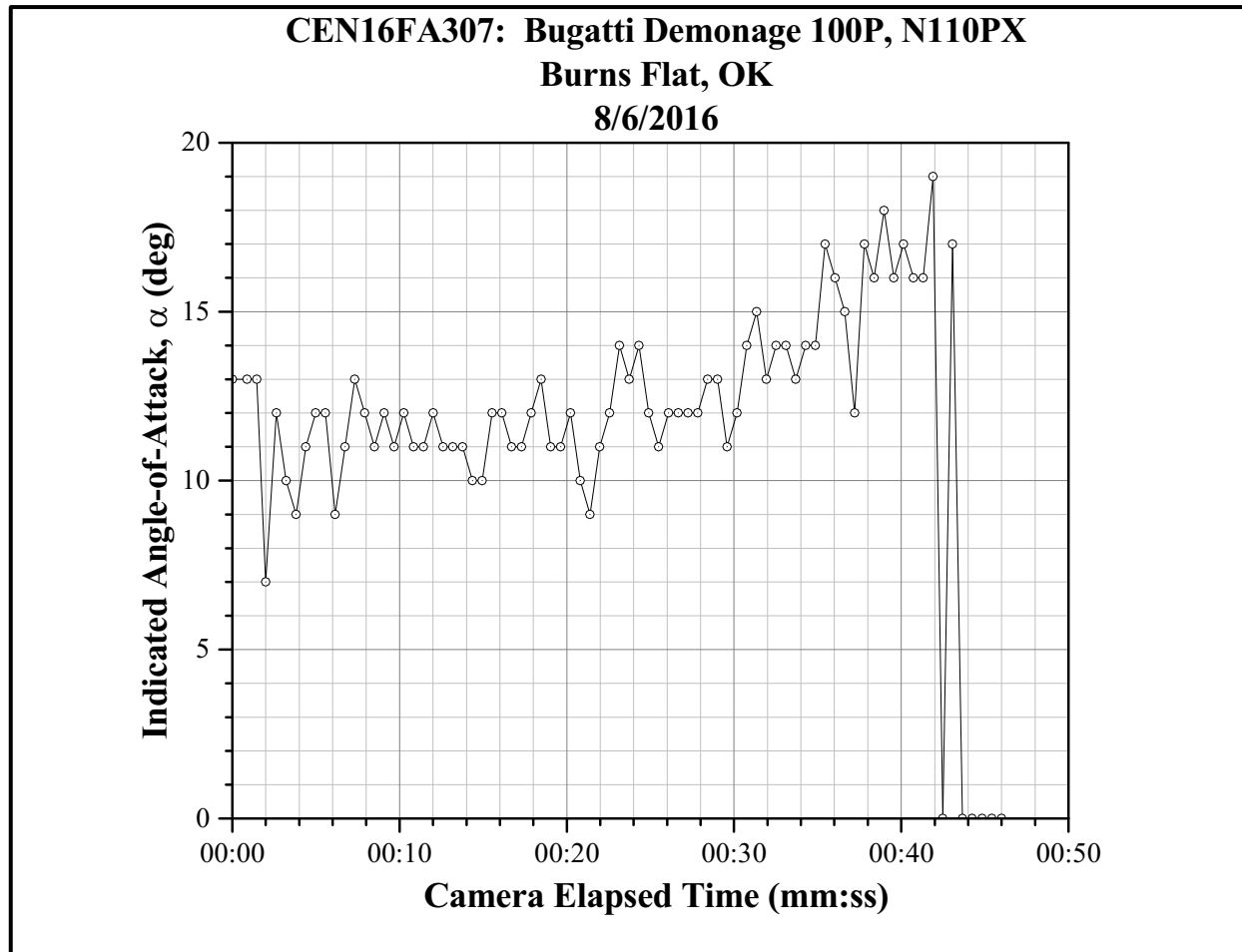


Figure 6: Lift Coefficient Based on Accident Data



**Figure 7: Angle-of-Attack from Digital Instrument in Cockpit**