

2016 LOBO White Paper – Lancair Safety

Introduction

Lancair aircraft are a family of high-performance experimental amateur-built kit airplanes. The product line ranges from the 2-seat, 100hp Lancair 200 to the 4-seat, 750shp pressurized Lancair Evolution. Design changes over the years have given each Lancair model its own unique set of handling characteristics and mechanical features. The common thread among the various Lancair models is all-composite construction and very high performance compared to certified aircraft of similar horsepower.

Safety Record

Since its founding in 2008, the Lancair Owners and Builders Organization (LOBO) has worked with the FAA and insurance companies to find solutions to Lancair fleet safety problems. Today, the fatal accident rate for Lancair aircraft is 10 per 100,000 flight hours, which is disproportionately high compared to the GA fleet (approximately 1 fatal accident per 100,00 hours) and other experimental amateur-built aircraft (approximately 2 fatal accidents per 100,000 hours) (NTSB, 2010).

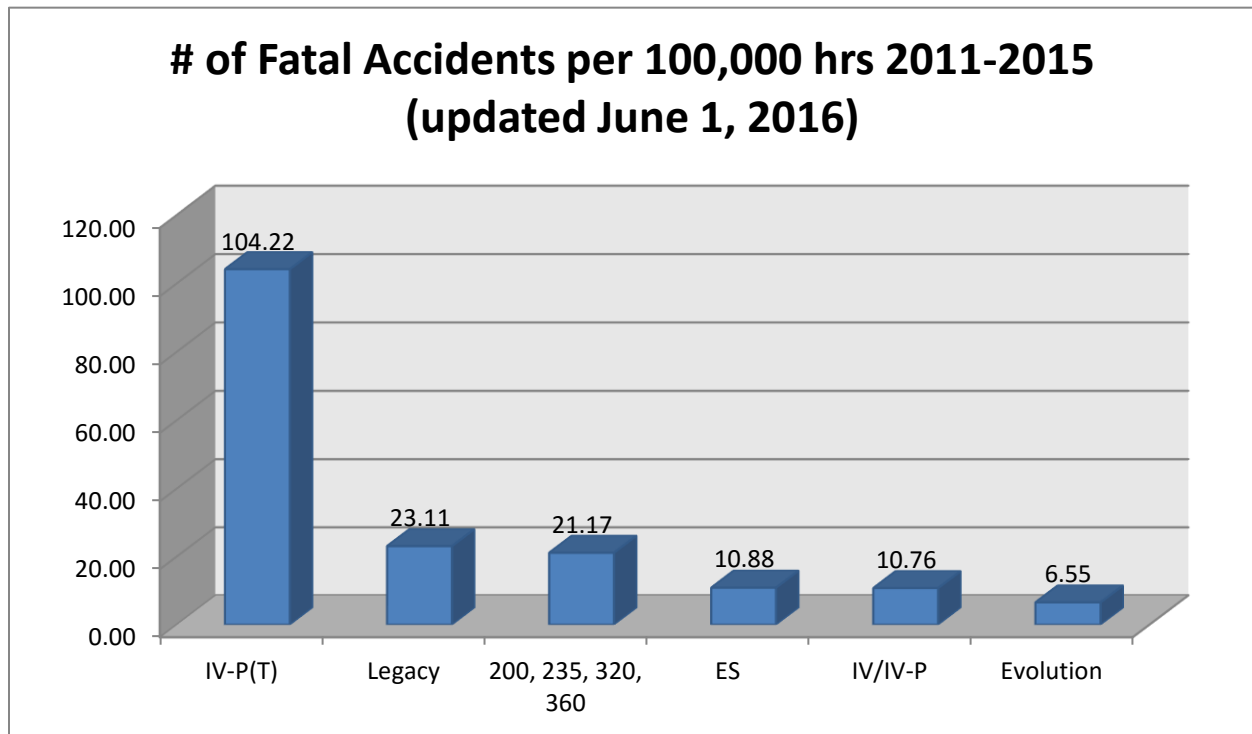


FIGURE 1

Initial Response

In 2009 LOBO developed a training syllabus which subsequently received FAA/Industry Training Standards (FITS) acceptance. Insurance companies agreed to offer coverage to pilots who received training in accordance with LOBO's FITS-accepted syllabus. Despite available training, on average less than 11 pilots per year participate in LOBO flight training, with only three obtaining transition training per year. These numbers represent less than 1.5 percent of the total Lancair fleet and are consistent with data on training rates supplied by the American Bonanza Society. Additionally, LOBO conducts dedicated ground training at its annual fly in, which is attended on average by 36 pilots.

Long-Term Results

The requirement for formal training is not regulatory in nature, but rather is driven by the economic interests of the insurance industry. Some insurance underwriters mandate transition and recurrent training; however this requirement currently applies to Lancair IVP, IVPT and Evolution.

Economic Forces

The 2008 economic downturn saw a significant drop in aviation activity across the entire GA fleet. At the same time, more of the Lancair fleet went up for sale on the used market at significantly reduced prices, making them available to pilots who could not previously afford them. With the softening of the insurance market due to reduced demand, insurance companies began relaxing training mandates, making it easier for new owners to fly newly acquired planes with little or no transition training. The result has been a number of Lancair accidents directly attributable to a lack of familiarity with the aircraft.

2012 Safety Effort

LOBO leadership met with Mr. John Allen, FAA Director of Flight Standards (AFS-1) and his staff in April 2012 to review Lancair safety concerns. LOBO made three proposals we believed would address the highest risks:

1. Mandatory transition training for new owners.
2. FAA to notify LOBO of Lancair sales (to facilitate LOBO advice and assistance to new owners).
3. Approval for a second pilot during Phase 1 flight testing of new EAB aircraft.

The FAA has since implemented the second-pilot program. This initiative (AC 90-116) has been successful in reducing risks during Phase 1 testing.

2016 Safety Study

The FAA's General Aviation & Commercial Division (AFS 800) approached LOBO in March 2016 requesting assistance in addressing Lancair safety concerns. Their goal was to identify risks factors, develop ways to mitigate them and implement procedures to improve overall fleet safety.

As a first step, LOBO formed a Safety Working Group (SWG) comprised of experienced Lancair owners/builders and instructors. LOBO's SWG conducted an in-depth study of the Lancair fleet accident history. This study followed the same processes as the GA-JSC research, with LOBO categorizing accidents and incidents using common taxonomy recommended by the Commercial Aviation Safety Team and the International Civil Aviation Organization. We studied the NTSB's accident database, the FAA's incident database and foreign safety databases. We supplemented that data with news reports, social media posts and first-hand accounts with additional information on the pilot and aircraft where possible. Charts detailing the data may be reviewed in the Addendum at the end of this document.

Safety Study Results

There have been 557 known accidents and incidents in the Lancair fleet since 1988, including 116 fatal accidents involving 192 fatalities. The leading cause of these accidents is broadly “pilot error.” Specifically, the number one issue of all accidents and incidents is failure to follow and/or unfamiliarity with aircraft procedures (see Figure 11). Loss of Control In-flight (LOC-I) is the leading cause of fatal accidents (see Figure 7).

Analysis also shows that pilot experience is a factor in these accidents and incidents. Pilots with less than 100 hours in model are at the greatest risk of an accident (see Figure 2).

Highest Risk Group

We have determined that pilots with little or no time in Lancairs are at the highest risk of an accident. This risk group includes pilots with extensive flight experience in other aircraft. For the first two decades most Lancair pilots were the original builders. As builders, they had intimate knowledge of their aircraft systems, making their low time-in-type the main risk factor. As Lancairs enter the used market and change hands each new owner faces the two-pronged threat of unfamiliarity with the aircraft and little or no experience in make and model. The NTSB identified second owners as having a higher risk of accident than the original builder due to lack of familiarity with the aircraft and recommended transition training to mitigate this risk (NTSB, 2010).

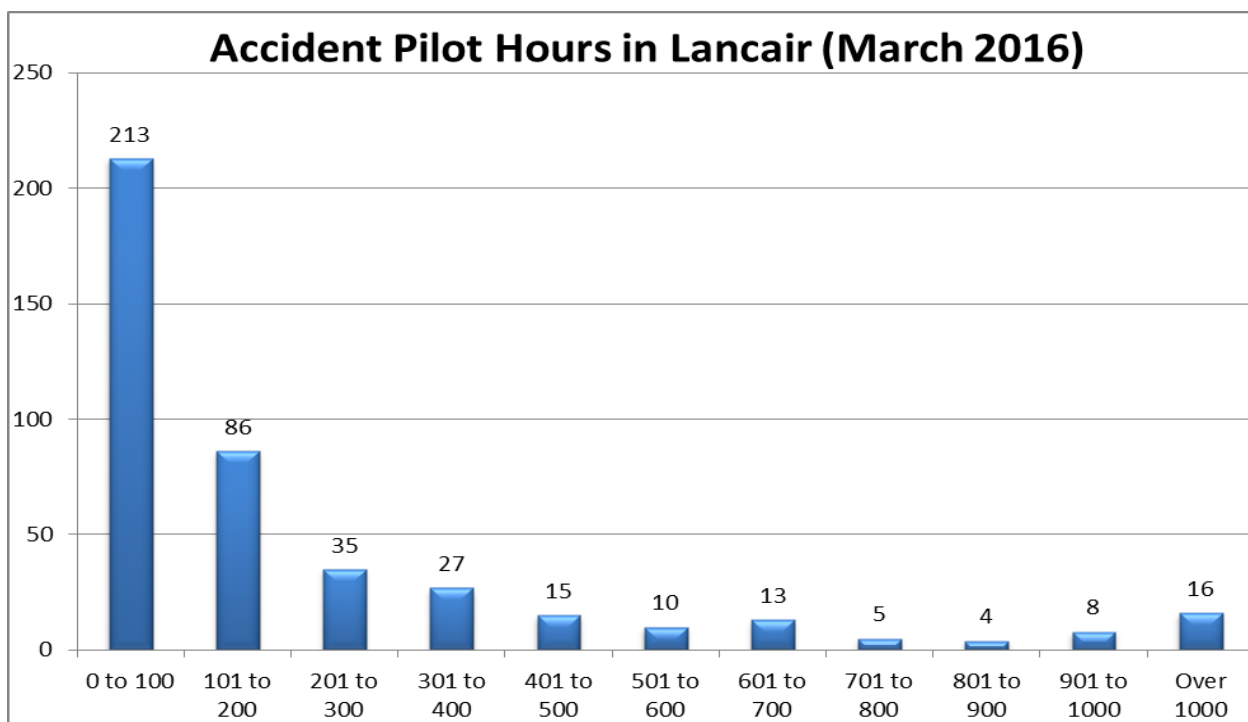


FIGURE 2

LOBO Annual Flight Training

Only 1.2 percent of Lancair pilots seek and receive recurrent flight training. Forty-six percent of all LOBO members report having received no Lancair-specific flight training. Eleven percent report LOBO flight training; twelve percent report training with independent training provider High-Performance Aircraft Training (HPAT) and 31 percent report “other” training. The following table shows the LOBO and Elite Pilot Services (currently the other active Lancair training provider) training output since 2009.

	Initial	Recurrent	Totals
2009	-	5	5
2010	1	5	6
2011	4	5	9
2012	-	1	1
2013	8	9	17
2014	7	15	22
2015	4	14	18
2016	1	8	9
Total	25	62	87
Avg./Year	3.3	8.2	11.6

Figure 3

Identifying the Risks

Loss of control inflight—the leading cause of fatal accidents for all GA aircraft, including Lancairs—is of utmost concern. Almost all Lancairs have high wing loading (some as high as 40lb/sq ft at maximum gross weight) resulting in stall speeds well in excess of 61 knots. The Lancair fleet does not have abnormal stall spin characteristics. FAA AVP analysis indicated that IVP spins are unrecoverable. Pilots have reported recovering from a steady state spin—albeit with a significant loss of altitude. AVP reported the time from loss of engine power to stall as “fast.” This is also not true. The airframes have very low drag for their operating weight and do not decelerate with loss of power as fast as a Cessna or Piper. In fact, the Lancair fleet has excellent glide characteristics—for example, the IVP model glide ratio approaches 20:1 with the prop at high pitch.

What is of significance is that most experimental aircraft have not been stall tested to the same level as certified aircraft. Like their certified brethren, it is unlikely that the angle of incidence on a given Lancair aircraft is exactly the same on both wings. Certified aircraft mitigate this issue with sufficient testing and the addition of stall strips and/or other aerodynamic devices. Most Lancair aircraft lack these aerodynamic devices which can result in poor stall characteristics. In addition, the average general aviation pilot does not have sufficient knowledge with respect to aerodynamics and experience to test and mitigate stall characteristics. LOBO transition and recurrent training emphasizes these factors. LOBO also discourages Lancair IV pilots from performing stalls and that recommendation seems to reduce the number of LOC-I events in that series. The word is out and pilots who get LOBO training are respectful of that corner of the envelope. Additionally, although most Lancairs do not have classic stall warning devices, many are equipped with angle-of-attack indicating systems—the most common being the Advanced Flight Systems, Inc. unit developed by Mr. Jim Frantz, a former Lancair builder.

Lancair aircraft have a reputation for unforgiving handling characteristics. That is not true of all Lancairs.

The small 200 and 300 series have very light stick forces, especially in the longitudinal axis, resulting in difficulty learning in the landing phase as reported by LOBO instructors and many PIO-related accidents.

Reducing the Risks

The key to reducing the accident-related risks discussed above is training. When done properly, type-specific transition training can make pilots safer by improving stick-and-rudder skills, teaching aircraft-specific techniques, driving home emergency procedures and instilling a healthy respect for proper operating practices.

Insurance-required training received from approved organizations has proven helpful, however an insurance requirement is not a substitute for an FAA mandate. Insurance requirements vary from company to company, and even from one year to the next within the same company. If a single underwriter drops the training mandate when the insurance market softens the rest typically follow suit to remain competitive. The NTSB recognized these issues in its study of Glass Cockpit Safety (NTSB, 2010b). In an ideal world every Lancair pilot would undergo initial and recurrent training from an accredited organization. Thus far this year LOBO has trained seven pilots in the Lancair fleet. Independent training provider Elite Pilot Services reports similar numbers.

Training Challenges

Providing Lancair instruction presents unique challenges. There are a limited number of instructors with Lancair experience in the various models. The instructor pool is basically limited to Lancair owner-builders who are also CFIs. Additionally, there is wide variation in aircraft configuration within each model, especially in instrument panel layout and avionics. Even if mandated, the current pool of Lancair instructors could not train all Lancair pilots every year; however they are sufficient to train new transitioning pilots.

It has been suggested that LOBO acquire a flight training device and offer training in that. The fleet variations make designing such a flight simulator or flight training device technically infeasible.

LOBO Survey

LOBO surveyed members in 2012 to determine attitudes and opinions regarding FAA mandated transition training. Approximately 80% of the members who completed the survey supported mandatory transition training for new Lancair pilots. A survey of our members completed on July 22, 2016 shows 90% of respondents favor mandatory transition training as a means to reduce accidents (Figures 12-14).

Conclusion

Based on the available resources and economic impact to owners, LOBO believes that mandatory initial transition training is the best solution for reducing the current accident rate. Since insurance industry training requirements are not regulatory, any training mandate must come from the FAA. Mandatory training has been successful in reducing the fatal accident rates. The flight review requirement supported by NAFI reduced the fatal accident rate by 15 percent in one year. Likewise, the Special Federal Aviation Regulation (SFAR) requiring mandatory training for Robinson R22 and Mitsubishi MU2 aircraft significantly reduced accidents in those communities.

Addendum

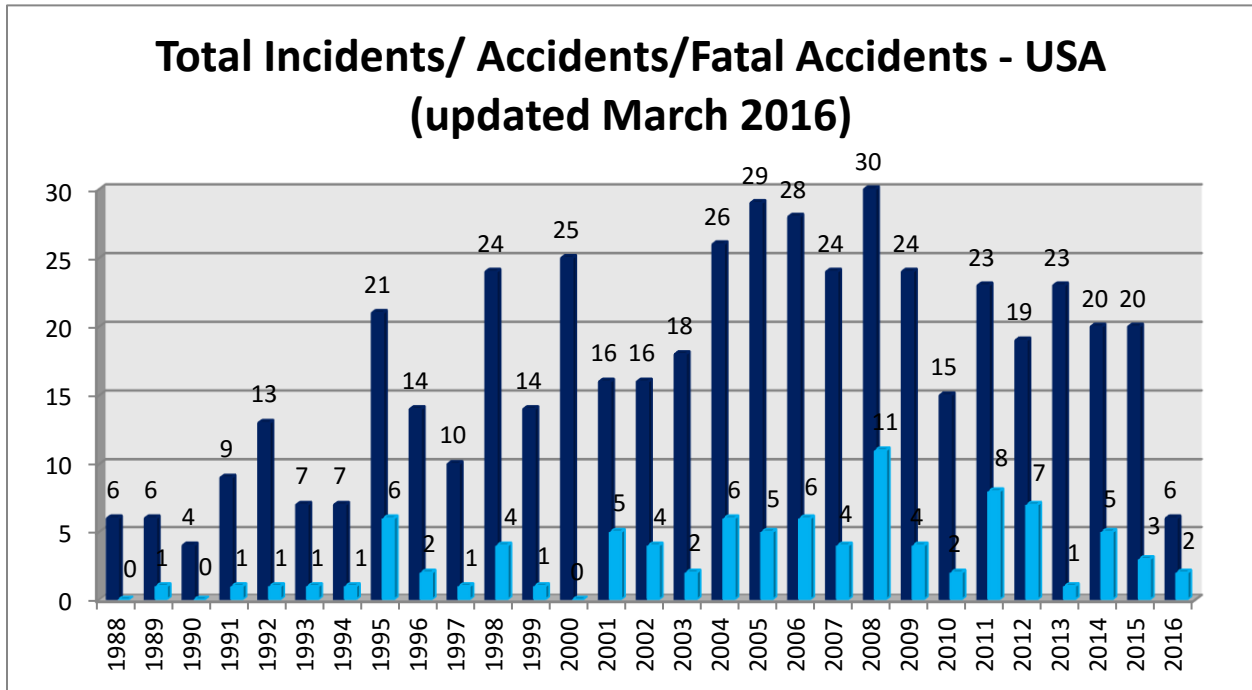


FIGURE 4

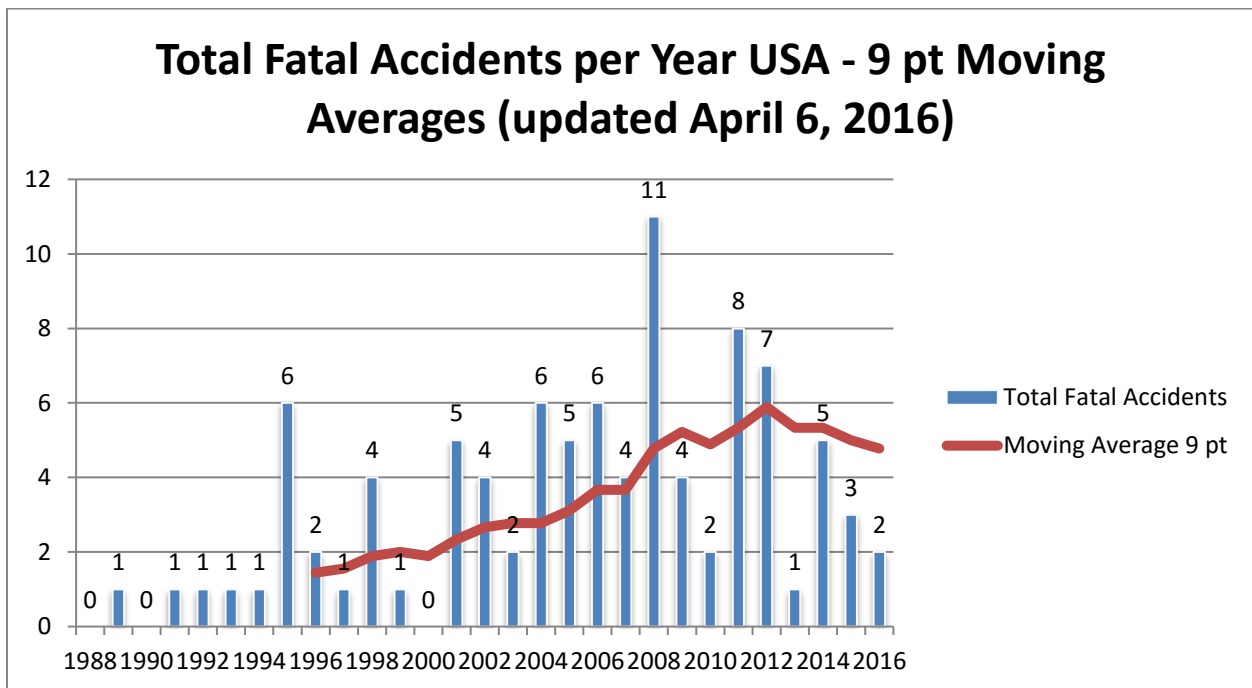


FIGURE 5

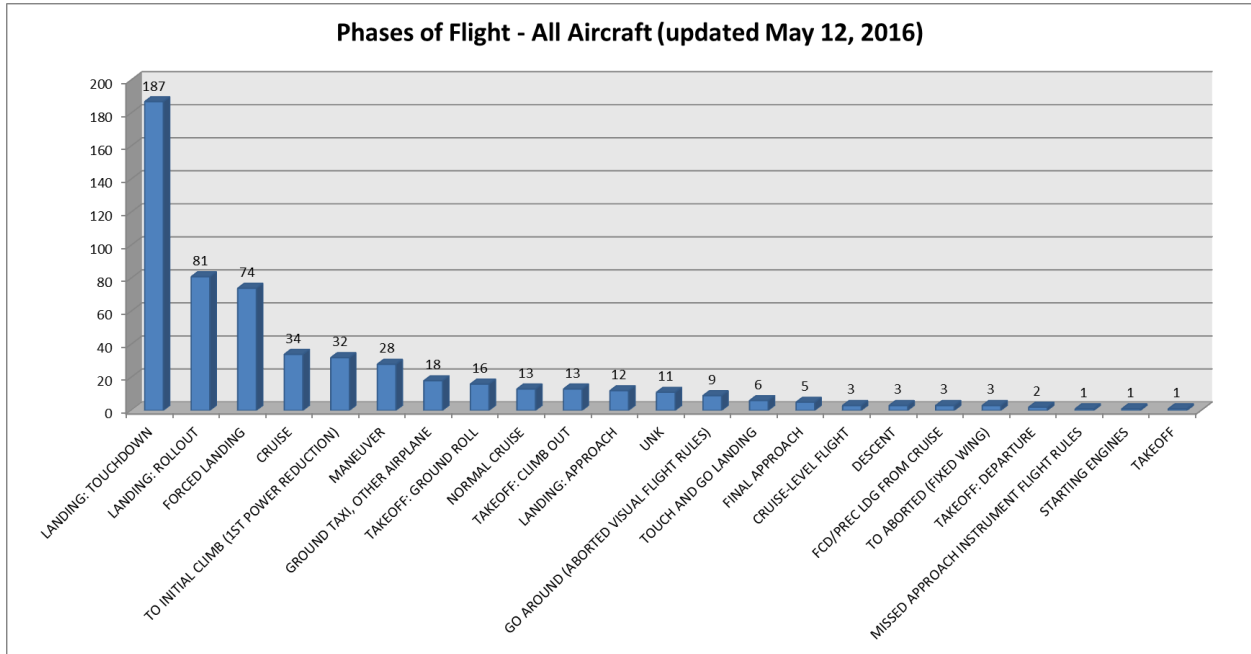


FIGURE 6

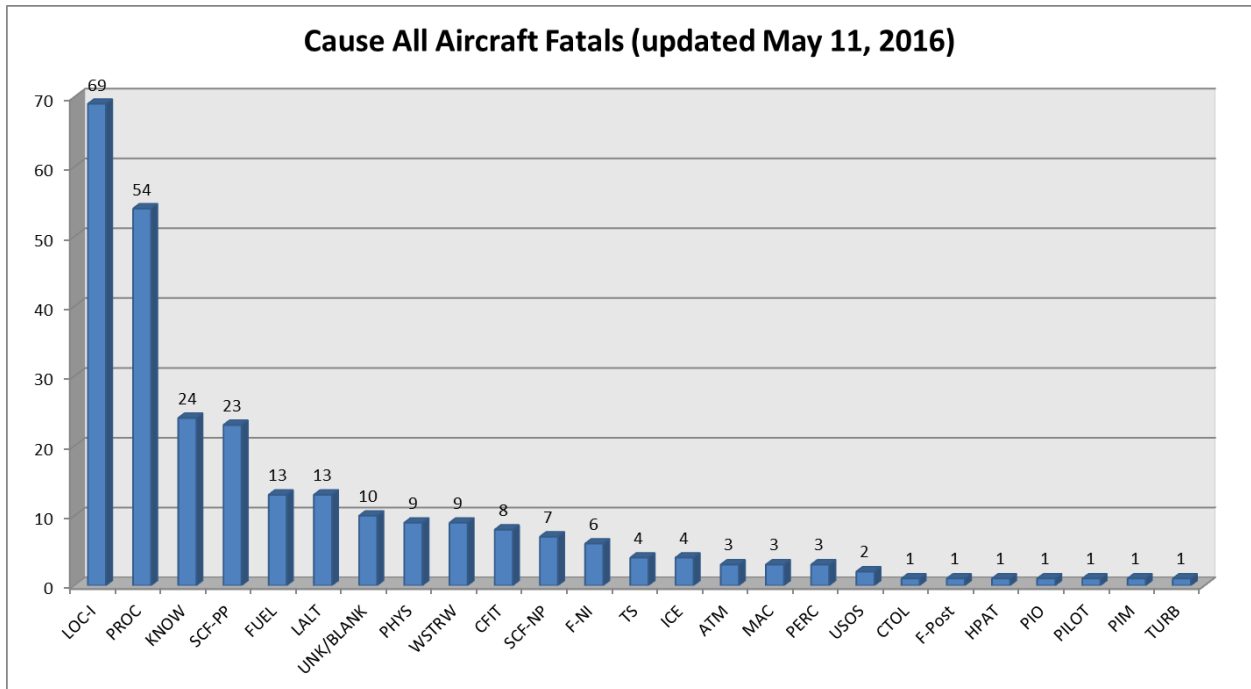


FIGURE 7

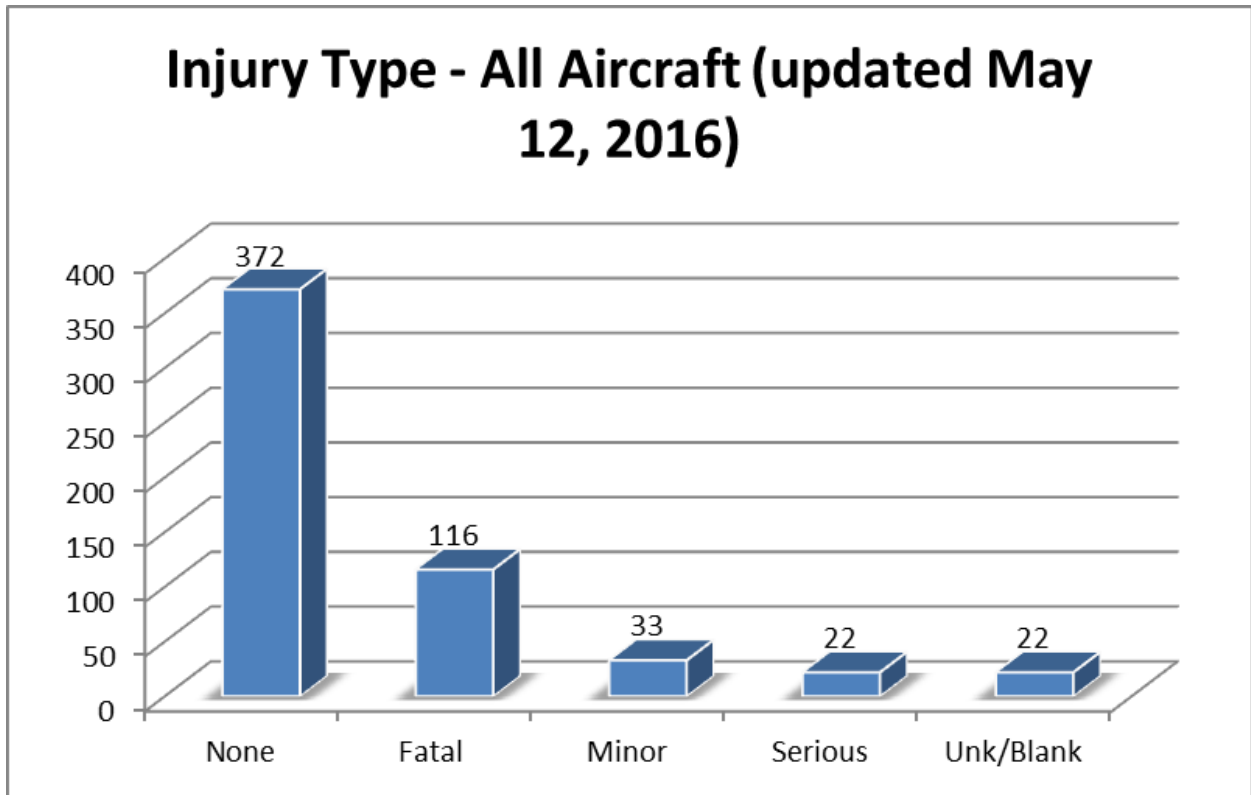


FIGURE 8

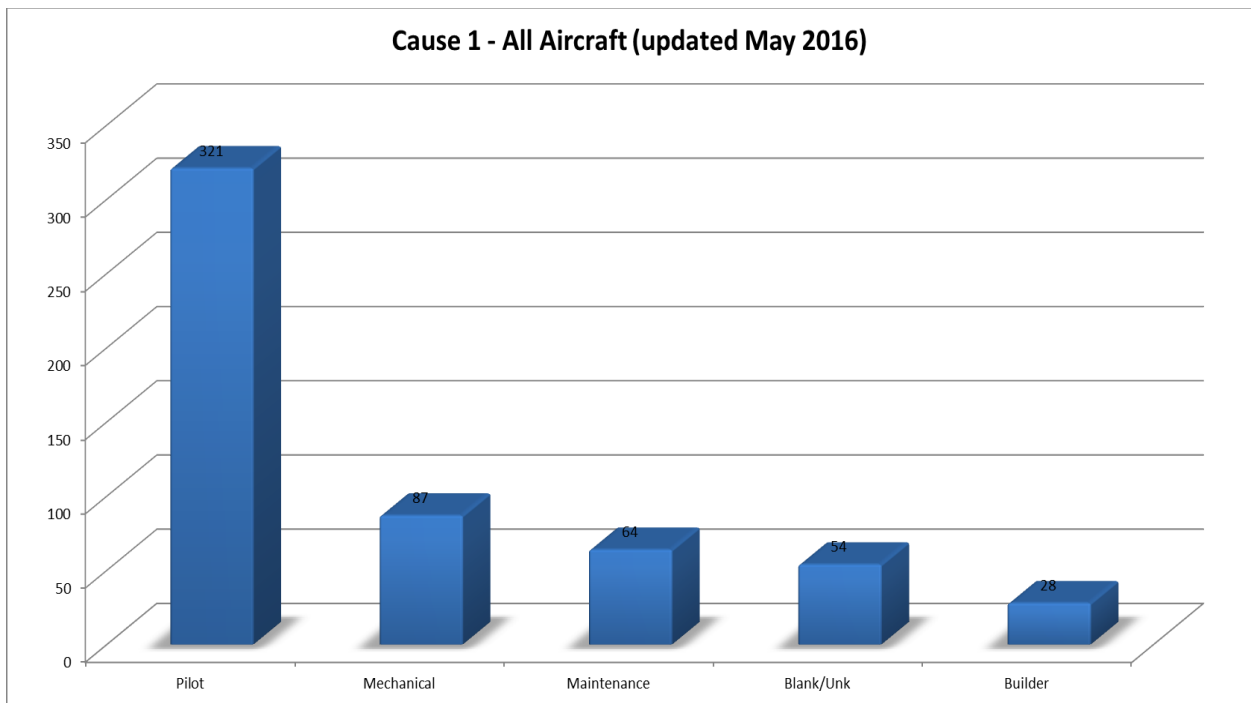


FIGURE 9

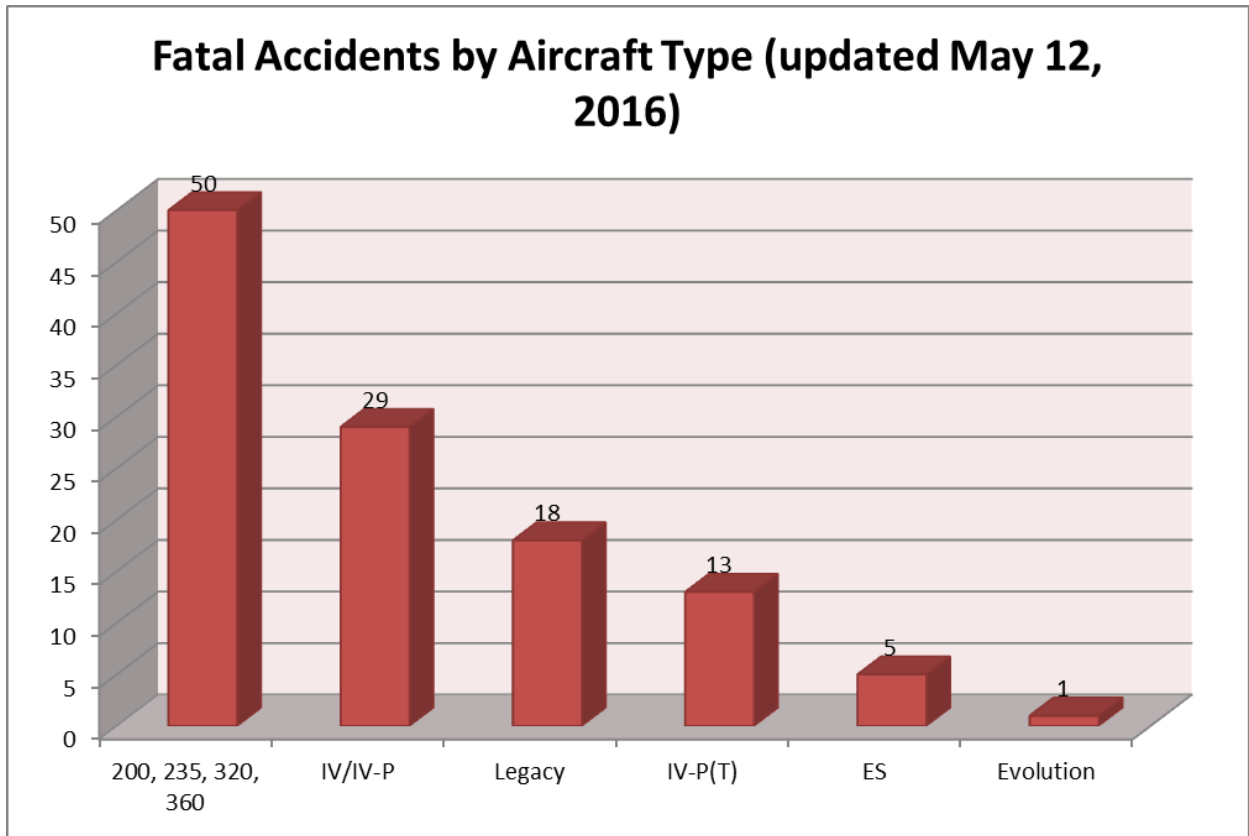


FIGURE 10

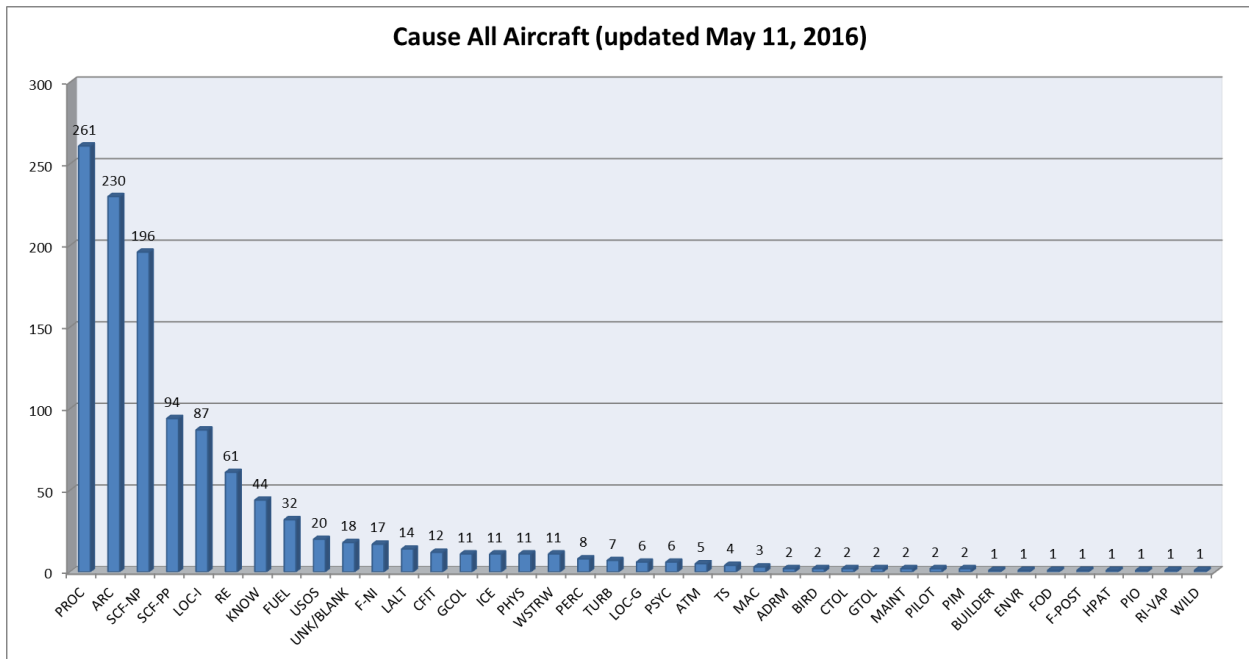
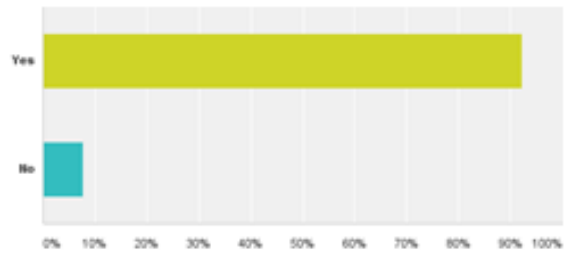


FIGURE 11

Q4: If mandatory initial transition training could lower the accident rates for Lancair aircraft, would you support such training?

Answered: 180 Skipped: 1

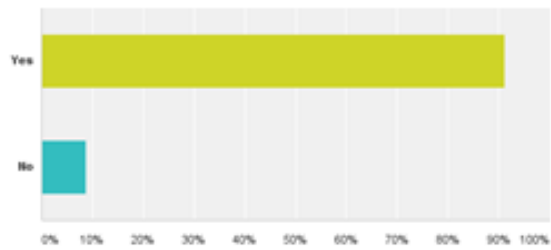


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FIGURE 32

Q5: If mandatory initial transition training could lower insurance premiums for Lancair aircraft, would you vote to support such training?

Answered: 131 Skipped: 0

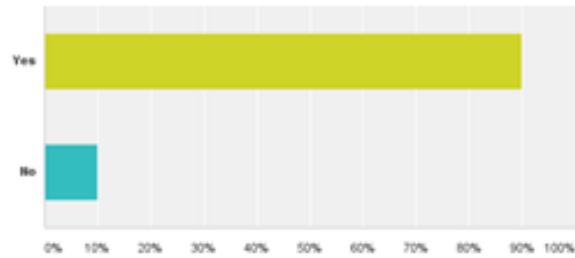


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FIGURE 13

Q6: Would you support mandatory initial type training for pilots new to Lancair aircraft if pilots current in a Lancair aircraft were "grandfathered" and were exempted from initial training?

Answered: 179 Skipped: 2



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FIGURE 14

References

- NTSB. (2010). *The safety of experimental amateur-built aircraft*. Washington, DC: National Transportation Safety Board.
- NTSB. (2010b). *Introduction of glass cockpit avionics into light aircraft*. Washington, DC: National Transportation Safety Board.