



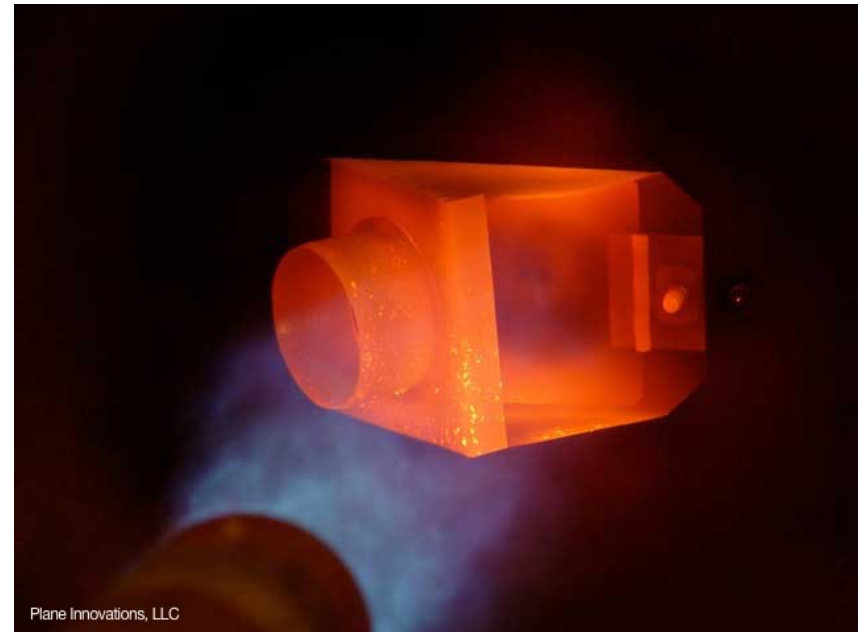
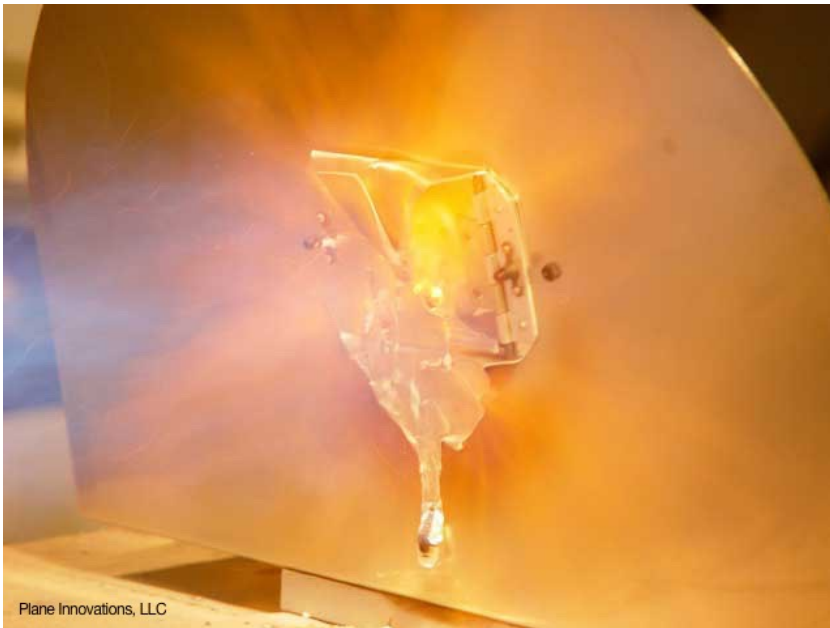
Fireproofing Your Firewall

A Presentation on Firewall Safety

By

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Pictures are courtesy of Plane Innovations LLC and Brian Wendt

Firewall Penetrations - <https://www.youtube.com/watch?v=Rs4ohdgulpE>

Protecting your aircraft wiring - https://www.youtube.com/watch?v=W0_jzlnmLS8



FAA Test Requirements For Firewalls

- 23.1191 Firewalls.
 - Compliance with the criteria for fireproof materials or components must be shown as follows:
 - The flame to which the materials or components are subjected must be $2,000 \pm 150$ °F.
 - Sheet materials approximately 10 inches square must be subjected to the flame from a suitable burner.
 - The flame must be large enough to maintain the required test temperature over an area approximately five inches square.
 - Firewall materials and fittings must resist flame penetration for at least 15 minutes.
- § 23.1182 Nacelle areas behind firewalls.
 - Components, lines, and fittings, except those subject to the provisions of §23.1351(e), located behind the engine-compartment firewall must be constructed of such materials and located at such distances from the firewall that they will not suffer damage sufficient to endanger the airplane if a portion of the engine side of the firewall is subjected to a flame temperature of not less than 2000 °F for 15 minutes.

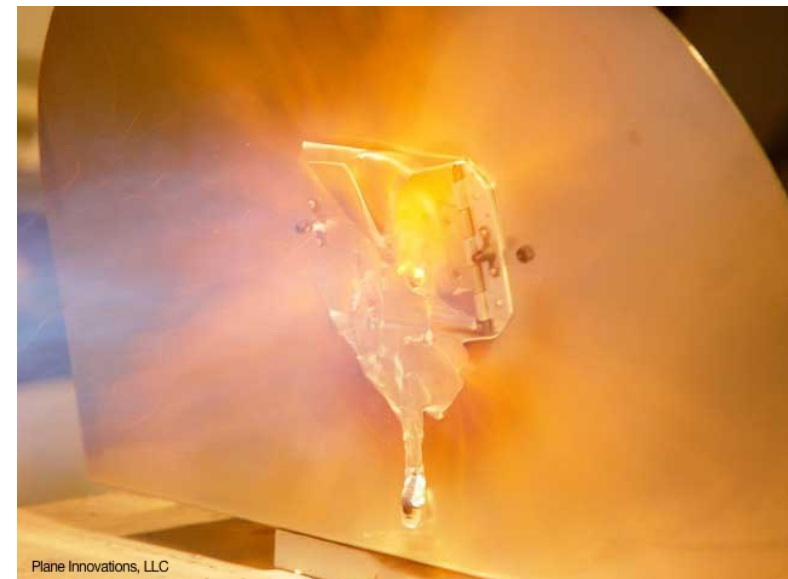
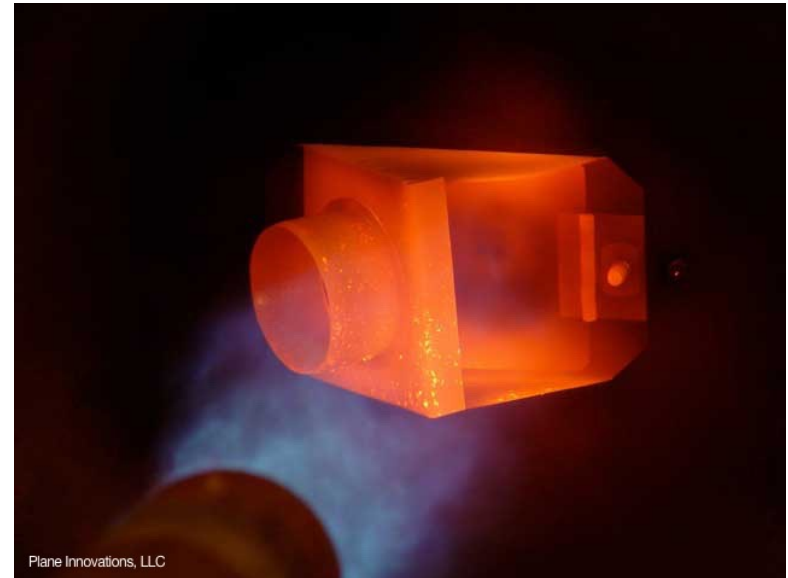


Many of the pictures used in this presentation came from Brian Wendt's website about building his RV-8. You can find out more at [Brian's website](#).



Use Steel Instead of Aluminum

- Steel won't melt and fail when exposed to an engine fire, but aluminum will.
 - Melting Temperature – Metals:
 - Titanium – 3000 F
 - Stainless steel – 2700 F
 - Steel – 2500 F
 - Copper – 2000 F
 - Yellow Brass – 1700 F
 - Aluminum - 1200 F
 - Magnesium – 1200 F
 - Melting Temperature - Insulation materials:
 - FiberFrax – 2600 F
 - Woven Glass fabric – 2500 F
- The intact glowing airbox is made of stainless steel and shields the cabin from the engine fire.
- The melted airbox is made of aluminum and is now dumping 2500 F gases and molten aluminum into the cabin.





Firewall Feed-thrus Must Be Fire Proof

- Feed-thrus for cables and wiring must be fireproof and prevent gases from entering the cabin.
- Rubber Grommets burn and fail, even with shields. The grommets on the cabin side of the firewall began to burn after only 20 seconds.
- Plane Innovations Fire Sleeve type penetrations stood up to 15 minutes of exposure.

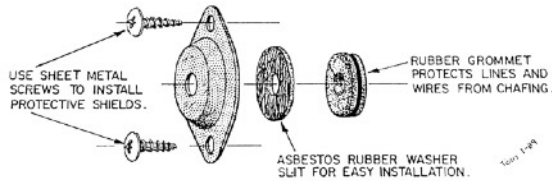
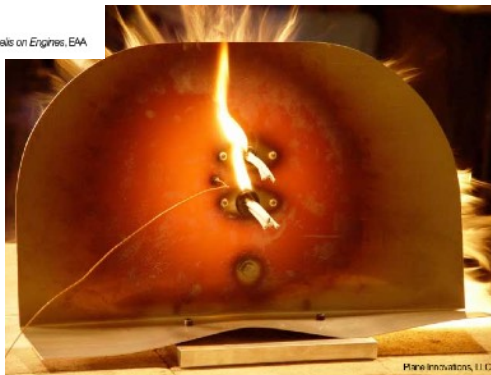


FIGURE 1.

PROTECTIVE SHIELDS FOR FIREWALL OPENINGS

Tony Bingalis on Engines, EAA



Plane Innovations, LLC



Eyeball Feed-thrus Work Well For Cables

- Eyeball Feed-thrus not only seal the firewall, but also allow you to direct cables as desired.
- Various fireproof sealants are available.
- Check out this webpage and post #38 for more information.
- <http://www.vansairforce.com/community/showthread.php?t=72087&page=4>.

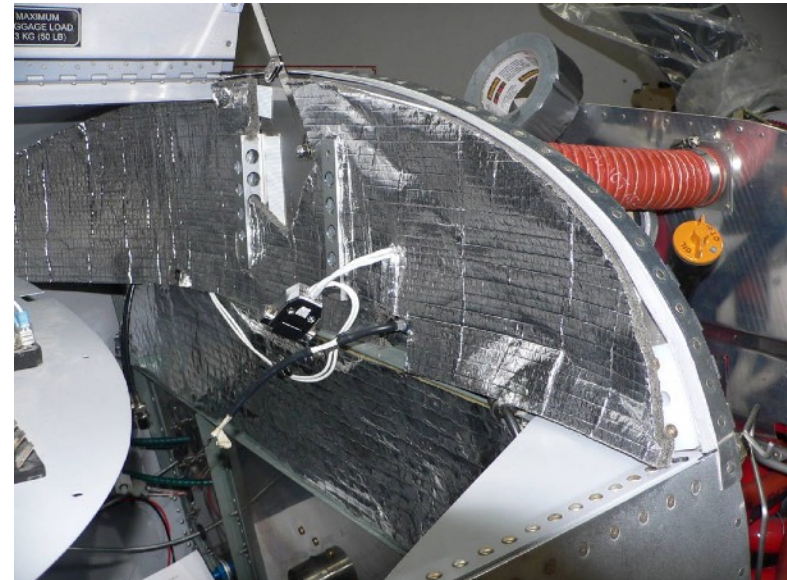
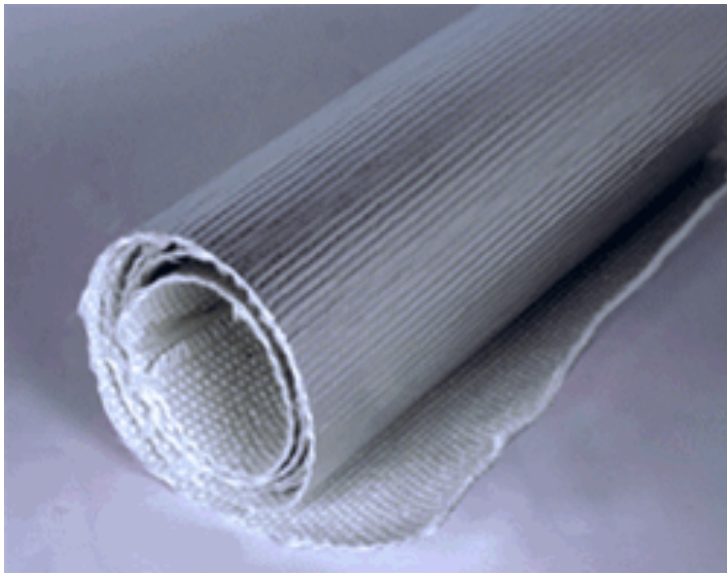
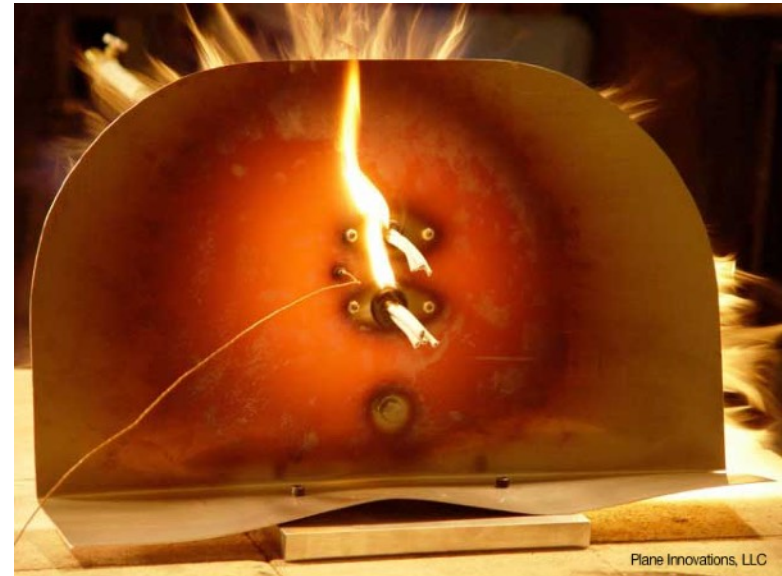


Pictures are courtesy of Dan Horton



Cabin Side Firewall Insulation Must Be Fireproof

- The firewall may get red hot with an engine fire, and without insulation on the cabin side, the radiant heat will melt or ignite like your pants and shoes, and panel wiring.
- Make sure to use fireproof insulation and not materials designed only for sound deadening or low temperature thermal insulation like Thermozone.
- Instead use materials like Fiberfrax or fiberglass insulation.





Inflight Fires Are Often Fatal

- Read this Aftermath analysis of an inflight fire by Peter Garrison:
 - <http://www.flyingmag.com/technique/accidents/flight-engine-fire>
- If you have an inflight fire, immediately shut off all sources of fuel, ignition, and cabin vents.
- Begin an emergency descent and LAND NOW.
- It doesn't matter if it is a field, road, or runway. Typically in a light aircraft you only have a few minutes to live. In the Aftermath article above, the fire breached the cabin and overcame the pilot in less than 5 minutes.



A Fire Following A Crash Is A Very Deadly Event



- Your chances of surviving a fire following an aircraft crash are very low.
 - In 1998, a safety analysis of 68 GA aircraft accidents revealed that 22 pct of the crashes involved post-crash fire. Forty-eight pct of the occupants in these accidents were fatally injured³.
 - The crash scenarios evaluated in the study were selected to approximate the limits of survivability, and the statistics obtained from their analysis suggest that although there are not a large number of GA aircraft crashes involving post-crash fire, the accidents that do involve fire are extremely life-threatening for the occupants.
- Modern light aircraft designers avoid storing fuel in the cabin area. They also seek to protect fuel lines and fuel selector valves in the event of a crash.
- Crop dusters, use self sealing fuel tanks and lines.
- Recently, Robinson Helicopter Co. began installing self sealing tanks in their helicopter because the occupants were being killed by fire far more often than by the crash impact.
- Avoid installing fuel tanks in front of the cabin and in front of the spars of the wings where they are likely to be damaged in crash.

