

Software controlled fuses.

Many electrical systems are controlled electronically using semiconductors to switch power on and off. In some safety critical applications there are potential faults inherent in the nature of the semiconductors, which can be difficult to guard against and make safe. They can fail short circuit, allowing the current they are controlling to continue to flow.

Conventional fuses are unable to protect systems against this fault as the current flowing may be at normal levels.

In complex power electronics systems, such as those used in aerospace applications, sophisticated software controls allow many real time checks on the health of the system. Faults such as short circuit semiconductors can easily be detected. What is needed now is a safe and reliable way to disconnect the power running through the faulty semiconductor.

TT electronics Welwyn Components has introduced a switch disconnect component with a very low resistance fuse link path for the current to flow through in normal operation. When a fault condition is detected the fuse can be activated by an independent control signal, opening the fuse in a controlled manner.

This feature allows for the software of the system to decide when to activate the fuse, in response to any fault conditions, irrespective of the actual current running through the fuse. In gross current overload this will break as a conventional fuse.

For use in civil and military aircraft applications the device is light and robust. Voltage withstand of the open fuse at high altitude is maintained by a semi hermetic construction.

Applications - Wing de-icer for Boeing 787 Dreamliner.



The new de-icer system for Boeing's 787 Dreamliner incorporates heater panels moulded into the leading edges of the flight surfaces. These are powered electrically when needed to prevent ice formation.

The control system switches power to the heater panels through 44 channels of MOSFET switches. If a fault causes a MOSFET to remain switched on then the heater panel can be damaged, leading to an expensive refit working on the surface of the wing.

To overcome this potential problem each power channel is protected by a Welwyn Switch Disconnect component and the system is scanned continuously by the control software. If a short circuit fault is detected a signal is generated which activates the Switch Disconnect and opens the fuse element, isolating and protecting the heater panel.

The control system has several degrees of redundancy built in so that the heaters will continue to operate with one channel isolated. Using this system any subsequent repairs required are only to the electronics and not to the airframe.