Cooper Bussmann
CBPR033

Fuse technology improvements lead to high-tech applications

Fuses have been around for a very long time. Indeed, the first recorded instance of a fuse (non-enclosed) being used to protect electrical equipment was in 1864. But it would be wrong to think that the mechanism of operation of today's high performance fuse is as simple as its distant ancestor. Modern fuses are very robust and protect totally reliably. They do so with a very high breaking capacity, minimum energy let-through and, up to the point at which they operate, they do not deteriorate in use. After operation, which involves the overcurrent melting the fuse element(s), the fuse must be replaced but it is often a small price to pay for high performance and total reliability. It should also be remembered that fuses are relatively low-cost items and are highly compact. The space saving alone can save a lot of money in application and many modern fuse systems have evolved to be still more compact.

Despite the operating principle – the melting of the element that is - being essentially unchanged, it would be a mistake to think that fuses have not evolved considerably. Performance has been improved by better understanding fuse behaviour through the use of computer modelling techniques. Moreover, improved performance characteristics now uniquely enable fuse-based systems to protect high-tech equipment. An example would be the use of semiconductor fuses to isolate Integrated Gate Bipolar Transistors (IGBTs) in electronic equipment.

Dual indicators save money:

Take the NH fuse link. This is the tried and tested LV fuse type for general industrial applications and it comes in a wide range of sizes and ratings. Many such fuses have been fitted with an indicating device to show clearly which fuse has blown. Even so, it is not always easy to see the indicator when the fuse is fitted to typical fusegear, so a recent development has been the dual-indicating device. This is a simple yet elegant and reliable mechanism for giving visual indication of fuse operation from both top and side, so saving still more valuable time. It can be seen whether situated in a fuse base, fuse switch-disconnect or a vertical fuse rail. Distributors' stockholding can be reduced by 50% because it is no longer necessary to stock two different NH fuse link types.

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Benefits from modular overcurrent protection module:

Another recent innovation is one of Cooper Bussmann's own. Called Optima OPM-NG, this is a modular overcurrent protection module – essentially an advanced fuseholder, that has been specifically designed to fit into 45mm wide motor starter systems for 32A IEC motor circuits. It is IP 20 finger-safe, thus meeting global standards for minimising contact with current-carrying parts. An integral DIN rail spring allows for easy installation without tools. A major advantage is that when used in motor starter applications, the wiring time in group installations is can be significantly reduced.

Optima OPM-NG has been designed for OEMs around the world and has already found many novel applications.

CUBEFuse innovation:

Then there is Cooper Bussmann's CUBEFuse, one of the most innovative fuse designs in over 50 years. CUBEFuse was designed for OEMs, panel builders and industrial automation applications. Some of its unique, hassle-free features include a finger-safe protection system, smaller footprint than any power class fuse on the market, permanent 'open-fuse' indication and interchangeable 30A and 60A fuse bases. There is probably no other overcurrent protection device that provides more protection with simplicity.

Chip fuses for high technology applications:

A step-change in fuse technology came about only 15 years ago with the introduction of chip fuses. These are made by depositing fusible elements on to a ceramic substrate. Using this procedure, fuses as small as 3mm X 1.5mm can be made. These are ideal for automated direct mounting on to PCBs for the protection of electronic equipment. It should be remembered that your mobile phone doesn't have a circuit breaker; it has a chip fuse! This is an example where modern fuse technology has realised exciting new applications.

High-speed semiconductor fuses:

Current limiting semiconductor fuses, also manufactured by Cooper Bussmann, are very compact and have extremely fast acting trip characteristics. They have exceptionally low I2t, low power losses, arc voltages and peak let-through and provide short circuit and overload protection for diodes, SCRs, GTOs, IGBTs and many other types of power semiconductors.

Power semiconductors come in a wide variety of types and sizes, and Bussmann can provide tailored solutions to fit every type. The pace of change in this field is rapid, and new products are being constantly developed to ensure that protection is provided. Some examples include the new IGBT flat pack fuse and the size 5 high-speed fuse for high power rectifiers up to 9000A. The growth of new technologies such as fuel cells will see the development of further new generations of fuse types.

The fuse has, and continues to make, the transition from being a reliable low-cost tried and tested technology to being a thoroughly modern method of circuit protection with all the original benefits but with the added advantages of enhanced performance capabilities, increased safety, still more compact size and greatly increased applications.

Cooper Bussmann is the world's biggest fuse and fuse equipment manufacturer and is able to provide fuses with global approvals for virtually every application.

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