

A safety switch prevents a big bang

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"Power-i"/DART monitors each spark very closely already as it forms. Credit: PTB

German scientists developed a new method to prevent explosions due to electrical sparks. For this development and the successful technology transfer, they received this year's Technology Transfer Prize of the Chamber of Industry and Commerce, Braunschweig.

In most cases, a spectacular accident must first occur in order to make the public aware of a problem that lurks continually in many areas of industry: the danger of explosions due to electrical sparks. The simplest method to prevent such explosions is called "Intrinsic Safety". The intention thereby is to prevent ignitable sparks from even being created. Up to now, this has only been possible with small devices having a power

of up to approx. 2 Watts - thus, above all, in process measuring and control technique.

A new concept that has been developed at the Physikalisch-Technische Bundesanstalt (PTB) in cooperation with industrial partners, increases this limit now up to 50 [Watts](#) and thus makes application possible in many more technical fields. The [technology](#) which is already being marketed under the name "Power-i"/DART and which is to be launched as an international IEC standard, promises the industry great cost savings. For their development and the successful technology transfer, the three PTB scientists Ulrich Johannsmeyer, Udo Gerlach and Thomas Uehlken will on 5th November receive this year's Technology Transfer Prize of the Industrie- und Handelskammer (IHK) (Chamber of Industry and Commerce), Braunschweig.

There's something in the air: Whether in chemistry, oil processing or pharmacy – combustible gases, vapours, mists or dusts occur often here, where even one spark can lead to an explosion. In order to prevent electrical and mechanical devices and equipment from becoming an ignition source in such environments, there are various protection principles which are specified in the national, European and also global standards. The "Intrinsic Safety" type of protection has for many years now established itself in process measuring and control technique. Thereby, the electrical voltages, currents and powers for the devices in the explosion-hazardous area are limited to such low values by specially constructed supply units, which are installed outside of the explosion-hazardous area so that a danger of explosion due to sparks or hot surfaces can be excluded with reasonable certainty. The intrinsically safe-supplied units can then – as opposed to all other explosion protection methods – be operated, adjusted, modified, serviced and exchanged while live.

But up to now, that has been solely possible where only small sparks

occur. The electrical power may as a rule be a maximum of 2 W – the typical range for process measuring and control technique. For a long time now, end users and manufacturers have wanted a considerably higher active power while at the same time keeping all the positive characteristics of Intrinsic Safety. And this is exactly what the new "Power-i"/DART technology offers. DART here stands for "Dynamic Arc Recognition and Termination".

"Power-i is different from previous concepts", states Udo Gerlach, the project leader at PTB. "The principle of an emergency shutdown is just as simple as it is effective." The safety-related validated, intelligent monitoring system recognizes a spark already while it is forming and then shuts down the system in a controlled and quick manner, before the spark can even become ignitable. "Thus, complex, expensive structural safety measures can now be replaced with the new technology", explains Ulrich Johannsmeyer, head of the department. For the first time, up to 50 W output power is possible, whereby motors, actuators, lighting and much more can be powered. This means that for all these devices, explosion protection will become considerably less expensive and simpler in practical application.

The interest from industry is great. Therefore, PTB, together with 13 renowned German manufacturing companies, started a consortial project in June 2009 in order to jointly bring forward the "Power-i" technology and initiate the necessary steps towards international standardization. The project runs until the end of 2011. However, there are now already first marketable devices with this technology: a process analytical device and a fieldbus data communications system, which were introduced in spring 2010 at the Hannover Messe (Hanover Fair). Many other devices are being developed at various companies and will be developed to marketability.

Ulrich Johannsmeyer is very optimistic about the future: "The market

potential of devices with "Power-i"/DART Technology is very high. The sales volume of German manufacturers with explosion-protected field devices lies at several hundred million euros per year. And the new technology could obtain a considerable portion of it." Thus, the strong market position of the German explosion protection industry could be expanded still further.

More information: Gerlach, Udo; Johannsmeyer, Ulrich; Uehlken, Thomas: Eigensichere Speisung hoher Leistung ("Power-i"/DART) – Grundlagen und Anwenderaspekte / Intrinsically safe supply with high power ("Power-i"/DART) – basics and user aspects. ATP Edition: 52 atp Edition: 52 (2010), 1-2, 32 - 39 ISBN / ISSN 0178-2320, Munich: Oldenbourg Industrieverl.

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