Is it worth 'splashing out' just in case?

Chris Brennan, Endress+Hauser Ltd, Manchester, UK Tel: (44) 0161 286 5000, Fax: (44) 0161 286 5094, Email: info@uk.endress.com Web: www.uk.endress.com

Chris Brennan, Level Product Specialist at Endress+Hauser Ltd discusses the benefits of investing in high level alarms when considering the subject of overspill prevention.

In discussing overspill, there are a number of issues to address such as the various legislations in place to prevent it, the implications of failing to heed pollution prevention recommendations and how to select the most appropriate level technique. The above issues will be addressed before the consequences of doing nothing, or 'risking it', are examined.

There are two general schools of thought on the subject of overspill protection (although recent events have highlighted its importance). One is that it is a necessity whilst the other is the opposite - that slipping under the radar is preferable to parting with the cash. The latter is a foolish consensus as the potential implications of omitting overspill protection devices are huge, therefore a precautionary strategy should be implemented.

According to The Control of Pollution (Oil Storage) (England) Regulations 2001, any fixed tank used for storing oil must be 'fitted with an automatic overfill protection device if the filling operation is controlled from a place where it is not reasonably practicable to observe the tank and any vent pipe' (p4 - 4:4 The Control of Pollution (oil storage) England Regulations 2001). There are nearly 100 sites around Great Britain with consent to store quantities of oil or other fuels that make them subject to the UK's Control of Major Accident Hazards (COMAH) Regulations 1999. Following the Buncefield incident, the UK 'sHealth and Safety Executive issued a safety alert that recommended the review of maintenance arrangements for storage tanks and bunds and their associated safety-critical equipment, such as level measuring and alarm systems. But it doesn't end here – from the Environment Agency (EA) to HSE, the rules and regulations are plentiful. Non-compliance attracts huge fines but more importantly, these regulations are there to protect the public and the environment.

The consequences of overspill fall into three main areas:

1. Effect upon the environment

Depending upon what materials are onsite and what overspills, there is significant risk to the environment. The EA have issued pollution prevention guidelines that advise ways to avoid causing pollution, minimise waste and comply with the requirements of the law.

2. Health and safety of employees and neighbours

From fire-risks to harmful gas emissions, overspill can impose severe health and safety consequences upon individuals working onsite and in the surrounding areas. The site is responsible for ensuring that these individuals are not exposed to risk that could otherwise be avoided by implementing safety procedures.

3. Cost

The cost attributed to clean-up of overspill is incalculable as it depends on the type of oil, the location of the spill and the characteristics of the affected area. Following a recent oil spill in Beirut, clean-up of the affected area in the Mediterranean is estimated to cost approximately £53 million. And it doesn't end here, non-compliance to regulations will also invite fines of indeterminable proportions.

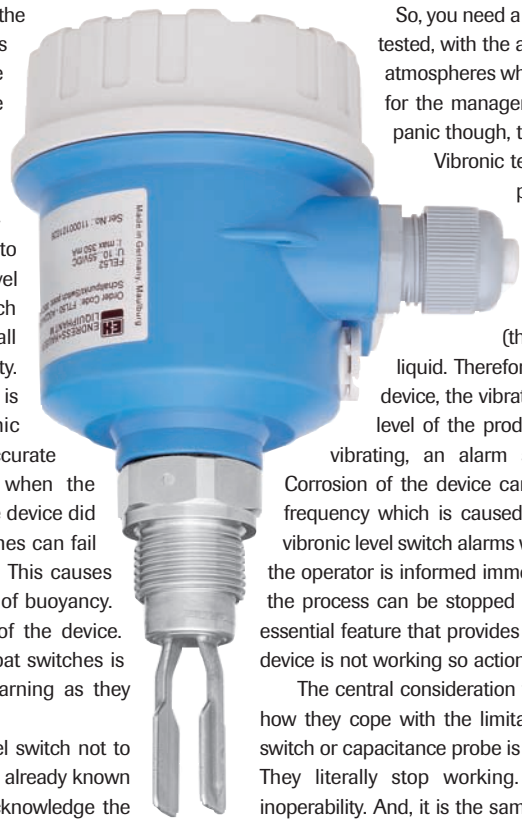
When the environment, human health and safety and finances are at such risk, a preventative strategy must be implemented. But, where do you start?

There are various methods available for the prevention of overspill, from simple float switches to more complex systems that use capacitance or vibronic technologies, all of which have varying levels of accuracy.

There appears to be a recurring approach to the specification of overspill devices that follows a traditional hierarchical gradient - beginning with the float switch, through to capacitance before arriving at the vibronic level switch. As the oldest technology, the float switch has guaranteed its place as the first port of call by virtue of its age and longstanding popularity. The problem is that this mechanical technique is not nearly as advanced as its electronic counterparts and is not equipped to provide accurate and failsafe level measurement (especially when the product is as potentially hazardous as oil) if the device did fail. One of the myriad of ways that float switches can fail is due to their inability to cope with corrosion. This causes holes to appear in the float resulting in a loss of buoyancy. In addition, build-up will affect the mobility of the device. However, the most significant problem with float switches is that when it does fail, there is no way of warning as they cannot be remotely monitored.

It is important when specifying a high level switch not to just go for what sounds the simplest or a switch already known (the float switch). Initially, it is necessary to acknowledge the fact that the device is likely to be installed for a significant length of time without being stimulated. This requires a reliable method that can be trusted to operate in case of overfill and respond to the threat of spillage. Regular testing and maintenance is a common sense and precautionary approach to ensuring the optimum safety and reliability of your overspill prevention system. If the system is mounted on top of a tall tank holding hazardous product, there may be extra costs incurred in ensuring that sufficient safe access is provided to allow local testing to be carried out. In this case, remote testing and maintenance should be put in place. This will mean that the device can be tested more easily and frequently so that device failure (at that critical moment) can be avoided. However, selecting the most appropriate device for your application is an essential requirement because testing today, does not guarantee that it will work tomorrow. And testing a device that has not been properly specified to cope in the specific condition of your application is futile, because no matter how often you test it to ensure it is operating, if it is not the correct solution for the application - it will not work.

Capacitance is a technique that may be appropriate for more difficult environments as capacitance devices are built with special measuring sections that continuously monitor build-up and use this as a reference to be measured against, thus detecting a difference when the vessel is full. However, because this measurement principle monitors the change in capacity, there is a limit to how much build-up can occur without affecting the ability to detect the tank capacity. If there is too much build-up, capacitance probes are rendered ineffective. Corrosion caused by vapours within a vessel is another potential limitation that can affect operability. Of course, selection of the correct construction material is important but on occasion, circumstances can occur after the device has been installed that can not be anticipated at the specification.



Regulation Salvation - Endress+Hauser's Liquiphant vibrating level switch.

So, you need a measuring device that can be remotely tested, with the ability to work continuously in corrosive atmospheres which also comes complete with a system for the management of build-up and corrosion. Don't panic though, there is a solution…

Vibronic technology can be used as an excellent problem solver for overfill protection. As a high level alarm, this device works by constantly vibrating at its natural resonant frequency in air or gas. The resonant frequency will be higher in (the less resistant) air and gas than in a liquid. Therefore, when the product level reaches the device, the vibration frequency drops and indicates the level of the product. Because this device is constantly vibrating, an alarm sounds when the frequency drops. Corrosion of the device can also be detected by the increase in frequency which is caused by the mass reduction. Because the vibronic level switch alarms when the frequency drops or increases, the operator is informed immediately that there is a problem so that the process can be stopped – irrespective of the cause. This is an essential feature that provides a warning that the overspill protection device is not working so action can be taken.

The central consideration to make when selecting your device is how they cope with the limitations as previously outlined. If a float switch or capacitance probe is affected by build-up, what do they do? They literally stop working. No warning, no indication - just inoperability. And, it is the same story with corrosion. However, when a vibrating level switch is affected by corrosion or build-up (that limits its ability to detect the level) it alarms to inform the operator. This is the key consideration when specifying overspill protection devices – will you know when the device

stops working before it is too late? In the case of capacitance and float switch technology the answer is no, but vibronic technology – yes!

So all things considered, do you part with the cash or risk it? Too many companies are 'risking it' but how much convincing does it take? If you don't install an overspill protection device you are risking the health and safety of personnel and neighbours, the environment and the financial stability of the company. However, installing the correct device is essential as the wrong one - which maybe ineffective, unreliable or susceptible to build-up or corrosion - is literally useless. If you risk it and suffer an overspill – you will pay for it.

On 12 October 2006, HSE issued a report providing a recommendation for immediate action with regards to areas of concern identified in the review of fuel and oil storage sites. This report states that the system for tank-filling control should be of high integrity with sufficient independence to ensure timely and safe shutdown for the prevention of overspill. The report also maintains that site operators should meet the latest international standards by June 2007. This means compliance with BS EN 61511:2004 - functional safety and Safety Instrumented Systems. The selection of an overspill protection device could not be more crucial - the instrument needs to have a SIL rating and a method that allows ample time for shutdown, before overspill occurs.

Safe and Easy Level Switch

Magnetrol's (Belgium) new Echotel 961/962 liquid level switch makes use of unique self-diagnostics to detect malfunctions of the electronics and transducer, and also alarm the user in case of excessive electro-magnetic noise interference. This unique feature safeguards not only the performance of the switch but also the performance of other field instrumentation in the area. SIL philosophy is fully integrated into the design, resulting in a reliable and safe to use switch. With a SFF of > 90%, the 961/962 scores as one of the safest switches in the world. It can be easily integrated in SIL instrumented loops of SIL 1, 2 and 3 level depending the users' safety system and historical experience with the technology.

The unique features of the 961/962 include adjustable time delay, "on-demand" testbuttons for the output (alarm, error, wiring, linked actuators), LED indication for alarm status, reliability condition and in case of malfunction, identification of the malfunction and separate error signal. The 961 provides a single setpoint where the 962 offers two selectable setpoints on the same sensor. The 962 can be set for high/low level alarm detection or pump control. In pump control mode, the unit will latch its relays internally so that no peripheral equipment is needed to perform automatic fill and drain functions.

The 961/962 is available with relay or mA output options, various transducer materials incl. plastics, aluminium or stainless steel housing, threaded and flanged process connection. The 961/962 is designed for use in ATEX intrinsically and explosion proof area as well as CIP/SIP clean environments. The construction of the device is conform to PED (Pressure Equipment Directive) regulations. The 961/962 is not sensitive by changing density or other liquid variables and therefore does not require any calibration. The units can be used on almost each liquid with a max. viscosity of 10.000 cP, resisting temperatures up to +165°C and pressures from full vacuum service up to 138 bar.

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Level Sensor with HART® - Protocol

The magnetostrictive Torrix level sensor from **Fafnir** (Germany) is available with a HART® - protocol. This functional extension enables the simultaneous measurements of the filling level and separation layer. Torrix with HART® is suitable for all liquid media which require highly accurate filling level and separation layer measurements.

The highly accurate Torrix level sensor can also be ordered with a HART® - protocol 6. It can be used for the simultaneous measurement of the filling level and the separation layer. The simultaneous evaluation of two float positions is carried out via a digital signal modulated upon the two-wire 4-20mA. The tube can be configured without demounting. The HART® version of Torrix can communicate with any process management system which supports HART® 6 and is equipped with a universal device description.

At extreme temperatures of -200°C to 250°C Torrix always provides the actual filling level value. The robust but compact and mechanical structure of Torrix ensures a very high shock and vibration resistance in co-operation with the microcontrolled sensor electronics. Additional advantages are: Application in Ex-zone 0 (ATEX and IECEx approval), very short measuring intervals, measuring range covering the total tube length. Torrix and Torrix with HART® are extremely accurate and have a high reproductivity.

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New Ultrasonic Level Transmitter Includes an LED Digital Indicator for Local Inventory Readings

Flowline's (USA) new AK10 series Ricochet™ level transmitter includes a loop-powered, 4-digit bright-red LED indicator for local readings in inch, gallon or percentage of span values. This compact, two-wire transmitter provides accurate level measurements ranging from 3.6 inches to 6 ft. with an accuracy of ±0.25%. With non-contact technology, the AK10 can be broadly applied in highly corrosive acid, caustics, and chemical solutions.

Employing innovative ultrasonic techniques, microprocessor-based electronics rugged design and a 3/4" miniature PVDF transducer, the AK10 is ideal for level measurements in general-purpose Intermediate Bulk Containers (IBCs), process vessels and metal plating lines. The narrow 8 deg. beam diameter enables the transmitter to function within the restricted space of the tank. Once installed through the top wall of the tank, the transmitter stands only 3.6" above the tank top. Automatic temperature compensation is provided over the entire measurement range.

Additional features include Echo-safe™ filtration to eliminate false echo signals, fail-safe diagnostics for enhanced process safety, and CE compliance. The polypropylene enclosure is rated NEMA 4X (IP65).

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PDO Puts its Trust in Optiflux Flow Meters

Petroleum Development of Oman (PDO) recently ordered the first part of an expected several hundred electro-magnetic flowmeters from **Krohne** (Germany).

PDO, which has entered into a three-year price agreement with Krohne, uses the Type Optiflux 4300 devices for water injection.

PDO started using electromagnetic meters for water injection ever since these meters have been found to be less problematic compared to other types of flow meters. Krohne Optiflux flow meters' state-of-the-art technology is not only technically proven, but also supplemented with competitive pricing and extensive after sales support. The diameters of the devices range from 1" to 20"; their pressure rating going up to 1500 lbs.

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