*Interview by Peter Edwards, Global Cement Magazine*

# In Discussion: robecco & Thorwesten Vent

*Global Cement* recently spoke with Robert Becker, founder of inerting expert robecco, and Berthold Bussieweke, head of sales at explosion protection systems producer Thorwesten Vent, about the development of explosion protection in the cement sector, with a focus on alternative fuels and future trends.

***Global Cement (GC):* What were your first experiences with alternative fuels (AF) in cement?**

***Robert Becker (RB):*** The first time that robecco worked with a cement sector client regarding inerting systems for alternative fuels was in 2007. The client was Titan Cement, which wanted to use dried sewage sludge and other AF materials at its Thessaloniki plant in Greece. The plant installed a feeding system from Schenck Process and robecco installed gas analysers to monitor methane ($CH_4$) generation and any carbon monoxide (CO) from smouldering fires. To extinguish smoldering fires and to prevent explosions a $CO_2$ inerting system was installed.

At this time there was insufficient literature on the use of inerting systems for such a fuel, so robecco and the client had to carefully analyse the system. We performed a lot of tests and made very small changes to the industrial system to figure out safe operating procedures for monitoring and inerting systems with sewage sludge and other AF materials. This case-study still delivers us good information today and has helped the company install similar systems elsewhere.

***Berthold Bussieweke (BB):*** Thorwesten Vent's first experience with alternative fuels was also with sewage sludge, at a European cement plant in the early 2010s.

***GC:* How has the approach to AF safety changed over the years?**

***RB:*** We have seen significant developments with alternative fuels safety over the past 15 years. The most safety-conscious world region is in Europe, where I am involved with the development of EN 15281, Guidance on Inerting for the Prevention of Explosions and Fire. A new standard DIN EN ISO 20024 was also published for the safe handling and storage of solid biofuel pellets.

With some notable exceptions like North and Central America, many other world regions do not view AF safety, indeed fuel safety, with the same degree of importance. Of course the other exceptions are the big players, Holcim, HeidelbergCement, Cemex and so on. They always follow best practice.

***BB:*** At the moment the lack of attention paid to fuel explosion safety is being exacerbated. The hazards of coal dust explosion are known to everybody but the hazards of AFs creating explosive atmospheres is often underestimated and neglected. When a new cement producer builds a plant in

**Below:** robecco inerting system (left) and control cabinet (right), recently installed for a client in the global cement sector.

**Above:** Robert Becker founded robecco GmbH in 1995. The company is engaged in the field of inerting systems for industrial processes. It began working in the cement sector in 1999 and the sector now represents 70% of its client base. It was the first supplier to offer a complete gas detection and inerting system package to the global cement sector.

**Above:** Berthold Bussieweke has been Head of Sales at Thorwesten Vent since December 2010. Before this he had an extensive career with GEA Group, particularly within its marine business unit. Thorwesten Vent is a manufacturer of explosion venting devices, launching the first self-reclosing explosion vents. Cement sector clients represent around 80% of the company's business.

particular in a developing market it often opts for the low cost option, which results in a non-effective explosion protection concept. Unfortunately, standards and regulations are rarely followed with such projects. Multiplied accross many projects in developing regions, this phenomenon threatens the overall safety level of the global cement industry.

***GC*: How does AF safety differ from fossil fuel safety?**

***RB:*** Every AF has different ignition and explosion characteristics. For example dried sewage sludge, plastic wastes and wood pellets can be even more explosive than coal. However, while everyone knows that coal dust explodes, this behaviour is not assumed of alternative fuels. Unfortunately this is demonstrated by numerous sewage sludge and wood pellet explosions in the energy sector.

In terms of handling, the main differences between inerting systems with AF-based systems compared to coal or petcoke is the absence of direct grinding processes. In addition alternative fuels are often less dense, meaning that storage silos and warehouses are larger in volume. This presents some differences in the configuration of inerting systems, but none of the changes is insurmountable. robecco has built up experience in the proper design of such systems over the years.

***BB:*** When installing a venting system, explosion characteristics of the fuel also affect the required venting area. Coal, petcoke, lignite, bituminous coal and all alternative fuels have different parameters, with regard to explosive characteristics. If you do not consider the correct values you may design a venting system that is not safe. The best option is increasingly to prepare for the worst possible scenario.

***RB:*** Another issue is that AF supplies are unreliable, indeed some fuels are seasonal. Whenever an AF changes, the operator must adjust the detection settings and alarms to reflect the change in fuel. This is related to $O_2$ limits, $CH_4$ limits and other parameters within the system. Using robecco's systems, the client can select the fuel being used on

**Below:** Thorwesten Vent's self-reclosing explosion vents on top of a pulverised coal silo.

the control panel or even a smartphone. The system will then adjust the point at which there is a response. The same is the case when a fuel changes appreciably in terms of calorific value, for example due to changes in moisture content. This could affect the behaviour of dried sewage sludge.

I have seen cases in the cement sector in which the customer has failed to change the inerting system settings when changing the fuel. The user can be happily unaware that the system is suddenly dangerous. This was the case in Egypt, when it transitioned from heavy fuel oil to petcoke and then coal in the mid 2010s. Everything was fine with the petcoke, which has a fairly low volatility. But then when producers switched onwards to coal, they experienced the first fires and, unfortunately, explosions too, simply because the monitoring systems had not been adjusted.

***GC:* How do changing volumes of AF challenge your businesses?**

***RB:*** For the storage silos of 2000-3000m$^3$, sizes typically seen in the cement sector, we can guarantee that our inerting systems operate effectively and rapidly, eliminating the potential for smouldering fires and explosions. However, some sectors, for example waste to energy or power plants that use wood pellets, the volumes are much higher, perhaps as high as 40,000m$^3$. This poses significant challenges for the systems in terms of the speed at which we can deliver inert gases, as well as how much gas can actually be stored. This is an issue that could come to play in cement in the coming years.

***BB:*** From Thorwesten Vent's perspective, closed storage facilities are growing in the cement sector, as well as in the energy sector. The larger the silo, the more difficult it is to observe smouldering fires. Wood pellets, for example, are a particularly challenging fuel to design a properly-functioning explosion venting solution for. Silo volumes of tens of thousands of m$^3$ often lead to unmanageable, hazardous situations in terms of fire or explosion incidents. Overall volumes should be limited to appropriate sizes.

**Below:** Non-type tested explosion venting devices mounted on a bag house of a coal grinding plant. This does not conform to required norms and will lead to heavy bag house damage in the event of an explosion.

***GC:* How will increased use of pelletised SRF, sewage sludge, biogases and hydrogen affect your businesses going forward?**

***RB:*** We do not expect major challenges from the use of grinding pelletised fuels, as these are similar in characteristics to the fossil fuels and AF that we already deal with. Similarly sewage sludge is a known fuel for robecco. However, it will be increasingly available in the future. In Europe there is already a ban on spreading it on farmland. This could expand to other regions. Biogas is not a factor in the cement sector at the moment, as it is mainly used by the farmers that generate it.

Finally, hydrogen is a clear future fuel. In the EU there is clear political will to direct hydrogen towards steel and cement production, among others. It is not clear today what will need to be done regarding the safe storage and firing of hydrogen. robecco is looking into this area now to try to get a headstart on its competitors. We are also keen to hear about standards for the use of hydrogen in industrial processes.

***BB:*** I think, regardless of the specific fuels used in the future, both of our companies have a duty to educate the market as to how to look after safety of AF. This includes work on regulations such as DIN ISO 20024 (safe handling and storage of solid biofuel pellets in commercial and industrial applications). This is now more important than in the past, as there will be a drive within the sector towards increased use of biogenic AF, wood, sewage sludge, agricultural byproducts, all of which carry significant explosion risks.

This is because biogenic fuels offer lower $CO_2$ emissions than other types of AF. In the EU this is already having an effect on AF selection due to the high cost of emitting $CO_2$ under the EU Emissions Trading Scheme (ETS), currently Euro80-90/t. There are going to be a lot of new technologies in the pipeline for the future, for example technologies to grind wood pellets to a fine powder, a very explosive combination. Overall, we will need to keep developing and experimenting with new fuels to help the global cement sector realise its goals, all within safe parameters of course!

***GC:* Thank you for your time today gentlemen.**

***RB/BB:*** You are very welcome.