A LOOK TO THE FUTURE:
THE CHEMICAL INDUSTRY IN 2030

ZERO CLIENTS
Safely visualising processes

NEVER ALONE
High-tech companions

TRACE HEATING
A major project in Kazakhstan
Dear Reader,

Have you ever heard of Ascanio Sobrero? This Italian chemist, born in 1812 in Casale Monferrato, discovered nitroglycerine, paving the way for Alfred Nobel’s invention of dynamite. Sobrero’s homeland still has much to offer when it comes to groundbreaking safety technology. Find out more in our “Question time” section.

In this issue’s industry focus, we’ll show you how the new Zero Clients from the tried and tested POLARIS visualisation series are making waves in pharmaceuticals. We’ll also take a look at an impressive petrochemicals project making use of electrical trace heating. Last but not least, we’ll find out what the future holds for the chemical industry in our expert discussion.

I hope you enjoy reading this issue.

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High-tech solutions from BARTEC are used around the world. As the world market leader in explosion protection, BARTEC continuously invests in new technologies and new markets.
Mr Eisenhuth, what were the strategic considerations you had in mind when acquiring TOP Group?

**Eisenhuth:** Explosion-protected control and connection equipment is the largest single product division in the BARTEC Group. The addition of TOP Group – made up of the manufacturer FEAM and the two trading companies FEAM and NUOVA ASP – is a significant reinforcement in three areas of explosion protection: enclosure technology, lighting solutions and cable glands. This also includes strategically important technologies, thanks to which we can now offer more complete systems from a single source than ever. From a global perspective, this gives us a new competitive advantage.

Which technologies in particular, Mr Eichert?

**Eichert:** In lighting, this is above all LED technology, which is becoming established in the market now in actual solutions. They also have many years of experience in aluminium die casting, particularly when it comes to manufacturing thick-walled and rigid enclosures in a range of sizes. Systems engineering is the third area. Here, TOP Group are excellent at assembling the individual components into complex, explosion-protected, low-voltage systems.

The challenge here lies in controlling motors, pumps, lighting and system technology safely, i.e. without any sparks escaping. All this with values up to 690 volts and 1,250 amps.

What are the main sectors where TOP Group solutions are used?

**Eisenhuth:** Just like at BARTEC, it’s extremely varied: from oil and gas to process engineering and the automotive industry. With the exception of the larger switch-gears, some products are also interesting for smaller businesses, such as for carpenters’ workshops looking for a way to protect against fires or dangerous dust explosions.

Which of the newly acquired products do you each find most exciting?

**Eichert:** Right away I think of the patented EIC enclosure for the gas group IEC. Instead of the round cover with thread- joint that you see in most enclosures, it has a square cover with an extended flat joint. This may seem like a minor detail, but it gives us a real competitive advantage by making it much easier to fit the square enclosure without the typical “dead” corners. It also allows us to install actuators in the flat cover. Square covers are also easier to handle and maintain. What we also find interesting is the TOP Group’s thick-walled aluminium enclosure, as this allows us to now target the Arabian and American markets.

**Eisenhuth:** Lighting technology is also a big addition. Often it is handled separately from switching projects, but it is still required to operate these kinds of systems. Once installed, the lighting is usually active 24 hours a day. In future, this means the efficient LED solutions will become much more important. Together with the TOP Group, we can now provide lighting technology as part of a complete package from a single source. FEAM in particular has won major lighting projects in Saudi Arabia in recent years. This opens the door for the entire BARTEC Group to a new market, which had previously closely followed the American Ex standard.

How are you planning to integrate the three new companies in the BARTEC Group?

**Eisenhuth:** Just as with past acquisitions, we want to make sure that the TOP Group brands are retained. What’s new is that for the first time, this integration process will be accompanied by an integration manager. In this role, Mr Eichert will ensure open communication and high transparency in the respective tasks and processes. After all, with TOP Group, we’re talking about three family businesses that have their own corporate structure. The companies’ employees all have a strong emotional connection, and it’s this that makes them stand out so successfully.

How will the respective customers benefit from the merger?

**Eichert:** Above all through the expanded product range, but also from the even better delivery performance thanks to the value that each company adds in their respective areas. Extra benefits come from the sales synergies resulting from the various regional strengths. This will make us even more responsive internationally.

**Mr Eisenhuth, what does this mean for BARTEC’s market position?**

**Eisenhuth:** Together with the three companies in the TOP Group, we are now able to offer the full portfolio in explosion protection. It also makes us even stronger internationally as a system provider, regardless of whether the focus is on switch-gears including lighting and fittings, or industrial automation, which we cover both in a traditional sense and in the mobile computing sector. Our global business partners are increasingly looking for comprehensive expertise with the potential to outsource. In this respect too, the BARTEC Group is in an excellent position.

The two BARTEC managers agree that the acquisition is an important strategic step that will open doors to new markets.

How do you see this happening, Mr Eisenhuth?

**Eisenhuth:** Among other things, we organised welcome days at each site in order to integrate the staff as early as possible. We presented the BARTEC Group at these events and handed out Italian versions of the company brochure. We are able to keep the information up to date with regular teleconferences and newsletters.

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HIGH-TECH COMPANIONS

Many advanced economies suffer from a lack of skilled workers. As a result of stretched resources, staff are increasingly operating alone, especially in the chemical industry. Electronic noses, mobile offices and, in future, even augmented reality can make everyday work easier and safer.

The fewer staff there are in the field, the more important occupational safety becomes. Every minute of working time also becomes more valuable. Unnecessary journeys hide dangers and cost money – particularly in the process industry, where daily journeys quickly add up to several kilometres.

The portable office

Ex-protected tablet PCs are leading the fight against unnecessary trips between the office and the site. Using modern technology, they form a complete PC workstation no bigger than a school book. Quickly check your e-mails? Tip, tap, done. Fill out an Excel table or read some maintenance instructions? No problem. Thanks to the hi-res displays, even complex systems can be visualised in detail. The extra-robust device is connected via WiFi or high-speed standard LTE with the company network for exchanging information in real time. Integrated barcode scanners, optional RFID readers and sensors open up further options. Back in the real office, this mobile assistant can be used as a full workplace computer using a docking station.

With tablet PCs like the BARTEC Agile X, the mobile office is also advancing into hazardous areas.

Augmented-reality goggles

In the not-too-distant future, individuals will be able to use data goggles to receive important information on the spot. Augmented reality merges computer graphics with real images to give a whole new perspective. By superimposing a route directly into their field of vision, even external service personnel can easily find the best way to get to where they’re needed. If the systems to be serviced are recorded as a 3D model, the technician can receive valuable information during maintenance, such as current measurement values, documents or instructions. This speeds up troubleshooting, and can help level the playing field when experienced staff are lacking. Combining the data goggles with speech recognition free up both hands. Looking further into the future, technicians will even be able to “talk” to certain components. 3D voice technology and headphones will allow them to get the information they need from the right direction.

Electronic noses

Back in the 19th century, coal miners took special safety lamps with them underground to protect against the dreaded mine explosions. Today, portable gauges provide added safety in a range of sectors. In supply and disposal, the coal and steel industry, or in production, these handy devices can detect a range of gases using electro-chemical and infra-red sensors, even in tiny concentrations. If the limits are exceeded, users are alerted with acoustic and visual warning signals. In the near future, this task could even be incorporated into protective clothing. New technology makes it possible to directly integrate super-thin sensor materials in the clothing as a kind of “electronic nose” to detect so-called volatile organic compounds (VOCs).
A 2014 drew to a close, the new technology centre for chemical development at Boehringer Ingelheim opened its doors, becoming the pharmaceutical company’s largest research and development facility worldwide. Playing their part were the new, highly secure Zero Clients from BARTEC.

**Faster time to market**

Thanks to its wide range of device technology, the highly flexible technology centre can cover a variety of chemical processes. The focus, however, is on the newly developed pharmaceutical substances. In order to bring these ‘new chemical entities’ (NCEs) to market as quickly as possible, the 2,700 m² technology centre houses a number of synthesis laboratories, in which the process transfer from the laboratory to mass production is managed. In complex pilot facilities, the NCEs are produced in batches of 10 to 100 kilograms for clinical trials.

**Safely visualising processes**

If the basic automation of the technology centre was largely comparable with real production, the automation of the pilot facility represented a greater engineering effort in view of the higher degree of freedom and flexibility. This was not the only reason why the project team placed particular value on cost-effectiveness during implementation. This was achieved using a range of perfectly intertwining innovations. One of these is the virtualisation of visualisation, a forward-thinking concept that grants advantages in flexibility, cost and space savings.

**The Zero Client solution**

Instead of a classic KVM system, the project team decided on a much more modern, but no less safe, HDMI solution – the POLARIS REMOTE ZeroClient from BARTEC. All the streamlined end devices have to do is depict the virtualised process control system running centrally in the server room and make it operable. Only the remote desktop protocol Microsoft RDP, the industry standard for remote access to Windows systems, is permitted for exchanging the screen, mouse, and keyboard codes required.

**Safety first**

As the Zero Clients do not offer any kind of data interface in hazardous areas, staff can use the visualisation solution exclusively for their own work. This form of data protection is reinforced by the enhanced write filter (EWF) of the Windows embedded operating system, which is activated as standard. It prevents any kind of physical write access to the system partition of the installed data medium, thus eliminating typical security risks such as abuse or virus infections.

**Benefits in operation**

The design, developed together by Boehringer Ingelheim and BARTEC, secures the process control system in compliance with all the rules of IT security, without unnecessarily tying up internal resources. This is because the ingenious system and client architecture removes the need for regular patching, reducing the total cost of ownership. As the actual intelligence of the Zero Client solution, i.e. the application, is outside the Ex area, the cost and workload of installation are also reduced. Any necessary maintenance can mostly be conducted outside hazardous areas. The devices themselves require virtually no configuration, and can be relocated quickly if necessary.

**A successful complete package**

The real coup that BARTEC has achieved with the POLARIS REMOTE ZeroClients, however, is the innovative complete package of individual components, each of which represent a new market benchmark. The hardware, certified for Ex zones 1 and 2, together with the RDP access protocol and modern HD touch screen in a range of formats, combine to form a unique visualisation solution. For users in the technology centre, this means a uniform look and feel to all the devices they work on, from the synthesis reactor and drying chamber to the hydrator or centrifuge.

**Flexible installation**

Boehringer Ingelheim operates 17 Zero Clients, several of which are integrated in the wall. Most of them, however, work as part of a mobile workstation based on an ergonomically designed stainless steel carriage. With the specification calling for a maximum outer dimension of 70 cm, the project team decided on a compact design with a 17.3 inch display. Safe touch operation of the system is still ensured, however, thanks to a zoom function integrated in the visualisation.

**Innovative and efficient**

On the hunt for a future-proof design for the new technology centre, BARTEC once again proved its value as a solutions partner to its long-term customer Boehringer Ingelheim. This intensive cooperation resulted in a Zero Client solution tailored precisely to the customer’s wishes. Given their low investment costs, high availability and flexibility, however, the POLARIS REMOTE ZeroClients may soon become the industry standard. ///
Remote control in hazardous areas: POLARIS REMOTE ZeroClients offer secure access to differently hosted applications.

In sectors like oil and gas, chemicals and pharmaceuticals, IT applications that are needed in hazardous areas are usually installed on individual PC or server systems and then provided remotely. So-called KVM solutions (keyboard, video, mouse) are the most common way of safely operating these applications remotely as they run in the safe area. They “extend” the connections for the keyboard, monitor and mouse from the host computer to form an ex-protected control and display terminal.

The problem with this classical KVM solution is that it only works as a 1:1 connection.

New generation of remote PCs
In modern IT systems, applications are provided either based on servers or via virtual PCs. In order to cover these highly cost-effective scenarios with the same level of safety, BARTEC has expanded its POLARIS REMOTE series of HMI devices with the so-called Zero Clients. These slim and sealed end devices have only one job: display the remote application safely and reliably across the network, and make it operable – regardless of whether it is running on a PC system, a physical server or in a virtual environment.

Sealed display terminal
Thanks to their comprehensive safety concept, the POLARIS REMOTE ZeroClients offer reliable protection against manipulations by users or third parties. The device remains invisible in the network, with the USB connections completely deactivated as data interfaces. By having the system strictly separated between administrator and user modes, the user can only use programs approved for their workstation and switch the device on or off.

Flexible
The complete Zero Client solution is certified for zones 1/2 and 21/22 according to both ATEX and IECEx standards. Zero Clients can also be easily integrated into a front panel.

Conclusion: double safety
By adding the Zero Clients to its POLARIS REMOTE HMI device range, BARTEC is taking the issue of remote control in hazardous areas to a new level with an impressive and doubly safe solution for data and explosion protection.
PRESTIGE PROJECT BY THE CASPIAN SEA

48,000 metres of heating cable, 40,000 metres of power and control cable. In a record time of just five months, BARTEC planned and completed the entire electrical trace heating for the Aktau bitumen plant in Kazakhstan.

Brought online in 2014, the petrochemicals plant in the port city of Aktau on the banks of the Caspian Sea is a showcase project for Kazakhstan’s continuing development. The plant takes heavy crude oil arriving via pipeline from Karasambas and turns it into a range of oil products, including 400,000 tons of valuable bitumen.

Heating technology from BARTEC

As bitumen only remains liquid and therefore conveyable at a certain storage temperature of up to +180 °C, electrical trace heating plays a vital role. In order to avoid both functional and economic risks, client CASPI Bitum called upon BARTEC’s team of experienced experts. The challenge was to complete this major project in just five months, from the engineering and supply, installation including power supply, cable routing and control, all the way to commissioning and documentation.

Superior trace heating

500 detailed technical drawings and 2,000 man-hours are evidence of the scale of the task that BARTEC successfully completed, as requested, in just five months. The team consisted of eight engineers, three logistics managers, four construction managers and 45 fitters, as well as a quality manager and safety officer assigned to each group. The components from BARTEC, which consume a total of 1.7 megawatts of power, are used in a wide range of areas. As well as in the production, storage and transport of the bitumen, these also include pumping stations, pipelines for crude oil and refined products, as well as the gas flare and loading stations for trucks and trains.

Ingenious solutions save costs

The BARTEC team used three different heating tapes and cables, depending on the requirements. Around the bitumen production area, they installed single-core heating cable with mineral insulation. This is particularly robust and therefore requires no additional protection. This solution also ensures constant power output per metre and is highly resistant against chemicals and stress corrosion. In order to provide frost protection for the eight kilometres of pipeline in the depot for light distillates and gas oils, as well as the pumping stations and diesel loading stations, BARTEC installed self-limiting parallel heating tapes that can be used without temperature limiters, even in hazardous areas. This also saves both material and costs, especially as the parallel power supply allows the heating tape to be conveniently cut to any required length.

The third and final type consists of the extremely flexible and equally resistant heating cables with polymer insulation. They allow heating circuits of over a kilometre in length to be constructed, meaning the project team was able to save around 60 kilometres of supply and control cable on the main line compared to original estimates.

Outstanding performance

For the new bitumen plant in Aktau, BARTEC planned and installed trace heating solutions with a total length of 48 kilometres. On top of this came 600 Ex e terminals, 16 control cabinets and 40 kilometres of power supply and control cable. The successful realisation of this project allowed the world market leader in explosion protection to once again prove its expertise and ability to meet the most diverse requirements of the global markets. //
Interview: Hans-Peter Riegler /// Photos: Markus Hintzen

**AN OPEN ORGANISER**

Better safe than sorry. BARTEC’s new Chief Compliance Officer Marc Waeber aims to create a new system based on preventative recommendations. As a trusted advisor, he wants to support his colleagues and raise awareness of liability risks.

What exactly does a compliance officer do? Ask people on the street and you won’t get many answers. One person who should know is Marc Waeber, Director of Corporate Compliance & Legal Affairs at BARTEC.

Anyone who bumps into this giant of a man beneath the hexagonal glass ceiling at the company headquarters in Bad Mergentheim will quickly realise that compliance is a matter of authority. After all, this is a serious issue. Compliance means acting within the rules that govern our actions every day and avoiding risks for the business and its components. These rules can either be externally imposed by laws and specifications, or defined internally through programmes, procedures and inspections.

Marc Waeber’s job is to draft joint rules and the associated processes with the aim of systematically preventing, detecting or sanctioning any breaches. These rules help ensure legally compliant and ethically correct behaviour. According to Waeber, most decisions of greater or lesser difficulty in everyday business life can be made correctly by honestly answering four questions.

Are my actions in the interest of BARTEC?
Are they in line with the company values?
Are they legally and ethically justifiable?
And last of all, am I prepared to assume responsibility for my actions in public?

When you listen to Waeber speak, you believe straight away that he lives by these rules. But the thing that particularly excites him about his role is something else. Waeber, who lives in Munich and is a passionate skier, wants to establish a values-based compliance management system adapted precisely to the structure of the BARTEC Group. This system aims to have both the right preventative, policing and sanctioning measures (“guard rails”) and the required room for manoeuvre for business operations.

Waeber, who also enjoys spending his free time in the mountains, sympathises with those members of staff who initially react sceptically for fear of more management or bureaucracy. But instead of thick rule-books, he emphasises the role of an internal service provider. As a trusted advisor, he wants to above all work preventively, acting as both an open ear for his colleagues as well as a clear communicator. “I want my colleagues at BARTEC to come to me at the right time, ideally before things lead to legal complications,” says Waeber looking to the future.

In his dual function as Director of Corporate Compliance & Legal Affairs, Marc Waeber is also responsible for the legal department. Here, he helps in preparing and processing contract negotiations, cooperations and acquisitions. Waeber grew up in Ghana, Turkey and Indonesia, and this international inclination has given him a degree of specialist expertise for both sides of his job. After graduating with a joint degree in law and business administration, he worked in consulting and industrial positions at companies like PricewaterhouseCoopers, Siemens, MAN and FERROSTAAL.

With his deep understanding of processes, Marc Waeber hopes that his work will make a contribution to increasing the value of the company and lead to healthy, sustainable growth. Above all, this requires consistency, and the man in the blue suit has his own way of describing this: “As a person, I never start stopping and I never stop starting.”

"I WANT MY COLLEAGUES AT BARTEC TO COME TO ME AT THE RIGHT TIME, IDEALLY BEFORE THINGS LEAD TO LEGAL COMPLICATIONS."
As ACHEMA, the world’s leading trade fair for the chemical industry, approaches, Christian Bünger from the German Chemical Industry Association (VCI) speaks to BARTEC INSIGHT about the future of the sector.

Interview: Hans-Peter Bayerl /// Photo: Hans F. Daniel

Mr Bünger, at the VCI, you work in economics and accompanied the future study “Chemistry 2030”. Which developments do you see influencing the sector in fifteen years’ time?

Overall, we are observing six megatrends. These include the varying demographic developments in advanced, developing and emerging economies, as well as aspects concerning globalisation and world trade. On top of this, we look at resource scarcity, technology and innovation, and the environment and climate protection. Factors that limit growth, such as high public debt levels in Europe or poor infrastructure in India, are also important.

What do these trends mean for the individual regions?

In our prognosis to the year 2030, we assume that despite unfavourable conditions, the global economy will be able to regain the growth levels of three per cent that we saw before the financial crisis, as emerging economies grow much more dynamically than advanced ones. The USA will also have to give up market share, whilst western Europe and Japan will lose market share to developing and emerging economies, particularly China. We assume that China’s contribution to growth will grow significantly. In the textile industry, we believe this will be at around 80 per cent by the year 2030, and 61 per cent in the chemical industry. This dynamism will lead to China expanding its share of global chemicals production from 29 to 47.1 per cent. Europe (not including Germany) will lose eight per cent, but will remain the second-largest force with 16.5 per cent. They are followed by the USA with 12.1 per cent and Japan with 7.4 per cent, both suffering losses of around three per cent. Germany’s share of global chemicals production will fall from 5.6 to 3.4 per cent.

Resources are becoming scarcer, and China is lagging when it comes to climate change and environmental protection. What are the impulses coming from these factors?

Our efforts to develop shale gas and deep-sea deposits do not change the fact that raw materials will become scarcer and therefore more expensive in the coming years. But these new production options do relieve the upward pressure on oil prices, which European economies can also benefit from. Fortunately, more value is being placed around the world on climate change and environmental production. Whilst China is still undertaking relatively small steps, the German chemical sector has been able to reduce absolute greenhouse gas emissions by 49 per cent since 1990, whilst increasing production by 60 per cent. But there is not much more room for improvement here. At the same time though, environmental and climate protection also offers opportunities for new products, such as insulation materials or high-performance lubricants for wind turbines.

What is the key for individual players to still be internationally competitive in 2030?

For the traditional advanced economies, innovations are particularly important. As well as the move towards specialisation, greater material and energy efficiency are required. Further potential lies in the continuing processes of automation and digitalisation. Globalisation can also bring a number of benefits for certain regions, particularly if it succeeds in removing trade barriers through bi-lateral or preferably multi-lateral agreements. Infrastructure improvements, such as the construction of roads, bridges, pipelines, deep-sea ports or LNG terminals are also needed, especially in Germany. Last but not least, we need politicians to confront bureaucratic barriers, for example through more efficient regulation within the EU. This also applies, however, to emerging economies like India. There is great potential here in internal trade.

One more question: what does this future scenario mean for a manufacturer of explosion protection equipment like BARTEC?

Demand for these products will of course rise with the growth of the global chemical industry. If you take a quick look at the company’s product portfolio, you will see market opportunities – for example in plant safety, remote maintenance or mobile data access. This kind of specialisation, combined with innovative solutions, will always be of benefit to the chemical sector. ///

"Thank you for speaking to us.

CHRISTIAN BÜNGER, VCI: "ASIA WILL BECOME MORE IMPORTANT."
What a coincidence!
Although they were the result of serious research, many everyday products were discovered completely by accident. In the late 1930’s for example, Roy J. Plunkett was trying to come up with a new coolant. The frugal chemist ordered more or less 50 gas bottles with tetrafluoroethylene (TFE), in order to later mix it with hydrochloric acid. One of the containers was stored for so long, the TFE polymerised itself. Plunkett became the father of the non-stick film Teflon.

Another accidental discovery came a hundred years earlier. In 1839, a piece of rubber mixed with sulphur accidentally landed on a hot stove. The smelly blob changed from being brittle to elastic and the man behind it – Charles Nelson Goodyear – went down in history as the inventor of the rubber tyre.

A load of hot air
A product that was patented in England in 1900 proved to be strange, but unsuccessful. The so-called “fire closet” aimed to turn human waste immediately into ashes. This sterile disposal method created fertiliser. Despite interest from a number of hospitals, the fiery toilet failed to succeed commercially due to its high investment and operating costs.

Still light years away from a patent is one of the greatest flops in the history of chemistry. In the late 1980’s, the idea of starting a nuclear fusion through a simple chemical process, and thus creating a virtually inexhaustible source of energy, seemed so appealing that many scientists really believed in “cold fusion”. Some still believe to this day …

Would you have known?
“Dad, you’ll never believe it,” an excited eleven-year-old tells his parents. “Today the whole school was cleaned with something called dihydrogen monoxide. I heard that this stuff causes acid rain and the greenhouse effect. Isn’t it dangerous?” After a concerned phone call to the headteacher, this seemingly irresponsible action was explained. Dihydrogen monoxide, also known as DHM, hydrogen hydroxide, hydroxylic acid or dihydrogen ether, is no risk to health, but rather a chemically correct designation for H₂O – plain old water. ///
BARTEC

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