

No. 16 Issue 02 | September 2015

**MESSER**   
Gases for Life

# Gases for Life

The industrial gases magazine

Gases in science and research

## No progress without gases

Welding and cutting:  
Focus on Cylinder

Food-grade quality:  
Pure bubbles

Transport refrigeration:  
Without noise  
or exhaust gases



## Dear Readers,

If you don't go forwards, you go backwards – this statement is as valid today as it ever was. Across the globe, existing solutions are being put to the test, optimisation potential sought and results analysed. In short, research is being done.

The fact that this research involves the use of a wide range of "Gases for Life" may come as no surprise to you. But would you have thought that they'd also play a role in researching the "primeval soup" that came into being just after the big bang? Or in the question of how long harmful substances remain in the biological cycle? You can read more about these and other interesting areas of research in our cover story.

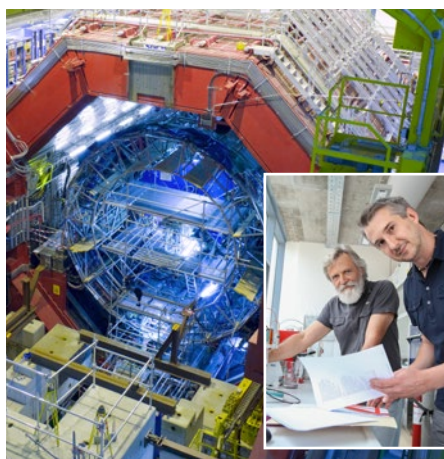
I'd also like to draw your attention to our new "Focus on Cylinder" section. It features practical examples showing the degree of Messer's engagement in the area of cylinder gases, all with a view to optimally supporting customers and users in their work.

I hope you find this issue of Gases for Life an interesting and enjoyable read.

Best wishes,

Stefan Messer





## Cover Story

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## No progress without gases

**Cover photo:**  
Asim Herceg (left),  
head of the appli-  
cation technology  
department, and  
project manager  
Primož Urek of  
Messer in Slovenia

The work of researchers from a wide range of disciplines is geared towards gaining an ever better understanding of our world and broadening the scope for human action. They are helped in this quest by helium, which cools the high-performance magnets used in particle accelerators; by cryogenic nitrogen, which facilitates the long-term storage of environmental samples; and by oxygen, which helps make chemical conversion processes more efficient.



## Practical Focus

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## Pure bubbles

Carbonated beverages put fizz in your glass and a tingle on your tongue – pure pleasure. But only if the carbon dioxide that is used comes from a reliable source. The Slovakian gases association – on the initiative of Messer – launched a campaign to protect consumers from contaminated products.



## Using Gases

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## Refrigerated transport without noise or exhaust gases

Cooling plates can only store a relatively small amount of cold and need to be precooled. Refrigerating compressors generate exhaust gases and noise. The alternative is transport refrigeration with cryogenic gases, for which Messer has developed a whole range of individual technologies.

### Good for you and the environment

**This magazine** not only brings you interesting articles and interviews – it is also kind to the environment. "Gases for Life" is printed on 100% recycled paper.



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For long-term storage of our magazine, request the free "Gases for Life" slipcase.

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## China: CO<sub>2</sub> for wastewater neutralisation



## Ecologically dyed

At the beginning of the year, Messer in China commissioned its first carbon dioxide production facility. It uses the waste gas generated by Sichuan Meifeng, a chemical company in Mianyang, as a raw material and is designed for an annual output of 10,000 tonnes. Mianyang Ganlion Printing & Dyeing has been acquired as one of the first customers for the purified carbon dioxide. The company is the largest manufacturer of camouflage fabrics in southwest

China. The process of dyeing the textile material involves the production of alkaline wastewater, which was previously neutralised with sulphuric or hydrochloric acid. Neutralisation with CO<sub>2</sub> eliminates the risks associated with handling these hazardous substances and is kind to the environment. The customer has reported improved wastewater quality and more precise pH control with the new method.

*Jasmine Yan, Messer China*

## Germany: New specialty gases brochures

## Great variety

Messer has completely revised and redesigned its specialty gases brochures. Amongst others, this product group includes noble gases and high purity gases. Their uses are extremely varied. For example, liquid helium is used to cool superconducting magnets; in analytical processes, high-purity gases are used as carrier and process gases; special gas mixtures are used to calibrate analytical equipment; high-quality insulating glass panes are filled with krypton and halogen lamps with krypton-xenon mixtures.

The new brochures on all these topics are available at [messergroup.com](http://messergroup.com) Info & Download or [specialtygases.messergroup.com](http://specialtygases.messergroup.com).

*Marlen Schäfer, Messer Group*

## Slovenia: CO<sub>2</sub> for cooling water neutralisation

## Corrosion prevention without risk

At German family owned company Knauf Insulation's production site in the Slovenian town of Škofja Loka, Messer has converted neutralisation of the cooling water from sulphuric acid to carbon dioxide. At this facility, Knauf produces rock wool for heat insulation. The furnaces for melting the mineral raw material are fitted with a water cooling system. The pH of the cooling water increases during the process and has to be lowered again on a regular basis. Previously this was done with sulphuric acid, which, as a hazardous substance, presents a risk to employees and the environment. CO<sub>2</sub> neutralisation has facilitated a significant

improvement in the quality of the cooling water.

*Izidor Gostinčar, Messer Slovenia*



## Hungary: Gases for heat treatment

## Clutches for the world

LuK Savaria, the auto parts manufacturer, has installed a new methanol and ammonia supply system at its site in Szombathely. The gases are being supplied by Messer in Hungary. They are used to heat-treat disc springs for clutches. Messer is also supplying nitrogen for explosion protection: the gas creates an inert atmosphere inside the heating furnaces. LuK Savaria is part of the Schaeffler Group, a leading international automotive and industrial supplier. One in three new cars worldwide is fitted with a LuK clutch.

*Lilla Németh, Messer Hungarogáz*





© David Bormans / Mons 2015

Belgium: Balloon gas for opening ceremony

## Light, fire and heat

The Belgian city of Mons is European Capital of Culture this year, along with Plzeň in the Czech Republic. At the opening ceremony in January, countless balloons filled with helium from Messer were released into the sky to in keeping with the event's motto of "light, fire and heat". Messer is supplying the balloon gas to the Walloon city throughout the year of culture, during which a total of over 300 events are planned. The town, which was founded in Roman times and lies to the southwest of Brussels, is also home to the supreme headquarters of NATO in Europe (SHAPE).

*Marina De Ridder, Messer Belgium*

Bosnia-Herzegovina: Inerting of gas pipes

## Blast furnace overhaul

Last October, within a very short space of time, Messer in Bosnia-Herzegovina delivered six tanker-loads of liquid nitrogen for the inerting of gas pipes at the ArcelorMittal steelworks in Zenica. The 6,500 cubic metre pipe system which supplies the blast furnace needed a general overhaul after 30 years of operation. Safe working on the pipes was made possible by flooding them with nitrogen, thereby displacing natural gas and atmospheric oxygen and creating an inert atmosphere. In cooperation with Dutch company Pipeline and Refinery Services International (PRS), Messer completed the risky purging job without incident. Even though the Messer tankers were in use at ArcelorMittal for three whole days, all nitrogen customers were supplied on time. This was organised by Serbian affiliate Messer Tehnogas.

*Maja Softic, Messer BH Gas*

## Dates + Facts

**14 April 2015**

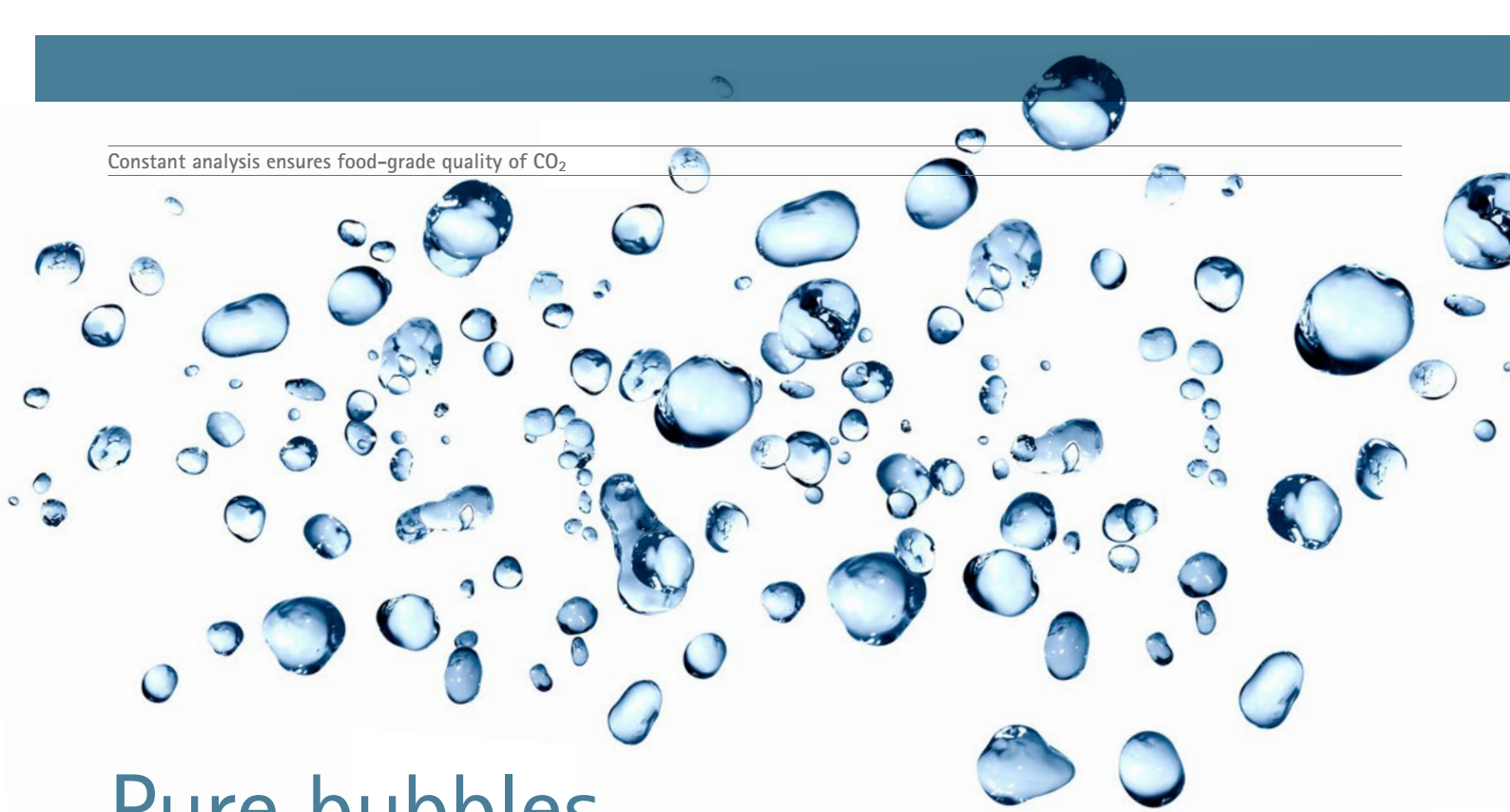
AmpaCity qualifies as KlimaExpo.NRW project: World's longest superconducting cable (RWE Deutschland AG), cooled by Messer system, included in list of qualified KlimaExpo.NRW projects. Certificate presented in April in Essen.

**15-17 September 2015**

DVS Expo 2015: Große Schweißtechnische Tagung (GST) welding conference, in Nuremberg. Presentation by Dr. Dirk Kampffmeyer (Messer) on new ternary mixtures (triple savers). Messer to have own stand at company exhibition.

**14-16 October 2015**

Kunibiki Messe in Matsue (Japan): Organiser: Japanese Cryogenics and Superconductivity Society (CSSJ). International workshop on cooling systems for superconductor applications. Presentation by Dr. Friedhelm Herzog (Messer) on 16 October, Topic: Successes to date AmpaCity Project.



# Pure bubbles

The fizz in cola and lemonade is produced by carbon dioxide. The gas is dissolved in the beverage, producing sparkling bubbles in the glass and a tingling sensation on the tongue – pure pleasure, since it is calorie-free and completely safe. At least if it comes from a reliable, certified food gas source. However, this can't always be taken entirely for granted, as experience in Slovakia has shown, where carbon dioxide without food certification came into circulation. This led to the Slovakian gases association – on the initiative of market leader Messer – launching the “čisté bublinky” (pure bubbles) campaign to protect consumers from contaminated products.

**C**arbon dioxide can be obtained from very different sources. It is produced as a waste gas in any combustion process and many chemical processes. This gas can be collected and the CO<sub>2</sub> separated from the other components. But there are also natural sources of volcanic origin or from natural gas fields. The purity of the raw CO<sub>2</sub> varies, depending on its origin; it may contain greater or lesser amounts of sulphur, steam, hydrocarbons and other gases.

## Every step documented

The CO<sub>2</sub> which Messer delivers in Slovakia comes from a natural source in Ölb, in neighbouring Hungary. There the crude gas is collected in a tank, the contents of which are subject to continuous analysis. Molecular sieves and distillation processes are used to purify the carbon dioxide before it is analysed again and conducted to a second tank, from which the tankers are filled. This is followed by repeated analysis steps, explains Jana Némethová, Quality Manager at Messer in Slovakia: “The contents of the tankers – there is always some residual gas in the tanks – are analysed before and after filling. And this is repeated when the gas is trans-

ferred into the storage tanks at Messer and from there into the cylinders. Each charge is checked thoroughly, each process properly documented in accordance with the requirements of European and national food regulations.” Handling of the cylinders is also subject to strict rules as they are classified in this instance as food vessels. One of the factors which drew attention to the use of uncertified CO<sub>2</sub> in Slovakia was that some of it was sold in old fire extinguisher cylinders.

## Extensive analyses

The degree of the effort undertaken by Messer in its analyses of the food gas can be illustrated by the new equipment that has been installed at its facility in the French village of Lacq. Here the CO<sub>2</sub> is obtained from the fermentation of maize for bioethanol production. The Messer laboratory recently received a whole range of analysers which facilitate identification of, among other things, the following impurities in the CO<sub>2</sub>: traces of steam and oxygen, nitrogen oxides, hydrocarbons, acetaldehyde, ammonia, methanol and carbon monoxide.





## Medusa

The Medusa Group was founded in 2003. It runs over 40 restaurants and catering facilities in Slovakia as well as Prague and Vienna. The group runs eight cafeterias and a VIP restaurant at Volkswagen's Slovakian sites. A large number of Medusa's restaurants and beer clubs can be found in the old part of Bratislava, where delivery is only permitted before nine in the morning – a logistical challenge which gases supplier Messer is mastering without any problems.



Due to the large gas requirements, customers are often supplied with tankers, and the cryogenic liquid CO<sub>2</sub> is stored on site in tanks.

A separate analyser checks taste and odour. The analysis methods range from gas chromatography to UV luminescence. "Such analyses allow us to ensure that in fact only 'ňsté bublinky', i.e. completely pure CO<sub>2</sub> bubbles, end up sparkling in the consumer's glass," Jana Némethová emphasises. "Incidentally, the campaign of the same name in Slovakia has been a great success. The buyers in the catering trade have understood that the CO<sub>2</sub> is a food gas and may therefore only be used with the appropriate certificate. The campaign also brought us into contact with the Medusa catering chain, which is now one of our customers."

*Jana Némethová and Erika Hergottová, Messer Tatragas*



## Further information: Jana Némethová

Food Gases Expert for Medical and Food Gases Messer Tatragas  
Phone: +421 (2) 50254213  
[jana.nemethova@messergroup.com](mailto:jana.nemethova@messergroup.com)



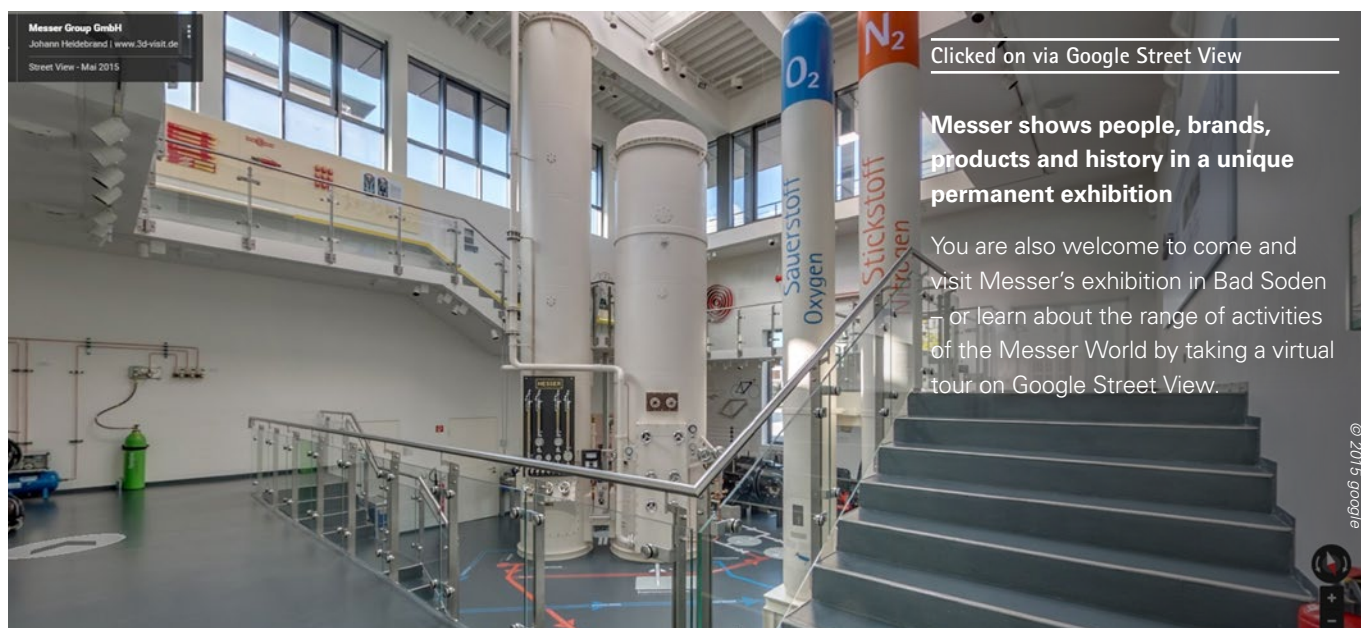


**B**osal is a supplier of complete exhaust systems for all leading car manufacturers. Messer supplies Bosal with gases at a total of five locations in four European countries. The parent plant in the Belgian town of Oevel receives liquid gases for welding and cutting; the research and development centre in Lummen, also in Belgium, is supplied with shielding gas mixtures

produced specially for Bosal. These are tailored to the customer's requirements and are used for new developments and pre-production series. The Bosal plants in Spain, the Netherlands and the Czech Republic are also supplied by Messer. The plant in the Spanish city of Zaragoza manufactures exhaust systems for cars and trucks. Liquid argon and CO<sub>2</sub> bundles are used there for

aluminium welding. The plant originally came into being purely as a supplier to Opel España, which has production facilities close by. Now the Zaragoza plant also serves other customers. Messer helps Bosal find the optimal gas mixtures for its welding processes. The two companies are currently discussing the possibility of expanding their cooperation to the sites in China.

*Marion Riedel, Messer Ibérica, and Kurt De Boeck, Messer Belgium*





# People Focus

## 6 questions for

Johann Ringhofer

Germany/France:

Cold test facility for the ITER fusion reactor

### Ultra-cold for extreme heat

Nuclear fusion allows energy to be generated without producing greenhouse gases or having to dispose of radioactive waste. Working on this principle, the world's first nuclear fusion reactor, ITER, is being built in Cadarache, France, as part of a major international project and will produce more energy than it consumes. The aim is to create a virtually inexhaustible source of low-emission energy which does not leave any dangerous waste. The reactor's superconducting solenoids have to be tested at low temperatures before being installed. For this purpose, Messer developed a liquid nitrogen cooling facility, which involves the refrigeration temperature being regulated with a patented process based on the nitrogen's evaporating pressure. This also makes it possible to achieve temperatures below nitrogen's boiling point of minus 196 degrees Celsius, thus facilitating cooling to minus 209 degrees Celsius. A further reduction in temperature is not possible since nitrogen freezes at minus 210 degrees Celsius.

*Dr. Friedhelm Herzog, Messer Group,  
and Thomas Kutz, Messer Industriegase*



Credit © ITER Organization, 2011

The cryostat, inside which the solenoids are installed, measures almost 29.3 metres in height and 28.6 metres in width, making it one of the largest ITER components.



Johann Ringhofer began his career in 1979 at Messer in Austria, where he started out as an application engineer. Following 16 years at Messer Hungarogáz in Hungary, including as Managing Director and Regional Director Southeastern Europe, he moved to Germany in 2009, joining the management of the Messer Group. There he has responsibility for Engineering and Production.

#### 1. A working day is perfect ...

... when it starts with a good breakfast, your inbox isn't too full and your colleagues are cheerful and motivated. Getting some positive news about our company or the progress of our investment projects brightens up my day, especially if I can make a contribution towards decisions that move the Messer Group forward. The perfect working day is complete if I have successfully finished all my tasks by the evening and can focus on enjoying my evening meal around 8 o'clock.

#### 2. What I absolutely need for my job are ...

... above all know-how and experience in both technical and business management matters, coupled with a knowledge of human nature, team spirit and good networking.

#### 3. A novel/film which I can recommend without reservation is ...

... Ken Follett's trilogy "Fall of Giants – Winter of the World – Edge of Eternity", a thrilling novel covering the historic world events of the 20th century in about 3,000 pages.

#### 4. I can get irritated by ...

... injustice, ignorance and some public policy developments.

#### 5. I can get excited about ...

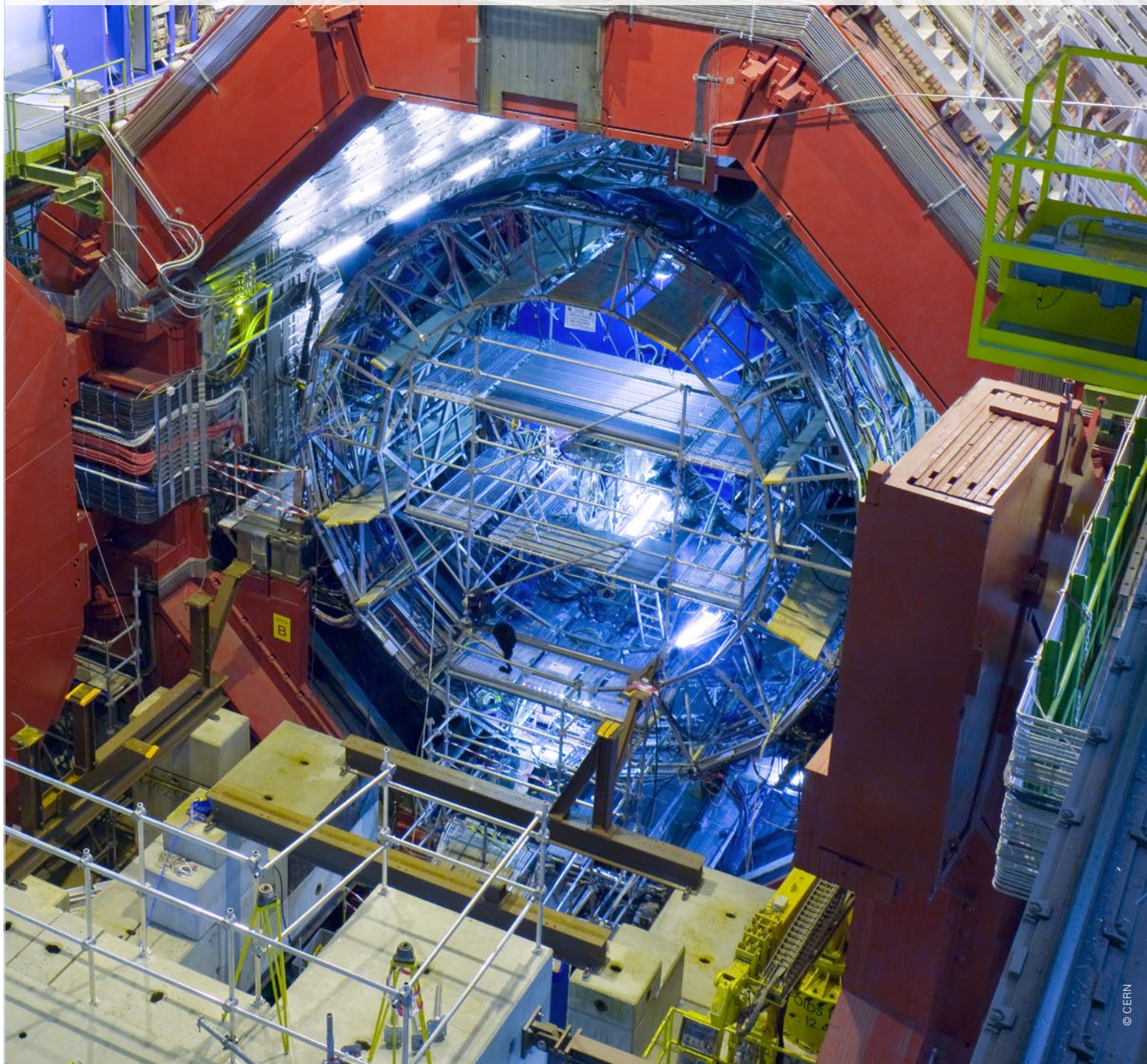
... technical innovations of any kind, particularly those that concern our business, special achievements in technology, science and sport, as well as snowboarding, mountain biking, diving, trekking tours and travel.

#### 6. My wish for the future ...

... is that through our work at Messer Group, we can make a small contribution towards protecting our environment in a sustainable way and keeping it healthy and viable for future generations. Personally, I would like to be able to pursue this development in good health for many years to come, catch up on some things I've missed out on in the past, and spend more time with family as well as doing sport and travelling.



# No Progress without Gases



© CERN

ALICE collides the nuclei of lead atoms, producing temperatures that are much higher than those inside the sun. The aim is to reproduce the primeval soup that came into being just after the big bang.



What actually holds our world together at its core? How do drugs get into the food chain? How can you neutralise them before they do so? How do you detect small and very small quantities of matter in the first place? These are just a few of the questions which scientists consider every day. Researchers from a broad range of disciplines use a variety of methods to gain an ever better understanding of the material world and extend the scope of human action. Gases very often play an important role in this process, as our brief survey of the world of research shows.

## ALICE and the forces of the universe

Physicists obviously have a penchant for catchy acronyms: their ALICE stands for "A Large Ion Collider Experiment". This facility is part of the CERN nuclear research centre in Geneva. ALICE collides the nuclei of lead atoms, producing temperatures that are several hundred thousand times higher than those inside the sun. The aim is to research the "primeval soup" just after the big bang. The researchers hope that their experiments will provide them with deep insights into the fundamental forces and elements of the universe.

Gas electron multiplier (GEM) detectors, along with others, are used to observe the primordial particles. The detectors guide freely moving particles through a perforated foil and into a strong electric field. In so doing, they produce an avalanche of electrons which can be "collected"

and analysed. ALICE is presently undergoing a general overhaul and being fitted with new detectors. Some of these are being built at the Romanian nuclear research centre in Magurele. Messer installed a specialty gases supply system there at the beginning of 2015. It supplies the researchers with nitrogen, synthetic air, carbon dioxide and argon. The gases are used to produce the foils and test the detectors. Since nuclear physics involves maximum precision with the tiniest of particles, the purity standards for the gases are particularly high. When the tests have been completed, the detectors will be transported to Geneva in an inert, dry nitrogen atmosphere to ensure that they are still in proper working order when they arrive. Incidentally, one of the suppliers of the helium used to cool the high-performance magnets in the large particle accelerator at CERN is Messer in Switzerland.

*Continued on page 12 →*



Helium is just one of many "Gases for Life" that Messer supplies to the CERN nuclear research centre.



Continued from page 11 →

### Time capsules for environmental protection

Ecology is also a question of time: how long do harmful substances remain in the biological cycle? How long do new environmental protection rules and procedures take to have an effect? In order to find answers to these questions, it's very useful to be able to look back into the past. Which is why the Fraunhofer Institute for Molecular Biology and Applied Ecology IME collects and stores samples from all over Germany on behalf of the German Federal Environmental Agency. The Environmental Specimen Bank is located in Schmallenberg, in the Hochsauerland region, and its collections date back to the 1980s. The samples were taken from typical ecosystems found in the country and represent different levels of the food chain. For the marine environment, for example, bladder wrack, mussels, fishes and birds' eggs are collected. Information on the types of samples and the results of the analyses can be found at [www.umweltprobenbank.de](http://www.umweltprobenbank.de).

"We currently hold about 2,100 homogenates from particular years in our 60 cryostorage tanks," explains Dr. Heinz Rüdél, Head of the Environmental Specimen Bank. "To take one example, that includes the fillets of 20 fishes from a particular section of river from the same year. They are pulverised in a cryogenic mill and mixed to produce a homogeneous mass. This is then divided into 200 individual samples, giving us an adequate supply for retrospective analyses for many decades to come."

To ensure that the samples remain unchanged over a long period of time, their storage temperature must be below minus

The flesh of mussels and fish is cryogenically ground and archived in the Environmental Specimen Bank for research purposes.

130 degrees Celsius. Below this glass transition temperature of water, ice crystals are no longer formed. The actual storage temperature of minus 150 degrees is ensured by a constant supply of liquid nitrogen. In the process, it is vital that the gas supply in Schmallenberg is never interrupted and that the institute's storage tank is always full. It is also necessary to ensure that the gas is grade 5.0 high-purity nitrogen. "The gas comes into direct contact with the samples, so any impurities would accumulate in the containers, with a potentially adverse effect on the samples. This is effectively prevented by the high degree of purity," Dr. Rüdél points out.

### Precision with very small samples

The quantity of samples available for clinical examinations is generally very small. Thanks to research done by Friderik Pregl, doctors were able to carry out precise chemical analyses of very small samples for the first time. Pregl, a medical chemist from Ljubljana, received the 1923 Nobel Prize for Chemistry for his work in this field. Today, a research centre at the National Institute for Chemistry in the Slovenian capital is named after him: it recently had a gas supply system installed by Messer in Slovenia. The system of pipes is two kilometres long and provides the institute staff with some 300 tapping points for argon, nitrogen, oxygen and helium as well as synthetic and compressed air. The uses to which the gases are put include purging, drying, cooling, inerting and the creation of defined atmospheres. They are essential for working with the most expensive piece of research equipment in Slovenia, the transmis-



sion electron microscope, with which the individual atoms of nanomaterials can be made visible. Liquid nitrogen is used to optimise the vacuum in the device and cool the samples.

## Rendering residues harmless

Residues of the painkiller ibuprofen and the blood-fat-lowering drug clofibric acid are deemed to be harmful to the environment. They are widespread and pollute the sewage and waste water. How to dispose of such substances is one of the main areas of research undertaken by the Group of Heterogenous Catalysis from Chemical Engineering Department at Rovira i Virgili University in the Spanish city of Tarragona. "We have found processes to render both substances largely harmless," explains Prof. Sandra Contreras Iglesias. "Such processes always involve converting the organic components to carbon dioxide, water and other inorganic components. Photocatalysis has proved suitable for ibuprofen, and catalytic ozonation for clofibric acid."

Photocatalysis involves light (photons) and a catalyst acting together to bring about the chemical conversion process. While this also works without gases, the addition of oxygen makes the process much more efficient. Ozonation involves

using the highly reactive oxygen molecule ozone ( $O_3$ ) to break down the bond of the pollutant molecules. The researchers in Tarragona obtain the ozone from oxygen. Another project also involves the development of a photocatalytic process to remove nitrates from drinking water. These salts pollute the ground water and drinking water primarily in regions with intensive agriculture. Here the efficiency of the purification process is boosted by the addition of hydrogen. Further projects run by the faculty require other gases such as argon, nitrogen or helium as well as synthetic air. The faculty gets the gases from Messer in Spain.

*Editorial Team*



The applications of analytical processes are extremely diverse, including, for example, engine testing in the automotive industry and process control in the chemical and pharmaceutical industry, in medicine, metallurgy and environmental monitoring. Such methods are used everywhere for process control, quality assurance or in proving compliance with statutory regulations.



## Without noise or exhaust gases

Refrigerated transport without noise or exhaust gases: many foodstuffs, biological samples and some pharmaceutical products are preserved using low temperatures. It is essential that the cold chain is never broken, even during transportation. Transport refrigeration with cryogenic gases is not only very reliable but also particularly efficient, flexible and environmentally friendly. Messer has developed a whole range of transport refrigeration technologies for the most diverse requirements.

Conventional transport refrigeration has a number of disadvantages. Cooling plates can only store a relatively small amount of cold. They need to be precooled over a longer period of time, hardly making them suitable for reacting to fluctuating demand. While cooling units produce the low temperatures themselves, their compressors generate exhaust gases and noise. If the doors of the refrigerated truck are opened frequently, the cooling effect of both methods quickly reaches physical limits. Cryogenic processes, which make use of the low temperatures of liquid nitrogen or CO<sub>2</sub>, have none of these disadvantages.

### Truck refrigeration without noise or exhaust gases

ECOLIN uses a nitrogen tank and a system of cooling tubes to turn the truck's entire container into a cold box. Before starting a journey, the tank is filled with cryogenic nitrogen, which provides a precisely metered cooling input to the box via the sys-

tem of tubes. The system can compensate for temperature fluctuations caused by opening the doors with virtually no delay. "As it does not need any compressors, ECOLIN is very quiet and easy to maintain," stresses Messer specialist Frank Gockel. "Its environmental footprint is another positive aspect – compared with a conventional refrigerated truck, CO<sub>2</sub> emissions are reduced by some 20 tonnes a year."

### Wheeled all the way to the refrigerated section

On a smaller scale, there are the Siber containers on castors, which are transported in conventional trucks without cooling equipment. They have a reservoir for dry ice at a temperature of minus 78 degrees. It is produced in the reservoir itself by filling it with highly pressurised liquid carbon dioxide, which partially freezes to form snow when it expands. Either chilled or frozen products can be trans-





The filling of the CRYO2PACK system's bags consists of dry ice snow, which is produced from liquid CO<sub>2</sub>.

ported, as required, in the same Siber box – all the way to the refrigerated or frozen section in shops and supermarkets. The low temperatures are maintained for up to 24 hours. In addition to their refrigerated compartment, Snowline containers have another compartment for heating up ready meals. They are used primarily to convey cold and hot food from hospital kitchens to the wards. "You can calculate exactly how much dry ice is required for a particular route," explains Frank Gockel, adding that "the CO<sub>2</sub> can be precisely metered, enabling us to achieve maximum energy efficiency. Precise documentation of the refrigeration process is also possible."

#### Low temperatures at the touch of a button

The CRYO2PACK system for portable cold boxes allows you to make your own cooling elements in a matter of seconds as and when required: liquid CO<sub>2</sub> is conducted through a special nozzle. The gas expands and turns into dry ice snow, which is collected in a plastic bag. The dry ice bag is then added to the chilled products in the transportation box. "For smaller product quantities, this is an incomparably flexible and cost-effective solution," explains Frank Gockel. "The system is easy to use, and you can touch the filled bag without protective gloves for a short time. If temperatures below minus 40 degrees are required for pharmaceutical or biological products, then this is not a problem either." The "snow centre" technology allows small quantities of dry ice snow to be produced without bags: the CO<sub>2</sub> is injected into the snow centre container through a nozzle in the lid. The dry ice that is formed in there can then be added to the transport boxes with the chilled products in the required amount by hand.

*Dejan Šibila, Messer Slovenija*

Siber containers on wheels facilitate a flexible combination of refrigerated and frozen logistics.

#### Tuš uses Siber and CRYO2PACK

Tuš is one of the leading companies in Slovenia's food sector. The group operates shopping centres, supermarkets, catering services, bars and restaurants throughout the country. In order to keep refrigerated sections supplied, the company has been relying on the Siber system since 2006. This year, Tuš has started using CRYO2PACK to supply small quantities of chilled products. The cost saving that this delivers in comparison with using purchased dry ice pellets is considerable.







## Heinz and Rolf Schages

Managing Directors of Schages GmbH & Co. KG, CNC Lasertechnik, in Krefeld, Germany



Heinz Schages



Rolf Schages

### What does "family business" mean at Schages?

*Heinz Schages:* The company was founded by our father in 1956. My brother Rolf and I took over management of the business from him. That makes us a second-generation family firm. The third generation is now on board too.

### What does your company do?

*Rolf Schages:* We specialise in laser cutting and are able, for example, to process a working surface of 3 by 12 metres without re-positioning. This allows us to work with great precision and efficiency, even when dealing with oversized dimensions. We cut pipes up to 370 millimetres in diameter and, again, 12 metres in length. We also do angle and bevel cutting.

### What are your most important projects?

*Heinz Schages:* We receive orders from every sector that requires the particularly high quality provided by laser cutting, such as for complex supporting structures in the area of metal constructions, in electrical engineering or mechanical engineering.

### What material and which gases do you use?

*Rolf Schages:* We machine alloyed and plain steel, aluminium, titanium, copper and brass. We use nitrogen, CO<sub>2</sub> and helium as process gases for the lasers, and oxygen 3.5 – Oxycut – and nitrogen 5.0 – Nitrocut – as cutting gases.

### What is your relationship with Messer?

*Rolf Schages:* We bought our first laser cutting machine from Messer in 1988, directly from the laboratory where it had been developed as a pilot facility. When the optimal purity grades of gases had to be determined for laser cutting 25 years ago, we carried out the practical tests for Messer, making us co-developers of the Oxycut and Nitrocut gases. Our results subsequently became the industry standard. We were very pleased when Messer returned to the German industrial gases market.

### What are your most important quality criteria for cutting?

*Heinz Schages:* The quality of the cut and the surface finish are the top priority for us.

### What do you expect from your gas supplier?

*Heinz Schages:* Referring to our motto "flexibility ist our strength" above all constant availability. We are service providers, so we want and need to respond as quickly as possible to our customers' requirements – and they quite often approach us with very urgent jobs. So we have to have an adequate supply of everything that we need for the handling. And of course the quality has to be right. We also value the excellent technical advice we receive from Messer.

*The interview was conducted by Dr. Bernd Hildebrandt, Messer Group*



## Green swing

Blowing oxygen rather than air into furnaces saves energy and reduces CO<sub>2</sub> emissions. This does not necessarily involve the use of high-purity gas; in most cases, enrichment of the combustion air is sufficient. To provide a supply for the manufacture of steel, ceramics and glass, energy-saving VPSA facilities therefore offer a good alternative to producing the gas by means of cryogenic air separation and liquefaction. They further improve the environmental footprint, which is already good thanks to combustion with oxygen.

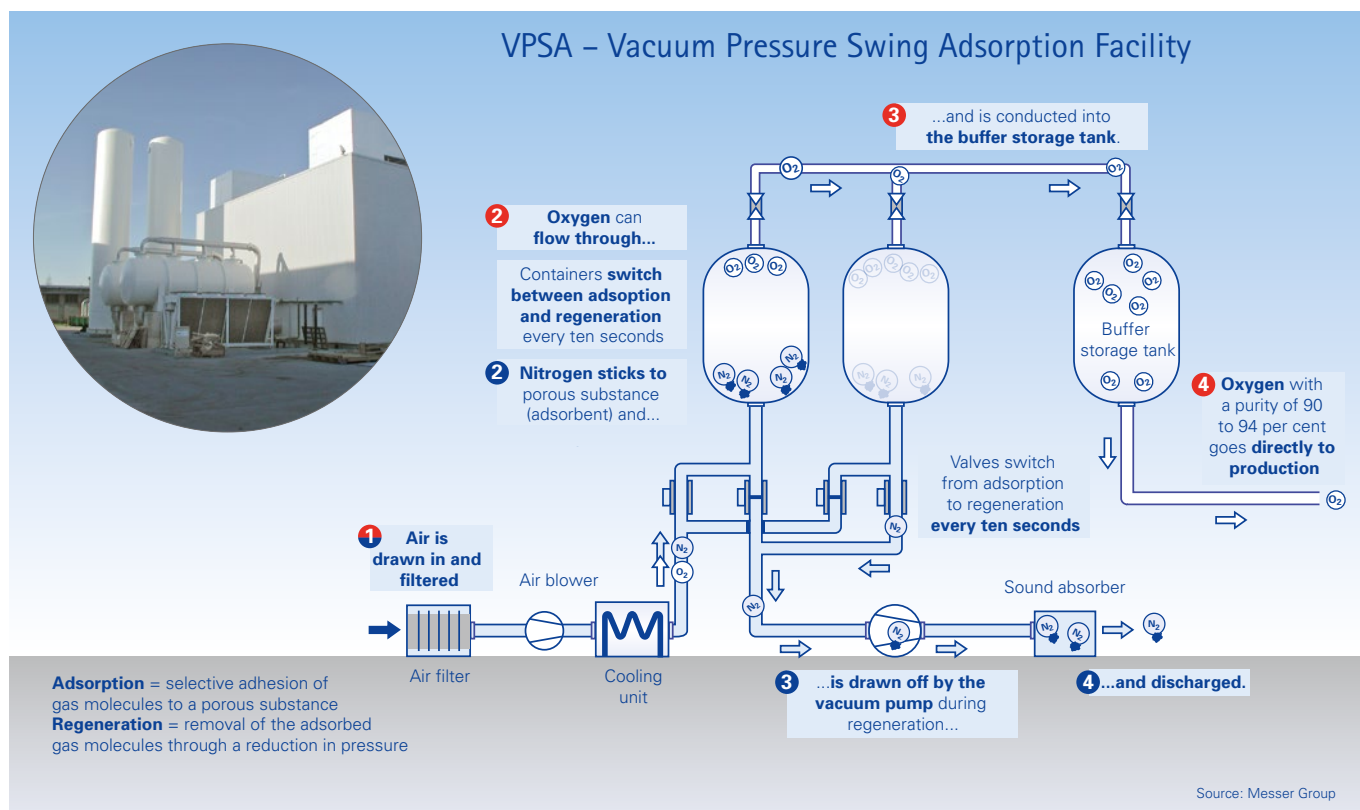
**C**ryogenic air separation facilitates the production of gases with a very high degree of purity. However, this requires air to be cooled to almost minus 200 degrees Celsius in order to liquefy it. By contrast, VPSA systems work without cooling, thereby saving the energy required for this liquefaction. Instead, they use the physical process of adsorption, which also gives them their name: Vacuum Pressure Swing Adsorption.

Some substances with a porous structure – activated carbon, silicate gel, a number of ceramic compounds (zeolites) – act as an adsorbent and are able to “capture” the molecules of certain gases. The molecules stick to their surface and accumulate there. This works particularly well under increased pressure. If air is passed through such a substance, the nitrogen is trapped, while the oxygen flows through it. However, the adsorbent’s capacity is exhausted after a few seconds. The nitrogen is removed and released back into the

environment by applying a vacuum. The VPSA system “swings” between vacuum and positive pressure in quick succession. The dual design – one half adsorbing, the other regenerating – ensures that a continuous flow of oxygen with a purity of up to 94 per cent is achieved. That is more than enough for most combustion processes.

Furthermore, since VPSA facilities are installed where the gas is actually used, there is no need to liquefy and transport it, thereby avoiding the CO<sub>2</sub> emissions that this would involve. The new VPSA facility commissioned by Messer in May in the Estonian town of Järvakandi is an example of this. It supplies some 18 million cubic metres of oxygen a year to the glass melting furnace at the directly adjacent site of Owens-Illinois, a glass container manufacturer with global operations.

*Christoph Erdmann, Messer Group,  
and Viktoria Jaroš, Elme Messer Gaas*



# Focus on Cylinder

Hungary: Agricultural and construction machinery production

## Smooth welds for cabs

Agrikon Kam is a major manufacturer of drivers' cabs for agricultural and construction machines. The company recently started using Ferroline C6X1 for welding. Gábor Barczány, a welding engineer at Agrikon Kam, attributes the switch to the new mixture to excellent test results, which he says have been borne out in everyday practice. "Previously, we used a shielding gas mixture consisting of 90 per cent argon and ten per cent CO<sub>2</sub>. We had to contend with considerable residual slag and welding spatter on the weld surface, which required a lot of work to remove prior to spraying. In our tests, which we carried out together with the welding experts from Messer, we checked the influence of the shielding gas composition on spatter and slag formation. A mixture ratio of 93 per cent argon, six per cent CO<sub>2</sub> and one per cent O<sub>2</sub> proved to be optimal. We were able to drastically reduce spatter and slag formation at the welds by using this ternary mixture. The arc is stable and can be easily guided and controlled. The weld surface turns out very smooth, and there are no longer any welding residues or negative deviations." The companies supplied by Agrikon Kam include the agricultural and construction machinery manufacturers Claas, JLG, Zetor, Wacker Neuson and Liebherr.

*Krisztina Lovas, Messer Hungarogáz*



When welding the driver cabs, ternary mixtures ensure very smooth weld surfaces.

Slovenia: Welding structural steel

## Ternary mixture superior

A ternary mixture produces a smoother weld and reduces spatter. This was also demonstrated by tests in Slovenia, which were carried out at Gostol TST, a manufacturer of sand blasting machines based in Tolmin. The tests involved welding eight-millimetre-thick plain structural steel (S235) with Ferroline C18, a mixture consisting of 82 per cent argon and 18 per cent carbon dioxide, and with the ternary mixture Ferroline C12X2, in each case using the GMAW method. Ferroline C12X2 not only improves the welding quality, it also boosts the efficiency of the process and reduces the formation of noxious vapours and particles.

*Edvard Bjelajac, Messer Slovenija*

Hungary: Laser cutting and robotic welding

## Gases for EMS service provider

At Zollner Elektronik AG's sheet metal-working plant in Szügy, Hungary, three high-precision laser cutting machines with fully automatic loading and unloading have been installed in the connected high-bay system. The cutting gases for the new machines – liquid oxygen and liquid nitrogen – are being supplied by Messer. In addition, Zollner has installed a new 3D robotic laser welding cell. Its helium and argon requirement is being met with cylinders and MegaPack bundles, also from Messer. The Hungarian plant, which belongs to the German specialist in complex mechatronic system solutions, works sheet metal products as well as welded, powder-coated and assembled constructions for the printed electronics industry, office and medical technology, telecommunications and other branches of industry. The company was founded in Zandt, Bavaria, in 1965 and now ranks among the world's top 15 EMS (Electronic Manufacturing Services) providers.

*Krisztina Lovas, Messer Hungarogáz*



## Imprint

### Published by:

**Messer Group GmbH**  
Corporate Communications  
Gahlingspfad 31  
47803 Krefeld, Germany

### Editorial team:

**Diana Buss** – Editor-in-chief  
Phone: +49 2151 7811-251  
diana.buss@messergroup.com

**Benjamin Auweiler**, Corporate Office  
benjamin.auweiler@messergroup.com

**Angela Bockstegers**, Corporate Office  
angela.bockstegers@messergroup.com

**Dr. Christoph Erdmann**,  
Production & Engineering  
christoph.erdmann@messergroup.com

**Tim Evison**, Corporate Office  
tim.evison@messergroup.com

**Dr. Bernd Hildebrandt**,  
Application Technology  
bernd.hildebrandt@messergroup.com

**Michael Holy**, Region Central Europe  
michael.holy@messergroup.com

**Katrin Hohneck**, Medical Gases  
katrin.hohneck@messergroup.com

**Dr. Dirk Kampffmeyer**,  
Application Technology  
dirk.kampffmeyer@messergroup.com

**Reiner Knittel**, Region Western Europe  
reiner.knittel@messergroup.com

**Monika Lammertz**, Application Technology  
monika.lammertz@messergroup.com

**Krisztina Lovas**,  
Region South Eastern Europe  
krisztina.lovas@messer.hu

**Dr. Joachim Münzel**, Patents & Trademarks  
joachim.muenzel@messergroup.com

**Marion Riedel**, Region Western Europe  
marion.riedel@messergroup.com

**Marlen Schäfer**, Corporate Office  
marlen.schaefer@messergroup.com

**Roberto Talluto**, Application Technology  
roberto.talluto@messergroup.com

### Concept and realisation:

**Agentur Brinkmann GmbH**  
Mevisenstraße 64a  
47803 Krefeld, Germany

### Text and editing:

**Klartext: von Pekker!**  
Römerstraße 15  
79423 Heitersheim, Germany

### Cover photo:

**Barbara Reya**  
Hafnerjeva 8a  
1210 Ljubljana - Šentvid, Slovenia

### Translation:

**Contextinc GmbH**  
Elisenstraße 4 - 10  
50667 Cologne, Germany

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## The "Gases for Life" editorial team

## We are ...



From left to right: Dr. Joachim Münzel, Angela Bockstegers, Dr. Bernd Hildebrandt, Michael Holy, Benjamin Auweiler, Katrin Hohneck, Dr. Christoph Erdmann, Marlen Schäfer, Tim Evison, Diana Buss, Marion Riedel, Roberto Talluto, Anthony Grandpierre, Elias Böker and Zolt Pekker (not pictured: Dr. Dirk Kampffmeyer, Reiner Knittel, Monika Lammertz and Krisztina Lovas)

## Competition

## Delicious!

The winner of this issue's prize draw will receive a gourmet hamper with summer specialties. For your chance to win this delicious prize, simply answer our questions about this issue of "Gases for Life". The letters in the numbered boxes will reveal the answer. Please send the answer by e-mail with the subject line "Gases for Life competition" to:  
angela.bockstegers@messergroup.com  
The deadline is 20 October 2015.  
Please remember to include your name and address.

The competition is not open to employees of the companies of the Messer Group and their families. In the event of multiple correct answers, the draw determines the winner. The result of the draw is final and not subject to appeal.

This campaign was launched by the Slovakian gases association on the initiative of Messer:

7  
         
2, 3, 10

This system for portable cold boxes allows you to make your own cooling elements at any time:

4 6

A university in the Spanish city of Tarragona is called:

9 5 8  
         
1

## Congratulations!

The winner of the last competition was **Christine Ohlenschläger from Wetzlar, Germany.**  
The correct answer was "SUPERMARKET".

**ANSWER:**              
1 2 3 4 5 6 7 8 9 10

Have fun and good luck! Your "Gases for Life" team!

FROM 2015 ON

# INTO THE FUTURE

Ever since Marty McFly whizzed across cinema screens on his pink hoverboard in "Back to the Future II" in 1989, the flying skateboard has been on the wish list of fans and technology enthusiasts. Messer uses it as a symbol of pioneering technology, such as the preservation of biological material with nitrogen. Our board is a handmade one-off with lots of cool lighting effects. Okay, we have to admit: it doesn't fly. And neither does it have a flux compensator. But we're sure that our technologies – such as in the area of pharmaceuticals and medicine – are already making part of the future a reality.

*Diana Buss, Messer Group*



For more on this and many other gas applications, go to:

[www.GasesforLife.de](http://www.GasesforLife.de)