

VETRO TIME

MARKET

Wide-mouth jars

CUSTOMERS

New online
catalogue

ART

Glass spheres – rolling
fascination



03 | MARKET

Attractively packed

06 | CUSTOMERS

Clear, easy to use and modern

09 | ANNIVERSARY

Grand celebrations of our successes

11 | NEW DESIGNS

Valuable delicacies

16 | AWARDS

Successful partnership

18 | ART

Glass spheres – perfection all round

**Dear Reader,**

"The ball is round", according to a well-known quotation from the world of football and it means that you should always stay curious and excited right up to the final whistle. This also rings true and fits well in the world of glass, because glass is an all-rounder, both in the literal sense and because it is ever-present in our day-to-day lives. Not convinced? Let the article on pages 18 and 19 win you over. Glass balls are used everywhere – in games, in medicine or on roads. And as regards the final whistle, glass packaging is more topical than ever as it is diverse and colourful, sustainable and healthy.

Our new online catalogue is another all-rounder worth exploring. The whole spectrum of our standard range can be found there with just one click and the products are sorted by area of use, packaging volume, colour or type of cap, to name just a few examples of the filter settings. You can find out more about the online catalogue on page 6 or by trying it out yourself. The online catalogue can be found on the Internet at: www.vetropack.com. It is available in nine languages (CZ, DE, EN, FR, HR, IT, RU, SK, UA).

Speaking of a standard range, one or two of the wide-mouth jars that we are presenting in this issue straight after the editorial can also be found in the online catalogue. Others are so-called customer models, however, which are individual, unique glass packages developed in close partnership with a customer and intended only for their use. However, irrespective of the shape, glass jars always showcase their content and ensure it looks even more appealing in the spotlight of the supermarket shelves.

The award that our Austrian subsidiary received from one of its customers is also particularly worth a mention. The food producer Spitz presented Vetropack Austria with the "Premium Supplier Award" in the "Beverages" category (pages 16 and 17) in recognition of its work in the area of Corporate Social Responsibility. In this context, I would finally like to draw your attention to our sustainability report. It is the third of its kind and once again conforms to the Global Reporting Initiative G4 guidelines. All of our sustainability reports are available to download from our website (www.vetropack.com) in German and English. In other words, if you are having a look at the new online catalogue, why not take a gander at our website too, or the other way round? Stay curious!

Best regards,

C. Cornaz
Claude R. Cornaz



WIDE-MOUTH JARS

Attractively packaged

Pickled vegetables, fruity jams, fish or meat – the selection of preserved food in supermarkets is huge. Sophisticated ideas are needed in order to stand out from the crowd. Vetropack wide-mouth jars give every product a distinctive look.

It's almost as if they are grinning at you in the supermarket shelves – the wide-mouth jars filled with delicacies for every taste. Whether it's sweet, mild, bitter, sharp, salty, sour or cool, consumers can find their favourite flavour well packed in an attractive glass jar.

Unique and distinctive

The content is presented in an ideal way in the jars in gleaming transparent flint glass or a subtle, fresh primeur. Standard models and individual glass packaging ranging from small sizes to ones with a volume of over three litres





are all part of the Vetropack range. Jars are usually finished with the classic paper label, the 'no label look' with a clear, contemporary appearance or a sleeve of film for a strong design appearance. Regardless of which finishing the customer chooses, a good design gives each product a clear identity and a strategically correct market positioning. This is because the selection in the supermarkets is huge. Good planning is required in order to stand out from the masses. Glass makes a product unique and distinctive because of its shape, colour and various finishing.

Elegant deep twist-off

Almost all jars have a twist-off cap. This ensures the familiar

pop sound when you open the jar. So-called deep twist-off caps are becoming more and more popular. They give the wide-mouth jar a touch more elegance than normal twist-off caps. Vetropack Austria recently produced a series of jars with this new cap system for the Austrian company Müller Glas.

Wide-mouth jar shapes

Wide-mouth jars are produced using the press-and-blow process. This is one of the most common industrial hollow glass production processes. The glass gob is dropped into the mould, into which the extrusion punch is inserted from below. When the gob is in the preform, the mould is closed from above with the bottom of the preform. The extrusion punch then moves upwards, forming the parison (preformed part) and the mouth. The punch is then pulled out of the parison and transferred to the finished form. Unlike the





blow-and-blow process, the mouth is produced last during the production of wide-mouth jars.

Lighter glass packaging

Depending on the size, filled wide-mouth jars have a hefty weight. Vetropack's varied product range also includes jars made from lightweight glass to make it easier for consumers to carry their delicacies home. They are just as stable as their heavier predecessors. The lower weight also facilitates transportation to the customer. This was made possible by the technological change from the traditional press-and-blow process to the narrow-neck press-and-blow process. In order to give these glass jars a wall thickness that is as smooth and thin as possible, a punch is pressed into the molten glass.

More light-weight packaging not only introduces challenges into the production process, but also to the preceding design stage. In the preliminary stage, glass specialists use the finite element method to determine where the containers will

be exposed to particular pressure. They do this by disassembling a glass container into individual elements. It is often only necessary to make minor adjustments to the packaging geometry in order to relieve the pressure. Light-weight jars can be filled and stored without problems and without sacrificing quality. The environment also benefits from the reduction in weight: fewer raw materials, lower energy and material consumption, lower transport costs and reduced CO₂ emissions.

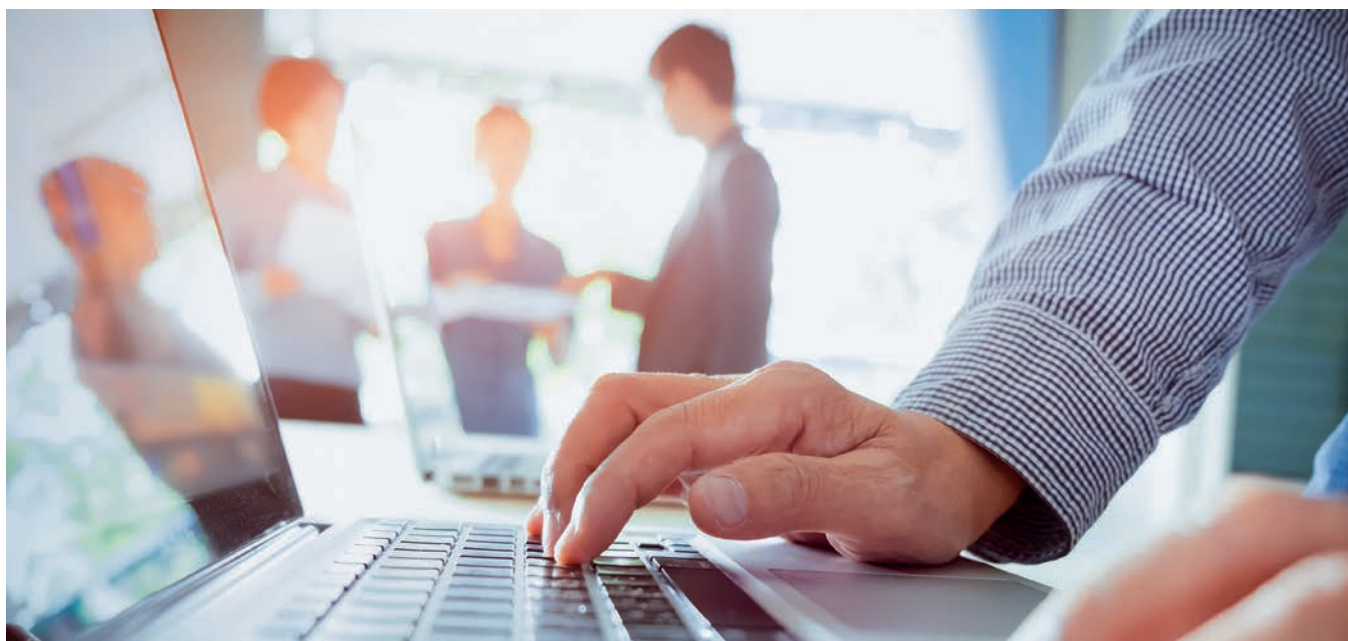




NEW ONLINE CATALOGUE

Clear, easy to use and modern

Vetropack has redesigned its online catalogue. Glass packaging for food and drink has now been given a new look. Catalogue searches can be filtered specifically by groups of items, shapes, colours, types of mouth and cap as well as bottle volume, while detailed information can be called up for each product.



Are you looking for the right glass packaging for a new drink that you want to launch on the market? Perhaps you are interested in finding some alternatives to bottles you have used in the past? Or do you want to know what Vetropack's range of wide-mouth jars look like? No problem – with the new online catalogue, you don't have to search for long before you find what you're looking for. And the process is highly targeted if you enter your desired criteria and set the filters accordingly. If you are interested in more than just one type of glass packaging, you can save individual products in a list and then compare them with one another very easily. The catalogue contains over 900 items in all –

and if you add the different types of packaging there are over 1,200 items.

The modern, visually attractive catalogue is not just available on your PC or laptop but, thanks to its responsive web design, can also be accessed on the move via your smartphone or tablet.

B2B market as a target audience

The online catalogue presents Vetropack's glass packaging for food and drink. It is primarily aimed at B2B customers and contains seven country-specific catalogues for Swit-

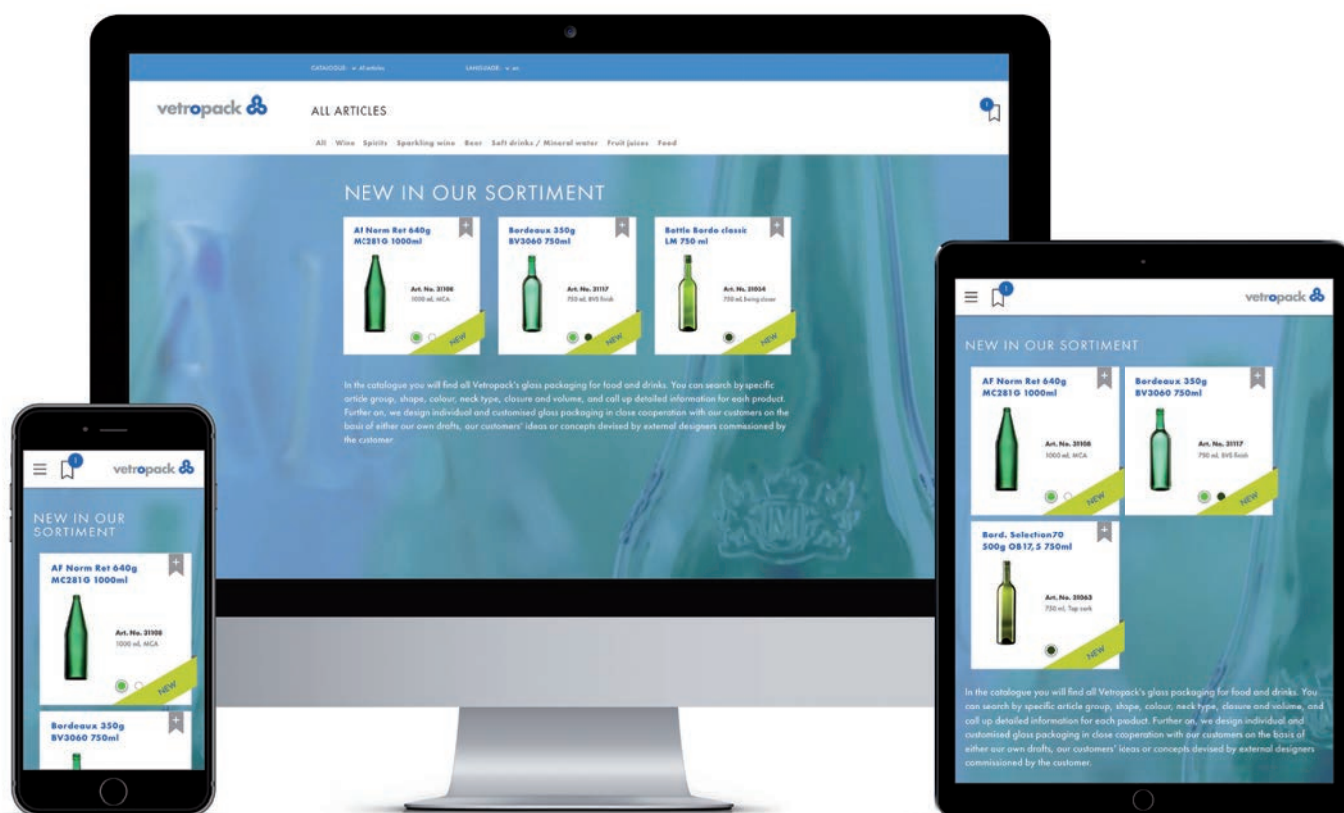


zerland, Austria, the Czech Republic, Slovakia, Croatia, Ukraine and Italy, as well as a complete catalogue. All catalogues are available in English, German, French, Italian, Czech, Croatian, Slovakian, Ukrainian and Russian.

Vetropack offers even more

In addition to the online catalogue's offering of glass packaging for the food and drink industry, Vetropack also produces customised glass containers in various colours based on its own drawings, the customer's ideas or those of external designers.

Vetropack's wide range of products is also supplemented by a comprehensive raft of services that extends far beyond simply manufacturing glass packaging. Built up over many years, Vetropack's expertise and extensive experience in design underpin its end-to-end consultation services. High-quality production, prompt deliveries and support with packaging analyses come just as naturally to the company as providing advice on all matters relating to filling, conditioning and closure technology or on finishing and labelling glass. This even includes calculating environmental life-cycle assessments.



REFINED GLASS

Burgundy Bonvillars wine bottle

Perfect glass packaging protects and highlights the high level of quality of precious drinks. The cellar masters of the Cave des Viticulteurs de Bonvillars wine are aware of this as well. They therefore commissioned the Swiss Vetropack plant to create a new cuvée glass bottle.

The Cave des Viticulteurs de Bonvillars wines received a new look just in time for spring. The 0.75-litre cuvée wine bottles are produced by Vetropack Switzerland. The bottle is adorned with an engraving of the letters CVB and grapes in the shoulder area on the front side.

Makeover for the big appearance

The wine bottle was presented as part of the festivities of 'Fashion week at la Cave de Bonvillars', which was held in March. A range of exhibitors demonstrated that fashion and wine can be combined and that wine is only properly 'dressed' if it has a suitable bottle and decorative labels. Vetropack produces this first-class quality wine packaging in the heart of Western Switzerland.

Visitors to the Vetropack stands in Bonvillars were able to see both the finished product and how it was made. The production images show just how fascinating and diverse the world of glass packaging manufacturing is. The heat of the glowing glass containers could actually be felt. The technical drawing of the wine bottle was projected onto a small corpus next to its preform.

Bonvillars wine cellar

The Cave des Viticulteurs de Bonvillars is a winegrowers' cooperative with 50 active members. The exquisite grapes grow at 450 to 500 metres above sea level between Lake Neuchâtel in the canton of Vaud and the foot of the Jura Mountains. The heat stored by the lake during the day mixes with the



cold wind currents from the Jura Mountains at night, ensuring that the grapes mature perfectly. The majority of the vines are Chasselas grape, followed by Pinot noir, Gamay, Garanoir, Gamaret and other red and white varieties.

Bonvillars produces its wine using micro-oxygenation. This technique improves the wine's balance and character. Ageing in oak barrels also contributes to balanced acidity.

CELEBRATIONS

Grand celebrations of our successes

On 2 November 2016, Vetropack Austria celebrated three important events at the same time: 30 years of belonging to Vetropack Group, the official opening of the Group-wide training centre and completing the furnace repairs.



30 years ago, Vetropack Group began its expansion towards Eastern Europe. The foundations were laid with the purchase of the Pöchlarn glassworks in Lower Austria, which is also where the success story of Vetropack Austria begins. "We are proud to be able to look back on 30 years of dynamic development, an innovative spirit and a high level of productivity at the Pöchlarn Vetropack plant, which

can be attributed not least to the enormous commitment of our employees," said Johann Reiter, Managing Director of Vetropack Austria, at the anniversary celebrations this past November.

Vetropack Austria welcomed guests to the Group-wide training centre (we reported on this in Vetrotime 3/2016), which



From left to right: Mag. Johannes Schedlbauer, MAS (Lower Austria Chamber of Commerce, Managing Director of the Industry sector), Franz Eckl (Lower Austria Chamber of Commerce, Head of Melk district office), Ing. Johann Reiter (Managing Director of VPA), DI Claude R. Cornaz (CEO), KR Sonja Zwazl (President of the Lower Austria Chamber of Commerce) and Karl Moser (Member of the State Parliament of Lower Austria)

was built last year. Personalities from politics and industry came, as well as a large number of customers and partners. Among those present were KR Sonja Zwazl, President of the Lower Austria Chamber of Commerce, and Member of the State Parliament of Lower Austria Karl Moser. The event was hosted by Austrian presenter and actress Silvia Schneider.

Opening of the new furnace

Following the speeches, the guests enjoyed the unique opportunity to visit the inside of the new flint glass furnace. A 400-tonne heavy steel construction was required for the repair work. A total of 2,500 tonnes of fireproof material was used for the new, more energy-efficient and more modern furnace. The new upgraded furnace generates fewer emissions than its predecessor. Two new production machines were installed at the same time. "Investment in the modernisation of our production facilities is essential in today's economic climate. It secures our success and competitiveness in the long term," said Claude R. Cornaz, CEO of Vetropack Holding.

Cheerful celebrations and lots of information

Following on from the tour of the plant, attendees moved on to Persenbeug Castle, which towers over the Danube on a high rock. Guest speaker Frank Rehme, Managing Director of gmvteam, gave a talk entitled "Glass packaging in the context of the shopper – the brain buys! How the subconscious mind influences decision-making processes when shopping". You can only successfully inspire consumers by

creating contexts, i.e. offering consumers products which fit perfectly into their environment and lifestyle. Consumers often make these decisions subconsciously. Products and their packaging must therefore give strong signals to activate the subconscious mind. "As a type of packaging, glass is ideally suited to fulfil the product's promises. The material's transparency, multi-sensorial aspect and high quality play just as important a role as the safety in the context of consumers' health," said Frank Rehme.

Sonja Zwazl had a special surprise up her sleeve. She presented Claude R. Cornaz with a medal of honour from the Lower Austria Chamber of Commerce and a certificate with thanks and recognition for 30 years of Vetropack in Pöchlarn.

MODERNISATION

Furnace in Ukraine upgraded

Furnace repairs are hugely important to all of the Vetropack companies because the furnace is the so-called heartbeat that drives production. The scheduled upgrade of the brown glass furnace in Ukraine was completed at the end of last year.

After around twelve years of uninterrupted operation, work began on the cold repair of the brown glass furnace at the Ukrainian Vetropack plant in September 2016. Cold repair means that the melt must firstly flow out under controlled conditions and the furnace must then cool off before repair work can begin.



In a nutshell, all the scheduled work was carried out successfully. This included rectifying defects on the furnace floor (basin), the furnace roof and the furnace itself, installing some brand new side walls, replacing feeder refractories and a channel. The glass-blowing machines at the hot end were upgraded and the fire-resistant construction materials brought in line with the state of the art. The aim of every cold repair is to enable the furnace to operate for another ten or so years without interruption. Before the glass containers are packaged and shipped, they now undergo a quality check in the modernised control and packaging zone at the Gostomel plant.

Nikolay Marchenko, Technical Director at Vetropack Gostomel, is very pleased with the results: "Up to 230 tonnes of clear or coloured melt can now be processed every day."



NATURAL

A field full of flowers

Vetropack Gostomel is manufacturing the new 0.4-litre bottle for VODA UA mineral water. Engraved poppies, Ukraine's national flower, climb up the flint glass.

VODA UA mineral water comes from springs of the central part of Ukraine, the region is also called "small carpathians", and contains valuable minerals and trace elements. It is available still or sparkling. The 0.4-litre bottle with a silver screw cap is produced by Vetropack's Ukrainian plant in Gostomel.

The national flower of Ukraine – the poppy – is engraved onto the flint glass bottles. They appear to be growing up from the bottom of the bottle and highlight the mineral water's natural origin. One look at the bottle is enough to make you feel like you are standing in a field full of red poppies.

WHITE WINE

An old grape with a new look

Near the border with Slovenia lies the Italian wine-growing region of Colli Orientali del Friuli. The "Ribolla Gialla" white is pressed from an old variety of grape and filled in glass bottles produced at Vetropack's Italian plant in Trezzano.

High quality, elegance and clear lines are what set apart the cuvée bottle for Tenimenti Civa's ribolla gialla wine. A large "R" is engraved above the white paper label on the 0.75-litre bottle manufactured by Vetropack Italia. Although originally made for sparkling wines, the bottle is now also used for reds and whites.

Until recently, Civa Group was primarily known for selling wines but it is now channelling its many years of experience into producing the very first one of its own. Ribolla gialla is a subtle, dry white made from an old variety of grape by the same name plus a small proportion of chardonnay grapes. Its flowery, fruity taste is the ideal accompaniment to cold starters, soups or fish dishes.



PURE NATURE

Fruity fresh in green

The Juicy fruit juices produced by the Croatian drinks manufacturer Stanić Beverages d.o.o. contain all natural ingredients. Vetropack Straža produces the 0.2-litre green glass bottles that hold the refreshing drinks.

Taking a sip of Juicy fruit juice feels like biting into a succulent apple or filling your lungs with the smell of a freshly peeled orange or a pineapple that has just been cut up. This is because the drinks guarantee 100-per cent fruity flavour thanks to their top-quality natural ingredients and high fruit content with no extra sugar or other additives.

Vetropack's Croatian plant in Hum na Sutli is responsible for manufacturing the green glass bottles with a screw cap. In keeping with the colour of the bottle, the cap also comes in a matching dark green. Their simplicity and elegance give the bottles a distinctive look. A transparent label adorns the sleek bottle and allows a glimpse of the refreshing contents. Just like their predecessors, the 0.2-litre bottles are used in the hospitality industry. The fruit juices are available in Croatia and Bosnia and Herzegovina.





RICH IN MINERALS

A refreshing drink from deep below the surface

Protected from any harmful substances, MAYA mineral water flows through the layers of rock found in the Mavrovo National Park in Macedonia. It is available in flint glass bottles manufactured at Vetropack's Croatian plant.

Close to the Macedonian city of Debar is a village called Gari, where MAYA mineral water produced by ML-Gari is bottled. Vetropack Straža is responsible for manufacturing the flint glass bottles that hold this natural thirst quencher. They have a silvery-blue screw cap and come in two sizes: 0.25 and 0.75 litres. With its clear lines and discreet label, the bottles' design emphasises the purity of their exquisite natural contents. The route the water takes from the MAYA source and on through layers of rock appears above the letter "Y".

With its source deep below the surface of the Mavrovo National Park, the water is one of a kind thanks to a perfect balance of minerals and the purest natural spring water. A sumptuous drink like this needs elegant packaging and glass is the perfect match.

LEMONADE

Intensely refreshing

Vetropack Gostomel is responsible for manufacturing the 0.44-litre bottles for "Seth & Riley's Garage". The hard drink from Carlsberg Ukraine has already won its recognition in the market.

"Seth & Riley's Garage" is a line of hard drinks with a refreshing flavor inspired by the classical recipes from the South of America. Since the temperature there is warm and summery all year round, iced lemonade – including with a bit of alcohol – is a welcome refreshment. These so-called hard drinks are marketed at consumers who like to try out new things and are up for experimenting.

The flint glass bottles produced at Vetropack's Ukrainian plant take the spotlight with their simple design. Nevertheless, the striking "Garage" and "Seth & Riley's" engravings on the bottle sides and neck really stand out too. The pull-off cap ensures quick and easy opening with no need for a bottle opener. Simply lift up the ring attached to the cap and there's nothing more stopping you from enjoying the refreshing drink.





SOUTH BOHEMIAN SOURED MILK

Sour makes you happy

Whether you have it for breakfast, as a snack to keep you going or in the evening – AGRO-LA spol. s.r.o.'s soured milk refreshes the palate at any time of the day. The flint glass bottles are produced by the Czech Vetropack plant in Kyjov.

Soured milk is one of the oldest milk products of all time. It is normally somewhat thicker than normal milk. This consistency is acquired in the fermenting process, during which lactic acid bacteria break down some of the lactose into lactic acid.

The soured milk in 0.33-litre bottles from Vetropack Moravia Glass is produced using high-quality milk and has a pleas-

ant sour flavour. The flint glass packaging is simple, has a narrower shoulder area and then tapers towards the bottle opening. A white screw lid with a big smiley face rounds off the glass container. The lactic acid bacteria found in the drink support the natural gut flora, regulate digestion and also strengthen the immune system. Consumers can enjoy the soured milk from the manufacturer AGRO-LA spol. s.r.o. in blackcurrant, apricot, strawberry or plain flavours.



ANTIPASTI

Ready to enjoy

As a snack to tide you over or to serve your guests with aperitifs – nobody needs to wait for long with this antipasto of vegetables and tuna. Simply open the jar and enjoy the contents straight away. The flint glass preserve jar is produced by Vetropack Italia.

The "Antipasto" with tuna in tomato sauce is one of the corner stones of the Italian company F. Illi Polli. Prepared following the traditional Piedmont recipe, the secret that made this product so special is the delicious combination of carefully selected vegetables mix – cucumbers, artichokes, peppers, carrots, olives, onions, cauliflower, mushrooms and capers – combined with tasty tuna and smooth tomato sauce. Perfect both as appetizer and as complete meal for quick lunch to enjoy out of home.

The wide-mouth jar with a twist-off cap is manufactured by Vetropack's Italian plant in Trezzano. The antipasto comes with a red lid to match its red label, which sticks unobtrusively to the jar. The unpretentious jar holds 0.212 litres.

POWERFUL YET DELICATE

The finest among all coffee liqueurs

A powerful coffee flavour with a delicate hint of vanilla and a sweet trace of chocolate – all of these blend together to make Tia Maria. Vetropack's Italian plant in Trezzano is responsible for manufacturing the cuvée glass bottles for the coffee liqueur of ILLVA SARONNO.

Tia Maria has its roots in Jamaica, where it has been made to a secret recipe for over 300 years. ILLVA SARONNO distributes it in over 60 countries. The sweet coffee liqueur combines 100 per cent Arabica finest coffee with a hint of vanilla and Jamaican rum and can be drunk neat or mixed. It's ideal for coffee based cocktails. Tia Maria lends an intense coffee flavour to any drink, coupled with a subtle note of chocolate, pipe tobacco and the gentle aroma of caramelised cane sugar and vanilla.

The new design for the cuvée bottle packs a powerful yet graceful punch. The screw cap gives way to a long neck, followed by rounded shoulders that form the distinctive outline and taper off at the base. Vetropack Italia is responsible for manufacturing the bottles for the coffee liqueur. Tia Maria lovers can choose between the different bottle sizes, with 0.35, 0.375, 0.7, 0.75, 1, 1.4 or 1.5 litres on offer.

**A PLEASANT SURPRISE**

Awakening a sense of vitality and happiness

Vetropack's Austrian plant in Pöchlarn is responsible for manufacturing a 0.3-litre flint glass bottle for the high-quality vegan juices produced by Pago.

Pago is part of Eckes-Granini, a company known throughout Europe for its fruit beverages. There are two varieties of the new product "Pago Passion". The flavour of slightly sour rhubarb combined with sweet pear or the exquisite aroma of Muscat grape trigger a sense of happiness and vitality.

Designed specifically for the two drinks, which do not contain any artificial colourings or preservatives, the bottles are produced by Vetropack Austria. Linear in shape yet with a refined, characterful engraving in the shoulder area, the bottle reflects its delicious contents. The flint glass bottle with its silvery screw cap and transparent label perfectly presents the refreshing drink.



SUPPLIER AWARD

Successful partnership

Vetropack Austria was presented with the Premium Supplier Award in the 'beverages' category by the Austrian food producer Spitz. Spitz values Vetropack's high product quality, value for money as well as the reliability and security of its delivery.



from left to right: Christian Eckel (Customer Account Manager at Vetropack Austria), Herbert Kühberger (Director of Marketing and Sales at Vetropack Austria), Harald Doppler (Beverages Division Manager of Spitz GmbH)

The Upper Austrian food producer Spitz presented the Premium Supplier Awards in the categories 'confectionery and baked goods', 'beverages', 'sweet and sour' and 'logistics' at the start of 2017. Vetropack Austria received the award in the 'beverages' category thanks to the work in Corporate Social Responsibility (CSR). This thematic area covers responsible entrepreneurial trade in actual business activities, environmentally related aspects and communication with employees and relevant stakeholders. Vetropack has always assumed responsibility for customers, product quality and the environment, which is shown clearly in the company film 'We take responsibility'*.

Valuable used glass

Long-distance transport and therefore also CO₂ emissions can be cut due to the geographical proximity of the two Austrian Vetropack plants in Kremsmünster and Pöchlarn to the company Spitz in Attnang-Puchheim. Energy consump-

tion is also continuously being reduced in the production of glass containers due to the use of cullet. The larger the ratio of cullet used in production, the higher the energy efficiency. As melting cullet requires lower temperatures than, for example, when producing glass from raw materials, for ten per cent of used glass three per cent of energy and seven per cent of CO₂ emissions can be saved.

It is very important for Vetropack to maintain the closed material loop of the products. With the ongoing optimisation of the used glass recycling plants, the company is making a valuable contribution to protecting the environment, conserving resources and reducing CO₂ emissions. The products supplied to Spitz contain around 60 per cent recycled glass.

Slight reduction in weight

Vetropack Austria also produces lightweight glass for Spitz.

The strength and stability of lightweight glass containers are every bit as good as those of the heavier models. Innovative computer technology and sophisticated production processes (narrow-necked press-and-blow process) ensure a significant weight reduction of up to 20 per cent. The con-

sumer reaps the benefits of this innovative packaging. And last but not least, weight savings also mean a conservation of resources.

*The film can be found at: www.vetropack.com

BRAUBEVIALE

Artfully brewed – artfully packaged

Last November, Vetropack Group presented in true fashion at the BrauBeviale in Nuremberg, Germany, putting the limelight on the growing bottle range for beer specialities. However, glass packaging for fruit juice, mineral water and soft drinks also sparked visitors' interest.

The BrauBeviale was able to record 38,000 visitors in November 2016. Among those present were experts from breweries, malting plants and companies manufacturing alcohol-free beverages, as well as specialists from dairies, winemakers and suppliers in the brewing and beverage industry. The guests expected innovative technology and new marketing ideas – and they were not disappointed. “Creative beverage culture” was the trending theme at the trade fair stands and in the supporting programme.

Vetropack Group showcased its well-balanced, attractive range of bottles for beer specialities with the motto “Artfully brewed – artfully packaged”. These bottles provide the individual touch that the creative beers require. From sparkling wine bottles, which are increasingly being filled with beer, and bottles with swingstoppers to content sizes which offer a lot of enjoyment for a slight thirst: all glass containers are completely neutral in taste and provide exceptional protection for trendy beverages with their own character.



Lots of people visited the Vetropack stand: more interested parties than ever before took the opportunity to exchange information and get inspired in conversations with the Vetropack trade fair team.



ROLLING FASCINATION

Glass spheres – perfection all round

Marbles are popular toys and collectibles enjoyed by both young and old. In industry, however, glass spheres are highly specialised precision products.

Marbles made from glass are a relatively new discovery and are – quite simply – a product of chance. Before the mid-19th century, round toy balls were made of semi-precious stones, marble, other stones, or from clay or porcelain.

From glass eyes to marbles

In 1984, the Thuringian glassmaker Simon Karl Greiner developed a device in Lauscha, Germany which could press molten glass sticks into balls. Greiner's plan was to reduce the cost of producing glass eyes. The plan was successful and the glass marble was produced as a spin-off product, which soon enjoyed popularity throughout the whole world. Incidentally, the USA was the main purchaser of the coloured, handmade glass spheres.

From craftsmanship to mass production

World War I almost brought the Thuringian glass production to a standstill and American manufacturers achieved market leadership due to machine production. In the early 1950s, the Japanese cat's-eye marbles conquered many hearts. However, only 20 years later China and Mexico dominated the marble market. Some companies are now thought to produce over 12 million marbles a day. However, despite this mass production, manual production has not completely disappeared.

Games and fun

Marble games can be played anywhere – indoors and out. You only need a small level surface and a small cavity. In Switzerland, a manhole cover is often used for this purpose as the gap in the middle makes an excellent target hole. Professionals don't make do with improvised playing fields;





they compete in world championships and come together in Tinsley Green (teams) or in Prague (individual players).

Technical glass balls

Glass balls for technological use are much simpler compared to marbles in terms of colouring, but of much higher-grade glass and quality. Their field of use, however, is as diverse as it is challenging.

Maximum precision and cleanliness is required for use in the pharmaceutical field. Glass is useful because it is inert, doesn't form a compound with other materials and is resistant to acids and alkalis. In a spherical shape, it is used for stirring pharmaceutical products like insulin cartridges, among other things. Other highly specialised products in-

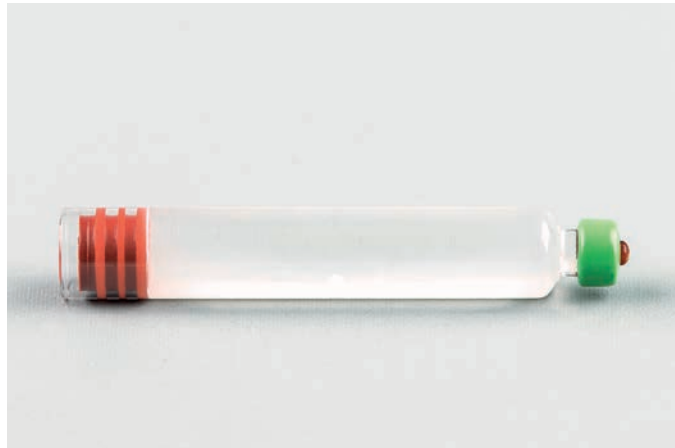


clude the glass balls used as valves in the chemical industry and dispensers in the cosmetic industry. Even the valve balls in ink cartridges used in fountain pens are made of glass.

Glass balls for road safety

Since glass balls reflect a vehicle's headlights, they can make motorists aware of dangers and increase road safety. Glass balls are therefore used as reflectors in road studs to mark road works or lane changes.

Tiny little glass balls or glass beads in paints and foils also ensure that markings or obstacles are immediately visible in the dark if light shines on them.



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