AHEAD

THE CUSTOMER MAGAZINE OF NETSTAL Issue 01.2017

THE PRELACTIA® BOTTLE AT DRINKTEC

INNOVATIVE SOLUTIONS FOR MILK PACKAGING

COST TRANSPARENCY

HIGH-END TECHNOLOGY PAYS OFF

Engineering Excellence

NETSTAL

EDITORIAL

Dear readers,

Nearly a year ago the plastics processing industry met at K. With its ELIOS series, Netstal celebrated its successful market launch of a high-end system for efficient manufacturing of thin-walled packaging.

We have continued developing our machines and technologies building on this momentum. At the drinktec and Fakuma trade shows, we can present exciting applications that provide you and your customers with new design leeway for highly productive manufacturing solutions and attractive products.

Today, technical progress is enabling the adaptive control loop between an optical inspection system and the control system for the injection molding machine. At drinktec, we are presenting our vision of an intelligent machine control system as a command center from which all processes within a manufacturing cell can be monitored. In doing so, we are bringing Industry 4.0 into the production of closures.

PRELACTIA® technology stands for cost-effective barrier preforms made of PET, innovative bottle designs and a revolutionary shelf life for milk. You will find background information about a French manufacturer of preforms and bottles that has been successfully relying on PRELACTIA® for several years.

What matters here is absolute precision and cleanliness for clean room manufacturing of medical products. SCHOTT Schweiz is a particularly experienced customer of ours in this segment that reports on its experience with Netstal Service & Solutions. In addition, we speak about the clean room standards that are common today and show how we support our customers in achieving certification.

We know that tenths of a second and tenths of a gram are critical for economic success in mass production. Therefore, we rely on high-precision control of the critical parameters of injection speed and holding pressure. And on high-end quality for design solutions, for materials and in production. This ensures nearly 100 percent good parts with the lowest material consumption. And this is accomplished with Netstal in the long run. Detailed information about this is also in this issue.

Renzo Davatz
CEO Netstal Maschinen AG

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We want to become even better. Please help us by answering the following ten questions in the online survey.

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DRINKTEC 2017 – MEETING POINT OF THE INTERNATIONAL MILK INDUSTRY

Milk is not just milk. Mixed milk drinks are popular and changing the market. Today they are achieving an annual retail turnover of about 100 billion euros worldwide. This already corresponds to the international market for standard milk products. At drinktec, the world's leading trade fair for the beverage and liquid food industry, market experts will interact with innovative products made from and for milk. This is because drinktec has now become the world's leading trade fair for the milk industry, too.

At its trade show booth, Netstal will be presenting innovative solutions for packaging milk beverages. With PRELACTIA®, Netstal is providing a cost-effective barrier preform made of PET. In particular, PRELACTIA® stands for innovative bottle design and a revolutionary shelf life for milk. And because a bottle always needs a cap, the corresponding preform-suitable 38-mm caps for milk bottles will be produced at the trade show booth.

→ **MESSEINFORMATIONEN:**
www.netstal.com/drinktec

PDG PLASTIQUES EXPANDS PRODUCTION OF DOUBLE-LAYER BARRIER PREFORMS

PRELACTIA®: THREE

STRAIGHT FROM THE NETSTAL TRADE SHOW BOOTH TO PDG IN MALESHERBES, FRANCE
There, the PET-LINE 2C will be operating in addition to the five existing PRELACTIA® lines.

PROFESSIONALS AND A MILK SOLUTION

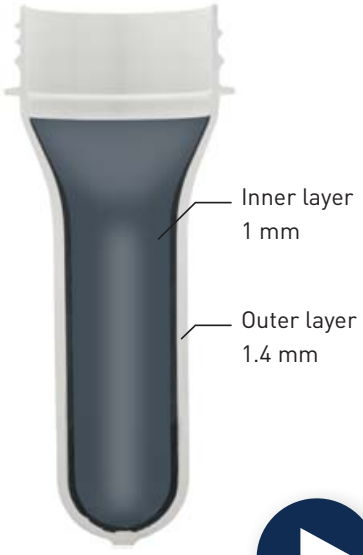
Exuding grandeur; brilliantly white, slightly corpulent with wavy lines to indicate its liquid content. In the shape of its PRELACTIA® PET bottle, PDG Plastiques offers the perfect packaging for milk and milk products. To keep up with high demand, the French bottle specialist is currently expanding its production to include a sixth PRELACTIA® production line from Netstal.

TEXT: DR. SABINE KOB PHOTOS: FOTOLIA, NETSTAL, PDG PLASTIQUES

PRELACTIA® blocks nearly 100% of light.

... needs fewer additives in the preforms.

CROSS-SECTION OF PRELACTIA® PREFORM



CLICK HERE FOR THE VIDEO

PRELACTIA® is a product of consolidated expertise: Spanish mold manufacturer Molmasa and Netstal developed the technology, while PDG Plastiques brought its processing experience to bear as a front-line user. As the only established process on the market to do such, PRELACTIA® effectively packs a liter of ultra-high temperature milk (UHT milk) into a 24-gram bottle. The basis for this is a preform with a double layer that reflects the primary functions: an appealing white outer skin to attract the customer's eye and a gray interior wall that is impervious to light to protect the milk. It blocks virtually all light and can therefore also be used for the queen of shelf stability, UHT milk. Boasting a shelf life of up to six months, it places far more demands on a container than extended shelf life milk (around 21 days) or fresh milk (10 days maximum).

21 Netstal machines are running

PRELACTIA® is all about quality and cost-efficiency, because PDG Plastiques strives to ensure its customers are always provided with the optimum solution. Since its foundation in 1948, the family-run company has constantly focused on beverage and liquid containers. Today, the company's 85 employees manufacture around 1.3 billion PET preforms and 50 million bottles every year in volumes of 20 milliliters to 10 liters. The preforms weigh in at between 2.4 and 90 grams. Cooperation with Netstal goes as far back as 1985 and started with a used 150-ton machine. The year 1990 saw the arrival of the first PET-LINE, with the company now running 21 Netstal machines in total. Francois Desfretier, CEO and owner of PDG, praises Netstal's reliability and excellent customer service above all else. Following drinktec in Munich, where Netstal and Molmasa are joining forces to present the PRELACTIA® technology, the PET-LINE 2C will be delivered directly from the stand to PDG in Malesherbes, where it will continue in production alongside the two existing PET-LINE 2C machines and the three first-generation PRELACTIA® systems, which were based on the SynErgy series. As the machines are configured for production flexibility, where operational capacity fluctuations arise they can easily also be used for monolayer applications. This merely involves deactivating the secondary injection unit software. For monolayer preforms, 24-cavity to 72-cavity molds can then be put into operation within the machine's performance capability.

Less usage of expensive additives

In contrast, PRELACTIA® preforms are produced through overmolding, in other words in two steps each using 32 cavities. First the darker component is injected into the mold, then the resulting blank is covered in a lighter outer skin within a separate cavity. This technique enables both layer thicknesses to be precisely defined and generates the greatest value-added in terms of efficiency compared to rival processing systems. Generally, to increase the barrier effect against UV light, the white pigment titanium dioxide has to be applied. The additive also ensures the attractive white color of the bottle. In PRELACTIA® preforms the outer layer specifically takes on

... and enables
an exclusive bottle design.

PRELACTIA® MILK BOTTLE LIGHT TRANSMISSION IN COMPARISON WITH MONO LAYER SOLUTION

this role, meaning additive equating to only five percent of the preform weight need be applied.

Conversely, monolayer PET preforms require around 15 percent additive, which can have an enormous impact on cost. An annual production of 70 million PRELACTIA® preforms at 24 grams each would save a total of 240 metric tons of the high-priced additive.

Overmolding convinces technically and economically

HDPE bottles long-since popular in milk filling are now a thing of the past from a technical perspective; not least due to the heavy weight (30 grams), high material price, minimum light barrier effect and extremely limited scope for design on account of extrusion blow molding. The thread is also frequently a source of sealing problems, which makes the use of an additional seal of aluminum foil necessary. Comparison of the drinktec application with its 17-gram PRELACTIA® preform against a similar 0.5-litres 21-gram HDPE bottle based on an annual production of 105 million bottles, would generate huge savings in raw materials and additives alone. The market price for PET is around 30 percent below that for HDPE.

Those who are seeking to reliably fill plastic bottles with milk need look no further than PRELACTIA®, especially given the fact that the pure PET containers are fully recyclable. Due to the two-stage manufacturing process of the PET bottle, PRELACTIA® opens up additional options for large dairies to stand out from the competition with exclusive bottle shapes.

Francois Desfretier is therefore anticipating strong growth and plans to further expand and develop the technology: "Through innovative strength and quality, we aim to set ourselves apart from the competition in future. Netstal is the ideal partner to help us achieve that."

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"If you want to fill milk into plastic bottles safely, you can't pass over PRELACTIA®."

FRANCOIS DESFRETIER, OWNER AND MANAGING DIRECTOR OF PDG PLASTIQUE

PDG PLASTIQUE
85 employees manufacture around 1.3 billion PET preforms and 50 million bottles every year.

THE LOWEST UNIT COSTS FOR BEVERAGE-CONTAINER CLOSURES

INJECTION-MOLDED, LIGHTWEIGHT, LEAK-PROOF AND EFFICIENT

In the world of beverage-container closures there are primarily two alternative manufacturing processes today: injection molding and compression molding. With injection molding solutions from the market leader Netstal, users today receive the optimal package: flexible design options, reliably functioning closures and the lowest unit costs.

TEXT: MICHAEL BIRCHLER PHOTOS: NETSTAL

If you want to manufacture screw closures for carbonated and non-carbonated beverages, first you have to make a fundamental decision: Which technology is best suited for which kind of closures? And which process will achieve the lowest unit costs? Injection molding and compression molding are two available manufacturing processes that differ fundamentally in terms of technology. It is a fact that the injection molding process now has a market share of about 40 percent. And we can expect its efficiency and reliability to keep increasing.

Many arguments in favor of injection molding

Many state-of-the-art closure designs clearly favor the injection molding process. "It displays its strengths particularly for lightweight and thin-walled standard closures. Cleanly shaped seal geometries and, consequently, leak-proof closures can be produced with high reliability in large quantities," explains Stefan Müller, Sales Director Asia Pacific at Netstal. For the compression molding process, on the other hand, the material consumption is too low. Problems with quality can arise because the plastic cools down too much in the cooled cavity before it can be pressed into shape.

Output and unit costs are critical

Advocates of compression molding frequently claim a shorter cycle time compared to injection molding. In principle, however, it is difficult to make an objective comparison of cycle times for different processes. For

> "If you want to stay flexible, you will definitely choose the injection molding process."
>
> PETER SCHMID,
> TEAM LEADER APPLICATIONS AT NETSTAL

a complete side-by-side comparison, the closure must be identical. Only then can all of the investment and operating costs as well as the production volume per unit of time be compared. In the end, the system with the highest output and the lowest unit costs wins.

Up to 3,000 completely finished closures per minute

A state-of-the-art high-performance injection molding system of the ELION series from Netstal, with extremely short cycle times and a high number of cavities paired with low energy consumption, provides advantages especially for particularly lightweight closures. For example, an ELION 4200-2900 and a 96-cavity mold produce about 170,000 closures of the type 29/25 per hour. This closure has a unit weight of only 1.2 grams and is used primarily for non-carbonated water, which is filled in PET bottles with the internationally used short standard 29/25 opening (29 mm thread diameter and 25 mm inner diameter).

Low unit costs, thanks to hybrid technology

The optimized energy efficiency of state-of-the-art injection molding machines also makes a critical contribution to reducing the unit costs. "Today, hybrid systems are used that often do not consume even half as much electricity as their fully hydraulic predecessors," states Müller. For the 29/25 closure mentioned above, the power consumption of the entire system is only 0.56 kilowatt hours per kilogram of material.

Shoot and cap: one-step manufacturing with a small footprint

"With each injection process, an injection molding machine produces completely finished closures, which are already provided with the functioning tamper band. In practice we call that 'shoot and cap,'" explains Peter Schmid, team leader applications at Netstal. On the whole, therefore, an injection molding system requires a comparatively small installation area. With the compression molding process, after the actual molding of the closures, the tamper band is first cut and then folded in separate systems. However, multiple process steps increase the complexity, which fundamentally increases the risk of faults in production, and they require more space.

Reliable functionality and flexible design options

Injection molding also provides you with many advantages when you design a closure. "Since it involves a universal type of machine technology, the options with regard to the shape and function of closures are nearly

THE ELION SERIES
Perfect technology for the highly efficient manufacture of all types of closures.

CLICK HERE FOR THE VIDEO

endless. Even flip-top closures, closures for sports drinks and other special closures can be made on the same machine. On the other hand, on a compression molding line you can only manufacture standard screw closures," says Schmid. "If you want to stay flexible, you will definitely choose the injection molding process."

Lightweights with sealing lips

Such a closure ought to fulfill primarily one critical main task: The bottle has to be absolutely and reliably sealed when closed. There must be no leaking, and foreign substances must not get into the beverage. That is accomplished by the sealing lips, which are inside of the closure. Particularly with very thin and lightweight models, designing these sealing lips is a big challenge due to the narrow processing window and the low material quantity. Even closures such as this can be manufactured with a reliable sealing function using the injection molding process.

Leading machine technology for perfect closures

"The big advantage of the injection molding process on the high-precision machines of Netstal is that, depending on the application and closure type, the material is injected at the processing temperature in less than 0.2 seconds. This makes it possible to shape and reproduce the finest sealing lips, which later protect the beverage in the bottle reliably," explains Schmid.

The properties of the products are influenced by numerous parameters. For example, the material shrinkage that occurs when the melt cools in the cavity also depends on the color masterbatch added. That is optimally balanced using the sophisticated Netstal control engineering. Colors can be changed within a very short time and a few cycles.

Perfect pressure substrate

Comparing the surface of injection-molded with compression-molded closures, we see that the injection-molded version usually has a visible and tangible injection point in the middle. Nevertheless, the closures are better suited for processing. In the case of labeled closures, the injection point is often less noticeable than the irregular streaks that occur in the compression molding process. These appear on the top side when the cut plastic pellets fall into the water-cooled mold. The material cools earlier and unevenly at the contact points, before being pressed into the mold at full pressure.

High overall equipment effectiveness leads to the lowest unit costs

On the whole, in the manufacturing of beverage-container closures today there are very many arguments for using state-of-the-art injection molding machines. The user benefits from very high flexibility and the excellent precision and repeatability of a one-step manufacturing process. "Thanks to the high overall equipment effectiveness of over 95 percent, most closures can be produced on Netstal machines with reliable quality and the lowest unit costs," says Schmid in closing. "This applies quite particularly to lightweight closures, which are manufactured worldwide in enormous quantities by the leading producers."

ADVANTAGES OF THE INJECTION MOLDING PROCESS WITH NETSTAL:

- Completely finished closures in only one operation (Shoot and Cap)
- Less space required in production
- Guaranteed leak-proof performance, even with especially lightweight closures
- Universal machine technology for all types of closures
- Maximum overall equipment efficiency and minimum unit costs

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IN THE BEST LIGHT
With eight cameras, the CapWatcher III inspects closures according to up to 30 criteria.

CLICK HERE FOR THE VIDEO

PLASTICS 4.0 AT DRINKTEC 2017

THE VIEW BEHIND THE VISION

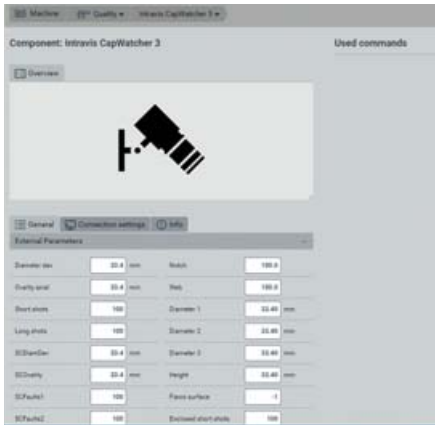
Ease of use, quality assurance and efficiency are continuing to gain importance as goals of development. Data from peripheral systems can now be evaluated in real time, and so the processes of injection molding machines can be adapted immediately. For drinktec, Netstal is collaborating with Intravis to present the vision of a control loop link between an injection molding machine and an optical inspection system.

TEXT: MICHAEL BIRCHLER PHOTOS: INTRAVIS, NETSTAL

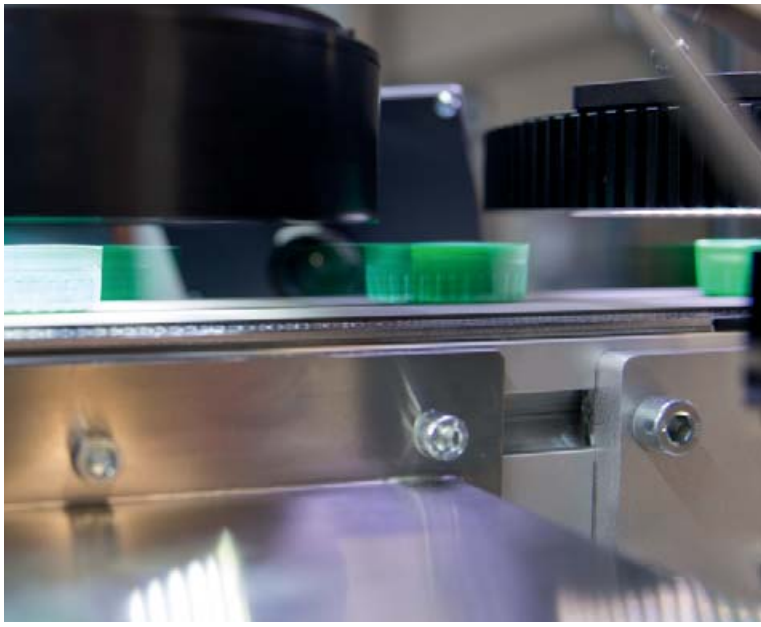
As providers of system solutions, the application engineers of Netstal work intensely on the question of how a complete production line can be made ever more efficient for closures, PET preforms, packaging and medical technology parts. "Our vision is an intelligent injection molding machine that can communicate with the connected peripherals and adapt to match them. This makes the entire process more robust in the face of disturbance variables," says Peter Schmid, Team Leader Applications at Netstal. The user benefits from greatly simplified operation and maximum cost-effectiveness.

Strategic development work in collaboration with Intravis

Peripherals are all systems connected to an injection molding machine as part of a production system: for material drying, dehumidifying, cooling and automation. Or an integrated video monitor, such as the one that German company Intravis develops for customers around the world. With its innovative solutions for turnkey optical inspection systems for plastic packaging, the Aachen-based company has been part of Netstal's strategic partner network for many years. One particularly successful product is CapWatcher III. The sophisticated system uses a total of eight cameras to inspect caps based on up to 30 different criteria. This includes, for example, ovality, diameter and color deviations of the caps. An inspection system can inspect and classify up to 252,000 individual caps per hour. When operating, the system generates extensive data about the numerous product properties. Until now, this information could be evaluated for trend analyses and manual corrective actions. In the future, the machine control system aXos will receive this data and immediately use it to adapt the process.



AXOS IS USED AS A COMMAND CENTER
The data transmitted by CapWatcher III are displayed in the machine control system.



Adaptive control loop via Euromap 82 interface

The specialists at Netstal and Intravis are working together for greater integration of their systems so that before long they can offer this critical added value to their shared customers. This will include an adaptive control loop between the optical inspection system and the control system for the injection molding machine. The two companies will already be presenting such a control loop for the first time at drinktec as part of a Plastics 4.0 showcase. The most important product properties of the caps that will be produced live at the trade show booth are continuously analyzed by CapWatcher III and transmitted to the aXos machine control system in the form of data packets. The Euromap 82 interface is used on the basis of OPC-UA. It is the standard interface for communication between injection molding machines and peripheral equipment.

Perfect integration of external data in the aXos machine control system

The application engineers and plastics technologists of Netstal in collaboration with Intravis have poured their expertise into new and practical aXos features. The data transmitted by CapWatcher III is displayed directly within the aXos machine control system as live specifications of the caps. If necessary, individual features such as the diameter can also be displayed on the individually configurable dashboard and remain in the machine operator's sight at all times. From this point, there are two conceivable integration scenarios. In a simplified scenario, an alarm is displayed on the aXos monitor as soon as certain product properties go beyond a defined tolerance range. Then the user has the option of manually making the necessary corrections. "If a cap diameter is too small, the user can set the desired diameter with a slide control. All underlying machine parameters are automatically configured," explains Schmid. Due to the continuous transmission of data in the control loop, you get feedback about the change in diameter as soon as the caps molded with the adaptation reach the inspection system. This in itself simplifies operation of the machine considerably and leads to measurable increases in efficiency. The actual goal, however, is to have continuously and substantially more complex coupling of the signals. The aXos control system can then respond adaptively to a minimum change in the diameter and, fully automatically, make necessary adaptations within the defined process window. Caps are produced continuously with the exactly defined product properties.

Making use of the full potential in closure manufacturing

The development work will extend beyond drinktec. As a result, customers with closure applications will soon be able to integrate CapWatcher III into their production system, thanks to the support of the aXos control system. There is a specific need: "Many of our customers are already very interested in this innovative solution, with which the user-friendliness and efficiency of their production lines are increased yet again," says Schmid.

INDUSTRY 4.0
The injection molding machine communicates with connected peripherals and controls manufacturing processes automatically.

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Processes & Products

MASS-PRODUCED DISPOSABLE SYRINGES
Efficient manufacturing with the injection molding process in clean room conditions.

TECHNOLOGY PLUS KNOW-HOW

MAXIMUM EFFICIENCY AND CLEANLINESS: INJECTION MOLDING IN CLEAN ROOMS

Today, clean rooms are the standard for manufacturing sterile or so-called "clean" parts for medical technology and the pharmaceutical industry. Netstal provides leading machine technology for injection-molding applications in clean room conditions and plans production processes for customers while taking into account the strict Good Manufacturing Practice (GMP) directives.

TEXT: MICHAEL BIRCHLER PHOTOS: GERRESHEIMER, NETSTAL

"Our experts at Netstal have the knowledge and understanding for the various qualification processes and make sure that important and mandatory documentation is implemented reliably and accurately," explains Dr. Patrick Blessing, Manager of Business Development at Netstal. In the case of medical applications, a very long and intensive project phase usually precedes the actual production start. The necessary foundation for implementing completely integrated system solutions is for manufacturer and customer to collaborate early on and closely.

Efficiency through division of labor

Complex production processes and tight schedules make it difficult for many manufacturers to implement the required calibration themselves with regard to the GMP directives. "We provide comprehensive capacities and extensive metrological expertise here, and thus we can guarantee calibration of the injection molding machines that complies with GMP," explains Blessing. The customer receives documentation that is comprehensive and GMP-compliant, which contains not only the standard operating instructions, but also the corresponding required documents, test certificates and checklists. The complete process occurs after consultation and in constant dialog with the customer.

NETSTAL ELION IN CLEAN ROOM DESIGN
Preferred production base for manufacturers of medical and pharmaceutical articles in many plants worldwide.

→ ELION MED (800 - 2800 KN)
www.netstal.com

"We can guarantee GMP-compliant calibration of the injection molding machines."

DR. PATRICK BLESSING,
HEAD OF BUSINESS DEVELOPMENT AT NETSTAL

The all-electric ELION provides high efficiency and cost-effectiveness

The machine technology of Netstal forms the basis for successful injection molding in clean rooms. The all-electric ELION with a clamping force of up to 2,800 kN has established itself as the cost-effective solution standard for medical applications. The uniform process stability and the high injection dynamics make the series a customized core element of complex production systems for pipettes, petri dishes, syringes, blood tubes, disposable contact lenses, insulin pens and many other plastic parts in medical technology.

Overall equipment effectiveness counts

"The high overall equipment effectiveness and reliability of ELION enables constantly good part quality with the lowest unit costs. At about 98 percent, the machine's availability is one of the highest in the market," underscores Blessing. The high precision and shot-to-shot constancy enables continuous production within narrow tolerances and efficiently reduces rejects to a minimum. The speed of the machine series is possibly record-breaking with drying cycles between 1.2 and 1.4 seconds. At the same time, the machines dazzle with how smoothly they run. "Many of our customers value the machine's harmonious, stutter-free sequence of movements and its noise emissions, which are particularly low compared to other brands," reports Blessing.

MED-KIT for consistently clean room-compliant equipment

Numerous options for consistently clean room-compliant equipment – depending on the selected equipment, ELION reaches a clean room class of up to ISO 5 – is available in what is called the MED-KIT. Most striking are the optimized design of the sheet metal surfaces and the special white paint. These not only lend the machine a medical appearance, but also make it easier to clean and thereby ensure that a particularly important requirement is met. In addition, elevation of the machine simplifies the regular cleaning processes under the machine.

The "Clean Purge" nozzle exhaust hood patented by Netstal significantly reduces the particle discharge during the purging program.

CLEAN ROOM 1×1

Profound expertise makes Netstal the preferred partner for manufacturers of plastic articles for the medical and pharmaceutical industries.

Guidelines
Corresponding to quality assurance for the production processes and environment:
- GMP (Good Manufacturing Practice)
- EMA – European Medicines Agency (EU)
- FDA – Food and Drug Administration (USA)
- ICH – International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (International)

Parameters
Continuous monitoring and control:
- Temperature, humidity, pressure
- Germ counts and particle loads

Measures
- Positioning of the particle sensors
- Control of the air-filter system
- Air-lock concept and clean room clothing
- Employee training
- Promotion of discipline
- GMP-compliant quality management system

For this purpose, the volume flow is automatically controlled depending on the operating status of the machine. "In addition, closed cable drags prevent undesired discharge of minuscule particles. A central argument for clean room applications," emphasizes Blessing.

Clean room-optimized design
Even in its standard version, the ELION clamping unit was consistently designed for use in clean production environments. All bearing points are optimally sealed, and the lubricating oil is fed into a hermetically sealed circuit. Furthermore, Netstal deliberately refrains from using spindles and belt drives. Both are typical sources of contamination, and Netstal does not consider using them for reasons of quality. The machine can optionally be equipped with a laminar flow hood, and additional finishers from INOX sheets facilitate laminar airflows. Galvanically sealed mold plates optimally protect against corrosion. All connections for water, air and electricity are fully integrated in the machine's protective cover – for flexible adaptation to various applications. And the mold single-circuit monitoring system uses flow rate, pressure and temperature sensors to provide for consistently high product quality.

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COST TRANSPARENCY

PREMIUM-QUALITY TECHNOLOGY PAYS OFF

Netstal is positioned in the market as a premium supplier; the injection molding systems from Switzerland are regarded as "pricey." Upon closer look, however, the Netstal series are less expensive than many machines from the competition. What is critical is not the acquisition price, but the overall equipment effectiveness. This is because the greatest profit potential is in the savings.

TEXT: GERHARD KONRAD PHOTOS: NETSTAL

In highly competitive markets every cent is important. "The product quality is specified by our customers as a firmly defined value," that is what sales team members from companies specialized in PET preforms, beverage-container closures or thin-walled packaging report. "The tendering party that gets the order is the one that can offer the lowest price and ensure the most reliable terms of delivery." The reasons are familiar. The producers operate in segments with low margins. Minimal differences in price per unit decide between profit or loss here.

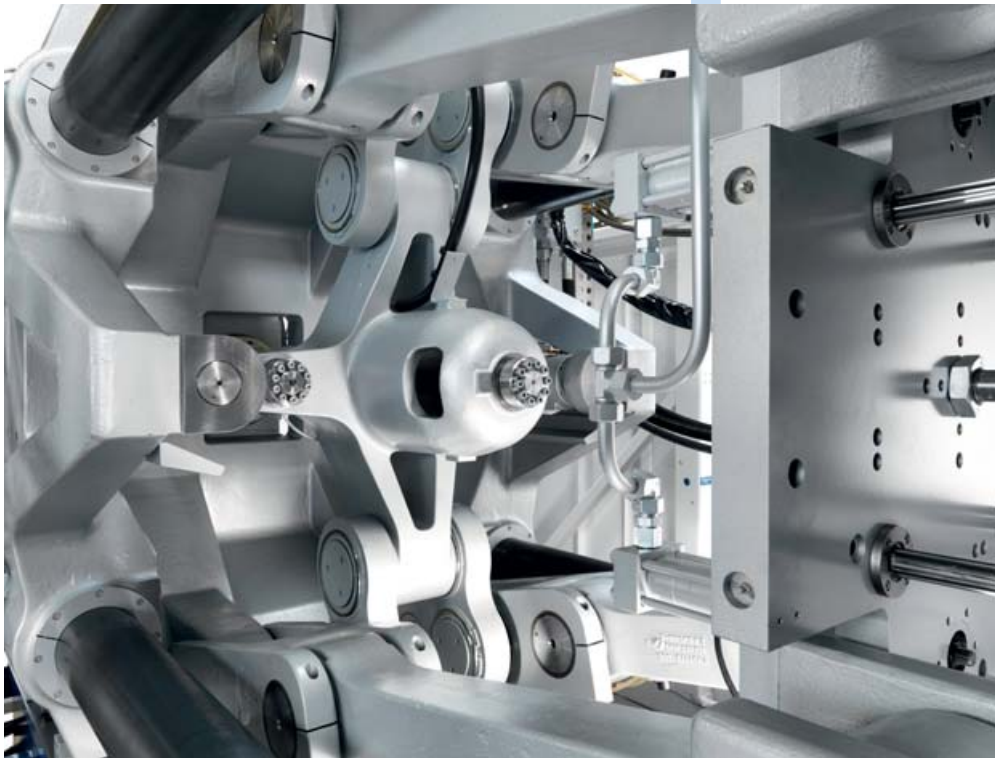
The partners in the supply chain also have to calculate with corresponding shrewdness. When a new injection molding system has to be chosen, therefore, the investment plays a central role. But if you look only at the acquisition price, you may quickly regret the supposedly advantageous investment.

Cost transparency increases potential

Consequently, "true cost transparency" has to take into account availability and reliability, production output and product quality. Netstal includes these in the term "true cost transparency" and thereby comprehensively characterizes the quality and performance capacity of an injection molding machine. These factors have a substantially higher leverage effect for reducing the production costs per unit. In the total cost consideration, a more expensive but higher-performance machine pays off very quick.

Tenths of a second make the difference

Quality problems, higher cycle times or more frequent maintenance work quickly push the overall balance of a machine into the negative. The most important indicators here are the production costs per unit. A five percent higher availability with Netstal frequently neutralizes the higher purchase price. And because in most cases the cycle time can also be shortened, even an approximately 20 percent higher acquisition price for the machine quickly pays off. Cycle times that are shorter by 0.2 seconds (thus, for example, 4.7 seconds instead of 4.9 seconds for production of an in-mold labeling yogurt cup) provide a unit cost advantage of about one percent at five percent higher availability.



NETSTAL ELIOS
Holds the speed record in the class up to 7,500 kN.

The greatest profit potential is in the savings

The actual percentage of machine investment costs per unit are usually only about

Your benefits with Netstal:

+ Constant product quality on the highest level

+ Economic success

+ High on-time delivery

three percent for injection molding products manufactured by the millions. In addition, there are other fixed investment costs for the mold, automation and peripherals. Of course, labor costs, energy costs and service charges as well as depreciation also affect the actual production costs per unit. However, in most applications the true cost drivers are the material costs. For example, for packaging applications up to 80 percent of the unit costs are for granulate and labels.

IML YOGURT CUP
73 percent material costs, three percent costs from the machine investment.

Built for continuous maximum performance

Why is the cost share of the machine so low? Premium-quality technology and proven expertise create reliably continuous maximum performance. Reliability and high availability are critical plus points for the systems from Netstal. Each assembly is designed for non-stop production under the toughest conditions. One example: the hybrid injection units from Netstal are developed for thin-wall applications with wall thicknesses of less than 0.5 millimeters. The dual-valve technology that is installed as standard in the ELIOS series and the hybrid versions of the ELION series enables injection times of less than one-tenth of a second. The injection speed is as high as 2,200 mm per second, a value never before attained in the market. The interplay between these two digitally controlled servo valves makes it possible to control the entire injection and holding pressure process with vastly greater precision. Users benefit immediately from the greater process consistency and consistent quality of the thin-walled packages. In addition, less scrap and fewer rejects are produced. The bottom line is that significant material savings and thus major cost benefits are achieved.

Performance, precision and productivity

The clamping units of the ELION and ELIOS series are designed for maximum output and the lowest mold wear. The ELIOS design offers the absolute best in terms of performance, precision and productivity in the upper clamping force range up to 7,500 kN. The solid five-point double toggle with electric movement and hydraulic clamping force build-up ensures smooth, harmonic movements even at the highest acceleration and mold speed. These properties make the largest ELIOS the fastest machine in its size class. The moving mold plate runs exactly and parallel on stable rails, protecting the mold. The closed oil circuit makes the system nearly maintenance-free.

COST COMPONENTS OF A YOGURT CUP

- 41% Material costs
- 32% Label costs
- 11% Depreciation of mold, automation, peripheral equipment
- 4% Depreciation of machine
- 4% Labor and maintenance costs
- 3% Energy costs
- 3% Capital costs of machine
- 2% Capital costs of mold, automation, peripheral equipment

+ Greater flexibility thanks to lower unit costs

+ High satisfaction of your customers

NETSTAL PET-LINE
Lowest energy costs in the industry for production of PET preforms.

Up to 60 percent energy savings
The drive system of the ELION and ELIOS series has been designed with sustainability in mind. Some 80 percent of the kinetic energy can be recovered from the movement of the clamping unit. This number speaks for itself. The autonomous energy management system distributes the recovered energy to the entire system in a way that is useful and prevents energy waste. The precise control technology continuously adjusts the speed to the optimal operating point. Overall, this makes it possible to save up to 50 percent of the energy used compared to conventional all-hydraulic technology. If all movement axes of the machine are servoelectrically driven, as is the case in the all-electric ELION variants, the additional benefit in efficiency is roughly another ten percent. In the world of PET preforms, the Netstal PET-LINE is delighting users worldwide with the lowest energy consumption of the industry.

Flexible control technology
To take advantage of the full performance potential of an injection molding machine, a powerful, highly flexible machine control system with intuitive operation is required. Netstal is setting the pace in this area as well with aXos. While many other manufacturers purchase their control systems from outside partners, Netstal has its own development department. This enables the control technology to be adapted optimally to the proprietary series, enabling additional increases in efficiency. Thanks to the great flexibility of the aXos control system, Netstal machines give most applications an additional speed boost compared to the competition.

The actual percentage of machine investment costs per unit are usually only about three percent for injection molding products manufactured by the millions.

Premium-quality technology that pays off
For decades now, the name Netstal has stood for outstandingly high-performance, efficient and reliable injection molding machines. Time and again, Netstal proves to its satisfied customers around the world that investing in high-end premium quality pays off. Manufacturers have flexibility in costing with low unit costs. High precision ensures consistent part quality. Reliable machine technology is the basic requirement for high on-time delivery – and of course, satisfied customers are less likely to switch suppliers. Those who produce using Netstal enjoy long-term economic success.

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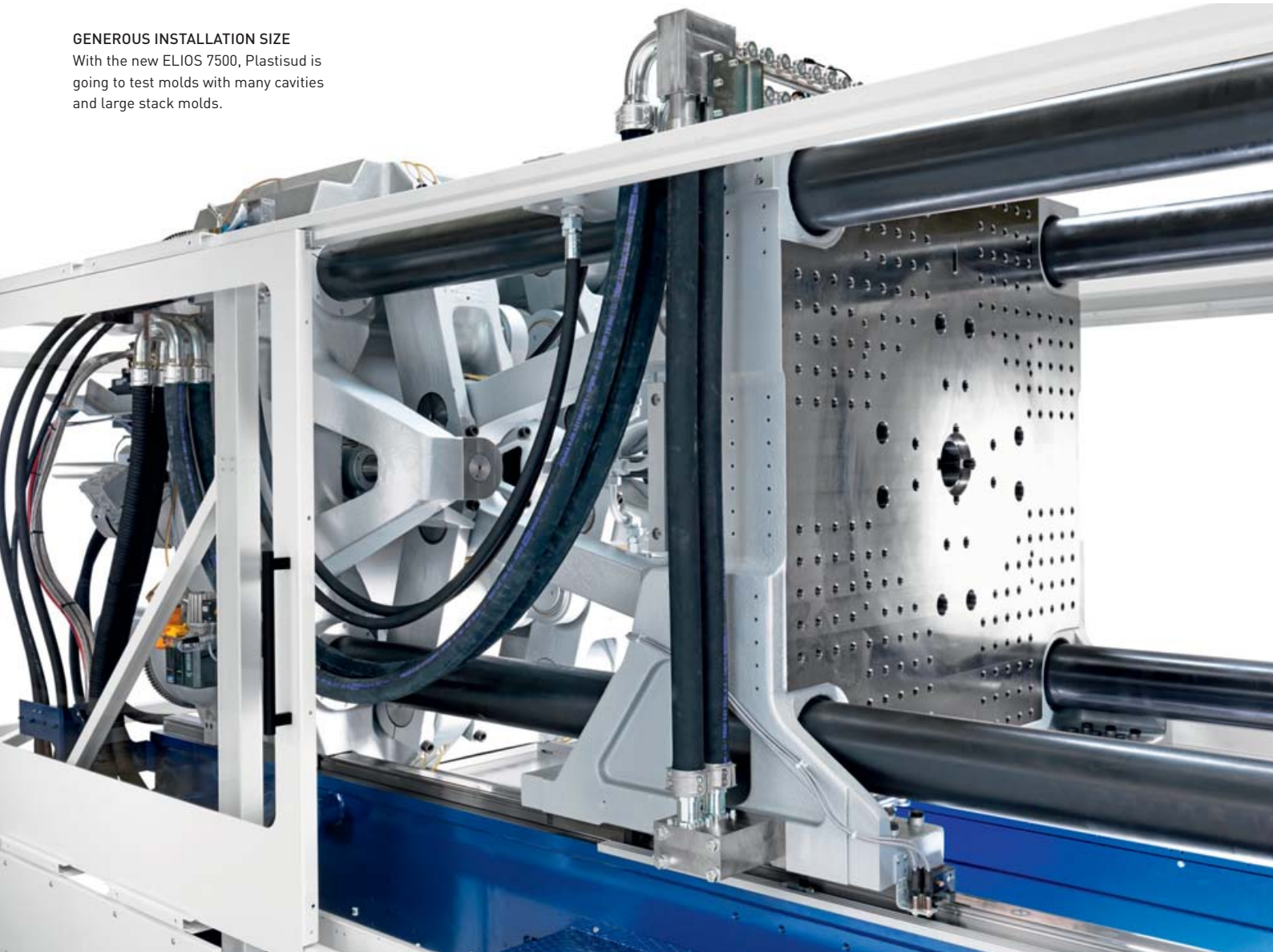
CLOSE COOPERATION

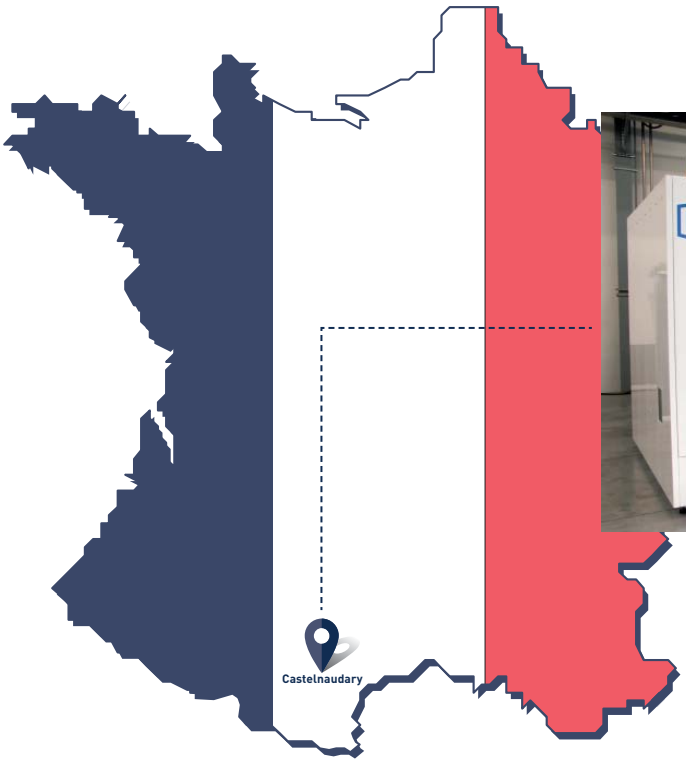
ELIOS 7500 FOR THE TECHNICAL CENTER OF PLASTISUD

The French mold manufacturer Plastisud has just received an ELIOS 7500 to supplement its technical center. Plastisud employs a staff of about 200 globally and is one of the world's leading manufacturers of high-precision injection molds for thin-wall packaging, beverage closures and medical components. Plastisud will use the ELIOS 7500 for intensive functionality and performance tests. Netstal and Plastisud have been working together closely for years. Plastisud's ultramodern technical center only contains injection molding machines from Netstal.

TEXT: MICHAEL BIRCHLER PHOTOS: NETSTAL



GENEROUS INSTALLATION SIZE
With the new ELIOS 7500, Plastisud is going to test molds with many cavities and large stack molds.



FOR FUTURE PROJECTS IN A HIGH CLAMPING FORCE RANGE
Installation of the ELIOS 7500 at the Plastisud Technical Center.

Mold commissioning with the ELIOS 7500

The new ELIOS is set up for the high performance and utmost precision required for thin-wall packaging. That's why the French mold manufacturer relies on the new Netstal series for performance tests of molds in the upper clamping force range. The new ELIOS 7500 was put into operation at Plastisud earlier this year. "In our technical center, we commission molds for our customers," said Plastisud CEO Laurent Buzzo. "We will need the ELIOS 7500 for future projects in a high clamping force range," Buzzo added. In particular, that means large molds for the production of lids, containers, cartridges, large beverage closures and petri dishes with a diameter of 90 mm. "We selected the new ELIOS because it perfectly meets our demands with regard to flexibility and adaptability. We have to test molds with many cavities and large stack molds on the ELIOS, but can also use it for smaller molds if the smaller machines are not available," Buzzo explained. "In this regard, Netstal and its ELIOS set themselves apart because the new machine can be adapted effortlessly for various projects. With its lightning-quick injection speed as well as rapid cycle times of about 2.5 seconds, it also offers an impressive performance package," said Jean-Luc Grange, Application Technology Manager at Netstal France.

Close cooperation between Plastisud and Netstal

Plastisud was founded in 1964 and has established itself as one of the world's leading manufacturers of high-precision molds for thin-wall packaging, beverage closures and medical components. The family-owned company has a staff of about 200 employees, most of which work at the headquarters in Castelnaudary, where all products are developed and manufactured. The company relies on its own ability to innovate and outsources almost no aspect of its work. In order to further stand out from its competitors, Plastisud began with the development of its own hot runner technology in 1969. The French mold maker Plastisud and the Swiss injection molding machine manufacturer Netstal have been cooperating closely for many years. The ultramodern 1,600m² test laboratory in Castelnaudary is exclusively equipped with injection molding machines from Netstal. Including the ELIOS 7500, Plastisud will cover the clamping force range from 900 kN to 7,500 kN with a total of eleven machines.

Injection-compression molding in a stack mold

Plastisud and Netstal are also working together closely in the field of application technology. In 2015, the two companies introduced the new ICM process (injection-compression molding in a stack mold, patented by Plastisud), which allows the production of thin-wall packaging with 20 percent less material and a clamping force that is reduced by 40 percent. "In order to establish the ICM technology on the market, we held the first ICM Days with 120 packaging experts at Plastisud in Castelnaudary last spring," said Jean-Luc Grange. At K 2016 in Dusseldorf, Netstal and Plastisud once again presented the ICM technology to a global audience of experts. On an ELION 2800-2000, which had been modified for the injection-compression molding process, margarine containers with IML decoration were produced in a 4+4 stack mold from Plastisud.

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COINJECTION PROCESS FOR COFFEE CAPSULES

AROMA PROTECTION WITH EFFICIENCY AND STYLE

Single-serve is the buzzword. In beverage filling, container sizes are shrinking all the time. Since Nespresso entered the field with its aluminum capsules, coffee powder has also been available in single portions. Due to the incredible growth rates, more and more companies are entering the market. Using what is called coinjection technology, Netstal now offers the ability to manufacture plastic capsules with a reliable barrier effect, including attractive IML decoration.

TEXT: DR. SABINE KOB PHOTOS: NETSTAL, FOTOLIA

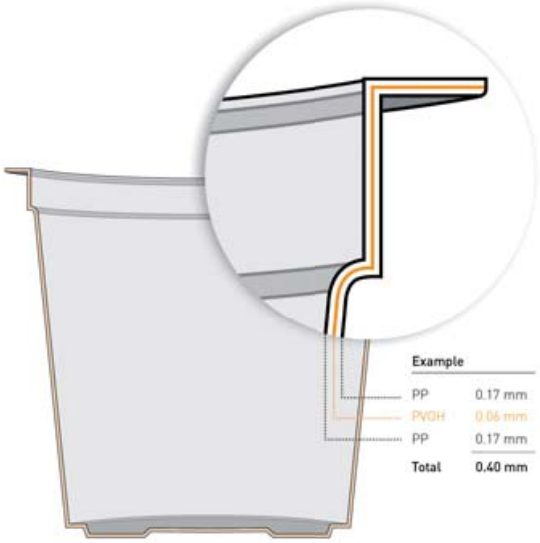
Visit Netstal at Fakuma in Friedrichshafen: from October 17 to 21, 2017

Hall A7, Booth 7303

Whether it contains coffee or tea, the most important task of a capsule is to protect the contents from the effects of oxygen, light and moisture. Only then can the consumer enjoy the full aroma. The familiar Nespresso capsule consists of aluminum, because it has ideal barrier properties. Another Nestlé product, Dolce Gusto, also uses the metal. Here, in a capsule with a complex design, as the floor of the chamber that contains the coffee powder. However, manufacturing aluminum consumes an extreme amount of energy, making it only logical to take advantage of the benefits of plastic for the disposable product. The critical factor then becomes how to ensure aroma protection. The new solution Netstal uses the coinjection process and the exceptional barrier effectiveness of polyethylene vinyl alcohol (EVOH) and polyvinyl alcohol (PVOH).

The coffee capsule: global consumer megatrend

From 2008 to 2016, global sales of coffee capsules grew fivefold. Since 2000, the proportion of single-serve coffee has increased to over one-third. This represents growth of over 130,000 percent! However, the market leader's share has dwindled to 11 percent since 2010 due to the 200 competing products that are now on the market. Many suppliers



SOPHISTICATED SYSTEM
Three layers for optimal aroma protection.

The entire wall thickness is only 0.4 millimeters.

use plastic. However, it is worthwhile to take a closer look at the details. Reto Gmür, Packaging Application Engineer at Netstal, explains: "Single-layer capsules made of polypropylene (PP), polylactide (PLA) or polybutylene therephthalate (PBT) have the wonderful property of being very easy to produce, but neither PP nor PLA have any barrier effect worth mentioning, and PLA is also not tasteless. PBT blocks oxygen to a certain extent, but is a relatively expensive material and not very widely used." Coffee capsules from low-end suppliers have a surprise hidden inside: They are packaged in little foil bags. The aroma that escapes from the single-layer capsules lingers inside the bag. The result is a pleasant scent when the capsule is opened but a disappointing, flavorless experience when the coffee itself is consumed.

With Netstal and its partners, the aroma remains in the capsule

The high-tech solution Netstal developed along with Fostag (mold-making), Beck (automation), IMD Vista (camera inspection) and Verstraete (label) therefore makes use of the possibilities of multilayer technology and has propelled it to the highest level of quality and efficiency with the shared expertise. In coinjection molding, melt is injected by two (or more) injection units into the mold cavities through the same runner. The material that arrives first is the "skin" of the molded parts, while the following component(s) make up the inner area ("core"). In the case of coffee capsules, two layers of PP surround one layer of EVOH, forming an extremely thin sandwich – the entire wall strength is only 0.4 millimeters. While the EVOH (0.06 mm) protects the coffee, the PP (each layer 0.17 mm) takes over protection of the EVOH, because otherwise the material – which provides an effective barrier – would absorb moisture and lose its ability to provide a barrier against gas exchange.

Coffee capsule with attractive IML decoration

In this application, which is being demonstrated for the first time at the Fakuma trade show in Friedrichshafen, an ELION 1200 with one main unit and one auxiliary unit produces the capsules in a four-cavity test mold with a cycle time of 4.9 seconds. In addition, the decoration is applied by the automation system using an automatically adhered IML label. The finished parts are stacked with the opening facing downwards, while a camera integrated into the handling system checks the position and thickness of the EVOH layer, after which the capsules are fed in bulk into a container.

The multilayer technology is also suitable for blocking light or using recycling materials. In the first case, the inner layer can be replaced by black polymer, while in the second, the exterior skin can be made of new material and the core of recycled plastic. Marcel Christen, Application and Product Manager at Netstal-Maschinen AG, has a positive outlook regarding the technology's future. "Sandwich injection molding offers such unique opportunities that we can imagine many other application areas. In addition to portioning out coffee and tea, these applications include infant nutrition, soft drink concentrate and medications."

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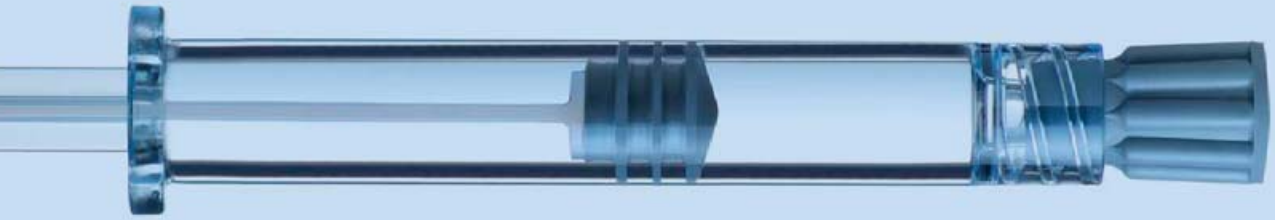
Partners & Projects

SCHOTT MANUFACTURES COC INJECTION UNITS IN THE CLEAN ROOM

PROFESSIONAL SERVICE FOR MAXIMUM EFFICIENCY

Since 1998, SCHOTT has been producing prefillable disposable syringes on Netstal injection molding machines at its location in St. Gallen, Switzerland. With a comprehensive range of services, Netstal has been supporting cost-effective long-term operation from the beginning.

TEXT: MICHAEL BIRCHLER PHOTOS: SCHOTT



The prestigious international technology corporation, SCHOTT, has an exceptional reputation around the world as a manufacturer of special glass and glass-ceramic for a variety of industries. In particular, the famous CERAN® glass-ceramic cooktop panel surely makes a major contribution to the high profile of the company, which is based in Mainz, Germany. However, the company's Pharmaceutical Systems business area also deals intensively with plastic.

At the SCHOTT location in St. Gallen, Switzerland, the company's 550 employees produce primary packaging for the pharmaceutical industry. The portfolio includes flasks, ampoules and carpules made of glass tube. For prefillable syringes, the customer also can choose between glass and the high-tech COC (cyclic olefin copolymer). "Glass is still dominating the syringe market. However, plastic is being used more and more frequently because it resists breakage so well and permits greater flexibility. Therefore, this business area is very important for us," says Michael Feldhaus, Director of Technology at SCHOTT Switzerland.

Precision supplier of injection molding machines

The collaboration began in the late 1990s, when Netstal was selected as a supplier for high-precision injection molding machines. Production now takes place in the GMP Class B (ISO Class 7) clean room with a machine pool between 600 kN and 1,500 kN of clamping force. Three Netstal SynErgy series machines form the backbone of production. The SCHOTT location in St. Gallen has fully automated systems that comply with GMP (Good Manufacturing Practice) and all other major pharmaceutical industry guidelines. The entire process of manufacturing the syringes is continuous and fully integrated. The granulate is fed from the storage silos to the injection molding machines. Injection molding and demolding are followed by additional process steps such as siliconization, camera inspection and

PREFILLABLE DISPOSABLE SYRINGES
Syringes made of COC resist breakage and offer greater design freedom.

CLICK HERE
FOR THE VIDEO

filling transparent tubs. These are sealed and packaged separately in the final step. The fully automated manufacturing process is monitored continuously by the in-line process control. Industrial camera technology is used to check the dimensions and cosmetic appearance. The reliable quality assurance system and the strict quality controls guarantee the consistent high quality of the syringe sets.

Professional service guarantees continuous operation

To ensure highly efficient manufacturing, manufacturers cannot rely solely on leading-edge machine technology. Only by combining this with optimal service will the best overall package be found. With its "Service & Solutions" technical customer service, Netstal provides support to its customers throughout the entire life cycle of the machine, from commissioning to phase-out. "The technical customer service is a valuable support for us. In particular, the expert advice the Service team provides and its flexibility in scheduling are benefits we value very highly," says Feldhaus.

A sophisticated Service strategy is indispensable to ensure production around the clock, 360 days a year, and prevent unplanned downtimes from the beginning. Therefore, all injection molding machines undergo regular service inspections in which certain components are preventively replaced before they exceed the usual service life and possibly fail. Netstal also ensures a supply of necessary spare parts for older machines. These service calls can usually be planned well ahead of time – for example, at times at which a standstill of the system is planned anyway. For this purpose, the Netstal team is available even on weekends.

> "The technical customer service is a valuable support for us. In particular, the expert advice the Service team provides and its flexibility in scheduling are benefits we value very highly."
>
> MICHAEL FELDHAUS, DIRECTOR OF TECHNOLOGY AT SCHOTT SWITZERLAND

Regular calibration

In addition, SCHOTT also has the injection molding machine calibrated by correspondingly qualified Netstal Service engineers. This ensures quality and product safety while simultaneously helping to ensure compliance with the stringent GMP requirements.

It is clear to see that the intensive collaboration pays off for the Swiss SCHOTT location. Despite running nearly all the time, the machines perform with exceptional stability, which is reflected in very high machine availability. When Feldhaus summarizes the benefits of the collaboration with Netstal, he emphasizes the Service partnership mentioned earlier. "We can always reach the Service team. We have dedicated contacts and can always depend on Netstal."

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ROTH MOLDMAKING ON A PACKAGING COURSE

EVERYTHING PACKAGED IDEALLY!

One year ago, Germany-based Roth Werkzeugbau GmbH expanded its in-house TechCenter by adding two high-performance EVOS injection molding machines. The high-speed packaging specialist machines are needed to create precision molds for thin-walled cups and covers in production conditions.

TEXT: MICHAEL BIRCHLER PHOTOS: ROTH WERKZEUGBAU

FAST AND HIGH-PRECISION MACHINES
In 2016, the Roth TechCenter was expanded by adding two Netstal EVOS injection molding machines.

And don't forget, everything Roth makes is guaranteed to work!" This is the promise heard by callers to the central Roth Werkzeugbau switchboard in the hold message. This thoroughly self-confident telephone message expresses the company's high standards for its own quality. "We either do it right or not at all. That's our motto," states Marco Roth, the second-generation proprietor of the family-owned company. His father, Rainer Roth, took advantage of the possibilities opened up by German reunification and founded the company from scratch in 1990. The first employees went to work in his barn. This sounds a little like a hip start-up story from Silicon Valley, but in fact took place in the tranquil area of the Auma-Weida valley in Thuringia, Germany, a region that is mostly farmland.

Industrial moldmaking with a high degree of automation

Notable progress has been made in the 27 years since the company's founding. The family-owned company has a staff of 140, making it one of the most important employers in the region. Despite its great success, the company remains modest and would prefer not to add any more staff. "We don't want to become an anonymous mass-production factory. We have reached a size that is manageable and still facilitates personal cooperation and collaboration," says Roth. Precision molds with a total weight of up to 14 tonnes are manufactured in shifts on state-of-the-art systems in an operating space of 20,000 square meters. The family-owned company depends on streamlined organization with clear structuring as well as a high degree of automation. This way they achieve an efficient production process that yields continuously comparable results. In addition, individual post-mold finishing of components is reduced

PRECISION MOLDS
Precision molds with a total weight of up to 14 tonnes are manufactured in shifts on state-of-the-art systems in an operating space of 20,000 square meters.

"With Netstal we have the right business partner at our side."

MARCO ROTH, ROTH WERKZEUGBAU

to a minimum. "For us, industrial moldmaking means that all molds are manufactured according to an exactly structured process. This way we ensure a consistent level of quality in accordance with the requirements of the customer," explains Roth.

Big growth targets with packaging applications
With packaging applications, Roth is developing a second strong mainstay next to the automotive industry. Today, the packaging area already contributes approximately 20 percent to the overall sales of the company. In the coming years, plans call for that percentage to rise to 50 percent. For Marco Roth, the central component for implementing this strategy is the company's own TechCenter. "Customers want more from us today than just a mold. We support them in making their injection molding processes more efficient. Not least of all, our longtime partnership with the KraussMaffei Group contributes to this by supporting us with expertise in the packaging area and covering the entire range of injection molding machines – all the way to the manufacturing of extremely thin-walled parts." Many technical applications are tested on the four injection molding machines from KraussMaffei. Then, molds for disposable and reusable packaging in the thin-walled range as well as higher wall thicknesses were added about five years ago.

Mold tests and acceptance runs under production conditions
This was followed in 2016 with the addition of two fast, high-precision EVOS injection molding machines from Netstal. Molds for thin-walled articles are tested on these under production conditions and developed until series production. Between the two machines with 350 and 550 tonnes of clamping force there is a highly flexible articulated arm robot for inserting in-mold

SUCCESSFUL ROTH PACKAGING DAY MARKS THE BEGINNING IN THE PACKAGING MARKET

Roth Werkzeugbau greeted more than 80 visitors on May 23, 2017, in its spacious TechCenter at the headquarters in Wöhlsdorf, for the first "Roth Packaging Day." With this event, the company from Thuringia marked its official entrance into the packaging market. Marco Roth, Managing Director of the family-owned company, reported at the beginning of the event that they have been intensively dealing with the particularities of packaging molds for about five years and have already completed their first projects, which has also definitely involved learning the hard way. Now they have gained enough experience to make the official beginning. The goal is ambitious: In five to ten years, they want half of the sales volume to be generated with packaging applications. In the company's own TechCenter, the validation of a four-cavity mold for rectangular cups with IML decoration on their entire surface was demonstrated on an EVOS 3500. The market entry of Roth Werkzeugbau produces interesting options for German producers in particular. Many important packaging manufacturers are at home within a radius of about 300 km around Auma-Weidatal.

SHOWING WHAT YOU CAN DO
Roth Werkzeugbau demonstrated the mold validation for an IML-decorated cup with a wall thickness of 0.4 mm.

labels (IML) and demolding the finished articles. Together with KraussMaffei Automation, a special solution was developed that optimally matches the requirements in test operation by a mold maker while also allowing for short cycle times. In IML applications the label is inserted into all cavities, which is an absolute novelty in the area of moldmaking. After the optimization phase, each mold completes a performance run and acceptance run on one of the company's own two EVOS machines. This eight-hour test operation is fully automated in order to model a close-to-production and reproducible production cycle.

Trend toward thinner and thinner wall thicknesses

To conform to the trend toward thinner and thinner wall thicknesses, Roth wants to try Netstal's further-developed injection compression molding process soon. "Our Netstal machines are ready for that. Now we have to build up the corresponding process knowledge to support our customers to that end. With Netstal we have the right business partner at our side," Roth says in closing.

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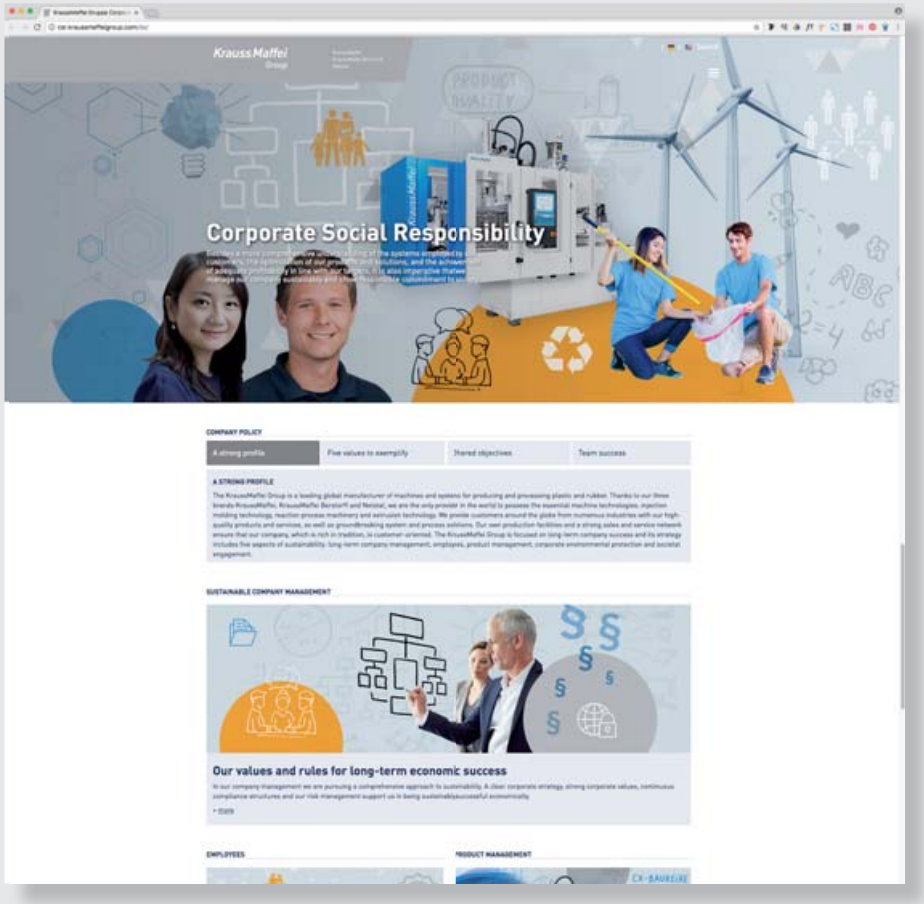
KraussMaffei Group

THE NEW CSR WEBSITE IS ONLINE

SOCIAL RESPONSIBILITY AND SUSTAINABILITY COUNT

The KraussMaffei Group pledges to uphold sustainability and, for the first time, is publishing non-financial information about its social responsibility on a dedicated website.

CSR (corporate social responsibility) is a general term used to describe a company's responsibility for sustainable management in economical, ecological and social terms. This year, CSR reporting became mandatory for large capital market-oriented companies as a result of a new EU directive. Although the KraussMaffei Group is not directly affected by the directive, it is in keeping with our mission to report about CSR topics proactively and with transparency. This so-called non-financial information regarding topics such as respect for human rights, environmental protection and social aspects is an increasingly important part of our corporate culture. Moreover, the information requirements from customers, representatives of public interests and potential employees concerning these topics are growing.



COMMITMENT TO SOCIAL CAUSES AND SUSTAINABILITY
The CSR website of the KraussMaffei Group provides information about current projects and measures.

The strategy of the KraussMaffei Group is focused on long-term corporate success and includes five areas of sustainability:

- Sustainable company management
- Our employees
- Product management
- Corporate environmental protection
- Social involvement

The current CSR projects include the use of environmentally friendly technologies and donations to non-profit organizations as well as professional development programs and development measures for employees. Of course, our sustainable compliance system also makes an effective contribution to the social responsibility of the KraussMaffei Group.

For more information, refer to our new CSR website:

http://csr.kraussmaffeigroup.com

Check it out!

TRAINING PROGRAMS

EXPERTISE DETERMINES SUCCESS

FIRSTHAND EXPERTISE
Experts convey knowledge about the technology and process.

Employees with sufficient training are a critical success factor in plastics processing. For this reason, the KraussMaffei Group offers the users of its systems a sophisticated, modular seminar program. The courses deal with practical aspects of machine operation and configuration as well as the theoretical basics of the work with all types of plastics. Qualified instructors share their knowledge of mechanical and hydraulic systems, machine control systems, servicing and maintenance of machines and fault management. New employees recognize opportunities to improve their performance and to implement the correct measures where necessary. Experienced machine operators can help them refresh their knowledge and learn to use new technical developments optimally.

Specific course offers

The seminars are each specifically tailored to the special features of products from the KraussMaffei, KraussMaffei Berstorff and Netstal brands, and to the needs of the target groups. The courses are held at all locations by request or at a customer's facility. We have developed a special selection of qualification courses for our customers in Mexico and South America. You can obtain information on the websites of the KraussMaffei Group brands, or contact your service contact or our sales and service partners.

THE NEW PX

THE ALL-ELECTRIC MADE-TO-MEASURE MACHINE

KraussMaffei presents the first all-electric machine on the market that the customer can tailor specifically to their production needs. The new PX series combines the advantages of an all-electric injection molding machine with maximum modularity. Processors will benefit from higher levels of precision, productivity and flexibility. The machines from KraussMaffei are integrated with features like APC plus, DataXplorer and interfaces for online service in Industry 4.0 landscapes.

At the Fakuma trade show, visitors can experience the new PX and its Plastics 4.0 solutions live, featuring applications from various industries and many equipment options.

THE DECISIVE FACTOR FOR COST-EFFECTIVENESS

TWIN-SCREW EXTRUDERS FOR PO RECOMPOUNDS

At the Fakuma trade show, KraussMaffei Berstorff is presenting concepts for a processing system built in a cascade design.

Customized compounds can be manufactured entirely or in part from recyclates. They feature similar characteristics to those of virgin materials, but at a significantly more attractive price point. Compatible processing units are required in order to create customized recompounds. Extrusion technology plays an increasingly important role here.

TRADE SHOW CALENDAR JANUARY 2018–JUNE 2018

India Rubber Expo, Chennai, India	01.01. – 01.01.2018	KraussMaffei Berstorff
Lightweight Technology, Tokyo, Japan	17.01. – 19.01.2018	KraussMaffei
Saudi Plas, Riyadh, Saudi Arabia	21.01. – 24.01.2018	KraussMaffei, KraussMaffei Berstorff
Interplastica, Moscow, Russia	23.01. – 26.01.2018	KraussMaffei Group
MD&M West. Anaheim, CA, United States	06.02. – 08.02.2018	KraussMaffei
Iran Plast, Tehran, Iran	07.02. – 12.02.2018	KraussMaffei, KraussMaffei Berstorff
Plast India, Gandhinagar, India	07.02. – 12.02.2018	KraussMaffei Berstorff
Gulfood, Dubai, United Arab Emirates	18.02. – 21.02.2018	Netstal
Tire Technology Expo, Hanover, Germany	20.02. – 22.02.2018	KraussMaffei Berstorff
PolyurethanEX, Moscow, Russia	27.02. – 01.03.2018	KraussMaffei
Foam Expo, Novi, Michigan, United States	06.03. – 08.03.2018	KraussMaffei
JEC World, Paris, France	06.03. – 08.03.2018	KraussMaffei
Plast Alger, Algiers, Algeria	11.03. – 13.03.2018	KraussMaffei
Plastics in Automotive Engineering, Mannheim, Germany	14.03. – 15.03.2018	KraussMaffei
Medtec, Stuttgart, Germany	17.04. – 19.04.2018	KraussMaffei
ReTEC, Essen, Germany	24.04. – 26.04.2018	KraussMaffei, Netstal
Tires & Rubber, Moscow, Russia	24.04. – 27.04.2018	KraussMaffei Berstorff
Chinaplas, Shanghai, China	24.04. – 27.04.2018	KraussMaffei Group
NPE, Orlando, United States	07.05. – 11.05.2018	KraussMaffei Group
Elmia Polymer, Jönköping, Sweden	15.05. – 18.05.2018	KraussMaffei
Utech Europe, Maastricht, The Netherlands	29.05. – 31.05.2018	KraussMaffei
Plastpol, Kielce, Poland	29.05. – 01.06.2018	KraussMaffei, Netstal
Plast Milano, Milan, Italy	29.05. – 01.06.2018	KraussMaffei Group

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In order to make the magazine easier to read, we have mostly dispensed with gender-related double designations (e.g., "male and female readers" – this is more relevant for the German text) for mixed groups of persons. The male gender form is used as a collective term.

Visit us online:
www.netstal.com

For a lot more information and a fascinating 3D animated video, visit **www.netstal.com/elios** or scan the QR code and dive right into the world of the new ELIOS.

Performance, newly driven
ELIOS – powerful, fast, precise

The ELIOS series is setting a new standard in high-performance injection molding with its innovative drive technology. The result is more than fascinating: up to 7500 kN of clamping force, a dry cycle time of 1.9 seconds* and a never-before-achieved energy efficiency. In combination with the proven precision, reliability and usability of Netstal you get a highly productive premium system for successful realization of demanding applications.

* ELIOS 7500, measured according to Euromap

Engineering Excellence

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