Dear Reader,

Made by KraussMaffei – our new magazine. The concepts, processes and systems described here will give you some idea of the breadth of our expertise. We are committed to using this expertise to develop engineering solutions for the challenges you face. And the scope of our business is now wider than ever before. By merging the extrusion activities of KraussMaffei and Berstorff to form the KraussMaffei Berstorff brand, we now operate as a system supplier supplying machinery for all the main extrusion processes for plastics and rubber processing.

With best regards, Manfred Reichel
Dear Reader,

Welcome to the first edition of our magazine Made by KraussMaffei. In this new customer magazine we aim to provide you with information specifically tailored to your interests, which is why the copy you are now reading is one of three parallel editions, one each focussing on injection moulding, extrusion and reaction processes.

This threefold approach reflects the unique expertise of KraussMaffei: we are the only company in the world which unites these three key technologies for the plastics and rubber industry under the same corporate umbrella. At the end of October, at the K2007 in Düsseldorf, we’ll be demonstrating that this has enormous advantages for you as a customer. We’ll be the first company worldwide to present a new process concept which integrates the three technologies of extrusion, injection moulding and reaction processes in a single manufacturing cell.

You as a customer will profit from faster cycle times, lower space requirements and an innovative concept that is ready for mass production. In short: we can offer you new prospects for deploying manufacturing processes which have hitherto not been feasible! KraussMaffei is currently going through a process of change. We will not be retaining the previous holding structure. In addition we have merged our extrusion activities under one management and a new, single brand, KraussMaffei Berstorff. Across all our core competences – in extrusion, injection moulding and reaction processing – we are committed to partnering with you in delivering not merely machinery, but complete solutions. Our expertise is comprehensive – from raw materials conditioning, through all stages of processing, to highly automated systems. Our goal is to supply innovative machinery and systems for an integrated complete solution.

See for yourself what the new KraussMaffei has to offer in products and services. And talk to us about what we can do for your business. Visit us at the K2007 in Düsseldorf, October 24 –31, 2007. Until then, we trust you will find a lot to interest you in our magazine. This first issue, naturally, focuses on the most important event in the industry calendar, the K2007.

I look forward to meeting you in Düsseldorf at the end of October!

Best regards
Dr. Dietmar Straub
A priority for KraussMaffei in communicating its new brand identity is to present the same strong identity across all business divisions and in all relevant target markets and groups. One of the key communication tools will be the new customer magazine *Made by KraussMaffei*, published in German and English. This is the first issue. It’s unusual in that, while presenting all the important information from the world of KraussMaffei, the layout has also been tailored to the special interests of people active in the fields of injection moulding, extrusion and reaction processing. The magazine has a dual structure. The first section of the magazine covers topics relating to KraussMaffei as a whole. In this first issue, the focus of pages 1 to 9 is mainly on the K2007, the most important event for us on the autumn trade show calendar. The content of the second half of the magazine will be different for each of our three divisions. The link between the three versions of *Made by KraussMaffei* will be the topics relevant to all three technology divisions. Although the design of all three versions is similar, it’s easy to tell them apart: on the title page the managing director of the division in question addresses his readers directly and in person.

Since July 1, 2007, KraussMaffei’s new orientation has been reflected in a new corporate design. The company logo has been given a new look which is both fresh and modern. The amalgamation of the extrusion activities of KraussMaffei and Berstorff has created the new KraussMaffei Berstorff brand, with a new logo embodying the new name. Injection Moulding Machinery (IMM) and Reaction Process Machinery (RPM) will use the KraussMaffei logo with the claim “People for Plastics”. A third logo variant, with no additions, will be used in any situation where the company presents itself as a unified entity, for example on the internet with the international domain name www.kraussmaffei.com. Important and practical for all concerned: the e-mail addresses of KraussMaffei staff members now follow a uniform and easy-to-use pattern: first name.last name@kraussmaffei.com. KraussMaffei operates successfully on a global scale, and so it makes sense to use the website www.kraussmaffei.com as the domain for e-mail addresses. The advantage of the new system is that if you know the first and last names of your contact, you automatically know his or her e-mail address.
Lead trade show and a high point for the industry

At this year’s K2007, the leading trade show for the plastics and rubber industry, the emphasis is on process optimization and increasing productivity. KraussMaffei presents its wide-ranging portfolio of products and services with a great many impressive innovations in injection moulding, extrusion and reaction processes.

The K2007, the traditional lead show for the plastics and rubber industry, takes place in Düsseldorf from October 24 – 31, 2007. Under the motto “Turning Visions into Business”, the K is set to attract over 3,000 exhibitors from over 50 countries with their products and innovations. Once again, world market leaders from Europe and the USA are strongly represented along with numerous exhibitors from China, India, Korea and Taiwan. They will be showcasing their innovations and lead products at this meeting point and trendsetter for the entire industry. This year there’s a strong market focus on process optimization to deliver cost benefits. This shifts the spotlight onto identifying new and expanded applications, onto faster and more flexible use of existing process technologies, and onto boosting machine performance and product quality. Enhanced-performance materials and novel process combinations are also high on the agenda.

The K2007 covers a total exhibition space of over 250,000 square metres, divided into four sections: machinery and equipment; raw materials and auxiliaries including semi-finished products; technical parts and reinforced plastic products; and services. The manufacturers of plant and machinery traditionally make up the largest group of exhibitors at the K and occupy Halls 1 to 4 and 9 to 17, that’s around two-thirds of the total exhibition space.

The KraussMaffei booth: breaking records
Our motto for the K2007 is “Our technology – your advantage – worldwide” and we’ll be...
presenting our unique expertise in plastics and rubber processing in Hall 15. Our booth A23/B24/C24 occupies around 1,800 square metres, making KraussMaffei the largest single exhibitor in this hall. As the only company offering high-quality machinery for the three key technologies injection moulding, extrusion and reaction processes, KraussMaffei will once again be one of the big draws at the K2007. A very special premiere will be the first joint appearance of KraussMaffei and Berstorff as the new Extrusion Division. Visitors will gain an overview of their combined strength and concentrated expertise.

KraussMaffei’s numerous exhibits include the largest machine ever exhibited at the K, a KM 2300-12000 MX SpinForm injection moulding machine. It’s on the KM booth, in the injection moulding section alongside other high-performance machines. RPM demonstrates its strength as an exclusive supplier of complete systems for PUR processing with a wide diversity of exhibits and examples.

Of course, one focus of attention will be on the future prospects of our Injection Moulding, Extrusion and Reaction Process divisions. More than ever before, KraussMaffei intends to exploit synergies generated by combining different processes and materials. A wide-ranging technology presentation on the KraussMaffei booth shows innovative engineering solutions, new materials and sophisticated technology combinations. KraussMaffei bundles the expertise of all divisions in order to supply customers with complete, application-specific solutions from a single partner.

KRAUSSMAFFEI EXHIBITS AT THE K2007

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A unique pairing

Centre of attention on the KraussMaffei booth at the K2007 will be machines which integrate several processes. These machines are capable of producing plastic components that match customer specifications today and tomorrow. This means premium surfaces, different surface combinations, and material pairings, all produced with short cycle times and low unit costs.

One of the most impressive machines at the K2007 will be on view at the KraussMaffei stand. It’s a manufacturing cell incorporating a spin-platen machine 21 metres long, nine metres wide, and weighing 200 tonnes. KraussMaffei will be demonstrating a SkinForm process where the PUR process is fully integrated in the injection moulding process. This process is ideal for highly-automated mass production in a “one-shot” process without manual post-processing. In the first phase, a complex thermoplastic substrate – the interior trim for a car door – is injection moulded. In the second phase, the plastic substrate is enhanced by adding a bi-colour polyurethane skin. The PUR mix is poured via a mixing head which is permanently docked onto the mould. In this application, the PUR skin has sections in different colours. The system on show uses KraussMaffei’s multi-colour mixing head ULKP-2KV+2K; pigment is added in the mixing chamber using a MicroDos pigment metering system. This makes it possible to change the colour of the PUR skin sections from shot to shot.

“As an automotive industry supplier, we must be able to rely on the innovative strengths of our partners.”

Pavel Neumann, Managing Director of CADENCE Innovation.

Higher quality, lower manufacturing costs

The trade show machine demonstrates the serviceability of the SkinForm process for volume production of parts which meet OEM requirements for higher quality and lower manufacturing costs. To achieve this KraussMaffei pooled its expertise in injection moulding, reaction processes, automation and tooling technologies. Together with CADENCE Innovation, an established automotive parts supplier from Liberec/Czech Republic, who took on responsibility for product development and mould making, we produced a component which meets OEM requirements for this technology. Pavel Neumann, Managing Director of CADENCE Innovation, explains the reasons for his company’s ongoing (since 1994) partnership with KraussMaffei: “As an automotive industry supplier we are operating in a very dynamic market. We must be able to rely on the innovative strengths of our partners. In KraussMaffei we have

Marco Gruber (left) and Frank Peters (right) welcomed Pavel Neumann (third from left) and Karl Elsnegg (second from left) of CADENCE Innovation at the KraussMaffei plant in Munich.
such a partner." Other cooperation partners are Rühl Puromer, ISL Chemie, Bayer Material Science, Bomix, Syventive, Eschmann, Kistler, Robot Technology and Skoda, the OEM.

“All in one”: the X-Form process

A concept machine from KraussMaffei integrates three processes – extrusion, injection moulding and reaction processing – in a single manufacturing cell and thus achieves considerably shortened cycle times. “All in one” achieves the elastic properties and high resilience of natural rubber and other elastomers through an innovative curing step. KraussMaffei will demonstrate that this machine is ready for mass production with the fully automated manufacture of a typical 2C component with integrated vibration damping, similar to a roll restrictor. The substrate and the load-bearing collar, made of Ultramid CR (PA66-GF35) from BASF, are joined together in the mould, in a 2C process, by an injected damping element with adhesive properties.

A trailblazing process

The damping element is made of Elastollan (TPU-X) from Elastogran; it is integrated during the cooling process following the moulding process. The crosslinking agent is added to the TPU melt as a liquid prepolymer and the two substances are mixed on a KraussMaffei injection moulding compounder (IMC). IMC machines successfully yoke continuous extrusion and discontinuous injection in one machine. Because the extruder operates continuously, it ensures that the crosslinking agent is metered continuously into the TPU melt and thoroughly mixed to produce a homogenous compound. The plasticized and homogenized material is injected via a heated runner and an injection piston into the mould. Both parts of the process – compounding and injection moulding – are highly repeatable. This means constant quality throughout the whole production run, and the tight tolerances familiar in injection moulding. With a thermoplastic process, it becomes possible to use modern tooling and hot runner systems and to deliver a high-quality, sprueless and flashfree product. The mould comes from Mues. Dr. Erwin Bürkle, Manager Research and Development Process Engineering (Injection Moulding Machinery) at KraussMaffei, describes the particular problems which had to be solved in the development of the process. “The thick walls of the injection moulding component require a relatively long cooling period. In order achieve a short cycle time, we decided to apply the TPU-X in two layers.” Despite the thickness of the TPU-X element, manufacturing the part in stages in a rotary table mould made it possible to cut cycle time to 60 seconds instead of 900 seconds using other processes. As Dr. Bürkle pointed out, “This material combination and the new manufacturing process developed by KraussMaffei and Elastogran opens up completely new prospects for applications which were previously restricted to rubber-metal pairings. With this process we can make a huge difference to production times. We think we’re right to call it a trailblazing process.”

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KraussMaffei has perfected the one-step CoverForm process to apply functional surface coatings under cleanroom conditions in the mould right after injection moulding. The simple process cuts the cost of applying a protective, scratchproof layer to plastic parts.

PMMA is the material of choice whenever transparency is high priority, for example, in displays or cockpit instruments. PMMA produces the hardest surfaces of any thermoplastic material, but for some applications which demand a super-hard surface the PMMA is given an extra scratchproof coating. This coating used to be applied in a relatively complicated post-mould process. This has all changed now that KraussMaffei and Degussa have jointly developed the CoverForm process. The coating is applied under cleanroom conditions to the PMMA substrate in the mould immediately following injection moulding. It’s a simple and reliable process that cuts costs dramatically.

**A dustfree environment**

A laminar-flow box above the KM 80-180 CX clamp unit creates a dustfree environment. Operating under cleanroom conditions inside the machine safety housing, a KraussMaffei IR 50F industrial robot picks the coated part from the mould, presents it for sprue-removal and deposits it on a conveyor belt where curing completes under UV light in a post-mould process.

**Thin coating layer**

KraussMaffei is demonstrating this process for the first time at the K2007. A specially developed small-volume mixing and metering system is used to pour the liquid, acrylic-based reaction mix – produced by Degussa GmbH, Düsseldorf – into the mould cavity. The low viscosity of the reaction system lends itself to long flow paths. The compression moulding stage spreads the coating evenly over the PMMA surface. This process produces a very thin coating layer – under 50 µm. The coating cures in two stages – it cures in the mould until the parts can be demoulded without damage; curing then completes under UV light in a post-mould process.

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Diversity for the senses

Surface look&feel determines whether plastics products look expensive or cheap. High-quality surfaces can only be achieved with suitable processes.

There’s a huge diversity of plastic surfaces out there. And look&feel strongly influences our intuitive response to a product – which is why the design of the surface is such an important factor product design. At the K2007 KraussMaffei shows its expertise in this field with a wall of surfaces showing some of the wide variety of surface finishes available.

**PUR spray skins**

PUR spray skins are a cost-effective way of producing high-quality PUR skins for complex components such as instrument panels, centre consoles and door trim for vehicles. This technology offers, above all, wide freedom in component design. Complex geometries, such as undercuts, can be designed as required. Sprayed material is very evenly distributed, guaranteeing uniform layer thickness. The result is surfaces that look and feel expensive.

**More colour with SkinForm**

The combination of the SkinForm process and the spin-platen technology makes it possible to coat a thermoplastic substrate with a polyurethane skin, which can combine varying thickness and colours. The process is ideal for highly-automated mass production without post-processing. The new spin-platen machine, which KraussMaffei is showcasing at the K2007 (see page 6), will be producing this type of part. The complex thermoplastic substrate is injection moulded and then, in the second process stage, the polyurethane surface – in varying colours – is added. The resulting surface not only looks like leather, it also shares many of the properties of the natural material.

**Films and sheet for many tasks**

Optically clear films and sheet are used where high levels of transparency, scratch and impact resistance, UV durability and thermoforming ability are required. Films reinforced with fibre insulate houses, swimming pools and rubbish depots. Technical films with a variety of surfaces are used in the automotive and furniture industries and in civil engineering. XPS insulating panels are a favourite with home builders, because they are highly pressure resistant, non-rotting, a good heat insulator and virtually non-flammable. KraussMaffei Berstorff offers a very wide range of machine concepts for innovative end products.

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Dear Reader,

Welcome to our new company magazine Made by KraussMaffei. It covers some of the huge range of concepts, products and applications that go to make up our business spectrum. We trust it will give you an idea of how committed we are to using this expertise to develop engineering solutions for the challenges you face. KraussMaffei Berstorff is a system partner supplying machinery for all the main extrusion processes for plastics and rubber processing. We are specialists in all the main processes. With the new company structure, KraussMaffei Berstorff is well-positioned for accelerated growth. We will be expanding our sales and service presence in the fast-growing markets of Eastern Europe, Asia and the USA.

We are currently experiencing a surge in demand for extrusion capacity in the construction, packaging and automotive industries. This trend can be observed across all segments and geographic regions, with orders ranging from single machines to complete extrusion lines. We have already been able to realise a large number of successful projects together with our customers. I hope you will find a lot to interest you in the magazine. If you would like more information, you are assured of a warm welcome at our booth in Hall 15 at the K2007. We trust that you will take away an impression of our competence across the whole range of extrusion technologies and our dedication to delivering solutions. We would welcome an opportunity to develop innovative solutions for your business.

With best regards

Manfred Reichel
Member of the Management Board, Extrusion Technology

Highly satisfied with KraussMaffei Berstorff

On July 16, 2007, the Thai company Thai-Asia P. E. Pipe Co., Ltd (TAP), located near Bangkok, designated KraussMaffei Berstorff as Grade A supplier for the past half year. The designation, made in line with ISO 9001:2000, indicates very high satisfaction with a supplier’s performance. TAP has built an outstanding reputation as a manufacturer of high-quality PE pipe and fittings systems. The company is also a pioneer in production of HDPE pipe up to 1600 mm diameter. Most of the extruders in the company’s production plant come from KraussMaffei Berstorff and they include various single-screw extruders and multilayer pipeheads for the production of three-layer HDPE pipe. Recently we supplied a KME 125-36 B/R for extruding large-diameter pipe.

KME 125-36 B/R single-screw extruder.

Thai-Asia P. E. Pipe is located near the pulsating city of Bangkok.
Flexible polishing stand meets all criteria

At the K2007, KraussMaffei Berstorff is showcasing the PlanetCalander. Flexibility makes this polishing stack ideal for optically clear film and sheet. It unites all the advantageous processing features of standard polishing stacks. Of the three cooling rolls, only the central roll is fixed in position. By adjusting the position of roll 3, the PlanetCalander can adjust its cooling behaviour to very different materials and sheet thicknesses. In addition, the PlanetCalander’s whole base frame can be tilted so that the intake angle of the product into the first roll nip can be precisely controlled. Fast roll change is another of the PlanetCalander’s advantages. Production of optically clear film and sheet often requires the use of various embossing rolls. The middle roll on the PlanetCalander can be hoisted out and replaced in under an hour.

SALES SUCCESS FOR A VERSATILE MACHINE

The 360th 36D extruder

KraussMaffei Berstorff’s 360th 36D single-screw extruder was part of a bigger order for the Swiss company THE Thomas Machines. THE builds and supplies complete systems for the production of irrigation pipe and also sells components for aluminium composite pipe. “THE has partnered with our company for many years,” explained Franz Füreder, KraussMaffei Berstorff sales manager. “They buy our single-screw extruders to process LDPE and LLDPE and they are very satisfied with our products and services. We’ve just booked an order for 13 more KME 45-36 B/R and KME 60-36 B/R extruders – one of them is the 360th 36D single-screw extruder we’ve sold.” Compared with conventional extruders, 36D single-screw models, launched at the K2004, can achieve up to 40% higher output – and the melt is very homogenous both thermally and materially.

White roofs of California

Californian roofs have turned white since Arnold Schwarzenegger became governor. He advocates wide-ranging measures to save energy and reduce emissions of greenhouse gases. More and more roofs are being covered with white sheeting that reflect the sun’s rays and keep building interiors noticeably cooler than dark-coloured roofs. Orders for film extrusion lines to produce the white sheeting have shot up as all the leading roofing suppliers in California strive to keep pace with demand. KraussMaffei Berstorff supplied complete systems – from silos to product packing systems – with two, three or four twin-screw extruders as core production line components. Some of these production lines achieve output rates of up to four tonnes an hour with sheet widths between ten and twelve inches.
KraussMaffei Berstorff’s wide product portfolio demonstrates the company’s ability to deliver engineering innovations for the extrusion sector. One core competence is single-screw and twin-screw extruders for plastics and rubber processing.

The company’s other major specialities include complete production lines for compounding, physical foaming, sheet and film extrusion, technical rubber products and tire intermediates.

KraussMaffei Berstorff’s high-quality product portfolio gives the company a decisive competitive advantage. With a core competence in single-screw and twin-screw extruders for plastics and rubber, the company’s other major specialities include complete production lines for compounding, physical foaming, sheet and film extrusion, technical rubber products and tire intermediates.
Our labs offer you facilities for extensive machine and material trials, for example, to test a new formulation. You can count on intensive and competent support throughout the trials from KraussMaffei Berstorff engineers and technicians.

In recent years, continuously escalating specifications for products and higher expectations for cost-effective production processes have driven the pace of development across all segments of extrusion technology. With numerous technical innovations and patents, KraussMaffei Berstorff has contributed strongly to the development of more differentiated and cost-effective processes.

Rubber
- Extruders and extrusion lines for tire profile components and technical rubber products
- Profile systems consisting of high-performance extruders plus vulcanization know-how and downstream units for continuous production of rubber, TPE or silicone rubber profiles
- Roll covering systems for fast and easy coating of rolls, sleeves or pipe with various rubber compounds
- AUMA rotational press for simultaneous doubling and vulcanization of multiple rubber sheets
- V-belt production systems, complete lines for the production of sheathed or open-flank V-belts and ribbed V-belts

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Extrusion lines on show in the KraussMaffei Berstorff lab.
Specialist for big pipes

Productivity and top quality: KraussMaffei Berstorff supplies complete solutions for large-diameter pipe.

Pipe made of plastic or plastic composites is rapidly gaining market share in the large pipe market. This is partly due to surging demand from countries and regions as diverse as Russia, China, Saudi Arabia and South America, where large pipe is needed to build drinking water pipelines or wastewater networks. District heating networks are another interesting area, with international suppliers increasing turning to large steel pipes inside plastic jacketing. The gap between the steel pipe and the plastic jacket is filled with foamed polyurethane for effective insulation.

Opening the way for this new development is the availability of large-diameter PO pipe at an affordable price. KraussMaffei Berstorff teams 36D single-screw extruders with spiral distributor pipeheads to offers its customers an innovative production solution that scores on low costs and highest quality. The high-performance extruders can be relied on for output up to 1700 kg/h. Teamed with our top-of-the-range KM-RKW 40 pipehead, for example, the extruder can be used to produce pipe up to 2000 mm diameter with wall thickness up to 100 mm.

For maximum flexibility, we also offer a reducing adapter, for a pipehead diameter range from 630 to 2000 mm.

Gentle plasticizing and a homogenous melt
The proven successful screw design for these extruders, with a L/D ratio of 36, stands for high output, gentle plasticizing and a very homogenous melt. Fillers and colour masterbatch are mixed in evenly and thermal homogeneity is excellent. Sagging behaviour is improved and cooling zones shortened by the use of low sagging resins and the fact that 36D extruders keep melt temperature low. Excellent product quality and KraussMaffei Berstorff’s proven ability to
engineer stable processes make this system an attractive option for cost-competitive production of very large pipe.

**Easier pipe dimension change**
A number of engineering details make the system even more productive. These include optimized flow through the spiral distributor, aided by precision channels in the predistributor zone, and easier die-set change. KraussMaffei Berstorff engineers set out to minimize the time and the material costs involved in changing pipe dimensions. Their solution was to suspend the pipehead in a mounting carriage with electric motors that allow the operator to tilt the pipehead for easier access to the die set. Optionally, the pipehead and mounting carriage can be designed to move sideways out of the line. These improvements sharply reduce the time and material costs of changing pipe dimensions. Starting with the engineering excellence of the 36D single-screw extruders, KraussMaffei Berstorff plans intelligent complete systems for cost-effective production of large pipe. Our engineers work with you to deliver a custom system – from the metering system, through calibration, cooling and cutting, to the right maintenance and service concept. It takes this type of holistic approach to make sure you benefit from the full value-adding potential. Especially with large pipe, engineering details in the calibration unit and the vacuum and cooling tanks can make a huge difference. All the baths use a specially designed system to support and convey the pipe. For easier line start-up, the spray baths are designed to be moved longitudinally and sideways. The rolls that support and centre the pipe as it moves through the tanks are height adjustable. This ensures that the start-up pipe moves easily towards the pipehead and significantly reduces set-up times.

**Adjust line settings at the pipehead**
The vacuum tank consists of three hydraulically coupled chambers – 1.5 meters, 6 meters, 6 meters – with intensive cooling in the intake zone. The first tank is short, but cooling is intensive, so that wall thickness spread can be measured with a handheld device already at this stage. This means that the operator can make any necessary adjustments right away at the pipehead, for extra material savings. In lines up to 1600 mm, the 12-track haul-off has a take-off force of 120 000 N. Float-mounted tracks guarantee smooth, reliable transmission of the necessary forces. During start-up, the start-up pipe is winched smoothly through the extrusion line towards the haul-off. Once the pipe reaches the haul-off, the winch is detached. The parting system in these big pipe lines is a planetary cutter unit with both a saw and a knife. The advantage of a “combi-cut” is that, while most of the wall thickness is cut through by the rotating saw blade, the last few millimetres are cut by the knife, in a process that produces no swarf. This eliminates the problem of swarf contaminating the pipe sections. All key line components are controlled by KraussMaffei Berstorff’s C5 control system. One development goal was to maximize flexibility and ease-of-operation. Production lines for large pipe are necessarily very long, so that having a second operator panel makes the operator’s job much easier and reduces the error risk. Cable or wireless connection to the main control unit is offered as an option.

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Extrusion line components for large PO pipe, incl. the KME 150-36 B/R and the KM-RKW 39 pipehead.
Building block concept saves time and money

KraussMaffei Berstorff has developed a building-block concept for a complete compounding system, with the different system components “packaged” as separate modules. We’ll be showcasing this time- and cost-saving system at the K2007.

On-site, the separate modules are easily connected to produce a complete compounding system. The modules – extruder, upstream and downstream components – are integrated in packages the size of a shipping container. The extruder module, for example, comprises the extruder itself plus all auxiliary units – vacuum pump, cooling system, switching cabinet, etc. All necessary electrical and media connections within each module are provided. Pelletizing, drying, classifying and bagging are also bundled as modules. The extruder, a ZE 50 UTX, is itself engineered on a modular basis, making it easy to configure an application-specific machine from standard modules. Each system undergoes comprehensive factory trials at the KraussMaffei Berstorff plant in Hanover, Germany, before the containers are shipped. On arrival at your production plant, the modules are positioned, connected up and your compounder is ready to start operating.

This approach has a number of important advantages. One obvious benefit is much faster installation at your site. And you save on construction costs – the frame construction of the modules means you can stack them without building a special supporting structure. All you need is a basic hall to put them in.

Get off to a fast start

Your system can be operational within a very short time. Any connection or interface problems will have been identified and eliminated at the KMB factory. You can also have your employees trained and products certified during factory testing in Hanover, so that you are ready to go almost as soon as your system arrives. Another consideration is that a modular, building block system is much easier to move than a conventional system. This becomes an important consideration if you have to expand or move your factory. The modules are easily disconnected, transported and reassembled again at the new site.

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At the heart of this innovative system concept is a corotating twin-screw extruder from the ZE series. Teaming a short rubber extruder with a gear pump makes it possible to meter the rubber melt to the connected compounding extruder at the correct rate for the formulation being processed. In this way, the rubber is metered volumetrically to the compounding process. The innovative combination has a number of advantages for processors. Instead of expensive granulate, they can process split bale rubbers directly. This simplifies the process and cuts manufacturing costs – by eliminating cost-intensive pregranulation, the use of separating agents and problems with reagglomeration.

The rubber extruder is tasked with intake of the material, plasticizing and building up melt pressure ahead of the intake zone of the gear pump, so that the pump is always 100% filled and able to meter the rubber component to the compounding extruder at exactly the required flow rate. The gear pump keeps the volume flow constant. The compounding extruder continues to mix the rubber melt and mixes in other components, such as carbon black or resins.

**Steady and stable**

This operating method of this new system is completely different to that of the internal mixers currently used to produce rubber compounds. Internal mixers have all the disadvantages of discontinuous processing. By contrast, the rubber extruder/gear pump/compounding extruder combination offers the advantages of a continuous process. Most important is constant mixing quality, eliminating the problem of variation between batches. In continuous processing, energy consumption rates are also constant, so that production becomes more cost-efficient. The new process is completely automated. This reduces labour costs and eliminates filling and idle times.

KraussMaffei Berstorff has developed a new system for rubber extrusion. Combining a rubber extruder, a gear pump and a twin-screw extruder makes a continuous production process possible. Compared with discontinuous processing on conventional systems, the new system delivers decisive cost benefits.

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Schüco International KG is a global supplier of complete window systems incorporating plastics, aluminium and steel. When it comes to manufacturing the plastic profiles, the company is now using regrind-core technology. A cooperative project with Greiner Extrusion and KraussMaffei Berstorff has produced a double-strand extrusion solution to produce 5-chamber window profiles.

Innovative production line for window profiles

No other raw material offers as many recycling options as plastic. One example is regrind-core technology, where a profile core is made of recycled material and the outer layers of virgin material in a ratio of around 60% virgin material to 40% regrind. Schüco is using this technology to make window profiles. Launching its project to develop an optimal solution for production of its 5-chamber main window profiles, Schüco decided to work with two strong partners from the extrusion sector, Greiner Extrusion and KraussMaffei Berstorff. Thanks not least to decisive synergy effects, it took the three companies only a very short time to plan and implement a solution. The big challenges were to design the die, to split up and manage the melt streams, and to come up with a cost-effective extruder concept. It was decided to use only two extruders so as to be able to manage both melt strands. The melt streams were then split in the dies via a pressure-optimized channel system and extruded in the required pattern. Two KMD 90-32/P extruders were chosen for the job. They each have a guaranteed output for PVC virgin material of 180 to 390 kg per hour. To feed melt into the channel system, the two extruders must be positioned very close together.

Flexibility for tomorrow’s markets

It was decided to keep the two extruders completely independent – with separate base frames and separate control cabinets (located away from the extrusion line). Two extra compact control units, positioned close to the extruder output zone, house the die control circuits and the operator panels. Both operator panels (one for each extruder) are on the operator side. Each extruder can be controlled separately, with an override facility for synchronized operation. This concept allows Schüco to keep its options open for the future.

In the meanwhile, the company has an extremely cost-effective solution. It all goes to show that the skills and know-how of a strong team can master today’s challenges and tomorrow’s as well.

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In the past couple of years, a number of new application areas have opened up for chemically-foamed PE and PP sheet. Highly integrated sheet extrusion lines from KraussMaffei Berstorff are capable of producing high-quality sheet at a constant conveying speed – with the properties required for a specific application.

Chemically foamed polyethylene and polypropylene sheet products are far from new. Which makes it all the more surprising that so many interesting new applications are only now opening up. One factor driving this development is certainly the rise in raw materials prices, which has encouraged foamed sheet processors to venture into applications that were formerly the preserve of compact, homogenous intermediates. Currently the focus is not so much on the physical strength of the foamed product as on other benefits like their thermal insulation and soundproofing properties, low weight, low transport costs, lower raw material consumption and prospects for sandwich products with foamed cores.

In some applications it’s possible to reduce the density by around 15%, compared with compact sheet, to produce a foamed product with a density of between 0.75 and 0.8 g/cm³. With viable mixtures of HDPE and LDPE grades, it’s relatively easy to achieve densities under 0.7 g/cm³. Despite their lower densities, the physical values for this type of foamed sheet don’t fall far short of those for a homogenous polymer, and despite the cellular structure, their surfaces are relatively smooth, even and closed. These types of sheet can be used very successfully for interior cladding in containers and coolers, in chemical process equipment, and in water and sewage treatment plants. The foamed panels from 5 to 15, and even 25 mm, thick can be worked and handled like compact sheet. They are also good for welding.

High conveying performance
KraussMaffei Berstorff has developed highly-integrated sheet extrusion lines for the production of PO foamed sheet. Line output is between 800 and 1000 kg an hour and each line can be individually planned to customer requirements. Crucial for the optimized performance of the whole line is the single-screw extruder that is capable of conveying the melt at a constant high rate even against high die resistance and without a melt pump. The KraussMaffei Berstorff system delivers excellent sheet quality with a uniform, finely distributed cell structure in the sheet cross-section.

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PO sheet extrusion line: typical of the highly integrated sheet lines supplied by KraussMaffei Berstorff.
EXTRUSION TECHNOLOGY

Krauss Maffei Berstorff

Extrusion Technology Division

This division supplies machines and lines for the production and processing of plastics and rubber. The product range of KraussMaffei Berstorff offers single-screw extruders, twin-screw extruders and extrusion lines for the profile, sheet, pipe and film extrusion and rubber processing, calenders, rotary presses, foam extrusion lines, v-belt production lines and pelletizers. In fiscal 2005/2006, the division began producing systems for pipe and profile extrusion in its plant in China.

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