

Profit from the expertise
of a system supplier
Complete pipe extrusion lines

Engineering Value

Krauss Maffei
Berstorff

Facts and figures regarding pipe extrusion

Applications



Direct-extruded, highly filled,
three-layer pipe



Aluminum composite pipe



Two-layer, corrugated PP pipe



Multilayer PE pipe



PUR foam-insulated pipes



PE-X pipes



Socketed PVC pipe



PVC foam core pipes



PP-R pipe with glass-fiber reinforced
core layer



PE pipe for transporting
drinking water



Telecommunications pipe



Extra-large PE pipe up to 2500 mm
diameter

For every application, we offer systems tailored to your wishes, from a single source. No matter what kind of pipe you are making – whether smooth or corrugated, made from PVC or PO – KraussMaffei Berstorff pipe extrusion systems keep all your options open:

- Drinking water pipes
- Sewage pipes
- Irrigation pipes
- Drainage pipes
- Hot water and heating pipes
- Cable conduits
- Gas pipes
- Multilayer pipes
- PE-X pipes
- RTP pipes
- Coextruded pipes with different combinations of materials, e.g. PVC foamcore pipes
- Aluminum composite pipes
- Highly filled pipes
- PUR foam-insulated pipes
- Sheathing for steel pipe
- Microduct bundles (conduit for fiber-optic cable)
- Extra-large pipes up to 2500 mm diameter

Profit from the expertise of a system supplier Complete pipe extrusion lines

Whether you are processing PVC or PO, KraussMaffei Berstorff has everything you need for producing plastic pipes from 5 mm to 2500 mm in diameter – including automation components for maximizing material savings.

Our product portfolio covers single-screw extruders, counter-rotating and corotating twin-screw extruders with the corresponding pipeheads, and downstream components through to fully automated pipe lines. All our components and automation systems are consistently engineered to maximize savings on materials, energy and costs, without compromising on product quality. We are your expert partner for any type of pipe extrusion line.

Your benefits:

- First-class system and process solutions from a single source
- System solutions for efficient and effective production
- Expert partner for customer-specific special solutions

Meet the machines

Take a tour of a high-performance extrusion line for pipe production

Socket-forming machine

For bonded, O-ring and pressure pipes in standard and high-performance versions for PVC and PP pipes



Cutting unit

Cross-cut saw, planetary saws and swarf-free cutters for cutting all thermoplastic pipes to length

Haul-off

Belt haul-offs, double caterpillar haul-offs, multiple caterpillar haul-offs

Calibration systems

For PVC, PO and engineering plastics, sleeve or diskpack calibrators or a fully automated QuickSwitch solution

Spray bath with high-performance cooling

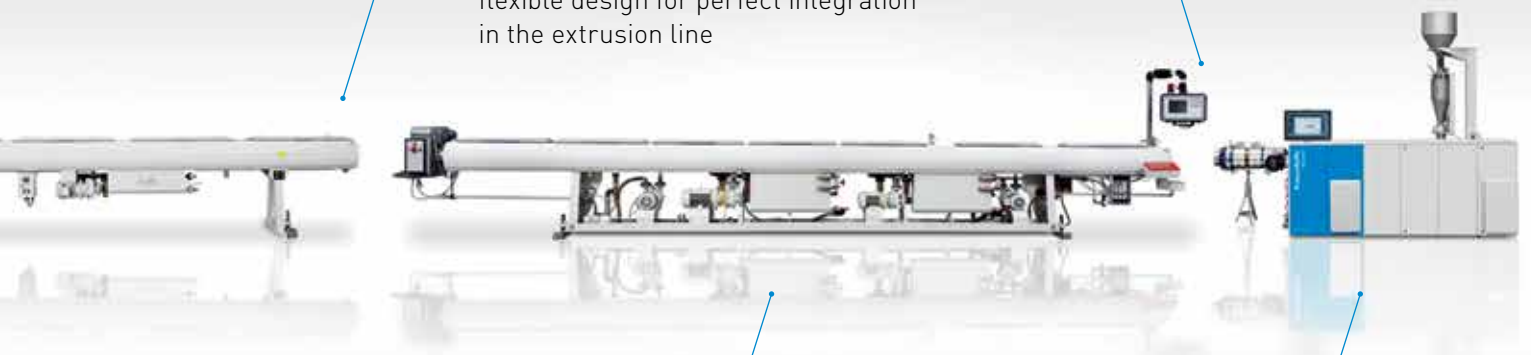
Spray bath and vacuum tank with flexible design for perfect integration in the extrusion line

Vacuum tank

State-of-the-art and easy to operate with multiple options for ensuring optimum quality

Single-screw extruder

For PO materials, with spiral distributor pipehead





Twin-screw extruder
KMD 75-36 E2/R



Single-screw extruder
KME 90-36 B/R

The perfect team line-up for successful pipe extrusion – from the extruder to all peripherals

KraussMaffei Berstorff develops and provides complete conventional and fully automated extrusion lines, ranging from extruders, pipe molds, downstream and automation components, to all peripheral equipment.

Application-specific, proven line components

Our extruders, molds, calibration systems and downstream components are tailored to your individual requirements and have already been tested multiple times. All downstream components such as vacuum tanks, spray tanks, haul-offs, cutting units, socket forming machines and additional equipment are engineered for optimum interoperability; the automation components are designed for maximum operational safety and ease of operation and servicing. All functions for control and monitoring are fully integrated into the modular extrusion line control system. The result: With KraussMaffei Berstorff systems, you achieve the highest output with the greatest possible flexibility and maximum material savings. We also supply a range of optional addons for our complete extrusion systems:

Fully automated additional equipment

- Seal ring insertion robots
- Pipe hoist and pipe rotating units
- Bundlers
- Palletizers

Winding systems

We supply single and twin winders for polyolefin pipe up to 160 mm in diameter.

Additional equipment

- Mixers
- Material feeding systems, plus weighing and metering systems
- Screen changers
- Melt pumps
- Wall thickness and diameter gages
- Marking devices
- Winches as start-up aid
- Pipe bending machines
- Thread-cutting machines
- Shredding and grinding systems



Single-screw extruder
KME 60-41 B/R



Direct extrusion system

The heart of your extrusion line – KraussMaffei Berstorff extruders

Twin-screw and single-screw extruders are the powerful heart of your pipe extrusion line. Thanks to their modular design with integrated control cabinet and control panel, our extruders are tailored to every application and can meet any market requirement.

36D twin-screw extruder series

Our 36D twin-screw extruders with their HPG (High Performance Geometry) screw concept are ideally suited to producing U-PVC, M-PVC and foamcore PVC pipes, as well as PVC-O pipes and pipes with a high filler content. The HPG screw design incorporates an effective preheating length with an extended output and mixing zone. The whole length of 36 L/D can be used

for processing the PVC compound. This is very advantageous for processors because it allows considerable flexibility when processing many different formulations – with maximum output and a perfectly homogeneous melt every time. The HPG screw concept reduces process fluctuations to an absolute minimum for all types of PVC pipe formulation.

36D single-screw extruder series

Our 36D single-screw extruders are specially designed to produce polyolefin pipes in an extremely cost-effective way by combining very high output with premium pipe quality. The processing unit is engineered for flexibility and has high-performance screws that are matched to the raw material. All extruders are fitted with a high-performance U-shaped gear system and have a flexible drive concept (AC or DC motor) for maximum versatility.

41D single-screw extruder series

As a high-performance model, the 41D series is ideally suited to increased throughput with excellent product quality in PE and PP processing. Combined with the patented screw concept, the real 41 L/D processing length – as a continuous new development from the proven and successful 36D single-screw series – offers a disproportionate increase in specific throughput and, at the same time, enables low melt temperatures, which bring about outstanding homogeneity.

Global system solutions for sustainable production solutions



36D series single-screw extruder
fitted with AC motor and gearless drive unit.

KraussMaffei Berstorff is reinforcing the global market trend towards conducting sustainable business operations by developing, manufacturing and delivering efficient, premium quality product solutions. This includes criteria such as high machine availability, optimal performance and maximum product quality, which processors demand in line with the principle of "Overall Equipment Efficiency". This is what we strive for, which is epitomized by our commitment to delivering "Engineering Value".

Sustainable production thanks to reduced energy consumption

Energy is generated and dissipated in different forms throughout the extrusion process. This energy is needed for overcoming physical enthalpy and achieving a molten state, as well as for cooling and solidifying after molding. This means that energy consumption is an important factor in the cost-efficiency of an extrusion system. KraussMaffei Berstorff offers modern drive solutions and efficient heating and cooling systems together with intelligent line control – thereby making a significant contribution to reducing energy costs and increasing productivity.

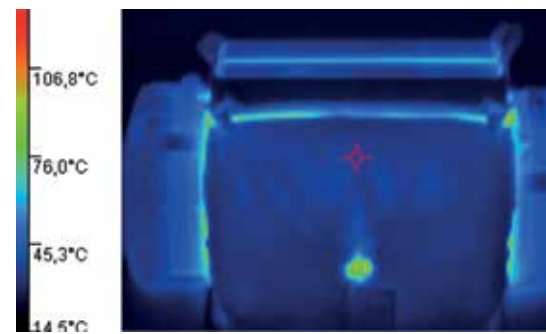
Drive concepts for efficient production

KraussMaffei Berstorff single and twin-screw extruders are fitted with highly efficient air-cooled (or water-cooled) AC motors as standard. In combination with optimized gearboxes, this drive train offers outstanding levels of energy efficiency for a wide range of speeds and applications. The very high efficiency of the motors enables different polymers to be extruded efficiently even at partial load and guarantees energy savings of 5-10% when compared with standard motors. A number of models are also available with direct drive and high-torque motors, which offer additional energy-saving potential despite the higher investment costs. Maintenance and servicing costs can also be reduced by using gearless drive units. For extruders in the 41D series we offer frequency-controlled cooling fans, which combine uniform cooling from an air flow with energy efficient operation.

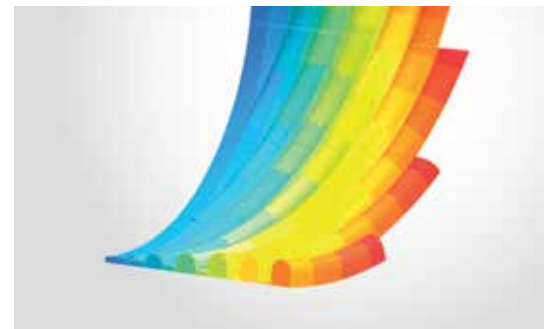
EcoPac insulation for saving energy

All our twin-screw extruders can be fitted with EcoPac insulating sleeves, which achieve further energy savings of 5-10% both during continuous operation and during the heating phase.

Energy can even be saved when using KraussMaffei Berstorff pipeheads. EcoPac insulating sleeves, which are also available for pipeheads, significantly reduce heating times. Heat output can also be considerably reduced in stationary operation. In combination with optimally designed flow channels, which allow the melt to flow efficiently with low pressure loss, our pipeheads make production cost-effective and efficient.



Energy efficient EcoPac insulation



Computer-aided design for optimal spiral geometry

Optimal systems for maximum machine availability

Controlling costs is a top priority in pipe extrusion. Competition is fierce and the prices that can be charged for extruded pipes are sometimes not much higher than the cost of their raw materials. Keeping your material consumption as low as possible is therefore decisive in reducing costs and increasing profitability. KraussMaffei Berstorff extruder systems are unrivaled in their ability to get the most pipe out of the least material while maintaining consistent quality. Large quantities of raw materials can be saved by keeping pipe diameter and wall thickness within tight tolerances. This can be achieved only by employing a sophisticated control system capable of measuring and regulating the entire extrusion line. All components and automation systems in our pipe extru-

sion lines are consistently engineered to maximize savings on materials without compromising on product quality. We have developed flexible extrusion lines to increase cost-efficiency – such as the QuickSwitch System for making in-line dimensional changes without interrupting production of PO pipes. Other processes that reduce material costs include:

- Gravimetric melt throughput measurement and closed-loop control systems for dispensing materials precisely
- Ultrasonic measuring gages for defining wall thickness exactly
- Direct extrusion systems for manufacturing cost-effective, highly filled PP pipes
- 36D twin-screw extruders, which have been engineered specifically for manufacturing highly filled PVC pipes with a chalk content of up to 60 phr

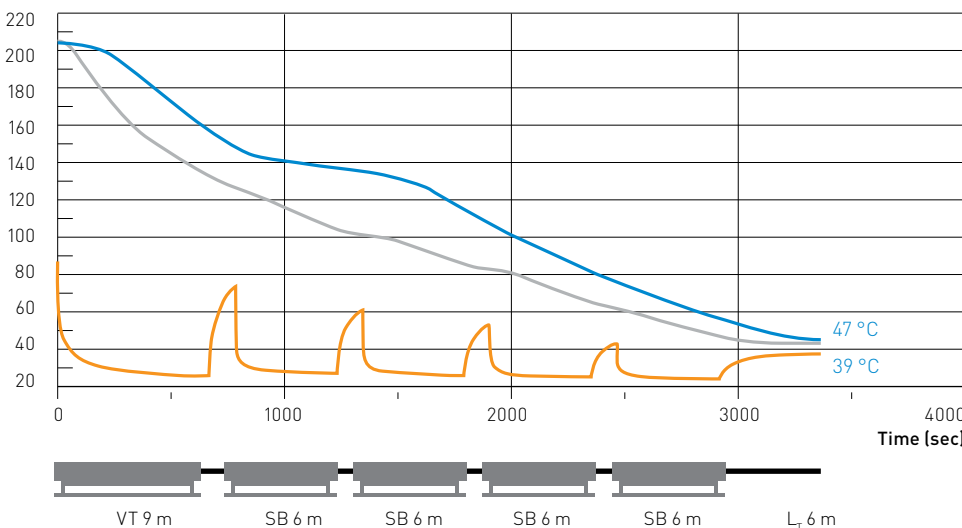
Increasing productivity with innovative IPC technology

The technology developed by KraussMaffei Berstorff for internal pipe cooling (IPC) is the answer to the constantly increasing demands of pipe producers for an extrusion system that takes into account efficient production, minimum space requirements, reduced investment costs and increased output, which are the most important criteria in making a decision.

With the aid of IPC technology, you can not only cool the outside of the pipe with water in vacuum tanks and cooling baths, but also cool the inside of the pipe using air. This has a particularly positive effect on thick-walled pipes, from which heat can be removed only very inefficiently using standard cooling technology.

Design of the cooling zone (vacuum tanks and spray baths)*

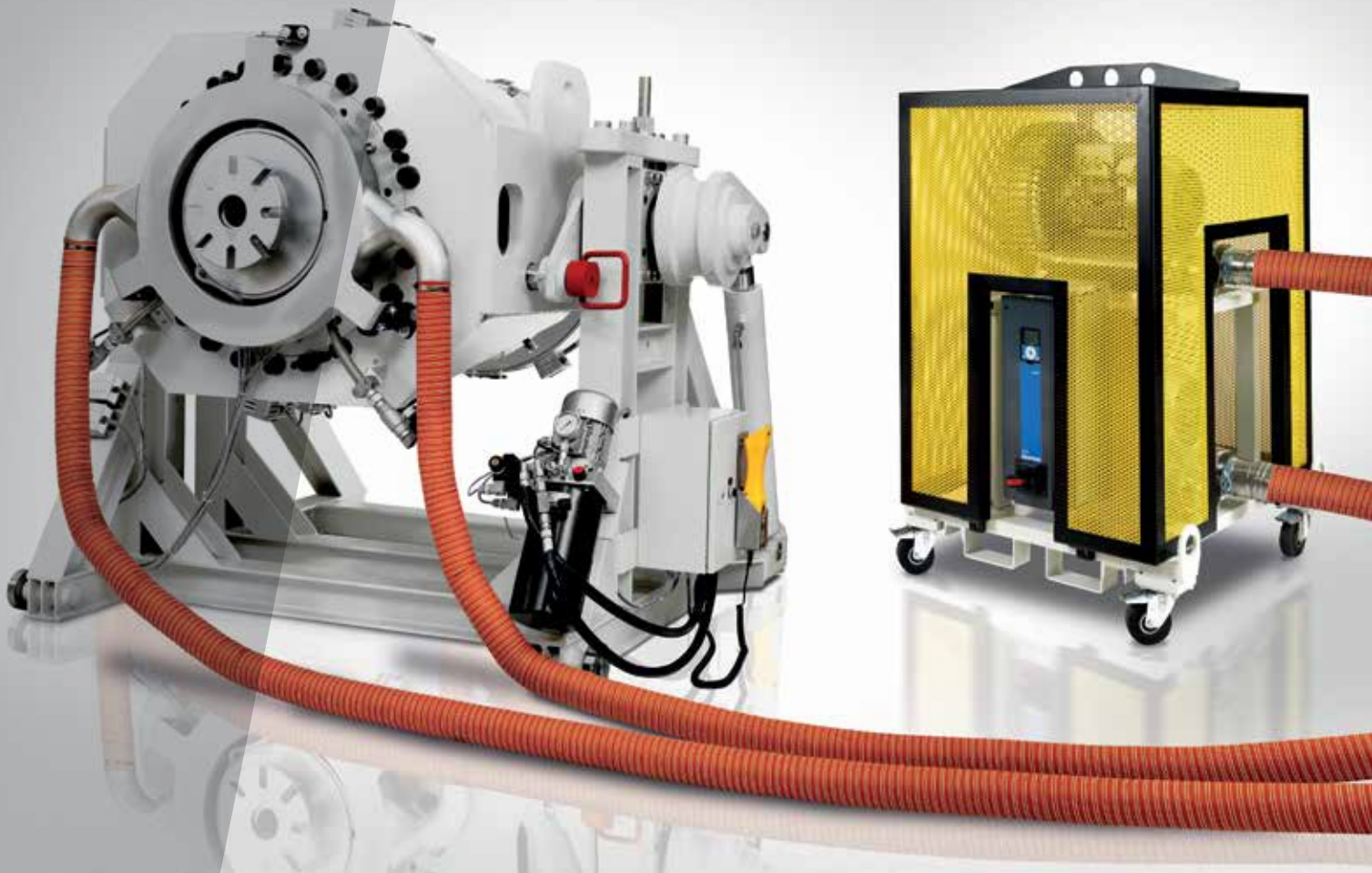
Temperature [°C]



Pipe diameter/wall thickness 225 x 20.5 mm
Line speed: 0.8 m/min
Distance VT-SB 1.5 m
Distance SB-SB 1.5 m
Total cooling length: 45 m

Inner pipe layer
Core layer of pipe
Outer pipe layer

* Tailored to individual production requirements



The IPC system can be used with all PO pipe extrusion lines from 110-2500 mm in diameter (producing SDR 26 pipe and below). The processor benefits from considerable advantages – for example, shortening the cooling section by up to 40 percent reduces both investment costs and space requirements.

Twice the throughput with double-strand extrusion

Improving extruder performance will increase your profit margins. Modern high-performance extruder lines, which cost little more than earlier ones, increase your productivity without requiring more space or additional staff to operate them. Double-

strand extruders are a good example. Pipe throughput is often constrained by the die pressure, the calibration system or the haul-off speed. Double-strand extrusion doubles the extruder's throughput of small-diameter pipe. Adjusting the haul-off speed and the cutter function separately for each strand cuts material consumption to an all-time low, because differences in material flow can be allowed for and wall-thickness kept within tight tolerances. Double-strand systems are available for diameters ranging from 12 to 160 mm.

Your benefits:

- Robust, high-performance, drive system for single and twin-screw extruders – this makes the extruders particularly low maintenance and durable
 - Consistently high output rates at low screw speeds
 - Outstanding and consistent product quality
 - Efficient and cost-effective production
 - Outstanding price/performance ratio
-



Extruder-pipehead combination
for producing PVC foamcore pipes

C6 control system – flexible system for open-and closed-loop control and monitoring of an extrusion line

With its new, innovative C6 control system, KraussMaffei Berstorff offers fast, direct access at all times to the individual units of an extrusion line, the extruders which work conjointly to produce the product, and to integrated downstream equipment.

With its numerous monitoring and control functions, the C6 control system ensures optimal production preparation and transparency throughout the production process, thereby satisfying the most stringent requirements for excellent product quality and a high level of process reliability.

Multi-touch technology for intuitive operation

The C6 control system is equipped with the latest multi-touch technology and state-of-the-art hardware components. A high-resolution 24-inch full HD screen provides an optimal overview. The intuitive operation and clear screen layout facilitate fast intervention and provide a comprehensive process overview. Units and functions can easily be operated and activated via the touchscreen display. With the C6 control system, KraussMaffei Berstorff has placed a particular emphasis on maintaining continuity in the design

in terms of both its operation and its functionality, which have proven successful over a great many years.

Maximum flexibility

The C6 control system offers the user an incredibly high level of flexibility. The composition of parameter pages can be chosen freely, and display and parameter texts can be tailored to individual requirements. In addition, the system components can be connected and disconnected as required.

Fast, secure access management using RFID technology

The C6 control system allows fast, secure access by means of non-contact identification using RFID readers. Remote diagnostics via the Internet and data interfaces to connect to the company network tip the balance to make the C6 control system the perfect solution for all your extrusion line's control tasks.

Your benefits:

- Modern, innovative operating philosophy
- Fast, intuitive operation
- Highly flexible
- Maximum process reliability
- Optimal monitoring of integrated system concepts and standalone machines
- A variety of user-friendly models



Various operating configurations are available



Swivel-mounted on switching cabinet (standard version)



Mounted on switching cabinet door, tilting (option)



Boom-mounted version (option)



Mobile version (option)

Further information

This might also be of interest to you



Ask us for information about the following, such as:

- Pipeheads for polyolefin processing
- Pipeheads for PVC processing
- Single-screw extruders for pipe extrusion
- 36D twin-screw extruder pipe extrusion series

You can find our brochures and flyers on other topics online at:

www.kraussmaffeiberstorff.com.

On request, we will also be pleased to send you the information and technical data for our products free of charge.

KraussMaffei Berstorff

A strong brand in a unique global group

Value-proven Extrusion Technology solutions

Around the world, KraussMaffei Berstorff stands for reliable and value-proven solutions in Extrusion Technology. These range from using individual extruders for degassing in polymerization, compounding, pipe, profile, film and sheet extrusion, physical foaming and the manufacture of technical rubber articles and intermediates for tire production up to complete extrusion lines. All machines and systems from KraussMaffei Berstorff are custom-configured, for example for the chemical, automotive, construction, packaging or pharmaceutical industry.

There for you around the world

KraussMaffei Berstorff is your partner – from the first planning meeting through development of the best possible technical and business solution up through commissioning, servicing and production of your system. We guarantee high-quality advice, solution expertise, reliable spare parts logistics and fast-reacting service during each phase. Our goal is increasing your success.

Individualized service

Benefit from KraussMaffei Berstorff's reliable service. Our customer service team and experienced fitters, technicians and engineers are there for you as quickly as possible and even help on location to optimize your systems and processes and to minimize downtime as much as possible. Rely on our highly skilled repair and spare parts service.

You can find additional information about KraussMaffei Berstorff at:
www.kraussmaffeiberstorff.com

KraussMaffei Group

Comprehensive expertise

Unique selling proposition Technology³

The KraussMaffei Group is the only provider in the world to possess the essential machine technologies for plastics and rubber processing with its KraussMaffei, KraussMaffei Berstorff and Netstal brands: Injection Molding Machinery, Automation, Reaction Process Machinery and Extrusion Technology.

The group is represented internationally with more than 30 subsidiaries and over ten production plants as well as about 570 commercial and service partners. This is what makes us your highly skilled and integrated partner. Use our comprehensive and unique expertise in the industry.

You can find additional information at:
www.kraussmaffeigroup.com



The KraussMaffei Group has a global presence. Countries with subsidiaries are marked in light blue. In the white-colored regions, the Group is represented by over 570 sales and service partners.

Profit from the expertise of a system supplier

Complete pipe extrusion lines

Whether you' are processing PVC or PO, KraussMaffei Berstorff has everything you need for producing plastic pipe from 5 mm to 2500 mm in diameter – including automation components to maximize material savings.

Our product portfolio covers single-screw extruders, counter-rotating and corotating twin-screw extruders with corresponding pipeheads and downstream components through to fully automated pipe lines. All our components and automation systems are consistently engineered to maximize savings on materials, energy and costs, without compromising on product quality. We are your expert partner for any type of pipe extrusion line.

