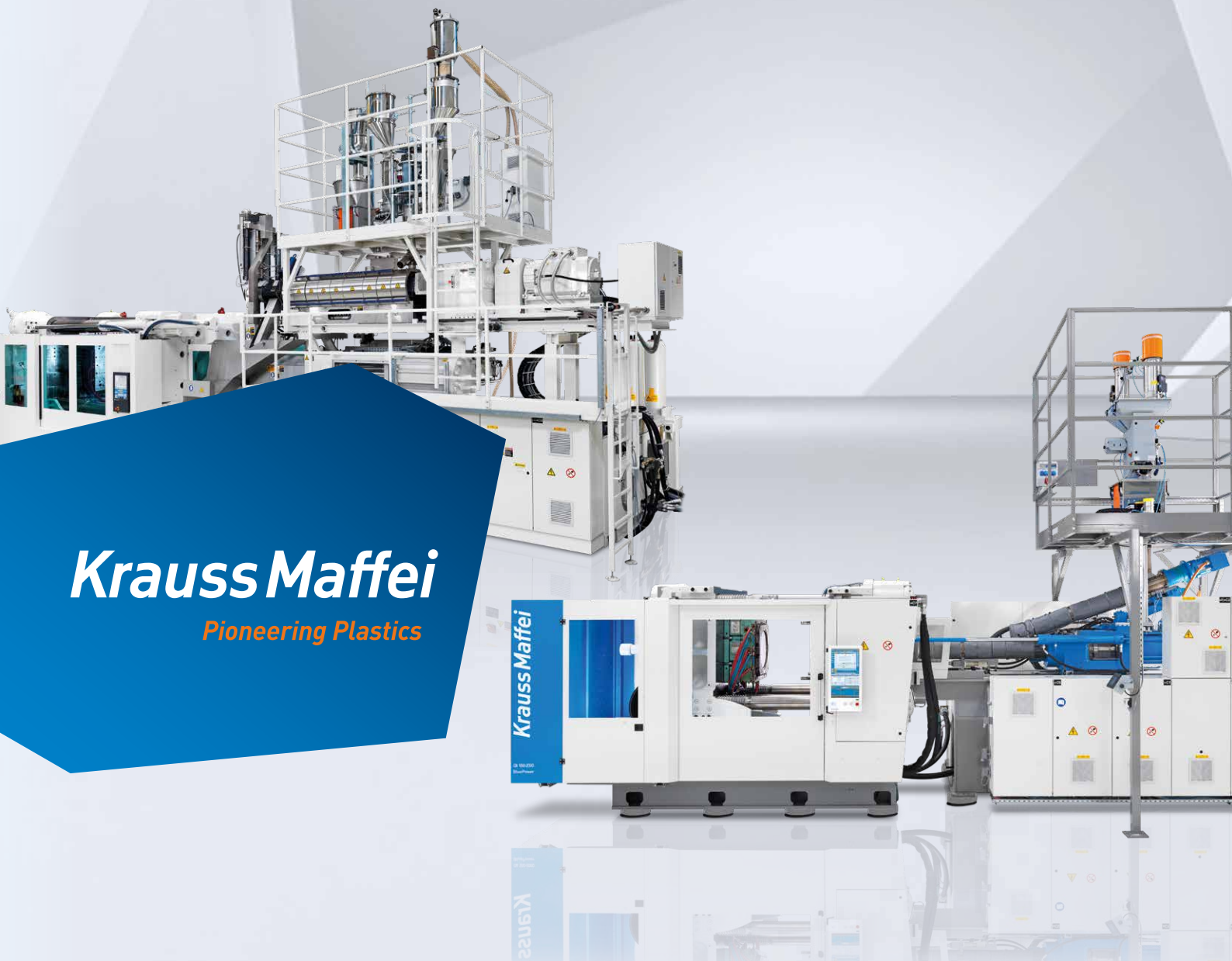


SUSTAINABLE. PREMIUM QUALITY. CREATING VALUE.

DCIM OR IMC
COMPOUNDING AND INJECTION MOLDING
IN ONE STEP

KraussMaffei
Pioneering Plastics



AREAS OF APPLICATION FOR DCIM AND IMC INJECTION MOLDING COMPOUNDERS



Automotive



Electric



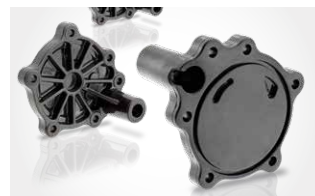
Logistics



Automotive



Packaging



Technical parts

Clamping/injection matrix of the DCIM injection molding compounder

Working capacity	Clamping force in kN								
	1.600	2.000	3.500	4.500	5.500	6.500	9.000	11.000	13.000
750									
2.000									
4.300									
12.000									

Clamping/injection matrix of the IMC injection molding compounder

Working capacity	13.000	16.000	20.000	23.000	27.000	32.000	40.000
14.000							
24.500							
60.000							

SUSTAINABLE. PREMIUM QUALITY. CREATING VALUE.

COMPOUNDING AND INJECTION MOLDING IN ONE STEP

KraussMaffei has over two decades of experience in the production of injection molded components from directly compounded materials. Our DCIM and IMC solutions cover a wide range of applications in the automotive, logistics and technology segment. This technology is currently more on-trend than ever. Demand for sustainable products made of recyclates is escalating, as is the demand for energy-saving and cost-effective manufacturing solutions.

The injection molding compounder combines the value-creating factors in molded part production optimally. By combining compounding and injection molding, it brings together technological innovation and high cost-efficiency.

Sustainable: By producing in one heat process, the systems save a great deal of energy compared to two-stage production. They are also ideal for processing recyclates.

Premium quality: Compounds can also be provided in small quantities in component-specific formulations. Therefore, the quality of the components corresponds exactly to the respective requirements.

Creating value: Processors decrease their material costs significantly and attain high cost-efficiency.

BENEFITS FOR CUSTOMERS

EFFICIENCY MEETS SUSTAINABILITY

DCIM and IMC injection molding compounders give you entirely new possibilities for compounding your own starting materials and processing them in a one-step process. For the production of molded parts, you can combine plastics with your choice of reinforcer, filler or substitute material: Switch on, produce and benefit. Combining two fundamental processes – compounding and injection molding – enables you to save energy and transport and storage costs as well as reduce your CO₂ footprint.

Cut raw material costs

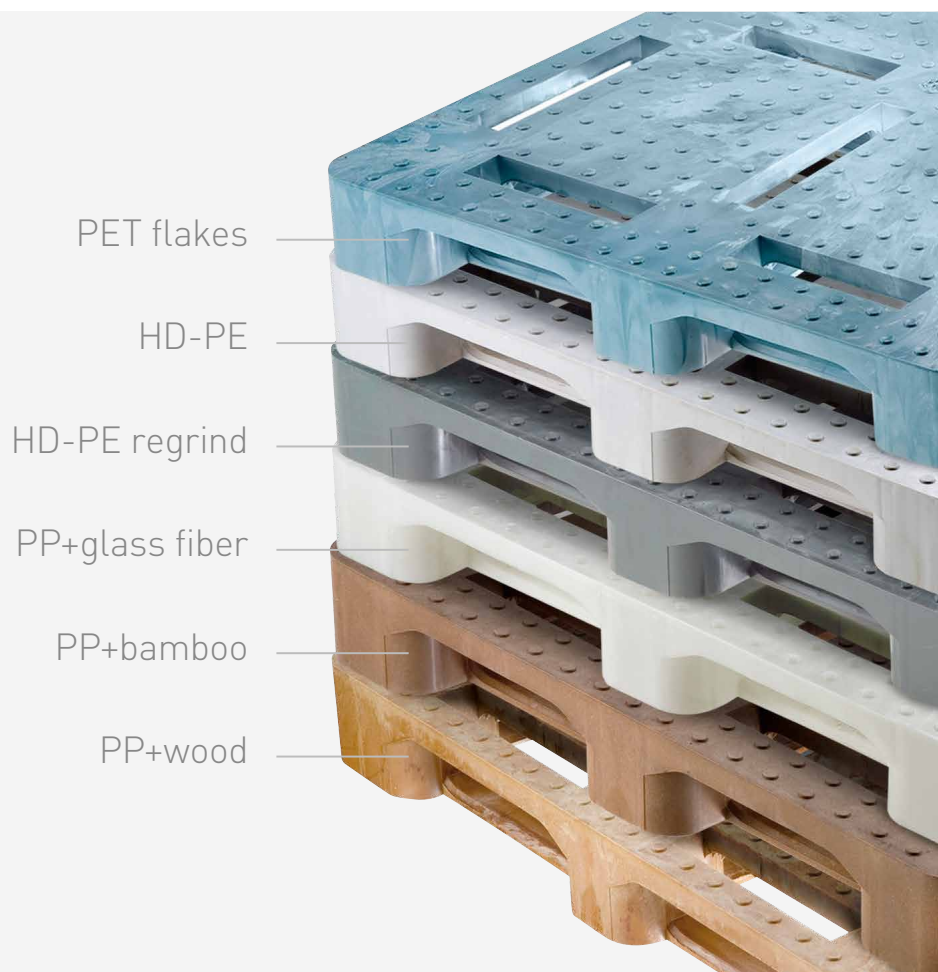
By mixing your compounds yourself, you will be able to achieve a significant reduction in raw material costs. Raw material costs make up a high share of total manufacturing cost, in particular if you're working with special formulations. With the DCIM and IMC injection molding compounder, you can bypass this step in the value chain because you purchase your raw materials separately and more cheaply and then compound them exactly as required for your application. With lower raw material costs, your investment in direct compounding will pay off faster, as you can see from our sample calculation.

Optimize mechanical properties

The special process engineering of direct compounding improves component quality, especially in relation to fibers and fillers. By adding in endless or cut fibers, the average fiber length in the components is increased, with a corresponding increase in impact strength. This also achieves an extremely homogeneous fiber distribution in the molded parts. You can also see savings in consumption of some additives – such as color masterbatch – owing to more homogeneous dispersal in the polymer. And the IMC process is the only way of incorporating a high proportion of some fillers – such as iron oxide and graphite.

More flexibility in your choice of materials

Basically this process can handle anything you want it to. The range is enormous, from blends to genuine reinforcing materials and any conceivable filler. The different materials are added to the screw at an optimal point in respect of functionality and process engineering. Since you formulate your compound yourself, you don't face the problem of minimum order quantities. You can develop new compounds rapidly whenever you need them. And you don't need to compromise on the formulation. You'll be able to react more flexibly to changing market conditions, and you can substitute less expensive raw materials to give your products the edge on cost competitiveness.



Boost material quality cost-effectively

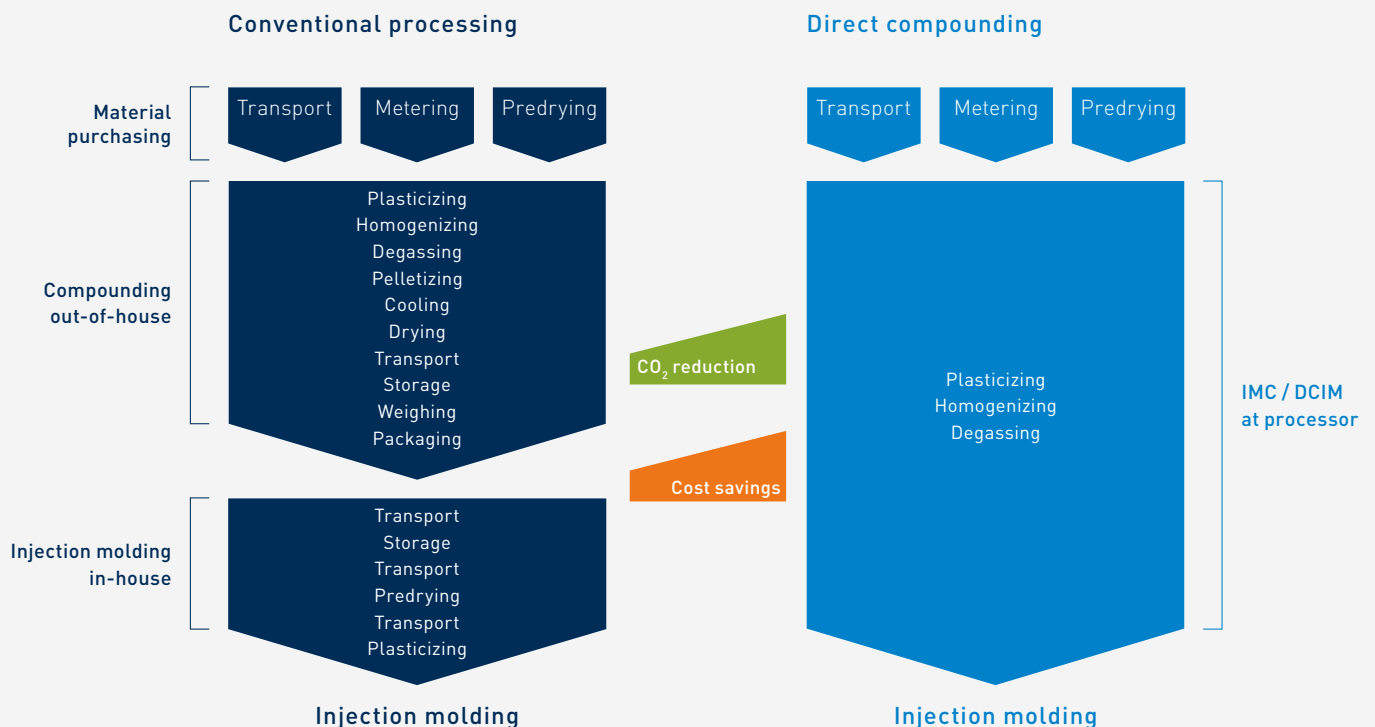
In the single-stage process, the material is treated more gently, because it is only plasticized once. The melting temperature is usually lower than in conventional plasticizing. The result is better melt quality, in the case of temperature-sensitive materials, and better quality for the end product. In some cases, cooling times are shorter. In addition, this is precisely where you save energy and reduce your CO₂ footprint.

Higher-viscosity recyclates

Higher-viscosity recyclates, for example from packaging industries, are difficult or impossible to process on injection molding machines. Direct compounding has an advantage here. Due to the longer melt processing, a DCIM system can also plasticize these types of materials and inject them into the mold reliably. The same is true of the IMC, which can process tough materials effortlessly with twin-screw technology.

YOUR BENEFITS:

- Reduce raw material costs by 0.30 €/kg – 1.00 €/kg
- Reduced CO₂ footprint
- Higher-viscosity recyclates can be processed
- Material selection optimized to requirements
- Best mechanical property patterns



Having fewer process steps in the direct process reduces the CO₂ footprint and cuts the material costs by 0.30 to 1.00 €/kg.

TRANSPARENT TECHNOLOGY

A TOUR OF THE DCIM INJECTION MOLDING COMPOUNDER



GX or CX machine
Proven technology
for high standards

Control system
Extrusion functions fully
integrated for easy process
set-up and monitoring



**Weighing, metering,
and feed systems**
Project-specific
gravimetric metering

Single-screw extruder
with optimized mixing
and dispersion effect

Standard injection unit
Also suitable for production
in standard injection molding
operation

DCIM PROCESS AND APPLICATIONS

In the DCIM process, a standard injection molding machine from the CX or GX series is coupled with a single-screw extruder to create one system. Direct Compounding Injection Molding is a sustainable and economical production solution, particularly for components with a lower shot weight with smaller batch sizes and special formulations.

The single-screw extruder feeds the melt directly into the plasticizing unit. This turns compounding and injection molding into a continuous production process. Production takes place in one heat process. This reduces CO₂ and expenses for storage, transport and, above all, the costs of the special compound recipes.

Two-platen clamping unit

DCIM: Direct processing with standard components

KraussMaffei's hydraulic two-platen clamping unit is compact, fast and low-maintenance. It is engineered to minimize mold wear and to ensure platen parallelism. Beyond the moving platen, there is free access to the clamp, simplifying machine set-up and adjustment. The two-platen clamp also makes it easy to implement special processes or meet special requirements. Outstanding access to the clamp makes these machines ideal for the integration of automation systems.

Easy operation, detailed production log

With the extrusion functionalities seamlessly integrated in the control software of the injection molding module, operating the IMC is like operating a normal injection molding machine. To check that the product always meets specifications, the material formulation for every shot is automatically documented. If necessary, the DCIM can also work as a standard injection molding machine by simply pivoting the extruder unit.

Broad range of applications

The application range of the DCIM series is extremely diverse. It ranges from simple fiberglass compounds and polymer blends (e.g. PC/ABS) to additives, modification or a wide variety of combinations. Other application fields include highly viscous polyolefin melts from recycling processes and upcycling of recyclates or agglomerates. The DCIM technology gives the processor the ability to match the materials optimally to the specific application. In addition, DCIM provides useful leeway for material costs.



*Technical parts: housings for electrical devices
made of PC/ABS.*



Construction industry: fitting made of PP/rPP.



YOUR BENEFITS:

- Very good melting and homogenization properties
- Processing in a single heat process
- Good feed of raw materials with poor flow properties
- Integrated degassing zone replaces drying process

In the DCIM process, a single-screw extruder with direct connection to the plasticizing unit compounds material.

Requirements-based material combinations

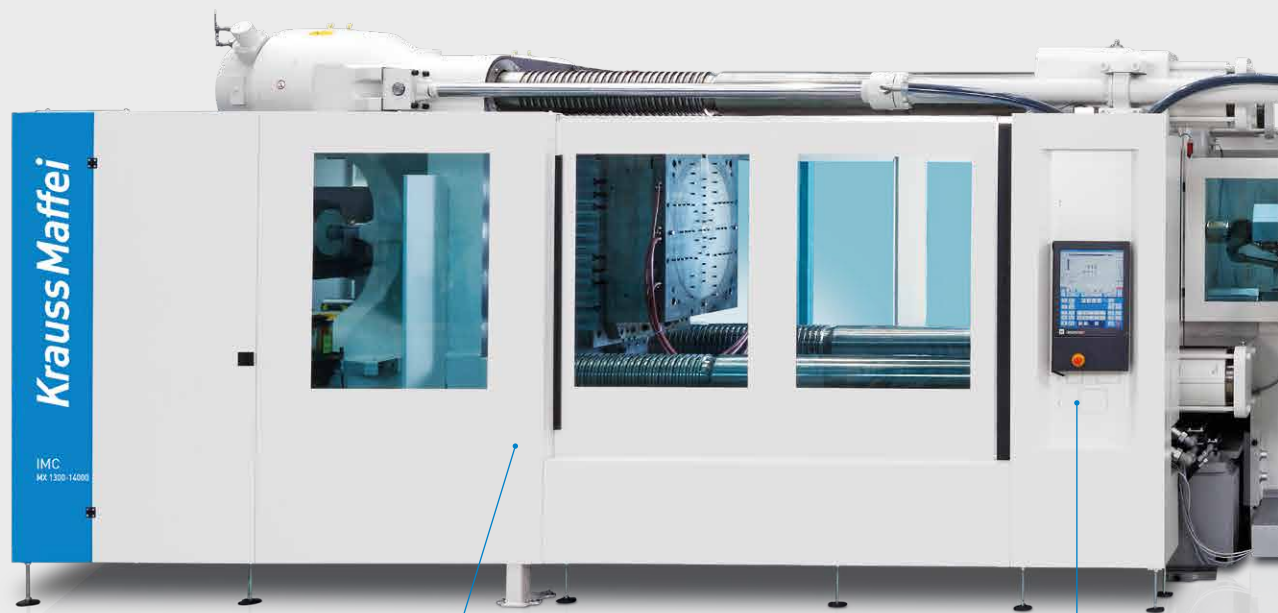
Material	Application examples
PC ABS / PC PBT	Interior parts, housings, galvanic coating applications
PP EPDM or SEBS	Boxes, sealings for syringe
PLA PBS	Cups, pens or cosmetic packaging
PA6 or PA66 additives	Housing (airbag, gearbox, damper, filter, etc.)
PP (L)GF	Housing (airbag, gearbox, damper, filter, etc.)
PA6 or PA66 (L)GF	Housing (airbag, gearbox, damper, filter, etc.)
PC GF	Various technical parts
PP MD or PP TD	Boxes, various technical parts
PA BaSO4 GF	Acoustic parts
PE HD high viscosity	Boxes, lids, protectors, attachments
PET-R additives	Boxes
PP SEBS MD	Sealings for syringes

Melt accumulator

Buffer storage for the melt extruded continuously during the injection and holding pressure phase

Start-up valve (optional)

Start-up material is discharged and cooled in a water bath



Clamping unit from standard series

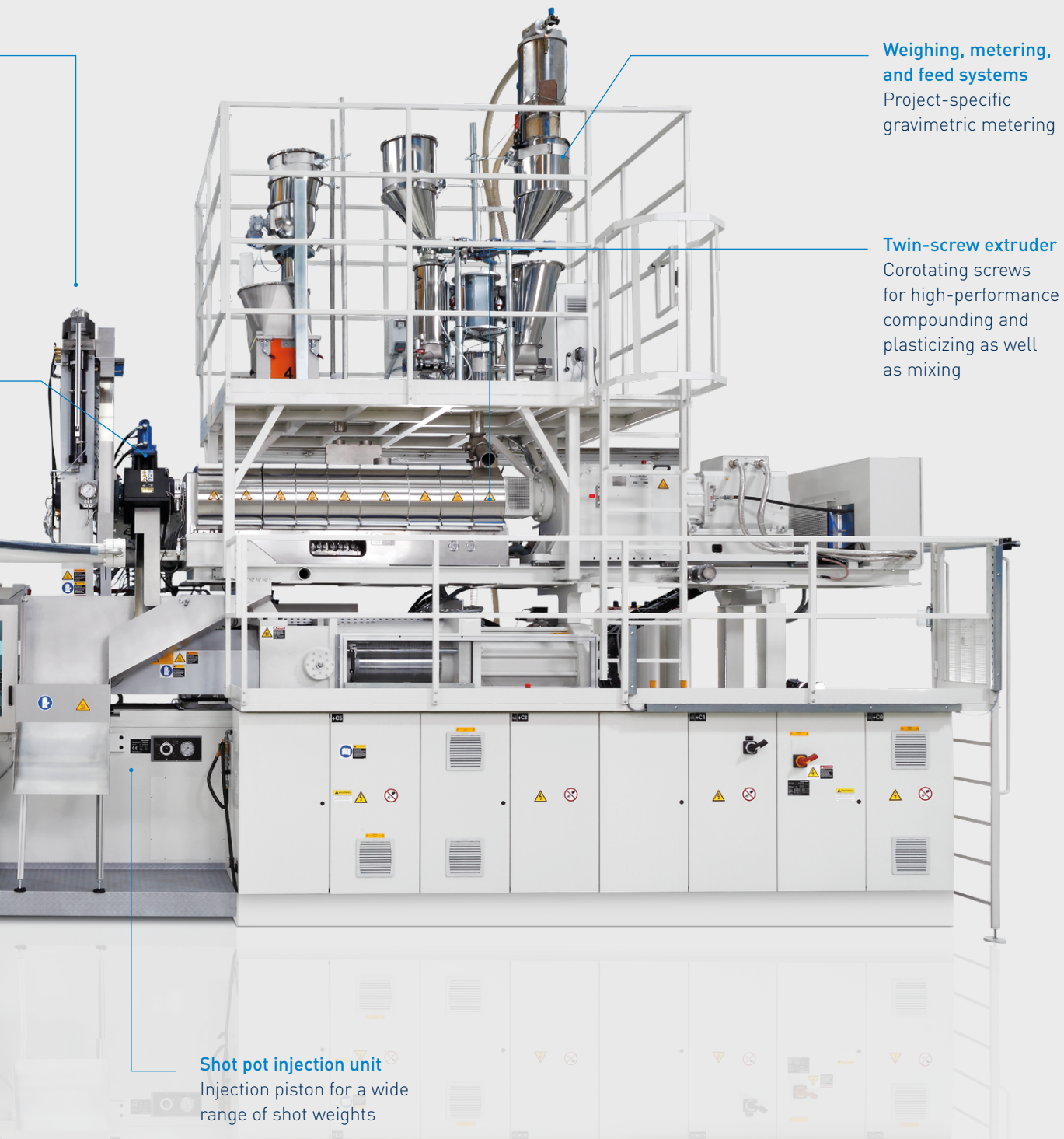
Proven performance, building block modularity, shortest dry cycle times for high productivity

Control system

Easy process set-up and monitoring through integration of the gravimetric feeder and the twin-screw extruder

TRANSPARENT TECHNOLOGY

A TOUR OF THE IMC INJECTION MOLDING COMPOUNDER



THE IMC INJECTION MOLDING COMPOUNDER CONTINUOUS REQUIREMENTS- BASED PRODUCTION

The IMC injection molding compounder is the ideal system for manufacturing large-format, fiber-reinforced plastic molded parts. The configuration is adapted individually to the formulation and the marginal conditions for each project. The result: High precision, sustainability and cost-efficiency in production.

IMC: Stable process under constant conditions

How does the injection molding compounder work? The plasticized and homogenized material moves from the extruder via a heated melt line into the injection cylinder. During the injection and holding pressure phases, the melt produced continuously by the extruder is diverted into the melt accumulator. When the holding pressure time expires, the transfer valve opens. The material from the melt accumulator is conveyed into the injection cylinder together with the material from the extruder. The melt accumulator is completely emptied in every cycle. Therefore, it holds only the material quantity extruded during the injection and holding pressure phases.

Gravimetric metering for precise control of the formulation

Essential to the quality of the compounding process is the fact that all the constituents of the formulation are

gravimetrically metered into the underfed extruder. Gravimetric metering is more exact than a volumetric system would be. Because factors such as throughput, material consistency and number of materials will differ from project to project, feed and metering systems must be engineered separately for each application.

Longer fibers and no post-processing

Adding reinforcing fiber significantly improves properties of plastics, such as flexural strength, modulus of elasticity, impact strength, thermal stability and shrinkage characteristics. The chief technical advantage of adding fiber on the IMC is that the matrix polymer is plasticized first and the fibers are then added to the melted polymer.



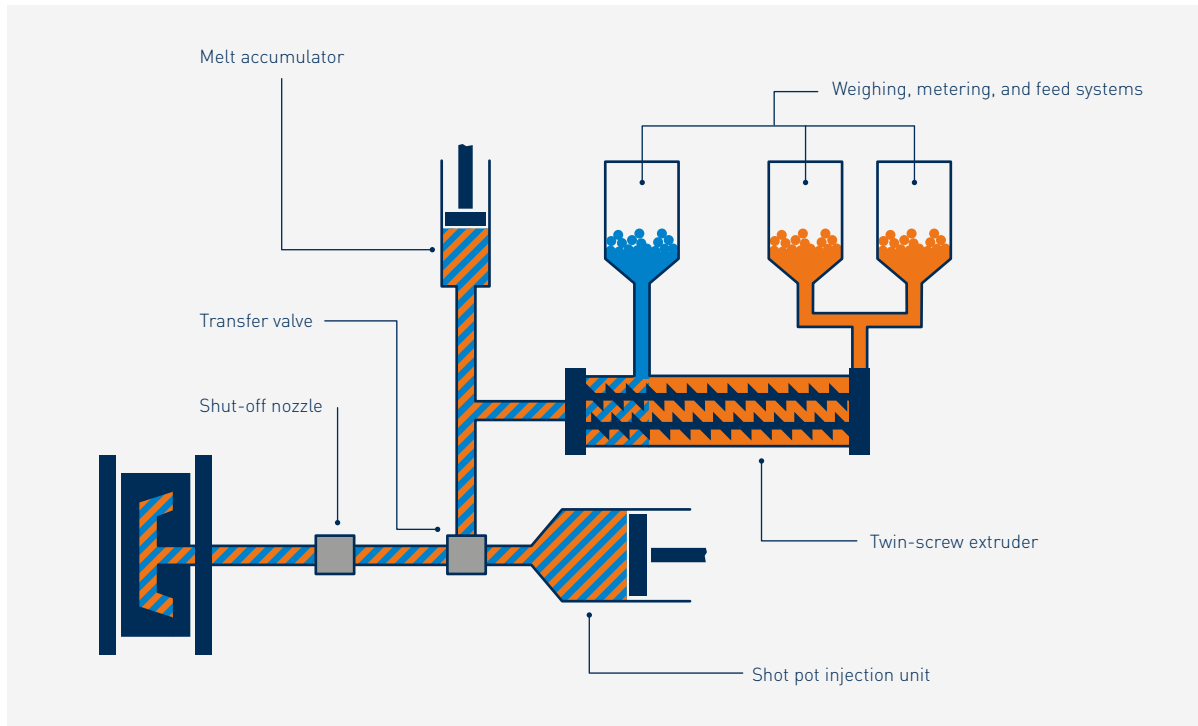
Front-end assembly carrier:

Fiber reinforcement improves product properties and cuts material costs significantly.



The advantages of the IMC Injection Molding Compounder can be seen above all in molded parts with high filler content levels. As noise-absorbing components,

insulating mats have a high proportion of the acoustically effective filler barium sulfate.



Main functional elements of an IMC Injection Molding Compounder.

High shot weights maximize productivity

The high-performance extruder achieves high working capacity and higher injection volumes. This makes it ideal for use with stack molds or to produce heavy, thick-walled parts. Manufacturing plastic pallets is a good example of an optimal use for the IMC. Another is manufacturing front-end assembly carriers or front wall bulkheads. In addition to the high shot weights required for the pallets, the IMC also makes it easy to incorporate regrind or filler as an effective way of reducing raw material costs.

Range of applications

Automotive

- Front end carriers
- Door modules
- Instrument panel supports
- Underbody shields
- Tail doors
- Spare wheel wells
- Battery housings
- Bumpers
- Exterior components
- Oil sumps
- Sound absorbers
- Fan wheels
- Wheel housings
- Hat trays
- etc.

Packaging

- Reusable pallets
- Export pallets
- Transport containers
- Wood-effect crates
- PET preforms
- etc.

Electrical/electronics

- Television housings
- Large parts with short fiber reinforcement
- Counterweights - high-density molded parts
- etc.

YOUR BENEFITS:

- Integrated venting zones substitute for upstream drying processes
- Smooth and reliable feed, even of low density raw materials with poor flow properties
- Trouble-free conveying of powdery or sticky materials
- Very good plasticizing and homogenization



OUR WORLDWIDE EXPERTISE IS YOUR ADVANTAGE DIGITAL & SERVICE SOLUTIONS

With your KraussMaffei machine, you have chosen a product that delivers the highest levels of productivity and reliability. In addition to our range of machinery, KraussMaffei focuses on comprehensive and future-oriented solutions, innovative business models and an innovative portfolio of digital products.

Customer service at the touch of a button

The process of digital transformation is becoming faster and easier than ever for the customer. Our Digital & Service Solutions unit makes your production chain even more flexible and efficient with future-oriented solutions. KraussMaffei thus globally provides an all-inclusive customer service package and networks machines and processes with each other. Our global support offers a sound basis for your local long-term success.

Individual challenges in mechanical engineering call for intelligent solutions

With our services portfolio, we support you throughout your machine's lifecycle with a strong focus on your specific needs. In order to satisfy your wishes, we offer you a wide range of solutions in order to ensure maximum availability and optimum productivity of your machines.

Technology² as a unique selling proposition

KraussMaffei is the only supplier in the world with a product range comprising the most important machine technologies for plastic and rubber processing: injection molding machinery, automation, reaction process machinery and extrusion technology. KraussMaffei is represented worldwide with more than 30 subsidiaries and over 10 production plants as well as about 570 commercial and service partners. Working together with our customers and partners, we are thus in a position to offer vast and unique expertise in the industry.

You can find further information at:
www.kraussmaffei.com

KRAUSSMAFFEI – PIONEERING PLASTICS



Extensive expertise from a single supplier

KraussMaffei is one of the world's leading manufacturers of machinery and systems for producing and processing plastics and rubber. Our brand has been synonymous with cutting-edge technology for over 180 years. Our product range includes all technologies in injection molding, extrusion and reaction process machinery. KraussMaffei has a unique selling proposition in the industry as a result. By drawing on our proven innovative capacity, we can guarantee our customers sustained additional value over their entire value-adding chain through our standardized and individual product, process, digital and service solutions. The range of our products and services allows us to serve customers in

many sectors including the automotive, packaging, medical and construction industries. We also supply manufacturers of electrical and electronic products and household appliances.

At your service all over the world

KraussMaffei is represented all over the world. Subsidiaries provide you with support in the countries shown in light blue. Our sales and service partners take care of you in the regions shown in white.

You can find all contact information at
www.kraussmaffei.com

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