

LIGHTWEIGHT CONSTRUCTION

Light work: using innovative processes
to produce innovative products

ARBURG

PROBLEM SOLVERS

**Reducing costs, increasing
efficiency and protecting resources.**

**With innovative injection
moulding processes.**

Lightweight construction is very much on trend - in addition to the automotive industry, it can also be found in the fields of logistics, medicine, packaging and building technology, for example. The objective is to reduce part weights or replace metals. Functional integration and multi-material design also ensure sustainable and cost-effective production. Innovative injection moulding processes are required for this purpose, as well as partners who can offer you all-round consulting and service. Like ARBURG.

WIR SIND DA.



Our expertise in lightweight construction: replacement of classic materials and efficient high-volume production.

AT A GLANCE

// The potential of lightweight construction: optimised component design and production process as well as the combination of various processes and materials. These all contribute towards significant cost savings. ARBURG is acutely aware of the strengths and limitations of all the processes. This is because ARBURG has formed partnerships in various networks that focus on the optimisation and combination of processes and materials. This enables us to offer you comprehensive advice on specific technical applications, as well as the corresponding technology. //

Scope of available processes

- Foam injection moulding
- Integrated fibre reinforcement
- Thermoplastic composites
- Combination with particulate foams
- Fluid injection technology

Recognising potential

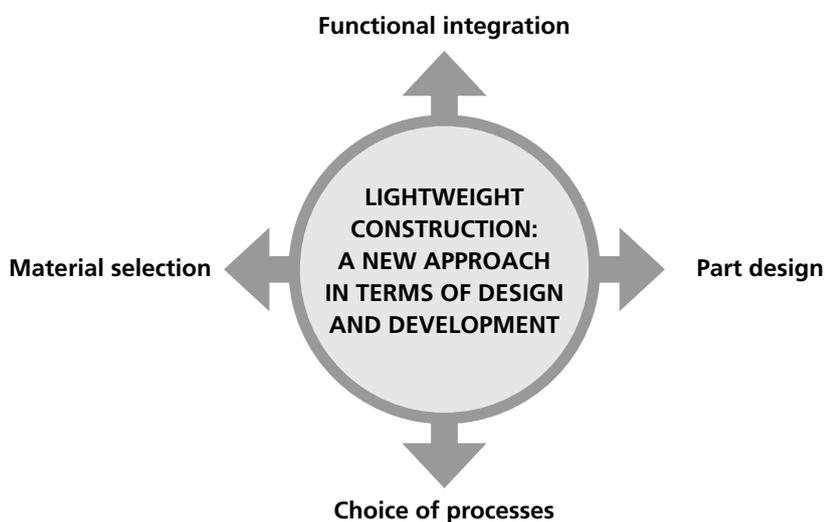
The optimisation of part design and the production process or the combination of different processes and materials enable significant cost savings to be achieved. Further benefits: replacement of conventional materials and efficient high-volume production. ARBURG is very familiar with the potential savings and the limitations of the processes involved in moulding lightweight parts. Our special additional equipment and our high-level expertise in consulting will enable you to get the most out of all your processes.

Specific configurations

Our universal ALLROUNDER injection moulding technology can be adapted in detail to the various lightweight construction processes. The frequently complex production sequences are managed with upstream/downstream processing steps, precision injection moulding and detailed quality monitoring via the high-performance machine control system. When implementing turnkey systems, ARBURG, as a primary contractor, offers precise answers to application-specific requirements.

Comprehensive consulting

We offer you comprehensive expertise – from part design and the choice of material, mould and machine configuration to production optimisation. To ensure you get the best solution for your task, a number of specially prepared ALLROUNDER machines are available at the ARBURG Customer Center (Lossburg, Germany) to test the various lightweight construction processes. We ensure a smooth testing process, including detailed documentation: on this you can rely.



FOAM INJECTION MOULDING

// Lightweight construction with weight reduction: In the thermoplastic foam injection moulding process, blowing agent is dissolved in the plastic melt during plasticisation and escapes again as microcellular “bubbles” during injection moulding. This not only enables significant savings to be achieved in terms of material use, but also ensures higher component quality, for example through a reduction in distortion or sink marks. The physical properties of the blowing agent and foam-appropriate component and mould optimisation often enable the cycle time to be reduced, thereby ensuring cost-effective production and enabling you to get the most out of foaming. //

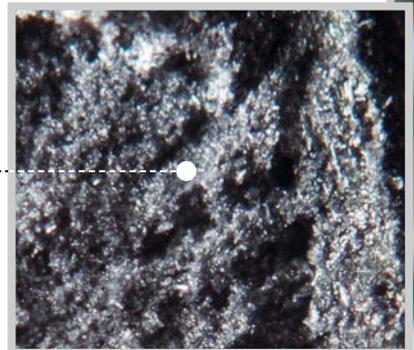
Compared to compact components, up to

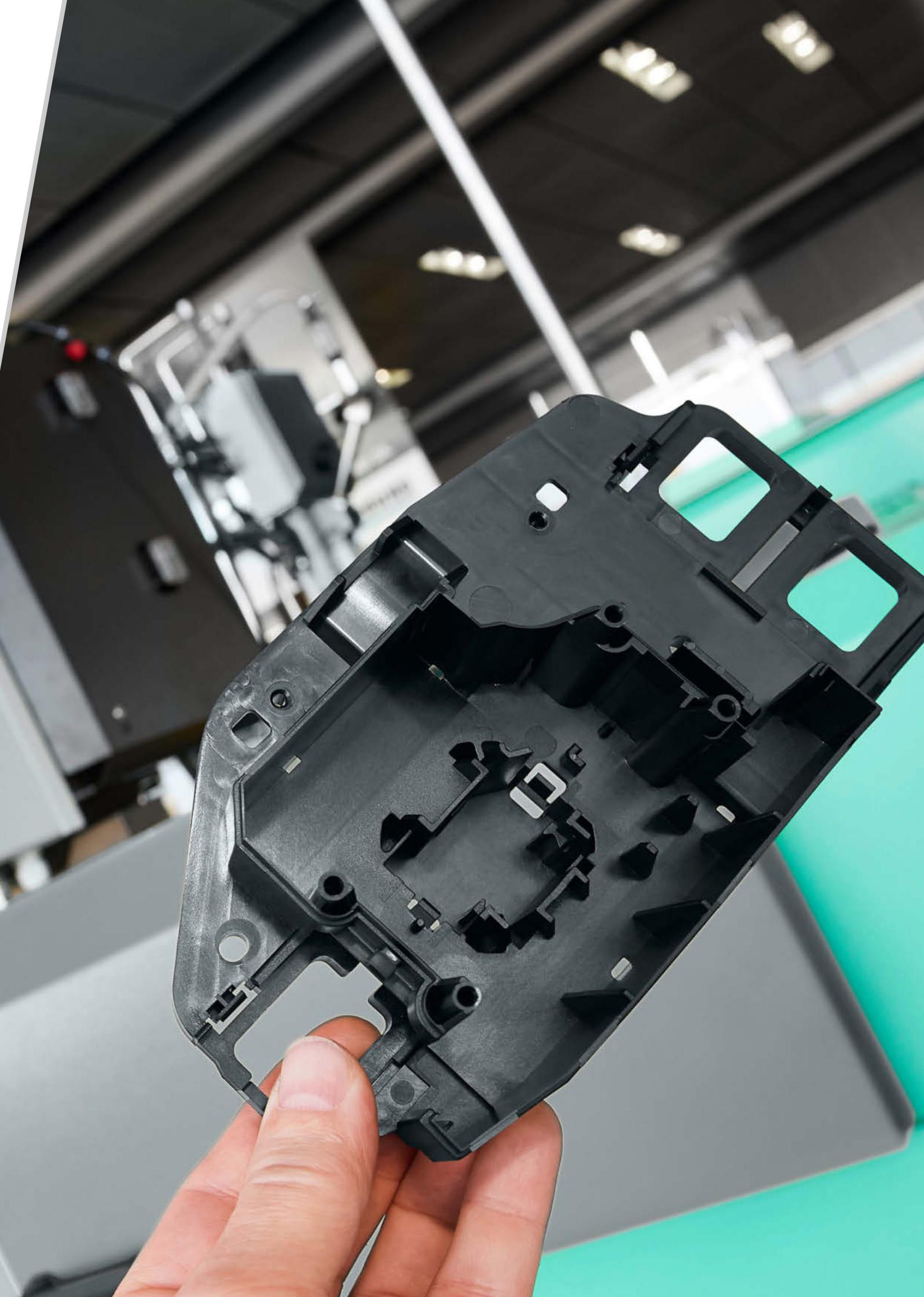
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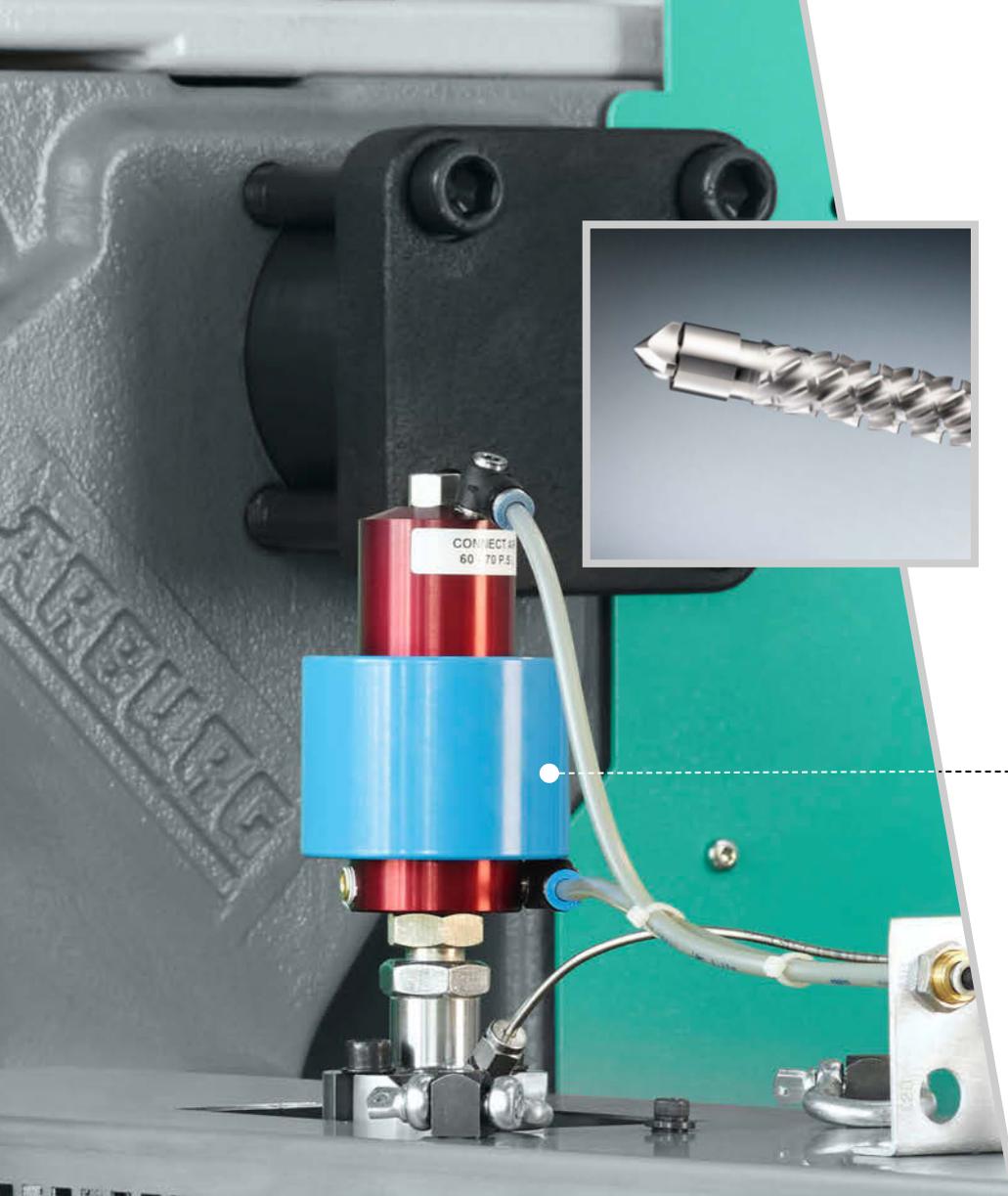
LIGHTER



Material-saving: physical foaming creates minute cellular structures in the part.







Perfect interaction:
 modular ALLROUNDER and
 special MuCell® technology
 from Trexel Inc.

INJECTION UNITS FOR MUCELL®

		290	400	800	1300	2100	3200	4600
		Screw diameter [mm]						
		30	40	50	60	70	80	90
ALLROUNDER	370	■	-	-	-	-	-	-
	470	■	■	-	-	-	-	-
	520	■	■	■	-	-	-	-
	570	-	■	■	■	-	-	-
	630	-	-	■	■	■	-	-
	720	-	-	-	■	■	■	-
	820	-	-	-	-	■	■	■
	920	-	-	-	-	■	■	■

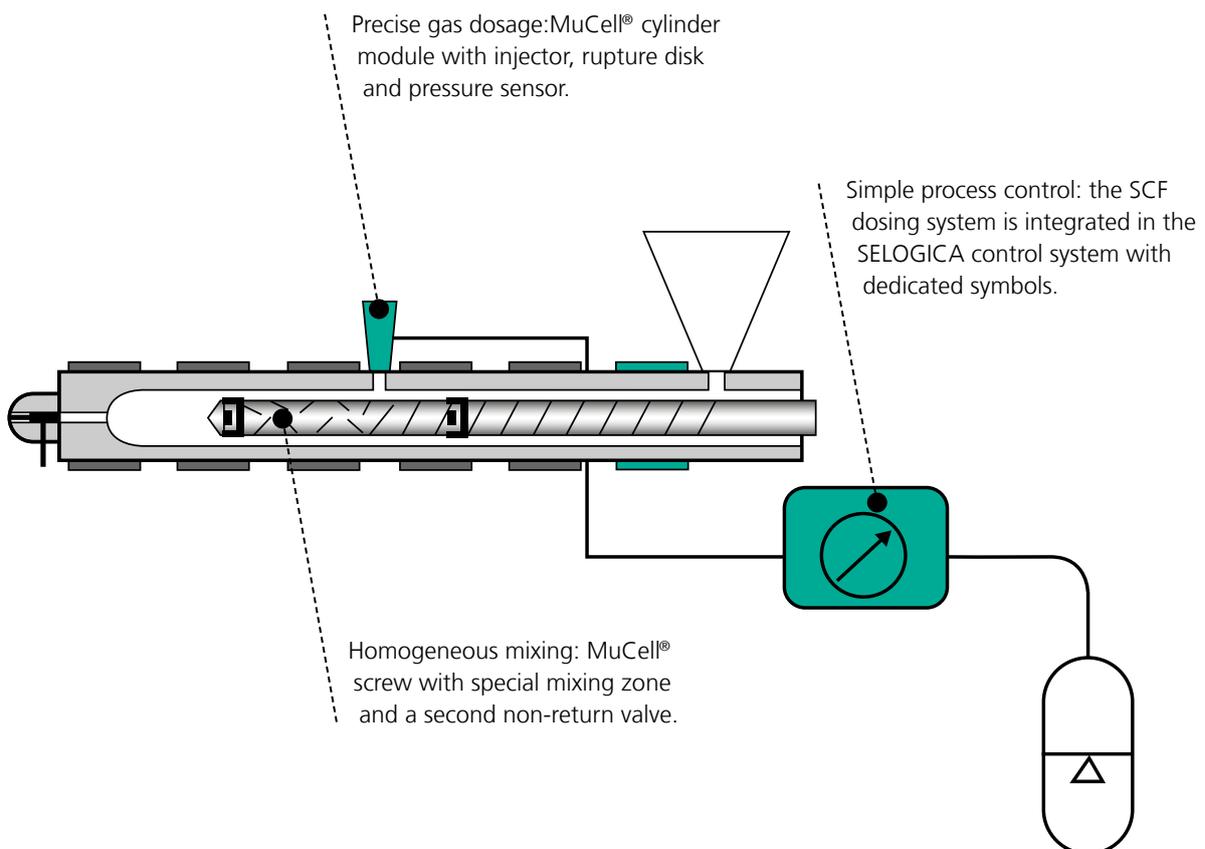
MuCell® process

In the MuCell® process, microcellular structures are created by bringing a gaseous blowing agent to a supercritical state (SCF). In this state, the blowing agent can be dosed precisely and mixed homogeneously with the plastic. Hydraulic and hybrid ALLROUNDERS are equally suited to the requirements of the MuCell® process. The technical requirements for reproducible injection are met with the aXw Control ScrewPilot and a pressure accumulator. All process-related parameters can be set precisely via the SELOGICA controller

and are stored in a data set. In addition to suitable technology, foam-appropriate optimisation of the component and mould design is a critical element. We are working in close collaboration with a partner who is carrying out in-depth feasibility studies and advising on component design, simulations, mould design, and mould construction.

MuCell® package

- Extended injection unit
- MuCell®cylinder module
- MuCell®screw
- Pneumatic needle shut-off nozzle
- Adapted nozzle guard
- MuCell®SCF dosing system
- Varan interface
- SELOGICA functional expansion
- Functional testing at ARBURG





Unique process: fibres are added directly to the liquid melt.

FIBRE DIRECT COMPOUNDING

// High-strength lightweight construction: carbon or glass fibres improve the mechanical properties of many components. The greater the proportion of longer fibres the better. This is exactly where fibre direct compounding (FDC) as developed by ARBURG and the German Plastics Centre (SKZ) comes into play. This makes it easier to substitute other materials and to generate new material combinations more effectively. Moreover, all this can be achieved with inexpensive basic materials. Cost-effective high-volume production – at reduced unit costs. //



Lower material costs:
individual combination of
inexpensive basic materials.

Flexible setting options:
targeted influencing of
mechanical part properties.



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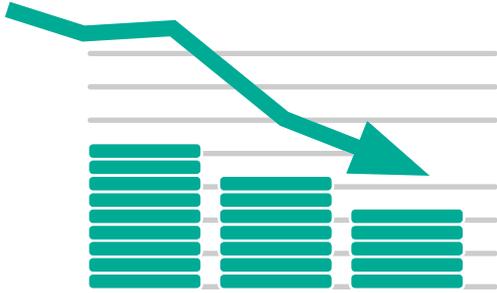
INJECTION UNITS FOR FDC

		1300	2100	3200	4600
		Screw diameter [mm]			
		55	60	70	80
ALLROUNDER	570	■	—	—	—
	630	■	■	—	—
	720	■	■	■	—
	820	—	■	■	■
	920	—	■	■	■

Compared to long fibre granulates up to

45%

LOWER MATERIAL COSTS



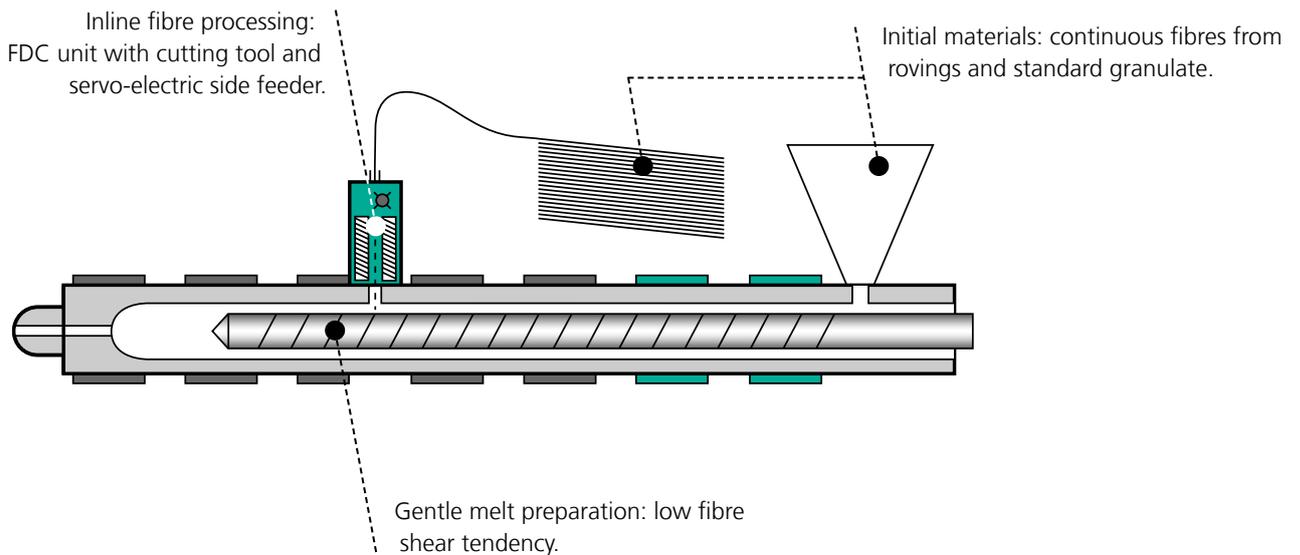
Integrated fibre reinforcement

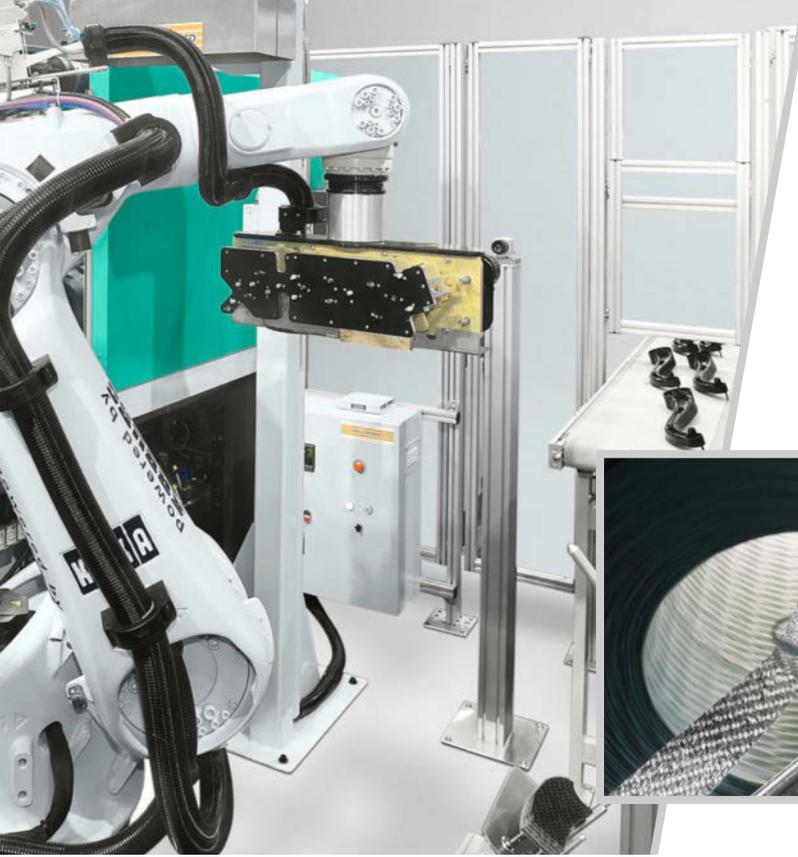
Increasing part resilience and reducing wall thicknesses: the FDC process allows continuous fibres to be cut into lengths of between 5.6 and 33.6 millimetres, which are fed directly into the liquid melt and mixed homogeneously. You can select the fibre length, fibre content and material combination to match your individual needs. An additional thermoplastic cylinder module means that your ALLROUNDERS can still be used for conventional injection moulding. Typical ARBURG: The FDC process is fully integrated in the control system and dedicated symbols enable the process to be programmed easily and flexibly. In addition, you can use the signals of the FDC unit to monitor quality.

FDC features

Little damage to the fibres while preparing the melt, targeted influencing of the component properties, and significantly reduced material costs: The FDC process offers significant advantages over long fibre granulates. we can provide you with turnkey production cells for integrated fibre reinforcement of PP, PA, PET and PC/ABS (more materials on request) - including a function test at ARBURG. The basis for this is our hydraulic ALLROUNDER S with adapted equipment:

- FDC cylinder module
- Special two-stage screw
- FDC unit
- Roving station





UD tapes, prepregs or thermoplastic composite sheets: common fibre-matrix semi-finished products can be processed thanks to ARBURG's expertise.



Combination with the FDC process: new approaches to component design and function integration.

With the same thickness
and similar characteristics
up to

50%

**LIGHTER
THAN METAL**



THERMOPLASTIC COMPOSITES

// Lightweight construction with multi-material design: the overmoulding of thermoplastic composites can significantly improve the mechanical properties of components. Local reinforcement by means of ribs or functional elements such as mountings produces highly resilient, installation-ready products. In many cases you can also replace classic materials in this way. Our modular ALLROUNDER technology enables you to produce high-quality products of this type fully automatically and therefore cost-effectively. //

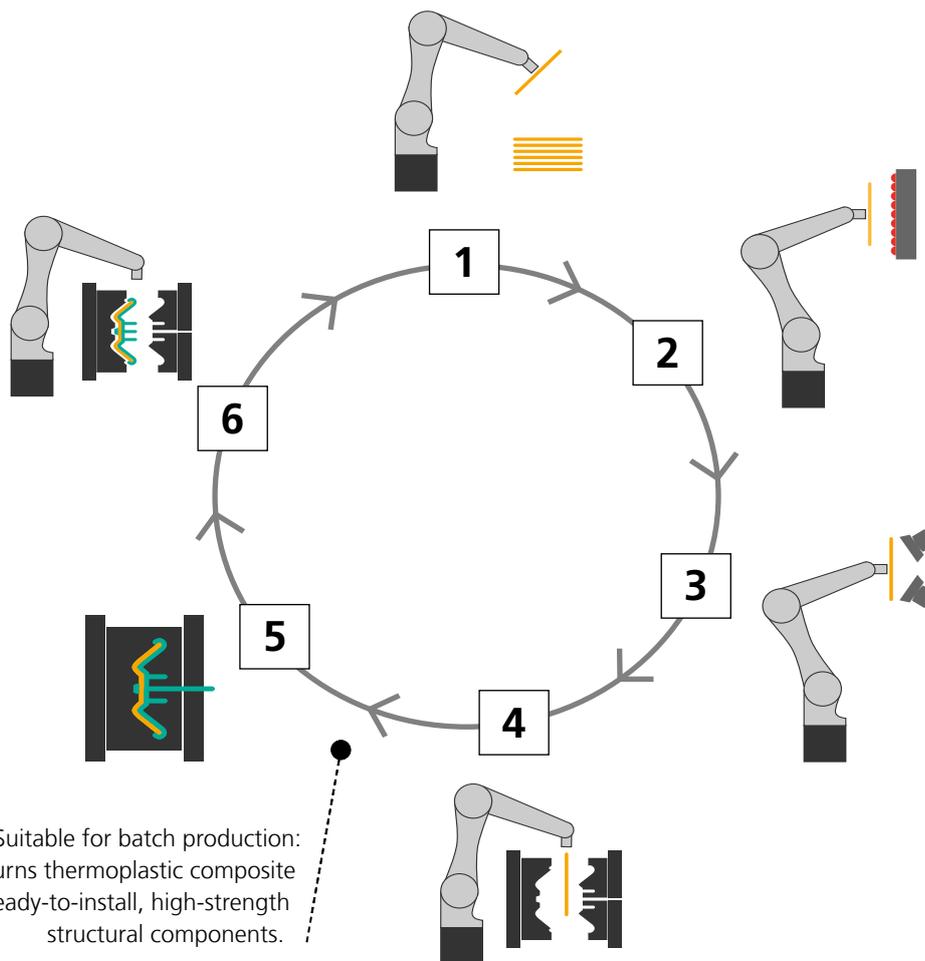
Fibre-matrix semi-finished products

Thermoplastic composites consist of a combination of continuous fibres (glass, carbon or aramide) and a variety of matrix materials. When these are overmoulded with conventional thermoplastics, their positive properties increase. This makes it easier to replace metal materials.

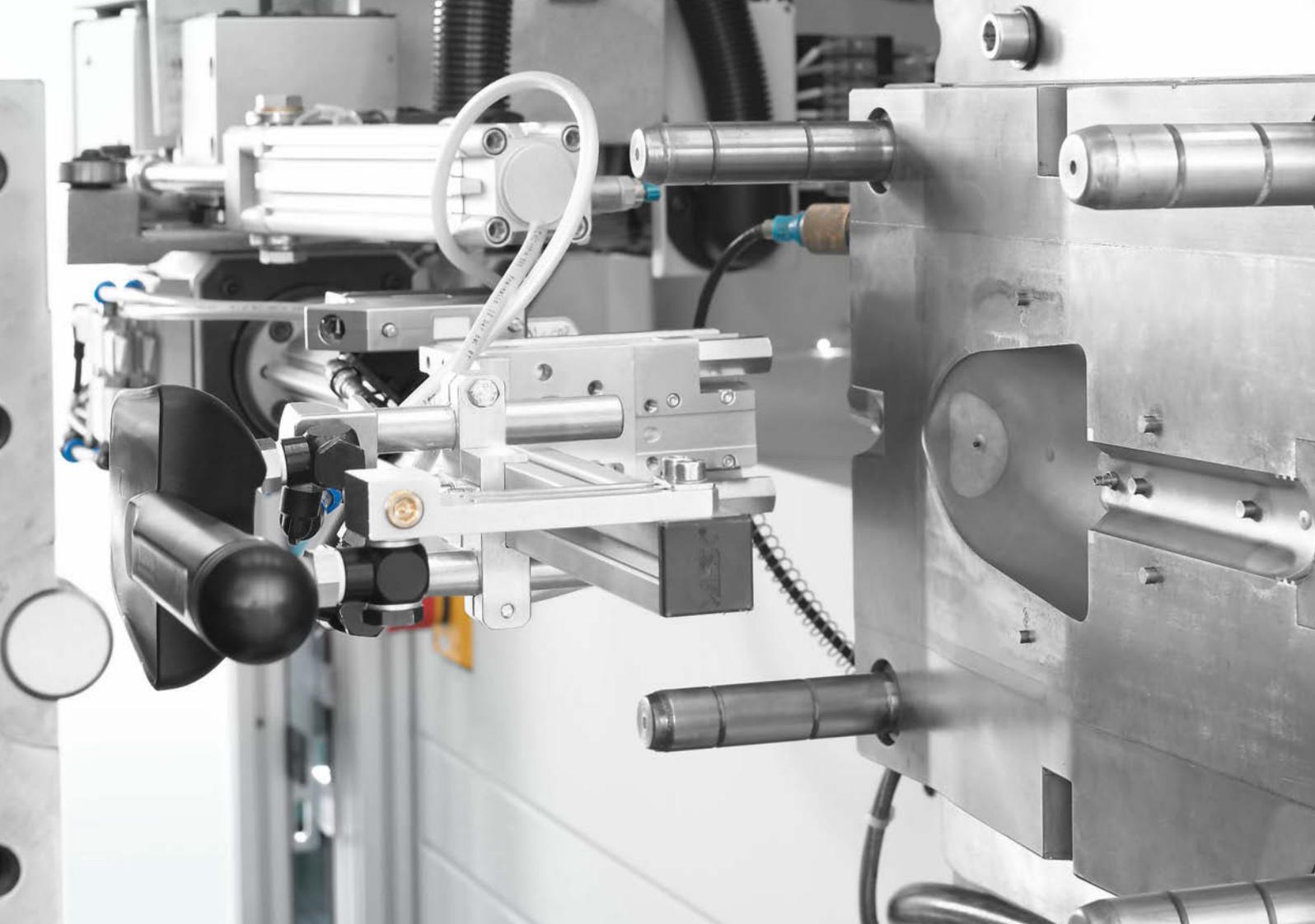
Automatic process

Ideal for high-volume production: thermoplastic composites can be efficiently processed in an automated production cell. The cycle times that can be achieved are the same as for injection moulding. A further advantage is that it can be combined with other processes, such as the FDC process. As a technology and system partner, we offer you comprehensive expertise when it comes to the processing of

fibre-matrix semi-finished parts with turnkey systems. Services range from the integration of composite processing or inline quality control to the definition of interfaces or coordination and monitoring of the entire project from acquisition to commissioning.



i / Further information:
Turnkey projects brochure

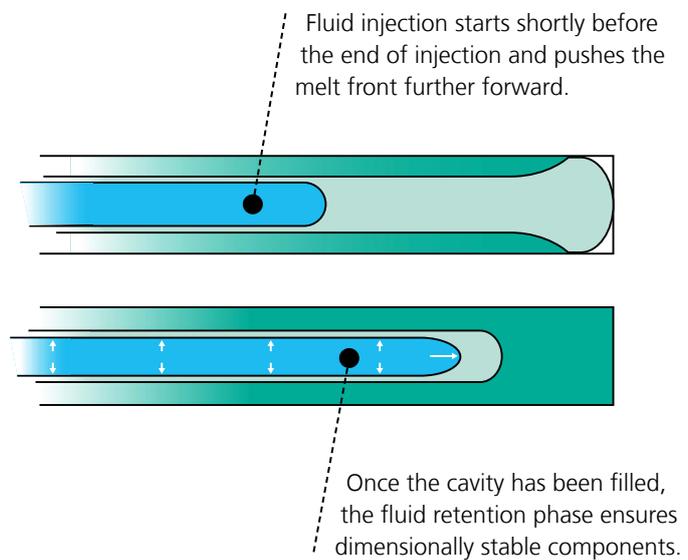


FLUID INJECTION TECHNOLOGY

// Lightweight construction through hollow spaces: the use of liquid or gaseous media during injection not only reduces weight significantly, but also ensures mechanically resilient components. Furthermore, quality is enhanced, sometimes with significantly faster cycles - especially for components with thick-walled areas. To enable you to exploit the potential of fluid injection technology to the greatest possible extent, we offer you a comprehensive package in close cooperation with our partners. //



Lightweight and mechanically resilient: WIT or GIT produce targeted hollow areas in the component.



Added value for component design and process

During injection, gas (GIT) or water (WIT) is introduced into the mould cavity via the injection nozzle or injectors. This enables cavities to be created in the component. Fluid injection can achieve significant material savings. At the same time, sink holes in components can be reduced. The thinner walls also reduce the cooling time, which has a positive effect on the overall cycle.

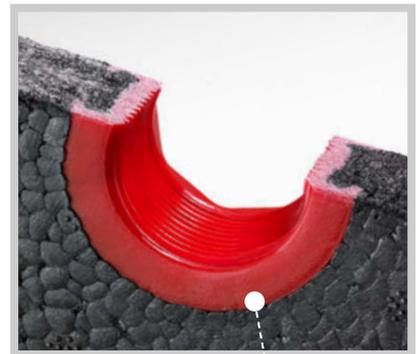
Individual uses

All ALLROUNDER injection moulding machines can be equipped with a device for fluid injection and a special interface. The machine control system allows switching from material injection to gas or water injection as standard, as a function of time, stroke or pressure.

APPLICATIONS: IN PRACTICE

// Owing to their many excellent characteristics such as reduced weight, improved quality and shorter cycle times, new product ideas and applications frequently arise with regard to lightweight parts. As a technology and system partner, ARBURG always keeps a close eye on efficient production with appropriate unit costs. Using our powerful, customizable ALLROUNDER machines and applying our in-depth expertise, we develop the best production solution for your needs. //

Innovative: the semi-finished fibre matrix is heated directly in the mould, formed and overmoulded.

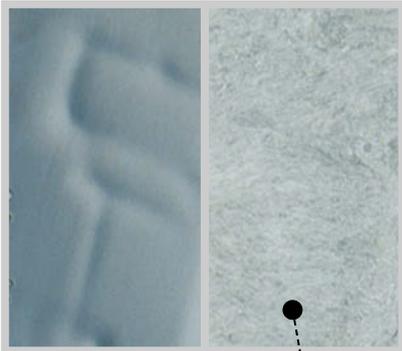


Firmly bonded: Particle-foam Composite Injection Moulding® combines the benefits of particle foam with thermoplastics.

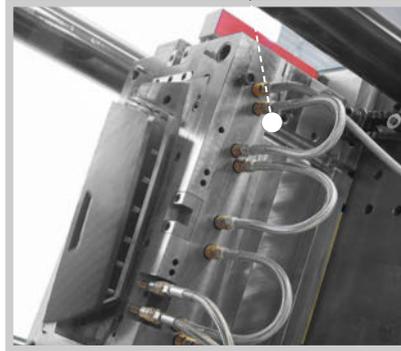


Innovative: Prototype of a seat shell shows the potential of overmoulding fibre-matrix materials.

High-quality: foaming with dynamic mould temperature control produces a class A surface.



Lightweight: foaming saves on material and prevents sink holes.



Cost-efficient: sturdy cable drive housing made using the FDC-process, dispensing with more expensive pre-compounded granulate mixture.





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