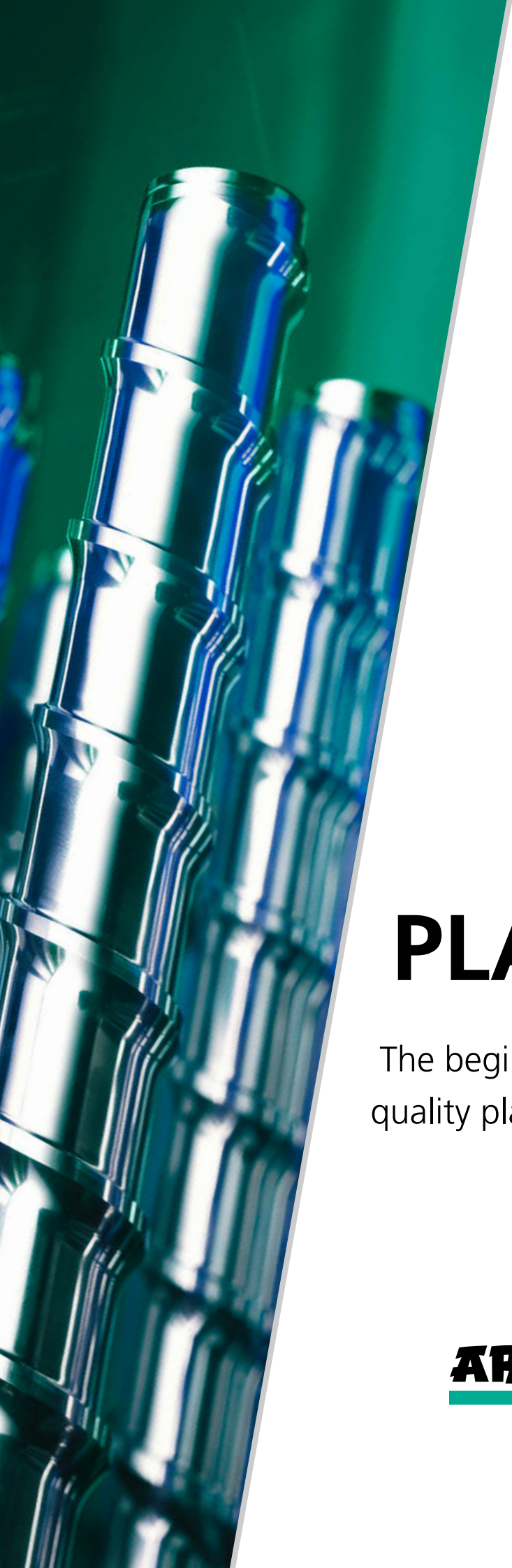


PLASTICISING

The beginning of high
quality plastic products

ARBURG

ADDING VALUE

**Something you can rely on:
plasticising components
from ARBURG.**

Wherever material is conveyed and machine parts are in motion, wear is inevitable. The same applies to the components that plasticise the plastic and transport it to the mould, which impacts on the functional parts and thus on the quality of the items produced. You consequently need high quality screws, plasticising cylinders and non-return valves. These need to be available at short notice and tailored to your applications. In other words, genuine quality components „Made by ARBURG – Made in Germany“.

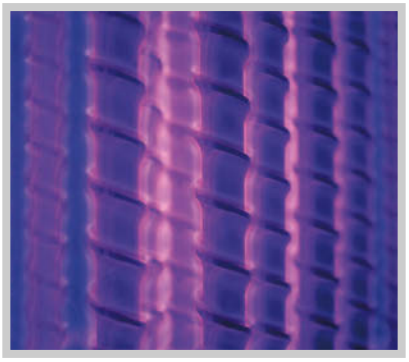
WIR SIND DA.

THE GENUINE ARTICLE: COMPONENTS FROM ARBURG

// Stringent demands apply when it comes to protecting screws, plasticising cylinders and non-return valves against wear. This is particularly the case in the area of technical thermoplastics, where the range of materials is continuously growing. Applying our wide range of experience and process expertise, we develop and manufacture our products to perfectly match your day-to-day requirements. Our high quality is achieved through the in-house production of all plasticising components at one central location. An advantage from which you benefit directly in your production through high levels of parts availability and long service life. \\

Online spare part catalogue
Register here for a fast and inexpensive option for ordering genuine components.

„Made by ARBURG - Made in Germany“: Development and Production work side-by-side under one roof on an area measuring 171,000 m² at our German headquarters.



Everything is produced in-house; all products meet consistently high quality standards.

Top quality

Machining, heat treatment, alignment, grinding and polishing - starting from the raw material, all operations for screws, plasticising cylinders and non-return valves are carried out at our central production facility and part quality is monitored continuously. This ensures high-level precision, performance and reliability.

Top-class expertise

As a manufacturer of high-end injection moulding machines, we have a sound command of the processes involved. This expertise continuously flows into the development and production of all the plasticising components. This results in a practice-oriented range for the processing of a variety of materials that perfectly combines several wear resistance categories with different geometries.

Detailed analysis

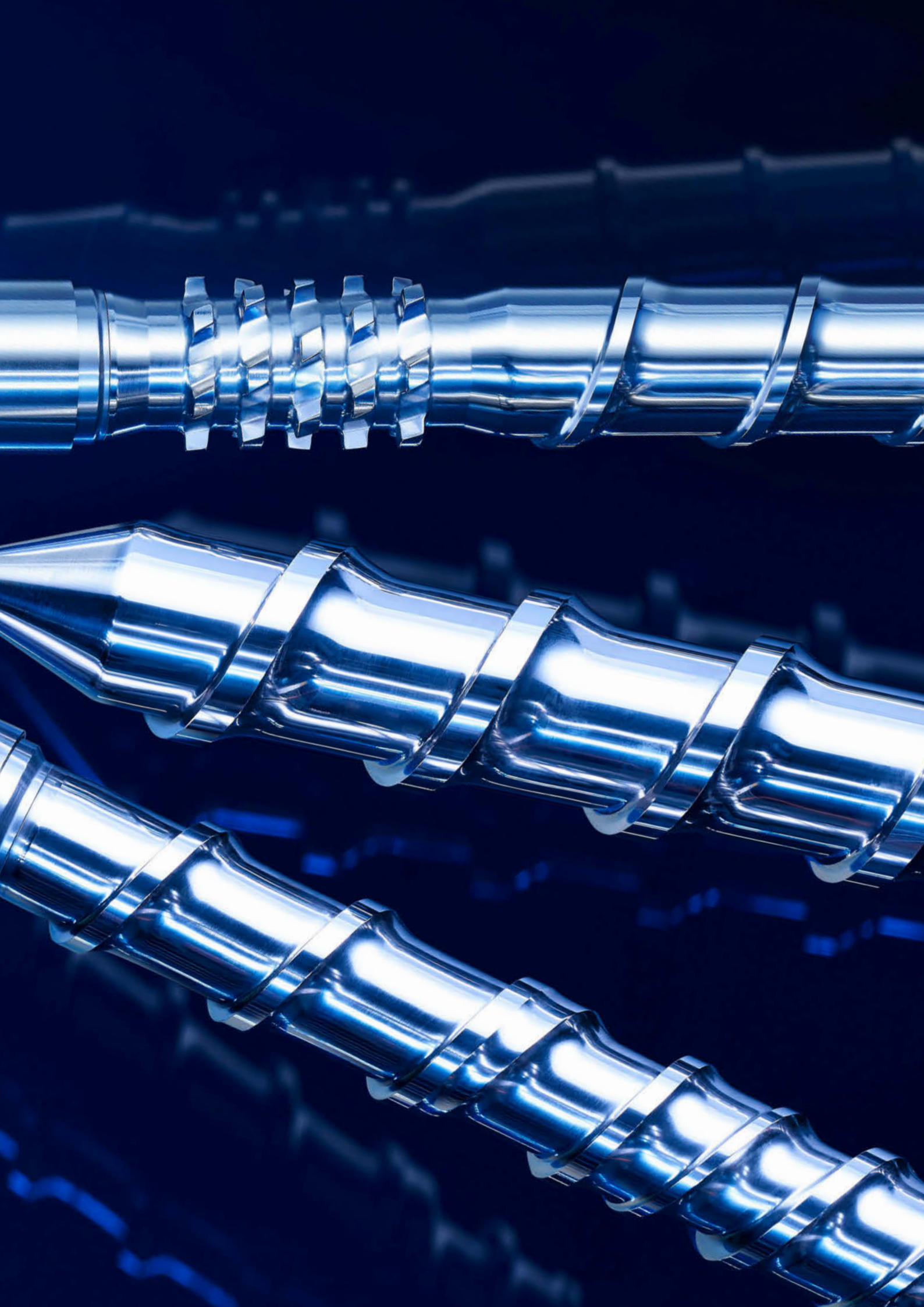
If screws or non-return valves fail, you can have these analysed by us. If necessary, we can also carry out material testing for this purpose. We provide extensive feedback on the results. If the cause is known, we give a recommendation for a replacement. For example, it may help to change to a different wear category in order to prevent the problem in future.

Fast delivery

Comprehensive service is synonymous with the name ARBURG. This applies in particular to the supply of spare plasticising components. In order to ensure the prompt delivery of spare parts wherever our customers may be, our German headquarters and worldwide subsidiaries are connected via a digital network. This minimises the downtime of your machines.

WEAR RESISTANCE CATEGORIES: WELL PROTECTED

// The plasticising components of an injection moulding machine are subject to high loads. Depending on the plastic used, both corrosion and abrasion play a significant role when it comes to preparation of the melt. In order to always ensure adapted protection against wear, we stock different versions of the screw, plasticising cylinder and non-return valve, which you can select and use depending on the materials to be processed. \\



Extremely hard: bimetal cylinder (BMA) with a protective layer up to two millimetres thick.

Material-specific: genuine plasticising components from ARBURG.

ONLY HIGH QUALITY PARTS ARE GOOD ENOUGH FOR YOU!

Abrasion

In the case of abrasion, a hard foreign body penetrates the comparatively soft surfaces of basic metal bodies, scoring the material. These hard particles can be either a filler in the molten plastic or a solidified particle that has already become detached as a result of wear. Consequently, abrasive wear occurs virtually throughout the entire plasticising unit, i.e. in both the solid plastic and melt areas of the unit. Abrasion is also commonly the forerunner of corrosion.

Corrosion

Corrosion is primarily caused by the volatile constituents in the melt. For example, corrosion can be caused by water from inadequately dried granulate combined with oxygen. Aggressive constituents in additives, such as dyes and flame retardants, and the thermal degradation of the plastic polymers themselves can attack the plasticising components. As these volatile constituents are only released under processing conditions, corrosive wear occurs primarily in the area of the metering or extrusion zone and in the non-return valve.

WEAR FACTORS

Material	e.g. corrosion with PVC or fluoro-thermoplastics
Additives	e.g. flame-protection agents/lubricants, dyes
Filler type	e.g. glass or carbon fibre, mineral fillers
Filler content	the higher this is, the more critical
Process parameters	speed, dynamic pressure, temperatures, dwell time

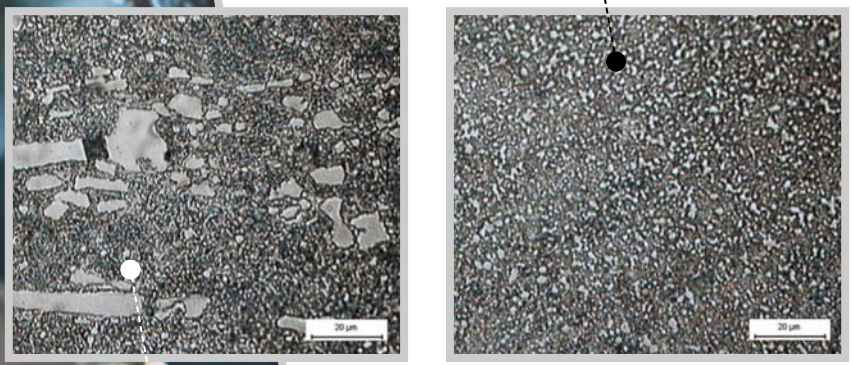
Wear categories appropriate to the material

High wear resistance and long period between maintenance: the surface hardness and the hardness profile across the diameter (hardening depth) are key for the plasticising components. The question of which wear protection should be used and where depends on the material. However, several plastics are used in everyday production on injection moulding machines. Accordingly, a universal design is recommended in order to allow a wide range of processing.

WEAR PROTECTION

Plasticising screws with very high outer layer hardness and bimetallic cylinders

Highly wear-resistant: carbide structure with powder-metallurgically processed steel.



Wear-resistant: carbide structure with melt-metallurgically processed steel.

Wear-resistant

We manufacture our wear-resistant plasticising screws from high-chromium steel. They provide excellent protection against abrasion and corrosion for plastics with a low filler content and low corrosion tendency. Highly wear-resistant bimetallic cylinders (BMA) combining two different materials are also available. A hardened alloy is applied in a cylinder made from conventional steel. With a thickness of 1.5 to 2 mm, this layer has a high degree of hardness and offers an optimum wear reserve.

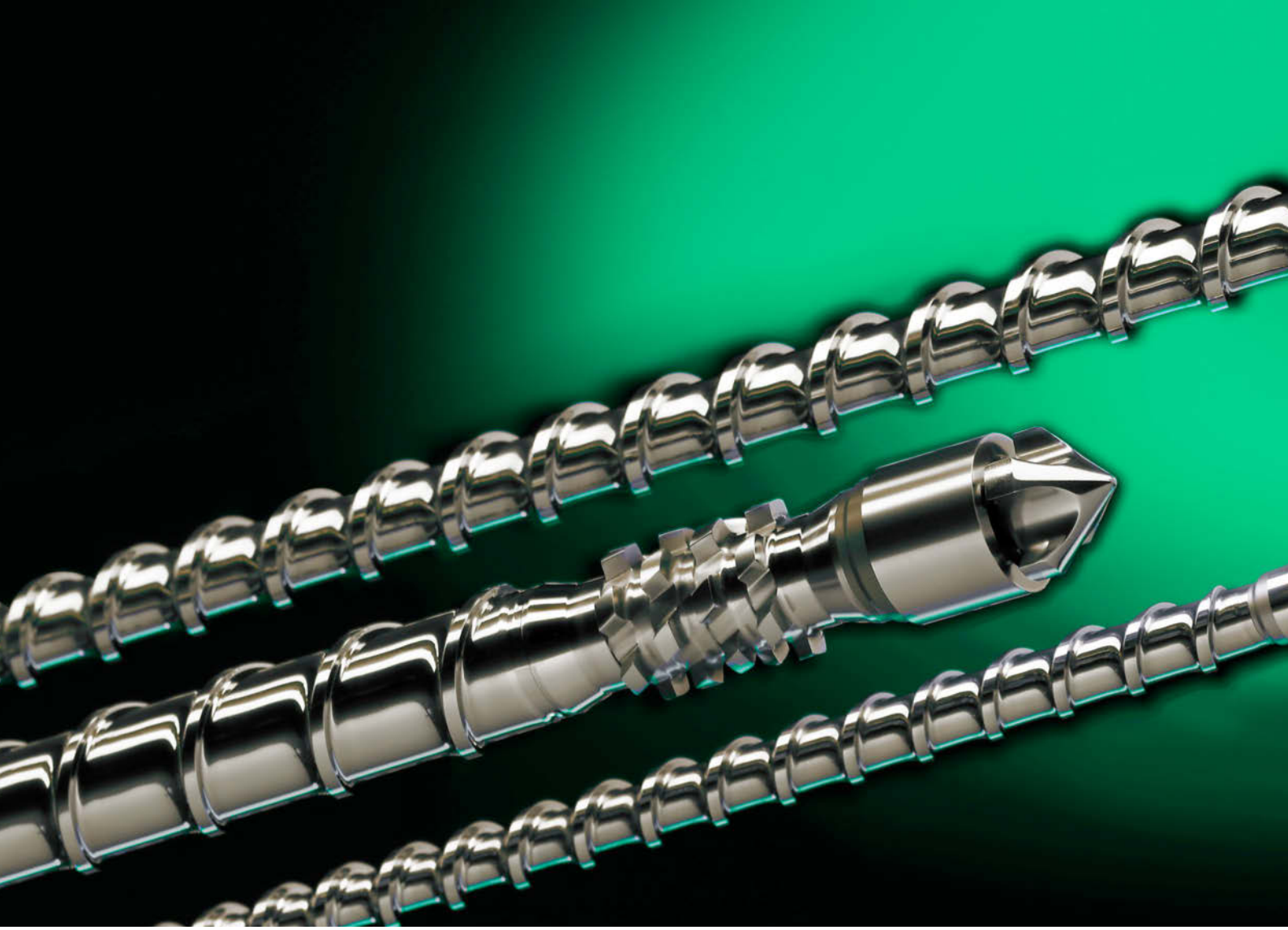
Highly wear-resistant

We use powder-metallurgically processed steel with a high proportion of chromium carbide (PM steel) for our highly wear-resistant screws. The advantage over conventional melt-metallurgically processed steel is that it produces a more even and fine-grained carbide structure. This results in high abrasion and corrosion resistance. The screws are highly wear-resistant and, thanks to the hardening process employed, have a significantly higher wear reserve. These screws are combined with highly wear-resistant bi-metallic cylinders (BMA).

	WEAR-RESISTANT	HIGHLY WEAR RESISTANT[1)]
Screw	High-chromium steel	High-alloy PM steel
Cylinder	Bimetal	Bimetal
Non-return valve	High-alloy tool steel	High-alloy PM steel
Area of application	Unfilled plastics or plastics with a low filler content (< = 25%) and low corrosion tendency	Plastics with high filler ratio (> = 25%) and high corrosion tendency
	Temperature range up to 380 °C	Temperature range up to 450 °C

[1)] Standard from injection unit 800 upwards

Further details regarding wear protection on screws, plasticising cylinders and non-return valves are available on request.



PLASTICISING FOR SPECIAL THERMOPLASTICS

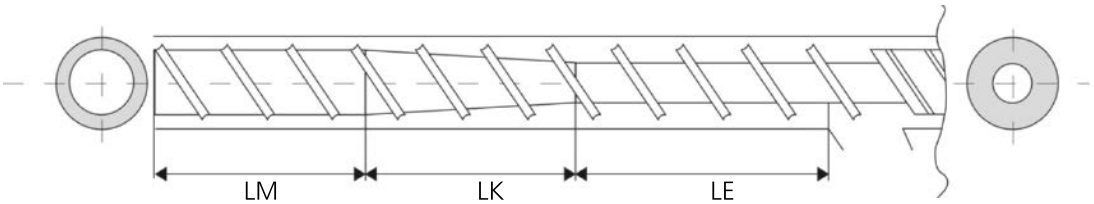
// The right choice of screw geometry can also significantly minimise wear to your plasticising components. For this reason we recommend the use of screws adapted to the relevant compression ratio and extended plasticising cylinders for certain thermoplastics. For problems with highly adhesive and coating-forming plastics, we also offer our components with a specific surface treatment. This allows you to individually adapt the plasticising process – just as your application requires! \\

Product range

- PVD coating
- High- and low-compression screws
- Extended screws and barrier screws
- Faceted mixers

Free cross-section
Metering zone

Free cross section
Feed zone



PVD-coated components

Highly adhesive plastics, such as, for example, polycarbonate (PC), tend to form a coating on plasticising components. The result: surface flaws. PVD (Physical Vapour Deposition) coatings from chrome nitride (CrN) on screws and non-return valves prevent the formation of these coatings. This form of surface treatment, well known in the metal machining tool sector, provides additional wear protection.

High-compression screws

In order to improve the melting of semi-crystalline thermoplastics such as POM, it may make sense to use of a screw with a higher compression ratio. These HC screws are produced in a highly wear-resistant quality. The more deeply cut feed zone is beneficial with respect to process stability when it comes to the processing of materials with poor granular feeding properties or the addition of reground material.

Low-compression screws

These screws are suitable for the processing of shear-sensitive materials. A reduced compression ratio and a longer compression zone ensure gentle melting. Low-compression screws are mainly used for PVC and in powder injection moulding (PIM). Highly wear-resistant quality is a must here. It also increases resistance to corrosion.

OUR EXPERTISE ENABLES YOUR PRODUCTION TO RUN SMOOTHLY!

Extended screws and barrier screws

Lengthened three-zone screws with L/D ratios of 22:1 to 25:1 have proven suitable for meeting high demands with regard to material throughput and melt quality. These are usually combined with facetted mixers.
As an alternative, barrier screws are available and are used primarily for processing PE and PP intended for packaging applications.

Facetted mixers

Plastics are often not dyed until the processing stage on the injection moulding machine. Master batches and liquid dyes are typically used here. Facetted mixers ensure homogeneous mixing of the melt in order to prevent streak formation. Optimal homogenisation also makes it possible to reduce the additive content and consequently lower material costs. Facetted mixers are available for screws with diameters exceeding 25 mm and an L/D ratio greater than 20.

APPLICATION	SCREW GEOMETRY
Thermoplastics (general)	Standard three-zone screw
Shear-sensitive materials, e.g. PVC	PVC screw (low-compression)
Semi-crystalline thermoplastics, e.g. POM	HC screw (high-compression)
Self-dyeing	Three-zone screw with mixing section
High-speed parts	Lengthened screws with mixing section or barrier screws

Barrier screw: use in packaging sector.

Facetted mixer: homogeneous mixing of the melt.

Highly specialised: cylinder modules for moist polyester and granular thermosets.

PLASTICISING OF CROSS-LINKABLE MOULDING COMPOUNDS

// A significant distinguishing factor in the processing of cross-linkable moulding compounds compared to thermoplastics is temperature control. Whereas cylinder modules for thermoplastics are heated electrically, liquid-medium temperature-controlled cylinder modules are used in the case of cross-linkable moulding compounds. The screw geometries and non-return valves employed also differ. Our range therefore also includes special plasticising components for the processing of cross-linkable moulding compounds. \\

/i/ Further information:
Silicone injection moulding brochure
Thermoset processing brochure

Thermosets

Thermosets are usually processed with abrasive fillers and reinforcing materials. Our highly wear-resistant cylinder modules are adapted to the associated requirements. The screws operate without compression and feature a relatively small L/D ratio as the material feed is positioned further forward than is normally the case. Pourable materials are processed without a non-return valve; in the case of BMC compounds, a specially-adapted non-return valve is used.

Elastomers

Screws for elastomer processing are designed purely for conveying and are compression-free. In addition, a customised non-return valve and a specially designed area for processing band material are available.

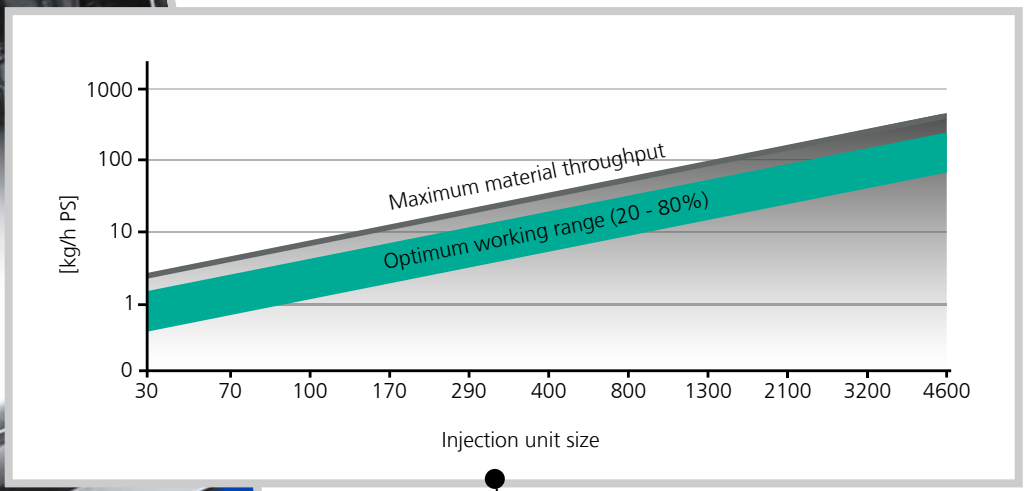
Liquid silicones

Compression-free conveying screws with very flat-cut channels are used for the processing of liquid silicones (LSR). Due to the low viscosity of LSR, these screws are combined with special, disc-type non-return valves which allow precise dosage and secure closure. In addition, needle-type shut-off nozzles are used. This prevents the silicone rubber from leaking out when lifting the nozzle. Depending on the mould design, numerous sealing nozzle versions are available.

Precision: disc-type non-return valve and needle-type shut-off nozzles for LSR processing.

A MATTER OF DESIGN: ALWAYS WELL ADVISED

// We offer you a finely graded range of injection units, on which you can use cylinder modules of various sizes without requiring major conversion. This allows plasticising to be tailored precisely to your respective production requirements. We will be happy to advise you on all questions relating to the design of your plasticising system. This guarantees the productivity and quality of your injection moulding production. \\



Always ideal: optimum working range of injection units in relation to material throughput.

Design basis: dosage volumes

The dosage volume should be in a range between 20 and 80 percent of the maximum possible stroke volume of the screw. The reason for this is that an excessively large stroke results in increased air inclusions and unevenly processed material due to non-melted particles.

Key parameter: melting capacity

The ideal operating range of the injection unit is between 20 and 80 percent of the maximum melting capacity. The upper limit is determined by the screw flight volume and the minimum required dwell time. If an injection unit is operating at the lower limit, thermal damage to the material due to an excessively long dwell time must be expected.

Required parameter: injection flow

At high injection flows and pressures, as required for thin-walled articles for example, selection according to dosage volume and material throughput alone is often not enough. This is because the maximum achievable injection pressure for an injection unit decreases as the screw diameter increases. In such cases, a change to the next largest injection unit is recommendable.

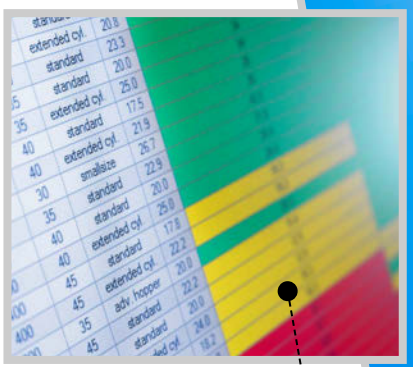
Of relevance for the cycle time: the plasticising flow rate

Finally, a check should be carried out to determine whether the plasticising flow, which is dependent on the screw speed, is adequate for dosing the required shot weight within the remaining cooling time. Selection of a larger injection unit may also be necessary in this instance.

The basis for the reliable configuration of your plasticising unit:

MATERIAL THROUGHPUT [kg/h] =

$$\frac{\text{Shot weight [g]} \times 3.6}{\text{Cycle time [sec]}}$$



ARBURG's expert database: the right plasticising system for every application.

Scan this code to visit our Media Centre: in-depth, captivating, entertaining.

ARBURG GmbH + Co KG
Arthur-Hehl-Strasse
72290 Lossburg
Tel.: +49 7446 33-0
www.arburg.com
contact@arburg.com

WIR SIND DA.

526421_EN_GB_092022 · Subject to alterations
Printed in Germany