

SWARCO Indusferica

# SWARCOFORCE

THE GAME-CHANGING INDUSTRY SYSTEM



**swarco** 

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## 1.1 FIELDS OF APPLICATION

SWARCOFORCE glass filler beads are a premium-quality filler used to improve the physical properties of plastics, resins, paints, coatings and building materials.

They influence key characteristics of the final product, including stiffness, compressive strength, warpage and shrinkage behaviour, flowability, abrasion and scratch resistance, tensile strength, impact resistance, colour performance, surface gloss and light diffusion.



PAINTS, VARNISHES AND COATINGS



GLASS FILLER BEADS FOR PLASTICS



GLASS FILLER BEADS FOR BUILDING MATERIALS



ADDITIVE MANUFACTURING OF PLASTICS

### GLASS BEADS WITH A SMALL CARBON FOOTPRINT

At a time when sustainability and environmental protection are gaining importance, companies are challenged to develop innovative solutions that enhance product performance while reducing environmental impact. SWARCO Indusferica demonstrates how this can be achieved – with innovative glass beads for specialised industrial applications.



CRADLE-TO-GATE (CTG)

SCOPE 1-3

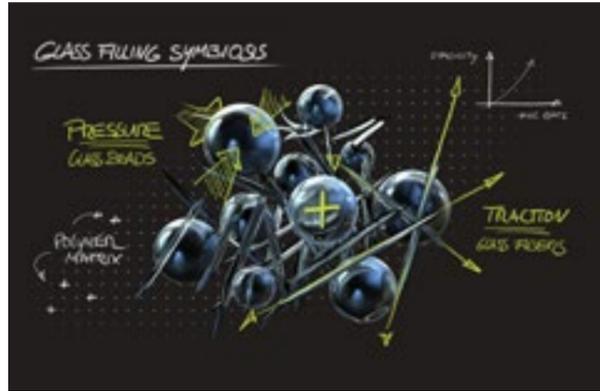
SWARCOFORCE  
SWARCOBLAST

**1.11**  
kg CO<sub>2</sub>e/kg\*

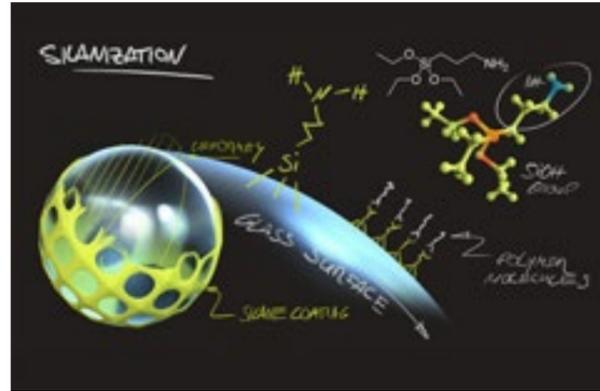
\*value only applies to SWARCOFORCE glass filler beads & SWARCOBLAST glass blasting beads

01 SWARCOFORCE  
GLASS FILLER BEADS

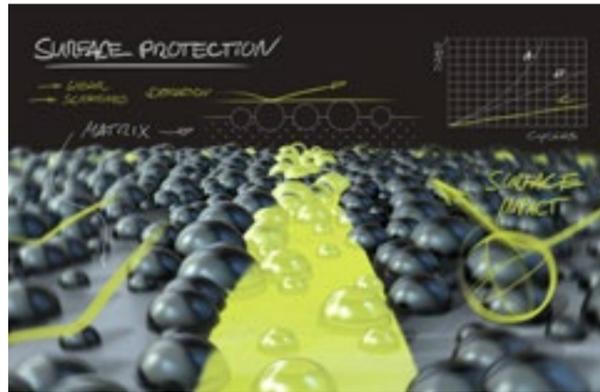
## 1.2 PROPERTIES AND FUNCTIONAL EFFECTS



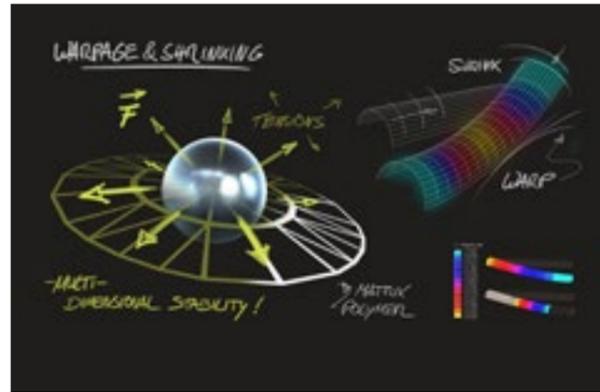
The hybrid combination of glass filler beads and glass fibres effectively combines the strengths of both reinforcement materials.



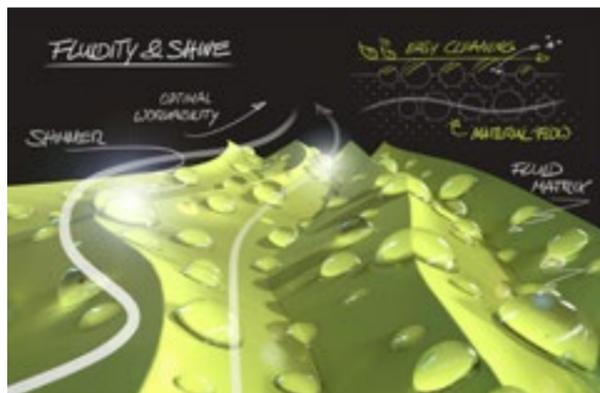
Silanisation of the bead surface enhances bonding with the matrix material.



The scratch and abrasion resistance of product surfaces can be significantly improved by using glass filler beads.



The warpage and shrinkage behaviour of thermoplastics is positively influenced by the addition of glass filler beads.



Surface characteristics such as gloss level and haptics can be enhanced by using glass filler beads.

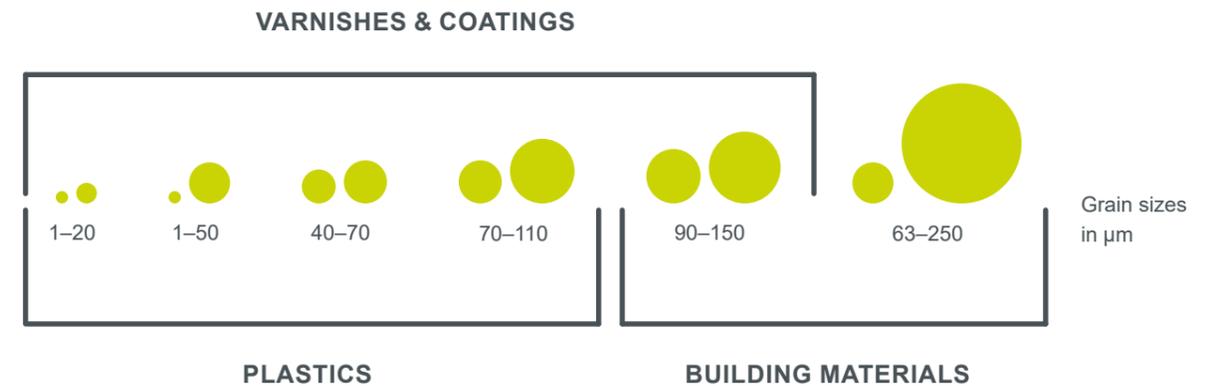
## 1.3 TECHNICAL DATA



SWARCOFORCE glass filler beads are manufactured from soda-lime glass cullet. Due to production-related factors, traces of foreign matter, additives and oversize particles may be present up to a maximum of 0.1 wt%. Fines or undersized fractions (unless otherwise specified in the grading curve) may be present up to 0.5 wt%.

## 1.4 SIEVINGS AND APPLICATIONS

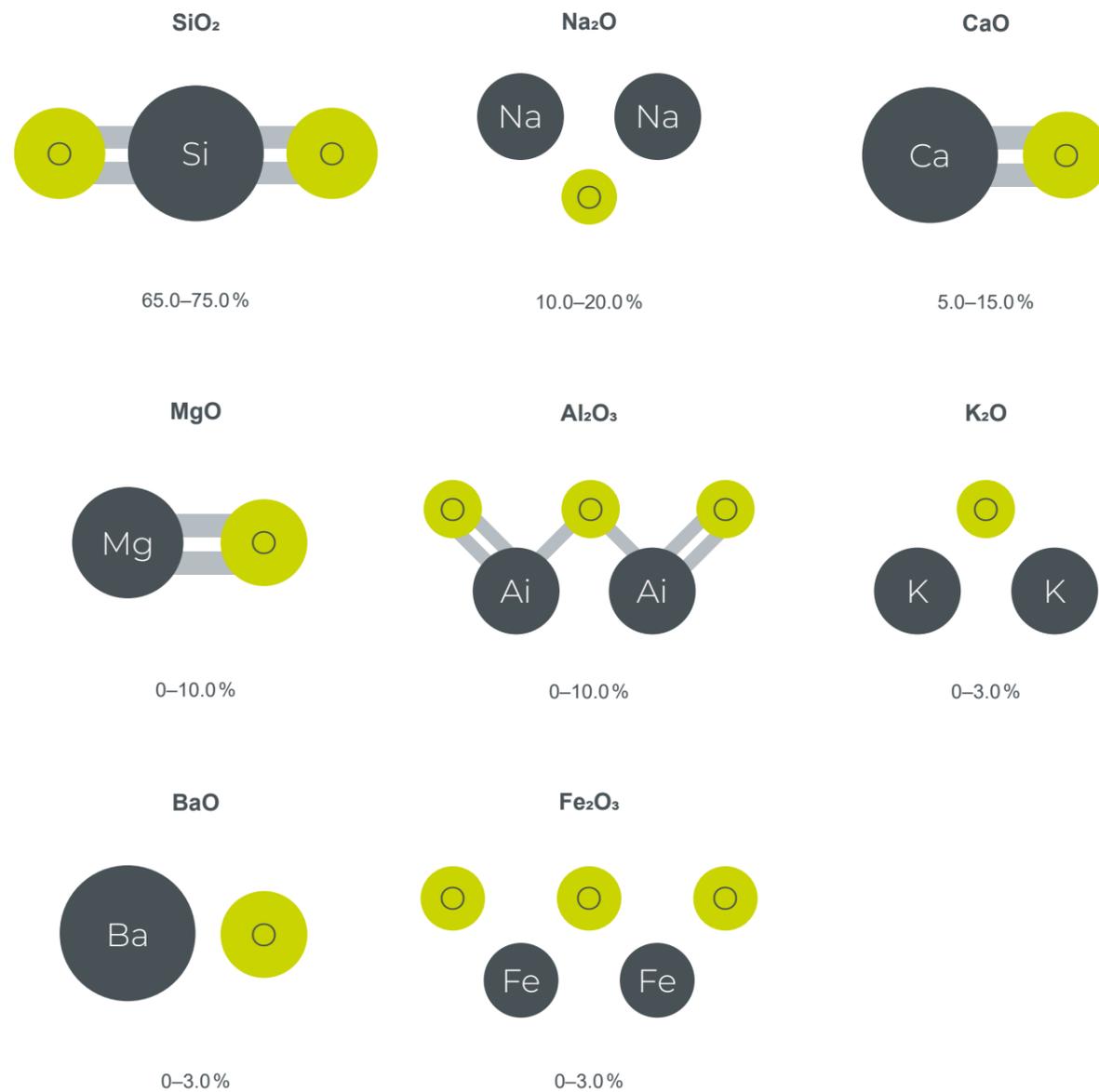
SWARCO Indusferica is your expert partner for customised solutions involving the industrial use of micro glass beads as filler material. A broad range of particle size distributions is available. The production process ensures tight grading curves and consistent quality. Additional customised gradings can be developed on request.



## 1.5 CHEMICAL COMPOSITION

Elements connected by a solid line represent covalent chemical bonds, while unconnected elements indicate ionic bonds. The depicted chemical composition corresponds to the typical glass chemistry of soda-lime glass (A-glass).

For applications with specific technical requirements, alternative glass types – such as alumino-borosilicate glass (E-glass) or barium titanate glass – are available upon request.



## 1.6 SILANISATION

SWARCOFORCE glass filler beads can be customized with a variety of coatings to tailor the interaction between the glass and each specific matrix material (e.g. adhesion between glass and polymer).

| Embedding material / Matrix material | Recommended silane type               |         |
|--------------------------------------|---------------------------------------|---------|
| <b>Thermosets / Elastomers</b>       | Epoxy                                 | C2 / C3 |
|                                      | Melamine                              | C2 / C3 |
|                                      | Phenol                                | C4      |
|                                      | Polyester                             | C1      |
|                                      | Polyurethane (PU)                     | C2 / C3 |
|                                      | Silicone                              | C3      |
| <b>Thermoplastics</b>                | Acrylic resin, unsaturated            | C1      |
|                                      | Acrylic resin, saturated              | C3      |
|                                      | Acrylonitrile-butadiene-styrene (ABS) | C2      |
|                                      | Polyamide (PA)                        | C3      |
|                                      | Polybutylene terephthalate (PBT)      | C2 / C3 |
|                                      | Polycarbonate (PC)                    | C3      |
|                                      | Polyether sulphone (PESU)             | C3      |
|                                      | Polyethylene (PE)                     | C1      |
|                                      | Polymethylmethacrylate (PMMA)         | C3      |
|                                      | Polyoxymethylene (POM)                | C3      |
|                                      | Polypropylene (PP)                    | C1      |
|                                      | Polystyrene (PS)                      | C2 / C3 |
|                                      | Polysulfone (PSU)                     | C3      |
|                                      | Polyvinyl chloride (PVC)              | C3      |
|                                      | Styrene-acrylonitrile (SAN)           | C3      |
| Thermoplastic Polyurethane (TPU)     | C3                                    |         |

The optimal silane type depends on the application, matrix material and processing conditions. This overview is not a universal recommendation. Individual alignment is recommended.

# 02 PAINTS, VARNISHES AND COATINGS

Glass filler beads are used in paints, varnishes and coatings to selectively influence the physical properties of the material – for example, to improve surface quality or scratch resistance.

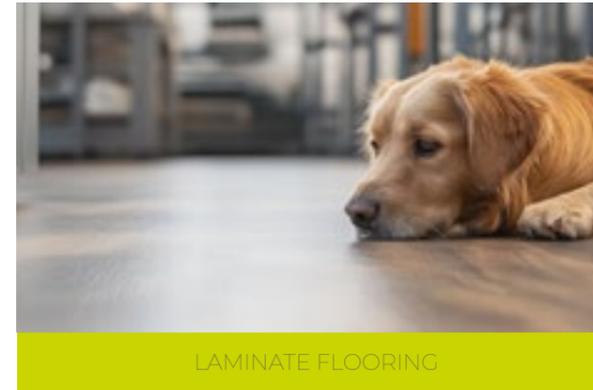
In laminate flooring, they reinforce the top layer and increase abrasion resistance.

## 2.1 SWARCOFORCE GLASS FILLER BEADS AS FUNCTIONAL FILLERS FOR THE OPTIMIZATION OF PHYSICAL PROPERTIES

SWARCOFORCE glass filler beads from SWARCO Indusferica enhance the physical properties of paints, varnishes and coatings as a functional filler material.

Depending on the application, they allow for targeted adjustment and optimization of effects such as gloss, matting, transparency or other surface characteristics.

## 2.2 APPLICATIONS



LAMINATE FLOORING



COATINGS



INTERIOR WALL PAINTS



VARNISHES

## 2.3 BENEFITS

### CUSTOMISED SOLUTIONS TAILORED TO CUSTOMER NEEDS

SWARCO Indusferica is your reliable partner for customised solutions involving the industrial use of micro glass beads as filler material. Properties such as particle size distribution, type of silanisation and filling content influence the performance of the final product. By analysing these parameters precisely, materials can be systematically optimized and further developed.

A broad range of particle sizes is available. The production process ensures consistently tight grading curves. On request, we also develop customised grading curves tailored to the specific requirements of our customers.



**Enhanced  
flowability**



**Increased  
surface gloss**



**Improved  
abrasion resistance**



**Improved  
light diffusion**



**Optimized  
scratch resistance**



**TECHNICAL DATA SHEETS**  
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# 03 PLASTICS & COMPOSITES

Glass filler beads are added to plastics during compounding or granulate processing in order to selectively enhance specific properties. Especially in injection moulding applications, their isotropic structure helps to reduce warpage and shrinkage.

Typical fields of application range from technical components to interior and exterior parts in the automotive industry – and even include materials used in 3D printing.



## 3.1 SWARCOFORCE GLASS FILLER BEADS AS FUNCTIONAL FILLERS AND REINFORCEMENT MATERIALS

SWARCOFORCE glass filler beads from SWARCO Indusferica are among the most effective fillers and reinforcement materials used in the plastics industry. In thermoplastics, they are integrated during the compounding process with the aim of selectively improving mechanical properties.

The focus is on enhancing stiffness, compressive strength, heat deflection temperature and other technical parameters essential for high-performance plastic applications.

## 3.2 APPLICATIONS



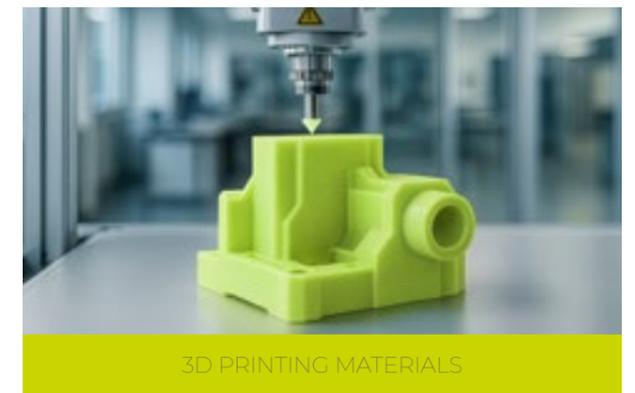
TECHNICAL COMPONENTS



INTERIOR AUTOMOTIVE PARTS



EXTERIOR AUTOMOTIVE PARTS



3D PRINTING MATERIALS

### 3.3 IMPROVED MATERIAL PROPERTIES

#### TARGETED MATERIAL OPTIMIZATION THROUGH FUNCTIONAL PERFORMANCE

Combining glass filler beads with glass fibres unites the benefits of both materials – reducing warpage and improving dimensional stability in thermoplastic compounds.

As an anti-blocking agent, SWARCOFORCE glass filler beads help to prevent unwanted adhesion of plastic films, thereby improving handling and further processing.

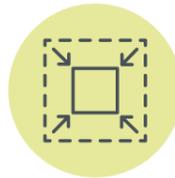
Additional silanisation of the glass bead surface enhances bonding to the polymer matrix and ensures stable incorporation. This allows for targeted optimization of both mechanical performance and processability – tailored precisely to customer requirements.



**Higher  
scratch resistance**



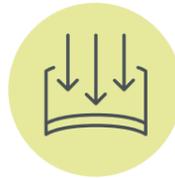
**Improved  
abrasion resistance**



**Reduced warpage  
and shrinkage**



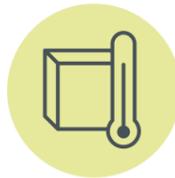
**Enhanced  
haptics**



**Optimized stiffness  
and compressive strength**



**Improved  
surface quality**



**Enhanced heat  
deflection resistance**



**Use as an  
anti-blocking agent**



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# 04 BUILDING MATERIALS

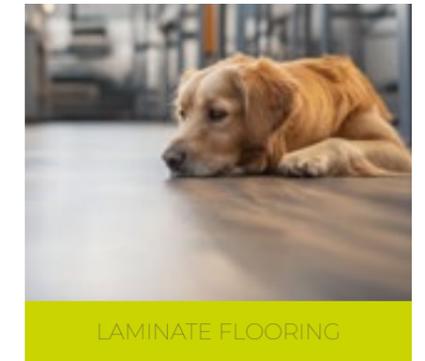
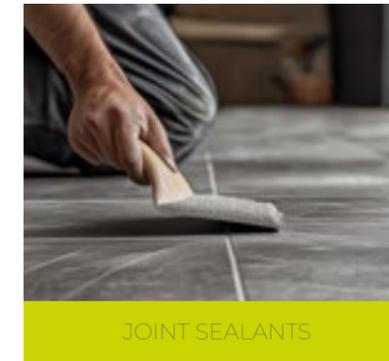
Glass filler beads are used in a wide variety of applications in the building materials industry – for example in translucent joint sealants that not only reflect light, but also refract it. This intensifies the colours of glass mosaics and glass tiles, creating a shimmering, vibrant effect.

Thanks to the densified surface structure created by the use of SWARCOFORCE glass filler beads, materials become water-repellent and particularly easy to clean – a clear advantage for durable, aesthetically appealing surfaces.

## 4.1 SWARCOFORCE GLASS FILLER BEADS IN THE BUILDING MATERIALS INDUSTRY

In the building materials sector, SWARCOFORCE glass filler beads significantly enhance surface aesthetics and functionality. They intensify the colours of glass mosaics and tiles and produce a refined, shimmering finish. At the same time, they densify the material structure, making the surface water-repellent and resistant to cleaning agents.

## 4.2 APPLICATIONS



### PERFECTLY OPTIMIZED BUILDING MATERIALS

SWARCOFORCE glass filler beads open up a wide range of possibilities for targeted material optimization in the building materials industry. They contribute to structural stability, improve processing properties and enable finely tuned formulations – tailored to each specific application and customer requirement.

Special surface coatings allow the beads to be precisely adapted to different binding agents, ensuring reliable incorporation into a variety of systems. A typical use case is laminate flooring: the glass filler beads reinforce the top layer and ensure durable, abrasion-resistant surfaces.

### 4.3 IMPROVED MATERIAL PROPERTIES

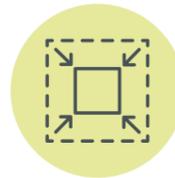
#### PROVEN WORLDWIDE – CUSTOMISED FOR EVERY APPLICATION

Numerous leading building materials manufacturers in Europe and Asia rely on the quality and versatility of products from SWARCO Indusferica. The particle size and surface characteristics of SWARCOFORCE glass filler beads can be tailored to meet specific requirements – ensuring maximum efficiency in use.

A wide variety of coatings is available to further modify the beads and optimise their interaction with different matrix materials.



**Increased  
scratch resistance**



**Reduced warpage  
and shrinkage**



**Improved  
abrasion resistance**



**Higher printing  
precision**



**Optimized  
flowability**



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# 05 ADDITIVE MANUFACTURING

SWARCOFORCE glass filler beads from SWARCO Indusferica are used to selectively optimise material properties in the additive processing of plastics. As a functional filler and reinforcement material, they are particularly suitable for processes such as Selective Laser Sintering (SLS) and Fused Deposition Modelling (FDM).

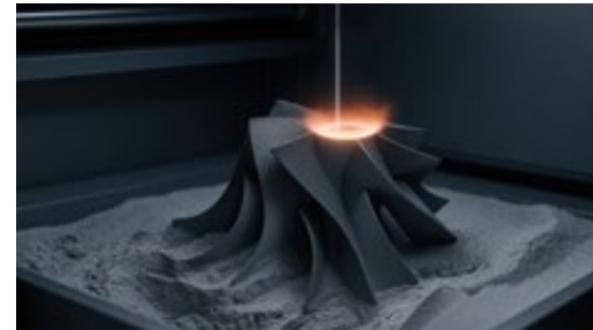


## 5.1 SWARCOFORCE GLASS FILLER BEADS AS FUNCTIONAL FILLERS AND REINFORCEMENT MATERIALS IN ADDITIVE MANUFACTURING OF PLASTICS

In additive manufacturing, components are built layer by layer directly from a digital 3D model – without the need for moulds or tooling. Almost any geometry can be realised within the build chamber of a 3D printer.

This technology is not only used in prototyping and small-batch production but is also becoming increasingly relevant in serial production with growing volumes. Its key advantage: even complex shapes and high levels of customisation can be implemented efficiently and with precision.

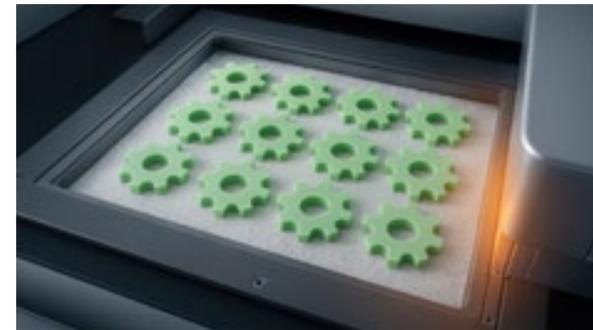
## 5.2 APPLICATIONS



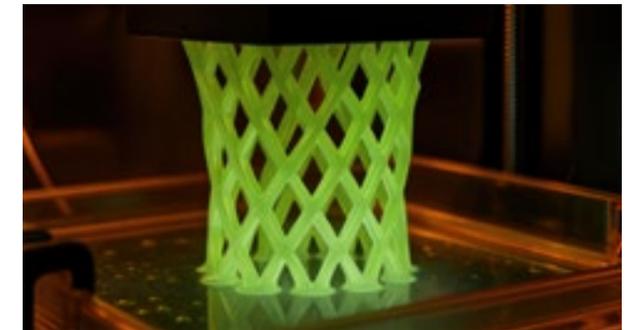
SELECTIVE LASER SINTERING (SLS)



FUSED DEPOSITION MODELLING (FDM)



MULTI JET PRINTING (MJP)



STEREOLITHOGRAPHY (SLA)

### 5.3 IMPROVED MATERIAL PROPERTIES

#### GLASS FILLER BEADS FOR ENHANCED PERFORMANCE

SWARCOFORCE glass filler beads from SWARCO Indusferica are used in the additive processing of plastics as a targeted filler and reinforcement material – especially in SLS (Selective Laser Sintering) and FDM (Fused Deposition Modelling).

Depending on the technology, the beads are either blended with the polymer powder (SLS) or incorporated into the filament during compounding (FDM). The result: 3D-printed components with improved shrinkage and warpage behaviour and optimized mechanical performance.



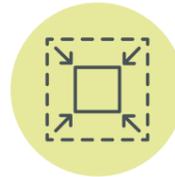
**Increased  
scratch resistance**



**Enhanced heat  
deflection resistance**



**Improved  
abrasion resistance**



**Reduced warpage  
and shrinkage**



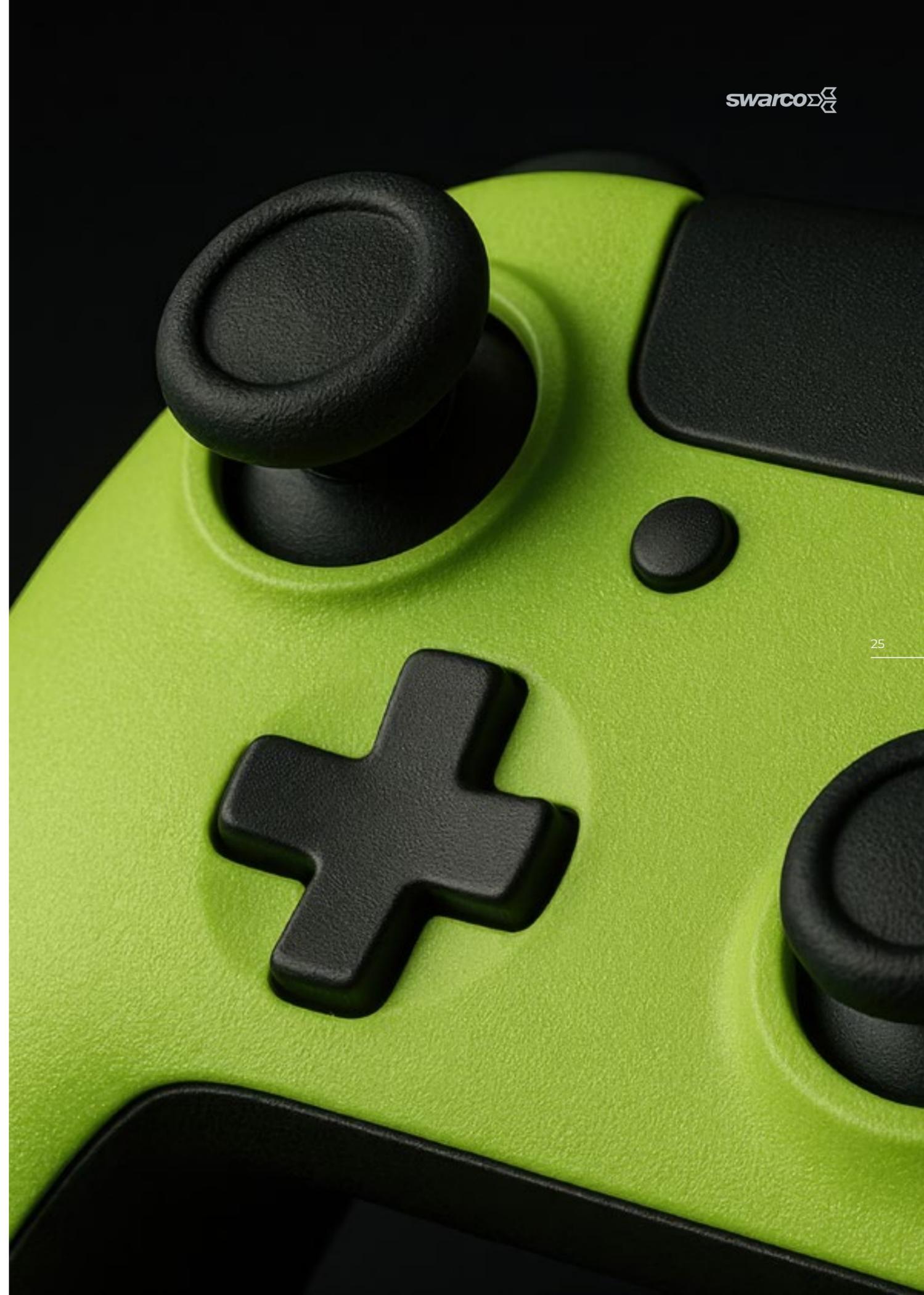
**Optimized stiffness and  
compressive strength**



**Higher precision  
of printed parts**



**TECHNICAL DATA SHEETS**  
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For reasons of readability, a single gender form  
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