



Schunk Carbon Technology

Just printed. Just 9,6 Mohs.

Create design in diamond-like hardness



**IntrinSiC<sup>®</sup>**  
SIMPLY COMPLEX

## In the past shapes were defined by manufacturing processes ... now it depends on your imagination.

IntrinSiC® is the superior innovation for the production of large, complex, monolithic constructional elements made from silicon-infiltrated, reaction-bonded silicon carbide (RBSiC). Based on this innovation it became feasible for the first time to provide large parts with a certain complexity efficiently by 3-D-printing accompanied by a diamond-like hardness.

### From Prototype to Volume Production

IntrinSiC® combines excellent material properties of RBSiC with process-related advantages of the 3-D-printing, providing a new dimension of constructive design potentials - i.e. in the market segments of lithography, metrology and thermal process technology.

Even large and complex monolithic structures with undercuts and cavities are feasible to be formed in

just one single manufacturing step. Besides, a high degree of surface finish can be achieved by grinding, polishing and lapping.

Upon customer request we may moreover realize a reverse engineering of existing parts using tactile or non-tactile measuring methods (i.e. laser-scanning) for data evaluating and digitizing.

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Intrinsic (from latin *intrinsecus*) originally means "internal" or "inwards", in a later reinterpretation "coming from inside". An intrinsic property is a property of a system or of a material itself or within - This perfectly defines the quality of IntrinSiC®.

A highly innovative new product which allows for the efficient manufacture of high quality precision parts.

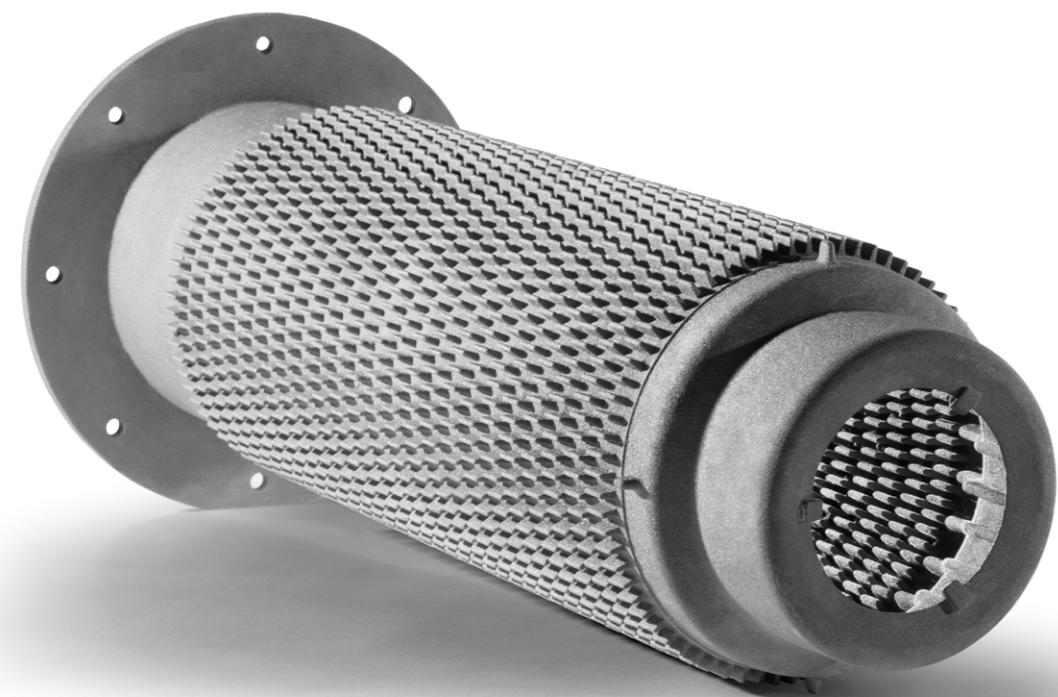
IntrinSiC® combines the following process and material advantages:

#### Process advantages of 3-D-printing:

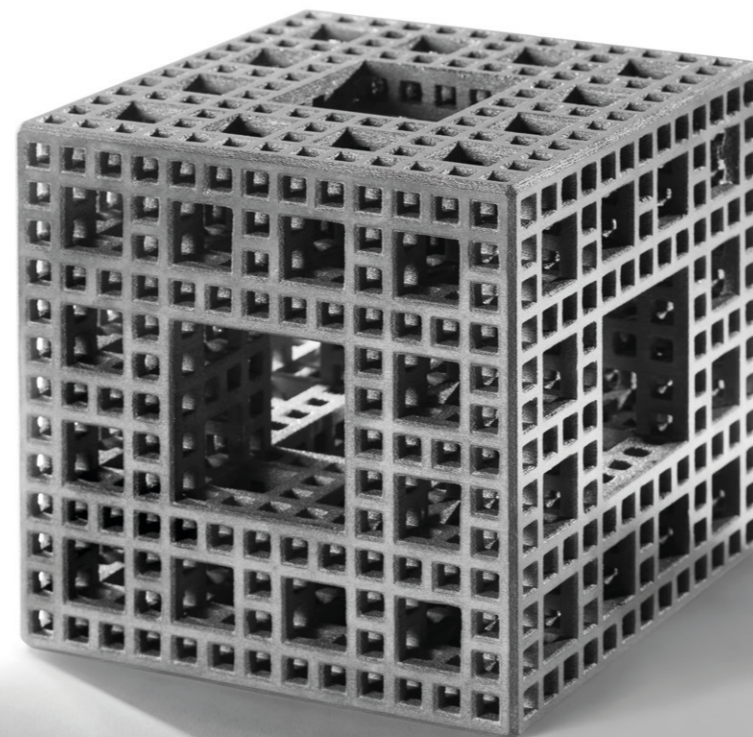
- ▣ Realizing of undercuts and/or cavities
- ▣ No time-consuming manufacturing from patterns and moulds (CAD-data means parts ready for manufacturing immediately)
- ▣ High degree of process-flexibility
- ▣ Fast production lead times
- ▣ Design modification by the click of a mouse
- ▣ No time-consuming retooling of moulds
- ▣ Digitizing from existing parts by Reverse Engineering

#### Material advantages of RBSiC:

- ▣ High temperature resistance
- ▣ Low mass
- ▣ Low thermal expansion
- ▣ Very high stiffness, bending strength and hardness
- ▣ High degree of size accuracy
- ▣ Excellent corrosion and oxidation resistance
- ▣ High thermal conductivity
- ▣ Direct polishable surfaces



Recuperative Burner  
(Design by WS-Wärmeprozessstechnik GmbH)



IntrinSiC®			Microstructure
Bulk density	[g/cm³]	3,07	
Apparent porosity	[Vol.%]	0	
Modulus of rupture (4 point loading)	[MPa]	210	
Weibull modulus		13	
Modulus of elasticity	[GPa]	360	
Vickers hardness		2800	
Thermal expansion coefficient RT - 400°C	[10 <sup>-6</sup> /K]	3,9	
Thermal conductivity 100°C 1200°C	[W/mK]	160 24	
Chemical composition	[weight.%]		
SiC		87	
Si		13	Light phase = free Si

The value quoted above were determined on test specimens and cannot generally be applied to all shapes.

The Schunk Group is an internationally operating technology company. It offers a broad spectrum of products and services in the fields of carbon technology and ceramics, environment simulation and air conditioning technology, sintered metal and ultrasonic welding. The Schunk Group has bundled its expertise in the development, manufacture and application of carbon and ceramic solutions in the Schunk Carbon Technology Division.

**Schunk Ingenieurkeramik GmbH**

Hanns-Martin-Schleyer-Strasse 5

47877 Willich - Germany

Phone: +49 2154 497-113

Fax: +49 2154 497-111

E-Mail: [IntrinSiC@schunk-group.com](mailto:IntrinSiC@schunk-group.com)

[schunk-carbontechnology.com](http://schunk-carbontechnology.com)

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35.05e/500/2018

