

Modular Ceramic Truss Structures

A new, modular system enables ceramic truss structures to be assembled in any form or shape, give the appearance of being made from a single ceramic piece.

One problem with many precision gauges that are framed by – or built within – a metal structure is thermal expansion. Climatic changes – between seasons or even temperature changes during a single day – can impact the reliability, stability and accuracy of the process, leading to mistakes and incorrect measurements. The use of Invar (iron-nickel alloy FeNi36) can reduce this problem, but its costs are significant and the added expense may not be justified. Ceramics, in this case SiSiC, can be an effective solution.

Another obstacle for technical construction and engineering is the correlation of stability and weight. When there is a larger gap to bridge, possibly with heavy tools and applications on top, materials that may initially be stable enough become very heavy. This slows the handling, processing and maintenance and ultimately costs in time, money and resources. When it comes to lightweight and strong, ceramics can offer a solution.

TRUSSCERAM – lightweight structures

SCHUNK Ingenieurkeramik GmbH in Willich, Germany, developed an entirely new product range for new applications and customers. They obviously got inspired by kids toys such as metal construction kits and the famous plastic bricks. The beams that the truss structure is made of are normally produced to be applied as kiln furniture.

The name – TRUSSCERAM – says it all: the ceramic beams and pieces that can be assembled are screwed together to large truss structures. Connecting elements are constructed to transfer the mechanical properties of the monolithic ceramic elements without any restrictions to the size or complexity of the structure.

Keywords

Silicon-infiltrated silicon carbide (SiSiC), truss elements



Fig. 1
Installation of truss elements (source: SCHUNK Ingenieurkeramik)

And while suitable for room temperature applications when using screws, SCHUNK Ingenieurkeramik went one step further: they developed a ceramic glue that can fasten parts together without any metal components.

The material silicon carbide SiSiC, combined to a truss shape, adds its excellent technical properties to reach a maximum axial, flexural and torsional stiffness. It has minimal thermal expansion, is lightweight, and has a high degree of chemical, corrosion and abrasion resistance. A ceramic truss structure remains exceptionally stable – even when subjected to the toughest operating conditions.

“There are no limits, neither concerning the shapes of the single elements, nor the whole, finished part. We can totally focus on the customers individual needs,” says Joachim Heym, Managing Director of SCHUNK Ingenieurkeramik. “We are always developing each element together with our customers.”

The combination of different production methods such as casting, pressing or ex-

truding leaves almost no problem unsolved. Attachments and other peripheral applications can be easily integrated. And with very little effort the structure can be integrated into existing applications. Individual covers, color coatings or additional reinforcements are available, making it even more resistant to stress.

TRUSSCERAM was successfully launched last year, and since then the interest from customers continues to grow. “Many engineers are fascinated by the material ceramics and its possibilities,” Heym says.

Easy-to-use and simple construction principles that are common in modular construction sets made of steel are now available with all the advantages that high-performance ceramics have to offer.

SCHUNK Ingenieurkeramik GmbH
Hanns-Martin-Schleyer-Straße 5
47877 Willich-Münchheide
Germany

www.schunk-group.com
www.trussceram.com