

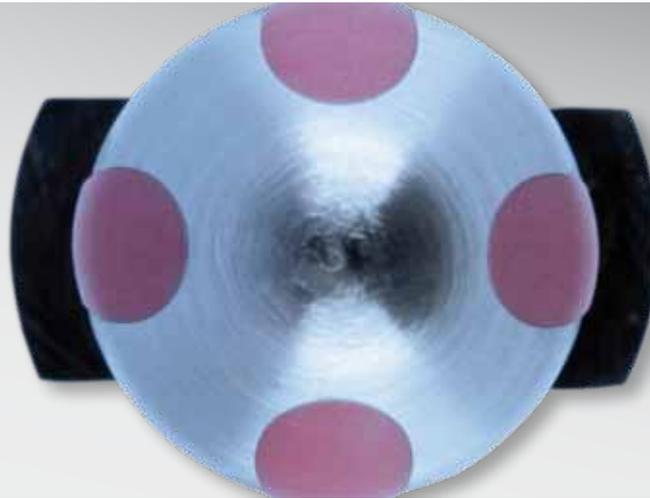
Positioning and Welding Pins for the Automobile Industry

FRIALIT®-DEGUSSIT® High-Performance Ceramics



For Greater Perfection & Precision in Car Manufacture:

FRIALIT®-DEGUSSIT® High-Performance Ceramics



Ceramic-to-metal components fulfill the very highest demands of the metal-working industry. The automobile industry, in particular, relies on the use of positioning and welding pins. And only FRIALIT®-DEGUSSIT® High-Performance Ceramics make such demanding applications feasible.

Extreme resilience

The automobile industry places high demands on the materials used. These are demands that push the individual materials, metal and ceramics, to their limits.

Due to their ideal properties, ceramic-to-metal components from FRIATEC are, however, highly impressive.

Our FRIALIT-DEGUSSIT High-Performance Ceramics are extremely resistant to heat, corrosion, high voltage and chemical influences. They also have excellent stability of shape and resistance to wear-and-tear, thus longer retaining their functionality.

Precision and economy

In the automobile industry our materials have become a must. Positioning and welding pins made of FRIALIT-DEGUSSIT High-Performance Ceramics exactly and precisely align the body parts to be welded, and fix them securely.

A vast number of car manufacturers all over the world are highly impressed by our components and now benefit from the advantages of low tool costs, reduced downtimes and minimum maintenance and repair costs.

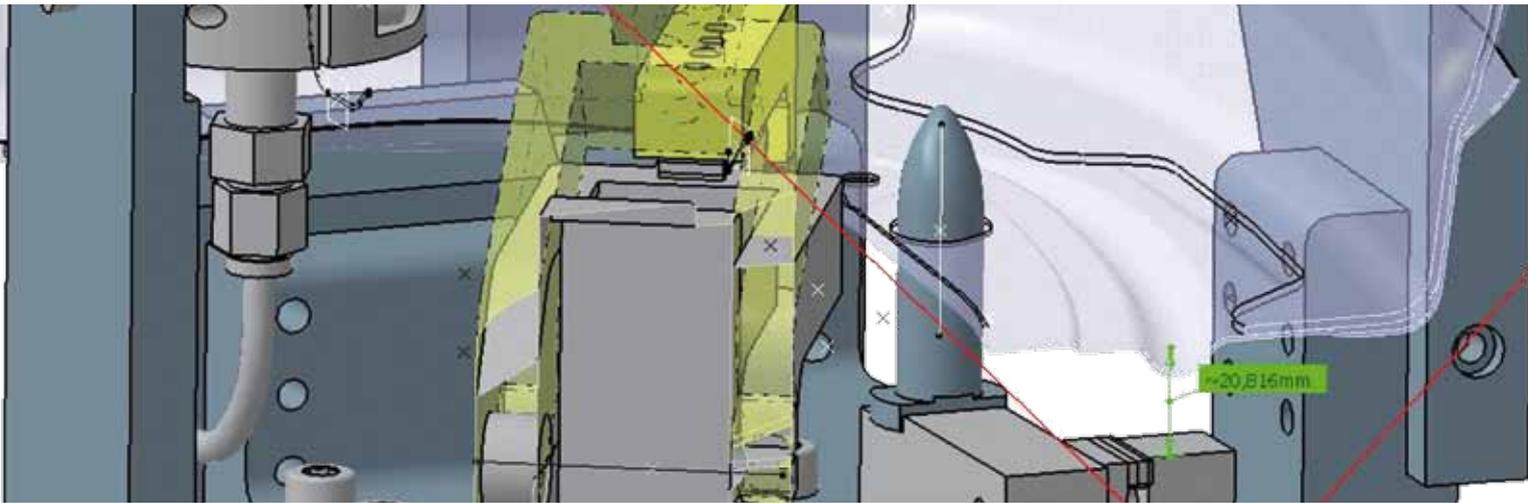
150 years experience

Our products provide you with the benefit of 150 years of experience in the manufacture of ceramics, combined with specialist expertise gained over a period of 40 years in the field of ceramic-to-metal components.

Our experts in our internal design department develop optimum solutions using high-performance ceramics for each specific set of requirements. Their orientation is geared towards the needs of the customer, with whom they remain in close contact. The result is ceramic-to-metal components to meet the very highest expectations.

„Excellent“

Top marks for our High-Performance Ceramics



With their outstanding material properties, components made of FRIALIT®-DEGUSSIT® High-Performance Ceramics have become firmly established in the global automobile industry. The wide range of FRIATEC materials makes it possible to provide precision solutions for the most varied requirements.

Both have a lot to offer: Whereas metal is extremely tough, ceramics is hard and corrosion-resistant. Demanding applications, however, expect all of these properties from just one, single material.

The development of FRIALIT-DEGUSSIT High-Performance Ceramics has made it possible to combine the outstanding properties of these individual materials

- metal and ceramics - into one single component.

Our high-performance ceramic products are extraordinarily resistant to high temperatures, wear-and-tear and corrosion. Together with their breaking strength and integrity of shape, their extremely long lifetime makes FRIALIT-DEGUSSIT High-Performance Ceramics highly convincing.

Our customers expect tailor-made solutions for their individual needs and tasks. The comprehensive range of materials available enables us to optimally manufacture components according to customer requirements. The physical material properties listed in the table clearly illustrate the potential of FRIALIT-DEGUSSIT High-Performance Ceramics.

1-3 Positioning pins made of FRIALIT-DEGUSSIT High-Performance Ceramics ensure exact positioning of the metal sheets.

1



2



3



Properties	Unit	Steel	FRIALIT HP 79 Ceramics Si_3N_4 (black)	FRIALIT FZT Ceramics Al_2O_3 (+ ZrO_2) (white)	DEGUSSIT DD57 Ceramics Al_2O_3 (red)
Density	g/cm^3	7.9	> 3.2	≥ 4.05	≥ 3.90
Hardness HV 10	GPa	1	1600	2000	2300
Compressive strength	MPa	1	3000	3000	3000
Bending strength	MPa	1	900	460	300
E - Modulus	GPa	200	310	360	380
Corrosion resistance		limited	good	very good	good
Thermal expansion	$10^{-6}/\text{K}$	11	3.2	7.5	8.5

Positioning and Welding Pins

Wide range of tools for the automobile industry



The fully automated positioning procedures used in automotive body-shell assembly demand the very highest standards of precision. This explains why so many car manufacturers rely on positioning pins made of FRIALIT®-DEGUSSIT® High-Performance Ceramics. These fully ensure that all body parts can be welded with exact precision.

The car manufacturing industry permits only low production tolerances. This requirement can easily be met with the help of positioning and welding pins made of FRIALIT-DEGUSSIT High-Performance Ceramics. The development of the ceramic rod version has enabled FRIATEC to again surpass the extreme breaking strength and shape integrity of their pins.

The special arrangement of the ceramic rods has resulted in optimization of the product characteristics. In this way, even components with a small centering diameter (\varnothing 10 mm) achieve a high degree of stability.

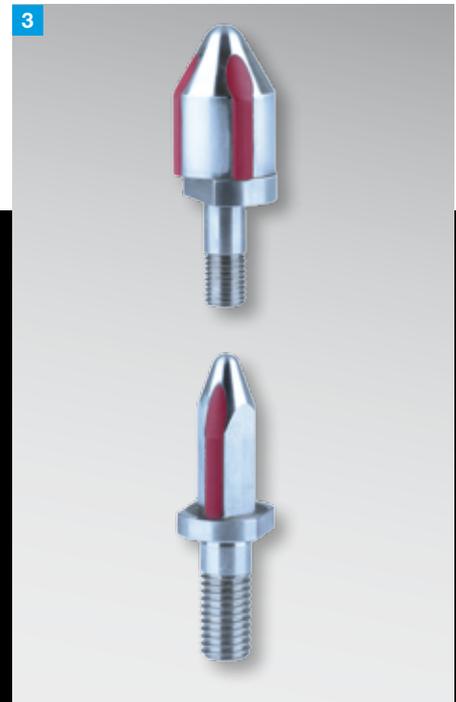
In the conventional production process metal bolts had to be fitted as place-holders for pins without the rod version

at the plant commissioning stage due to early damage to the delicate ceramic pins during plant set-up.

The advantage of using break and bend-resistant positioning pins in the ceramic rod version is especially obvious in the case of the small centering diameters described above. They can be inserted at the very start of set-up and transfer-line arrangement.



3 Positioning pins made of FRIALIT-DEGUSSIT High-Performance Ceramics in ceramic rod version: fully tried and tested in terms of breaking and bending strength, even with small centering diameters (under 10 mm).



This saves time-consuming as well as cost-intensive plant conversion, from initial set-up through to the production phase.

In terms of handling, our positioning and welding pins made of FRIALIT-DEGUSSIT High-Performance Ceramics are also most impressive. Thanks to the electrically insulating effect of ceramics no additional insulation is

needed. There is virtually no welding bead adherence on the ceramics, and disruptive metal abrasion has no chance of developing. In the case of projection-welding equipment, welding pins made of FRIALIT-DEGUSSIT High-Performance Ceramics ensure that the nuts to be welded can be exactly positioned on the metal sheet. Here again, the manufacturer

benefits from an increased plant lifetime, as well as from the high quality of the finished product.

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