ON POINT

COATINGS FOR VALVE TECHNOLOGY

The high performance coatings of Karl Schumacher:

- KS-InductiveCoat
- KS-HardCoat
- KS-SuperCoat

Highest performance for your business!






Karl Schumacher
Engineering and Thermal Spraying

COATING SOLUTIONS FOR FLEXIBLE POWER PLANT OPERATION

When high performance matters!

The requirements of modern industrial and power plant valves are constantly on the rise. Specially adapted modes of operation, spontaneous changing of the operating conditions and steadily rising operating temperatures result in reducing the lifetime of the plant components.

Besides constructive adjustments to affected components, **selective coating solutions are the first choice,** for upgrading the required properties of older (Retrofit) as well as brand-new valves.

The repairing of spindles is particularly economical. The primary standard and tolerances, as well as the control behaviour and wear behaviour are all improved simultaneously.

Highest quality - computerised process management.

MORE INTELLIGENT PROTECTION WITH SUPERIOR TECHNICAL PROPERTIES

KS-InductiveCoat - The BEST!

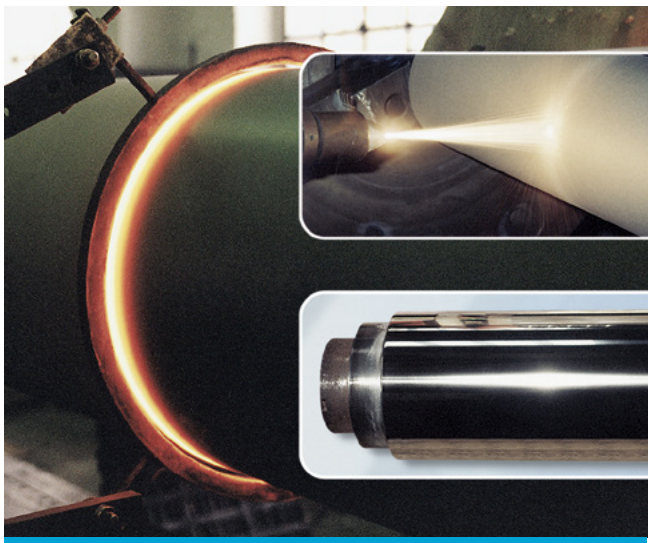
KS-InductiveCoat: The inductive enamel bond coatings are 100 % steam and gas proof and metallurgically connected with the base material. They provide excellent protection from corrosion and offer a maximum reliability, since these layers cannot flake (even with very high operating temperatures of up to 900 °C).

The coating materials themselves have a very good chemical reliability and therefore allow for a wide range of applications.

The inductive melting of the coatings ensure that the heat treatment properties of the basic materials are not weakened in any way. The effect of the temperature as a result of the melting process however has to be taken into account when planning the coating processes.

In the case of coating new components this should ideally be done at the time of constructing the components already.

Economical - whether used for restoration or new production.



The original - inductive enamel bond of Karl Schumacher!

FACTS: KS-InductiveCoat

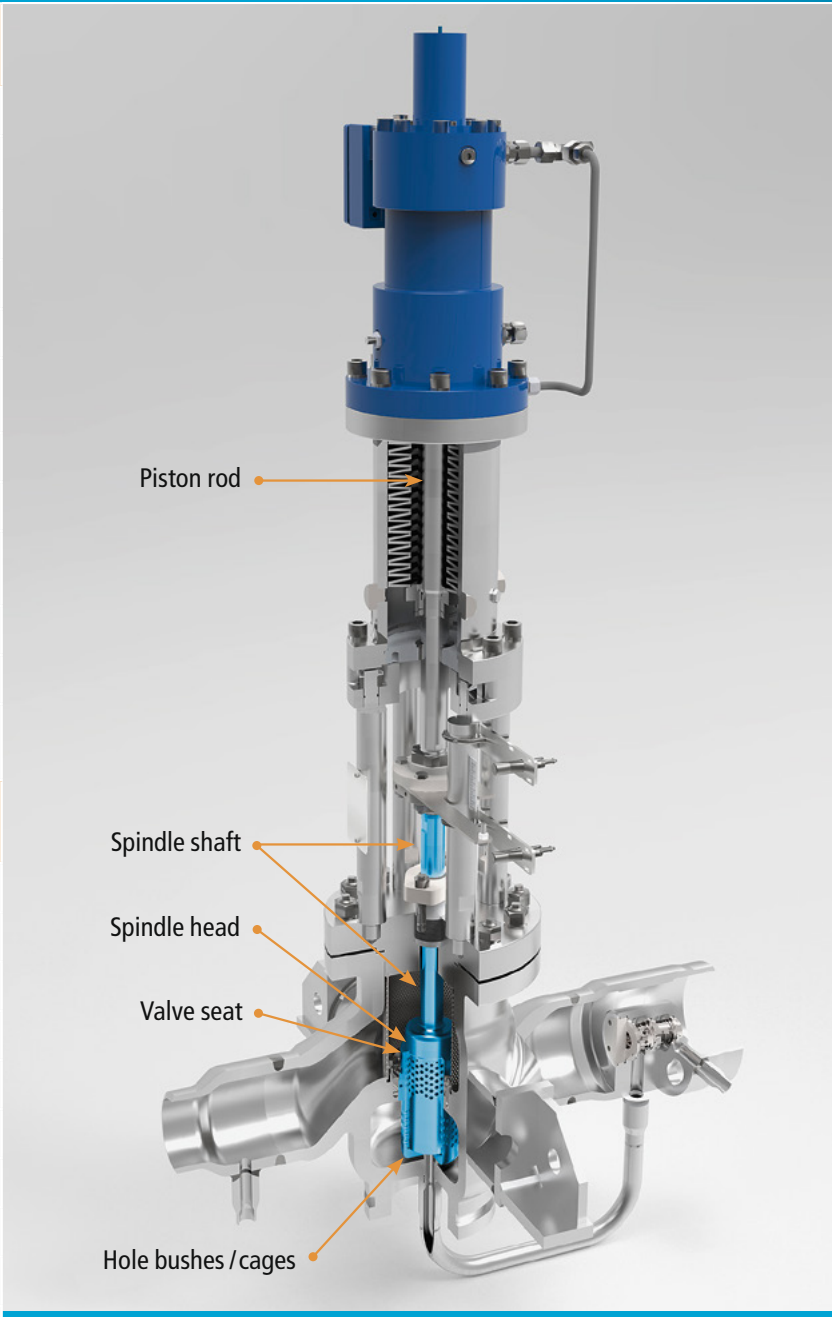
Composition:	Nickel-base-alloy
Layer hardness:	approx. 42-60 HRC
Adhesive pull strength:	approx. 400 MPa
Porosity:	0 % (completely melted)
Layer thickness:	up to 1.5 mm (dep. on application)
Surface roughness:	< 0.2 µm Ra (dep. on application)
Processing:	turning, grinding
Corrosion resistance:	excellent
Wear resistance:	very good
Operating temperature:	< 900 °C

BENEFITS: KS-InductiveCoat

- \+ Best control characteristics
- \+ No measurable difference between static and sliding friction
- \+ No stick-slip-effect
- \+ Flake proof and high hot hardness
- \+ Lowest friction on packings and guidings
- \+ Significant increase in lifetime of seals and packings
- \+ 100 % steam and gas proof
- \+ Layer thickness of up to 1.5 mm
- \+ Best wear properties in guidings and graphite packings
- \+ Excellent corrosion resistance
- \+ Tinder resistant up to 900 °C
- \+ Can be used for all types of spindles both for new production as well as repairs

AREAS OF APPLICATION: KS-Coatings

- Safety valves
- Turbine control valves
- Turbine bypass stations (HP, IP, LP)
- High pressure gate valve
- Butterfly valves and axial valves
- Stop valves
- Intermediate superheater safety valve
- Control valve
- Spindles
- Guidings of all types



Versatile - typical areas of application for fittings.

THE PERFECT SOLUTIONS FOR CHALLENGING APPLICATIONS

KS-HardCoat / KS-SuperCoat - The EXTREME!

The hard and extremely tight HVOF layers KS-HardCoat and KS-SuperCoat not only offer excellent wear- and tear corrosion protection, but also offer protection for abrasion, erosion and sliding abrasion as well as for damage from cavitation.

Due to the low component heating while coating, the temperature-sensitive components can be coated easily with either KS-HardCoat or KS-SuperCoat.

Various alloy compositions enable the problem-free use in valves, up to operating temperatures of approximately 460 °C. Special spray material based on tungsten and chrome carbides are used.

FACTS: KS-HardCoat / KS-SuperCoat

Composition:	e.g. WC Co Cr / CrC Ni Cr
Layer hardness:	900 - 1.400 $HV_{0,3}$
Porosity:	< 1 % (dep. on application)
Layer thickness:	up to 0.3 mm (dep. on application)
Corrosion resistance:	very good
Wear resistance:	excellent
Operating temperature:	< 500 °C

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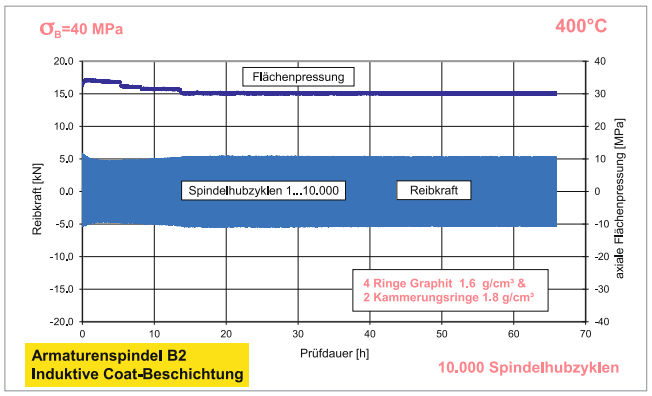
TEST RESULTS: KS-InductiveCoat

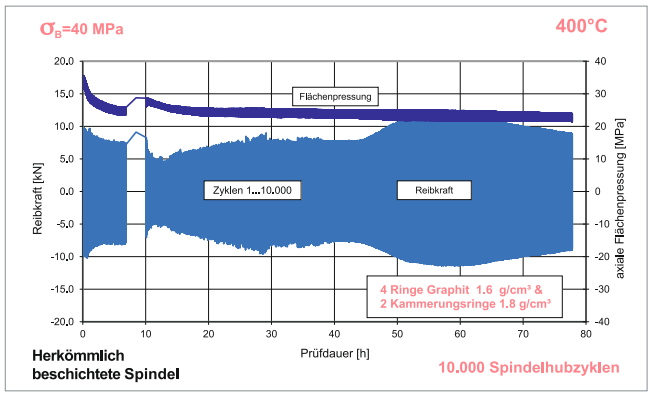
- Best control characteristics for challenging mode of operation
- Lowest susceptibility to wear and tear in the case of intensive mode of operation
- Prolonging of the useful lifetime of all critical components
- Very stable friction behaviour
- Transition from static to sliding friction very low or not measurable
- Control parameters are more easily realised

Results from the research project of the material testing institute of the University of Stuttgart: "Optimisation of spindle sealings in fittings with regards to function and blow-out resistance from surface treatment":

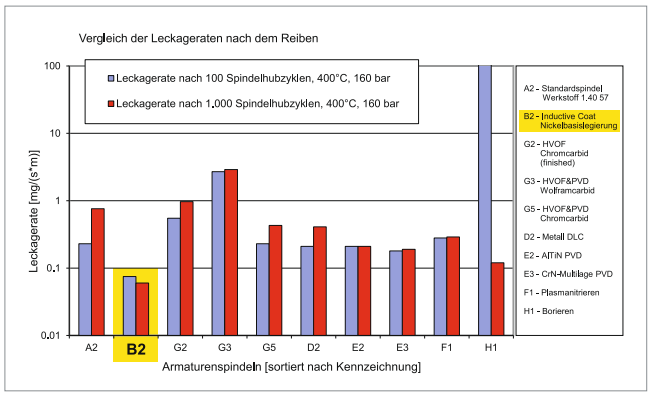
Various coating technologies underwent comparative testing in a research project of the Material Testing Institute (in German, MPA) of the University of Stuttgart by order of the VGB. The outstanding properties of our KS-InductiveCoat coating were thereby confirmed.

The inductively coated valve spindles are characterised by a stable process of frictional force and surface pressure.





Presentation of frictional force and the surface pressure on the inductively coated spindles compared to a conventional coated spindle.



"The transition from static friction to sliding friction for the B2 coatings are very low or not measurable, Image 7.14. These special slip properties of the B2 spindles should have a positive effect when using this coating technology in control valves, since the so-called stick-slip-effect, which is found for example in the A2 spindle, is often not wanted in technical applications, Image 7.46.

The term stick-slip-effect refers to the transition from static to sliding friction in the case of a movement process. This effect is also often accompanied by a noise [13]. The configurations of PID control parameters can be much more easily realised with the B2 spindle. With a low reduction, the surface pressure process is notably stable in the friction test."

(Extract from the final report of the MPA)

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