Bonded coatings
for industrial coating

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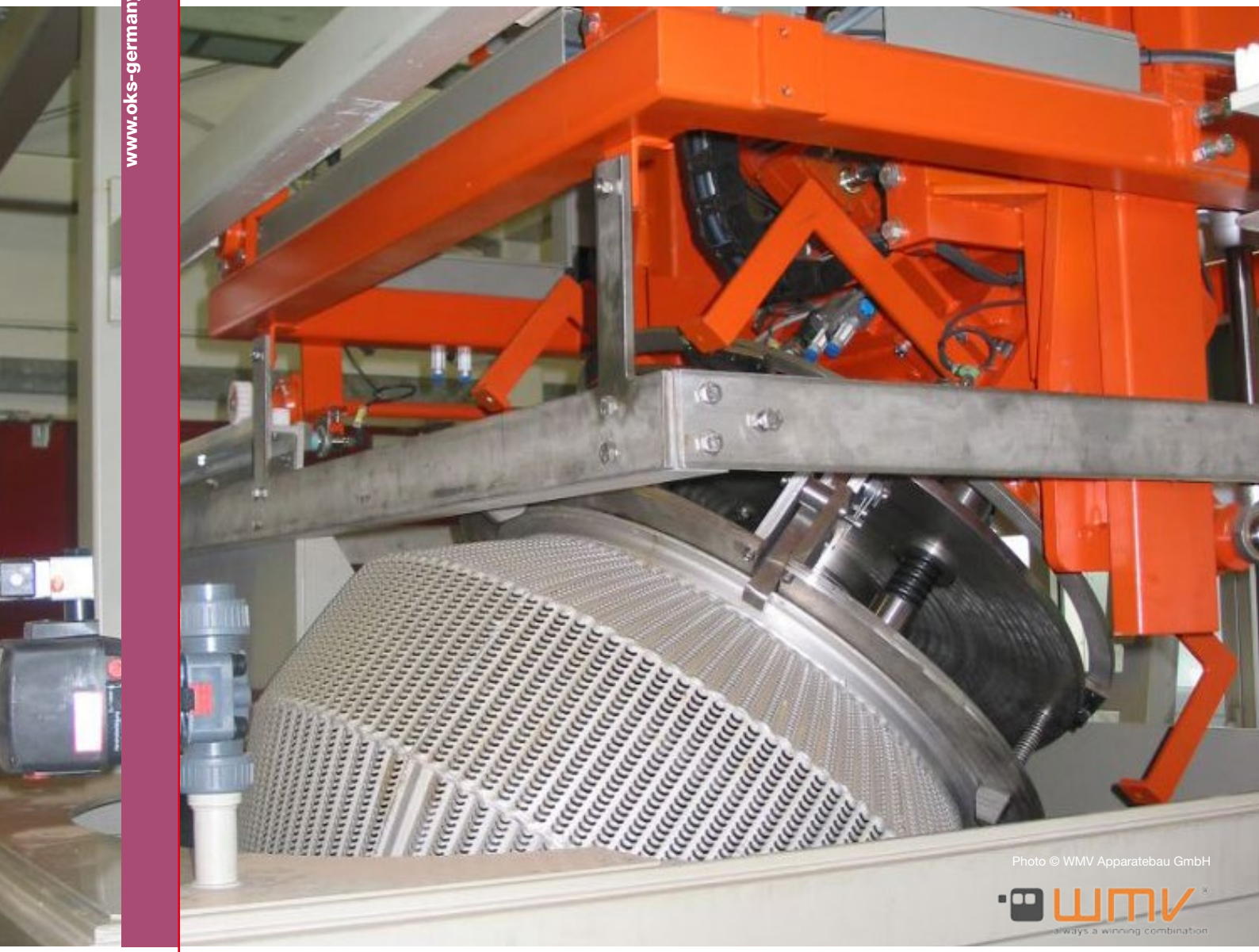

FUNCTIONAL COATING

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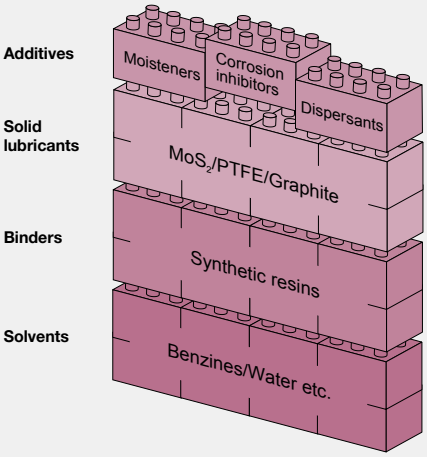
How bonded coating systems function

Definition of a bonded coating system

Bonded coatings are high-performance lubricants that form tribologically optimized layers on the workpiece surface. Their composition is comparable to that of an industrial coating. However, the colouring pigments are replaced by solid lubricants.
The layer formed after the application combines the outstanding tribological properties of solid lubricants, such as PTFE, graphite, MoS_2 and boron nitride, with the mechanical properties of the binder systems.



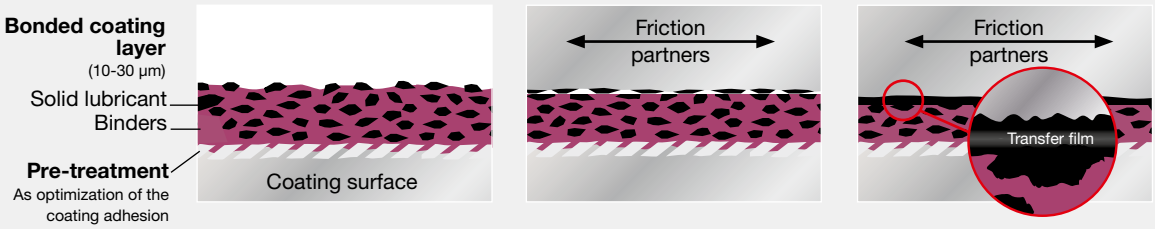
How bonded coatings function

Through the use of bonded coatings, thin composite material layers can be applied to almost any material. The tribological and mechanical properties, such as temperature and media resistance, coefficients of friction or corrosion protection, can be influenced by the use of a corresponding bonded coating. This allows you to change the surface functionality of the materials.

1. Coated material
After having hardened, bonded coatings form a thin film. This consist of dry lubricants embedded in an organic or inorganic binder matrix.

2. Run-in bonded coating
The uppermost coating layer is removed in the run-in phase. This allows maximum surface contact between the friction partners and thus optimum power transfer between the friction partners.

3. Transfer film
Solid lubricants are released when mechanical loads occur on the sliding surface. These are enriched as a transfer film on the surfaces of the friction partners and thus reduce the specific coefficient of friction.

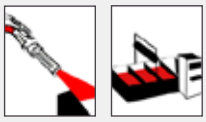


Substrate		Operating conditions	Bonded coating
Material		Vacuum	Excellently suitable
Metal, plastic, elastomer, wood, concrete		Low temperature	Highly suitable
		High temperature	Excellently suitable
Surface finish		Low speed	Excellently suitable, low stick-slip
No sharp edges Coating surface: R_a=1–2 µm Friction partners: R_a= smaller than 1 µm R_a = Roughness		High speed	Excellently suitable
		Environmental risk	Very low environmental risk
		Contamination of the bonded coatings	Low
Tolerances		Contamination by bonded coatings	Low
Take maximum or minimum layer thickness of coating into account		Relubrication	Not required

The enclosed product overview will help you when selecting a suitable bonded coating for your individual application.

Processing of bonded coatings

1. Pre-treatment

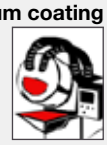


Prerequisite for the best possible performance of a bonded coating is the optimum adhesion of the coating on the surface of the workpiece. Therefore it may be necessary to pre-treat it either **mechanically, e.g. through sandblasting**, or **chemically, e.g. through phosphating**.

Workpieces before the coating

2. Cleaning

Ensure that the surface to be coated is free of residues, grease and dust.

3. Application	Description	Advantages	Disadvantages	Workpieces
3.1 Spray coating 	The bonded coating is applied extensively like a decorative paint or partially with spray gun. The coating procedure can be carried out manually or automated.	• Homogeneous surface quality • Partial coating possible	• High work input per part • High coating consumption	• Individual parts
3.2 Dip spinning 	The parts to be coated are immersed in a reservoir with bonded coating. Subsequently the superfluous coating is spun off. This can result in imperfections at the contact points of the individual parts. These are eliminated as a rule by means of several coating processes.	• Complex geometries possible (e.g. drilled holes) • Low coating consumption • Very inexpensive	• Imperfections at the contact points	• Bulk goods
3.3 Spray drum coating 	The coating is sprayed onto the bulk goods in the drum. Through the rotation of the drum and the resulting reciprocal rubbing of the coated parts the surface is smoothened during coating.	• Homogeneous surface quality • No sticking • Low coating consumption • Inexpensive	• Suitable only for simple geometries, (e.g. washers, bolts, pins, etc.)	• Bulk goods

4. Drying /curing

There are air-drying and heat-curing coatings. The temperatures, curing or drying periods have to be observed to achieve optimal performance of the coating layer. These product-specific data are available in the product information.

Workpieces after the coating

5. Checking of the coating

For simple quality control the **coating adhesion** can be checked in addition to the **layer thickness**.

Application of bonded coatings

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Examples of workpieces for bonded coating
Fitting parts, fastening elements, seals, anchors, springs, positive-locking connections, pivoting bearings, threaded spindles, slideways, friction bearings, sliding disks, chain parts, rocker levers, bearing bolts, metal profiles, metal forming, rivets, screws, nuts, switch cams, clamping sleeves, retaining pawls, chipboard screws, hinges, metal fittings, lock parts, shafts, gearwheels.

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OKS BONDED COATINGS

Drying / Base	Product	Designation	Technical Data	Colour, Solid Lubricant	Characterisation	Examples of use
thermosetting / solvent	**OKS 589**	MoS_2 PTFE Bonded Coating, thermosetting	Operating temperature: –70 °C to +250 °C Press-fit test: μ = 0.07, no chatter Thread friction (M10/8.8): μ = 0.08 Optimal coating thickness: 10 to 20 μm	• matt black • MoS_2, graphite, PTFE	• Dry lubrication of sliding surfaces under heavy loads, low speeds and corrosive influences • Fully effective even after long standstills • No adhesion of dust and dirt	• Increased protection against wear of otherwise not accessible slide areas
air-drying / solvent	**OKS 510** **OKS 511**	MoS_2 Bonded Coating, fast-drying	Operating temperature: –180 °C to +450 °C Press-fit test: μ = 0.07, no stick-slip Optimal coating thickness: 10 to 15 μm	• grey-black • MoS_2, graphite	• Dry lubrication for temporary operation or long downtimes, industry environments and at low sliding speeds • Run-in lubricant in combination with oils or greases • Creates emergency-running properties • Dries at room temperature	• Friction bearings, toothing and other sliding pairs with oscillating movements • For coating punching tools
air-drying / solvent	**OKS 521**	MoS_2 Bonded Coating, air-hardening	Operating temperature: –180 °C to +450 °C Processing temperature: Room temperature Optimal coating thickness: 5 to 20 μm	• black • MoS_2, graphite	• Dry lubrication of machine elements subject to high demands • At high operating temperatures (up to 450 °C) • In dusty environment, to avoid adhesions • Run-in lubrication in combination with oil or grease lubrication	• Lifetime lubrication of metal-to-metal connections at low to medium rotational speeds and high loads
air-drying / solvent	**OKS 570** **OKS 571**	PTFE Bonded Coating	Operating temperature: –180 °C to +260 °C Press-fit test: μ = 0.07 Thread friction (M10/8.8): μ = 0.10 Optimal coating thickness: 5 to 20 μm	• whitish • PTFE	• Dry lubrication of sliding surfaces of different materials at low pressures, low speeds and in dusty environments • Colourless, no-soiling sliding and parting film • Prevents tribocorrosion • Dries at room temperature	• For packaging machines, slide surfaces in the plastics and textile industry • Anti-stick coating of seals or sealing surfaces of all kinds
air-drying / water	**OKS 530**	MoS_2 Bonded Coating, water-based, air-drying	Operating temperature: –35 °C to +450 °C Press-fit test: μ = 0.10, no chatter Thread friction (M10/8.8): μ = 0.05	• black • MoS_2, graphite	• Can be sprayed onto hot surfaces • Use in a broad temperature range • Dries at room temperature • Spent sliding film can be topped up • Can be diluted with water in ratio of up to 1:5	• Lubrication of heavily loaded chains when oil and grease lubrication is no longer possible
air-drying / water	**OKS 536**	Graphite Bonded Coating, water-based, air-drying	Operating temperature: –35 °C to +600 °C Press-fit test: μ = 0.12, no chatter	• black • graphite	• Lubrication of heavily loaded chains when oil and grease lubrication is no longer possible • Can be sprayed onto hot surfaces • Dries at room temperature • Spent sliding film can be topped up • Can be diluted with water in ratio of up to 1:5	• For example, in annealing, stoving and baking ovens for aluminium tube manufacturing, in painting systems or in baking lines
air-drying / water	**OKS 575**	PTFE Water Bonded Coating	Operating temperature: –180 °C to +150 °C/+250 °C Optimal coating thickness: 5 to 10 μm	• whitish • PTFE	• For sliding surfaces made of different materials at low pressures, low speeds and in dusty environments • Dries at room temperature • Can be diluted with water • Prevents tribocorrosion	• For packing machines • Rollers and chutes in the transport range • Non-stick coating • Separating film for casting resin applications

OKS SLIDING FILMS AND SOLID LUBRICANTS

Drying / Base	Product	Designation	Technical Data	Colour, Solid Lubricant	Characterisation	Examples of use
air-drying / solvent	**OKS 1300** **OKS 1301**	Sliding Film, colourless	Operating temperature: –60 °C to +100 °C Thread friction (M10/8.8): μ = 0.08 – 0.10	• colourless	• Thread coating • Sliding film for plastic, wood and metal • Dry sliding film fast to handling with UV indicator • Prevents seizing • For all screw materials • Broad range of uses, in particular for precoating small and mass-produced parts	• For assembly of axial face seals or dry lubrication in textile or paper-processing machines
air-drying / water	**OKS 1710**	Sliding Film for Screws, water-based concentrate	Operating temperature: > +60 °C Thread friction (M10/8.8): μ = 0.08 – 0.14 (depending on concentration and surface)	• milky-white	• Thread coating for controlled assembly • Dry sliding film fast to handling, verifiable with UV indicator • Can be diluted with water in a ratio of up to 1:5 • Controlled friction coefficients • Economic precoating	• Coating of threads with galvanized surfaces and high-alloy steel threads
air-drying / water	**OKS 1750**	Sliding Film for Wood Screws, water-based concentrate	Operating temperature: > +70 °C Thread friction (M10/8.8): μ = 0.08 – 0.14 (depending on concentration and surface)	• yellowish	• Dry film fast to handling • Verifiable with UV indicator • Can be diluted with water in a ratio of up to 1:5 • Controlled friction coefficients	• Coating of threads with galvanized surfaces, e.g. screws for flakeboards
air-drying / water	**OKS 1765**	Sliding Film for Thread-Cutting Screws, water-based concentrate	Operating temperature: > +70 °C Thread friction (M10/8.8): μ = 0.06 – 0.15 (depending on concentration and surface)	• milky-white	• Dry film fast to handling • Verifiable with UV indicator • No cold welding • Can be diluted with water in a ratio of up to 1:5 • Controlled friction coefficients	• Coating of thread-cutting screws made of aluminium alloys, high-alloy steels, galvanised and austenitic steels
	OKS 100	MoS_2 Powder, high degree of purity	Operating temperature: –185 °C to +450 °C (up to +1,100 °C in vacuum, up to +1,300 °C in inert gas) Particle size: 16.0 – 30.0 µm, max. 190.0 µm	• grey-black • MoS_2	• To improve the sliding properties of machine elements • Run-in lubricant in combination with oil or grease lubrication • Difficult moulding processes in metal working • For integration in plastics, seals and packings	• Apparates and precision machinery, e.g. under the influence of oxygen, in vacuum or radioactive radiation • Tools or workpieces in cold- and thermoforming
	OKS 110 **OKS 111***	MoS_2 Powder, microsize	Operating temperature: –185 °C to +450 °C (up to +1,100 °C in vacuum, up to +1,300 °C in inert gas) Particle size: 2.5 – 5.0 µm, max. 15.0 µm	• grey-black • MoS_2 • wax (*only aerosol)	• Run-in lubricant in combination with oils or greases • Prevents friction and wear, even at high pressures • Good adhesion, even at extremely precisionmachined surfaces • For difficult moulding processes • For pressing in bearings	• Machine parts, apparates and precision machinery • For incorporation in plastics, sealings, packages, sintered metals