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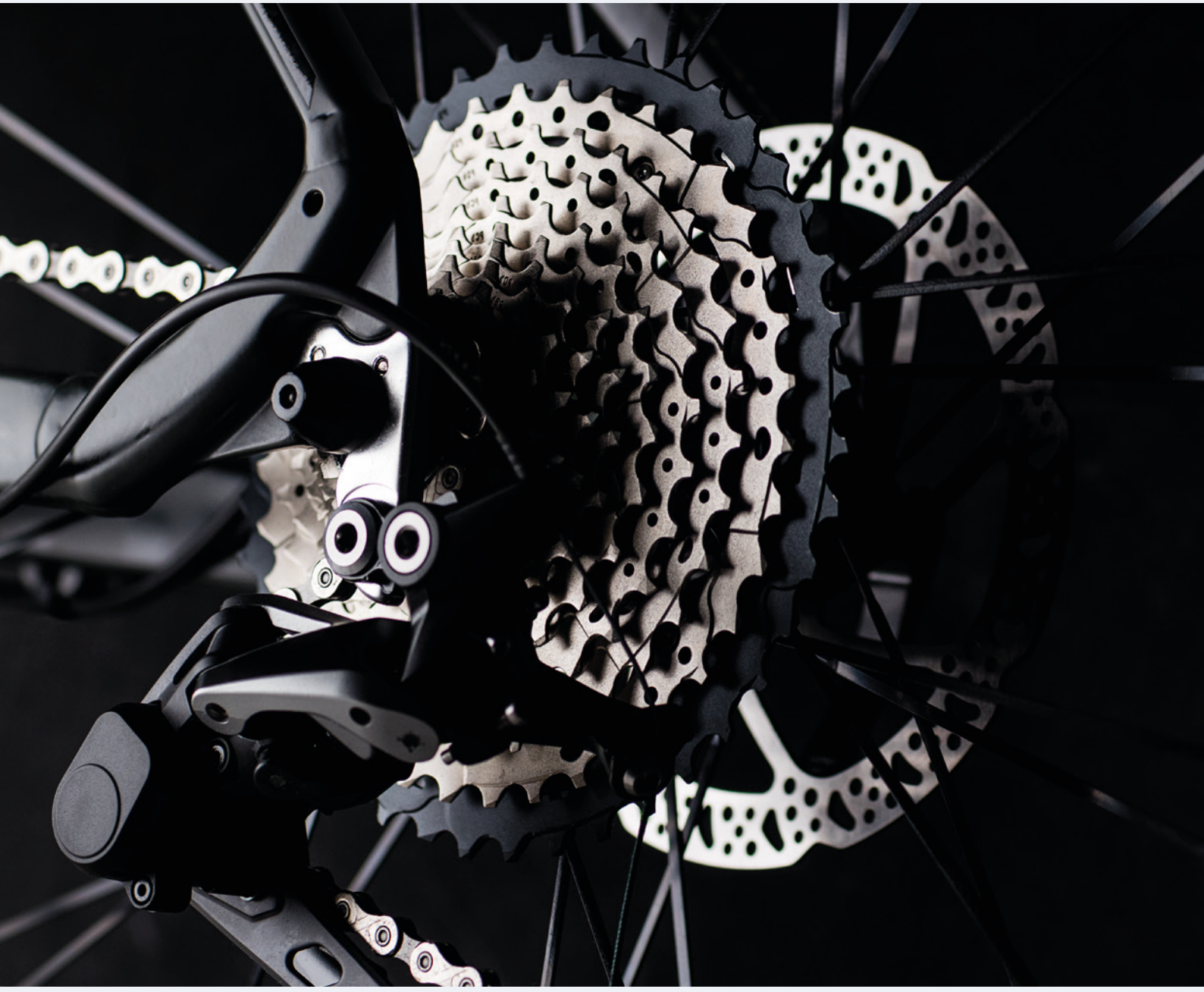
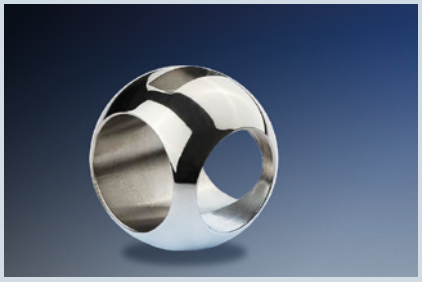
excellence in plating solutions

DURNI-COAT® innovative electroless nickel for high-performance applications.



DURNI-COAT®
electroless nickel made in Switzerland

Automatic coating facilities ensure impeccable coating processes of work pieces with a complex geometry as well as with high quality requirements.



For work pieces, which need a very consistent thickness across the surface (i.e. a spherical valve), electroless nickel layers are ideal because the thickness distribution of the resulting layers is uniform.

DURNI-COAT® is a surface treatment, which is adapted to different materials, processing parameters and end-use. Employed in a variety of industrial sectors, this method can efficiently protect components against corrosion. Additionally, the coating can also fulfil other functional requirements desired by customers.

How are DURNI-COAT® coatings generated?

The electroless deposition of DURNI-COAT® coatings is based on the reduction of nickel ions, which are present in an aqueous solution to metallic nickel. Chemical reactant and supplier of the required electrons are dissolved hypophosphite ions, which are oxidised to orthophosphite during the reaction. Hyphophosphite is also responsible for the phosphorous content of the resulting deposit.

Advantages of DURNI-COAT® compared to galvanic nickel coatings

Even if the geometry of the base material is complex, the coating uniformly deposits itself regardless of the size and shape of the work piece. DURNI-COAT® can even coat edges, dents, accessible cavities and boreholes equally. Therefore, small limits in tolerance with respect to the coating thickness are possible.

Chemical composition and structure

DURNI-COAT® coatings essentially consist of a nickel-phosphorous alloy. The chemical composition of the electrolyte and the process parameters regulate the resulting phosphorous content in the deposit. The phosphorous concentration can be adjusted from 1 up to 14%. As the most important parameter concerning the functionality of the coating, the phosphorous content will vary depending on the industrial application. High-phos DURNI-COAT® coatings are considered amorphous. After a post-deposition thermal treatment, recrystallisation takes place, which results in the formation of nickel phosphide crystals. This will have a large impact with respect to electrical, magnetic and mechanical properties of the coating.

Common coating thickness

If DURNI-COAT® deposits are used to increase solderability, thickness values in the range of 2 to 5 µm are sufficient. Prior selecting a DURNI-COAT® process it is important to consider the expected corrosion conditions, the type and condition of the base material and its surface and the desired lifetime of the work piece.

DURNI-COAT® – electroless nickel at a glance

Low-phosphorous

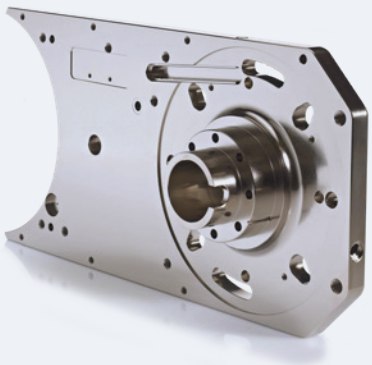
Particularly wear resistant, for high strain applications

Electroless nickel coatings with phosphorous alloy content ranging from 1 to 6 % (incl. alloying elements) possess a high hardness and high wear resistance already at the state after deposition. These processes are especially suitable for mountings, valves, mining equipment and highly stressed non-ferrous metals.

DURNI-COAT ®	Phosphorous content of deposit in %	Deposition rate in µm/h	Lead-free	Cadmium-free	RoHS compliant
DNC 700-B	3 – 6	16 – 20	✓	✓	✓
DNC 771	3 – 6	15 – 20	✓	✓	✓

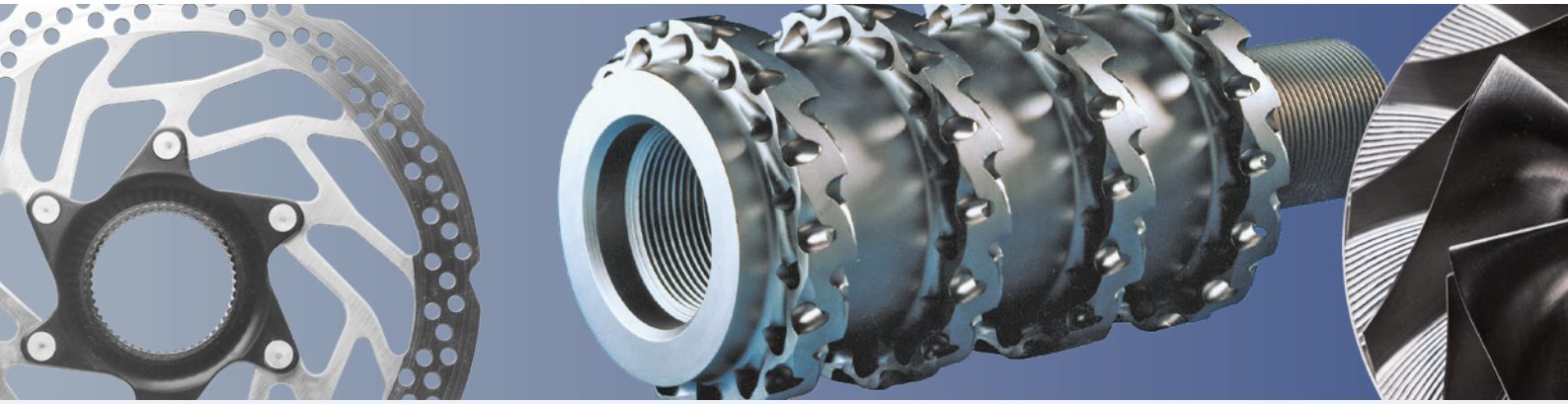
Medium-phosphorous

The well-balanced method for minor wear resistance and good corrosion protection



Deposition systems with a phosphorous alloy content ranging from 5 to 10% (incl. alloying elements) show very good mechanical properties whilst at the same time retaining a good corrosion resistance. The electrolytes possess a large operating window and can be employed in a variety of applications, for example in the automotive and electronic industry amongst other industrial sectors.

DURNI-COAT ®	Phosphorous content of deposit in %	Deposition rate in µm/h	Lead-free	Cadmium-free	RoHS compliant
DNC 520-12-46	7 – 9	14 – 16		✓	(✓)
DNC 520-12-50	7 – 10	15 – 20		✓	
DNC 571-11-47	6 – 8	15 – 20	✓	✓	✓

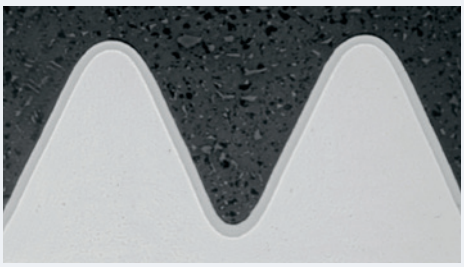


Medium/High-phosphorous

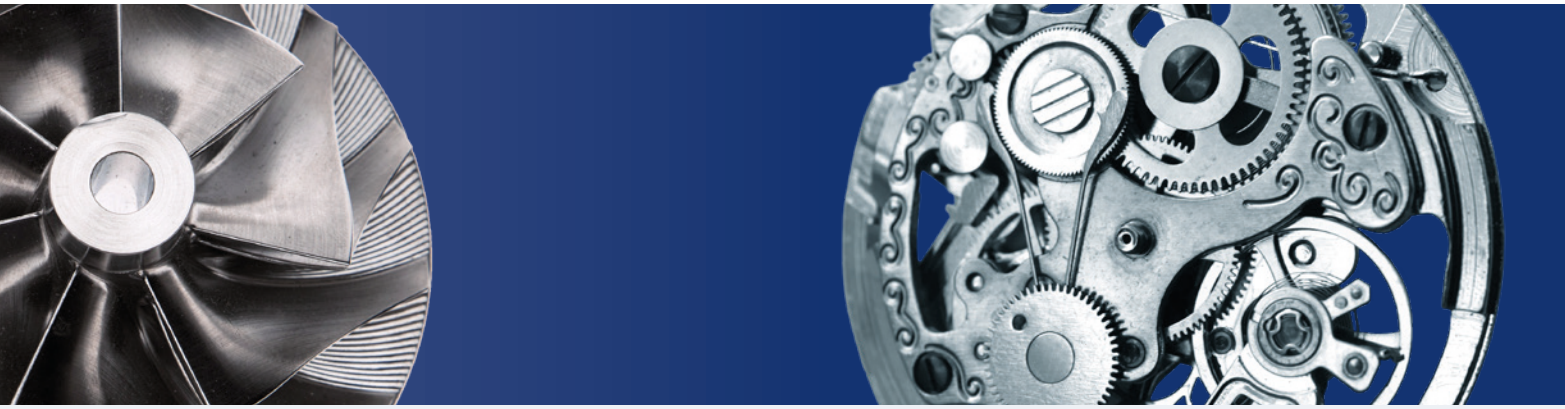
The best from both worlds, for high corrosion resistance and (at the same time) excellent hardness

The possibility to increase the phosphorous alloy content of the deposited layer up to 13 % (incl. alloying elements) extends the range of possible applications considerably compared to standard medium-phosphorous processes. Applications in pump engineering for natural gas and mineral oil extraction as well in the food industry rely on those products every day – even under extremely tough conditions.

DURNI-COAT ®	Phosphorous content of deposit in %	Deposition rate in µm/h	Lead-free	Cadmium-free	RoHS compliant
DNC 520-9	9 – 13	10 – 14		✓	✓
DNC 520-11	9 – 13	10 – 14		✓	(✓)
DNC 520-12	9 – 13	10 – 14		✓	✓
DNC 520-9-48	8 – 12	10 – 14		✓	✓
DNC 571	9 – 12	11 – 15	✓	✓	✓
DNC 571-11	9 – 12	10 – 15	✓	✓	✓



Electroless deposition (without external current) of nickel-phosphorous coatings is always uniform, even on materials possessing complex geometries. Boreholes, dents, cavities and edges are coated with very small margins of tolerance with respect to the deposition thickness.



High-phosphorous

Especially efficient against corrosion and (at the same time) featuring an excellent ductility

During development of these products, we focused on chemical resistivity of the coatings without making compromise on the mechanical properties. Customers employ layers resulting from this product range in applications where they look for an increased resistance against chemicals, especially in tasks involving prolonged contact with tap water or food products.

DURNI-COAT ®	Phosphorous content of deposit in %	Deposition rate in µm/h	Lead-free	Cadmium-free	RoHS compliant
DNC 462	10 – 13	9 – 13			✓
DNC 471	10 – 14	8 – 12	✓	✓	✓

Other variants of processes

Special tribological applications – let's focus surface texture

Coatings containing dispersed silicon carbide (SiC) particles are an excellent choice for applications in which highly abrasive compounds are processed. The purposefully deposition of polytetrafluoroethylene (PTFE) particles leads to coatings which possess anti-friction and anti-adhesion properties, very good drying behaviour as well as featuring a very high wear resistance.

	SiC	PTFE	Phosphorous content of deposit in %	Deposition rate in µm/h	Lead-free	Cadmium-free	RoHS compliant
DURNI-DISP DNC 520 SiC	✓		9 – 13	10 – 15		✓	
DURNI-DISP DNC 571 SiC	✓		9 – 12	11 – 15	✓	✓	✓
SIC-9-DURNI-DISP	✓		9 – 12	11 – 15	✓	✓	✓
PTFE DURNI DISP N		✓	7,5 – 9	≤ 8		✓	✓

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riag Oberflächentechnik AG

For more than 30 years, we have been developing and fabricating products for the whole range of process chemicals in the field of chemical and electrochemical treatment of metals and plastics. We help our customers to find the appropriate and optimal surface treatment for each of their application. Beside our established portfolio, we also develop tailor-made solutions for individual applications. Thanks to our own modern laboratory, we can provide application driven chemical analysis methods and enforce quality control protocols for our products. In addition, we are continuously testing new applications and routines in order to increase the efficiency and effectiveness of our customers' processes. By focusing on our goal that our customers obtain only the best products, we thoroughly fulfil our guiding principle *"excellence in plating solutions"*

A company within Aalberts Surface Treatment

riag Oberflächentechnik AG is an independent subsidiary of Aalberts Surface Treatment operating in the field of surface technology. Our customers benefit greatly from our extensive experience in developing comprehensive and innovative solutions within our corporate group.

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