Functional coatings with a decorative character

DIASHIELD

THE ROBUST COATING FOR DECORATIVE SURFACES

DIASHIELD® coatings to achieve functional and decorative properties in different areas of application.

THE MOST IMPORTANT PLUS POINTS:

+ The cost-effective alternative for wear and corrosion protection
+ High decorative value due to glossy layers
+ Functions as diffusion barrier and run-in layer
+ Anti-adhesive effect and wear protection for mould construction
+ and much more

CCT COATING SYSTEMS

If you have any questions or would like to place an order, please contact us at: T +49 (0)711 - 907 346 - 0

info@cct-plating.com
www.cct-plating.com

DIASHIELD

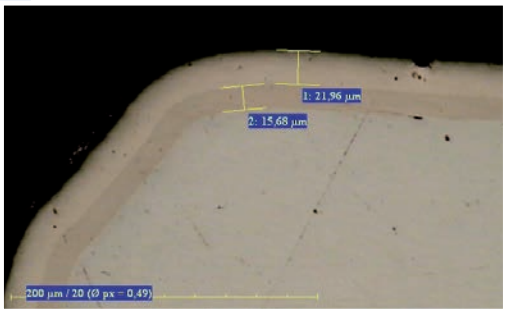
SOLUTION EXAMPLES

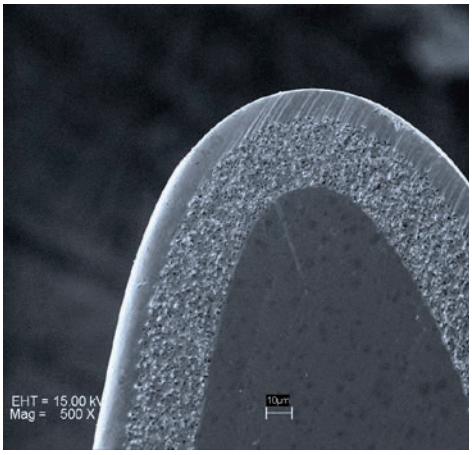
THERE IS ALWAYS A PERFECT SOLUTION

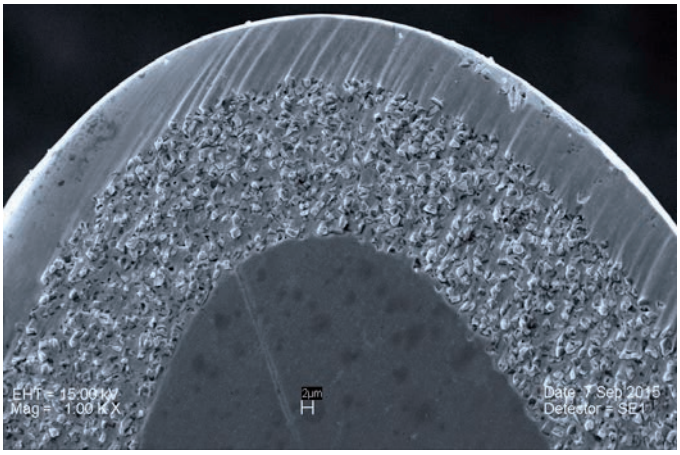
The requirements are different for each surface. Our coating process is flexible and has an adjustable degree of hardness. We adapt to your needs. Please feel free to get in touch.

*Further information about how **DIA**SHIELD® works can be found here or at www.cct-plating.com/diashield*

***DIA**SHIELD® coatings meet the highest demands for decorative applications.*







***DIA**SHIELD® forms the glossy finish.*

***DIA**SHIELD® is the perfect run-in layer and diffusion layer.*

AT A GLANCE

TYPE:
Electroplated or electroless nickel and nickel-phosphorus coating

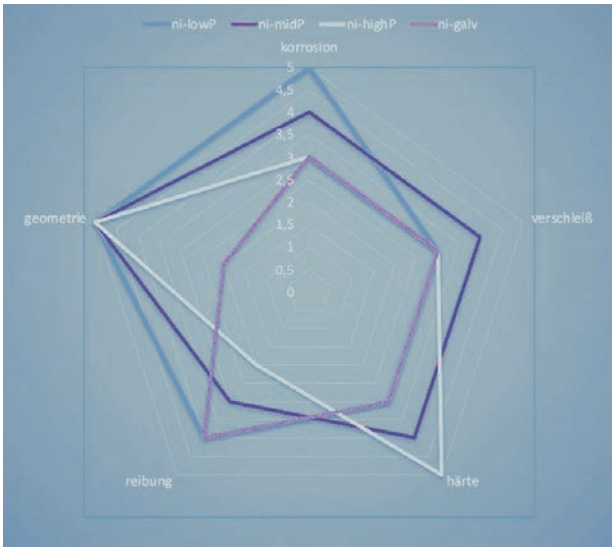
PROPERTIES:
> Wear-resistant friction pairing of metallic components
> Adjustable hardness of the nickel-phosphorus layer (approx. 550 HV0.1 to approx. 1,100 HV0.1).
> High corrosion resistance with nickel and with nickel-phosphorus
> Good contour accuracy or very uniform coating thickness with electroless nickel
> High layer thicknesses when using electroplated nickel

USE:
Tribological pairings in extremely stressed systems with high friction and corrosion loads such as injection moulds, textile machine components.

COATING CHARACTERISTICS:
Nickel-phosphorus layer from approx.5 µm to approx. 22 µm with and without dispersion materials (hBN, PTFE) nano-dispersions (< 1 µm), dispersions (</= 1-5µm)
Friction value µ = <0.3

SUBSTRATE CHARACTERISTICS:
Electroplatable base material with adapted, defined roughness

ADVANTAGES OF USING DIASHIELD® COATINGS



Overview of all advantages in the network diagram

+ **The cost-effective alternative for wear and corrosion protection**
+ **High decorative value due to glossy layers**
+ **Functions as diffusion barrier and run-in layer**
+ **Anti-adhesive effect and wear protection for mould construction**
+ **Effective combination** of the important properties wear protection and corrosion protection of metal surfaces
+ **Improvement of the running-in behaviour** of **DIA**PROTECT® or **DIA**GRIP® coatings
+ **Can be used without design changes**
+ **Insensitivity to lubricants**

The coatings based on nickel and nickel-phosphorus are characterised by the fact that they have several important properties, or that the **properties can be adapted to the requirements for use depending on the composition and/or heat treatment.** This can be illustrated by means of a network diagram for qualitative evaluation, on the basis of which the user can select the required properties.

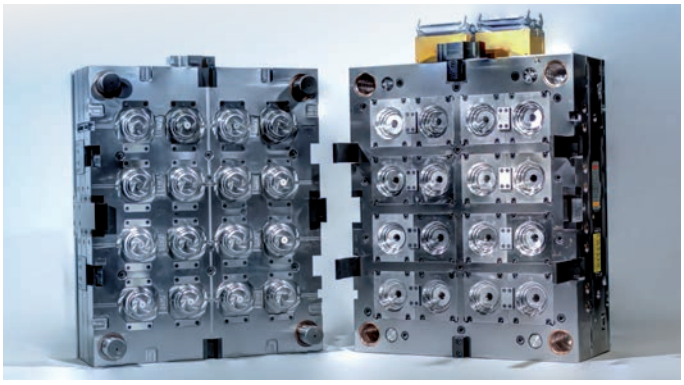
APPLICATION

Depending on the composition of the electrolyte system, electroplated and electroless nickel produces a surface gloss that can be controlled within certain limits. A shiny surface is achieved with layer thicknesses in the range of a few micrometres (</= 2-10 µm) thickness.

In combination with a layer to increase wear resistance or change the gliding behaviour, such as **DIA**GLIDE® or **DIA**GRIP®, a **DIA**SHIELD® coating provides an improved appearance or an additional decorative appearance. This can be advantageous in numerous applications, since functional surfaces can have a more or less high roughness. A decorative appearance can increase the acceptance of a functional coating by the end user.

The hardness of the coating can be adjusted to values between about 550 HV-1,100 HV when electroless nickel is used, depending on the phosphorus content and post-treatment. Thus, for example, the hardness or wear requirements of a combination coating (e.g. of **DIA**GLIDE® and **DIA**SHIELD®) can be met.

DIASHIELD® coatings can also be used as dispersion coatings with hBN/PTFE coating as demoulding aids, non-stick coatings in mould making and injection mould making. When used in combination with **DIA**GLIDE® and **DIA**PROTECT® Scoatings, wear and adhesion properties can be optimised together. In the case of electroplated nickel, no dimensional deviations due to edge build-up occur due to the usual layer thicknesses of the **DIA**SHIELD® system of less than 5 µm.



*Injection mould with **DIA**SHIELD®*

CHARACTERISTIC VALUES FOR **DIA**SHIELD® COATINGS

The layers for improving the appearance and also the shrinkage behaviour can be combined with pre-coatings such as **DIA**GLIDE® or **DIA**PROTECT® in different compositions, different types of deposition, as well as in combination with dispersion layers with different types of dispersion materials. The selected layer combination depends on the load in use and can consist of both wear load and corrosion load. Due to the layer thicknesses of a few micrometres (e.g. < 5 µm), the **DIASHIELD®** system does not cause any changes in the component geometry and only the slightest changes in properties such as wear behaviour.

Functional properties	Possible combinations **DIASHIELD®**		
Designation	**DIA**SHIELD®	**DIA**SHIELD®	**DIA**SHIELD®
Average particle size	0,5 µm / Nano	2 µm	10 µm
Coating rate	15 % to 30 %	15 % to 30 %	15 % to 30 %
Layer material	Electroless nickel-phosphorus or electroplated nickel or nickel-phosphorus		
Hardness of coating matrix	550 – 1.100 HV0,1		
Layer thickness of the matrix (electroless nickel)	5 - 30 µm	5 - 30 µm	5 - 30 µm
Layer thickness of the matrix (electroplated nickel)	up to several hundred microns		

PREREQUISITES FOR WEAR/CORROSION PROTECTION BY DIASHIELD®-COATINGS

The properties of wear and corrosion protection are linked to certain design prerequisites, or rather specific designs influence the properties of the protective coatings:

> Design of contact surfaces – wear when surfaces rub against each other is greatly influenced by the type and size of the actual (microscopic) contact surfaces. The roughness of the contact surfaces and the orientation of machining structures such as turning or grinding grooves play a role here. The smoother a surface, the larger the actual contact surfaces and the lower the actual surface pressure at the contact surfaces. The severity of wear tends to increase with an increase in the surface roughness of one or both friction partners.

> Hardness of the surface of the contact surfaces – a higher surface hardness improves the resistance to shearing or breaking off of material from the component surfaces of the friction partners. The risk of shearing or chipping is lower if the surfaces of the friction partners are made of the same material.

> Mechanical properties of the substrate – coatings with a high level of hardnesses, such as chromium, require a substrate with sufficiently high load-bearing capacity to prevent the coating from cracking or breaking; alloy steels, for example, are ideally suited.

> Coating of the contact surfaces with foreign substances – the friction properties of two tribological surfaces are changed by the presence of foreign substances (oil, grease, dirt). Oil and grease usually have a positive influence on the friction properties, dirt a negative influence. However, oils and greases as well as any degradation products that may arise can impair the corrosion resistance. If dispersion coatings are used, it must be checked as to what extent foreign substances impair the effect of the deposited particles.

> Design – electroless nickel coatings (primarily nickel) are characterised by a high degree of contour accuracy and do not require mechanical finishing to achieve surfaces with a high degree of accuracy of fit. With electroplated coatings, edge build-up must be expected, which becomes more pronounced with increasing coating thickness. In individual cases, the possibilities for mechanical finishing must be checked before applying a coating.