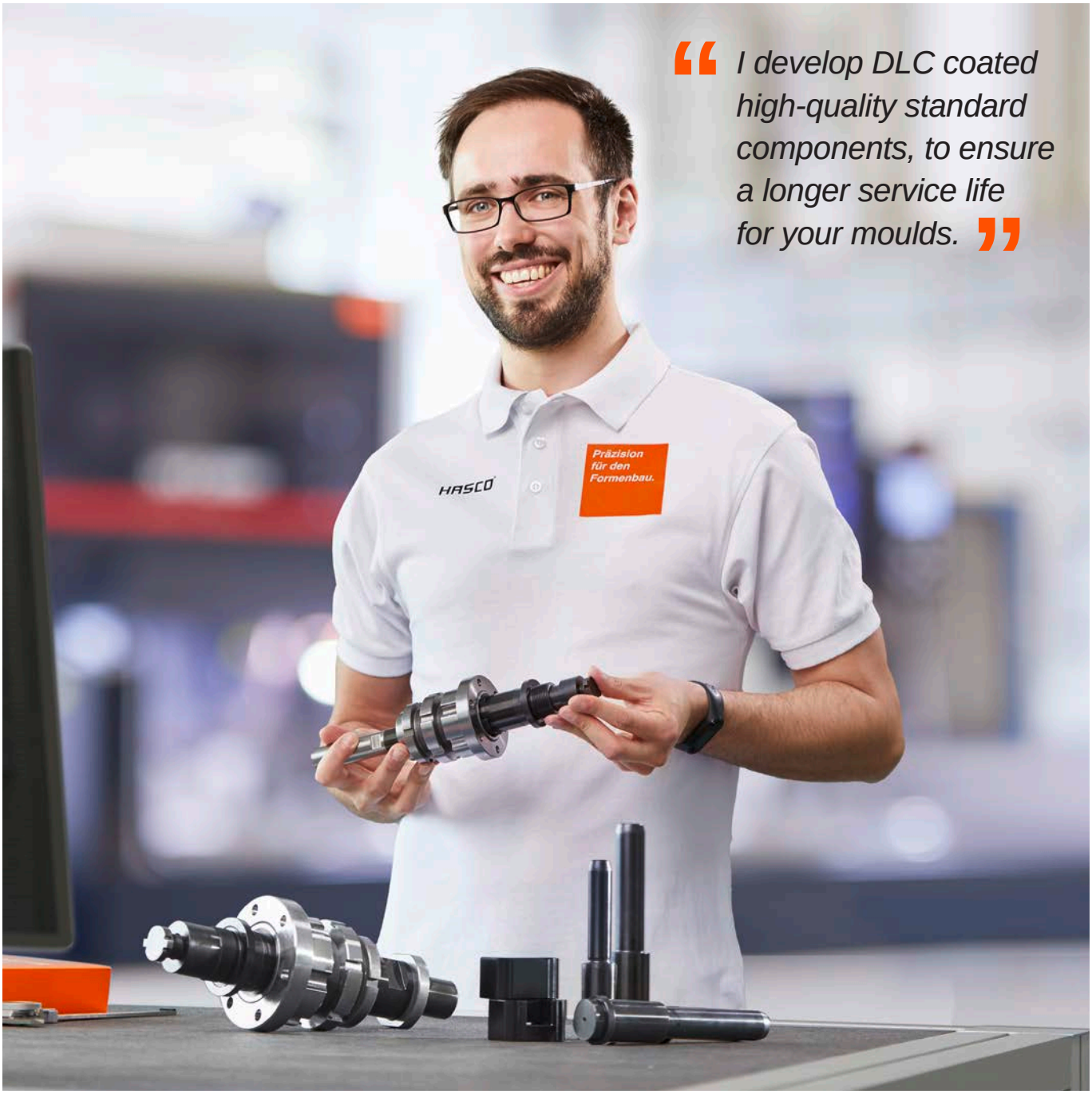
HASCO®

Enabling with System.

Know how 2go

DLC coatings



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What actually is DLC?

DLC means: **Diamond like carbon**.

The DLC coating is a slide coating applied by the PACVD process.

The coating is applied through a physical and chemical reaction at around 180°C and carbon-containing carrier gases are admitted at the same time. Because of the low coating temperature, DLC coating is also ideal for materials with a low tempering temperature.

It combines good hardness with excellent tribological properties as regards friction, anti-adhesion behaviour, wear and lubrication.

When is a DLC coating useful?

Because of its technical properties, a DLC coating is particularly useful for all types of motion or friction that occur in mouldmaking, e.g. ejection, guiding and centring.

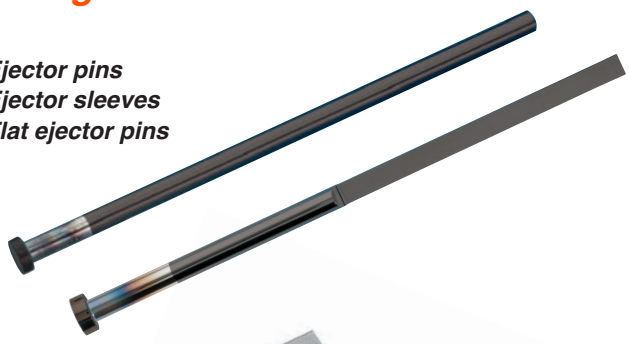
Through the DLC coating, it is possible to work completely free of lubricants. The coating is biocompatible and approved for the fields of medical technology and the packaging industry. LGA approval has been granted for this coating.

Special characteristics

- Lubricant-free operation
- Suitable for clean-room applications
- Longer maintenance intervals
- Very high abrasion resistance
- No seizing even when run dry
- Good corrosion resistance
- LGA-approved

For low-wear ejection, guiding and centring

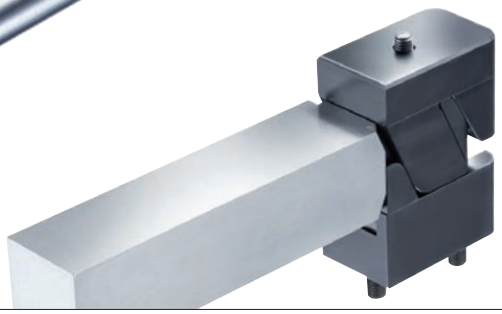
Ejector pins
Ejector sleeves
Flat ejector pins



Latch locking units

Two stage ejectors

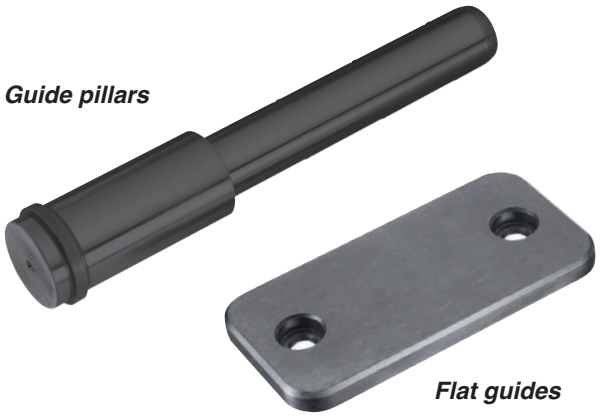
Slide units



Technical data

Coating hardness	2400 - 3000 HV
Coating thickness	~ 1,5 µm
Coating temperature	180°C
Temperature resistance	350°C
Coating colour	black-grey
Friction coefficient against steel	0,1 - 0,15

Guide pillars

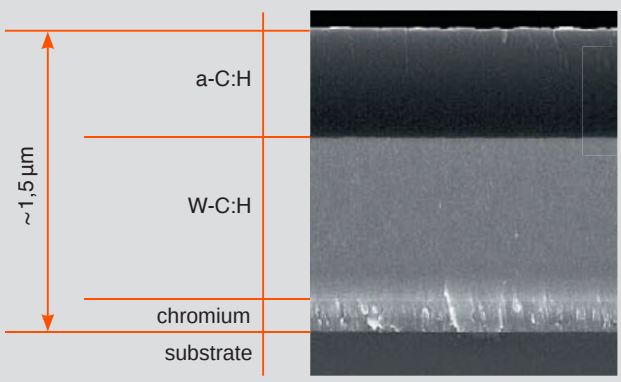


Flat guides

Flat locating units

Locating units

Slide retainers



DLC vs. WCC

We frequently come as well across the term WCC. This is also a slide coating that has found its way into mouldmaking.

However, the advantages of the DLC coating are very clear.

The surface hardness with DLC is, at 3000HV compared with 1500HV, twice as high. Compared with a nitriding layer, it is three times as high. The friction coefficient against steel is also considerably lower – 0.1 compared with 0.2.

The WCC coating offers advantages only to a small extent in the subsequent machining, because the surface does not attain the high hardness of the DLC coating.

In the field of corrosion prevention and also in terms of wear resistance, the DLC coating is far superior to the WCC coating.

Basically, DLC is the further development of WCC.

Why choose HASCO's standard components with a DLC coating?

HASCO offers a standard range of DLC coated quality standard components that is second to none.

The product spectrum covers ejector pins, ejector sleeves, latch locking units, air valves, as well as centring, slide and guide units.

At HASCO, the customer receives the tolerances he orders. It is not simply a standard article ex stock that is coated, but parts that are manufactured with a specific tolerance especially for the coating in order to have the original tolerance again after the coating.

This guarantees 100% interchangeability of the components.

DLC coatings enable maximum service life

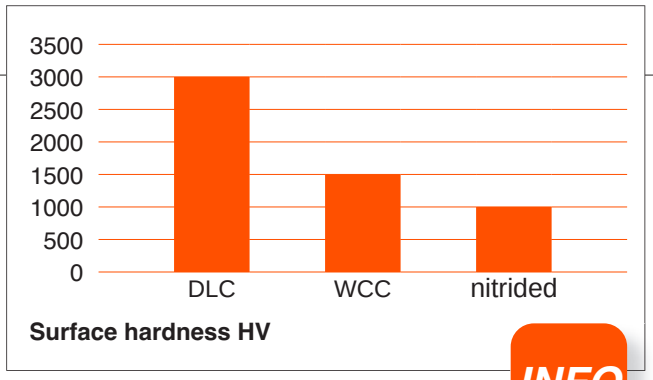
Especially in the production of packaging, medical products and numerous other plastic products such as toys or white goods, where the use of lubricants has to be avoided.

Lubricants basically contaminate the manufactured products, which is fundamentally banned with clean-room applications, but is also no longer desirable with more and more conventional applications for a number of reasons, e.g. greasy edges on the parts.

Added to this is the fact that the application of the lubricants always interrupts the ongoing process and thus negatively influences it. The resultant production interruptions naturally – like the very high costs for certified lubricants – have a negative effect on the production costs and thus reduce producers' already narrow margins even further.

Leading global manufacturers of plastic parts are very familiar with these challenges in day-to-day production.

The objective of achieving lubricant-free, wear-optimised operation exists with all injection moulding tools, and increasingly also with the moulding tools for precision parts from the automotive and computer industries.



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HASCO establishes DLC coatings as the standard

HASCO began many years ago with the standardisation of DLC coated products, and this has since become very well established as the standard in tool and mouldmaking. DLC coatings are being used in more and more injection moulding tools.

Thanks to unbroken innovative strength, it has been possible to produce an industry standard that has become virtually indispensable for any modern moulding tool.

HASCO's DLC coated standard components have ideal properties in terms of friction, wear and lubrication. Optimum tribological properties further improve the result and thus help to increase the productivity of the moulding tools even further.

Two stage ejector Z169/...

Much longer maintenance rates

HASCO, the reliable full service provider of standardised quality components and individual hot runner solutions, decided to meet the challenges of modern mouldmaking and search for the most suitable solutions to these challenges. When developing the DLC program, HASCO also took the advice of research institutes, particularly as regards tribological principles.

During this process, so-called 'PACVD coatings' were spotlighted. PACVD stands for Plasma-Assisted Chemical Deposition.

Briefly summarised, gases are deposited under vacuum with the coating materials onto the surface to be treated. The coating properties can be influenced by the applied voltage.

The resultant DLC coatings combine the specified low dry friction with simultaneously very high wear protection.

The initial trials with the coated functional surfaces were highly promising and the very high expectations were even exceeded. In parallel with this, more and more other components that were suitable for a coating were included.

These include various types of ejector pins, guide elements and other functional components such as two stage ejectors.

Cost savings through DLC coating – Cost efficiency calculation for the two stage ejector Z169/...

	Z 169 / 40 with DLC coating	Two stage ejector without DLC coating
Listed selling price in €	1,497.58	1,377.77
Component replacement (no. per year)	1	2
Total costs for component (p.a. in €)	1,497.58	2,755.54
Listed selling price in %	100	92
Component replacement (no. per year)	1	2
Total cost for component (p.a. in %)	**100**	**184**
Visual controls (min/day)	10	10
Number of visual controls (per day)	1	3
Visual controls total (min/day)	10	30
Visual controls total (p.a. in h, 360 days/60 h)	60	180
Lubrication of mould (min/day)	20	20
Number of lubrications (per day)	0.5	1
Total lubrication (min/day)	10	20
Total lubrication (p.a. in h, 360 days/60 h)	60	120
Machine downtime (p.a. in €)	3,600.00	9,000.00
Wage costs mouldmaker (p.a. in €)	5,400.00	13,500.00
Total costs component (p.a. in €)	1,497.58	2,755.54
Total costs (p.a. in €)	**10,497.58**	**25,255.54**
Total savings (p.a.)	**58.43 %**	

HASCO DLC components – used all over the world

In lamp development with LED, the use of light-guiding optical components of PMMA is ideal. In order to guarantee optimum light quality, we have decided to demould thick-walled optical parts in two steps from the injection moulding tool. The DLC coating of the two-step ejector enables the necessary dry-running properties of the moulding tool for lighting components.

Otto Ersching, Tool designer, Production / Mouldmaking, ERCO GmbH www.erco.com

Niko has been using HASCO's DLC coated accessories for many years for its high-performance tools. This has extended the service life of our tools and we also see a positive trend in our day-to-day work with regard to the maintenance costs.

Peter Van Damme, Manager Operations Technical Support Niko Group, www.niko.eu

The DLC coated HASCO components convinced us immediately, as soon as we used them for the first time. We benefit from the quality, because there is very little wear, hardly any maintenance necessary, no cleaning and no lubrication. In addition, the direct replacement without the need for machining provides us with efficient and reliable production processes.

Michael Roming, Managing Director Roming Werkzeugbau GmbH www.roming.com

We in the Vangest group rely on HASCO's DLC components in mouldmaking for the medical and packaging industries, because they are suitable for clean-room applications and ensure minimum maintenance with maximum reliability.

Jorge Oliveira, General Manager MOLIPOREX (Vangest Group) www.moliporex.pt

The DLC components from HASCO are far more hard-wearing and have a longer service life. The sliding works better and the durability is much better than that of non-coated parts.
To meet the demands of our customers, DLC coated products have already become the standard for us.

Rade Joksimović, Head of Design, Inmold-Plast www.inmold-ltd.com

At Schoeller Allibert US Inc., we have for many years been using solely DLC coated ejector pins from HASCO in certain areas of our moulding tools, in which only minimum lubrication is possible. The DLC coating offers us optimum conditions when building injection moulding tools for the food industry.

Roland M. Harke, Tooling Manager, Schoeller Allibert US Inc. www.schoellerallibert.com

For more demanding applications, we always use coated DLC ejectors from HASCO. Because of this, we not only lengthen the intervals for maintenance, cleaning and repair of our moulds, we also prevent the corrosion of ejector pins with aggressive plastics such as POM, PVC ...

Tomas Gajda, Technical Director Alca plast s.r.o., www.alcaplast.cz

FAQ

Product support via Live Chat

Your reply was missing?

Then please contact our technical service consultants directly. They can provide you with individual support quickly and with maximum technical expertise.

Q: Can a coated part be subsequently machined?

A: Yes, that's no problem. The very thin coating will briefly offer resistance when the hard metal drill, cutter etc. is placed on it. However, directly after penetration, the material can be machined as before. In such cases, however, the coating is damaged.

Q: Can inner diameters also be coated?

A: No, that is not technically possible. It must be assumed that, depending on the position, alignment and geometry of the component, a maximum coating thickness of 1xd occurs. A continuous internal coating is virtually impossible to achieve.

Q: Are there some plastics that are not suitable for contact with DLC coated cores?

A: Because of the extremely smooth surface, the DLC coating tends to stick. Because not every plastic reacts in the same way, you should consult our technical service department.

Q: Can grained, etched or polished surfaces be coated?

A: That is no problem. When coating, the surface is not negatively affected. A high surface quality of the carrier material has a positive influence on the coating.

Q: Are there quality signs that indicate a good DLC coating?

A: Generally speaking, your product should have an evenly black colour. Furthermore, it is possible to test through a scratch test, e.g. with a hand file or a key, whether the coating adhesion and surface hardness are good. However, this still does not guarantee a DLC coating. It can also be an old WCC coating, which is technically of far poorer quality than the DLC. To be absolutely certain, the best solution is to put your trust in your supplier. All the quality standard components available from us are, without exception, provided with a DLC coating optimised specifically for mouldmaking by one of Germany's leading coating companies.

Q: Is it enough for one of a pair of parts to be coated, or must both of them always be coated?

A: It is absolutely sufficient to coat one article of the pair. Both parts would, purely technically, not function at all because of the inner coating. Because the coated element does not offer any area of attack, coating of the simpler part is completely adequate.

Q: Can I really use my coated components without lubricant?

A: Yes, you can. Nor is any initial lubrication or similar necessary. However, it does not do any damage either. If you should therefore want some sort of lubrication, there is no reason not to. During operation you should nevertheless make a brief visual control from time to time and perhaps wipe off any contamination. You would recognise any wear by bare areas.

Q: Is the DLC coating also a useful choice for mould inserts?

A: That depends entirely on the plastic used. PE and PP, for example, are very compatible with DLC coating. PA and other materials, on the other hand, are not. Our technical service staff will be pleased to advise you.

Q: How does the coating behave with nitrided parts?

A: Generally speaking, there is no objection to using nitrided parts as the carrier material. However, attention must be paid to a bare surface, otherwise the coating will not hold. Additional nitriding is, however, unnecessary, because the DLC coating takes over the positive properties of the nitriding.

Q: Is the coating thickness evenly distributed or can significant deviations be expected?

A: With a professionally executed DLC coating, the part rotates in total about three different axes. This ensures that the coating is applied very evenly. A significant deviation in the coating thickness is thus not to be expected.

HASCO®

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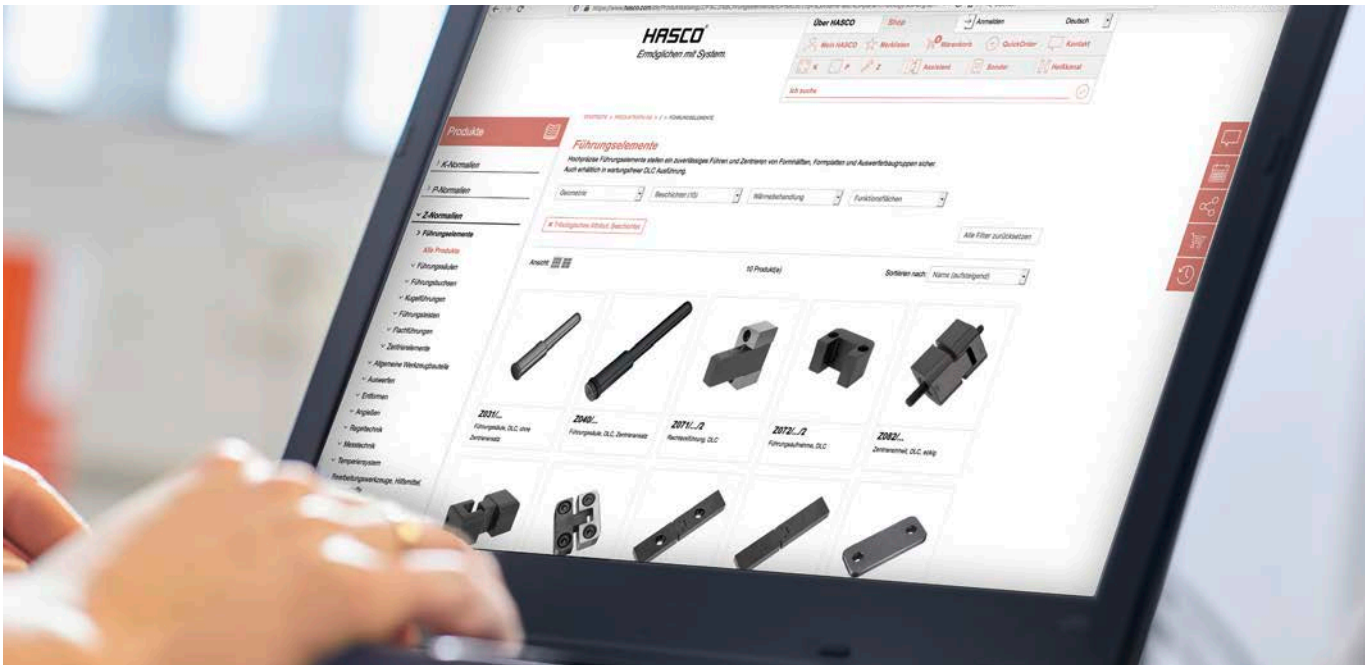

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