Chrome at its very best.

TOPOCROM® surface systems overview.

topocrom

TOPOCROM® – for highest demands.

For 40 years, TOPOCROM® has provided outstanding surface coatings.

Surface engineering as core strength

Our companies have long lasting industrial experience in the field of surface engineering. Surface coatings are produced in Stockach, Germany and the reactor technology is developed in Switzerland.

Repeatedly challenged by the demanding requirements of our customers from the machinery and automotive industry, steel mills and processing industries, our solutions have led to groundbreaking improvements in several industrial sectors.

Technology lead due to research and development

We are development leaders in our industry due to our great willingness to research and test innovative surfaces with special characteristics. This has led to new layer systems and to the environmentally friendly, modern and energy-efficient reactor system. With our customers and leading research institutes, we develop solutions ready for the future.

Closed reactor technology

TOPOCROM® layers are produced exclusively according to the closed reactor principle. In contrast to open baths, this allows more precise control of the coating process. Reactors with different sizes are available for serial production.

A major advantage: This technology enables the generation of structured TOPOCROM® surfaces in a continuous single process step.

Reliable planning – with REACH regulation.

The European Chemicals Agency (ECHA) has issued an approval recommendation of 12 years for the functional TOPOCROM® processes in the closed reactor system.

We guarantee absolutely chrome (VI)-free TOPOCROM® coatings.

What is it about?

REACH stands for »Registration, Evaluation, Authorisation and Restriction of Chemicals«. The REACH Regulation (Regulation (EC) 1907/2006) entered into force on 1 June 2007. It is one of the strictest chemical regulations worldwide and regulates, among other things, the use of substances with hazardous properties (»substances of very high concern«). The basic idea is to replace such substances or to make their use safe for humans and the environment.

Chromium trioxide (CrO_2) has been qualified as a substance of very high concern by the European Chemicals Agency (ECHA) and since September 2017 may therefore only be used after prior approval by the EU Commission. Chromium VI is required by companies producing metallic chromium layers.

In order to obtain approval, companies must identify and control the risks associated with the substances they manufacture and market in the EU. Companies must demonstrate to ECHA how the substance can be safely used.

Positive decision of the EU Commission. Approval for TOPOCROM® for a period of 12 years in accordance with EU Regulation No. 1907/2006.

ECHA has examined the application of Topocrom GmbH and recommended to the EU Commission an approval for a period of 12 years.

In good shape – our hemispherical surface.

Generation of TOPOCROM® layers.

Chrome plating in closed reactors

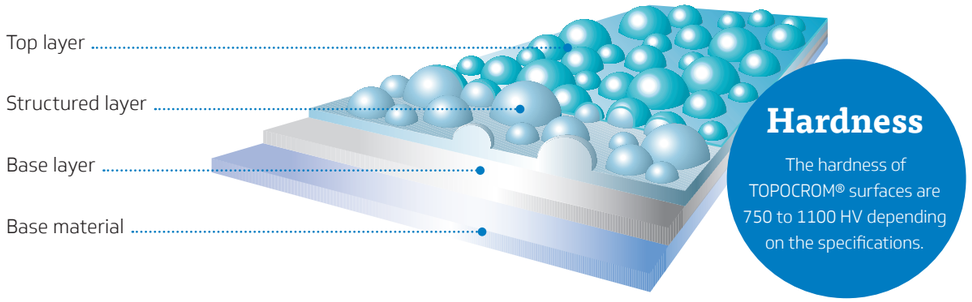
TOPOCROM® layers are produced according to the closed reactor principle. Reactors with different sizes are available for single item and serial production. This technology enables the generation of structured surfaces in a continuous single process step.

The customized parameters of the plating process are saved in the database. Thus, an exact reproduction of the required layer system is guaranteed.

Adjustable surface features

The structured chromium surface can be individually adjusted to achieve properties according to customers' demands. The composition of the layer system, the thickness of the layer and the suitable surface structure are thus defined individually and selectively: based on the application and the required characteristics our engineering develops the suitable formula. By means of sample coatings, the results can be controlled for a pilot application.

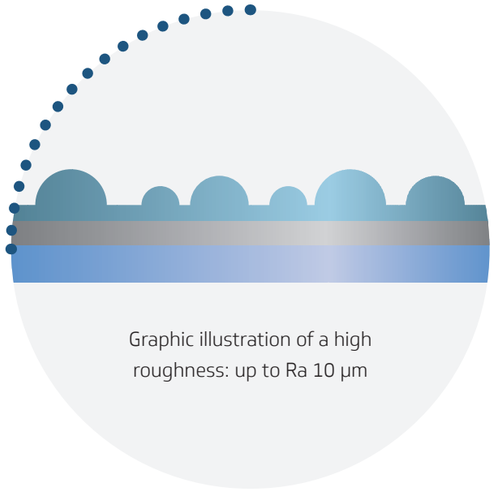
TOPOCROM® layer system



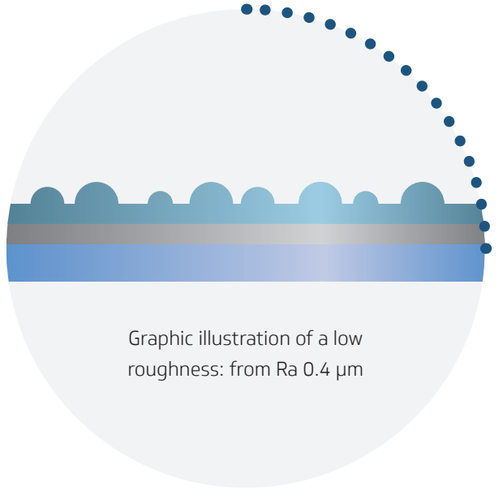
Unique – characteristics of TOPOCROM®.

Surfaces according to demands.

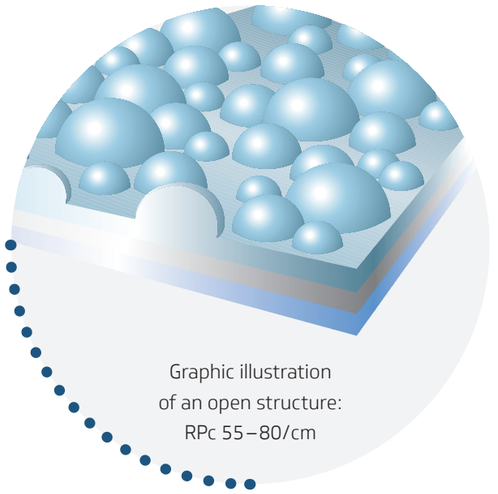
The TOPOCROM® principle allows a definite composition of various topographies with different characteristics for industrial use.



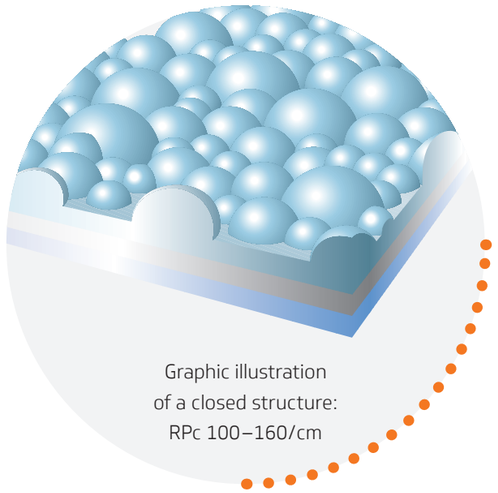
Graphic illustration of a high roughness: up to Ra 10 µm



Graphic illustration of a low roughness: from Ra 0.4 µm

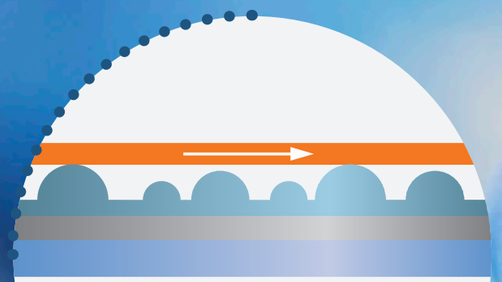


Graphic illustration of an open structure: RPc 55–80/cm

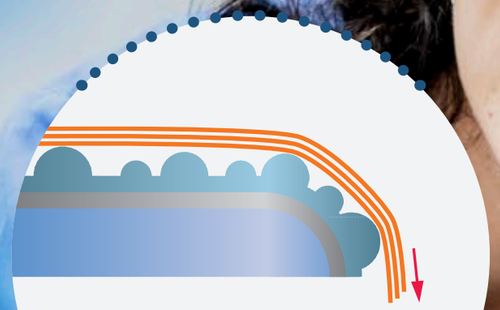


Graphic illustration of a closed structure: RPc 100–160/cm

Features and characteristics of TOPOCROM® layers.

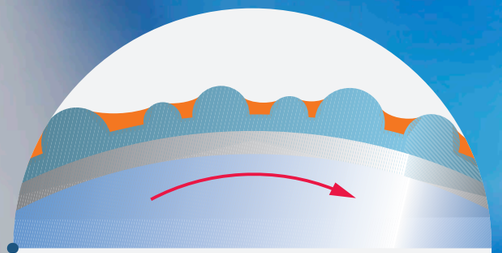


Excellent ejection of plastic parts from injection tools, better flowing ability during extrusion processes.

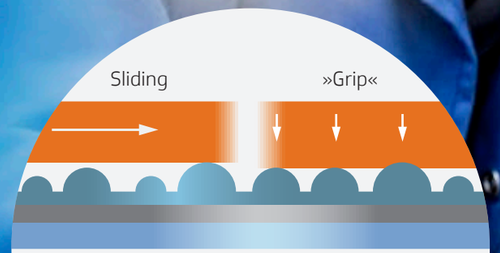


The »soft« surface is an ideal property for processing technical fibers such as carbon, basalt, glass and aramid.

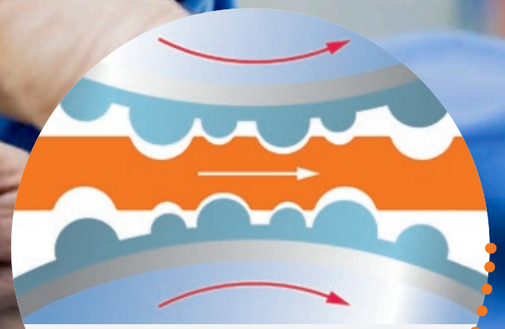
Air cushions prevent adhesion and sticking to surfaces during film production.



Good wettability, defined transportation of fluids.



Perfect sliding abilities due to reduced bearing contact and excellent grip abilities with appropriate pressure load.



Embossing properties for skin-pass rolling sheet metal for car body panels.

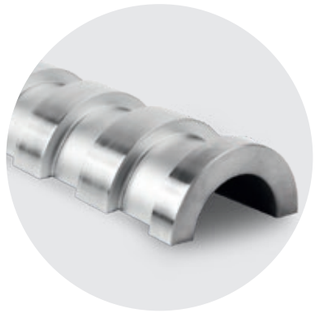
Efficiency – everything from one source.

From individual development and manufacturing up to recoating.

Manufacturing and TOPOCROM® coating

Our customers get the option to buy their components completely manufactured and coated at Topocrom GmbH. From the very first, we arrange the manufacturing of the parts according to your technical drawing at a specialized manufacturer.

This procedure ensures a perfect surface quality of the base material at the functional areas to get an optimal TOPOCROM® coating. The procurement from one source simplifies your purchase process and reduces the delivery time.



Cost savings

During various production processes, the exposed parts are subject to mechanical and/or chemical abrasion. The Topocrom GmbH technology enables a material-friendly and cost-saving removing of the worn coating from the base material; if the functional area of the base material is not damaged the new TOPOCROM® coating can be applied immediately – without further machining. This procedure saves time and money.

Individual solutions

We have long lasting industrial experiences in developing and optimizing chrome coating systems. Send us your demands; we are able to adjust our TOPOCROM® layers to your requirements and therefore help to find suitable solutions for your technological progress.

Our engineers are used to cooperating with institutes or R&D departments to find the best solutions.

Base materials suitable for chrome-plating

Steel, Steel alloys, Cast iron, Stainless steel, Copper, Copper alloys, Aluminum and Aluminum alloys, Titanium, Titanium alloys.

Base material requirements

The functional surface has a roughness of Rz ≤ 4 µm and no surface defects.

Quality, Environment, Sustainability, Values.

This is what Topocrom GmbH stands for.

Certified management system

Topocrom GmbH is based on processes according to ISO 9001:2015 and ISO 14001:2015. More certificates and processes are integrated into an overall system to meet customer requirements and to increase customer satisfaction.

TOPOCROM® – a sustainable technology

The TOPOCROM® surface structure generates a decisive benefit; furthermore the TOPOCROM® layer is a perfect wear and corrosion protection and extends the service life of the parts. The closed reactor principle in our company meets the highest standards for humans and environment and ensures an energy-efficient manufacturing of coatings.

REACH approved for a period of 12 years on 17 July 2018

This approval of the European Commission confirms our responsible environmental policy.

Important values we stand for

Humans, products, partners, corporation and environment form the value system of our daily actions. They form the basis for strategic decisions.

carbonprocessing

TOPOCROM® coating systems for
a fiber-friendly processing of filaments.

Requirements in the textile and carbon industry.

What’s important for fiber processing.

When processing composite fibers made of carbon, aramid, glass, basalt and ceramics production stops often occur due to unsuitable surfaces (sharp-ridged profile) of the filament guiding parts. This leads to quality defects in the final product.

Special features in the processing of carbon fibers

Filament break during filament guiding process due to unsuitable surface.

Signs of splicing arise e.g. during roving processing.

Composite fibers can be very **abrasive**.

Advantages of TOPOCROM® carbonprocessing coating

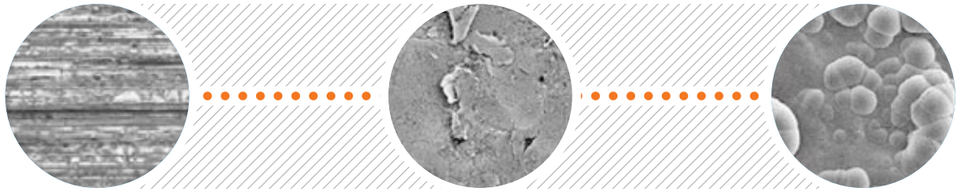
- ✓ Prevention of splicing
- ✓ Significantly reduced dust formation
- ✓ Less adhesion of filaments
- ✓ Prevention of wrappings
- ✓ Wettability with fluids (Avivagen)
- ✓ High wear resistance

Advantages – by experience.

Comparison of surface systems.

Conventional »orange peel« surface structure: unfavorable experiences in processing carbon fibers

The microscopic photographs below show a ground surface which was initially shot blasted and then hard chrome-plated. The previous shot-blasting rips open the metallic surface and thereby causes pointed sharp edges »riffs« which can only be unsatisfactorily smoothed out by the following hard chrome-plating step.



Ground surface

Shot-blasted or sand-blasted surface with sharp-ridged profiles

Hard-chromed orange peel surface

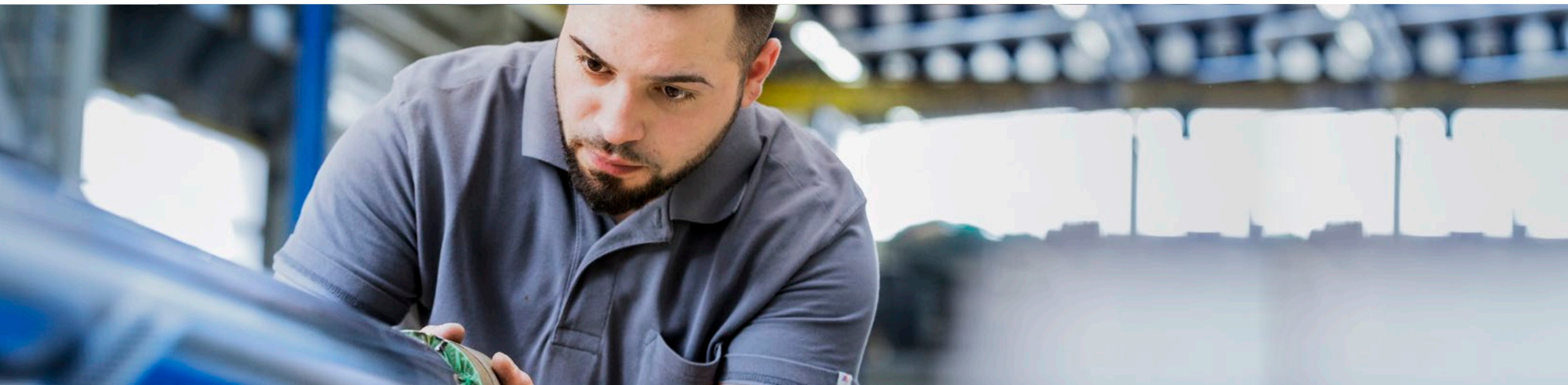
TOPOCROM® carbonprocessing surface structure: advantages due to technical innovation

The images below show the same ground surface which has been coated in a reactor using the TOPOCROM® principle. Preparatory roughening processes are not necessary – the surface structure is produced in a single process step. The complex blasting process step is no longer required. The TOPOCROM® carbonprocessing surface guarantees a fiber-friendly processing of carbon and other high-tech fibers.

Ground surface

No shot-blasting or sand-blasting

Round-ridged profile with TOPOCROM® plating in a single process step (in situ)



rollstructuring

TOPOCROM® surface systems
on rolls and rollers.

Printing and plastic film industry.

Surfaces for printing and plastic film processing.

Coating of rollers and rolls as a core competence

TOPOCROM® coating in cylindrical reactors is very suitable for the surface coating of rollers and rolls. According to the surface requirements, important parts of printing machines get the desired properties:

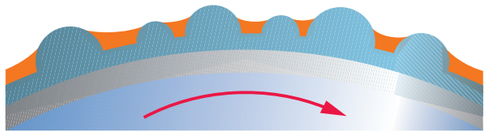
- Transport of fluids, scooping ability of the roll surface
- Hydrophobic/hydrophilic surfaces
- High resistance to wear, mechanical and chemical
- Optimized corrosion resistance due to special layer systems

Long-standing experience in the printing industry

The resistance of the coating against aggressive solvents and cleaning agents has been proven for many years. Leading internationally active manufacturers use TOPOCROM® coated rolls for their printing machines.

Wettable surfaces enhance industrial processes

It is possible to program the coating process in a way that the TOPOCROM® surface is able to carry a defined quantity of fluid evenly and without aquaplaning.



Surfaces with grip.

For the use in the metal sheet industry.

Roll surfaces with maximum grip for trouble-free processing of metal sheet in feeding or straightening machines

Thanks to the TOPOCROM® coating, the rolls show an ideal feeding behavior and reduced slip during the transport of metal strips treated with oil or lubricant. Furthermore, the service life of the rolls is significantly increased.

Perfect for metal sheet feeding

The adjustable topography respectively roughness of the coating on feed rolls result in friction characteristics (grip) already proven in the metal sheet industry. Leading manufacturers of feeding and straightening machines have their rolls coated with TOPOCROM®.

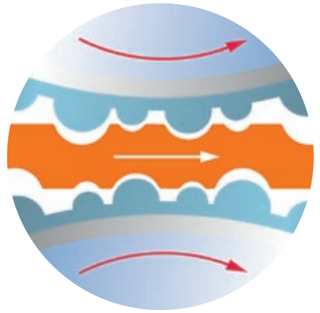
Test results of straightening machine manufacturer confirm:

Compared to conventional coating, TOPOCROM® coated rolls show:

- Excellent wear resistance
- Optimized friction coefficient
- Longest service life
- For feeding intensely lubricated metal sheet strips or plates only a TOPOCROM® coating offers the necessary friction
- Optimum grip, decrease of slip
- Use of one single type of roll for processing different sheet surfaces
- Resilience to bending and torsion
- Transmission of torque from the roll to the material by friction

Surfaces with embossing abilities.

For the automotive industry.



TOPOCROM® coated skin pass rolls are used for surface texturing (see above) of metal sheet. Metal sheet textured this way provides an excellent basis for further process steps.

The macro photograph above shows a TOPOCROM® textured sheet surface. The stochastic roughness structure features numerous finely divided hydrostatic lubrication pockets.

Embossing abilities of the TOPOCROM® surface for structure transfer during the rolling process

In the automotive industry car body panels textured by TOPOCROM® coated skin pass rolls are increasingly used. These metal sheet surfaces considerably ameliorate the forming behavior and form an ideal basis for modern painting without filler.

Carbody panels

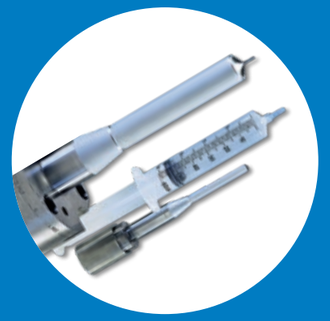
The appearance of the paint often gives the first impression of a vehicle and is therefore an essential quality feature of modern automobiles.

Quitting the filler in the paint system has increased the demands on the paint and the sheet to which it is applied. By saving the filler, process costs are reduced and in the sense of sustainability, another intermediate layer is saved.

Until now, the topography of the sheet surface has been described by the average roughness value Ra and the peak count RPc. The desired peak count RPc and the average roughness value Ra are adjustable according to the demands. For a better finish, the specification of the average roughness was decreased and the minimum peak count increased. The waviness of the sheet surface according to SEP1941 is an additional parameter required for a good appearance of the paint. Sheets structured with TOPOCROM® fulfil all these requirements to a high degree.

easyeject

For better ejection of molding tools and improved flowing abilities during extrusion process.



Coating of injection molding tools.

Faster and more efficient
with remarkable features.

Use of TOPOCROM® surfaces on male and female dies

The use of TOPOCROM® coated dies for plastic injection molding has proven itself over many years. Compared to other types of coated or structured surfaces, TOPOCROM® achieves considerably better results in a variety of ways.

A wide choice of materials

As the maximum coating temperature in the TOPOCROM® reactor is <70°C, there is a wide range of mold materials to choose from.

Advantages on the molding tool

- Better ejection
- Up to 30% quicker cycle times
- Little or no release agent is required
- Less pressure and effort during ejection
- Better heat distribution over the complete mold surface
- High resistance to wear and corrosion

Advantages for the plastic part

- Better heat distribution over the mold surface
- The option of smooth or structured surfaces

Cost-effective rework of used injection molding tools

If there is no mechanical damage to the base material, the tool can be recoated after de-chroming without any interim machining.

Coating of extrusion tools.

Cost optimization and less raw material consumption.

Process technology with a commitment to continuity of production

In the plastic industry, extruders are used to continuously produce semi-finished plastic products (e.g. films, tubes or profiles). The granulate is conveyed as raw material, plasticized and the melt is then homogenized.

For the melting process, mainly the internal friction in the material (dissipation) is used next to exterior heating. By this conveying principle, the back pressure of the extrusion tool is overcome and the melt is formed. Afterwards the semi-finished parts are calibrated, cooled down and brought to size.

Coping with mutual challenges and meeting targets

We support our customers with the most frequently expressed demands and challenges. These are among others:

- Minimizing the costs of raw material and energy
- Considering more product changes due to decreasing production batches
- Less waste during product changing processes
- Optimizing the product changing processes

Independently confirmed advantages of TOPOCROM® surface

Studies at the »Institute for Product Engineering IPE« at the University of Duisburg prove that TOPOCROM® coated extrusion tools show measurable advantages compared to other surfaces.

They analyzed the product changing behavior during single screw extrusion and diagnosed amongst others a significant influence of tribology on this process.

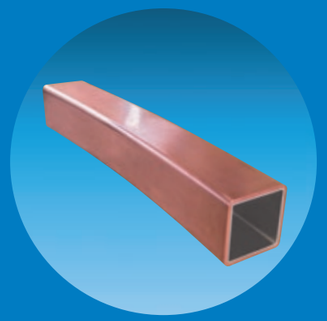
Selectable surface characteristics of TOPOCROM®

The characteristics of the structured layer (roughness, wettability, open or closed structure, Rz-values) can be defined precisely during the coating process. The use of TOPOCROM® coated tools shows the following advantages:

- Avoiding deposits
- Significantly less abrasion
- Better flowing ability
- Longer service life

highresistance

Coating of highly strained parts
such as continuous casting molds.



Coating of forming tools.

Better friction values thanks to TOPOCROM® surface

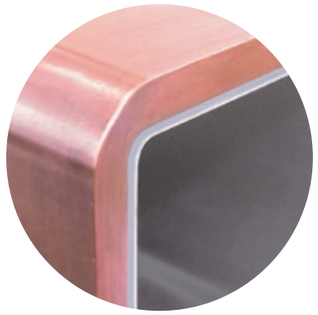
The hemispherical structure of the TOPOCROM® surface shows great advantages in sheet forming. The friction between tool and metal sheet is decreased; adhesion and cold welding effects are avoided.

The surface is able to carry lubricants

The concave impressions between the hemispheres generate hydrostatic lubricant pockets. Thus, the TOPOCROM® surface enables an even wetting with lubricant. These characteristics considerably help increasing the service life.

- Advantageous sheet metal forming
- Better sliding abilities
- Increased service life of the forming tool
- Prevention of tears and cold welding effects

Interior coating of continuous casting molds.



Longer service life even under extreme conditions

When fluid steel flows through the water-cooled continuous casting molds high temperature, pressure and abrasion occur. The mold is extremely stressed by the uninterrupted flow of the fluid steel. The high temperature results in particularly extreme abrasion. The resistance of the TOPOCROM® structure to this abrasion mechanism is, however, very high. The experiences of steelworks show a double or triple service life.

It is quite remarkable that the thickness of layer is exactly defined over the entire cross section (see above picture) of the continuous casting mold; even in the radii. The layer thickness can be maintained constantly during the coating process.

TOPOFLON® – extremely low friction values.

High performance in chrome.

Significantly reduced abrasion

TOPOFLON® is based on a TOPOCROM® layer into which PTFE anti-friction substances are integrated by an additional treatment. The field of application of TOPOFLON® is diverse. In case of special requirements, please contact our qualified personnel.

TOPOFLON® characteristics

- Hardness TOPOCROM® layer: max. 1100 HV
- Electrical conductivity: antistatic, non-insulating
- Layer thicknesses: e.g. 30–40 µm or according to prior discussion
- All electrically conductive metals can be coated
- Outstanding heat conductivity (99.8%)
- Temperature resistance of Teflon particles: -240°C to +250°C

Applications in following industries:

- Plastics industry, e.g. extrusion dies
- Food industry, e.g. stirring devices, dough nozzles
- Pharma industry, e.g. sorting and transporting devices
- Packaging industry

Gradientcrom® – for special parts.

More layers, unique possibilities.

Gradientcrom® is a special TOPOCROM® process that offers great corrosion protection. The multi-layer system is characteristic for this technology. The individual layers are distinguished by different hardness values. By means of a special deposition procedure in the closed reactors, compression stress arises in the functional surface of the chrome layer.

Interior coating of concrete pumping pipes.

Transport pipes for concrete, sand, gravel or mixture are subject to a high degree of abrasion. Compared to conventionally electroplated or hardened pipes, TOPOCROM® coatings provide considerably longer service life. In addition, TOPOCROM® layers are non-porous.

Areas of applications

- Transport pipes for concrete pumps and slurry pumps
- Pipes in the chemical and petroleum industries
- Transport pipes for waste disposal
- Transport of suspensions
- Pipework installations in sewage treatment plants and process technology
- Sugar, pulp and multiphase mixtures in chemical or food industry

Characteristics of the surface

- Interior layer thickness of the pipe up to 500 µm
- Optimized residual stress Gradientcrom® layers
- Multiple layer structures
- Optimum hardness, adapted ductility
- Precisely adjusted number of cracks

Advantages for the user

- Higher system availability
- Low maintenance costs
- Distinctly better corrosion and abrasion resistance compared to hardened or differently coated pipes

4792 | 04/2019 | duev.com

www.topocrom.com
info@topocrom.com

Topocrom GmbH
Hardtring 29
D-78333 Stockach

Topocrom Systems AG
Gewerbestrasse 8
CH-8212 Neuhausen am Rheinfall

Phone (D)
0049 (0) 7771 93 630

Phone (CH)
0041 (0) 71 620 01 83