About Cleanpart and IKOS Dynamant®

With the brandname IKOS Dynamant® Cleanpart is active as jobcoater in the hard coating market. The company also provides consulting services for tribosystems and protection against both wear, tear and corrosion.

The procedure Cleanpart uses to manufacture particularly heat-resistant coatings with diamond-like characteristics is plasma-assisted CVD (Chemical Vapor Deposition), or PACVD for short.

In this environmentally-friendly process, the parts to be coated can be of complex shape and are neither moved nor exposed to high temperatures in the reactor.

The manufacturing of DLC coatings uses hydrocarbons as precursors in combination with elements such as nitrogen, silicon, fluorine and titanium. The addition of these elements allows to modify and to customize the coatings so that they are harder, more elastic or more friction-reducing depending on the customer’s particular requirements.

This coating type is referred to as α-C:H:X, where ‘X’ refers to the dopant, and which is supplied by Cleanpart as a trade-marked DLC coating under the brand name DYNAMANT®.

Application Areas

- General engine construction
- Automotive industry
- Textile industry
- Fluidic and pneumatic systems and equipment
- Decorative surfaces
- Medical devices
- Food processing industry
- ...
About Dynamant®

Dynamant® is a coating based on diamond-like carbon (DLC coating of type a-C:H:X according VDI 2840). Using PACVD technology, a large variety of materials can be coated. By applying Dynamant® coatings, surfaces can be modified in terms of hardness and friction properties. Other characteristics of Dynamant® opens up a whole range of interesting perspectives.

- Very high hardness (< 2.500 HV)
- High elasticity (90% elastic resilience)
- Very low dry friction (µ < 0.05-0.1)
- Chemically inert, no corrosion
- Hydrophobic or hydrophilic surface characteristics can be set
- Biocompatible and certified for contact with food

Materials

- Metals, transition metals and its alloys
- Steel and steel alloys
- Light metals and their alloys
- Non-metallic materials like
  - Oxidic and non-oxidic ceramics
  - Polymer materials (heat resistant up to 200°C, e.g. Torlon)

Process technology

PACVD

Manufacturing capabilities

- We process lot sizes from single components up to high volume
- Dimensions from < 1 millimeter up to 1 meter

<table>
<thead>
<tr>
<th>Type</th>
<th>Character</th>
<th>Hardness (HV 0.02)</th>
<th>E-Module (GPa)</th>
<th>Friction coefficient (-)</th>
<th>Contact angle (water)</th>
<th>Process temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DYNAMANT® STD</td>
<td>Combines high hardness, low friction coefficient and low process temperature. The workhorse.</td>
<td>2.000</td>
<td>158</td>
<td>0.05</td>
<td>60-65°</td>
<td>230±30</td>
</tr>
<tr>
<td>DYNAMANT® HT</td>
<td>Focus on hardness. Needs higher process temp., mainly suited for non-metallic base materials or temp. stable metallic alloy. Temp. resistance up to 500°C</td>
<td>2.300-2.400</td>
<td>170</td>
<td>0.1</td>
<td>65°</td>
<td>300±30</td>
</tr>
<tr>
<td>DYNAMANT® HPA</td>
<td>Layer combines hydrophobic properties with good hardness</td>
<td>1.200</td>
<td>103</td>
<td>n.a.</td>
<td>90-100°</td>
<td>200±20</td>
</tr>
<tr>
<td>DYNAMANT® SRT</td>
<td>Scratch resistant, transparent coating</td>
<td>800</td>
<td>50-60</td>
<td>n.a.</td>
<td>n.a.</td>
<td>200±20</td>
</tr>
<tr>
<td>DYNAMANT® ML</td>
<td>Multi-layer system for thick layers &gt;5µm</td>
<td>1.700</td>
<td>127</td>
<td>0.05</td>
<td>n.a.</td>
<td>230±30</td>
</tr>
</tbody>
</table>

Standard coating thickness

- 2.5 µm for base materials steel and ceramic
- 8.0 µm for softer base materials like aluminium, magnesium, titanium
- Higher coating thicknesses upon request (see Dynamant® ML)