Speciality Additives for Plastics
in the Automotive Industry

- Anti-static
- Additives for all polymer systems
- Mold release
- Technical expertise
- Scratch resistance
- UV protection

Reasons to buy
- Industry targeted effects
- Additives for all polymer systems
- Technical expertise

Innovation you can build on™
# Speciality Additives for Automotive Plastics

The table below is intended as a guide for polymers and desired effect. More information on these effects can be found in this brochure or by contacting your local sales representative.

<table>
<thead>
<tr>
<th>Product</th>
<th>Mold release</th>
<th>Anti-scratch</th>
<th>UV protection</th>
<th>Anti-static</th>
<th>Composite lubrication</th>
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</tr>
</tbody>
</table>

- ▲: Product recommended for use with this polymer
- ●: Product may be suitable for use with this polymer
- X: Do not use this product with this polymer
Speciality Additives for Automotive Plastics

The use of plastics in automotive applications is becoming increasingly popular due to improved polymer technology and durability alongside the regulatory need to light-weight vehicles and reduce CO₂ emissions. With over 30 years’ experience in production, applications and research into additives for plastics, Croda Polymer Additives has developed a range of products suitable for this challenging market.

Our products can be utilised in a range of automotive applications including interior and exterior parts and under-the-bonnet components. The table overleaf can be used as a guide to effects in different polymer systems.

Mold release

Traditional mold release techniques involve the application of silicone sprays and mold washes which gradually wear off the mold, resulting in down time while it is reapplied.

Croda’s range of specially formulated internal release agents for plastics work by migrating to the surface of the polymer preventing the part from sticking to the mold. These products eliminate the need for silicone sprays and allow the continued production of parts, reducing cycle times and saving costs.

Anti-scratch

Anti-scratch properties are very important in parts such as dashboards, door panels and other body work to maintain a high quality appearance.

Our range of anti-scratch products protect the polymer from surface damage with improved oxidative stability.

Anti-static

Most plastics are good insulators and have the ability to support high static charge build up. This can be a particular problem for plastics which have a large surface area to volume ratio, e.g. dashboards.

Croda’s range of anti-static additives can be used externally or internally either for short-term or long-term anti-static effects. They reduce static build up that can lead to dust pick up and static shocks.

UV protection

Croda Polymer Additives produces dispersed ultra-fine metal oxides which deliver superior UV protection over a wide range of wavelengths and significantly improved dispersion.

Lubrication

A recent trend to light-weight cars and reduce CO₂ emissions has seen an increase in the amount of natural composite materials being used in the automotive industry.

In response to this market trend, Croda Polymer Additives has launched a range of lubricants for natural composite materials that have improved output rate of parts with minimal impact on mechanical properties.
Anti-scratch

Anti-scratch additives are important when producing internal automotive parts that are required to maintain a high quality appearance. Croda Polymer Additives has identified a number of speciality additives that can demonstrate an improvement in scratch resistance by reducing the scratch width, depth and appearance.

Our anti-scratch products work by controlled migration of additive through the polymer matrix to reduce the friction at the polymer surface.

**Key Benefits**
- Reduced scratch width & depth
- Reduced scratch appearance
- Reduced friction
- Excellent colour and oxidative stability
- Elimination of tackiness
- Low volatility

**Product Selection**

Croda offer a range of products that can deliver anti-scratch performance in different polymer systems. These products are available as 100% active beads for direct addition into the polymer melt or to be dosed by compounding into the formulation. Addition levels of 0.5% are recommended initially and then levels can be optimised between 0.2 and 1.0% depending on the presence of other additives and application.

<table>
<thead>
<tr>
<th>Product</th>
<th>Physical form @ 25° C</th>
<th>Suggested polymer</th>
<th>Additional benefit</th>
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</thead>
<tbody>
<tr>
<td>IncroMold™ K</td>
<td>Bead</td>
<td>PP copolymers</td>
<td>Reduced scratch appearance</td>
</tr>
<tr>
<td>Incroslip G</td>
<td>Bead</td>
<td>PP homopolymer</td>
<td>Improved mold release</td>
</tr>
<tr>
<td>Incroslip™ SL</td>
<td>Bead</td>
<td>PP copolymers</td>
<td>Excellent oxidative stability, organoleptics and low visible bloom</td>
</tr>
<tr>
<td>IncroMax™ 300</td>
<td>Liquid</td>
<td>Polycarbonate</td>
<td>No effect on clarity</td>
</tr>
<tr>
<td>IncroMax™ PS</td>
<td>Bead</td>
<td>PMMA</td>
<td>No effect on clarity</td>
</tr>
</tbody>
</table>

**Case Study**

**IncroMold K Reduces Scratch Whiteness in cPP**

A customer was compounding polypropylene impact copolymer for use in automotive parts and was adding IncroMold S as a mold release and anti-scratch additive. They were quite happy with the performance but wanted to know what the next generation of anti-scratch additives were that Croda could offer.

The customer compounded several additives into their formulation, including IncroMold K to compare against IncroMold S. The customer then molded plaques and sent them to Croda’s technical team in the UK to perform scratch testing. The technical team carried out testing using a single-scratch method and pictures of the scratches were analysed to get results for scratch width and whiteness.

The results showed that IncroMold K gave better scratch results compared to the other additives tested. In particular, IncroMold K demonstrated the best results for scratch whiteness which resulted in the least visible scratch. The customer also observed that IncroMold K gave an advantage over competitor additives for gloss.
Anti-scratch additives for polypropylene

Polypropylene is commonly used in the automotive industry for interior parts including dashboards, door panels and trim. A number of additives have been shown to dramatically improve the anti-scratch properties of PP, including IncroMold and Incroslip.

Anti-scratch with Reduced Scratch Whitening

IncroMold K is the newest addition to our anti-scratch range and has been specifically developed to reduce scratch width, depth and visibility. The product has also shown excellent performance in reducing scratch whitening in PP impact copolymer.

Anti-scratch in Challenging Conditions

Automotive parts are often subjected to challenging conditions such as high temperature and strong UV light, over a prolonged period of time. Some traditional anti-scratch additives can break down in such conditions, causing issues with odour, visible bloom and tackiness. Incroslip SL is a fully saturated additive that does not break down, resulting in excellent anti-scratch performance with no negative impact on the part.
Anti-scratch additives for clear polymers

Clear polymers such as polycarbonate and PMMA are also used in the automotive industry for applications including headlights and clear dashboard components. These polymers are tough, durable materials, however, they are prone to scratch and mar which can reduce transparency of the part.

The IncroMax range of products is perfect for transparent applications as not only do these products show excellent anti-scratch performance but they also have no negative impact on clarity.

Anti-scratch in PMMA

The addition of 0.5% IncroMax PS can reduce scratching at up to 15 N loads.

Anti-scratch in Polycarbonate

The addition of 0.5% IncroMax 300 can reduce scratch width in polycarbonate by up to 40% with no impact on clarity.

Anti-scratch with Improved Mold Release

Incroslip G shows excellent anti-scratch performance in PP homopolymer, with reduced scratch width, depth and visibility over blank PP. The additional benefit of using Incroslip G, is an improvement in mold release force. This means that the part can be removed from the mold much easier, with no need for silicone sprays. This results in continuous production, less rejects and cost saving.

Figure 5: Cross hatch scratch testing at a 10 N load on PP homopolymer with and without 1% Incroslip G.

Figure 6: Comparison of blank PMMA and PMMA containing 0.5% IncroMax PS scratched using a 15 N load.

Figure 7: Scratch widths with a 3 N load in PC. The polymer has a 40% reduction in scratch width when IncroMax 300 is used.

Figure 8: Blank PC and PC with 0.5% IncroMax 300 were scratched using a 5 N load. The scratch width and depth is clearly reduced in the sample containing IncroMax 300, resulting in the scratch becoming less visible.
Mold Release

**IncroMold** is a range of specially formulated internal release agents which migrate to the surface of the polymer preventing it from sticking to the mold. This eliminates the need for traditional silicone sprays and washes and allows for Continuous production of parts.

**Key Benefits**
- Improved packing density
- Consistent mold release and part quality
- Superior surface finish
- Reduced cycle times
- Improved de-nesting of stacked items
- Improved polymer flow
- No need for silicone sprays

![Figure 9](image-url) A molded part without additive and with 0.5% IncroMold S. The part molded with IncroMold S has a visibly better finish due to improved polymer flow and easier mold release.

**Figure 10: Release force in HDPE**

**Figure 11: Release force in PP**

*see table on page 2 for product/polymer recommendations

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**Case Study**

**IncroMold Produces Consistent Finish Quality in Door Trims**

A customer producing interior door trims was using a silicone spray as a mold release agent. The silicone spray was applied after every 5 shots.

The customer approached Croda for help to improve the consistency of part quality and we suggested using IncroMold S at 0.3%. This eliminated the need for silicone spray and improved the surface quality of the finished parts. The customer saw a 40% productivity improvement.
UV Protection

The unique patented technology of the Solasorb™ range provides superior dispersion and UV protection. Unlike commonly used organic UV absorbers, the stable metal oxide dispersions are proven to deliver low migration and permanent UV protection.

The use of Solasorb can aid colour dispersion and preserve the colour intensity over time, this helps to maintain a constant colour of internal parts even after long exposure to sun light.

Key Benefits
- Superior UV absorption and colour protection when compared to other metal oxide powders
- Reduced re-agglomeration due to stable optimised dispersion
- UV absorption in the same order as organic UV absorbers
- Permanent, non-migratory and non-degradable

Anti-static

Croda’s range of anti-static additives can be used internally or externally for either long-term or short-term anti-static effects. Short term additives are beneficial during processing, immediate handling and extrusion. Long term additives protect against static build up during storage and use, maintaining a dust-free part, which is particularly desirable in parts such as dashboards. Croda can provide synergistic blends that give both short and long term static resistance.

The Atmer™ range of anti-static additives work by migrating to the surface of the polymer where they attract atmospheric moisture. The additive and moisture layer provides a pathway for the charge to pass to earth, making the plastics become electrically neutral.

Key Benefits
- Decreased static build up in the polymer
- Decreased attraction of dust, leading to superior quality and appearance of the product
- Less risk of electric shock to employees and consumers

Figure 12: Comparison of UV absorbers (absorbance)

Figure 13: Long term effect of anti-static additive Atmer 7325 at 0.2% active addition.

Figure 14: A demonstration of static charge on two PP plaques, with and without Atmer 7325 (1% active addition). The blank PP plaque has clearly attracted more polystyrene balls than the plaque containing Atmer 7325, this is due to a greater surface charge on the blank plaque.

*see table on page 2 for product/polymer recommendations
Composite Lubricants

In order to meet the rising trend in natural composite materials being used in automotive applications, Croda Polymer Additives has developed a range of lubricants for this market.

The range includes metal stearate free products that have been scientifically developed to optimise production efficiencies and reduce energy consumption. These additives can be added directly into the composite and have been shown to improve flow during the extrusion and injection molding process, resulting in a superior quality part.

Key Benefits

- Increased output
- Superior dispersion
- Superior surface finish
- Enhanced mold release
- Reduced processing temperatures and pressures
- Reduced wear on processing equipment
- Optimised mechanical performance

Figure 15: Wood plastic composite (WPC) with and without 2% IncroMax 100. Extruded ribbon with lubricant has visibly improved dispersion, surface and edge finish.

Figure 16: Output rate improvement of 2% lubricant compared to un-lubricated 50% filled PP based WPC.

Figure 17: MOR EN 310 - 70% wood flour standard formulation in PP with 1% lubricant and 2% coupling agent.

*MOR - Modulus of rupture

Further information

Croda sales and distribution are coordinated through an extensive worldwide network of associates and agents. For details of your local representative please contact your nearest Croda regional office.

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