

WACKER

CREATING TOMORROW'S SOLUTIONS

GENIOPLAST®

PLASTICS | PERFORMANCE ADDITIVES

TOUGHEN UP YOUR SURFACES

Case Study: Scratch & Mar

A close-up photograph of a car's start/stop engine button. The button is circular, black, and features a silver-colored metallic ring around its perimeter. The text "START STOP ENGINE" is printed in white, bold, sans-serif capital letters on the black surface. Above the text is a small, semi-circular, textured area. The button is set into a brown leather dashboard with a pebbled grain texture. The lighting is soft, highlighting the textures of the leather and the metallic ring.

**START
STOP
ENGINE**



GENIOPLAST® PP50S12 FOR BLEMISH-FREE SURFACES

Some of the indicators of a flawless surface are no visible defects or scratches and consistent color and gloss. Automotive designers continually devise techniques to overcome these challenges, such as using contrasting colors on adjoining parts, and using textured surfaces to provide a consistent gloss and mask imperfections, resulting in a blemish-free surface.

GENIOPLAST® PP50S12 has been specifically developed as an additive to improve scratch resistance in polypropylene-based compounds for automotive interior applications. It is a pelletized masterbatch formulation, containing 50% of a non-reactive, ultra-high molecular weight silicone gum, dispersed in polypropylene homopolymer. This section examines the use of GENIOPLAST® PP50S12 in a typical automotive compound consisting of 20% talc-filled polypropylene. Adding

2% GENIOPLAST® PP50S12 significantly improves scratch and mar in automotive trim. To quantify the measurement of scratch and mar, we use ΔL values. ΔL is the change in the lightness of the color, which is affected by the reflection of light from the scratch pattern. After the sample is subjected to an Erichsen scratch test, the control has a ΔL value of 5.3, while adding 2% GENIOPLAST® PP50S12 reduces the ΔL to 0.9.

Upon further examination of the scratch, it is apparent that, due to the lower coefficient of friction, the depth of the scratch is not as severe and the surface of the damaged area is much smoother compared to the control samples. These two properties result in less scattering of the reflected light, which achieves a lower ΔL value and gives the appearance of a less severely damaged surface.



Material

Polypropylene-based automotive compounds



Additive

GENIOPLAST® PP50S12



Dosage

1 – 3%



Applications

- Door trim and trunk trim panels
- Dashboards
- Pillar trim
- Center consoles



Key Benefits

- Improved scratch and mar resistance
- Reduced scratch visibility
- No tackiness, no fogging

Reference

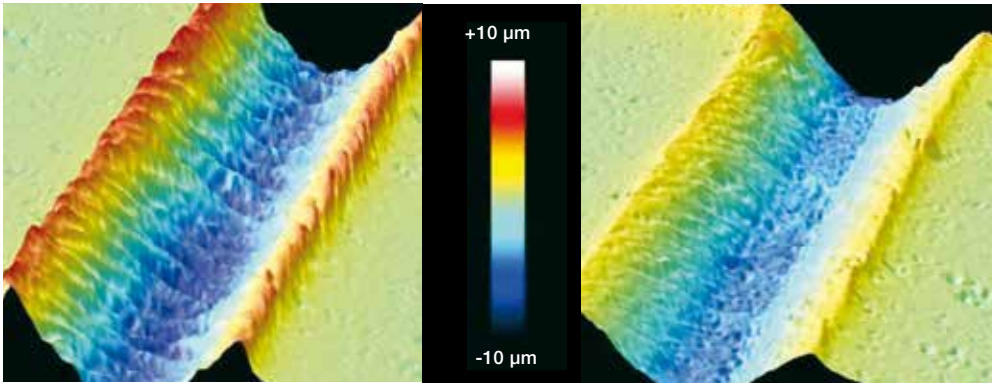
+ 2% GENIOPLAST® PP50S12



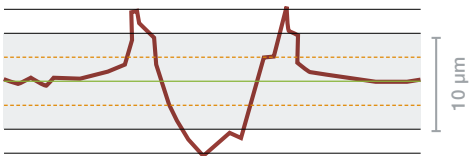
$\Delta L = 5.3$



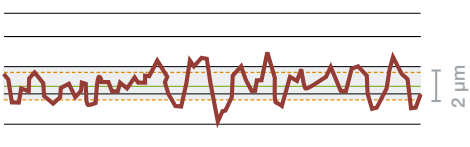
$\Delta L = 0.9$



Scratch Profile



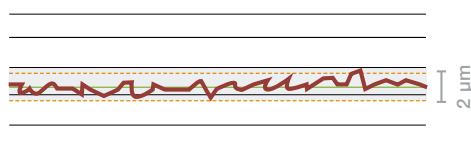
Roughness



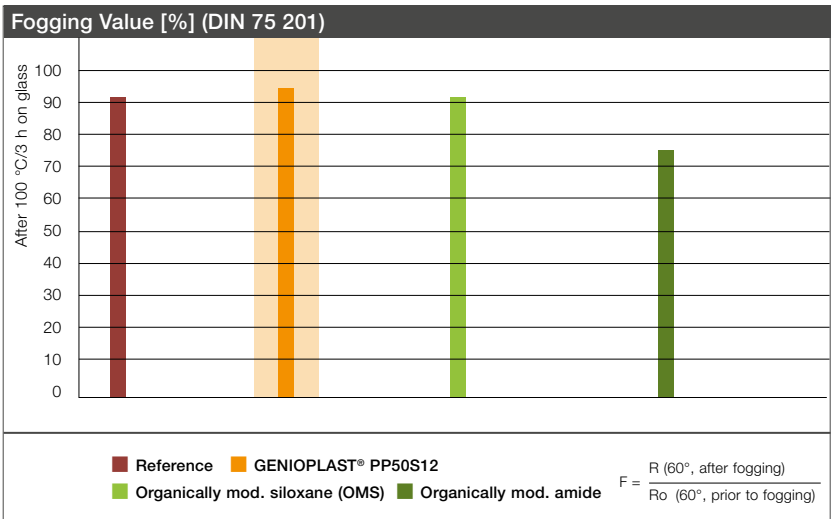
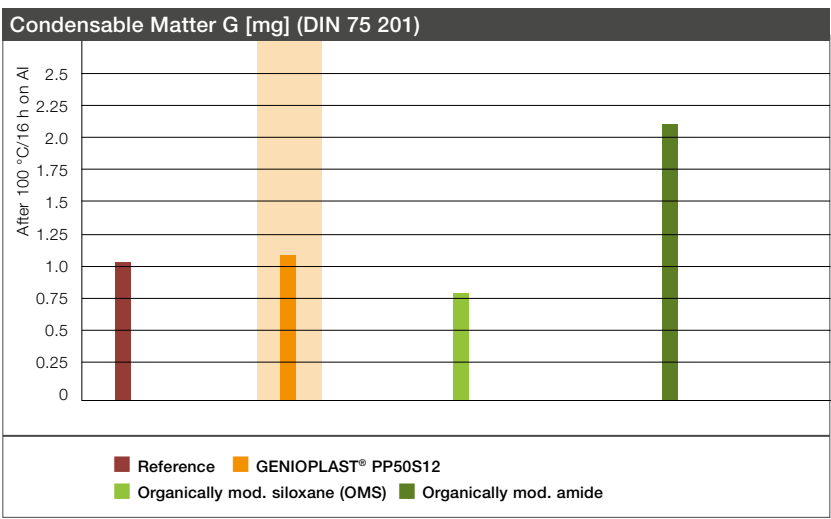
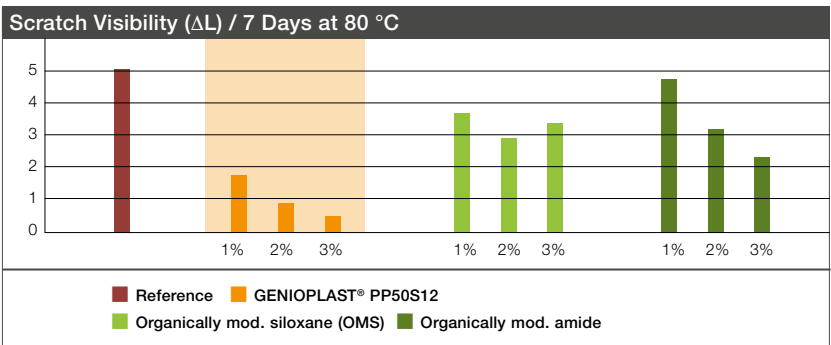
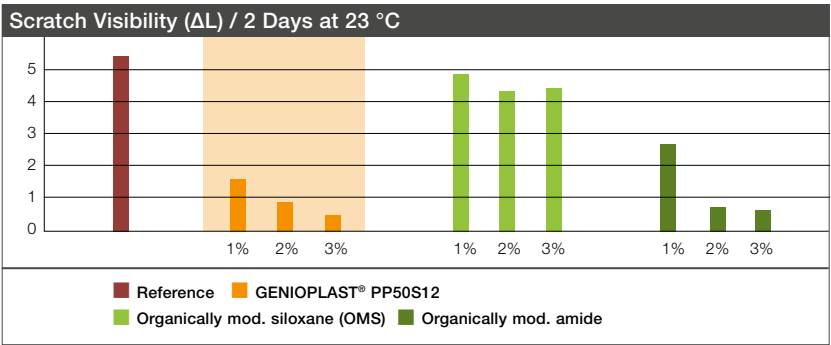
Scratch Profile



Roughness



Smoother scratches result in less scattering of the reflected light and achieve a lower ΔL value which gives the appearance of a less severely damaged surface.



There are many options commercially available to compounders to reduce scratch visibility. WACKER compared several of these materials against the effectiveness and permanency of GENIOPLAST® PP50S12.

The upper chart illustrates the initial effectiveness of GENIOPLAST® PP50S12 compared to other available materials. While all the materials improve the ΔL value (the lower the number, the better), silicone is one of the most effective.

Parts Molded with GENIOPLAST® PP50S12 Will Provide the Same Surface Benefit over a Prolonged Period of Time

The second chart shows GENIOPLAST® PP50S12 permanence after 7 days of heat aging. PP50S12 is non-migratory and provides the same level of benefit as in the 2-day room-temperature chart while the organo-modified silicone and organic amide have migrated and their effectiveness is diminished. When it comes to long-term use and benefit, the choice is clear – GENIOPLAST® PP50S12.

GENIOPLAST® PP50S12 Provides Long-Term Benefit

Fogging is another challenge designers must overcome when developing new parts. Due to its high molecular weight, GENIOPLAST® PP50S12 outperforms other commonly used materials and provides superior performance.

WACKER

Wacker Chemie AG
Hanns-Seidel-Platz 4
81737 Munich, Germany
Phone +49 89 6279 -1741
info@wacker.com

www.wacker.com

www.wacker.com/socialmedia



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