2 | 2025 Volume 18 www.ist-surfacetechnology.com

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Abrasive comparison
The Influence of Blasting Media on Corrosion Protection

Focus: Automotive and Mobility

Top Coat Lines Adapted to Electric Mobility

The Influence of Blasting Media on Corrosion Protection

To determine the effect of blasting on the corrosion protection of a coating solution, a study was conducted in the technical center of a blasting specialist. Seven different blasting media were compared, and their influence on cleaning speed and subsequent corrosion protection was evaluated.

Vadim Malashonak

In modern manufacturing technology, the highest possible corrosion protection plays a crucial role in the longevity and functionality of coated components. However, the success of coating depends not only on the choice of coating materials, but also on the previous surface treatments, including blasting. It has established itself as an effective method for surface preparation. The blasting process not only removes contaminants from workpiece surfaces, but also creates specific roughness profiles that significantly influence the adhesion and appearance of coatings.

To determine the influence of blasting, Ervin Germany GmbH conducted a study in its technical center. Seven different blasting media were compared, and their influence on cleaning speed and subsequent corrosion protection was evaluated.

The Study

The study focused on parameters such as grain shape, grain size, and hardness of the blasting media to analyze their influence on cleaning performance and the technical properties of the subsequently applied coatings.

There are two main types of blasting media: round (shot) and angular (grit) materials, of which each has different properties. Round blasting media produce wavy surface profiles, while angular blasting media tend to produce more jagged surfaces. The cleaning intensity also differs. The hardness of the blasting media used, which varies between 45 and 53 HRC, also affected all parameters under investigation.

A suspended conveyor system with two blast wheels was used for the study, allowing the different blasting media to be used under consistent conditions. Powder-coated steel plates were blasted with different blasting media, and their cleaning progress was visually recorded every minute. Amasteel S460, S390, and S330 were used for the round blasting media, and Amasteel SG18, MG18,

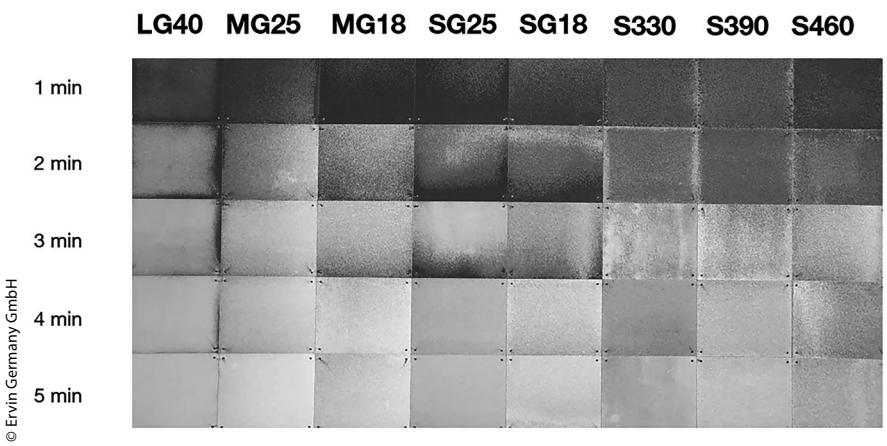

Figure 1 > The overview of all blasted panels shows a comparison of the blasting performance of the various abrasives over 1, 2, 3, 4, and 5 min.

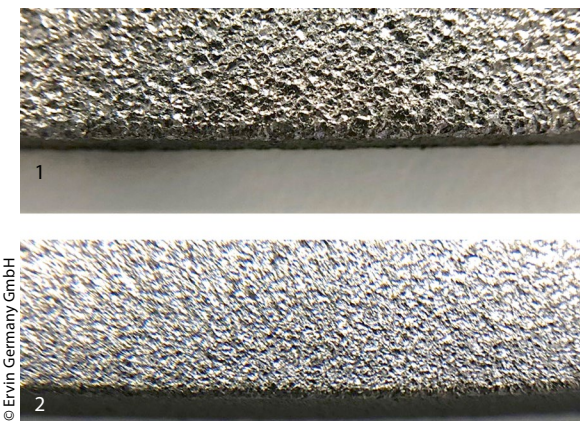

Figure 2 > Edge comparison between round (1) and angular (2) abrasive media (magnified 10 times).

	Ra µm	Rz µm	Rmax µm	RPc	
S460	15,5	82,0	104,6	20	Highest surface roughness, lowest peak count
S390	12,6	69,8	85,0	24	
S330	10,4	60,5	74,9	27	
SG18	13,7	79,3	100,0	25	
MG18	14,0	80,1	96,5	28	High surface roughness, medium peak count
SG25	9,5	55,9	68,4	31	
MG25	10,2	62,5	77,8	36	Moderate surface roughness, highest peak count

Figure 3 > Measured values of the roughness profiles.

SG25, and MG25 for the angular blasting media. After blasting, the cleanly produced plates (Sa3) were measured, hermetically packaged, and then coated. The durability of the coating was evaluated through a 1.000-hour salt spray test and a punch tear test.

The Result

Analysis of the cleaning performance of the three round blasting media types showed that Amasteel S330 achieved slight advantages despite its small grain size. In comparison, the harder grit blasting media MG18 and MG25 clearly outperformed all round blasting media. Especially the MG25, in particular, achieved a very attractive surface and impressive blasting performance (*Figure 1*, blasting results after 2 min).

When coating workpieces, problems often arise at the edges, which negatively affect the quality of the final product (edge misalignment). Mechanical preprocessing using Amasteel MG25 can offer a solution to this problem, achieving a homogeneous surface without major crater formation (*Figure 2*).

After blasting, the surface characteristics of all panels were documented. The round S460 blasting media exhibited the highest surface roughness and the lowest peak count, while the Amasteel MG 18 produced a high surface roughness with a medium peak count. In contrast, the MG25 exhibited a moderate surface roughness but the highest peak count (*Figure 3*). After measurements, the panels were coated with a single-coat powder coating and a single-coat wet coating.

The spray test and the punch tear test after 1.000 hours revealed clear differences in corrosion protection behavior. While the medium-hard grit products (MG18 and MG25) delivered very good results, the round blasting media sometimes resulted in complete delamination (*Figure 4*).

The results of this study confirmed the significant influence of the selected blasting media on the subsequent coating quality. Finer and medium-hard grit products proved to be advantageous, both in terms of optical properties and for the best possible corrosion protection. Furthermore, it was shown that the powder-coated panels reacted significantly more sensitively to the different surface profiles.

In conclusion, it can be said that using a grit blasting media that is neither too hard nor too soft and of the correct grain size can result in significant quality and cost savings. Round blasting media are the recommended option for some processes. However, when it comes to pure blasting performance combined with optimal surface preparation, grit blasting media clearly has the advantage. //

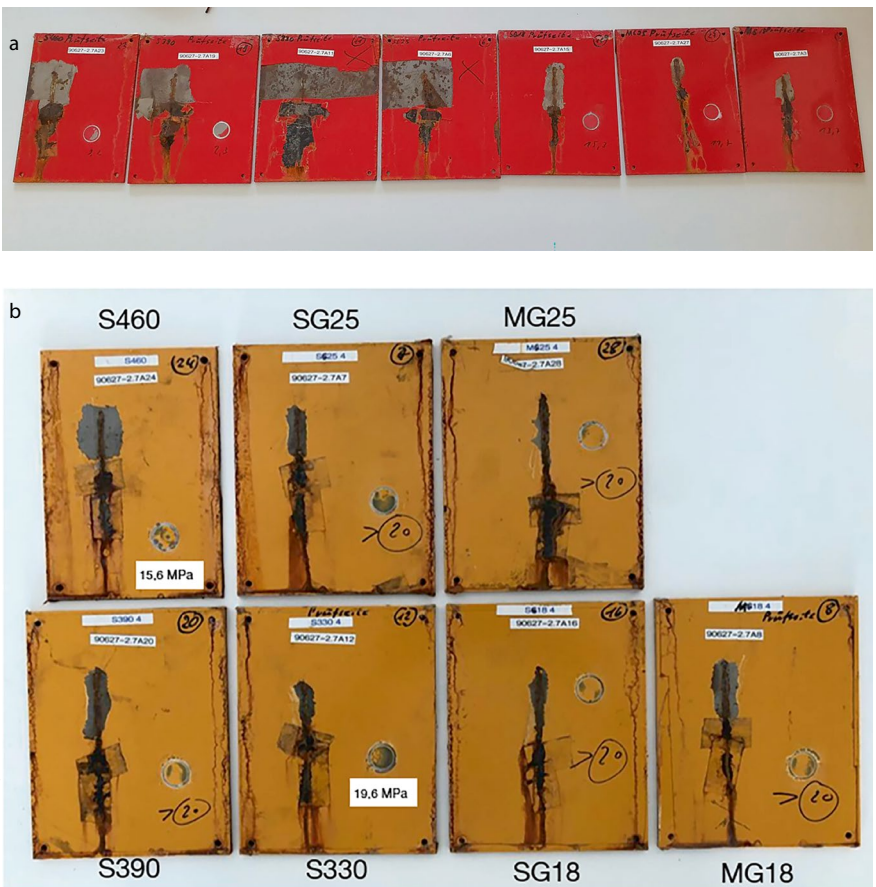

Figure 4 > Results of salt spray tests after 1000 hrs and stamp tear-off (powder coating in red, wet paint in orange).

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