GSB NEWS
16.12.2021

Dear members of the GSB,

Innovations are what drive us at GSB. All members are continuously on the lookout for new processes and products.

Today we like to report about a new trial of the Quality Committee Aluminum, where a pretreatment via laser was tested.

As always, we wish you a pleasant read.

Your GSB Team

Trial Pretreatment via Laser

Innovation for the Benefit of the Environment

Pretreatment remains one of the most important issues when it comes to coatings. In the context of the Green Deal, pretreatment processes that can be carried out entirely without the use of chemicals are of great interest.

Clean-Lasersysteme, based in Herzogenrath, Germany, offers laser systems for a wide range of applications (pretreatment for bonding and coating, structuring, pretreatment and posttreatment for welding and soldering, mold cleaning and degreasing, paint stripping, labeling and marking, restoration).

A laser system has the advantage that a very targeted proceeding can be taken. "For example, it is possible to pretreat a specific point for a glue joint in order to glue in a seal afterwards. This is something that is popular in the automotive industry. Furthermore, the lasers are also suitable for pretreatment before coating," reports Edwin Büchter (Managing Director - Clean-Lasersysteme GmbH).

Headquarters of Clean-Lasersysteme GmbH in Herzogenrath

The process, which is completely free of chemicals and promises high-quality pretreatment, of course immediately aroused the interest of the Quality Committee Aluminum. For this reason, a trial was initiated.

Pilot Trial

First and foremost, it was necessary to get hold of components to be coated. The company apt Extrusions GmbH & Co. KG provided the GSB with the necessary profile material of the alloy EN AW-6060, which is intended for use in architecture.

Then a schedule was prepared. According to the GSB Quality Regulations, a coating has to be applied within 24 hours after pretreatment. Usually, this is not a problem, since either pretreatment and coating take place only a few meters apart at the coating company or, in the case of job pre-anodizing, well-coordinated logistics are utilized. In this test setup, however, the pretreatment was to take place in the laboratory of Clean-Lasersysteme and then be taken to the production facility of the Hillebrand Coating - distance between the companies: about 200 kilometers. This was a particular challenge in the realization of the project, which was mastered through carefully thought-out planning and with the support of the Headquarters.

"We are always open to innovative processes and really like to think outside the box," explained Werner Hillebrand (Managing Director - Hillebrand Coating and Vice Chairman of the GSB Board) during the planning of the trial.

The application of the powder coating was scheduled at Hillebrand Coating to take place in the early morning hours. In the afternoon of the previous day, the profiles were pretreated at Clean-Lasersysteme.

Various laser parameters were tested in advance on the profile material until the correct parameter setting was finally determined.

Edwin Büchter, Managing Director
Clean-Lasersysteme GmbH

Laser pretreatment in the laboratory of
Clean-Lasersysteme GmbH

"During pretreatment via laser, the surface is remelted. For this, the right intensity must be found to achieve complete remelting of the surface," Edwin Büchter explained during the test.

It became clear that the area coverage of the laser for the pretreatment of sheets and profiles used in architecture is currently relatively low. In the test carried out here, the area output was 12.8 cm²/s. Consequently, the laser could currently be used more for small parts or parts to be pretreated at specific points.

The following day, the profiles were then coated at Hillebrand Coating with GSB Approved Coating Material Class Florida 1.

After that, however, the journey was by no means over for the profiles, as tests were now to be carried out at the fem I Forschungsinstitut Edelmetalle + Metallchemie to check the quality of the coating resulting from the innovative pretreatment process.

Test Results

The following tests were performed according to QR GSB AL 631:

- **Acetic Acid Salt Spray Test (AASS) 1000 h**
- **Filiform Corrosion Test (FFC) 1000 h**
- **Condensation Constant Atmosphere Test**
- **Drilling & Sawing Test**
- **Cross-cut Test**
- **Boil Test**

The test results were eagerly awaited by everyone involved. The results of the AASS and FFC tests corresponded to the GSB specifications. The same applies to the drilling and sawing test as well as the cross-cut test. Only in the boil test could the GSB standards not be met.

A similar case can be observed in the quality assurance of coatings for which pre-anodization is chosen as the pretreatment. These fail the boil test, but failures do not occur in the field. Consequently, the boil test is not practical for coatings where pre-anodization is used. For this reason, the boil test is not carried out in companies that use pre-anodization (additional seal Pre-anodization Sea Proof Plus) for pretreatment.

Despite the different pretreatment processes, the test results that the members of the Quality Committee examined were very similar to those that would have been seen if the profiles had been pretreated via pre-anodization. However, one difference was found.

In the FFC test, pre-treatment by laser could not quite keep up with the values prescribed by GSB for pre-anodization (additional seal Pre-anodization Sea Proof Plus). Here, a characteristic value for the filiform corrosion attack of 0.1 is prescribed. The highest value determined on the four test profiles for filiform corrosion was 0.19. This value nevertheless complies with the specifications for the FFC test, which must be fulfilled by coating companies

that carry the additional seal Sea Proof. Here, an F-value of up to 0.3 is permissible.*

At this point, it can be summarized that, except for the boil test, the laser-pretreated profiles withstood all the tests that samples from master or premium coating companies with the additional seal Sea Proof must also pass.**

Since all results except for the boil test indicated an outstanding quality of the pretreatment by laser, a condensation constant atmosphere test was carried out, which is also used in the testing of alternative pretreatment chemicals.*** This test was of positive result as well and thus the high quality of the pretreatment was confirmed.

A Sincere Word of Thanks

At this point, the Aluminium Quality Committee would like to express its sincere thanks to apt Extrusions GmbH & Co. KG, Clean-Lasersysteme GmbH, Rudolf Hillebrand GmbH & Co. KG and the fem I (Forschungsinstitut Edelmetalle + Metallchemie).

*F= I*H
I=average filament length (mm) H=filament frequency
**For more details see GSB QR AL 631-5 Sections 3, 4 and 5: LINK
***For more details see GSB QR AL 631-2 Section 2: LINK

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Katrin Schleicher is looking forward to your suggestions for topics and questions around the field of **technology**:

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