

IN TIME

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QUALITY COMES TO THE SURFACE

When buying a product, the surface is the business card, in a sense. It's a decisive factor in making the purchase. This is because when we encounter a visually perfect, delightfully sleek and smooth-feeling surface, it only takes a split second for our unconscious mind to equate it with high product quality.

Therefore, high-quality surfaces are an important aspect of sales promotion – not just for the automotive industry, but also for business-to-business products. It's no wonder, then, that the quality managers in many sectors of industry are becoming increasingly aware of how important it is to achieve the "perfect component surface".

However, the work processes required to manufacture faultless surfaces are relatively delicate and flaws can be difficult to identify. Even very slight errors in the early stages of production may be visible later on as dents, bulging or material thickening in the paint.

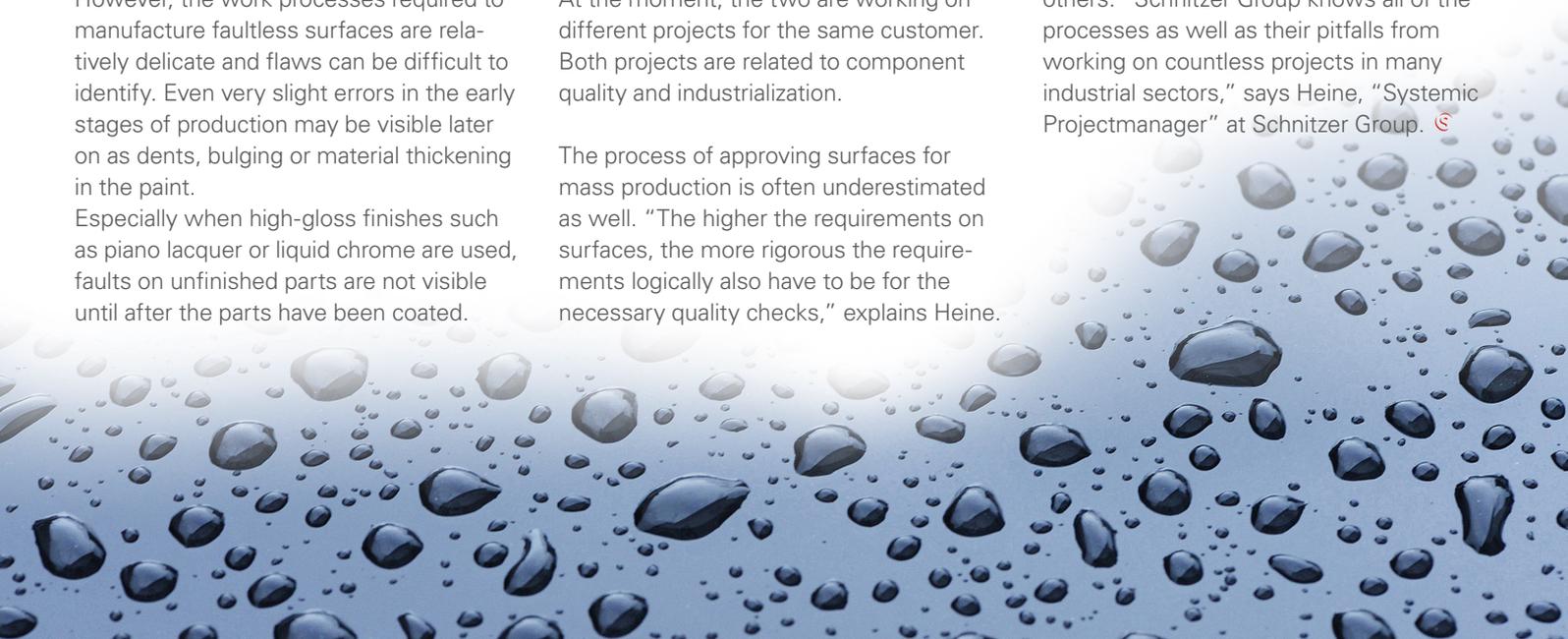
Especially when high-gloss finishes such as piano lacquer or liquid chrome are used, faults on unfinished parts are not visible until after the parts have been coated.

"As a matter of fact, the concept of coating begins with the decision on the material of the component. It has a direct effect on all downstream production processes, the molds, test methods and the extremely specific challenges involved in series production of the eventual surface finishes," according to the two industrial engineers Luis Gapp and Patrick Heine. At the moment, the two are working on different projects for the same customer. Both projects are related to component quality and industrialization.

The process of approving surfaces for mass production is often underestimated as well. "The higher the requirements on surfaces, the more rigorous the requirements logically also have to be for the necessary quality checks," explains Heine.

"Different layer materials often result in significant deviations in color – despite the use of identical paint colors. Therefore, multiple paint cycles are required for the color matching process."

Innovations such as the use of 4D printing, the secondary use of surfaces for projections as well as a growing number of colors and nuances for customizing products further increase requirements that are already stringent. Additional factors include increasingly strict environmental and workplace safety requirements. "The end result is a massive increase in expenditures and investments in an abundance of test steps and sampling processes," Gapp explains. It is therefore quite clear that companies who master these workflows and the quality controls that said workflows require will have the competitive advantage over others. "Schnitzer Group knows all of the processes as well as their pitfalls from working on countless projects in many industrial sectors," says Heine, "Systemic Projectmanager" at Schnitzer Group. 





Dear reader,

This issue is entirely dedicated to the component surface. The quality of the surface's look and feel is an important criteria for customers making purchasing decisions. The process flow that leads to the perfectly coated surface is extremely complex and prone to defects. In this issue, we'll show you everything that's involved and where the main obstacles lie. From the sampling discussion, mold building and injection molding optimization processes to detailed workflows for producing coated series components in the automotive industry – InTime will give you an in-depth view into the topic of surfaces. In conclusion, a personal tip from yours truly: Many things can take place on the surface level, but not communication within the project team! Open and honest communication is the name of the game in every project. This is also the credo of our "Systemic Projectmanagers." Are you starting a project in this area that would be a good fit? Bring Schnitzer Group on board!

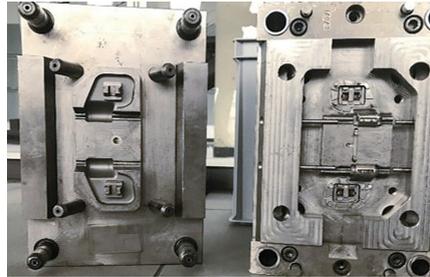
Sincerely

Peter Schnitzer



DEFINE THE PERFECT SURFACE AS EARLY AS MOLD CREATION

"The path to the perfect component surface is often not as smooth as the product itself looks in the end," says Gernot Tutsch, "Systemic Project-manager" and mold expert at Schnitzer Group.



The requirements on component finishes are continuously increasing – in the automotive industry and many other sectors. Modern surfaces truly do it all. The paints, films and coatings being used have to meet increasingly stringent quality requirements. They are also the "eye-catchers," ultimately providing the visual and tactile quality characteristics of the specific product for the end customers. This is why the quality managers at manufactures and suppliers are also

focusing on component surfaces. For Tutsch, the perfect surface finish begins with a component design that is suitable for both plastics and injection molding as well as an injection mold with a well-thought-out design down to the smallest details. "The design of the injection mold is the most important factor for the eventual surface quality," Tutsch explains. Here, attention must be paid to factors including the direction of the injection, the position and the demolding of the component. Furthermore, a close-contour tempering, the design of the hot runner as well as the type and layout of gating play a decisive role for later surface finish quality. "Otherwise, the results are imperfections in the coating, hazardous tension forces and even damaged material due to friction" says Tutsch. "The surface is only a simple topic if you look at it superficially. Schnitzer Group experts provide consultation as early as the design engineering phase and during the mold building process in the production of faultless, haptically attractive surfaces. Because in the end, that's what sells the product!" 

THAT'S HOW YOU GET INJECTION

InTime: Mr. Rößler, from the point of view of injection molding – what makes a perfect surface?

Klaus Rößler: There is an entire series of work steps, all of which must be carried out perfectly. It is crucial that the exact right settings or values be used. Apart from the basic conditions that the injection mold has to fulfill, there's a lot that can go off-track here.

InTime: Can you name a few of the most important factors with regard to the quality of surfaces?

Klaus Rößler: Well, that all starts with the right material preparation. The material should be pre-dried before the start of production in accordance with specifications from the data sheet so that



no moisture streaks occur and the mechanical characteristic values are adhered to. The next step is designing the injection profile. The time available for the injection process as well as the required holding pressure must be precisely determined and set. This also includes carrying out an accurate filling study. To ensure that no sink marks are formed, the required holding pressure must be precisely calculated. This is done based on the principle „only as much as neces-

sary – not as much as possible!” To prevent what are known as tiger lines, color streaks and air traps, the correct adjustment of the injection profile is extremely important. It is important to ensure that the injection speed is precisely correct in order to preclude material flash-over or burn streaks. The mold temperature should also be suitable for the material and injection.

InTime: *That’s quite a lot of details.*

Klaus Rößler: But in injection molding, that’s far from everything. Air bubbles, vacuoles and streaks caused by air can only be prevented if decompression and pull back are working perfectly. You also have to select the dwell time of the plastic melt in the cylinder so that it is absolutely suitable for the material.

The right demolding temperature should be used as well so that no deformations or

ejector marks occur. There are many factors to consider for achieving the perfect injection molding results. Things really get interesting when large-surface Class A visible components are molded using sequential injection systems. In this situation, it always pays off to adjust the hot runner system in series production. Basic conditions also have to be observed for the injection mold, such as the right polish in the mold. This plays an important role during subsequent coating or chrome-plating. Additionally, it is advisable to design the cavity ventilation so that it is suitable for the component in order to prevent the dreaded diesel effect or air burns.

InTime: *How does Schnitzer Group help its customers in this process?*

Klaus Rößler: We have a large amount of knowledge available and we are always

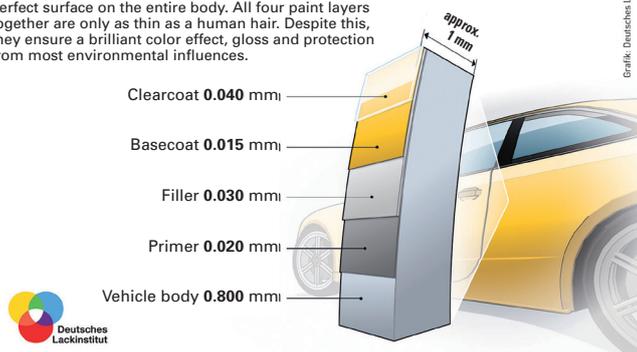
expanding it. Not just theoretical knowledge, but knowledge from real-world applications too. We call this hands-on experience. We actively contribute this knowledge – for example, as part of a rear spoiler project for a premium sports car manufacturer. As a result, we spare our customers from having to cancel or postpone projects and from high additional expenditures. We help them to achieve outstanding results instead. We also provide support to our customers in the form of training courses. In these courses, we pass on our mold technology and injection molding knowledge to employees working in an extremely wide variety of areas.

InTime interview with Klaus Rößler, Location Manager Weißenburg, Germany 

IT'S ALL IN THE PAINT

Structure of a modern car paint finish

A strong team of perfectly matched coatings guarantees a perfect surface on the entire body. All four paint layers together are only as thin as a human hair. Despite this, they ensure a brilliant color effect, gloss and protection from most environmental influences.



In the automotive industry, quite a few work steps have to be carried out perfectly in order to achieve the desired end result when painting just a single plastic component. It is therefore no small challenge to manufacture a painted plastic part with a uniform surface quality. The most important ingredient for the perfect surface is in-depth hands-on experience.

Producing painted surfaces on plastic components with uniform colors and layered structures is anything but mundane. The crux lies in the detail and in the fact that the defects that occur often become apparent only much later in the process. “This makes regular checks, and especially hands-on experience, all the more important” says Daniela Melzer, paint finish expert at Schnitzer Group. “To get a perfect surface, you absolutely cannot be inattentive!” Numerous details have to be noted while the components are still being prepared for

the paint process. The raw part surface should be free of any grease and residues, because otherwise accidental inclusions, delamination or other damage may occur after the painting process. The components must additionally be outgassed or annealed. Raw parts made from thermoplastics such as PP or ABS must not be sanded before being painted.

The result would be that the thin skin of the substrate surface would be destroyed. The paint would no longer be cleanly bonded. On highly complex components or components with surfaces incapable of being painted due to their substrate, it is possible to use what is known as a “sacrificial” paint layer.

Surfaces like these can then be processed accordingly. You obtain a paintable surface that meets customer specifications. “Thermoplastic component surfaces are activated before they are painted to ensure paint adhesion,” Melzer says. “This is done using flame treatment, which activates the surface tension.” During skid construction, special attention must be paid to both the visible surfaces of the component being painted and to unimpeded accessibility by the painter or robot arm. It must also be ensured that the skid is in a defect-free, clean and dimensionally accurate condition. Otherwise, missing paint spots, fat edge, over sprays or water stains may result.

Transport and storage of the paint materials should be temperature controlled and their shelf life and agitation guidelines must be observed. Before use, it is advisable to check the paint viscosity specified in the data sheet and, if necessary, to readjust the viscosity because it influences the flow behavior and exact tone of color. Additionally, the drying temperatures and times should not go above or below the specified values. For example, if a component is left in the drying oven for too long after primer has been applied, this layer degrades and the basecoat does not adhere later on. “In the worst-case scenario, such a defect will only be noticed by the end customer during a wash, when entire layers of paint fall off,” Melzer reports. Finding the right color tones is tricky. Matching the color to the adjacent components is an absolute necessity. A specific fault pattern with silver or silvery color tones is cloudiness. It can be counteracted using precise brush adjustment as well as wet or dry spray coats. Another measurable surface requirement is the structure (“orange peel”) of painted exterior components. Sometimes, defects in this sensitive and complex process can still be corrected using polishing processes in the finish. Since there are limitations to how many times components can be re-painted, it is not always possible – or economical – to smooth out coarser defects by repainting.

“It starts to get quite expensive if a defect remains undiscovered throughout the entire process chain all the way to the end customer,” says Melzer. In this area, Schnitzer Group contributes extensive hands-on experience to every project. 

THE PATH TO IMMACULATE SURFACES

The conditions for first-class surface quality are simply absent in many cases. For example, sampling discussions between the customer and supplier are still a rarity in many industries. Therefore, as of recently, Schnitzer Group has been offering its customers sampling seminars.

The feedback from European customers has been positive in every respect. Problems relating to surface quality usually emerge shortly before the sampling deadlines at TIER 1 or TIER 2 as well as after the part has reached the customer, which is exactly when these problems are most detrimental to everyone involved. It could be so easy! The workflows leading up to sampling

would simply have to be clearly defined.

During the feasibility check in accordance with DIN EN ISO 9001 and IATF 16949, the question as to whether the supplier can even produce the surface qualities requested by the customer – and specifically whether the supplier can check them – must already have been asked in advance. It is often the case that suppliers are asked to carry out quality checks on surfaces that they are not at all able to carry out. A sampling discussion in the early project planning stage prevents later surprises. This discussion defines which needs the supplier must practically fulfill, verify and document. “Therefore, our individualized training



sessions, which are coordinated to customer requirements, are equally well-received among suppliers. This is the ideal basis for creating your own sampling guideline, which significantly improves quality,” says Wolfgang Strotmann, Quality Expert at Schnitzer Group and responsible for the concepts and implementation of such quality training. ☺

DID YOU KNOW?

**4.2 kg of paint are used to paint a VW Golf body.
The Airbus A 380 has 620 kg of paint applied to it.**



REAL-LIFE GLOBAL NETWORKING

Schnitzer Group recognized the effects and importance of globalization very early on. The next logical step was to create stand-alone companies in each of the specific key regions of Europe, China and the US. In an effort to continue developing this strategy, the Schnitzer Group is now establishing requirements-based networking of all locations to each other. The existing connections among the employees are being utilized successfully and being sent out on an international assignment is perceived as a career opportunity. Also beneficial are our on-site and customized project support, globally networked project teams and an even broader-spanning team presence with the help of our Schnitzer colleagues on other continents. “As a result, our experience and know-

ledge can always be found when and where it is needed, anywhere in the world,” affirms Peter Schnitzer, CEO of Schnitzer Group. Andreas Kohler took over the executive management of Schnitzer Consulting Shanghai Co. Ltd. in April 2019 and has been leading projects in the Asian economic area with his team. Almost simultaneously, Robert Fällner, also a long-time and senior “Systemic Projectmanager” from the Shanghai regional leadership, assumed the office of managing director at Schnitzer Group USA Inc. He is acting as part of a team led by Stefan Graf, focusing on continued expansion of the American market. Thanks to the “swarm mentality” of the entire group, the teams can rely on the global Schnitzer Group network at any time. ☺

SCHNITZER GROUP

Schnitzer Group GmbH & Co. KG
Paradiesstrasse 4
88239 Wangen im Allgäu
Germany
Phone +49 7522 7079 69-0

Schnitzer
International Swiss GmbH
c/o OBT AG
Hardturmstrasse 120
8005 Zurich, Switzerland
Phone + 41 43 818-2536

Schnitzer
Consulting Shanghai Co. Ltd.
c/o German Centre for Industry and Trade Shanghai
88 Keyuan Road, Office 613, Tower 1
Zhangjiang High-Tech Park, Pudong
201203 Shanghai, China
Phone +86 21 2898-6184

Schnitzer Group USA, Inc.
121 West Trade Street, Suite 2900
Charlotte, NC 28202, USA

info@schnitzer-group.com
www.schnitzer-group.com



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