

Visually detecting peculiar color shades



Color fidelity as a visual mark of industrial products is increasingly gaining in importance. Due to this trend vehicle manufacturers and suppliers are facing great challenges, especially against the background of worldwide production facilities, different manufacturing and lighting conditions as well as different source materials and complex formulas. On behalf of Audi AG **Uwe Braun GmbH**, Lenzen, has thus developed a solution for the Neckarsulm plant, which enables the interior and the exterior of complete vehicles to be tested under different light conditions. Thereby, peculiarities of color shades are visually detected with all vehicle parts in combination. In the course of the project planning Uwe Braun GmbH has analyzed all given conditions and possibilities and has de-

veloped the requirements with regard to light colors, functional range and operating system – all in close cooperation with engineers of Audi AG. The most challenging task in this context was the system integration into the existing auditing area of Audi, whereby the audit cycles were to be optimized at the same time.

As a solution Uwe Braun GmbH developed a self contained Color-Matching-Cabin, consisting of 61 Color-Control-Optics which operate according to the principle of off-color reinforcement. By changing the color temperature on a range between 2.700 und 6.500 Kelvin each daylight situation can be simulated and continuously adjusted via a semi-automatic color control. A special feature is the reproduction of different light scenarios and light directions such as sunrise, midday sun and sunset, which can be achieved by a separate switching of side panels and ceiling light. Meanwhile, the color matching system of Uwe Braun GmbH for Audi AG has proved its worth. The main reasons: The solution offers effective auditing options at one single location and independent from weather conditions, and it also allows precise evaluations under constant conditions, whereby a great number of evaluations can be carried out. Identical cabins have already been set up at other manufacturing plants of VW, for example at Porsche in Zuffenhausen, at VW in Wolfsburg as well as in Chattanooga, USA.

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Automotive supplier – Quality assurance on the same level

With the growing quality demands of final producers as to the surfaces of their products quality assurance also becomes more and more important for automotive suppliers which produce rough and pressed parts, interior and exterior attached parts or entire component groups. In this respect it makes no difference whether the parts are small or large, or in how many variations

they occur. For all of them the same quality level has to be attained. Automotive suppliers produce excellent results with the same technical products and optics which Uwe Braun GmbH has introduced at OEM automotive manufacturers. This is particularly relevant when they have been looking for solutions that correspond with their final customers. On the basis of the respective pro-

duction profile, the range of errors involved and the visual and control task to be handled Uwe Braun GmbH develops individual solutions for automotive suppliers as well as comprehensive system concepts for tandem OEM suppliers. Many companies are already successfully operating with this quality level to market their products to end customers as well.



Schuberth GmbH, Magdeburg: Audit station for small parts inspection; in this case: motorcycle helmets



Gestamp Automocion, Kaluga: Audit for pressed parts inspection



BMW AG, Dingolfing: Audit for pressed parts inspection

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Everything becomes visible

In line with the trend for surface refinement the demand for effective quality engineering has been constantly growing. Uwe Braun GmbH has met this challenge and offers tailor-made and energy-efficient system concepts for visual inspection.

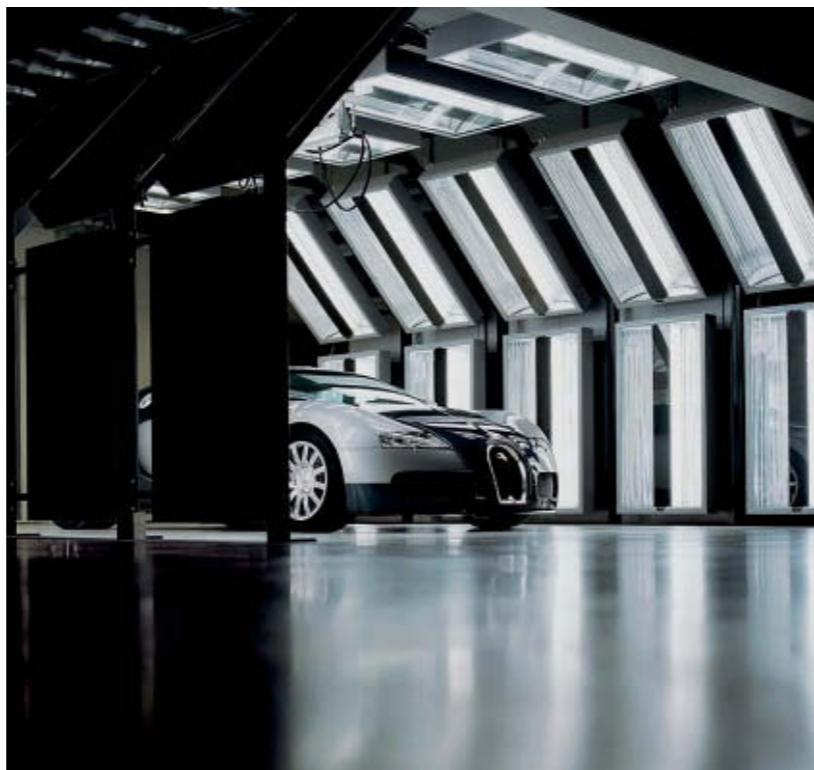
According to the formula „Outward appearance of the vehicle = Quality of the overall product“ surface refinement has gained a position of high priority in the automotive industry. At the same time the quality demands as to the surface of car bodies are constantly rising. Because the human eye is increasingly over-challenged with this task, specific optical systems for error detection are being called for.

Uwe Braun GmbH develops such products for visual quality assessment. Its color and surface control systems enable a permanent and repeatable quality assurance which leads to a genuine enhancement of quality. Production flows and cycle times are also shortened as a consequence of better illumination, which in turn leads to higher productivity.

Uwe Braun GmbH has carried out a renowned project at the parent plant of VW in Wolfsburg. Or more precisely: in the Lackiertechnikum, which is the centerpiece of VW corporate

Facts and Figures

Uwe Braun GmbH (www.uwe-braun.de) based in Lenzen on the shores of Elbe River has specialized on quality control of industrially manufactured surfaces. The produced optical systems for visual auditing and automatic process control are widely applied in the automotive industry: in the inspection of strip steel and pressed parts, in body shell work, in mounting and painting as well as in final inspection. In addition to color measurement and color matching, systems for image data processing are also part of the product range. With several thousand systems for surface control and color matching installed worldwide Uwe Braun GmbH belongs to the leading providers of optical quality control systems. The global presence of the company is underlined by commercial representations in Europe, the US, India, China and Korea.



Light Tunnel Surface Control Optics (OKO), Bugatti, Molsheim

group for research and development with regard to new colors, paints and surfaces.

Up until now it has not been possible there to visualize and check the entire spectrum of surface defects in the production process at one single place. Therefore VW commissioned Uwe Braun GmbH to implement a central unit for the inspection of attached parts and entire car bodies.

In the first stage the existing working processes, error spectrums and control options were analyzed in close cooperation with the experts of Volkswagen AG. In the second phase the suitable control optics were selected, and the functional range and the operational concept were harmonized. The particular challenge in the planning process consisted of the unprecedented task to create control possibilities for the entire manufacturing process - ranging from body shell work, KTL/filler, top coat, color matching up to the polishing in a single unit - and to implement them in only two cycles.

Eventually a multifunctional concept was realized which for the very first time combines and integrates five different light and surface inspection scenarios into one single light tunnel system: Wechsel-Linien-Optics (WLO) for the detection of body shell work and coating defects, Color-Control-Optics for the color matching of body shells and attached parts, Lack-Luster-Optics for the inspection of body shell errors on painted surfaces, LPS-100/58-Optics with daylight- and cool-white-color temperatures for the inspection of sur-



Lackier-Technikum VW AG, Wolfsburg



ColorMatching-Cabin, Mercedes Benz AG, Ludwigsfelde

face defects and as a reference for conventional audit illumination, as well as a shiftable Sunlight-System for the inspection of grinding and polishing errors.

With the help of semi-automatic controls light scenarios can be combined or separately adjusted. In addition, the illuminance and energy-efficiency can be regulated. This tailor-made solution allows body shell and attached parts to be tested as to their color effects and color behavior - on-site and in their installation position - well before they go into serial production and final mounting. ♦

Perfectly harmonized light

A consequent adjustment of the lighting systems used for surface control can improve working conditions, save energy and lead to an easier detection of possible faults. Digital technology and intelligent controls allow for an optimization in both directions. For example, an active regulation of light power depending on vehicle and paint color offers an enormous savings potential. In combination with a digital control the brightness value of each incoming car body can be defined automatically with the help of sensors. As a consequence, a perfectly harmonized light is available for the inspection of each individual car color. In addition, the light power can also be dynamically changed according to lower capacity utilization, interval times etc. and be dimmed to a minimum. With the help of specialized surface control optics with combined prism and lense optics the test personnel can detect all errors glare-free even under conditions of high light intensity. Reflective tapes and light-dark contrasts projected onto the surface visualize even the smallest defects.



Light Laboratory, Merck KGaA, Gernsheim

Control options for VW-Lackiertechnikum

1. Body Shell Work



2. Cathodic Dip Painting (KTL)



3. Filler



4. Top Coat



5. Color Matching



6. Polishing / Hologram testing