Quality assurance in the paint shop is of extreme importance, because the paintwork on a car body needs to be just perfect. Even the tiniest blemish is regarded as a product defect, and is unacceptable to both vehicle manufacturers and consumers. In quality assurance, despite ever greater automation in quality control, machines are no match for the human eye when checking a paint finish. For this, ergonomically well-equipped workstations are needed, such as Eisenmann VarioInspect LED light tunnel. VarioInspect is designed to facilitate and improve the final inspection process for body paintwork, and it also lowers total operating costs.

A closer look at the technology
VarioInspect is a tunnel comprising vertically arranged lights. Its open design conveys a pleasant sense of space, while reducing noise and echoes. Moreover, LED technology means only minimal heat generation, further contributing to a positive working environment. The continuous light strips, purpose-developed by Eisenmann in cooperation with external research organizations, create the ideal lighting conditions for checking the quality of paintwork. These special Eisenmann LEDs (E-LEDs) are fully adjustable from warm white to cool white, and can therefore be tailored to specific process parameters, such as the color of the paint or the gloss level. Moreover, it is possible to control each light strip individually to achieve exactly the right illumination.

Higher Quality, Lower Costs
The LED light tunnel VarioInspect facilitates and improves body paint inspection.

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In the freestanding aluminum portals, workers are provided with all key utilities, such as water and compressed air, via supply lines in the floor. In conjunction with stationary or mobile tool trolleys, this allows them to immediately tackle any faults in the finish.

**Better reflected image**
Defects in the paint, such as trapped dust particles, are identified by means of the reflected image created by the light tunnel: the vehicle body passes slowly through the tunnel, and the LED strip lights are reflected by the paint surface. The more clearly the light is reflected, the easier it is to detect faults where there is a transition from light to dark. With VarioInspect, the vertical arrangement of the lights means the reflected image comprises three bands, and it is possible to generate a variety of light colors.

The clarity of the reflected image varies according to the body paint color. With very light paint finishes, such as white, reflected light with a color temperature in excess of 5000 Kelvin is extremely hard to see. It is therefore very difficult, sometimes impossible, to detect faults on light-colored bodies in conventional light tunnels. The Eisenmann VarioInspect light tunnel system, however, enables the ideal contrast for any color of paint. For this purpose, the various paint colors were divided into categories, and each category was assigned a corresponding light setting. As a result, VarioInspect can automatically adjust its operating parameters to suit the color of the body being inspected. The color temperature of the light can be varied between 3,000 and 6,000 Kelvin.

**Lower costs for reworking the paint finish of light-colored bodies**
VarioInspect can cut the costs associated with reworking the paint finish of vehicles in final assembly by up to twelve percent. This is because the system’s diverse control features allow the creation of working conditions tailored to the needs of individual inspectors and to the specific process. As a result, they can find and correct more faults while the body is still in the paint shop.

The dimmer setting and color temperature of each of the three bands produced by each strip light can be adjusted individually. This makes a variety of permutations possible, which can be chosen quickly and simply via the control panel. Line tracking enables all parameters to be adjusted automatically, according to the body to be inspected. Overall, the system’s features improve the ability of workers to spot blemishes, especially on light-colored vehicles, not least as their eyes are subject to less fatigue.
The modular design of the E-LEDs is also a key to improving the quality control process. The lights comprise an extruded section to which individual LED PCBs are mounted. The greater the number of LED PCBs, the longer the E-LED light. In other words, the length can be modified to ensure full illumination of the vehicle body, no matter what its shape or dimensions. This minimizes the surface area in shade, where defects are difficult to see.

**Lower maintenance effort and electricity consumption**

VarioInspect can deliver maintenance cost savings of up to 57 percent compared with conventional light tunnels. The lower expenditure is a result of the extended life of the LED lights and the easy-to-replace external mains adapters. The LEDs deployed on VarioInspect last twice as long as the fluorescent tube lights previously employed. Moreover, they weigh a maximum of ten kilos, and are therefore relatively light and easy to handle, reducing the manual effort associated with maintenance tasks.

VarioInspect also reduces electricity consumption by up to 35 percent – LEDs are inherently energy-efficient, and can be dimmed, i.e. when there is no vehicle body in the tunnel.

**Award-winning design**

Eisenmann has not only created a light tunnel that delivers impressive results in terms of technical performance and cost, but also boasts aesthetic design. VarioInspect demonstrates that good product design is an integral element of pioneering solutions. In recognition of its successful combination of innovation, eco-friendliness, and outstanding form and function, VarioInspect garnered the 2016 Red Dot Award in the industry, machinery and robotics category.