



KONICA MINOLTA

Automotive Industry Solutions

Colour & Light Management Solutions for Quality Control
in the Automotive Industry



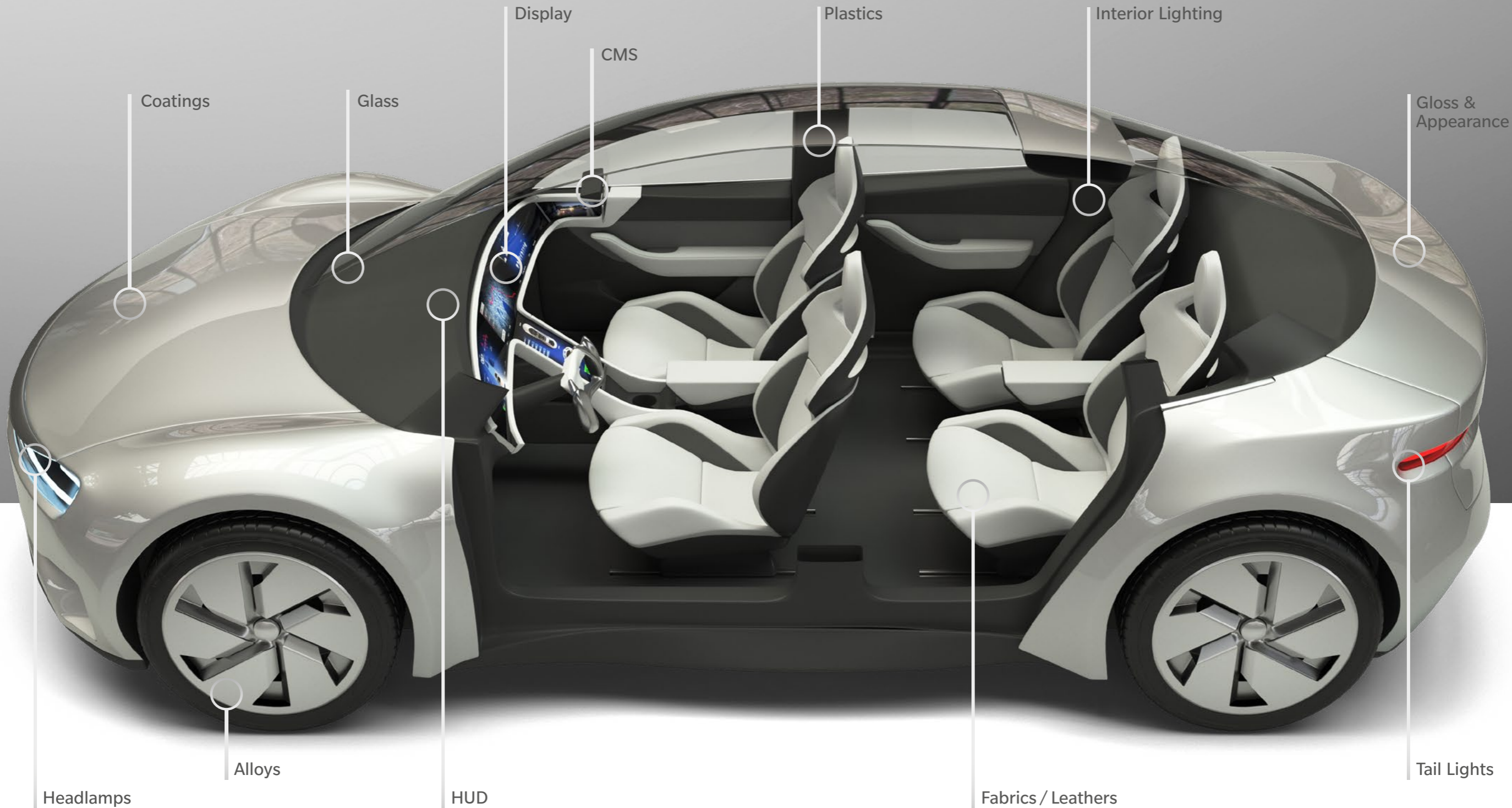
Giving Shape to Ideas

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Competent Measurement Solutions for Colour, Surface Appearance, Light & Display for Automotive Interior and Exterior.

Konica Minolta along with group company Radiant Vision Systems and partner Rhopoint Instruments offer leading technology and turnkey solutions for R&D and Quality Control on the production line. Our experienced teams can help you to implement measurement and control solutions for automotive interior and exterior throughout Development, Manufacturing and Quality Control, all supported by a global Sales and Support network.



Spectrophotometer CM-25cG

The CM-25cG is a state-of-the-art solution for colour measurement of interior trim in the automotive industry, with excellent correlation to visual assessment and the benefit of a built-in gloss sensor.

Automotive interiors combine different materials, textures and levels of gloss with the aim of creating a quality environment for the customer. Each element must be considered as part of the whole assembly where it is viewed at different angles and in real-world lighting. The 45°:0° geometry of the CM-25cG (and its predecessor the CM-2500c/CT) is renowned for providing colour values with excellent correlation to visual perception.

The CM-25cG also features a built-in ISO-compliant 60° gloss sensor to add an extra vital appearance parameter to the data. Colour and gloss are measured simultaneously, saving time during the quality process.

The CM-25cG maintains full data compatibility with its predecessor: The high inter-model agreement between CM-2500c/CT and CM-25cG enables users to keep their historical data for quality and supply chain communications. This allows the CM-25cG to integrate seamlessly into existing supply chain processes, avoiding breaks in communication or re-measuring of master targets.

The CM-25cG achieves even higher levels of accuracy and repeatability due to improved stability. This enables operators to take measurements throughout the interior with greatly reduced impact resulting from tilting the device, thus improving consistency, accuracy and measurement time.



Spectrophotometer CM-26dG

Unsurpassed usability for the measurement of all kinds of materials from glossy to matt, curved or flat.

Within global supply chains, manufacturers and suppliers have to work hand-in-hand when it comes to Total Quality Assurance. Reliable colour data is essential for flawless colour communication throughout the manufacturing process, from R&D to Production and Quality Assurance. Especially where components may have different surface characteristics, a device that can evaluate or ignore gloss is required.



The 26dG-series is Konica Minolta's newest user-friendly $d:8^\circ$ sphere-based spectrophotometer featuring a built in ISO-compliant 60° gloss sensor. Its large display shows all required information, from complete graphical and numerical colour information to a simple PASS/FAIL message. The ergonomic design and process-focussed features such as the Job Control (image-based workflow feature) were developed to satisfy all automotive interior quality control applications.

Precise control of sample selection is achieved using the sample viewing port of the CM-26dG, improving measurement time and accuracy.



Multi-Angle Spectrophotometer CM-M6

Portable and reliable colour measurement of metallic or effect coated parts and surfaces.

Designed for reliable and repeatable colour measurement of metallic and effect surfaces, the CM-M6 is particularly suitable for measuring small, curved or complex parts. The innovative, patented, multi-angle optical measurement system of the CM-M6 is optimised to give accurate and stable results on all exterior parts, even mirror bodies and door handles.

The patented double-path illumination system with directed 45° illumination uses high-colour rendering white LEDs and 6-angle observation (45°:as15°/as15°/as25°/as45°/as75°/as110°) from two sides to accurately measure effect surfaces on the automotive shop floor (single-sided measurement is also possible).

The user can control the quality of metallic and effect parts with high accuracy in full compliance with ASTM E2194 or DIN 5033-7 geometrical specifications. Car body colour can be checked against a master standard, or the colour harmony of the car body against accessory parts. Using the double-path technology of the CM-M6, operators can be sure that colour differences are caused by application or material, not by inconsistency of measurements.



Close-Tolerance Glossmeter Rhopoint IQ-S

Designed to exceed automotive Interior and Exterior measurement standards for gloss.

The Rhopoint IQ-S measures not only gloss but also additional gloss-related values that affect the surface appearance. Standard glossmeters only measure gloss, meaning that the values obtained do not always match the visual assessment, leaving room for subjectivity and uncertainty.



While standard glossmeters only measure how much light is reflected from a surface, the IQ-S profiles how light is reflected from a surface and characterises effects which dramatically reduce appearance quality, such as reflection haze.

As appearance quality is not just gloss and reflection haze, the Rhopoint IQ-S will also characterise image quality (DOI) and peak reflection behaviour (Rspec) of the surface –all in one measurement.

All IQ-S devices are close-tolerance, selected for maximum accuracy and comparability in all gloss and reflection haze applications to match and exceed automotive requirements and standards for “normal” gloss applications. IQ-S data are compatible with historical data so operators can easily evaluate the finish of a surface and analyse the effectiveness of the polishing process.

Rhpoint IQ-FLEX 20-S

Remote-head glossmeter for automotive exterior gloss and appearance measurements of complex-shaped parts and surfaces.



Rhpoint IQ-Flex 20-S allows operators to measure gloss for parts that would have previously been impossible, facilitating quality control of small and complex parts such as door handles or anodised brand emblems to check that these fulfil the requirements of the manufacturer.

Featuring the same technology as the Rhpoint IQ-S, the small footprint of the IQ-FLEX 20-S remote sensor head brings this technology to a new format, specifically designed for difficult surfaces or small parts.

For improved performance and repeatability on even the smallest parts, the Rhpoint IQ-FLEX 20-S can be customised with magnetically attached adaptor plates, which can be tailored for almost any shape and application. IQ-FLEX 20-S measurements are fully compatible with Rhpoint IQ-S gloss and appearance parameters (e.g. Rspec or DOI).



Rhpoint TAMS™

Rhpoint TAMS™ (Total Appearance Measurement System) is the first device to quantify the visual quality perception of the complete vehicle finish “as the eye sees”.

Rhpoint TAMS™ is a new way of quantifying surface appearance quality, developed in collaboration between Rhpoint Instruments, Volkswagen AG and AUDI AG. This innovative new technology models the human perception of surface appearance quality, analysing a range of measurements (contrast, sharpness, waviness and dominant structure size) to characterise “QUALITY” and “HARMONY”. TAMS™ revolutionises the understanding and communication of visual appearance information relating to automotive paint finishes.

For maximum impact, an automotive paint finish must instantly produce an appealing visual sensation for the customer. This can only be achieved if the overall surface finish displays both high “QUALITY” and “HARMONY” (assessed across panels, planes and materials). Whereas a QUALITY value of 100% indicates a smooth finish with perfect image-forming characteristics, based on extensive human perception research, the HARMONY value indicates the acceptability of adjacent car parts.

Rhpoint TAMS™ captures surface data for mid-gloss and high-gloss surfaces. Operators can measure and analyse data for all surfaces throughout the automotive manufacturing process – raw materials such as steel and aluminium, E-coat as well as filler, base and top-coat.

Rhpoint TAMS™ offers a major advantage over existing methods that produce complex results and rely on the user to interpret the values to provide a judgement-based evaluation of the visual experience.

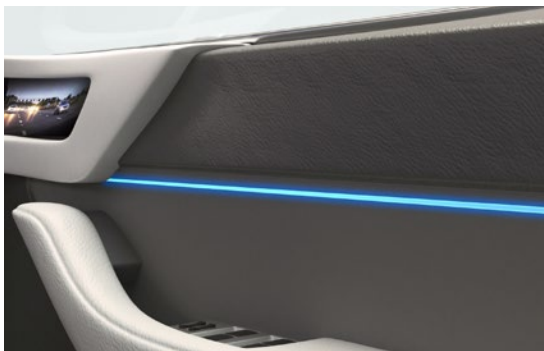


ProMetric® Imaging Photometers & Colorimeters

ProMetric Photometers and Colorimeters from Radiant Vision Systems are the World's Fastest and Most Accurate High-Resolution Imaging Solutions.

New Light & Display technologies present new challenges to automakers and suppliers, who must quickly adapt them for in-car use. Radiant offers leading automated visual inspection systems for automotive lighting, displays, and illuminated controls and indicators, with turnkey test solutions to help manufacturers accelerate development, control costs, and ensure that these critical components reflect brand quality.

ProMetric Y imaging photometers and ProMetric I imaging colorimeters are high-resolution CCD cameras with specialised software, designed as fully integrated solutions for improving R&D, quality control, and production operations.



Headlamps and Exterior Lighting

A ProMetric system allows users to inspect headlamps and tail lights for luminance and colour uniformity and for luminous intensity distribution to evaluate individual LED performance and identify failures. The system captures the illumination distribution in a single measurement, then analyses multiple criteria using the PM-HL™ headlamp evaluation module, designed specifically for headlamp evaluation. PM-HL functions include:

- Light source illuminance distribution measurement
- Evaluation of ECE and SAE Regulation test points
- Evaluation of custom test points
- Evaluation of beam pattern cut-off gradients
- Conversion to luminous intensity distribution
- Conversion to roadway illumination distribution

In-vehicle displays

Radiant's ProMetric imaging photometers and colourimeters provide the most accurate solution for testing embedded LCD and OLED displays and the latest HUD technologies. Instrumentation, information, navigation, and entertainment systems are all moving to display technology. Consumer expectations for colour and clarity of these displays are high, while stringent performance requirements must still be met. Automated visual inspection with ProMetric imaging colourimeters and TrueTest™ software helps to detect quality issues during the design or production process, allowing manufacturers to identify potential process improvements, improve yield, and prevent flawed products from reaching customers. With a built-in library of tests for luminance, chromaticity, uniformity, contrast, mura, pixel defects, display sparkle and image sticking, TrueTest is easily configured to meet specific needs, or test to established standards such as the German Automotive Black Mura Standard.



HUDs pose unique measurement challenges for manufacturers. ProMetric imagers feature an electronically controlled lens that is highly effective at identifying and focusing on an image projected into infinity. Our analysis software provides accurate luminance and chromaticity measurements at any working distance, and can test in night-time, normal, and daytime settings to ensure consistent legibility. High-resolution ProMetric cameras allow alignment of the HUD optical assembly and photometric measurements within the same test setup.

Instrument Cluster, Controls, Tell-Tales, & Indicators

A ProMetric solution is a simple and accurate way to test illuminated characters. Our software features a powerful tool (Auto-POI) that allows users to automatically select points of interest based on location or colour and luminance values (Lv and CIE x,y thresholds). You can run calculations on a single character, or a group of like characters, to ensure uniformity within or between symbols regardless of location, shape, size or colour. The Auto-POI system provides comprehensive data, including average luminance across characters, points of minimum and maximum luminance, colour value and dominant wavelength.



FPD Conoscope Lens

Radiant's FPD Conoscope Lens enables high-resolution photopic measurement of the angular distribution of colour, luminance, and contrast for displays and display components.



View angle measurements are critical to automotive displays, which must be flawless when viewed at an angle. Radiant's FPD (flat panel display) conoscope lens provides angular resolution of 0.05 degrees per CCD pixel for high-precision measurement of luminance, radiance, angular contrast, CIE chromaticity coordinates and correlated colour temperature (CCT) at all viewing angles up to ± 70 degrees.

The lens is designed to mount directly to a ProMetric imager (in either 16 or 29-megapixel CCD options), which together can be purchased for a fraction of the cost of alternative solutions. The solution offers a compact form factor and reduced complexity compared to goniometric measurement systems for R&D applications. Because of its speed, the FPD conoscope lens solution is also ideally suited for in-line inspection of displays during production. It provides real-time pass/reject results, eliminating poor-quality components from the line and identifying quality trends before significant material loss. Radiant's cameras can be used in both R&D and production environments to capture identical measurements of view angle data for seamless evaluation of displays throughout an entire product life cycle.



Spectroradiometer CS-2000

A high-end spectroradiometer for light sources and displays that measures spectral data, luminance and chromaticity.

Many recent FPD models are designed for better black level representation or better contrast in order to provide higher-quality images. The CS-2000 is a spectroradiometer which enables accurate luminance/chromaticity measurement even of blacks (from a low luminance of 0.003 cd/m^2).



The CS-2000 can be used for luminance and chromaticity measurement of various optical devices such as displays, for example LCDs, PDPs, organic ELs and FEDs, as well as light sources such as LEDs and lamps.

Konica Minolta's accumulated optical technologies and state-of-the-art signal processing technologies are combined to achieve a 100,000 : 1 contrast measurement using a spectral-type spectroradiometer.

Low-luminance measurement: From 0.003 cd/m^2 (Measuring angle: 1°)
Measurement accuracy: $\pm 2\%$ (Luminance)

Fast measurement with good repeatability is possible even at low luminance levels. Measurement time: Approx. 4 sec. (NORMAL mode: 4 cd/m^2 ; FAST mode: 0.5 cd/m^2). Easy operation with colour LCD screen and simple key arrangement.

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