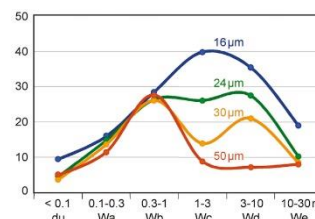# wave-scan 3 dual

The reference for Orange Peel & DOI on high – medium gloss finishes

Surface appearance changes with the size and distinctness of wavy structures when perceived at different distances. The wave-scan scans the optical profile of a high gloss surface using a laser light source. The optical profile is analyzed with 5 wavelength ranges from 0.1 - 30 mm (Wa-We). In addition, a camera image is taken with the focus on a reflected image to evaluate the image forming qualities of the surface caused by structures < 0.1 mm (du). Thus, it simulates our visual appearance perception at a close distance (~ 30 cm) and a far distance (~ 2-3 m). The result is a "structure spectrum" which is the basis to calculate customer specific scales for orange peel and DOI.

A new way was developed in cooperation with VW/Audi to filter the optical profile using fast fourier transformation (FFT) to determine dominant waviness sizes and their intensity. In visual studies it became obvious that observers can distinguish samples based on the dominant wavelengths.

wave-scan - your QC tool to check specifications and troubleshooting guide to analyze and optimize the surface quality based on material and process parameters.

Structure spectrum with varying clearcoat film thickness
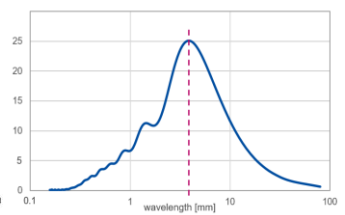
FFT analysis to determine dominant wavelength

The next wave-scan generation

The new wave-scan 3 generation comes with a **fresh design** to accommodate **an extra-large color touch** display - operation and feel is as intuitive as you are used to with your smart-phone. The **fastest chip** ever calculates complex waviness scales in no time at all, speeds up the measuring time and lets you do more in the same time. The **long battery life** optimizes the usage time, so you can measure many cars in the line or in the field.


Orange Peel and DOI measurement on high to semi gloss surfaces

Appearance control is no longer limited to final topcoat inspection. An additional, infrared high energy LED allows measuring the structure spectrum on medium gloss surfaces. Thus, the surface quality after each paint process step can be objectively evaluated.

No more guessing which substrate layer is influencing the final appearance. The wave-scan 3 dual will help you to objectively analyze appearance problems and reduce the time necessary for trouble shooting.

Example: Influence of Steel Quality

The same E-coat system was applied on rough and smooth steel and the primer surfacer was applied on both panels. The roughness of the steel quality can still be detected in increased Wb and Wc values. This primer system could not completely cover the steel influence.
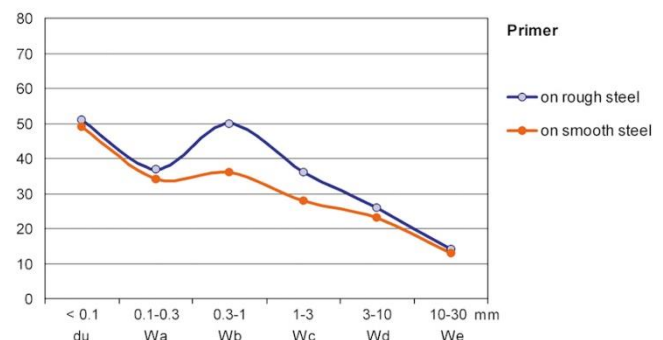
Brilliant color touch display

- The capacitive display technology provides a state-of-the-art haptic touch. Quick and easy operation including swipe functionality - without pressure or need of a stylus.

- The display automatically rotates with you – so it is always in the right position.

- The new design allows for an extra-large, easy-to-read display with colorful symbols for an intuitive menu navigation:
  - Quick check: Just measure without saving
  - Measure: Use standards with scales and statistics defined in the instrument or in smart-chart even including the limits for Pass/Fail display.
  - Organizer: Select a customized sampling procedure with standard colors and limits to measure a car body
  - Data View: View your saved measurements
  - Configuration: Customize your "Quick check and Measure" mode for your application

- For the first time the data can be displayed for Pass/Fail judgement in color. The limits are defined in the standard management with smart-chart by color.
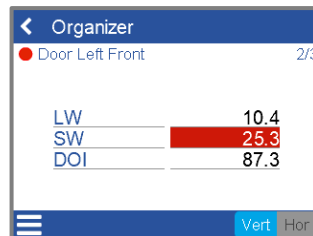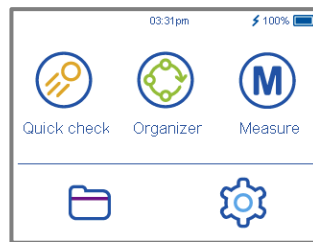
Always ready

- The new generation optimizes the energy consumption of optical and electronic components in combination with the firmware. Thus, a **long battery life** is achieved: Up to 1000 readings can be taken with one charge.

- The charging takes place in the newly designed docking station – Park and charge at the same time.

- The docking station houses a second battery pack which is always fully charged. The status of both batteries is displayed with LED indicators.

- Transfer your measuring data via docking station or directly connect with USB - cable. Optionally, wireless data transfer with Wi-Fi function can be activated on request.

wave-scan talks your language Company specific scales

The wave-scan family is the standard to objectively quantify the harmony of a class A surface finish in regard to orange peel and DOI used by all automotive, truck, aircraft, motorcycle, boat and yacht companies.

Depending on the OEM's visual appearance evaluation customer specific scales with different target values have been developed over the years. These company specific scales are an objective check to ensure company specifications are met and eliminate heated discussions between automotive producers and their suppliers.
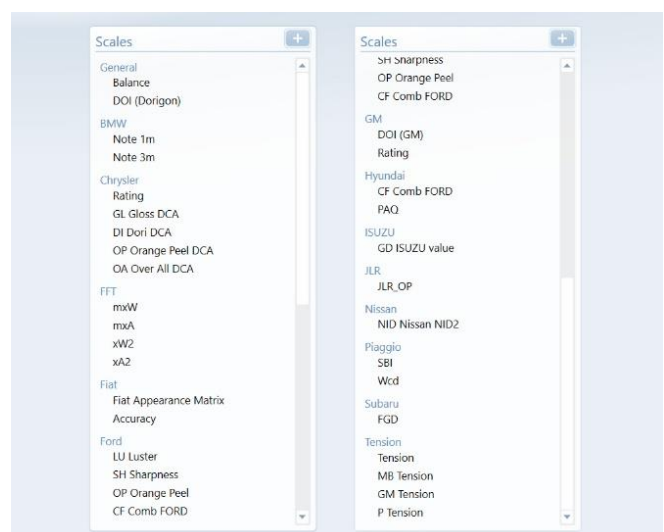
Objective and reliable data

- Excellent agreement with previous wave-scan models.

- In order to judge the brilliance of a high gloss surface the dullness measurement correlates best with the visual perception as it is independent of the refractive index of a paint system.

- The waviness data correlates with the slope information of mechanical profilometer readings.

- wave-scan can be used for measuring flat panels as well as curved body parts with excellent repeatability.


smart-chart for Data Analysis

The smart software to manage and analyze your data in more than one way.

- smart-chart includes a powerful standard management for defining scales and PASS/FAIL limits. For standardized sampling process so called "Organizers" are set up to define clear sample identification and a menu guided operation using your own schematics.

- The measured data is saved in a SQL database which allows handling of large data sets over time. This reliable database type ensures full network and server compatibility.

- Filter your database based on your specific criteria: Example: Select a certain color, a certain time range or all "failed – red color coded" test series for further analysis.

- The drill-in function shows history trend of the last 20 measurements of the same model, color and painting line. Just click on any point in the data table or graph!

- smart-chart offers a dynamic print layout allowing you to create your own reports.

- Data can be easily shared within the supply chain by extracting mini databases which can be combined with other databases.

With smart-process, you'll know where you are, where you're going, and how to get there.
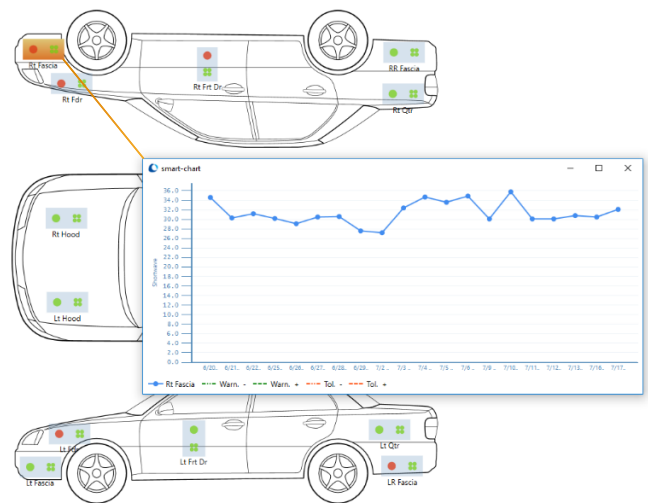
Drill-in on "Failed Zone" and get history of last 20 readings.

Training wave-scan 3 dual

BYK-Gardner offers more than just an instrument. A one-day training is included with the following topics:

1. Orange Peel and DOI Theory
- Visual perception and instrumental measurement of Orange Peel and DOI
- Data interpretation: How can the structure spectrum be used to optimize process / material parameters

2. Operation and Software Training
- Standard Management:
  Define color families, scales and limits
- Set-up of "Organizer" for standardized procedures
- Measurement of several products and saving in DB
- Data analysis:
  - → Test report with structure spectrum analysis
  - → Scorecard as executive summary
  - → Trend analysis with comparison function
  - → Dynamic print-layout

An all-inclusive training with valuable theory - device handling - data interpretation - all you need for CLASS A quality

Ordering Information

Cat. No.	Description
7400	wave-scan 3 dual

Comes complete with:
Instrument
Checking tile (7404)
Docking station with USB-cable (7401)
smart-process software with 2 licenses for download (4831)
2 rechargeable Li-Ion battery packs (7402)
Cable USB for direct connection to PC
Certificate
Operating manual
Carrying case
1-day training

System requirements:
Operating system: Windows® 10 v.1607
Microsoft® .NET Framework 4.72
Hardware: i3, 2.5 GHz; i7 recommended, or equivalent
Memory: 4-8 GB RAM, 16 GB recommended
Hard-disk capacity: 4 GB during installation
Monitor resolution: 1280 x 1024 pixel or higher
Interface: free USB-port

Technical Specifications

Application	
High to Semi Gloss	du < 65, linear range
Structure Spectrum	
du	< 0.1 mm
Wa	0.1 to 0.3 mm
Wb	0.3 to 1 mm
Wc	1 to 3 mm
Wd	3 to 10 mm
We	10 to 30 mm
Repeatability [1]	du < 40: 4% or > 0.4; du > 40: 6% or > 0.6
Reproducibility [1]	du < 40: 6% or > 0.6; du > 40: 8% or > 0.8
Object Curvature	radius > 50 cm
Min. Sample Size	35 mm x 150 mm
Scan Length	5 / 10 / 20 cm
Resolution	375 points/cm
Memory	10 000 readings in 1000 test series
Interface	USB port, WiFi optionally
Color display	2.8" capacitive touch display
Languages	English, French, German, Italian, Japanese, Portuguese, Spanish
Light Source	Laser diode, LED and IR-SLED
Laser Energy	< 1 mW (Laser class 2)
Dimensions	150 x 110 x 70 mm (5.9 x 4.3 x 2.7 in)
Weight	700 g (1.55 lb)
Power Supply	rechargeable Li-Ion battery pack, up to 1000 readings depending on usage
Temperature Range	operation: +10 - 40°C (+50 - 104°F) storage: 0 - 60°C (+32 - 140°F)
Rel. Humidity	up to 85% at 35°C (95°F), non-condensing

[1]Standard deviation

Ordering Information

Cat. No.	Description
7404	Checking Tile wave-scan 3 dual
7401	Docking Station, for 7400/7403
7402	Battery Pack, for 7400/7403
4831	Software smart-chart

Accessories

Replacement - please contact your local service department for replacement of your checking tile.

Incl. USB cable and power supply 100 - 240 V self-adapting

Rechargeable battery for automatic charge in the docking station

Software for professional analysis and documentation of color and