TRIOS® shade measurement tool more reliable than the human eye

Digital Trends - Autumn Issue

- TRIOS® shade measurement tool more reliable than the human eye
- Your dental lab needs CAD/CAM technology or else…
- TRIOS® 3 wins "Best of Class" Technology Award
- Dental System™ - scan and design using different software versions

The University of Copenhagen and University of Cyril and Methodius conducted a joint study comparing the reliability of three teeth shade color assessment methods used in dentistry. The study evaluated TRIOS® shade measurement tool versus the MHT SpectroShade™ spectrophotometric computer-based system and the human eye.

The university study found that the two objective methods, TRIOS® digital impression solution's shade measurement tool and the MHT SpectroShade™ spectrophotometric computer-based system, to be more reliable than the conventional visual system – the human eye. This is in accordance with a number of other studies cited by the study's authors. [7-9, 15, 16]

Published in the International Journal of Oral and Dental Health, the 2015 *in vivo* study compared the three teeth shade color assessment methods. Concluding that "The reliability of the objective, computer-based systems was higher compared with the subjective, visual method for color determination."*

Study Fact: "The TRIOS® intraoral scanner was easy to handle and more convenient to the patient than the colorimetric camera system used."*

Shade matching in the restorative workflow

The study noted that patients consider shade match to be the most important factor when judging the quality of a restoration, especially in the anterior region.**

However, reliable visual shade selection by the human eye and in nature can be inconsistent due to the complexity of tooth color and outside factors like room lighting, patient clothing and even makeup.

To compensate for these variables, the study performed the color determination in natural daylight, but away of all windows with no direct light. Patients were sat in the same unit-chair and with the dental lamp turned off. The angle of the view for MHT Spectroshade, 3Shape TRIOS® Color and subjective VITA 3D-master Vitapan was the same. Lipstick or other effects that may affect color assessment were removed and patients with strong colored clothing were covered with a white-grayish cloth.

The study found TRIOS® shade measurement to be more reliable than the human eye. An important result because few practices have the time or resources to meet the ideal conditions used in the study for evaluating patient' teeth shades. When you factor in possible doctor or assistant eye fatigue as well, then the proven reliability of TRIOS® shade measurement becomes even more significant. To be able to rely confidently on TRIOS® to identify teeth shades saves a tremendous amount of time and steps in the workflow and adds consistency and accuracy to the procedure.

TRIOS® is the only intraoral scanner on the market with an automatic shade measurement tool included. The digital impression solution embeds the teeth shade information into the intraoral scan which is then used to design the restoration. This makes communication of the unique teeth shades much simpler and eliminates several steps in the workflow for both the lab and dentist.

The teeth shades are embedded in the scan. And in TRIOS® case, the digitally-shared scan can be augmented with HD intraoral images and video – as TRIOS® also includes an intraoral camera featuring high speed video and image capture integrated within the IO scanner.

Study methodology

The study pitted the three shade measurement methods against each other: the subjective (visual) method and the objective TRIOS® and MHT SpectroShade™. Eighty-seven teeth from twenty-nine patients were used in the testing.

Visual pairwise comparison was used in the study for benchmarking because the human eye and perception is believed to be the most important factor in color evaluation.

The study concluded by supporting the use of scanning and color measuring computer-based systems for dentistry.

Saying, "the TRIOS® Color Shade system as well as the MHT SpectroShade™ colorimetric system were able to measure all the various shades appearing all over the tooth surface, thus give a very detailed shade determination at the tested tooth."

The study also determined that "the further development of such systems for clinical use would be warranted and could serve as a valuable tool for material selection and restoration design, particularly in the area of aesthetic, restorative dentistry."

*Source: **Effectiveness of Shade Measurements Using a Scanning and Computer Software System: a Pilot Study**

** Schropp L (2009) Shade matching assisted by digital photography and computer software. J Prosthodont 18: 235-241.

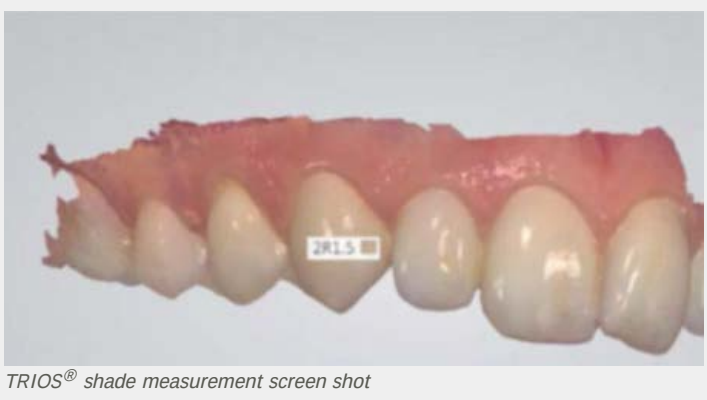
7. Bahannan SA (2014) Shade matching quality among dental students using visual and instrumental methods. J Dent 42: 48-52.

8. Judeh A, Al-Wahadni A (2009) A comparison between conventional visual and spectrophotometric methods for shade selection. Quintessence Int 40: 69-79.

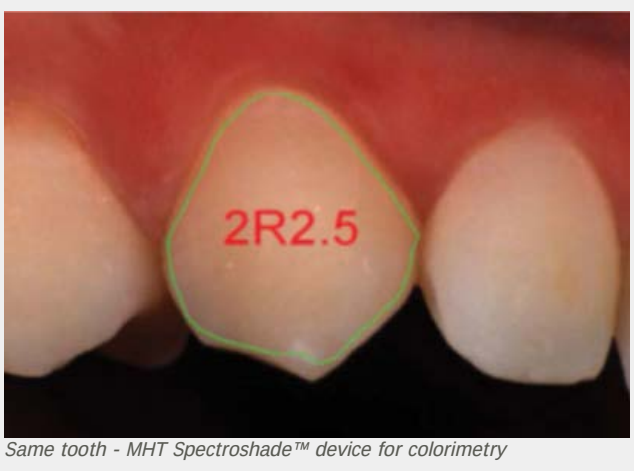
9. Gehrke P, Riekeberg U, Fackler O, Dhom G (2009) Comparison of in vivo visual, spectrophotometric and colorimetric shade determination of teeth and implant-supported crowns. Int J Comput Dent 12: 247-263.

15. Derdilopoulou FV, Zantner C, Neumann K, Kielbassa AM (2007) Evaluation of visual and spectrophotometric shade analyses: a clinical comparison of 3758 teeth. Int J Prosthodont 20: 414-416.

16. Horn DJ, Bulan-Brady J, Hicks ML (1998) Sphere spectrophotometer versus human evaluation of tooth shade. J Endod 24: 786-790.

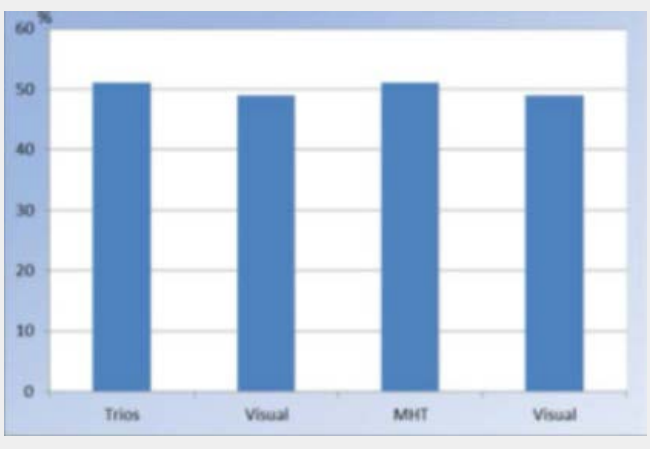


TRIOS® shade measurement screen shot



Same tooth - MHT Spectroshade™ device for colorimetry

Chart from study illustrating which method gave the best shade match



3Shape Trios® Color (Trios) vs. traditional visual method
and MHT Spectroshade™ (MHT) vs. traditional visual method

Study Highlights

- TRIOS® shade measurement is more reliable than the human eye
- TRIOS® shade measurement is as accurate as the human eye
- TRIOS® intraoral scanner was easy to handle and more convenient to the patient than the colorimetric camera system
- Further development of such systems for clinical use is warranted and could serve as a valuable tool for material selection and restoration design in aesthetic and restorative dentistry
- TRIOS® is the only intraoral scanner on the market with shade measurement