



## 3D printing technique to fabricate dental restorations

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### Abstract:

Additive CAD/CAM (computer-aided design and computer-aided manufacturing) technology has been used in dental labs to manufacture splints, surgical guides, removable dentures, crowns and facial prostheses, and chairside to fabricate orthodontic aligners. Dental caries remains as one of the main health problems globally. Direct filling technique with composite has several shortcomings. Especially large fillings in lower posterior teeth are challenging. Indirect restorations are developed to overcome the challenges linked with direct restorations.

Our solution to the problem is RAYO 3DToothFill. This novel technique for dental restorations is a concept based on modern 3D manufacturing techniques utilizing digital imaging and 3D printing to fabricate the filling on a single visit to a clinic. It includes preparation of a tooth, tooth imaging, automated filling processing outside the mouth and fixation of the filling on the tooth. Based on an in vitro study carried out in University of Eastern Finland, Kuopio, Finland, the accuracy of 3D printing technique overcomes that of milling technique in the fabrication of dental inlay and onlay fillings. Major advantages compared to current solutions in addition to accuracy of the restoration include lower cost, possibility to layering and tailoring properties, suitability for existing filling materials and material use efficiency. The project is devoted to preparation of commercialization. Additional clinical investigations are planned to carry out during 2019 to confirm the findings. This 3D printing technique has been developed by a team of professors and experts from the University of Eastern Finland and University of Oulu. International patent pending.

### Biography:

Dr. Pirkko-Liisa Tarvonen has a Specialist degree in Dental Public Health from the University of Turku, Finland, and a PhD degree from the University of Eastern Finland. She acts as Dental Marketing Director at Rayo 3D-Toothfill Ltd and as University Lecturer at the University of Helsinki and at the University of Eastern Finland. As voluntary project coordinator in a development cooperation program she has had a contribution to primary dental care



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### Publication of speakers:

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6. Ahlholm P, Sipilä K, Vallittu P, Kotiranta U, Lappalainen R. Accuracy of inlay/onlay fillings based on 3D printing versus CAD/CAM milling technique, an in vitro study. *Acta Biomaterialia Odontol Scand* 2018 (submitted).

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