**Reviewer’s report**

**Title:** Simultaneous, radiation-free registration of the dentoalveolar position and the face by combining 3D photography with a portable scanner and impression-taking

**Version:** 0 **Date:** 23 Jul 2019

**Reviewer:** Dieter Dirksen

**Reviewer's report:**

The authors present a study in which they evaluate a method for integrating 3D models of the dentoalveolar arch into 3D facial models. The data are acquired by a portable 3D scanner. In parallel, an impression of the maxillary dental arch is taken with one of two different reference targets ("scan bodies") attached to the impression tray. Subsequently, the tray with the attached target is rescanned extraorally. The scanned impression is then registered by matching the two data sets of the target. The accuracy of the procedure is estimated by measuring the RMSE differences between the matched data sets.

**Comments:**

The manuscript is generally well written with adequate illustrations. However, it is not completely clear what the novel aspects of the investigation are. The whole procedure is quite straightforward and similar to earlier work presented by, e.g., Bechthold et al. (2012) and others. The main difference in relation to the mentioned work appears to be the use of a portable scanner instead of a stationary one. Furthermore, the study lacks an estimation of the accuracy of the jaw model as it is transferred to the intraoral position. In summary, the authors present only a comparison of the accuracy of the registration of the two reference targets, one of which is obviously unsuitable given the limited resolution of the scanner.

Before a publication can be considered, I would therefore recommend the following additions in order to achieve a benefit for the reader: 1. Considering the intended application, an estimation of the required accuracy of the inserted models should be made. 2. At least the precision (i.e., repeatability) of the intraorally positioned models should be determined. This could be done, for example, by repeating the procedure sufficiently often on a test person with subsequent evaluation of the distance matrix to obtain a measure of the variance of the results.

**Level of interest**

Please indicate how interesting you found the manuscript:

An article whose findings are important to those with closely related research interests

**Declaration of competing interests**

Please complete a declaration of competing interests, considering the following questions:
1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organisation that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

'I declare that I have no competing interests'

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal