

INFLUENCE OF METAL-CERAMIC FIXED PROSTHESIS ON SIX IMPLANTS IN TRANSMISSION OF OCCLUSAL FORCES TOWARDS PERI-IMPLANT AREA: ANALYSIS BY FINITE ELEMENT METHOD

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INTRODUCTION

It is important to know the way in which chewing forces are transmitted during mandibular movements, for this reason, it is important to identify the behavior of metal-ceramic restorations and the influences in the distribution of forces in the peri implant area.

Knowing this distribution of forces and their influence on the peri implant area, it will be easier for the clinician to identify which material is ideal for different occlusal schemes to use. Furthermore, with this research, more information will be released on the behavior of six implants supported prostheses.

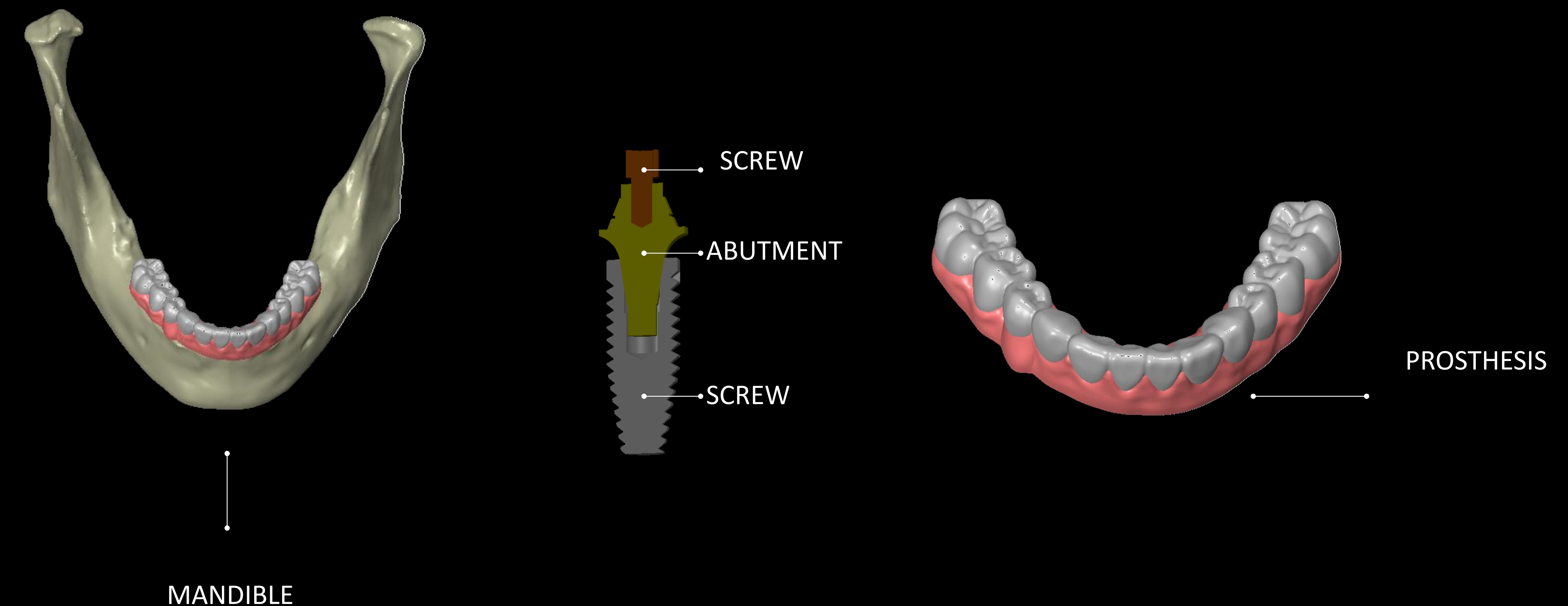


Figure 1. Geometric model of the All on six implant supported prosthesis used for the analysis. Elements represent a human jaw segmented from a CBCT (cortical and trabecular bone), implant, multiunit and screw. The prosthesis was designed with its metallic nucleus revisited of porcelain.

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METHOD

A finite element analysis was performed on a 3D model of a human jaw, with a fixed ceramic metal prosthesis supported on six Osseo integrated implants, these conical hex implants measuring 4 x 10 mm. Once this design was carried out, were be analyzed in the ANSYS software, in which the elastic modules was use according to each material, these data obtained from the current literature. Forces were applied according to each occlusal scheme (maximum intercuspation, canine guidance and group function).

Metal-ceramic is one of the most used and recommended materials for total implant fixed restorations and the aim of this study is to set some guidelines for the selection of this restorative material, based on its stress transmission properties, supported in finite element studies

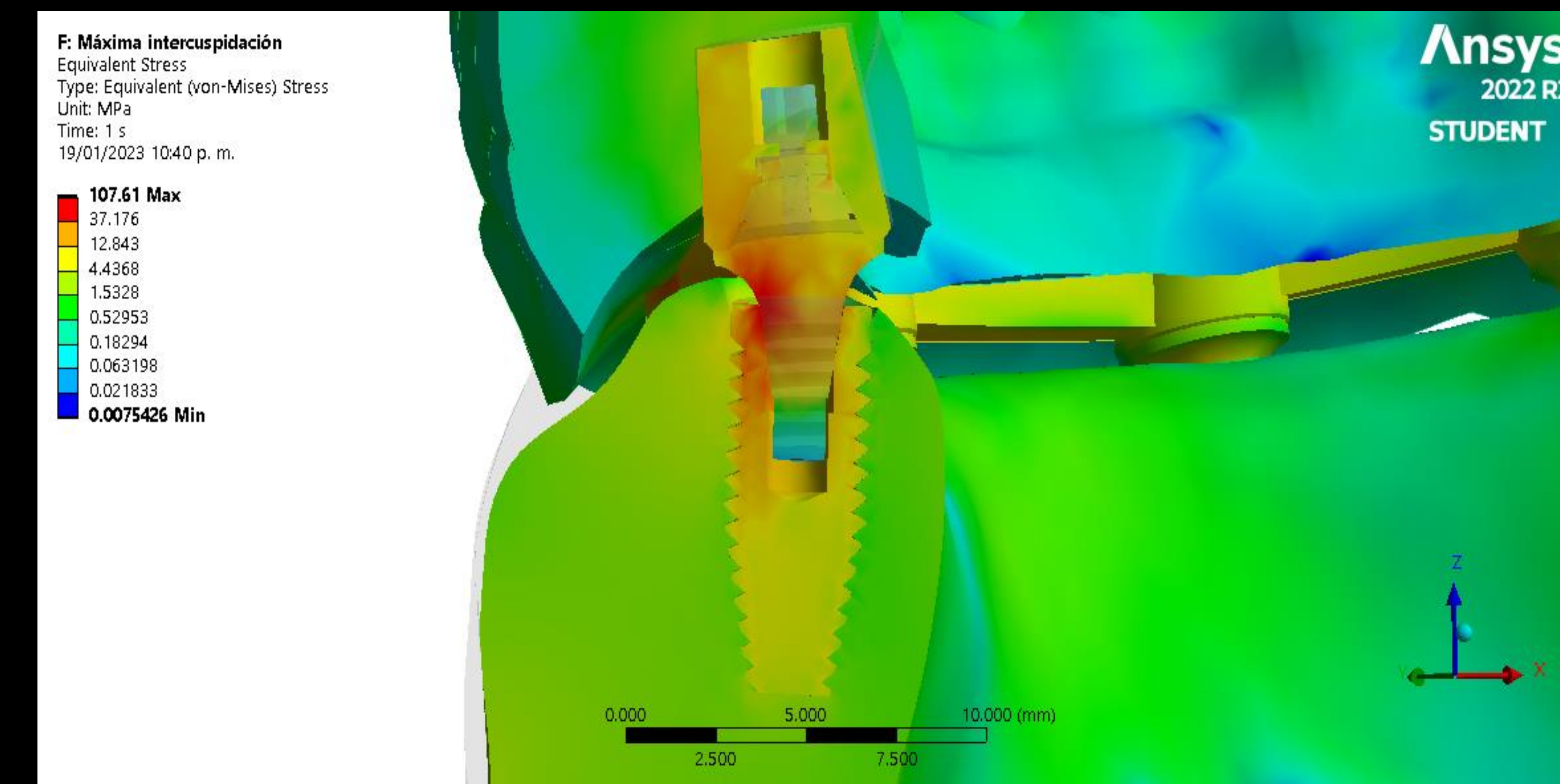
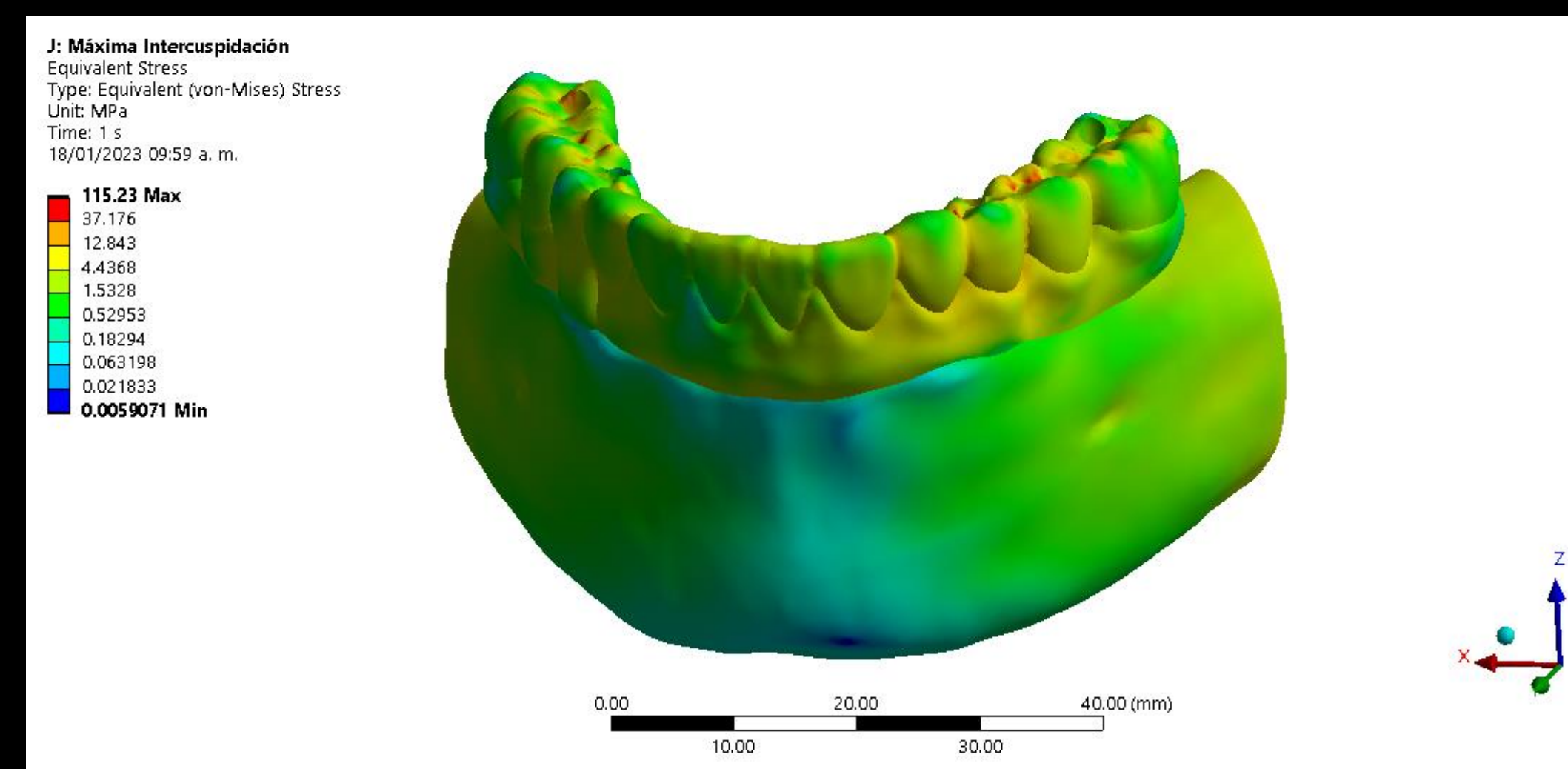


Figure 2. Force distribution in the model in ANSYS software. Load is distributed according to the dental contact in the processing of this model, the program solves the meshing equations with our conditions and expresses in images with a color scale which is assigned in accordance the received load in the particular area in the 3D model.

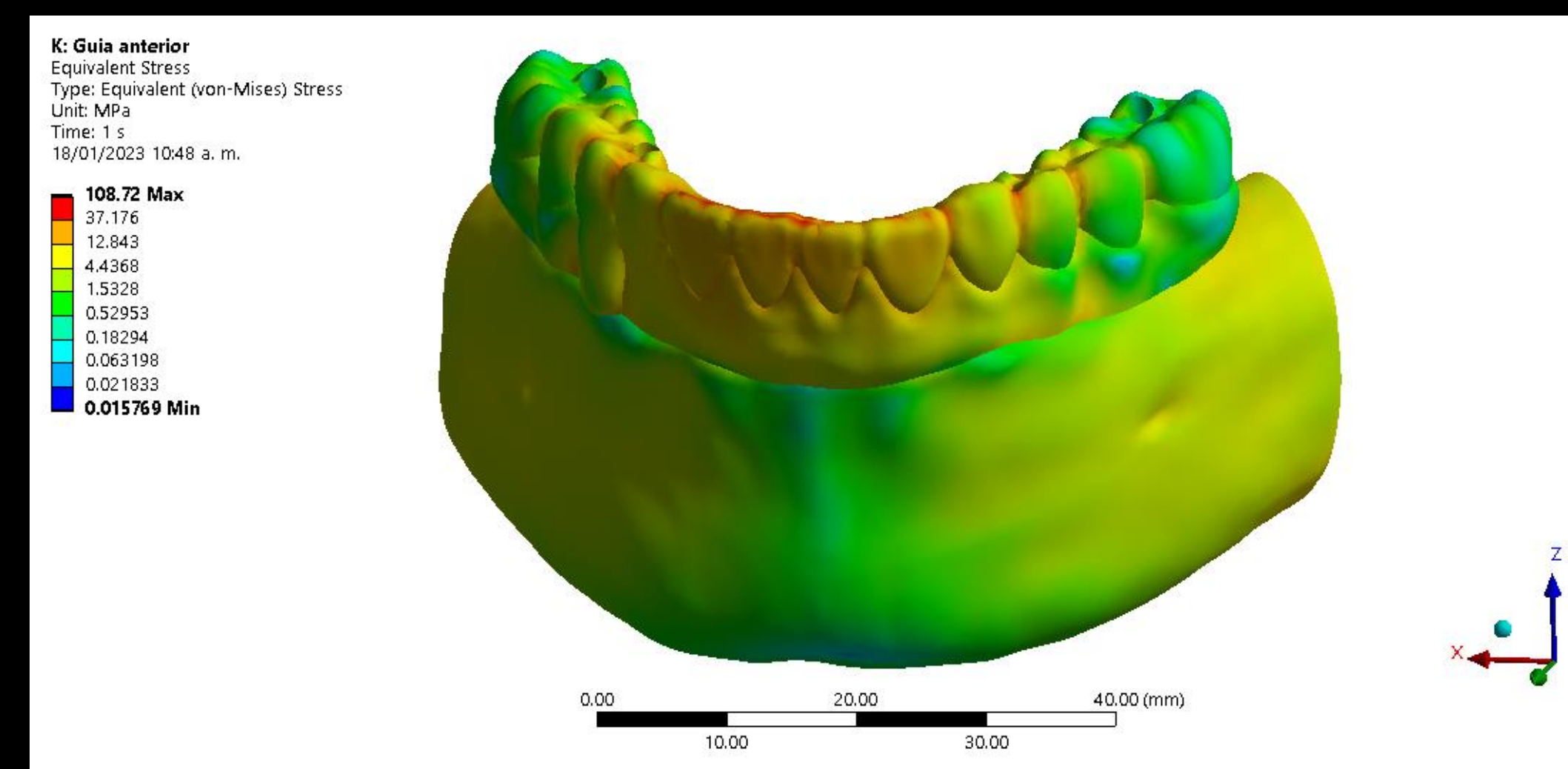
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MAXIMUM INTERCUSPATION



ANTERIOR GUIDANCE



GROUP FUNCTION

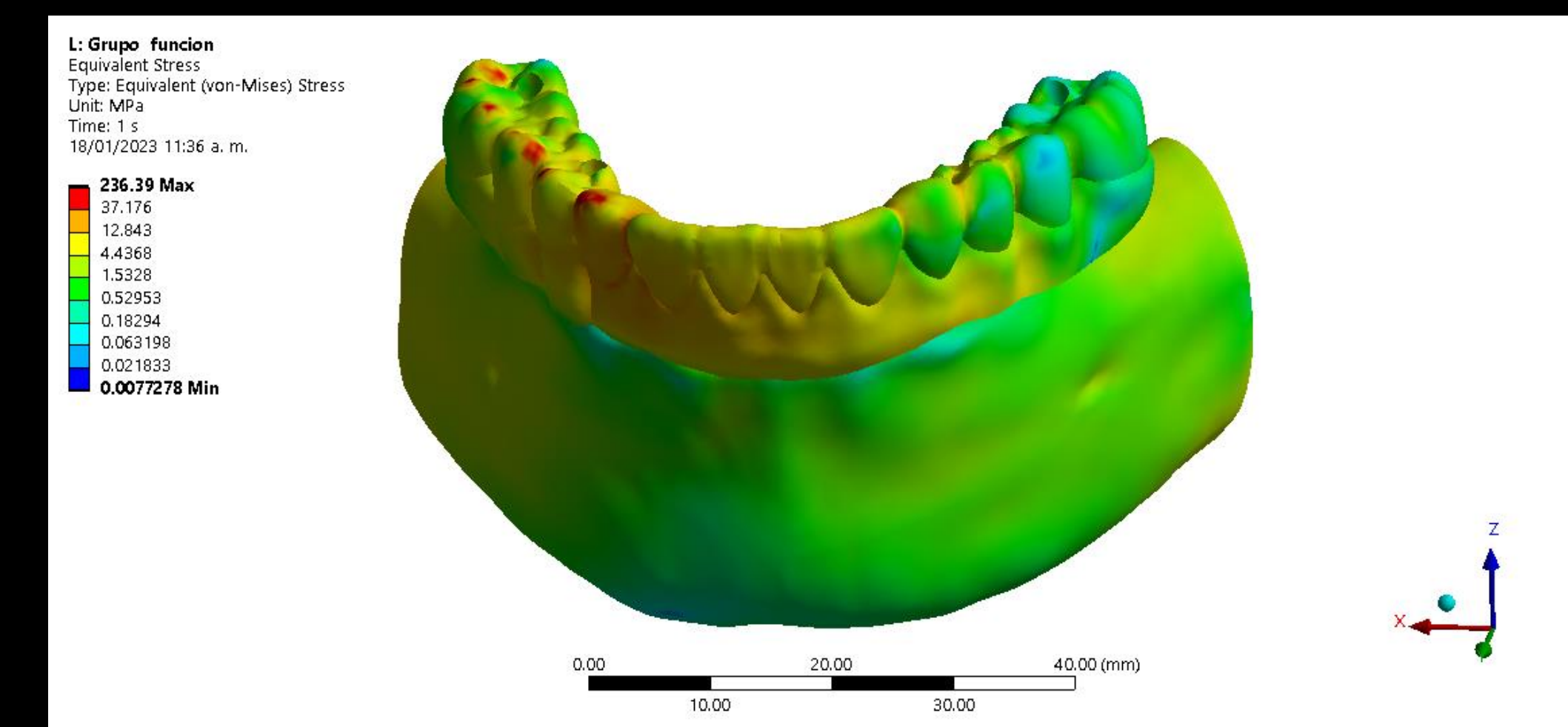
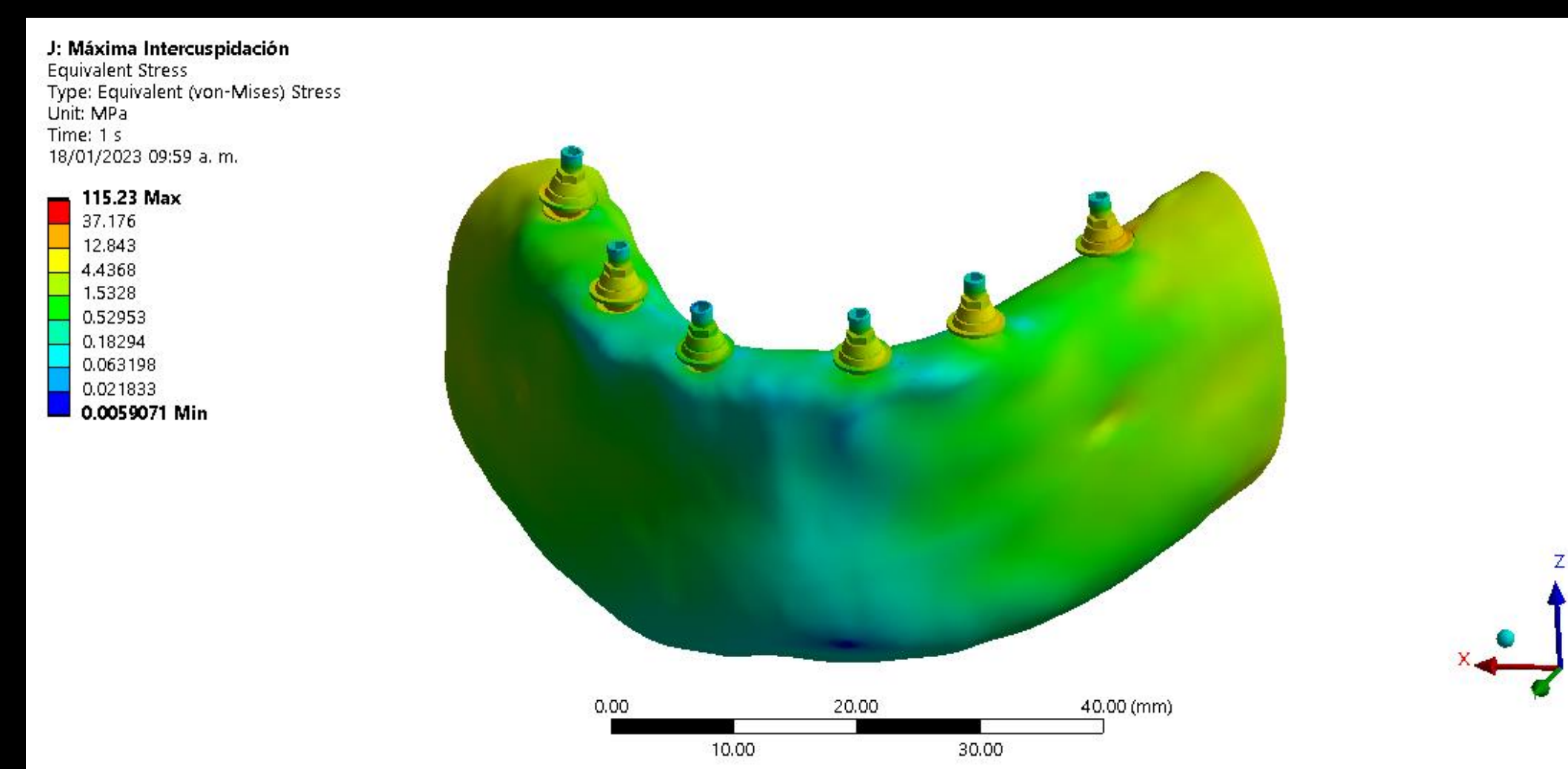
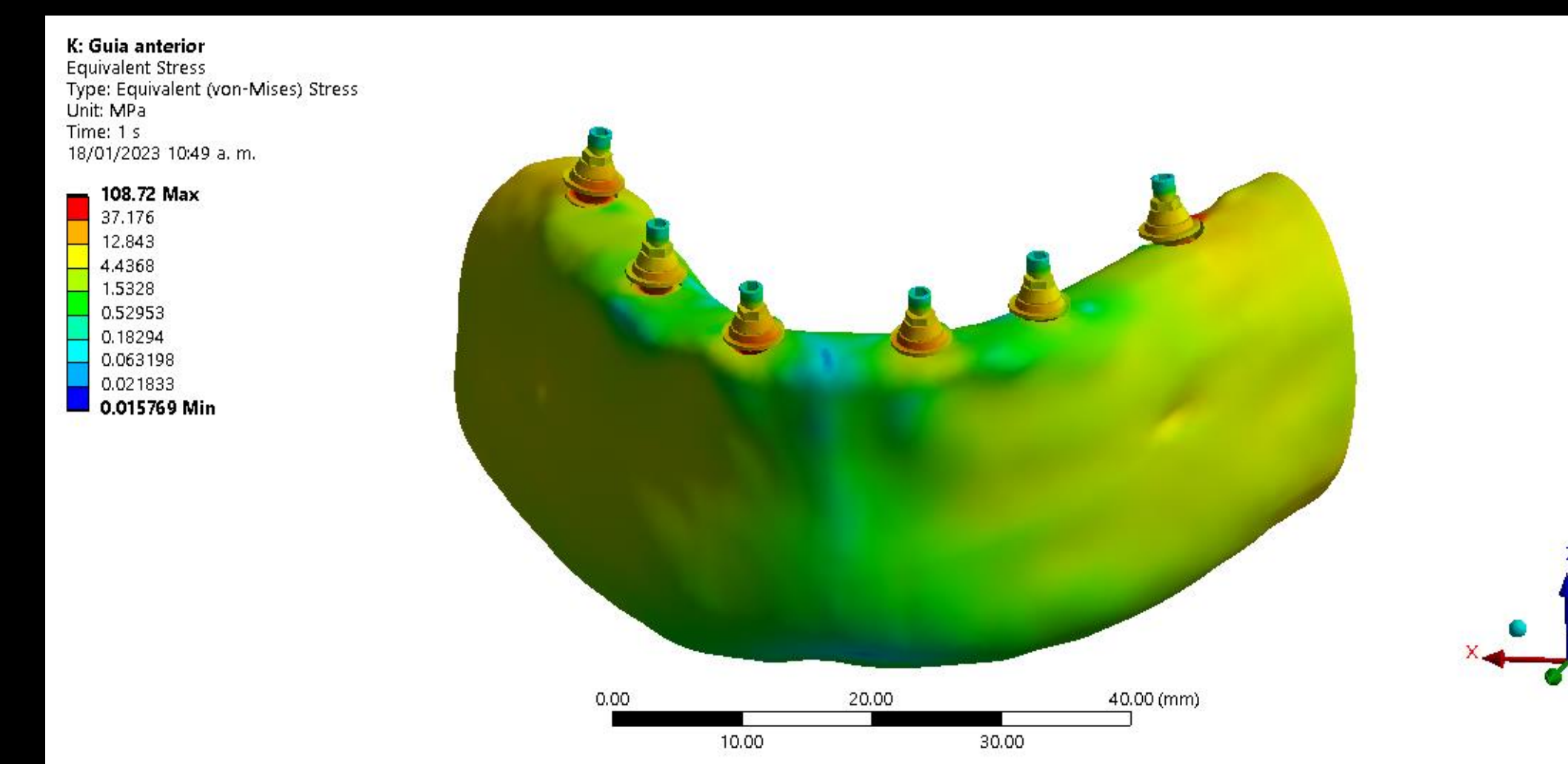
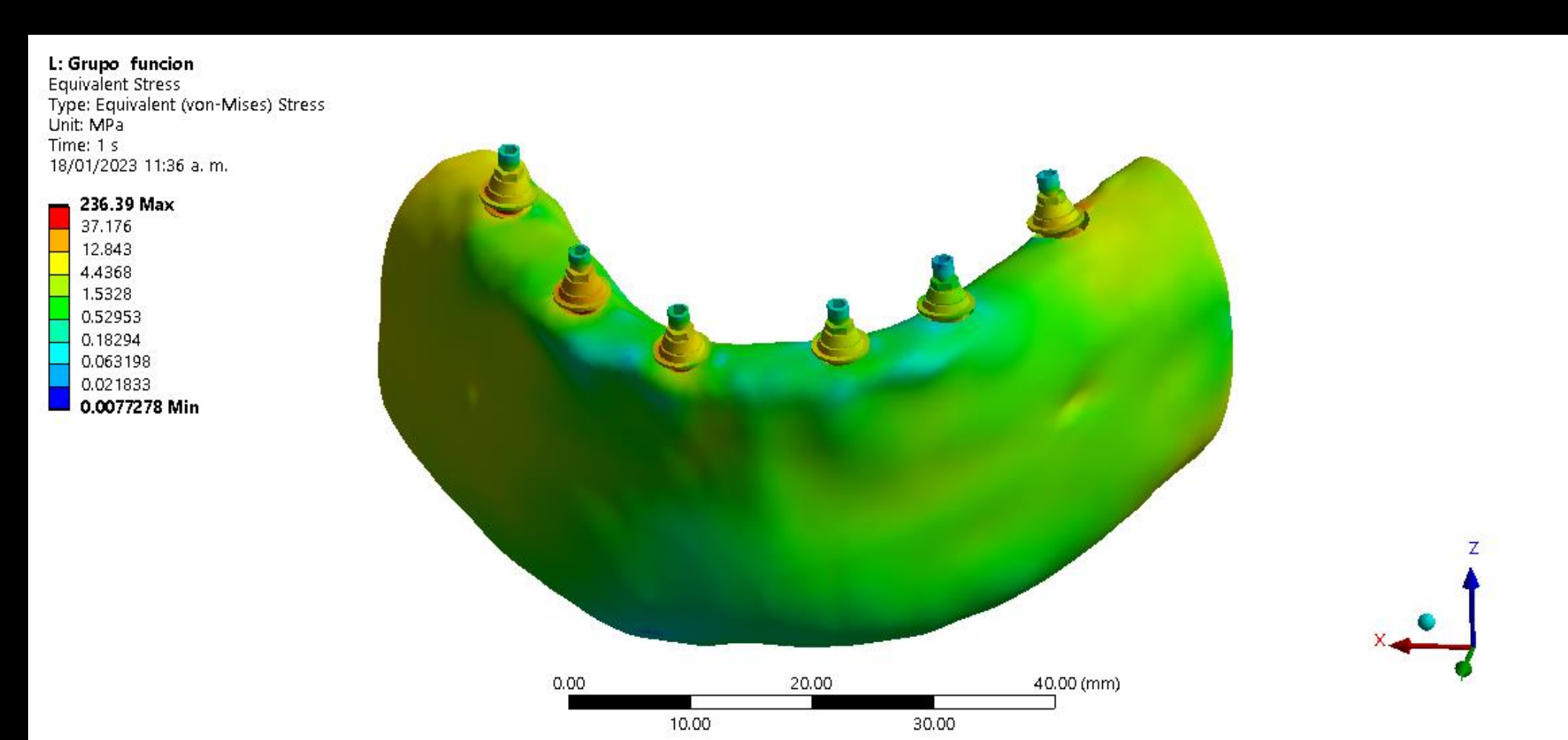


Figure 3. The results show the maximum principal stress in the solids and in the simulated 3D models of the jaw, implants and restorative material.



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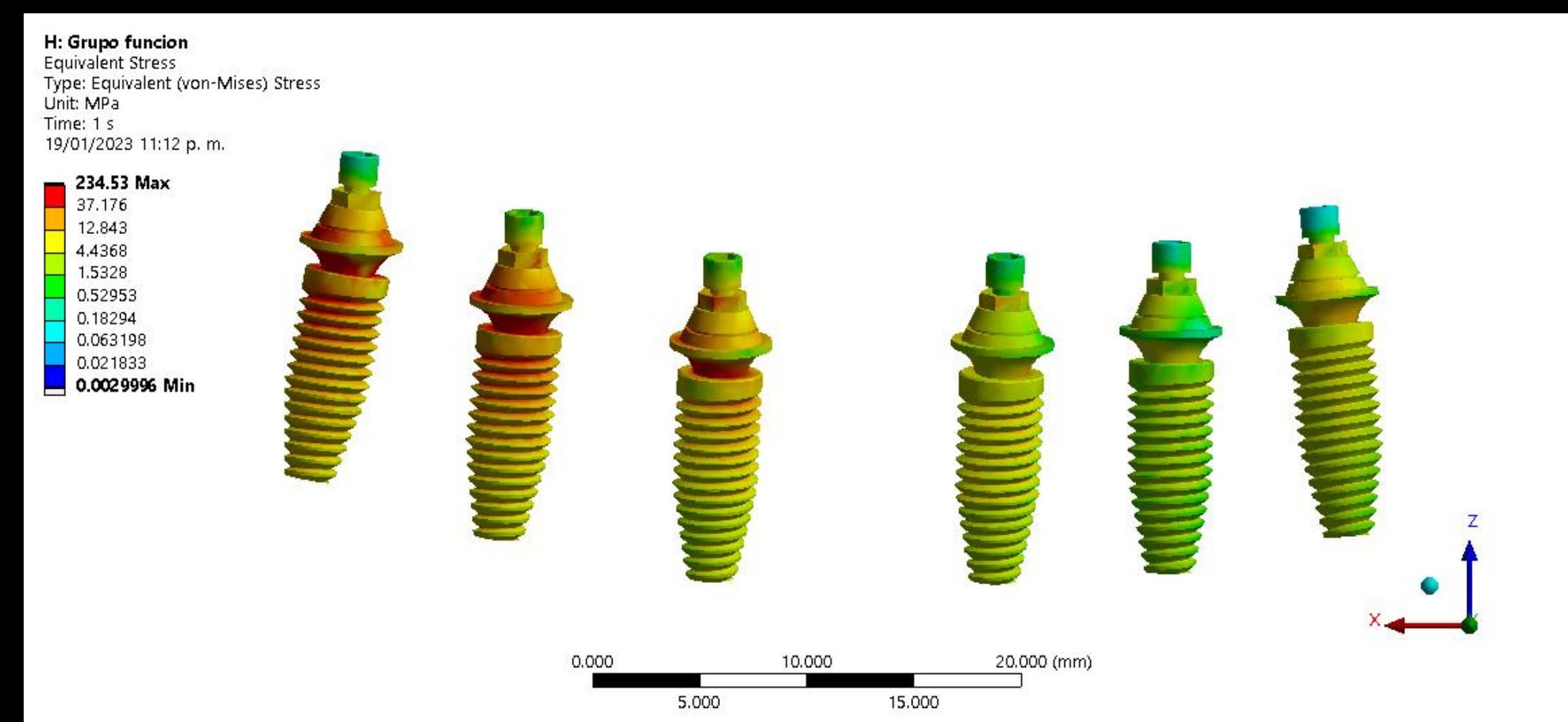
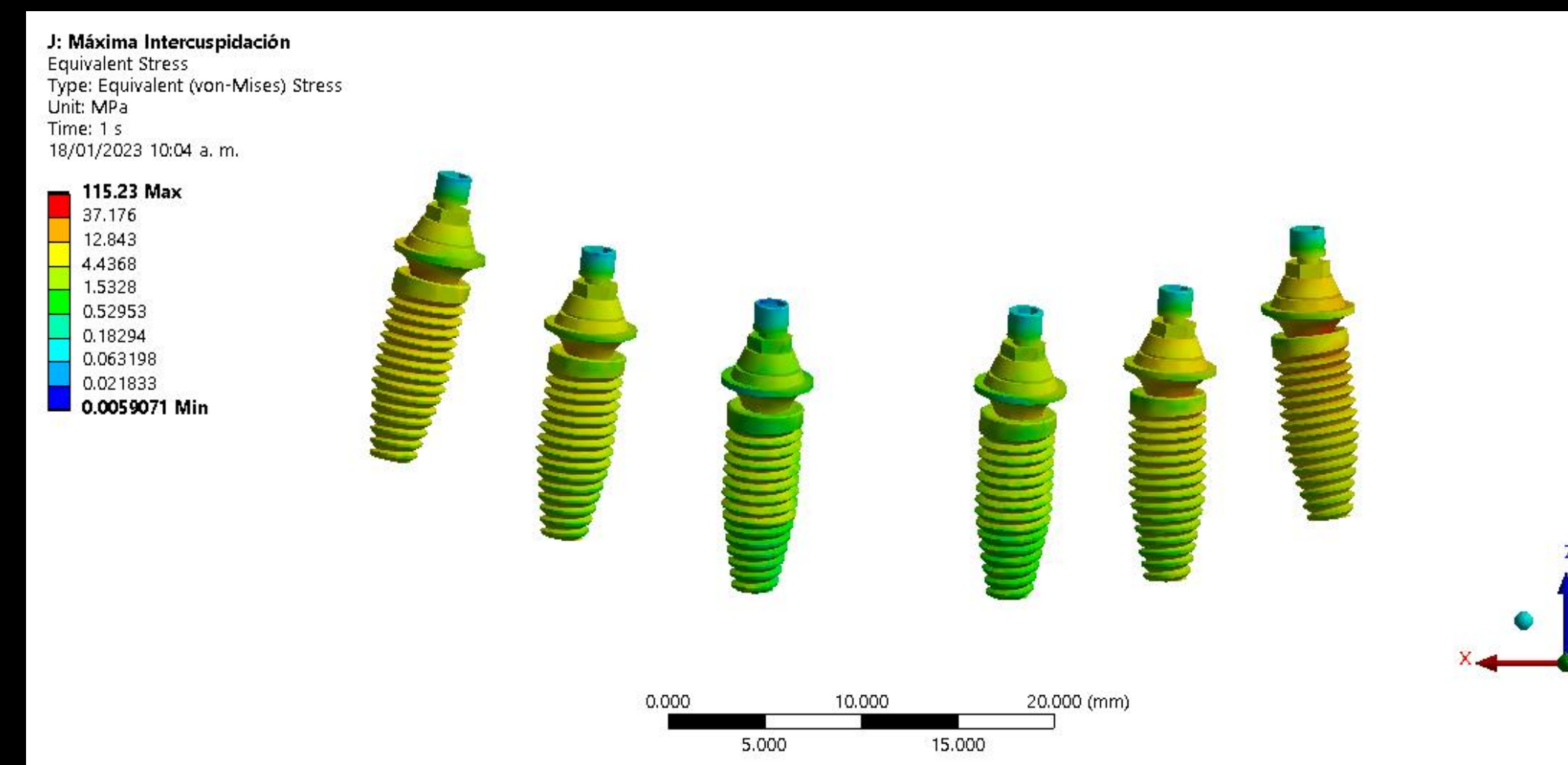
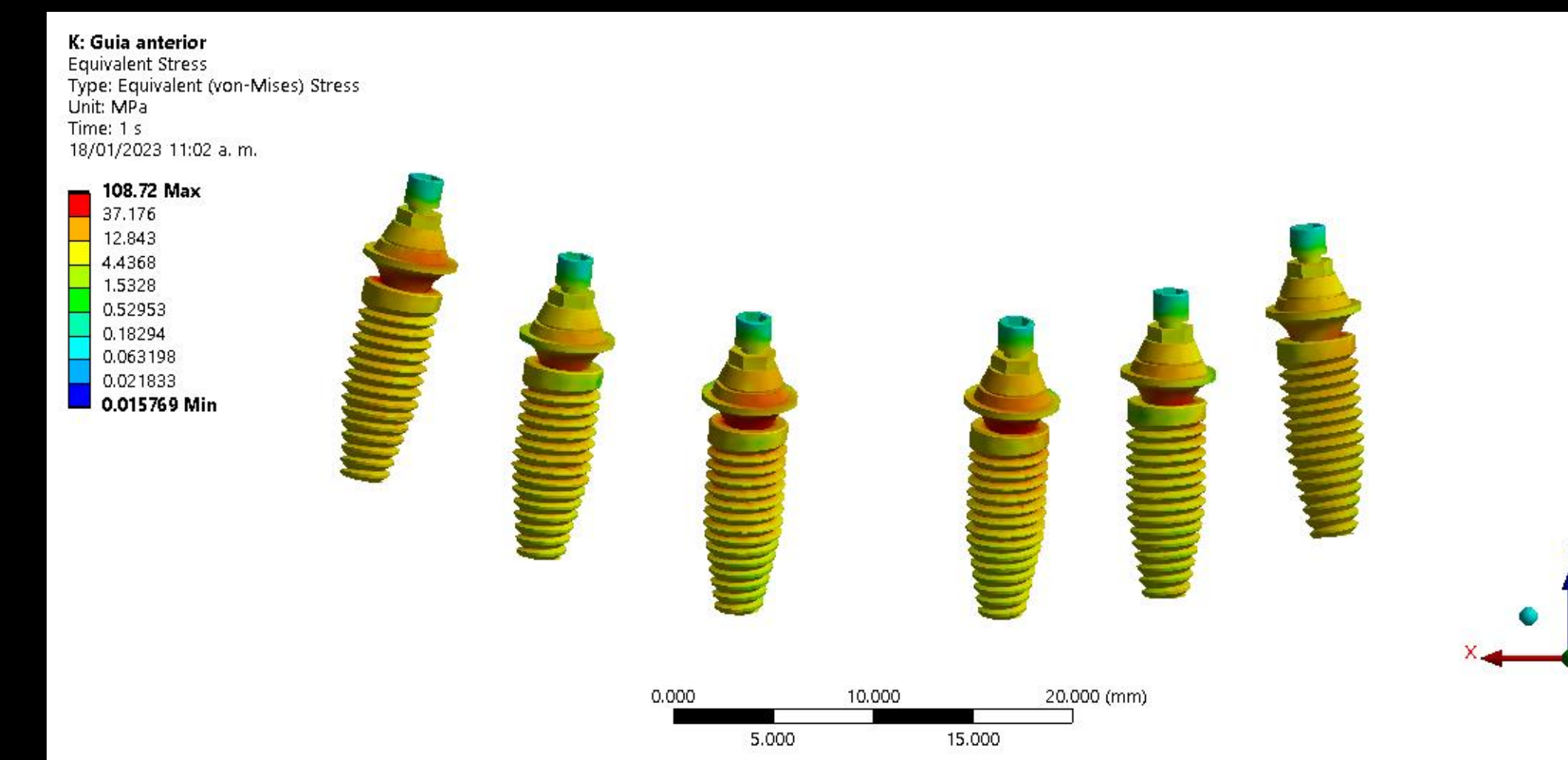
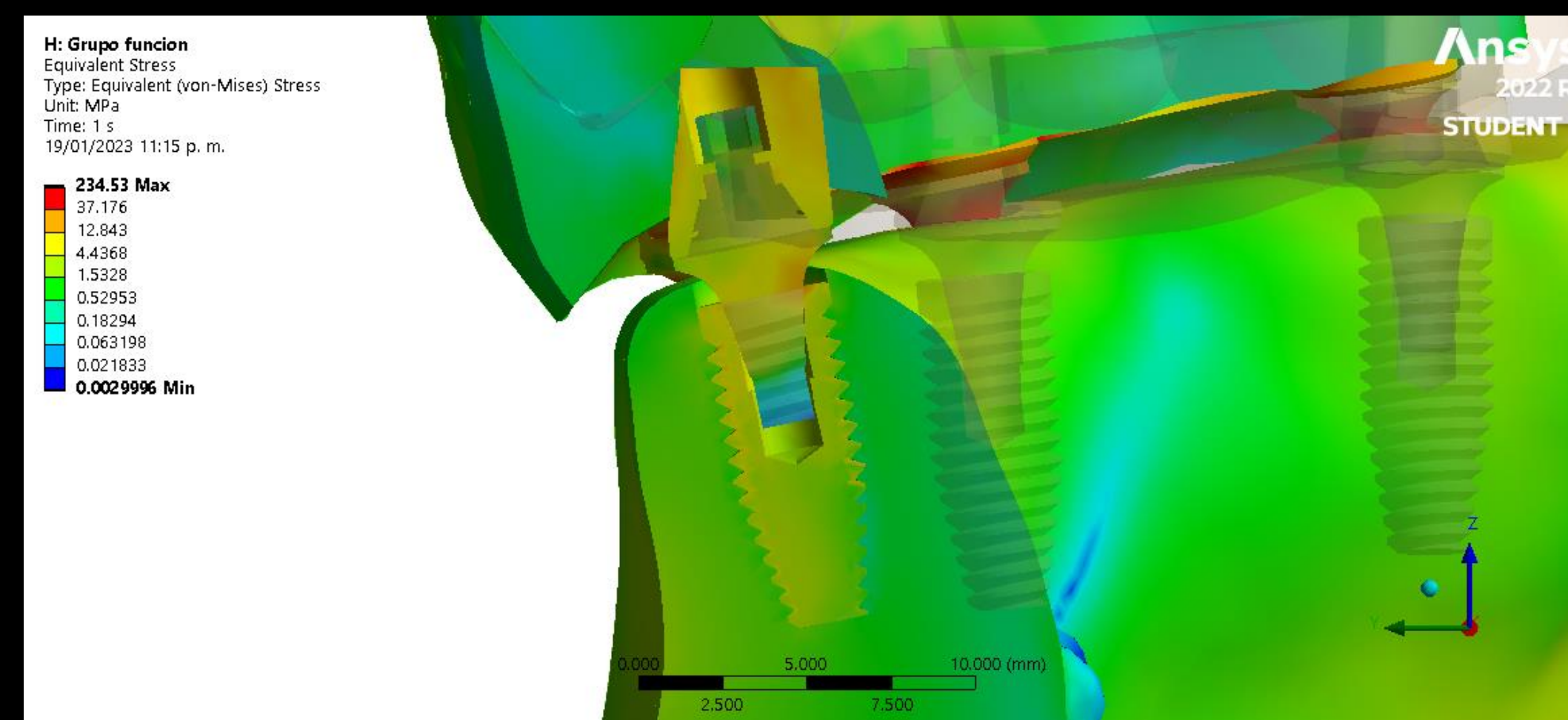
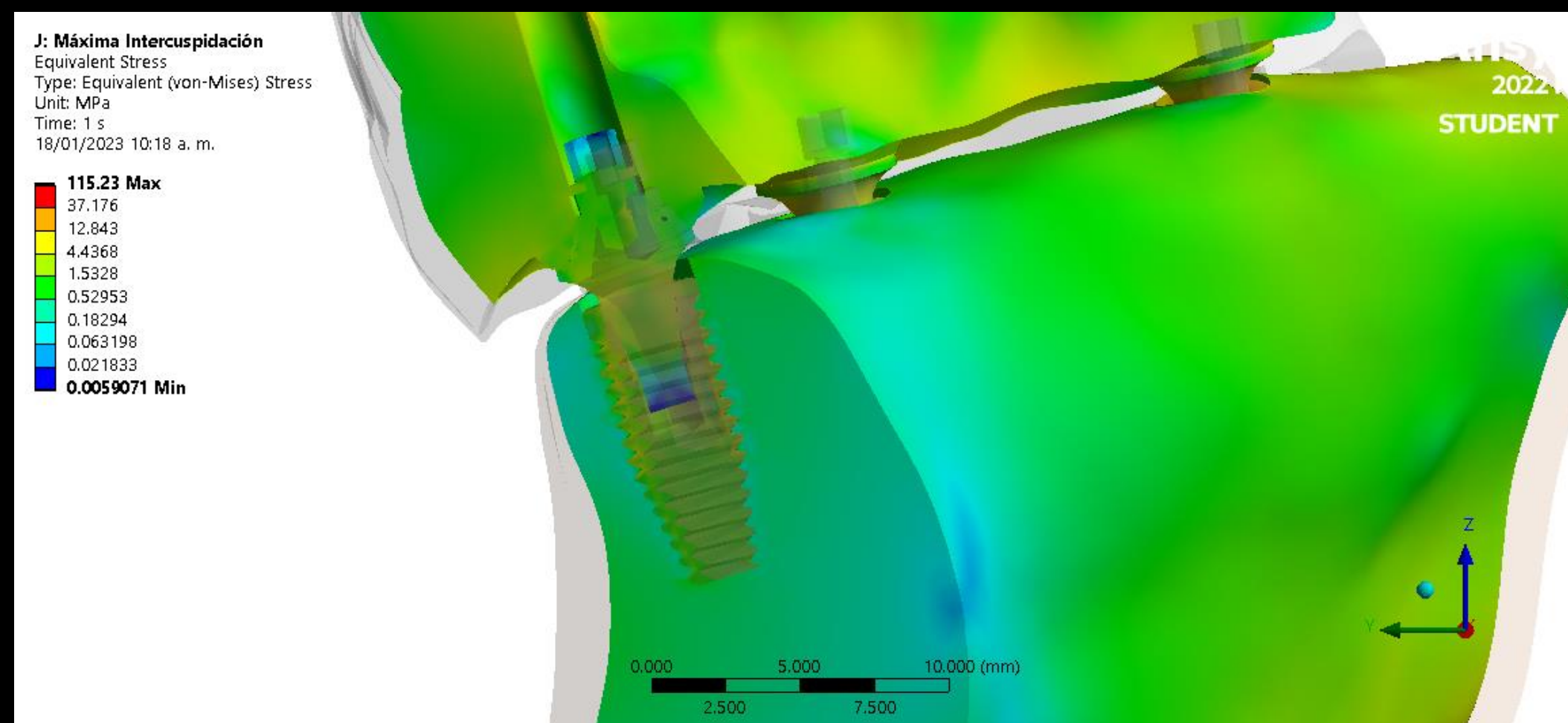
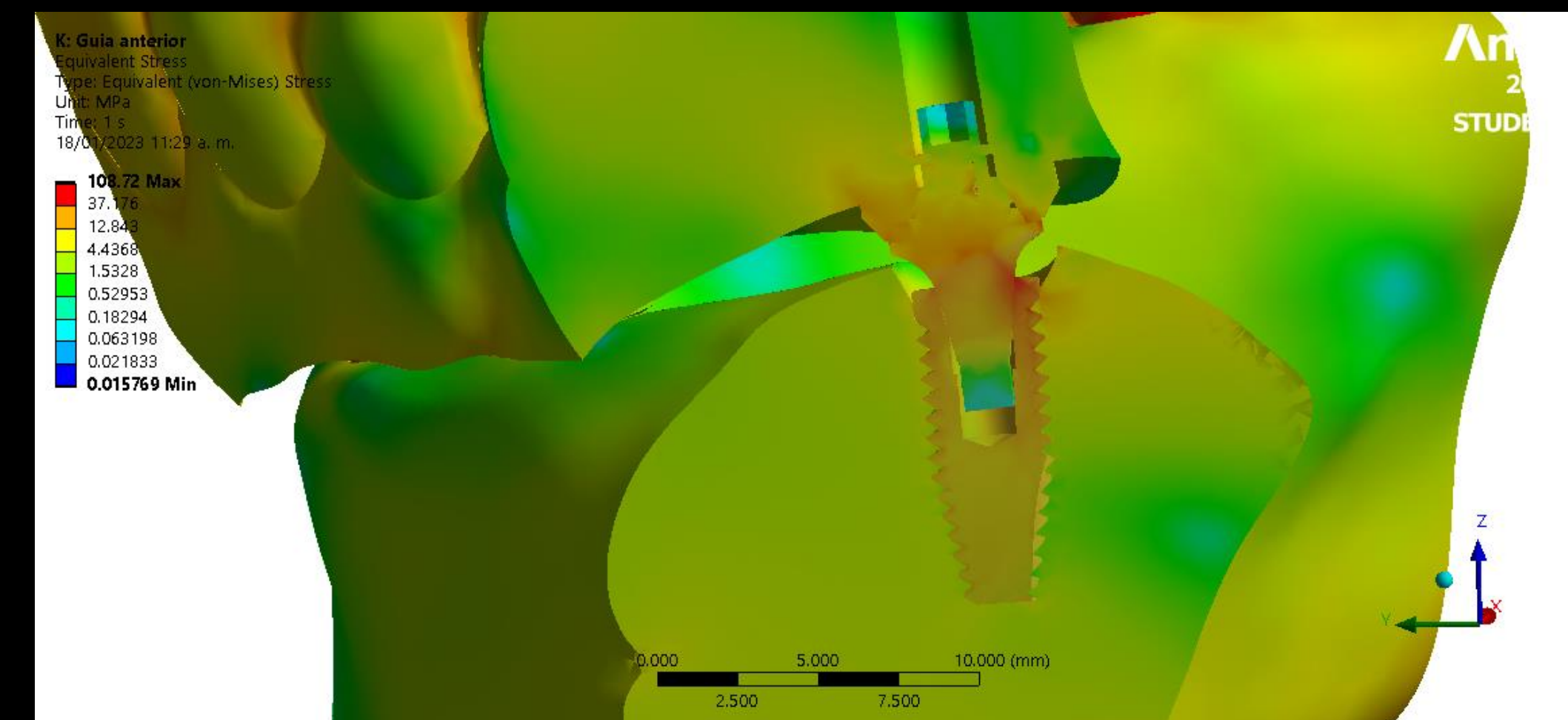


Figure 4. In the maximum intercuspation the highest stress area was in the surrounding area of the prosthetic screw, in the guide anterior model the highest stress area was received in the prosthetic screw and finally in the group function model the highest stress area was in the union between multi unit additament and implant platform.



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CONCLUSIONS

Metal-ceramic prostheses has a good distribution of forces, but more attention should be paid to the attachments that are used for restorations, if the rehabilitation has premature points or interferences, these attachments will receive greater stress and cause their rupture.

Finite element analysis is a tool in which the results can be correlated with clinical observations, with this, the clinician can obtain convincing evidence to properly choose the type of restoration to use.

ACKNOWLEDGEMENTS

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