

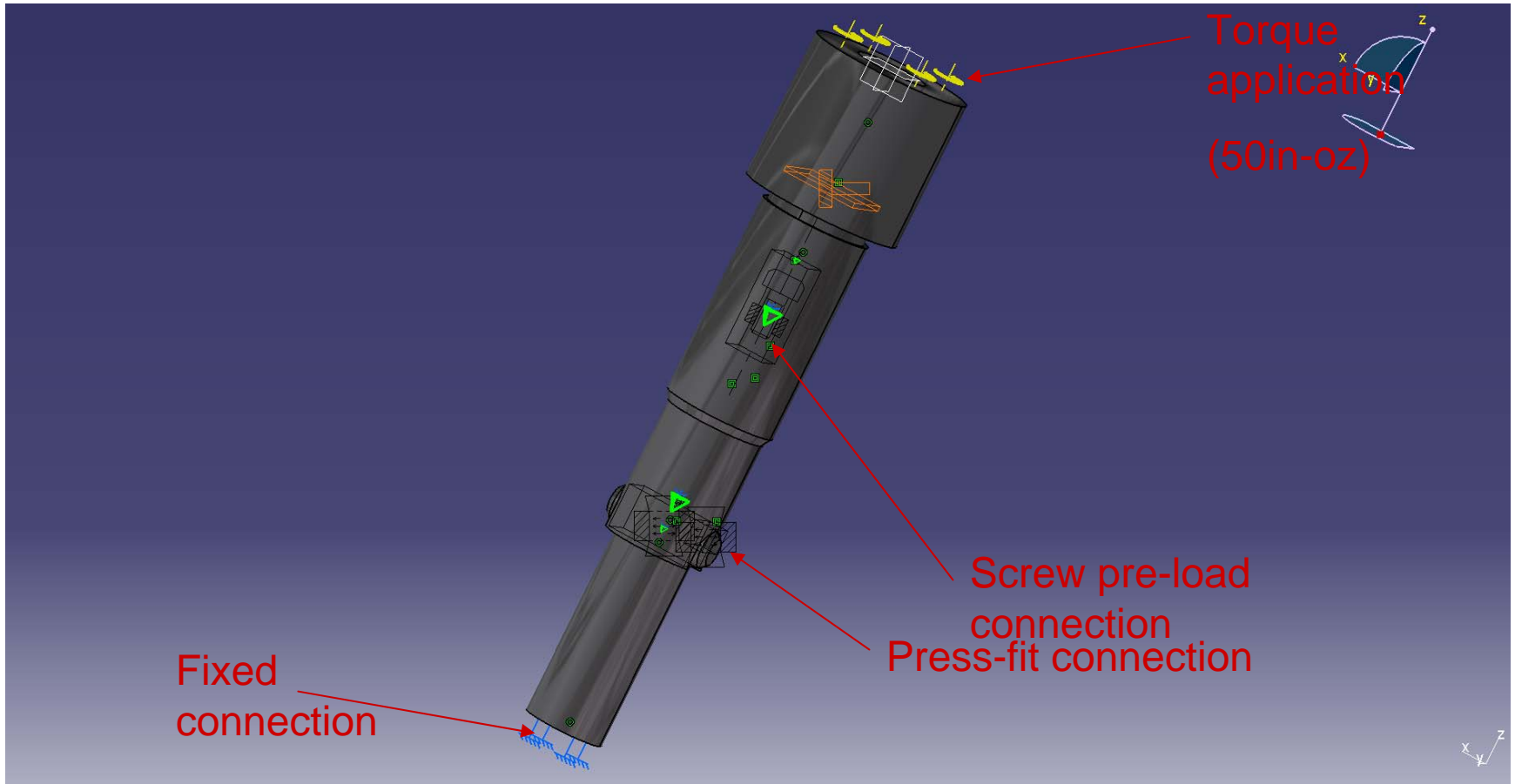
Tool Driver Analysis

Consultek

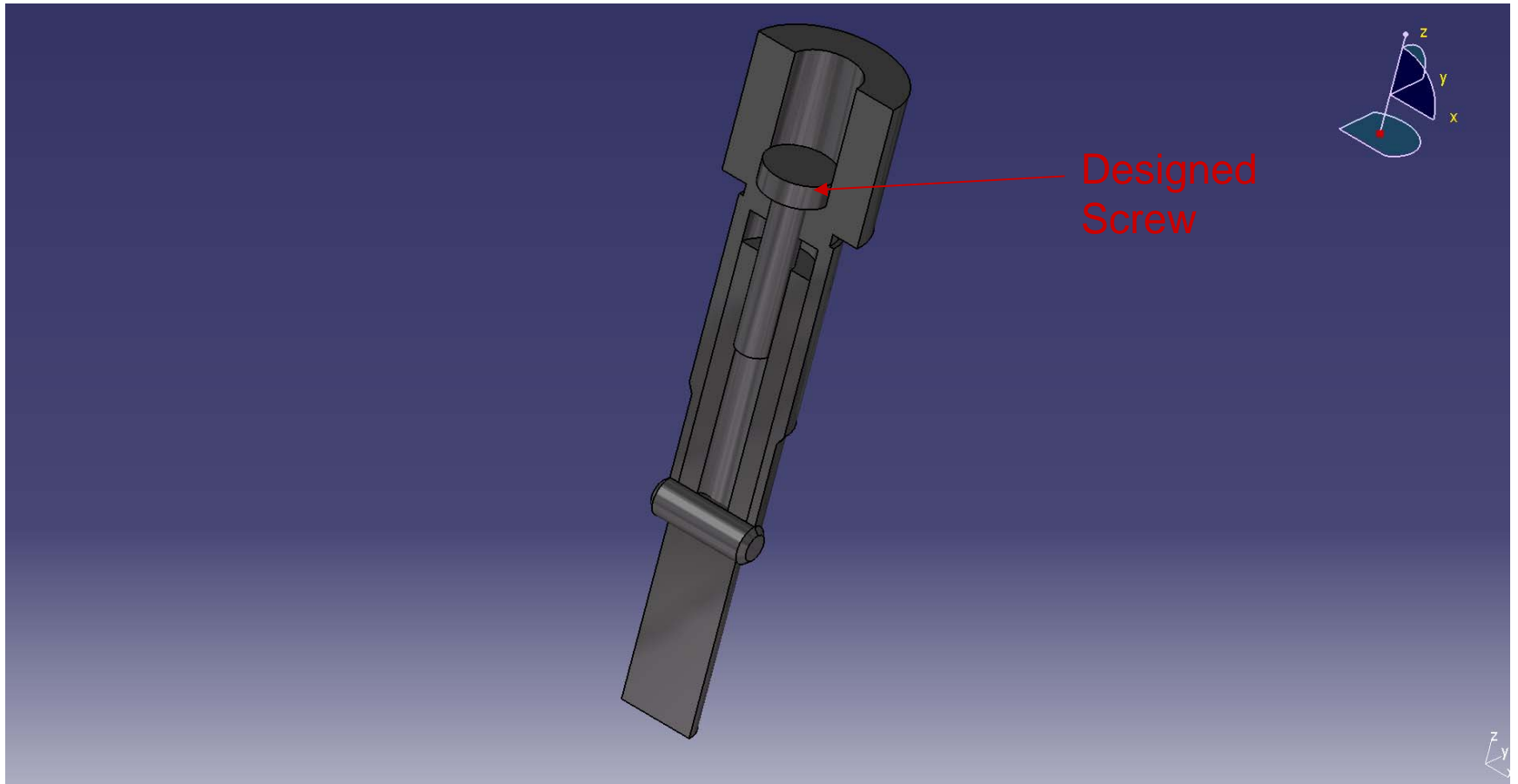
Assumptions

- In this case, tool driver is connected to the motor shaft via the screw, however, torque transmission still takes place from the tool driver to the cross-pin and then to the motor shaft.
- Pre-load on the screw was not calculated. Hole that was available in the motor shaft was used for outside diameter of the screw. A corresponding hole was drilled in the tool driver. A screw was placed between the aforementioned components.

Experimental Setup-1

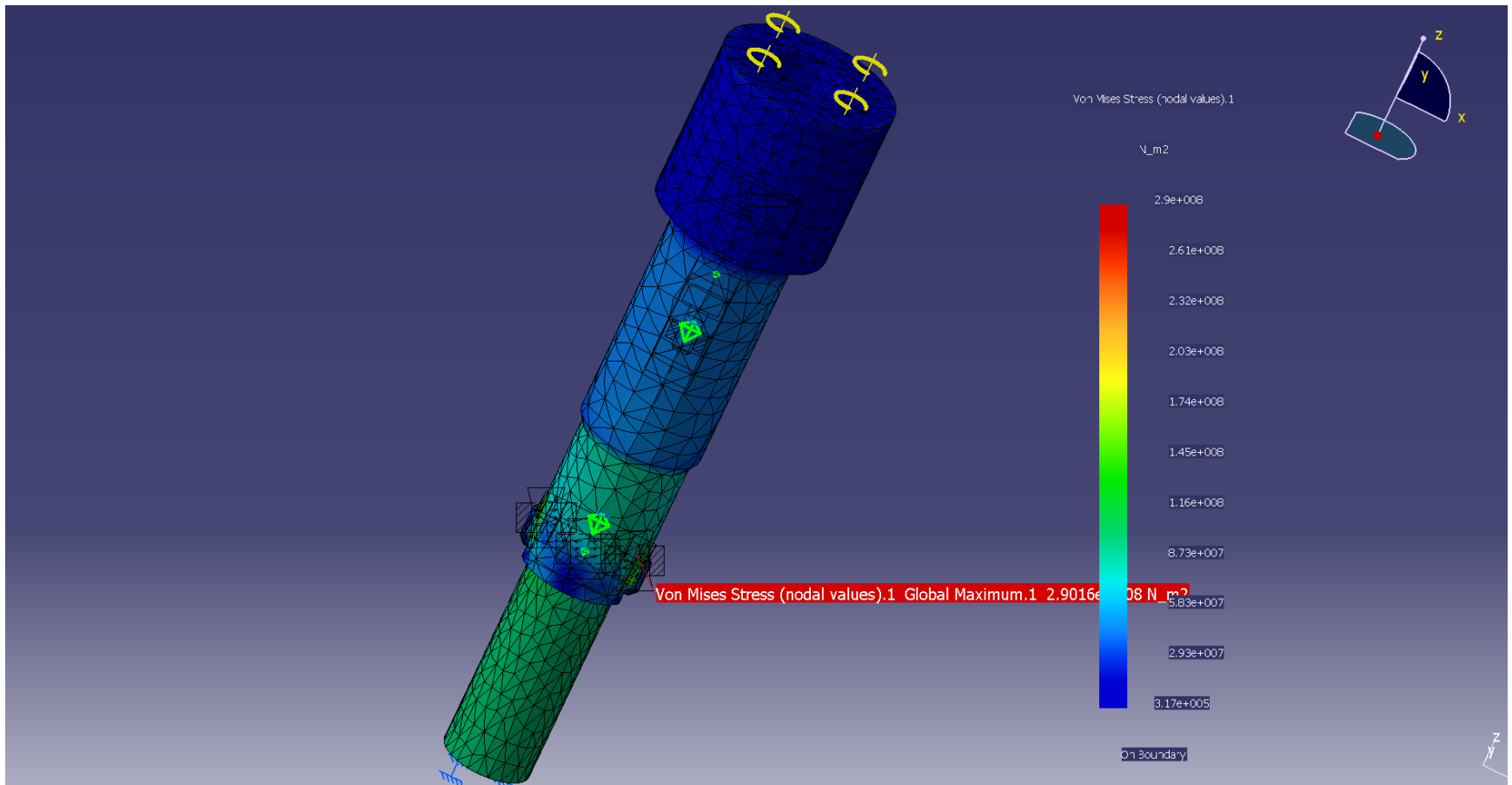


Experimental setup-2



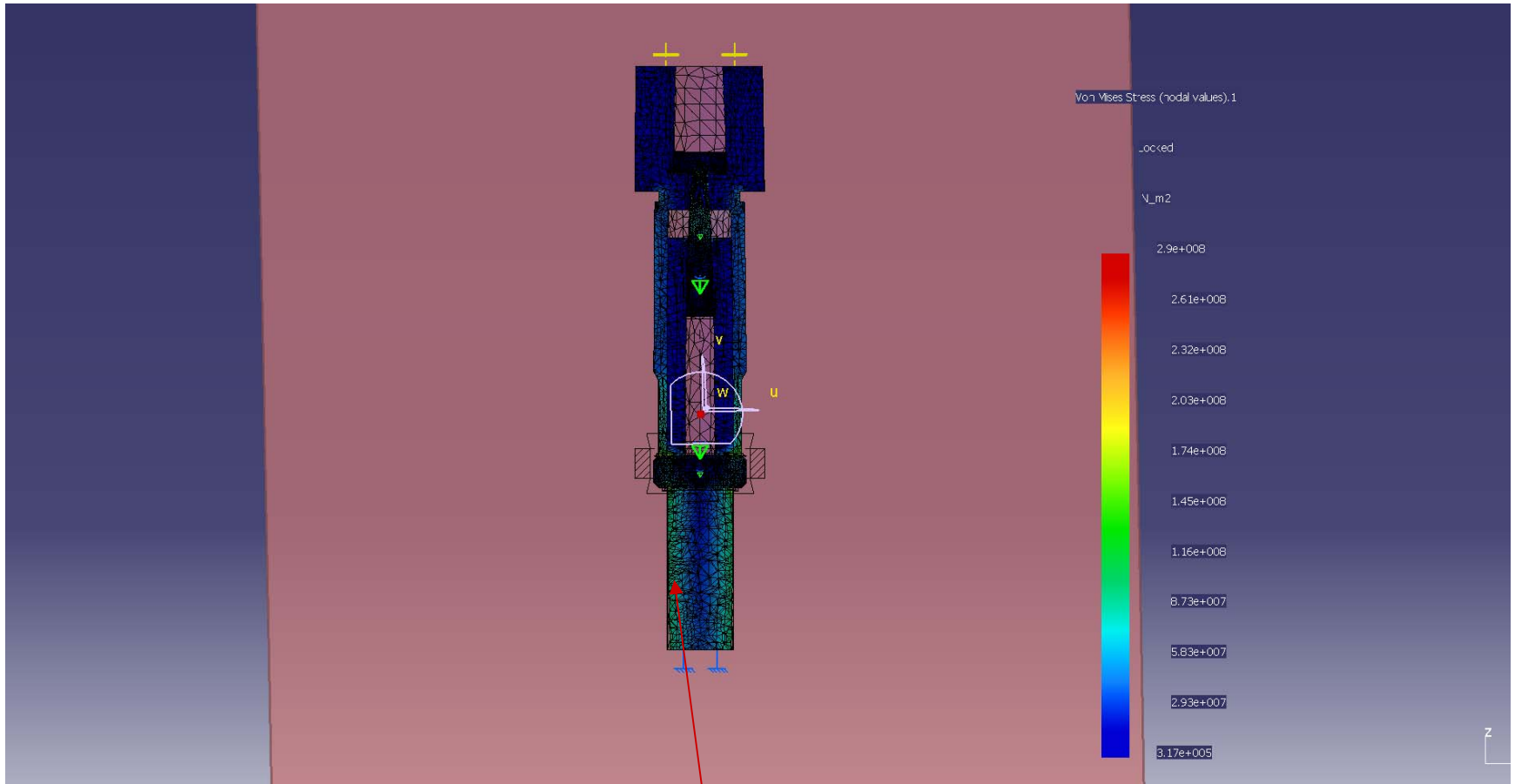
Note: No effort was made to design a proper screw with appropriate pre-load.
This may effect the analysis results

Von Mises-1



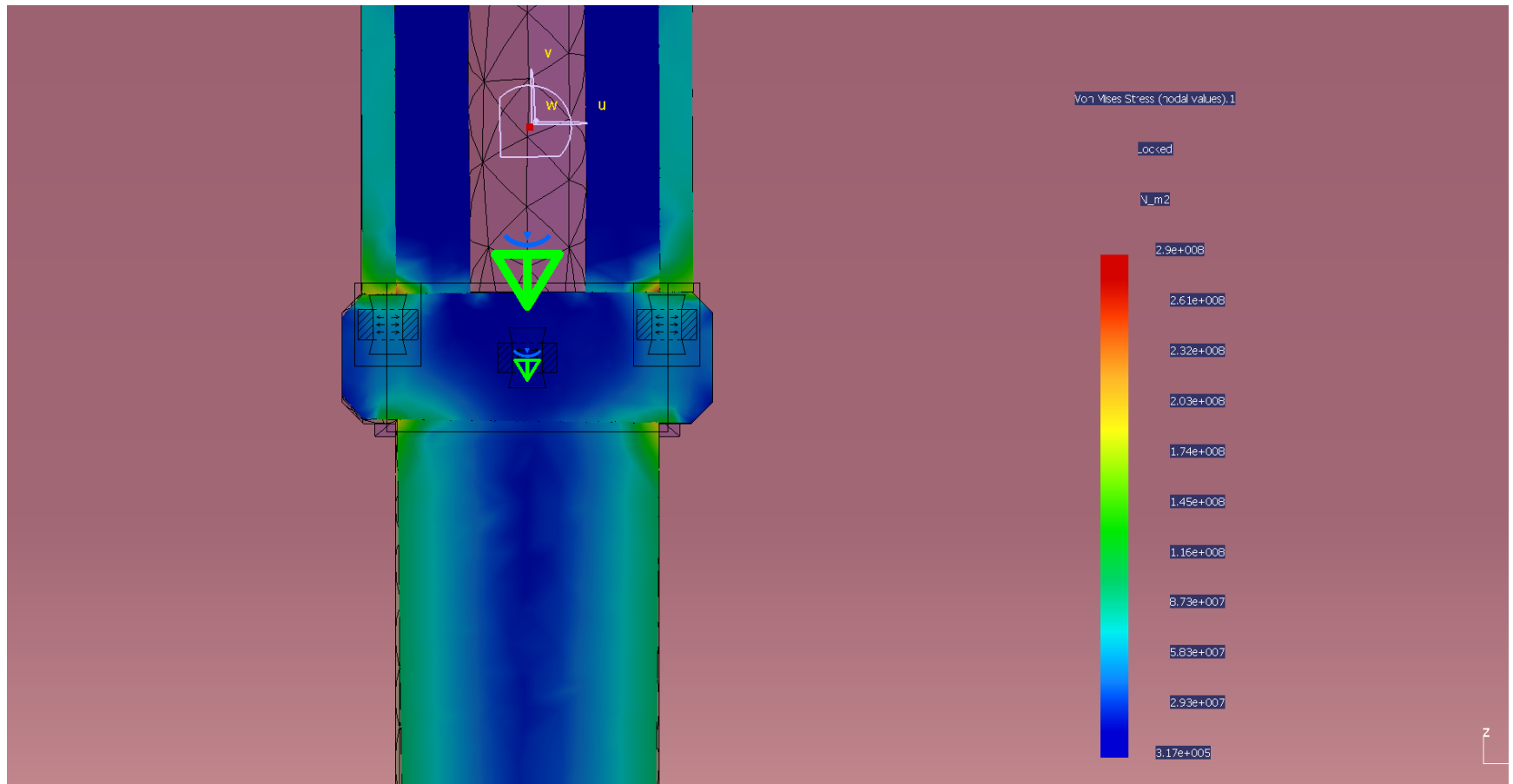
Stresses increase as one moves from the tool driver to the cross-pin and finally to the motor shaft. Smooth transition of the stresses takes place.

Von Mises-2



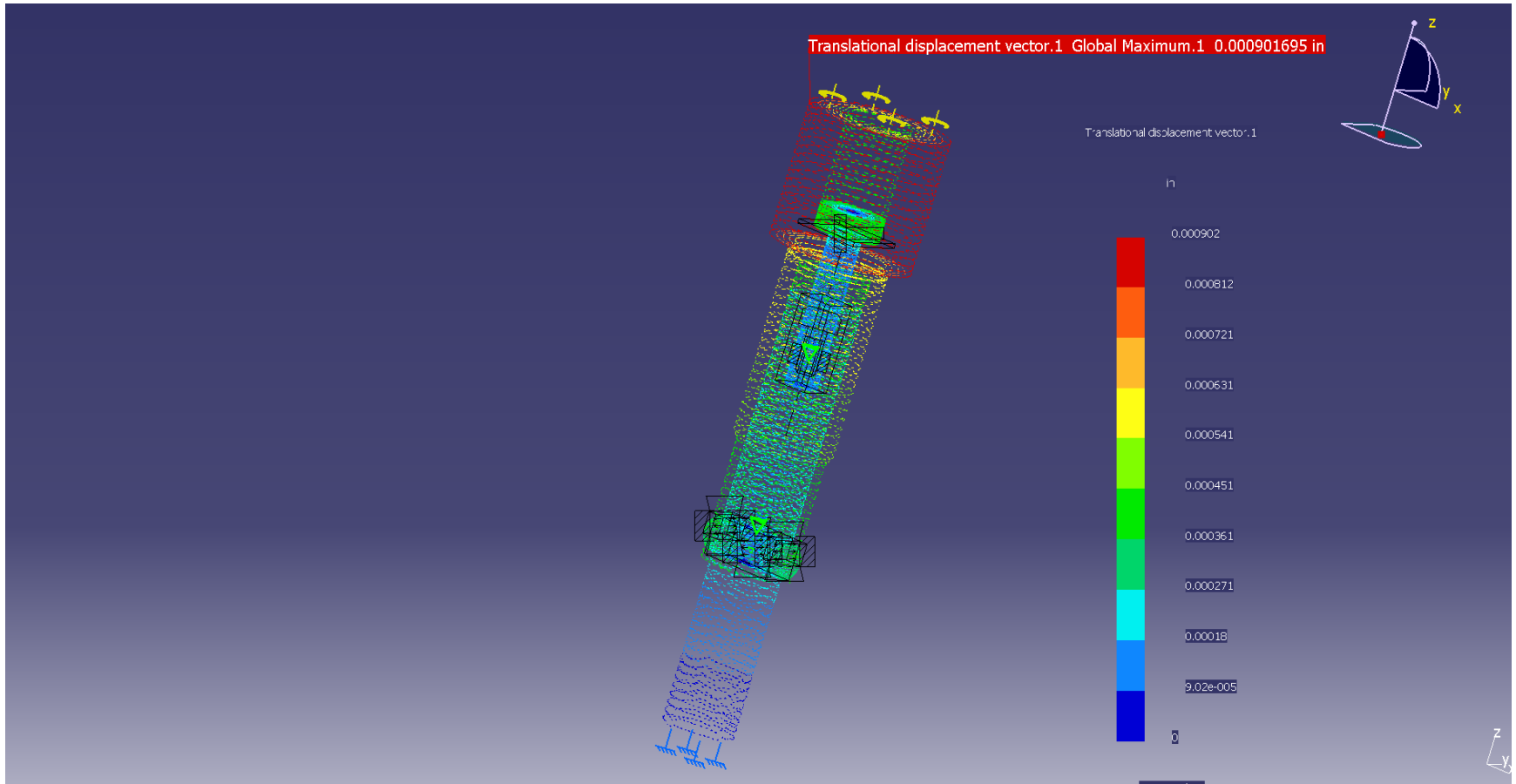
Sectional view indicates that max stresses are at the outer surface of the motor shaft

Von Mises-3



Detail view shows that max stresses are at the junction of motor shaft/tool driver/cross-pin. However, the stresses are well below the yield strength of the material.

Translational Displacement



Displacement is maximum at the application point and least at the motor fixed end as one would predict

Conclusion

- Proper pre-load on screw should be calculated before proceeding with actual prototypes.
- Without proper preload, it is quite possible that screw may become loose during usage.