

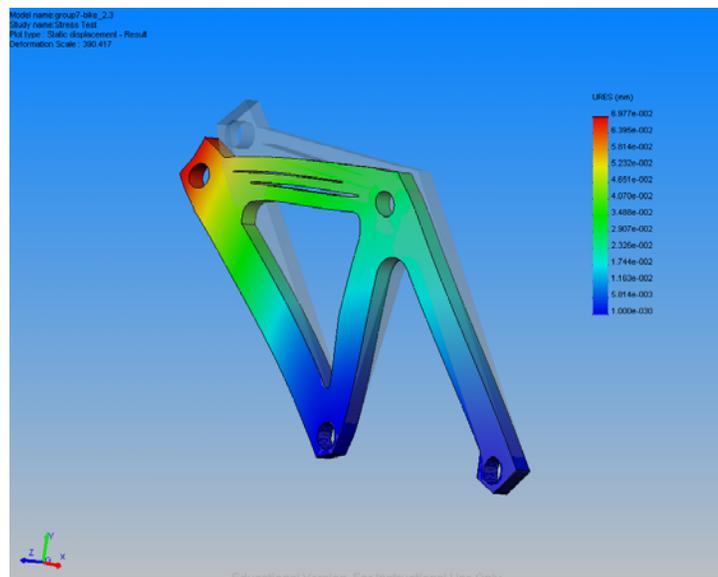
# Stress and Frequency analysis of Group 7 Frame

Author: John Head and Richard-Duane Chambers

## 1. Description

The Requirements document given to our group indicated that the performance requirements were to be considered secondary to mass constraints. The cost of the bike was not a large issue; in addition, the allotted funds were relatively high. Our basic design approach centered around mass reduction and placing structural members in direct line between forces and the reaction points. We found the "Seat" displacement requirement was very easy to achieve. However, in order to obtain a suitable value for the "Handle Bars" mass constraints became very difficult to meet.

## 2. Displacement Results



## 3. Conclusion

Continuing work in the development of the structure will focus on lowering the total mass and increasing natural frequency. However, this may prove difficult as the actions required to complete these tasks appear to oppose each other. The current mass of .265 lbs must be reduced by .035 lbs, while the first natural frequency must be increased to 340 Hz from its current position at 275 Hz. The designers also seek to lower the displacement at the seat by one hundredth of a millimeter (from .618 mm). At present, then, only the displacement requirement at the handlebars has been met and exceeded, yielding only .005 millimeters in the vertical direction. Therefore, further work may attempt to reduce the unnecessarily high safety factor around the handlebars in order to reduce mass, while strengthening the structure supporting the seat. Minor design changes may include cutting holes into areas which suffer only low stresses while thickening other areas in order to increase both natural frequency and resistance to bending.