

Figure 1

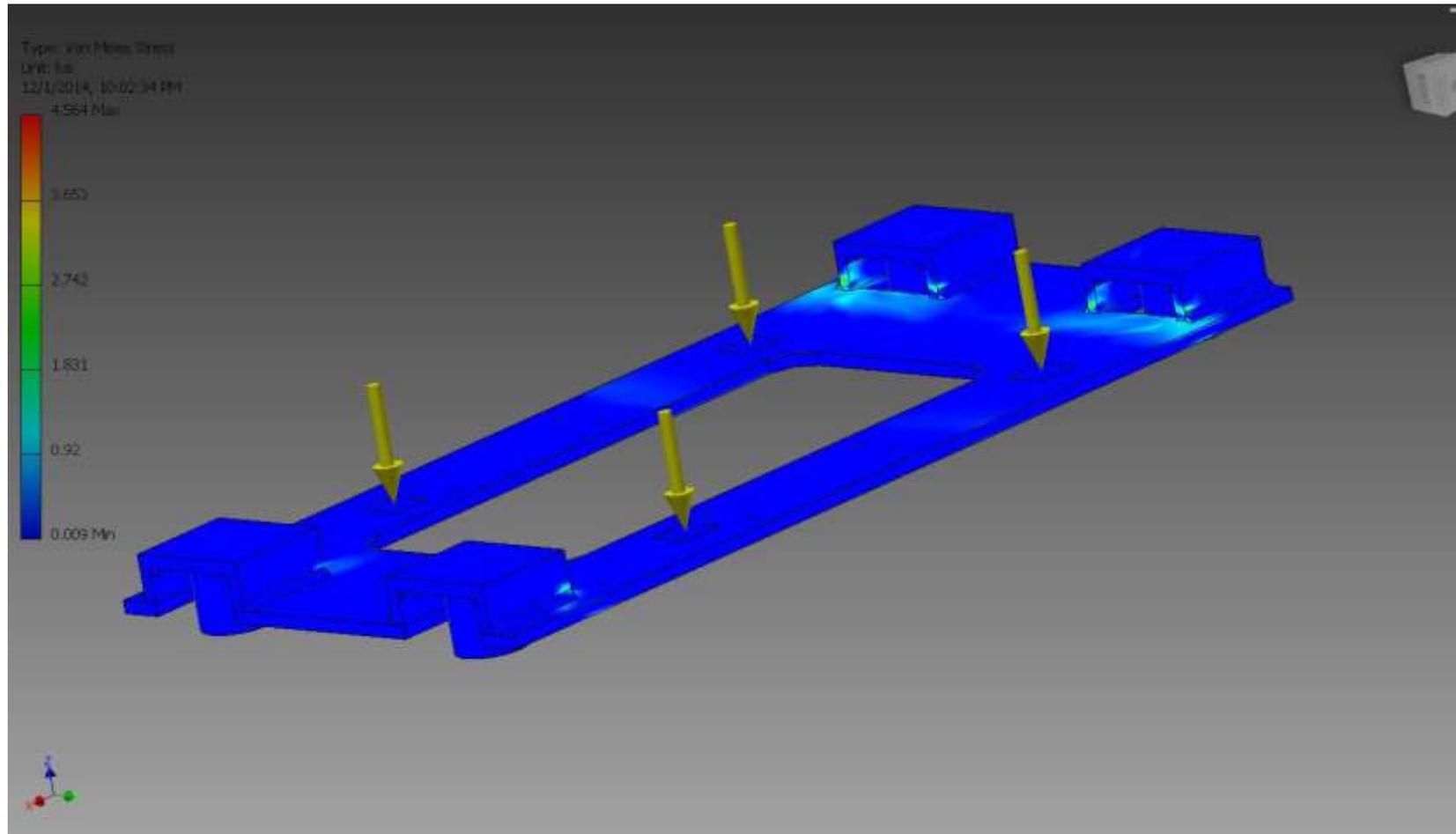


Figure 1 portrays the Von Mises Stresses that were dispersed along the bottom base plate. The four yellow arrows are the acting forces on the base plate and each is 100 pounds which adds up to a total of 400 pounds of force. The type of steel that was used was 304 stainless steel where its yield stress values are 36 ksi. The maximum stress concentrations occurred at the welded spots on the four ends of the base plate where it was 4.564 ksi which is significantly below the 36 ksi limit.

Figure 2

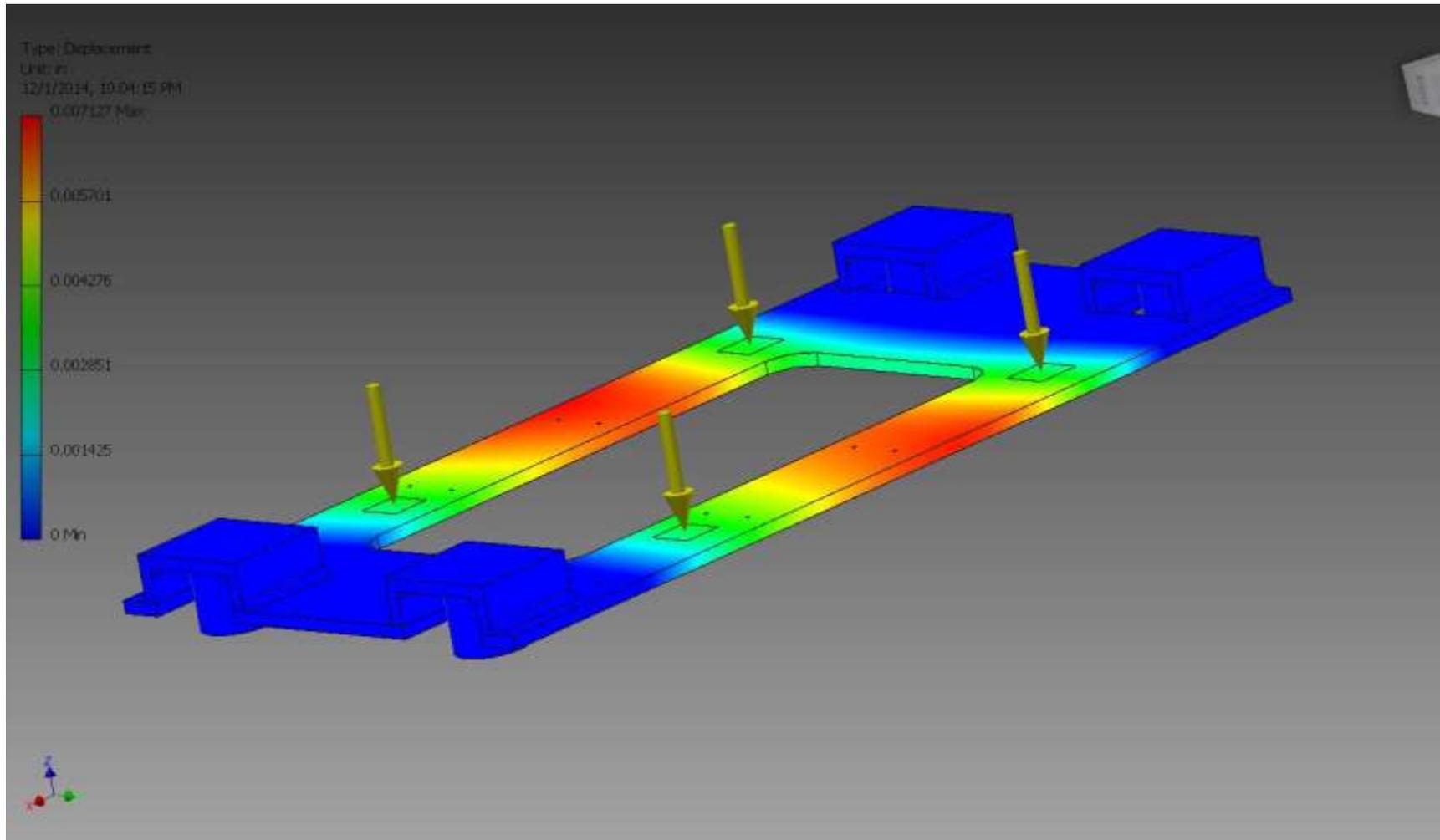


Figure 2 shows the displacement along the base plate. The fixed constraint positions occurred by the bottom of the 4 suction cups at each end of the base plate. The displacement occurred in the middle of the base plate where it underwent a natural bending motion. The maximum deflection was noted at 0.007" which is very low for 304 stainless steel. The maximum acceptable limit would be 0.035".

Figure 3

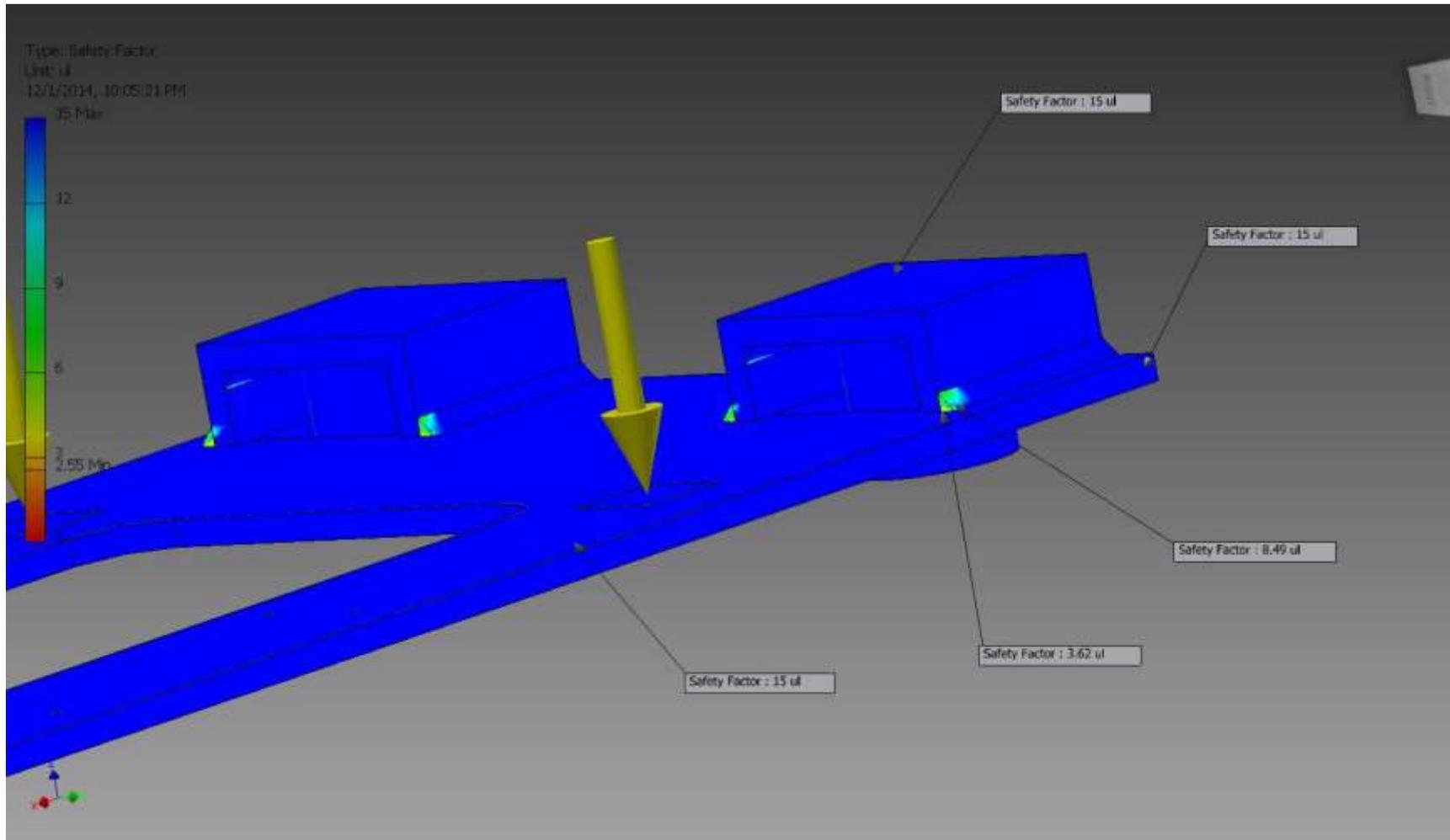


Figure 3 portrays the safety factor values along the base plate which ranged from 2.55 all the way to 15. Probes were taken to better portray the safety factor values in various locations on the base plate where stress concentrations were the highest. For this project the original accepted safety factor values were to be at least 2. The lowest which was 2.55 and in order for the base plate to fail, the total acting forces would have to exceed 1,020 pounds which highly acceptable.

Figure 4

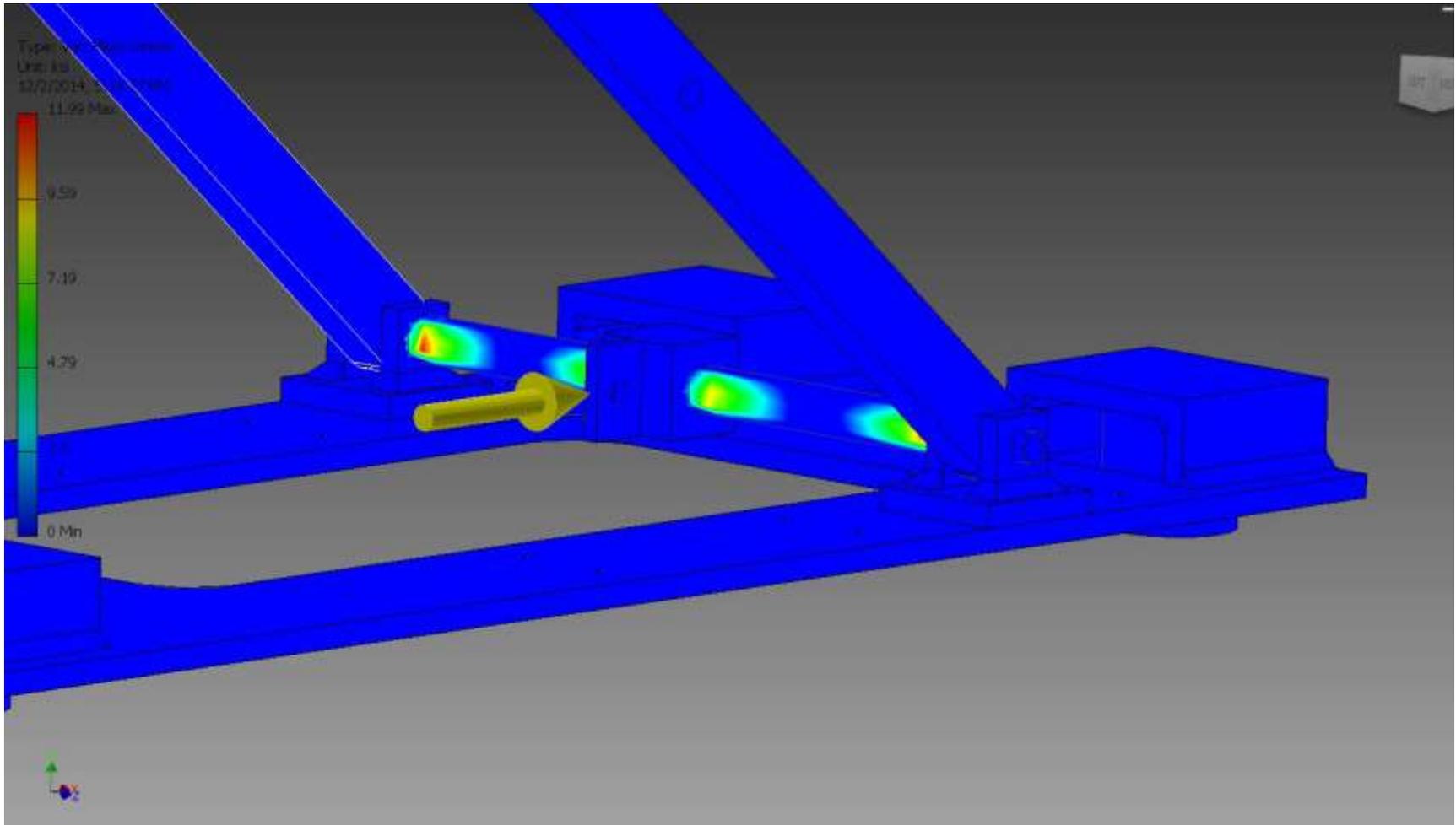


Figure 4 portrays the Von Mises stress values that occur on the rod bearing the actuator force and user weight. The total load value was 350 pounds. The maximum stress that occurred was 12 ksi which is significantly lower than the 36 ksi limit.

Figure 5

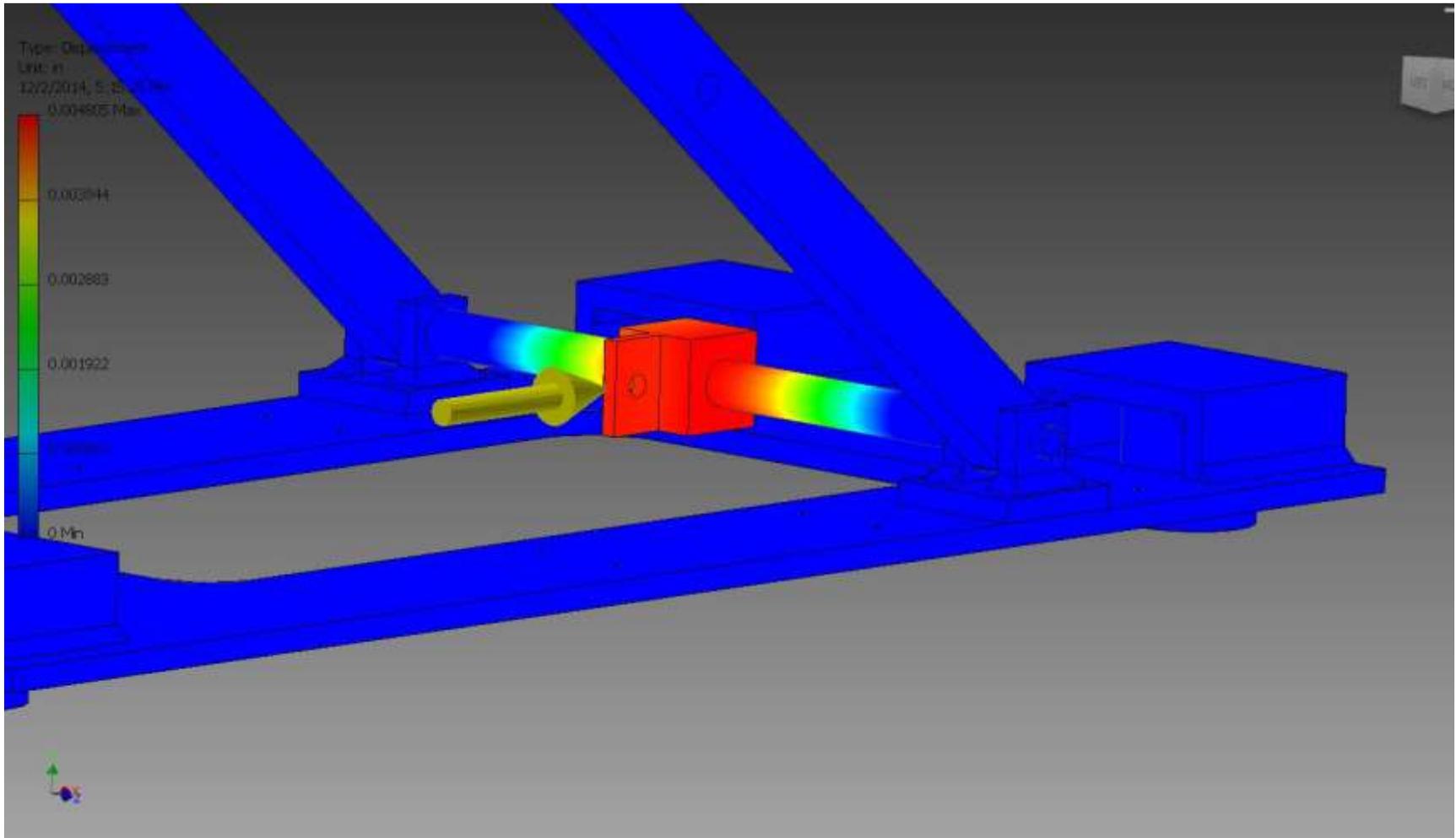


Figure 5 shows the displacement values that prolong along the rod bearing the forces. The maximum displacement values were roughly 0.005" which successfully passes the deflection test for 304 stainless steel. (The maximum displacement limit is usually 0.035").

Figure 6

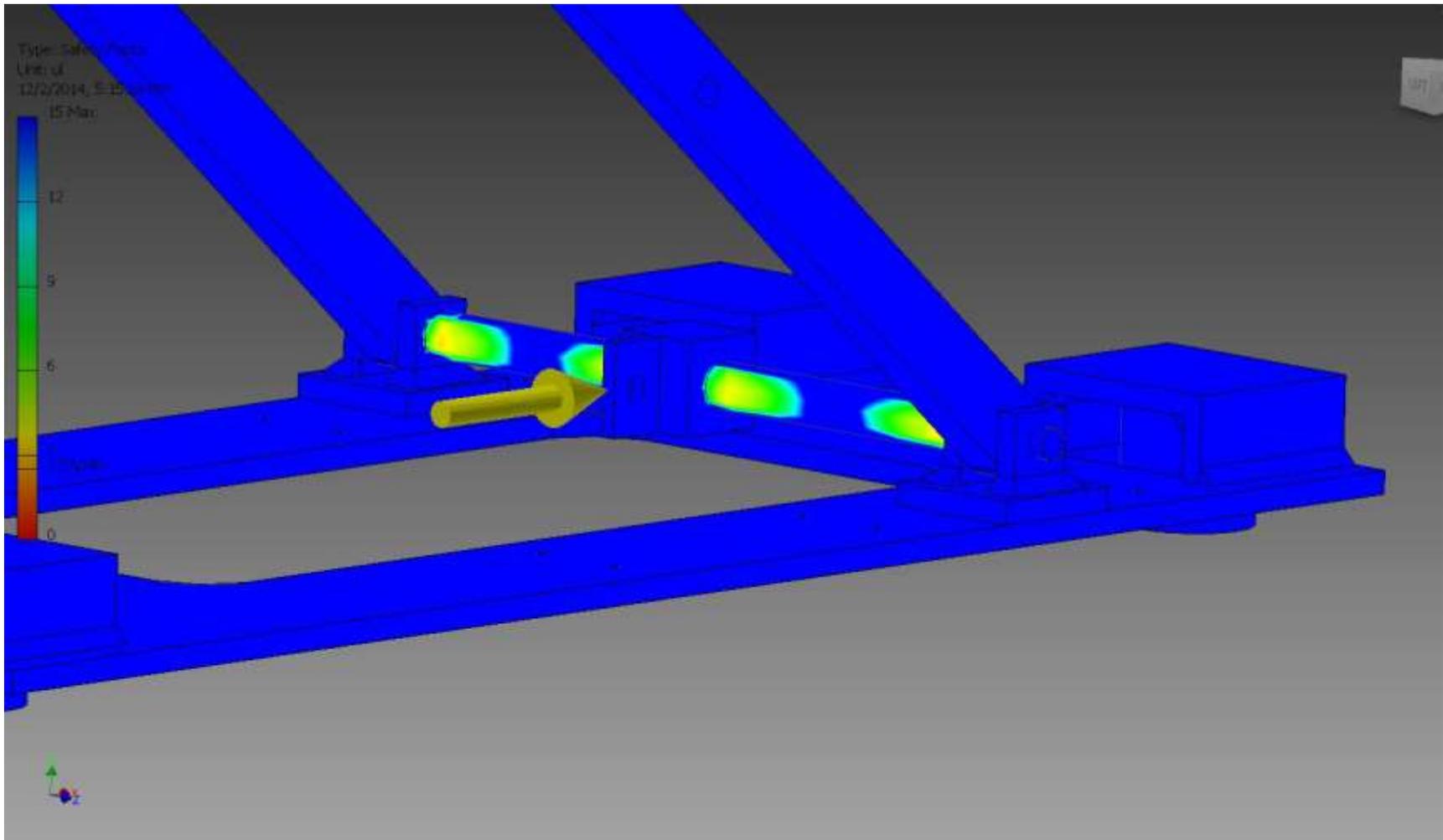


Figure 6 shows the safety factor values that are along the rod supporting the load. The stress concentrations occurred close to the pin ends by the clevises and also by the rod adapter piece. The lowest safety factor value was 2.51 which is satisfactory. The desired safety factor range for this project is 2-4.