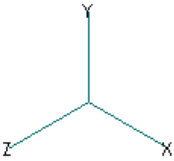
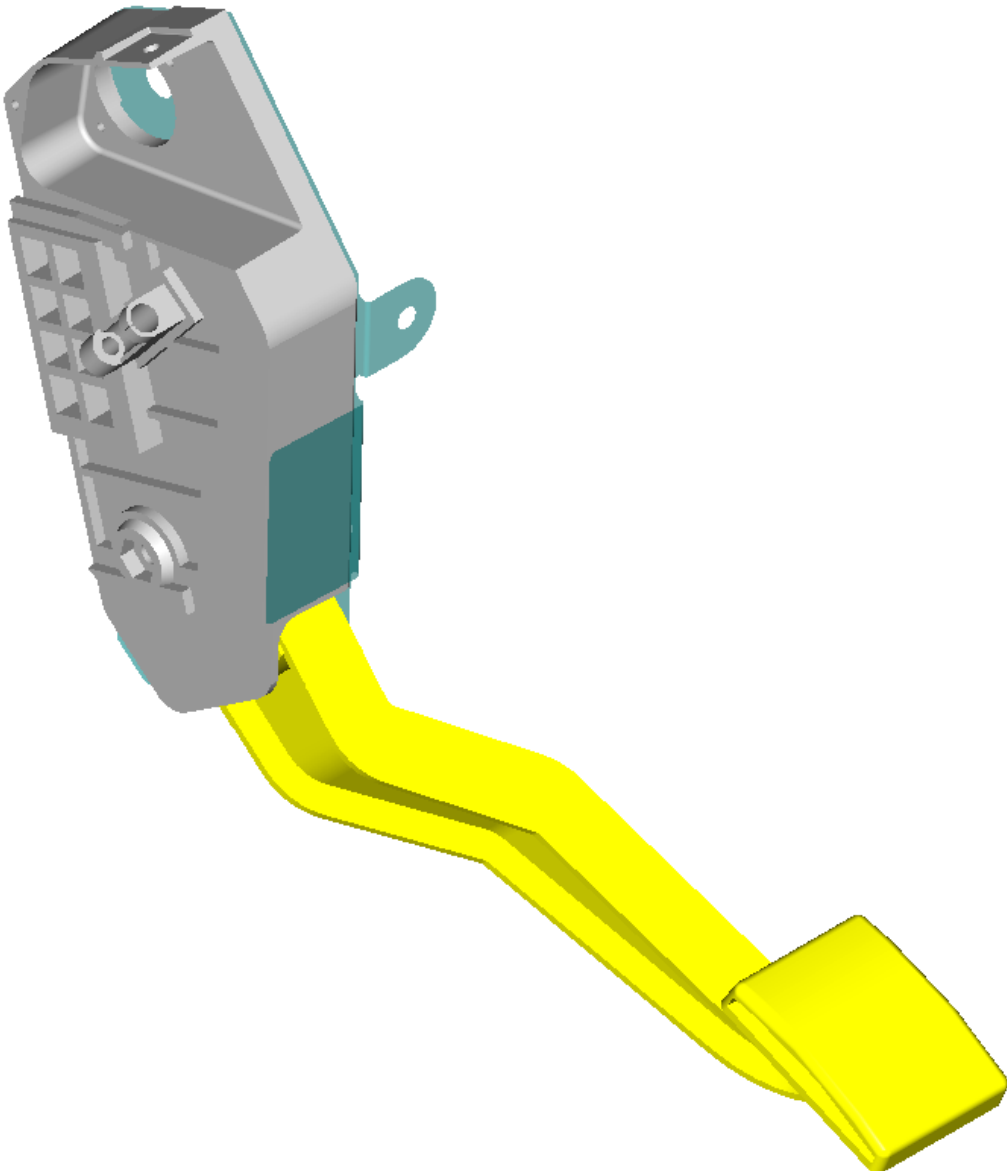
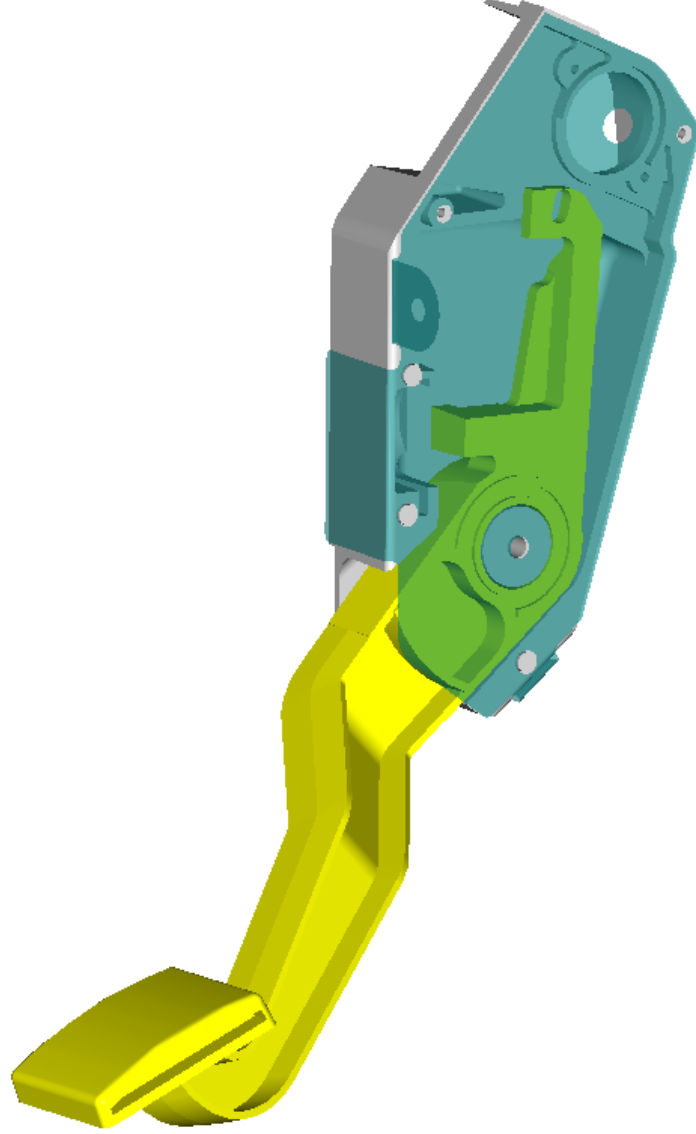
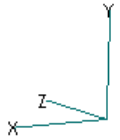


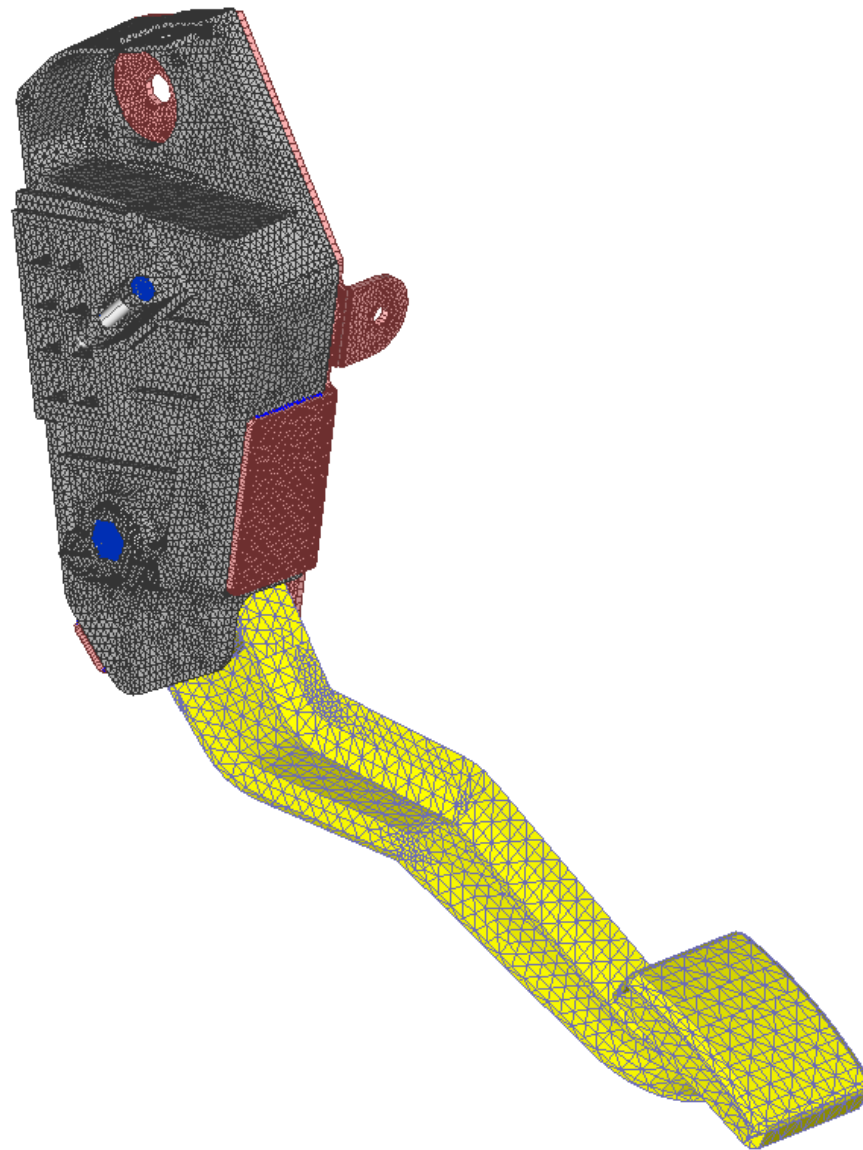
Williams Controls: Nonlinear finite element analysis of plastic throttle pedal assembly involving extensive contact behavior between the pedal arm, body, and cover plate. These high-strength plastic parts were rigorously evaluated to optimize the design for extreme durability. Modeling notes: material non-linearity was also included in the analysis strategy to better understand the elastic-plastic deformation response of the Nylon 66 throttle pedal.



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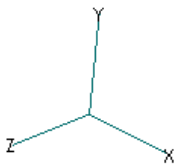
Geometric description of the RVI-Premium throttle pedal assembly.

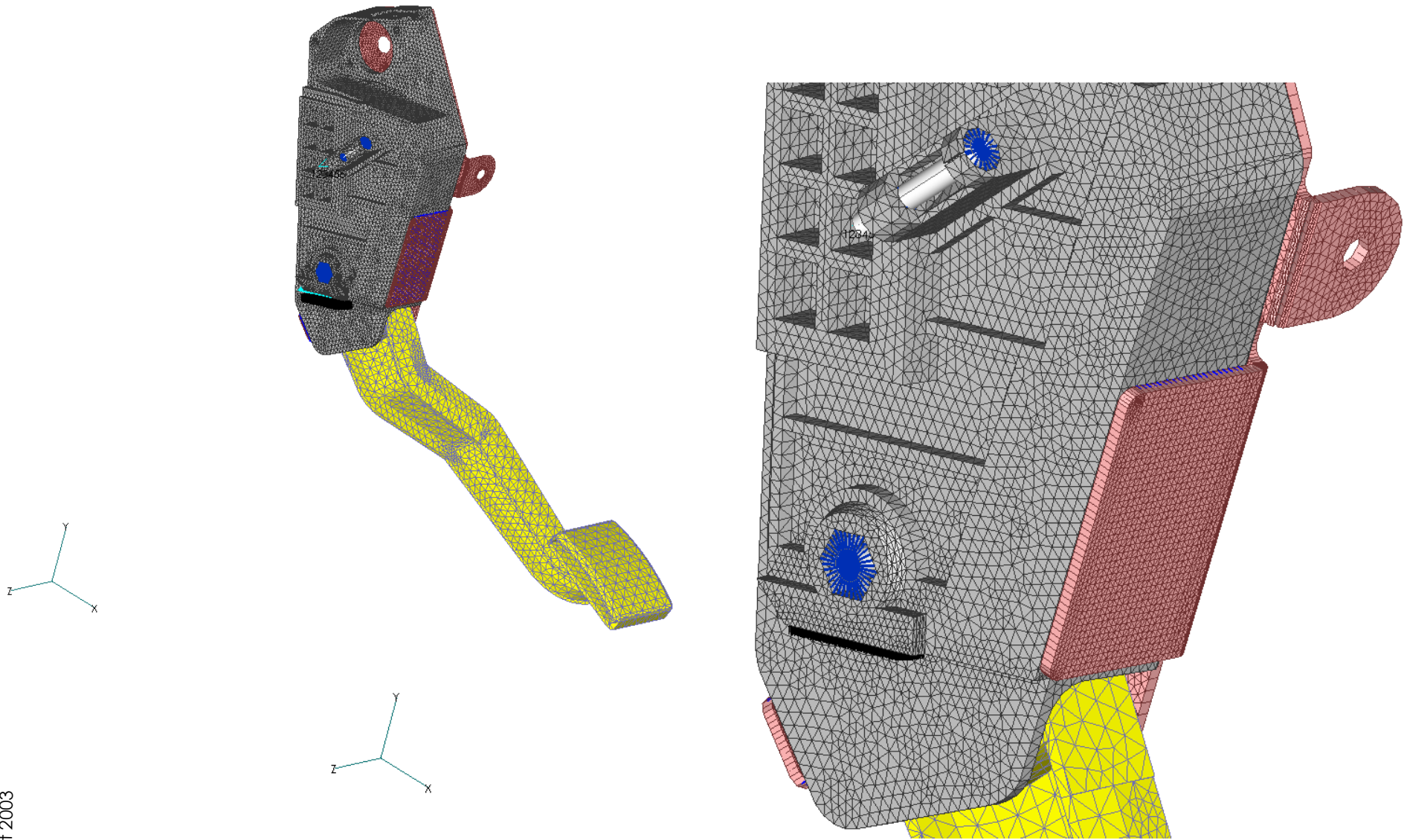




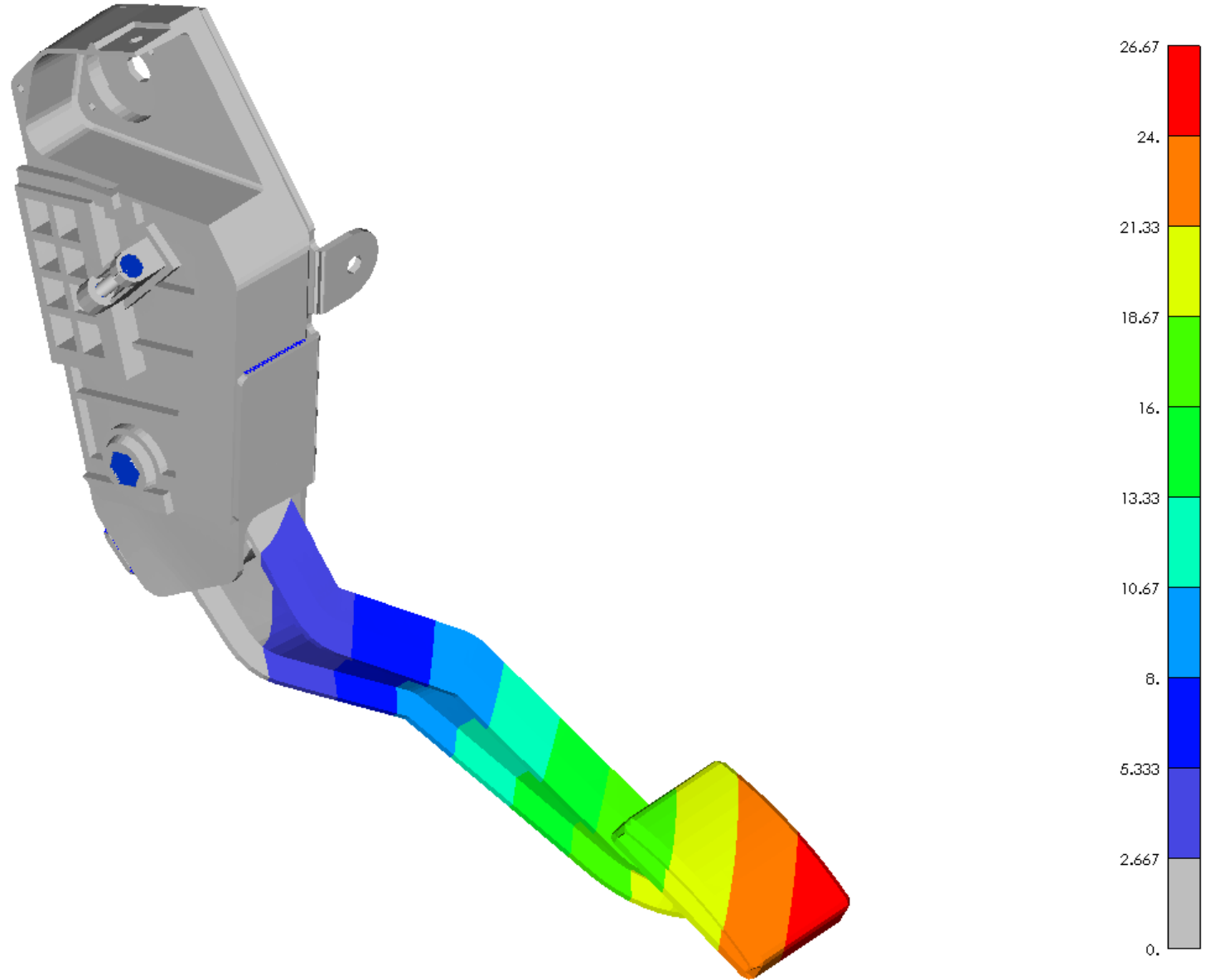
Solid 10-node tetrahedral elements were used for the body and pedal structures. The cover plate was modeled using three-node plate elements. The choice of these three-node elements was required to facilitate the match up of grid patterns between the body and cover where gap and rigid elements were connected. Although three-node plate elements are exceeding stiff, a very high mesh density was used to correct for this deficiency. The cover was modeled as 2.54 mm thick.

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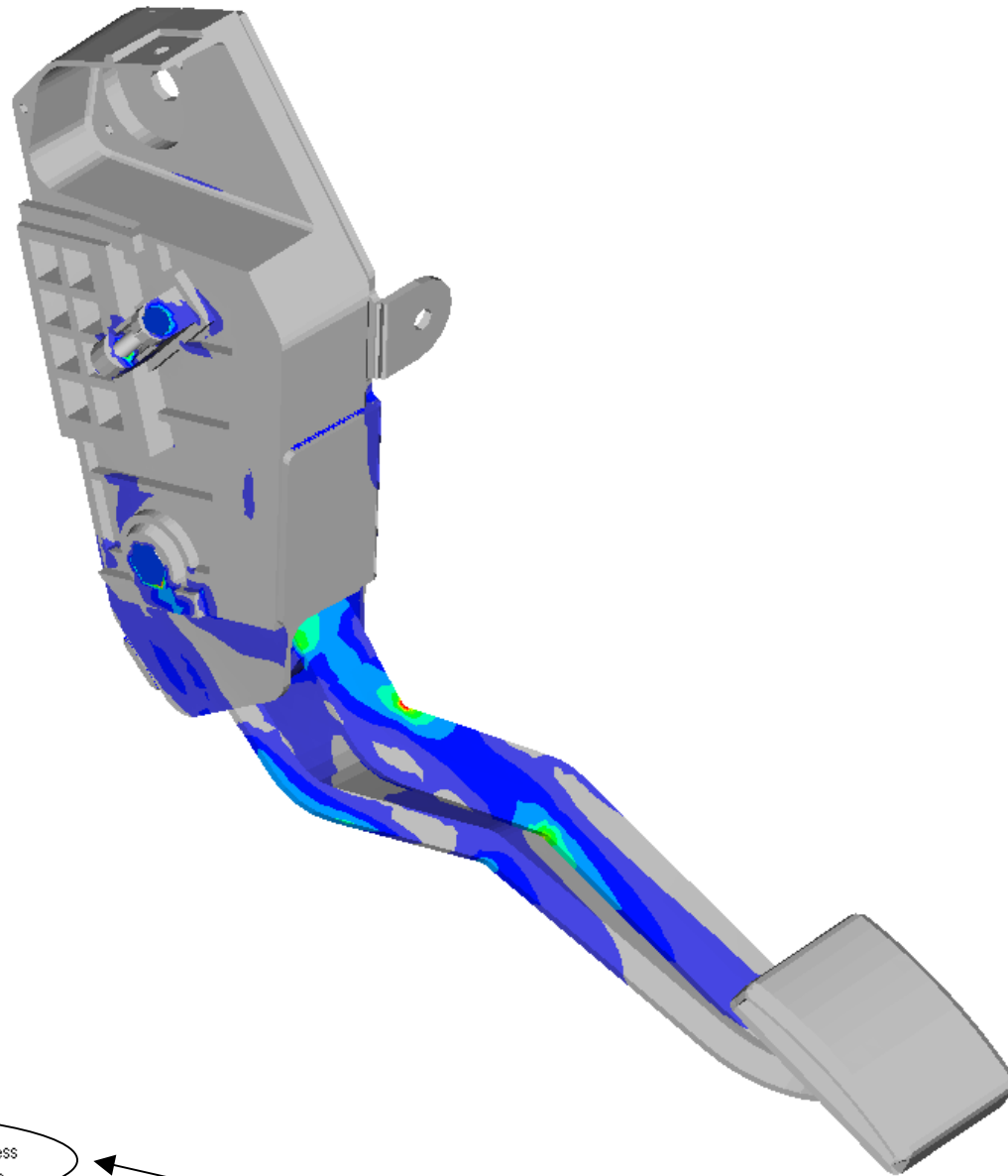


A very simple constraint set is used in this analysis. The pin attachment bolt (upper part of the body) is fixed to simulate its contact with the base. At the lower sliding connection, a small chunk of plastic is used to enforce contact (gap elements on all sides) between the body and base.



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The total translation component is contoured over the structure. The maximum deformation is 26.7 mm and is at the tip of the pedal.



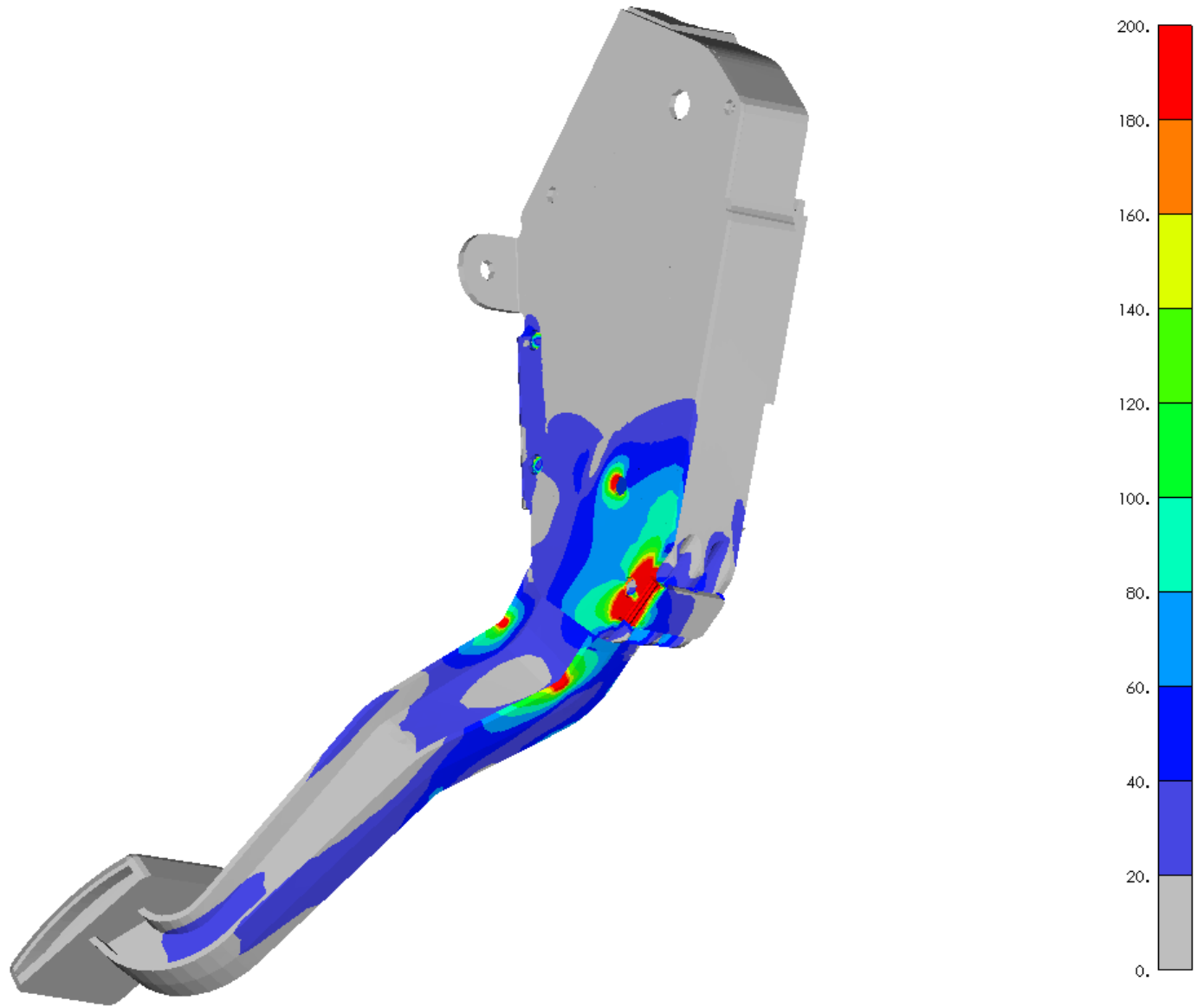
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- Output Set: 500 N Stomp
- Deformed(26.67): Total Translation
- Contour: Plate Bot VonMises Stress
- Contour double: Plate Top VonMises Stress
- Contour additional: Solid VonMises Stress

The von Mises stress component is contoured over the structure. The stress legend is capped at 200 MPa. The deformed shape of the structure is scaled 1-1.

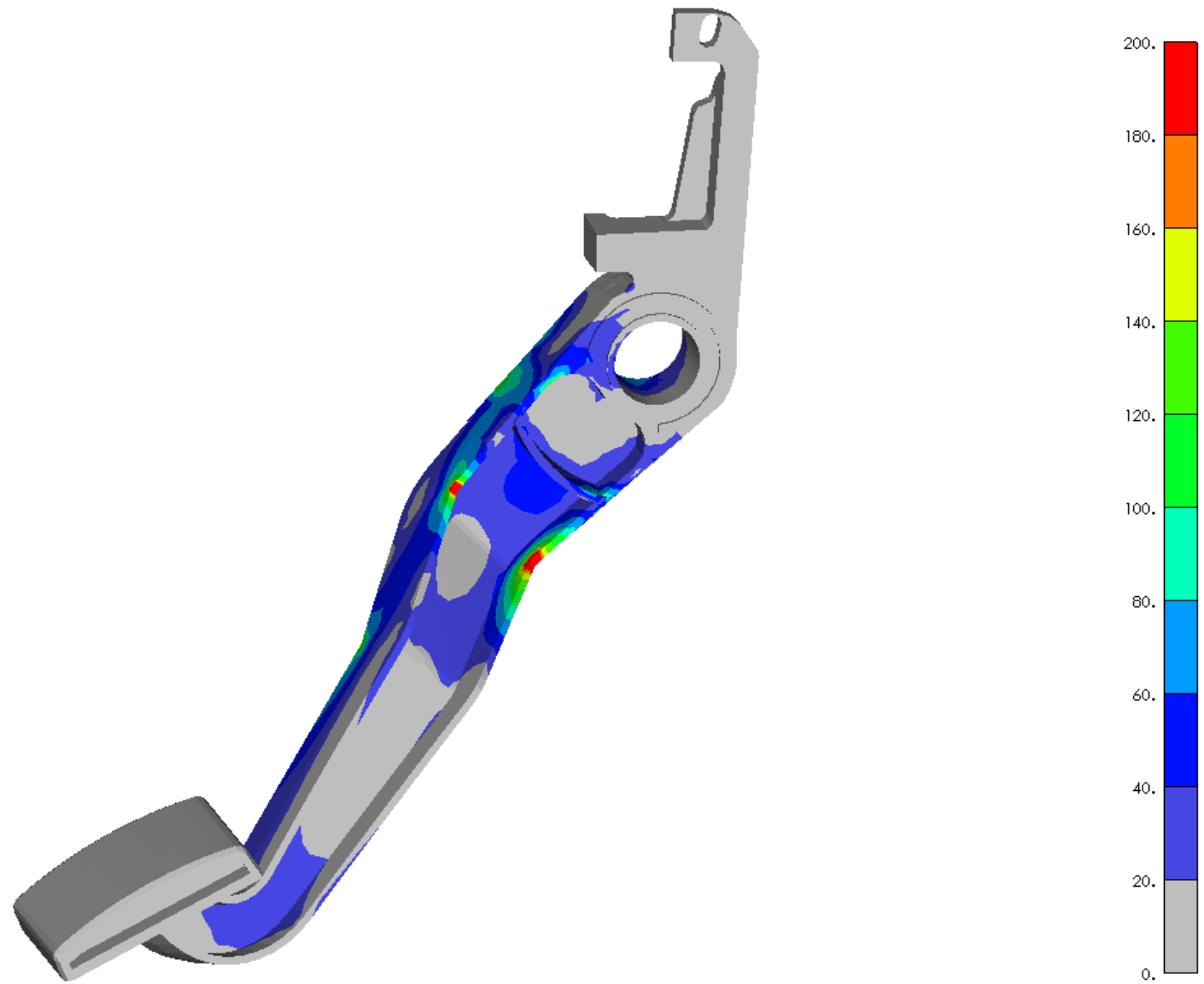
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Output Set: 500 N Stomp  
Deformed(26.67): Total Translation  
Contour: Plate Bot VonMises Stress  
Contour double: Plate Top VonMises Stress  
Contour additional: Solid VonMises Stress



Peak stress in the structure is within the cover where it supports the base structure underneath the pedal arm. Subsequent slides will document individual component stresses.

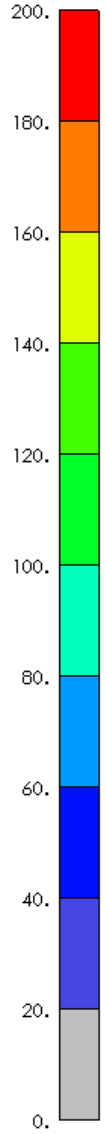
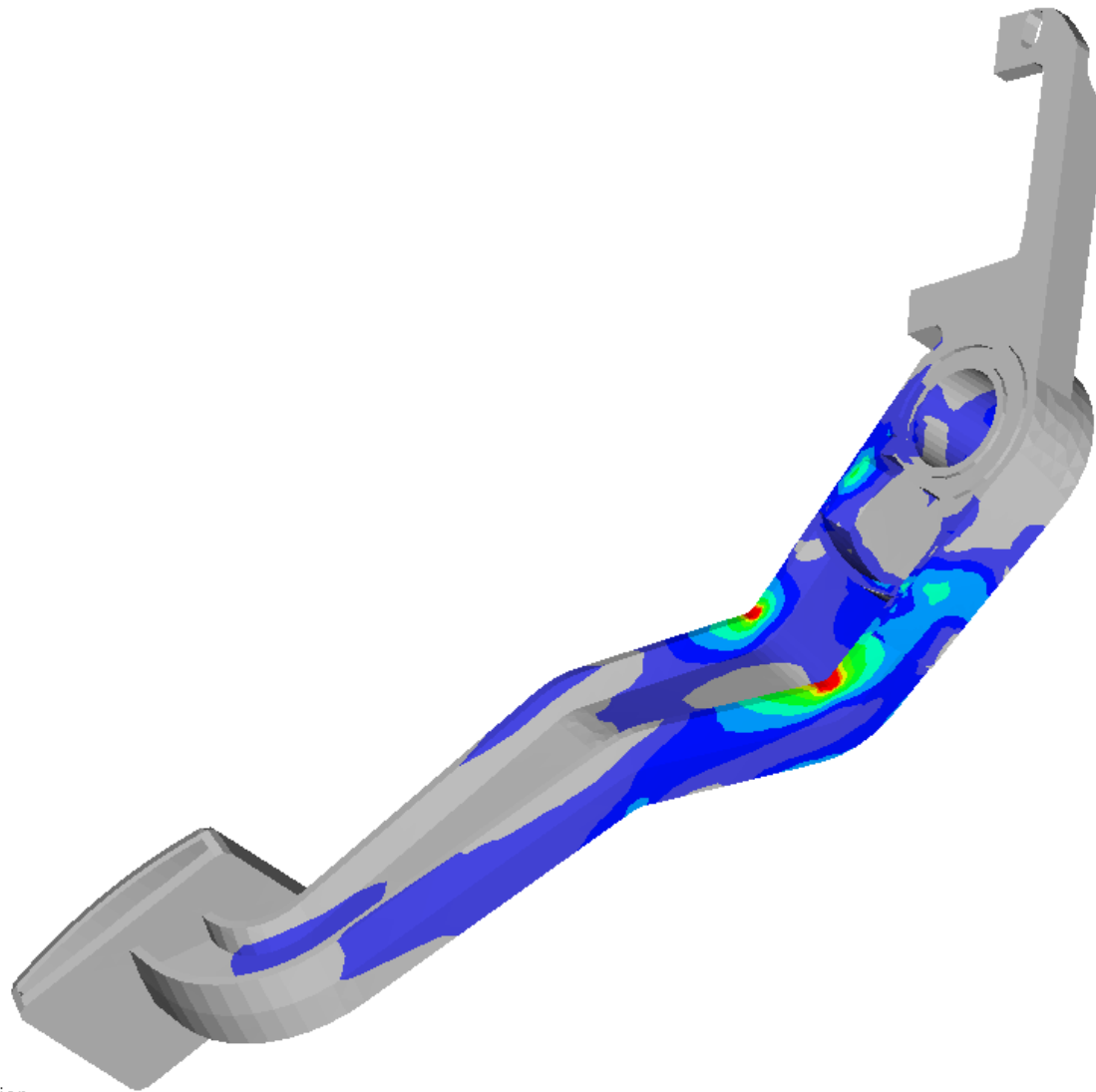




Output Set: 500 N Stomp  
Deformed[26.67] Total Translation  
Contour: Plate Bot VonMises Stress  
Contour double: Plate Top VonMises Stress  
Contour additional: Solid VonMises Stress

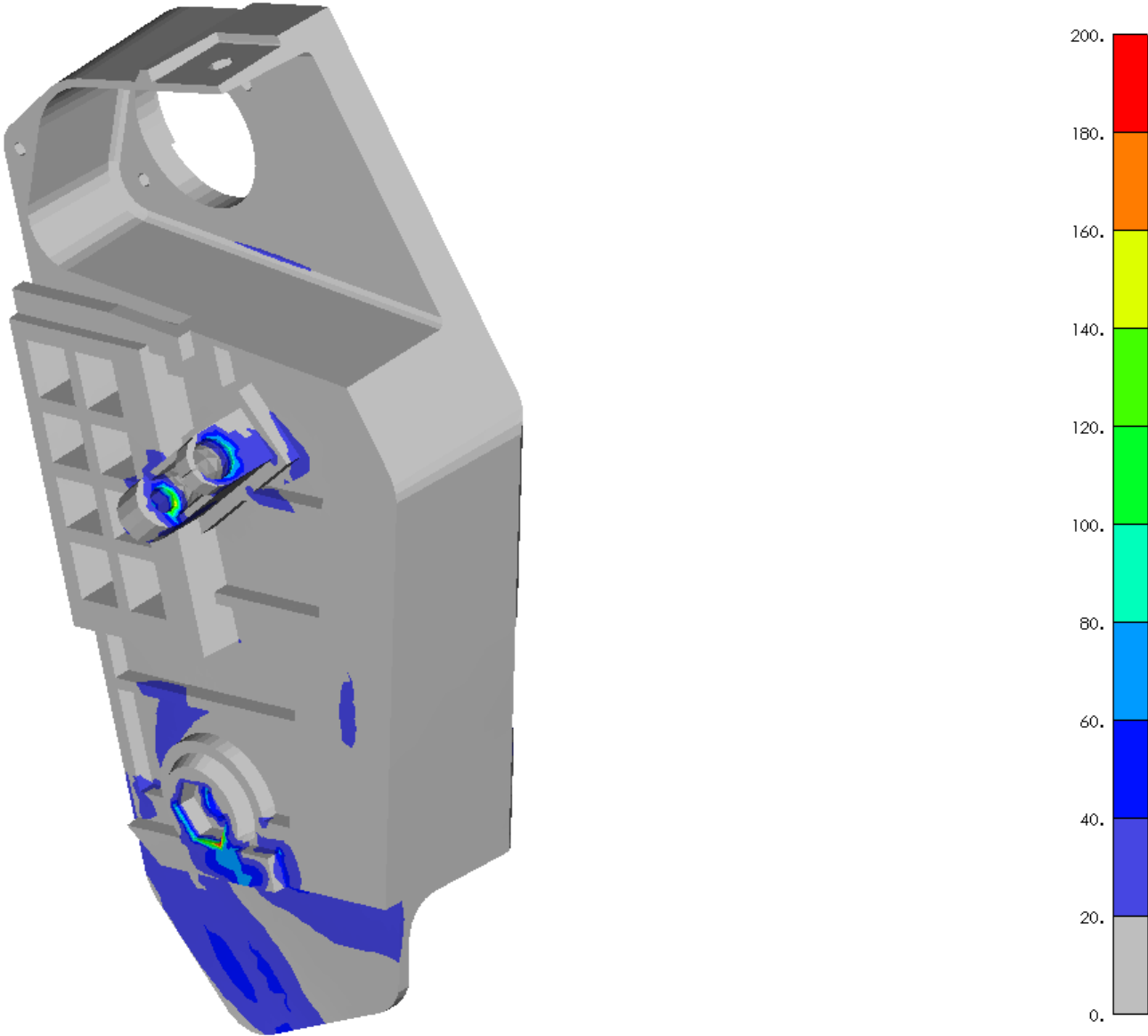
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Stresses in the pedal arm are documented in the subsequent slides. The stress legend is capped at 200 MPa to better differentiate stress levels within the part.



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Output Set: 500 N Stomp  
Deformed(26.67): Total Translation  
Contour: Plate Bot VonMises Stress  
Contour double: Plate Top VonMises Stress  
Contour additional: Solid VonMises Stress



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Y  
Z X  
Output Set: 500 N Stomp  
Deformed[26.67]: Total Translation  
Contour: Solid VonMises Stress

This next section displays the stresses in the body component.