

respectively. The maximum stress exceeded the material limitations which means improvements shall be made^[2].

V.Improvements

Sine the maximum stress exceeded the material limitations, strengthening components should be designed to strengthen the weak positions(Fig 6). Analysis of it indicates this component will make the maximum displacement and stress within material limitations.

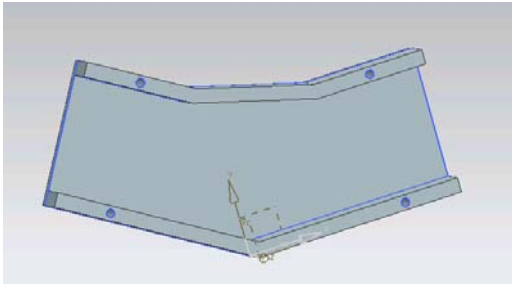


Fig 6 strengthening component

VI.Discussion

We also used Hyperworks to validate the model using another shell element type algorithm^[3]. However, the validation shows a slight difference in the displacement in the three dimensions. Although the variation will not influence the structural stability and safety, further validation shall be done to verify the variations.

Moreover, since this vehicle, which is based on the frame, will join the competition to compete for the lowest oil consumption, the frame seems to be a little bit heavy. This means further improvement shall be made if more appropriate materials are available^{[4][5][6]}.

The lightweight design and improvement should not be relied only on materials, rather, optimization of components and structure shall be considered when designing^[7].

VII.Conclusions

Simulation using ANSYS 12.0 and Hyperworks has successfully validated the model in static conditions and dynamic conditions with the safety index in mind. Based on the solutions, new component was designed to strengthen the frame. After improvements above, all statistics, including displacement, stress and load distribution are within the material limitations. The model is appropriate for the vehicle to join the competition.

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