Nissan 300zx Modified Steering Angle

Mechanical Engineering

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Abstract

Automotive Drifting is a driving style in which the driver uses the throttle, brakes, clutch, gear shifting and steering input while maneuvering from turn to turn. K.E.M.B group selected the Nissan 300zx to improve its steering efficiencies. The OEM steering system only allows for 35 degrees or less of steering angle however, the group's objective is to increase the steering angle to 60 degrees while keeping the OEM suspension geometry. The group used SolidWorks and other software's to analyze the components.

Installations

K.E.M.B came to the conclusion that three main suspension components are needed to achieve the goal: an adapter for the knuckle, a one piece front lower control arm , a tension rod combo and an offset Heim joint.

The knuckle adapter adapts to the knuckle where the front lower control arm and the outer tie rod would normally go.

The lower control arm will still go through the left hole shown in the first fig as well as the original mounting hole on the knuckle. The hole will be bolted to the knuckle where the outer tie rod would originally go. The middle hole is the new position for the outer tie rod connection.

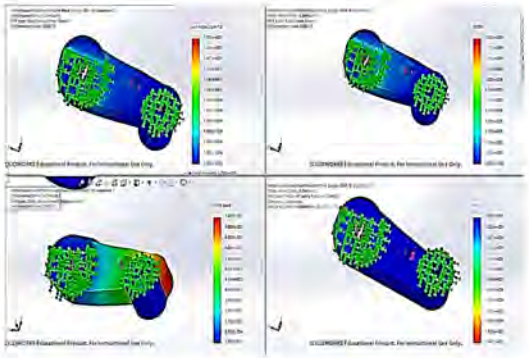
Fig(1):Knuckle Adapter

Fig(2): Knuckle With Adapter

Fig(3) :New Front Lower Control Arm

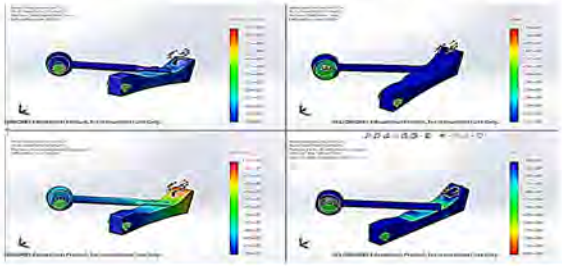
Design and simulations

Simulations were done using SolidWorks , and the following figure's shows the simulations of the knuckle adapter. The goal here is to have the adapter reach a factor of safety equal to or greater than the O.E.M knuckle. The simulations resulted in a factor of safety of 5.



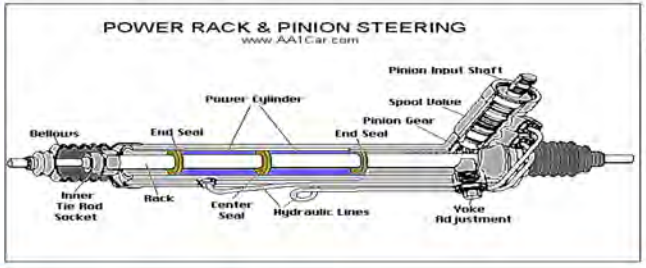
Design and simulations

The following figure shows the simulations for the O.E.M front lower control arm and the tension rod combo. Results show a factory safety of (3). The simulations of the new front lower control arm and the tension rod presented a larger factor of safety. KE.M.B used the analysis to verify that the lower control arm will hold the forces acting on it



Calculation

All forces were calculated and generated using MATLAB. A strain gauge was used to collect the strain on the factory components and comparing the results with the data obtained from SolidWorks simulations. K.E.M.B performed multiple tests and to assure a correlation between data.



Sponsors/Conclusion

It was an intensive project due to hard calculations and long hours that were spent on the project however, with the consistency of hard work and teamwork, the group was successfully able to finalize a design and come up with a final decision that made the best model. Finally we were able to design a steering system that gives us the desired 60 degree steering angle that K.E.M.B aimed for.

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