Hydraulic steering and fifth wheel

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Problematic

A custom steering system is necessary for the development of the autonomous car from the engineering department.

The escalated steering system and fifth wheel will the students to understand how an automotive plant works by demanding constant communication between the different areas of work.

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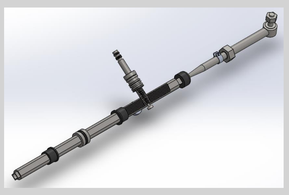
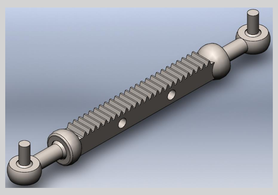
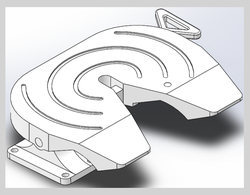
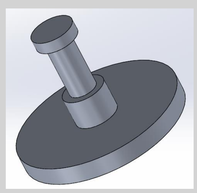
CAD Design


Ackerman Steering


Escalated steering


Fifth wheel


Kingpin

Results and analysis

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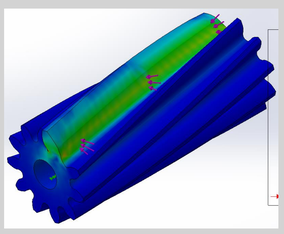
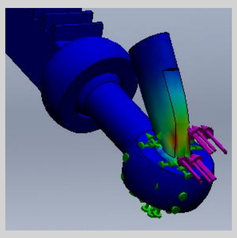
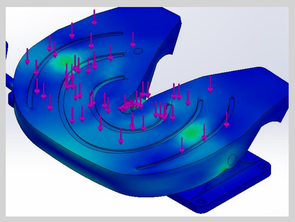
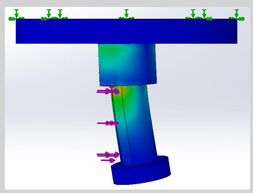

Ackerman pinion kingpin


Escalated steering system pin


Fifth wheel


Kingpin

Part/Load [Newtons]	Maximum Stress [N/m2]	Maximum permissible stress [N/m2]	Test load[N]
Ackerman pinion [2000]	9.459e+07	3.516e+08	NA
Scale Steering kingpin [30]	8.050e+06	2.184e+07	50
Fifth wheel [70]	3.377e+06	2.184e+07	100
Kingpin [50]	9.377e+06	2.757e+07	70

Ethical dilemma

The most important feature of the three systems is the security, a bad design, construction or use may result in accidents with material or human losses.

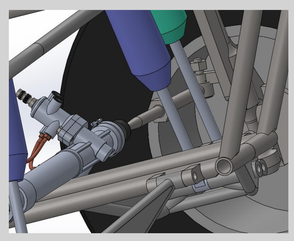
General Objective

Develop a steering system that can be used in the autonomous car; and the steering system and fifth wheel to be used in the escalated truck.

Specific Objectives

- Design and draw in CAD an assisted steering system that fits in the given autonomous car structure.
- Design, draw and implement a fifth wheel and steering system for an escalated truck.

Prototype


Assembled hydraulic steering system

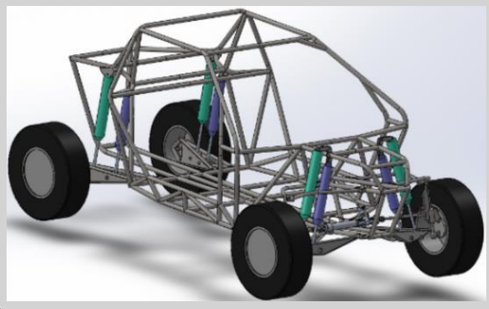

Escalated steering system (PLA)

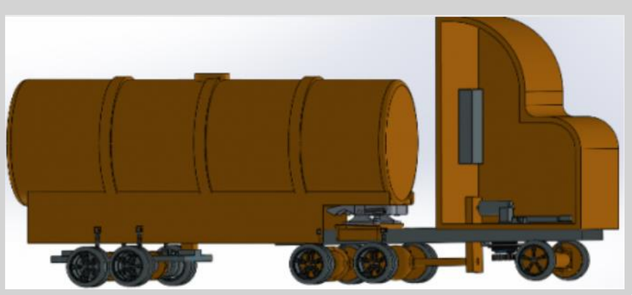

Fifth wheel (PLA)


Kingpin

Future work

- Design of an alternative assistance for the Ackerman steering system.
- Implementation of the Ackerman steering system in the autonomous vehicle.
- Fifth wheel, kingpin and steering system assembly into the escalated truck.





Conclusion

The objectives where successfully met. The Ackerman steering system assembled into the given vehicle structure without interferences. The test and simulations of the escalated parts did not present any fractures.

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