Housing Design for Commercial Truck Tires
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Overview
Goodyear has tasked the team with designing an improved antenna housing prototype. The bulk of the project involved the design, analysis and testing of a prototype able to withstand the dynamic stress loading associated with the weight of a semi-truck.

Objectives
The design should focus on durability, but should also be lightweight, portable, and easy to set up. Certain parameters, such as antenna tilt angle, RF transparency and distance between antennas in different sections, must also be met. The prototype should be split into six sections, with each section holding two antennas. The team should be able to construct all six sections for testing.

Approach
The team’s approach was as follows:

- Visit Goodyear to get a complete description of the problem.
- Create a list of customer needs based off of Goodyear’s deliverables.
- Perform external research to find any existing solutions or relevant ideas.
- Create a list of engineering specifications based on customer needs and research.
- Brainstorm ideas and teleconference with Goodyear regarding promising ideas to get feedback.
- Create concept drawings.
- Use concept screening and concept scoring matrices to choose a final concept for further design.
- Create CAD model of the final concept and perform stress analysis.
- Do material research and acquire samples to be sent to Goodyear for dielectric testing.
- Refine the concept as needed after discussion with Goodyear.
- Create alpha prototype from plywood and field test it and then refine the CAD design.
- Perform further FEA analysis.
- Create beta prototype from plywood.
- Visit Goodyear for RF testing.
- Perform final design revisions.

Outcomes
- The sponsor will receive the beta prototype for further testing.
- Durability of the prototype was significantly improved from the initial prototype.
- Recommendations for material choice and mass production methods will be provided to the sponsor.