UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE of ENGINEERING

Senior Design Project Description

Company Name	Husqvarna	**Date Submitted**	04/23/2018
Project Title	Telescope/Tilt Steering Wheel	**Planned Starting Semester**	Fall 2018

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person. Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

Discipline	Number	Discipline	Number
Mechanical	6	Electrical	
Computer		Systems	
Other ( )			

Project Overview:

Husqvarna Group

The Husqvarna Group is a global leading producer of outdoor power products for forest, park, and garden care. Products include chainsaws, trimmers, robotic lawn mowers, and ride-on lawn mowers.

The Group is also the European leader in garden watering products and a global leader in cutting equipment and diamond tools for the construction and stone industries. The Group´s products and solutions are sold under brands including Husqvarna, Gardena, McCulloch, Poulan Pro, Weed Eater, Flymo, Zenoah and Diamant Boart via dealers and retailers to consumers and professionals in more than 100 countries. Net sales in 2016 amounted to SEK 36 billion and the Group has around 13,000 employees in 40 countries.

The Consumer Brands Division of the Husqvarna Group has its headquarters located in Charlotte, NC. The Consumer Brands division aims to be the leading forest and garden supplier for the broad mass consumer segments.

Products are sold mainly through retailers such as Lowe’s and Walmart in the US and Castorama and B&Q in Europe. The retail landscape is highly consolidated in North America and competition in the mass consumer segment is fierce with a strong emphasis on price. The estimated

addressable market amounts to SEK 70bn, of which more than 60 percent is in North America and slightly less than 30 percent is in Europe.

The steering wheel on a tractor is one of the major touch points while the unit sits on a show room floor. Having premium features that allow for ergonomic customization with regards to the steering wheel may be a major factor in a consumer's decision to purchase a Husqvarna over another brand. The project proposal for the UNC Charlotte Senior Design Team would be to design/create a telescoping and tilting steering system. The steering system should be easy to adjust and should have minimal free play to promote the perception of brand quality.

Project Requirements:

Husqvarna will provide the UNC Charlotte Senior Design Team with a commercially available petrol lawn tractor as well as extra sets of steering components. The design team will be responsible for the following:

- Develop a system that allows for the steering wheel to be tilted at least 10 degrees in either direction from the existing position.
- Develop a system that allows for the steering wheel to be telescoped.
    - Steering wheel should be able to travel a minimum of 2" in total.
    - Must be able to travel a minimum of .5" in one direction from the existing position (i.e. .5" of travel in and 1.5" of travel out).
- The mechanism(s) for adjusting the tilt and telescope must be toolless and forces to activate the mechanism(s) must be less than 10lbf.
- Mechanism(s) for adjustment should be intuitive and should be in plain view as a consumer would see it on the show room floor (i.e. must not be hidden underneath the tractor hood).
- Steering system must be able to withstand 75ft-lbs being applied at the steering wheel in the worst-case scenario.
- Unit must not appear to be missing panels or look unfinished from a consumer's perspective.
- Designs should be cost effective, easy to assemble, and capable of mass production (i.e. design for stamping, injection molding, powdered metal, etc.)

Expected Deliverables/Results:

- Fully functioning lawn tractor with tilting and telescoping steering wheel
- 3D CAD models of any newly designed components
- 2D tolerance drawings of any newly designed components
- Technical specifications and documentation for any new sourced components

Disposition of Deliverables at the End of the Project:

- Any hardware or software developed by the UNC Charlotte senior design team is the property of Husqvarna. The hardware and software will be handed over to Husqvarna at the conclusion of the final Design Expo unless otherwise noted.

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

- 3D CAD modeling
- FEA
- Basic knowledge of metal fabrication