Windrower Steer-by-wire System

Mission Statement:
To integrate off-the-shelf non-contact sensor technology into a production steering column to measure the angular displacement of the steering shaft, meeting cost, reliability, and failsafe objectives for a steer-by-wire vehicle.

Background
The system is currently a purely mechanical linkage from operators hand to hydrostatic pumps. Goal is to remove mechanical linkage and replace with a lower cost, expandable, steer-by-wire system.

Project Goal
Goal is to remove mechanical linkage and replace with a lower cost, expandable, steer-by-wire system.

Concepts
Mounting Locations
- Below Cab
- Boot
- Knuckle

Mounting Bracket
Purpose of Bracket is to secure sensor and damper to steering column

Sensor
- Proximity
- Magnetic Hall Effect
- End Mount
- Feed-Through Mount

Shaft Extension
To hold sensor and viscous damper

Concept Selection
Mounting Locations
- Boot
  - Minimal structural alterations to steering column
  - Least space restrictions

Mounting Bracket
- Multi-piece design
- Laser cut and bent alloyed steel
- Secured with 4 bolts to framework

Sensor
BEI Duncan NCAPS
In communication with BEI Duncan design engineers who are working on design of custom sensor that will meet all requirements

Shaft Extension
- 3/8" Aluminum with ⅛" Flats
- Force fit to Existing Shaft
- Collar for Sensor

Shaft FEA
- Red: Greatest Displacement = 7x10^-5 inches
- Blue: Smallest Displacement

Prototype
- Prototype includes an optical encoder for testing.
- The production version will use a similar BEI sensor with a slightly smaller form factor and an added measurement channel to satisfy the redundancy requirement.

Testing
- Tested with Labview software
- Output signal was compared with output of an optical encoder

Will be installed in Windrower for further track testing!!

Team Members
Erik Pearson
Paul Rodriguez
Casey Strohmeyer
James Woodhouse

Advisor
Rick Strosser
Ed Priepke
Dave Lutz
Jim Glancey

Machine Shop Contact
Steve Beard