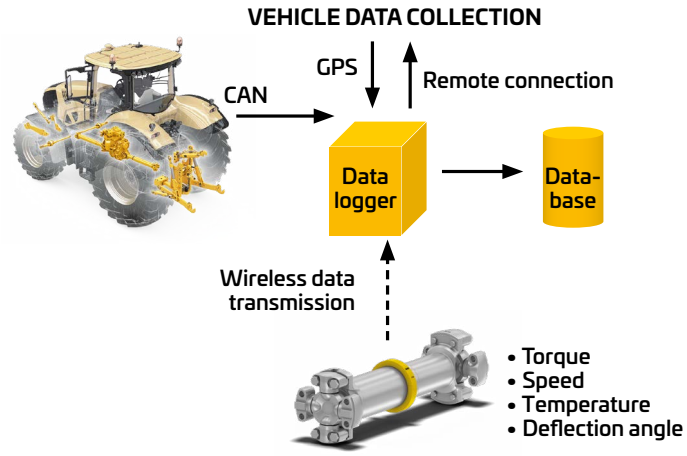
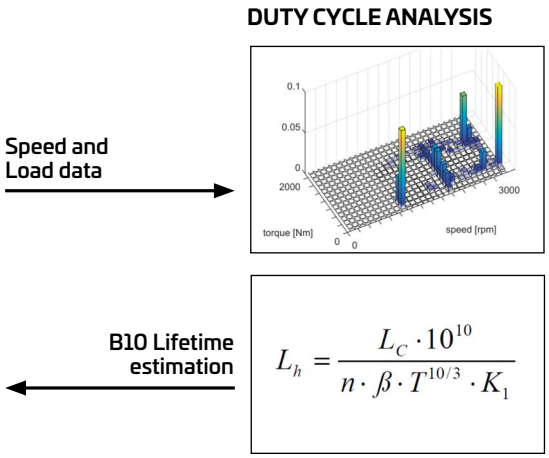
CASE STUDY

Industry: Agricultural Machines
Customer: R & D department of Italian Tractor manufacturer

OFF-HIGHWAY
POWERTRAIN SERVICES

Walterscheid determines duty cycle of the powertrain under real operating conditions for an agricultural machinery manufacturer





Case Description

Lack of information about actual duty cycle under real driving conditions is an issue often faced by our customers. Data that is only an estimation could lead to shaft being over-/ undersized. In this particular case, the customer requested for a review of the drivetrain design for an existing tractor platform using a duty cycle obtained under real conditions

The tractor was equipped with sensors for capturing rotation speed, transmitted torque and temperature of the shaft to assess the duty cycle and estimate the cardan shaft lifetime under real conditions. Different test scenarios such as driving on country roads, driving on country roads, over fields, and applying specific test loads using an external dynamometer, were recorded during the test at customer site. **The recorded duty cycle provided a reliable input for lifetime estimation.**

The data was also used to assess the behavior of more than just the cardan shaft. From our analysis of **drivetrain design in terms of vibration behavior**, the customer was able to work on redesigning components beyond the cardan shaft to achieve improvements. Based on our work, the customer has requested similar services on further tractor platforms.

Technology Snapshot

Powertrain Engineering Service

A Mechanics® 5C cardan shaft from our series production was fitted with integrated sensors and installed in a test tractor. Torque, vibration, and temperature measurements were captured and analyzed to produce a duty cycle, which was used to estimate the driveshaft lifetime for the tractor model.

Insight was also provided into noise and vibration behavior of the drivetrain. In order to track different test scenarios, the data logger recorded CAN bus variables and the GPS position. The logged data was stored on board, and was also accessible through the Internet.

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Customer Challenge:

- Products in drivetrain being selected from duty cycle estimations
- Calculations from estimations lead to risk of premature failure
- Real duty cycles are unknown and difficult to capture

Our Solution:

Powertrain Engineering Services provided:

- Measurement of duty cycle in real world conditions
- **Application specific driveshaft selection** and lifetime estimate based on analysis of duty cycle
- **Risk analysis of other drivetrain components** based on vibration and temperature analysis

Customer Value:

- Acquisition of real duty cycle under customer operation
- **Reducing total cost of ownership**
  - Design review and risk assessment by drivetrain experts; avoiding costly redesign and recall at a later stage
  - **Estimated lifetime improvement by 10x** through selecting a drivetrain matching the application
- Improved user experience: reduction of vibration and noise through design improvement

What's Special?

- **Design assessment** based on real world duty cycle
- Analysis and **insights into vibration behavior of drivetrain**

OFF-HIGHWAY
POWERTRAIN SERVICES

WORLDWIDE

Off-Highway Powertrain Services collaborates with manufacturers and logistics partners worldwide: benefit from our extensive network. By means of our Service Parts Availability Module, you can define which part are to be available, and how quickly they can be delivered to your location – regardless of manufacturers. We also offer customized spare parts to our clients on stock.

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