

# CASE STUDY

**Industry:** Marine Industry  
**Customer:** Ferry Operator in Sweden

OFF-HIGHWAY  
**POWERTRAIN SERVICES**

## ► Off-Highway Powertrain Services helps the customer reduce the background noise on a ferry to permissible limits!

### ► Case Description

Our customer in the marine industry had been experiencing excessive vibrations and background noise on the vehicle deck of his ferry. These high vibrations were above the emission limits of the ISO 20283-5 Standard. Over a period of 3 years the cardan shaft had to be exchanged every 6 months due to a worn out spline. In addition, exhaust pipes were broken and bolts were loosened. The customer worked with several service providers but was unable to resolve the problem.

Following an unplanned stop caused by a broken cardan shaft, which forced the operator to unload the ferry, organize a new one and caused expenses of around 20,000 € they approached Off-Highway Powertrain Services (OHP Services) to understand the real root cause of the problems and come up with a long term solution.

Vibration measurements were made to ascertain the natural frequency of the parts and determine the appropriate frequencies for smooth functioning of the powertrain. Based on these, the powertrain had to be adjusted and a number of components exchanged.

To avoid a clash with natural frequencies a coupling was substituted and rubber feet were replaced by spring feet. After the corrective actions were implemented, a base measurement was carried out to act as a comparison value for all future measurements, to help determine the actual condition of the powertrain.

### ► Guideline values of acceptable vibration

Type of occupied space	Guideline value
<b>Crew spaces</b>	
Crew accommodation	3,5 mm/s 125 mm/s <sup>2</sup>
Work spaces	6,0 mm/s 214 mm/s <sup>2</sup>
Offices	4,5 mm/s 161 mm/s <sup>2</sup>
Navigation bridge and engine control room	5,0 mm/s 179 mm/s <sup>2</sup>
Open-deck recreation spaces	4,5 mm/s 161 mm/s <sup>2</sup>

Type of occupied space	Guideline value
<b>Passenger spaces</b>	
Cabins and public spaces	3,5 mm/s 125 mm/s <sup>2</sup>
Open-deck recreation spaces	4,5 mm/s 161 mm/s <sup>2</sup>

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## ▶ Technology Snapshot

### High Tech Analysis:

Different technologies such as vibration measurement, stroboscope and alignment checks were used to determine the root cause of the problem. A multi-channel vibration measurement system was utilised for the analysis of the vibrations and natural frequencies. Using TVC, Torsional

Vibration Calculator, the right frequencies for the powertrain components were identified. Our service results in early identification and rectification of fundamental powertrain faults, leading to minimised risk of unplanned machine downtime.

## ▶ Challenge:

- ▶ Find the root cause of the problems and solve it
- ▶ Help customer to comply to the ISO Standards
- ▶ Define the parts with the right frequency ranges

## ▶ Solution:

- ▶ Define the right operating frequencies for the components of the powertrain using TVC (Torsional Vibration Calculator)
- ▶ Following the definition of frequencies the right components were chosen

## ▶ Customer Value:

- ▶ Ensure safe and uninterrupted operation and conformity to ISO Standards
- ▶ Cardan lifetime increased 10 times
- ▶ Avoiding further shutdown costs
- ▶ Complete solution from single independent service provider
- ▶ Efficient and quick solution by OHP Services due to extensive experience in Marine applications

## ▶ What's special?

- ▶ OHP Services was the first service provider to consider the complete system to understand the effect of each component of the powertrain to arrive at the root cause of the problem. Owing to the vast experience of our experts in Marine application the solution was found in relatively short time. OHP Services also took over the coordination with all the sub-suppliers.

OFF-HIGHWAY   
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## 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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This case study is exemplary only. Any and all information, data, values, products, procedures etc. which are mentioned in this case study vary from case to case and can be different. For calculation pertaining to your business, please refer to a Off-Highway Powertrain Services employee.