



## Vehicle Gearbox Noise and Vibration: Measurement, Signal Analysis, Signal Processing and Noise Reduction Measures (Automotive Series)

By Jiri Tuma



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### Vehicle Gearbox Noise and Vibration: Measurement, Signal Analysis, Signal Processing and Noise Reduction Measures (Automotive Series) By Jiri Tuma

Advances in methods of gear design and the possibility of predicting the sound pressure level and life time of gearboxes and perfect instrumentation of test stands allows for the production of a new generation of quiet transmission units. Current literature on gearbox noise and vibration is usually focused on a particular problem such as gearbox design without a detailed description of measurement methods for noise and vibration testing.

*Vehicle Gearbox Noise and Vibration: Measurement, Signal Analysis, Signal Processing and Noise Reduction Measures* addresses this need and comprehensively covers the sources of noise and vibration in gearboxes and describes various methods of signal processing. It also covers gearing design, precision manufacturing, measuring the gear train transmission error, noise test on testing stands and also during vehicle pass-by tests.

The analysis tools for gearbox inspection are based on the frequency and time domain methods, including envelope and average toothmesh analysis. To keep the radiated noise under control, the effect of load, the gear contact ratio and the tooth surface modification on noise and vibration are illustrated by measurement examples giving an idea how to reduce transmission noise.

Key features:

- Covers methods of processing noise and vibration signals
- Takes a practical approach to the subject and includes a case study covering how to successfully reduce transmission noise
- Describes the procedure for the measurement and calculation of the angular vibrations of gears during rotation
- Considers various signal processing methods including order analysis, synchronous averaging, Vold-Kalman order tracking filtration and measuring the angular vibration

*Vehicle Gearbox Noise and Vibration: Measurement, Signal Analysis, Signal Processing and Noise Reduction Measures* is a comprehensive reference for

designers of gearing systems and test engineers in the automotive industry and is also a useful source of information for graduate students in automotive and noise engineering.

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### Editorial Review

From the Back Cover

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### About the Author

Jiri Tuma graduated from the Brno University of Technology, Czech Republic, in 1970 and completed his doctoral studies in 1977. After graduation, he became a researcher in the field of control systems at a research institute and in 1988 began working in the R&D department of an automotive company (Tatra Trucks). He was a member of the team for the introduction of HCR gears in the transmissions. That time, Tatra entered among the top global manufacturers of this type of gears. In 1995, he joined the VSB - Technical University of Ostrava, Faculty of Mechanical Engineering where he became a full professor in 2001. He gives lectures and does research in the field of control systems, signal processing, active vibration control and machine diagnostics. He is the author of more than 200 publications, including a book on signal processing (in Czech) and a chapter of Crocker's Handbook on noise and vibration control.

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