

# MARK DALY

## CHASSIS NVH OVERVIEW

### MARK DALY CURRICULUM VITAE

**Ford Motor Company**  
Vehicle Level Powertrain NVH  
Technical Specialist  
July 1990 – February 2007

**Roush Industries**  
Hybrid NVH Consultant  
March 2007 – August 2007

**Ricardo, Inc.**  
Hybrid NVH Tech Leader  
August 2007 – March 2008

**Fisker Automobile AG**  
NVH Technical Specialist  
2009 – 2011

**NVH Experts, LLC**  
**March**  
Technical Leader  
2008 – Present

### WHO IS MARK DALY?

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*Mark Daly – Owner/Chief Technical Officer, NVH Experts; Senior NVH Technical Specialist, Advanced Vehicle Technologies, NVH Technical Leader, United Force Corporation, Shanghai*

*Over 20 years in the field of NVH at a Major US Automotive Manufacturer and various consulting firms*

*Experience includes: Hybrid, Gasoline & Diesel Vehicle Level Powertrain NVH; Road NVH; and NVH CAE*

*Bachelors & Masters of Science Degrees from Wayne State University majoring in sound and vibration*

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A Noise, Vibration and Harshness (NVH) engineer with approximately eighteen years experience in the automotive industry and a strong reputation as an expert, leader and automotive enthusiast. Areas of expertise include powertrain, road and Computer Aided Engineering (CAE) NVH as well as a strong understanding of durability requirements. Highly regarded as creative, out-of-the-box thinker. Consistently demonstrated innovation skills with feasible design solutions that reflect a “systems” approach. Acknowledged excellent written and oral communication skills. Proven skilled at presenting complex technical data in easily comprehensible formats.



*Mark Daly*

**Specialties:** Computer Aided Engineering, Vehicle Level NVH Analysis, Instruction, Developing Isolation Systems

# ***TRAINING OVERVIEW***

## **Seminar Overview**

The chassis system plays an enormous role in optimizing occupant comfort as it so strongly influences vehicle vibration, shake and interior noise. This seminar provides an introduction to the fundamental concepts of Chassis NVH. Chassis NVH relates to noise and vibration (NVH) issues generated by the powertrain and the suspension. These noise sources dominate Vehicle NVH and if executed poorly, they will dominate vehicle warranty as well. This presentation will focus on the most important chassis noise sources and the design strategies to minimize them. This two day seminar will cover vehicle level powertrain, driveline, brake and tire excitations. It will provide design strategies to reduce or eliminate NVH issues in the chassis system. It will also provide real world examples of NVH concerns and the countermeasures used to mitigate them.

## **Benefits of Attending**

Upon completion of the seminar, one should be able to:

- Understand wheel and tire modes and excitations and how they interact with the vehicle system
- Understand powertrain modes and how they interact with the vehicle system
- Understand and describe the various engine excitation orders and how they affect NVH
- Understand isolation systems which provide optimal tradeoffs between noise, shake, durability, and cost
- Identify isolation caused NVH issues in existing systems and develop feasible countermeasures
- Effectively communicate with suppliers about isolator properties

## **Who Should Attend**

This seminar is designed for engineers (working with passenger, commercial, industrial, and agricultural vehicles) who need to design vehicle components that may influence NVH. Engineers new to the isolation field, as well as managers, marketing personnel, purchasing professionals and others interested in NVH fundamentals will also benefit from this seminar. The material covered on the first day is presented at a level suitable for beginners, but offers the more experienced practitioners new insight into the concepts presented through the illustrations and demonstrations that are included. The second day covers more advanced topics.

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## ***\*\*Principles of NVH\*\****

- *Definition of NVH*
- *Example with Countermeasures*
- *SDOF example with excitation*
- *Amplifier/Attenuation Effects*

## ***\*\*Vehicle System NVH\*\****

- *Definitions*

## ***\*\*Wheel, Brake & Tire NVH\*\****

- *Wheel Excitations*
- *Brake Excitations*
- *Tire Excitations*
- *Real world example*
- *Countermeasures*

## ***\*\*Driveline NVH\*\****

- *Excitations*
- *U-Joints & CV-Joints*
- *Design recommendations*
- *Real World Examples*

## ***\*\*Engine NVH\*\****

- *Sources of Excitation*
- *Strategies for NVH*
- *FWD, RWD & AWD Examples*
- *Hybrid NVH Considerations & Examples*
- *Intake and Exhaust Systems*

## ***\*\*Isolator Behavior\*\****

- *How Isolators are described*
  - *Frequency, Amplitude, Preload, Temperature and Age Dependencies, etc.*
  - *Typical Isolator Materials: Rubber, Butyl, Multi-Cellular Urethane, Silicon*
  - *Measuring Isolators in the lab*
  - *Measuring Isolation in vehicle*
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## ***\*\*Isolator Design\*\****

- *Designing for Installation Robustness*

  - *Designing Brackets*

  - *Tuned Absorbers*

  - *Span/Size*

## ***\*\*Isolation Strategies\*\****

- *Mass Loading*

- *Modal Decoupling and Modal Alignment*

  - *Number and Placement of Isolators*

- *Inertial Torque Roll Axis (TRA) and Elastic Torque Roll Axis (Elastic Axis)*

  - *Example*

- *Other Noise Generating Components Attached to the Body*

## ***\*\*High-end isolators\*\****

- *Air Spring Mounts*

- *Hydromounts (Viscous, Tuned, Dual Orifice, Switchable)*

  - *Active Mounts*

- *Focalized Mounts and Focalized Systems*

## ***\*\*Torsional Vibrations\*\****

- *Flywheels and Crank Dampers*

  - *Dual Mass Flywheels*

- *Mechanical Torsional Dampers*

  - *Advanced Torsional Dampers*

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