

Team

A member of the **N|V|T** GROUP



Discussion topics:

- Test Method Comparison
- System Design
- CUBE System
- TENSOR System
- Method of Control

Why M-DoF?

- Replicating real-world excitations in the lab helps identify potentially new failure modes
- Can be a more accurate representation for drive input
- Higher fidelity testing leads to better product design and ultimately results in savings (cost, weight, etc.)

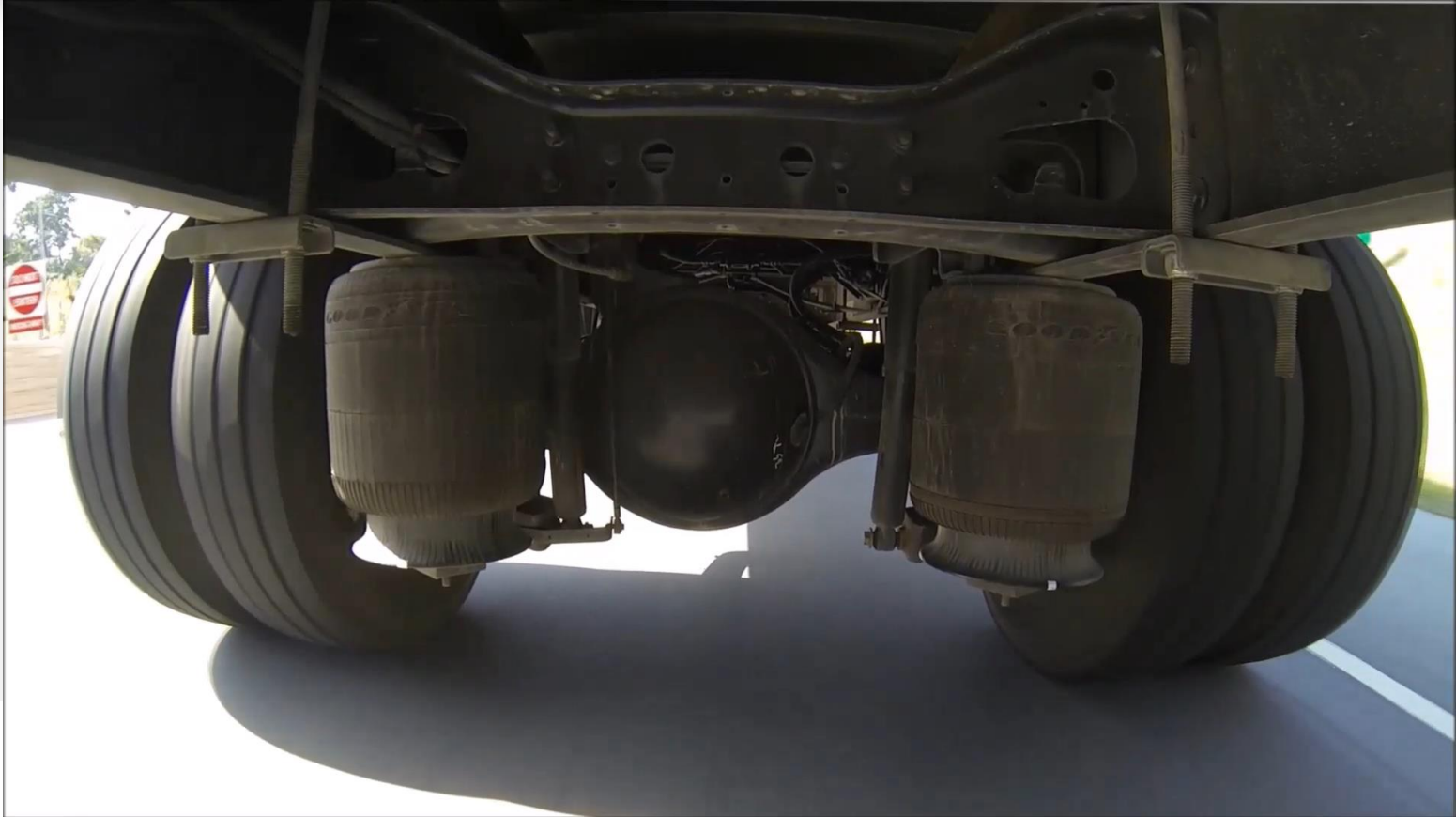
- Simplest form of testing is 1-DoF
- M-DoF is now more common
- Realistic field representation
- Accelerated testing while maintaining fidelity
- M-DoF testing simultaneously leads to additional failure modes not captured in 1-DoF

TEST METHOD VISUAL: SETUP



TEST METHOD VISUAL

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TEST METHOD VISUAL

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- Multiple axes requires interconnection of many moving parts
- Kinematics are an important consideration
- Swivel-ends are low-cost solution
- Hydrostatic couplings offer high transmissibility
- High frequency requires stiffness



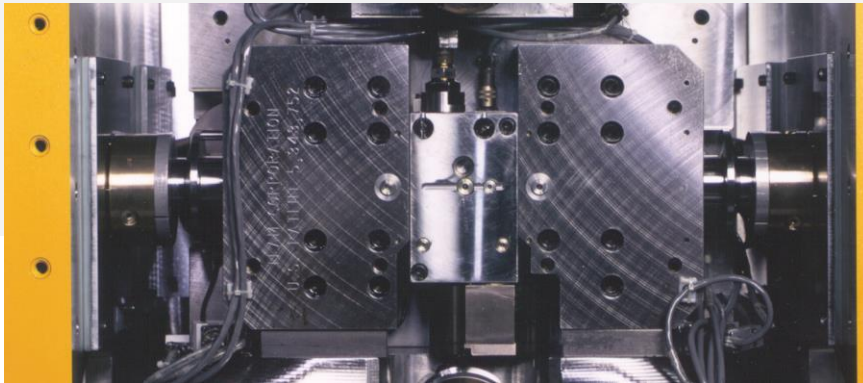
MULTI AXIS SYSTEM DESIGN



CUBE TEST SYSTEM



- CUBE is an integrated 6-DoF system
- Six double-ended, integrated actuators
- Hydrostatically supported table structure allows for 500 Hz response



TEST METHOD VISUAL

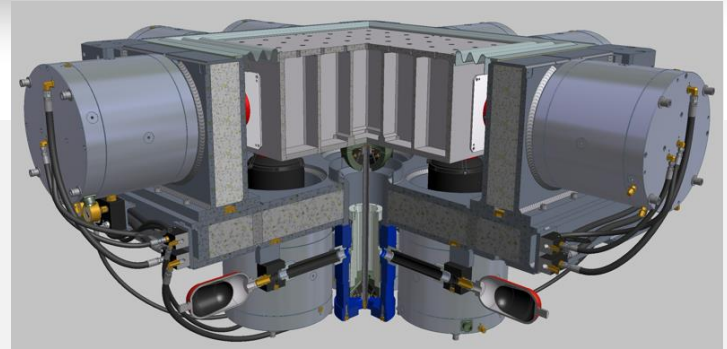
- 6-DoF system with tall payload running M-DoF random test
- Payload shifting around
- Road data simulating back of truck on a double-stack pallet load



TENSOR TEST SYSTEM



- TENSOR is designed with ED shakers for a 2,000 Hz bandwidth
- Twelve oil-guided and oil-cooled ED shakers with integrated Pads
- Exceptional control over table
- Enhanced possibilities for multi-axis control



- Over-constrained design relies heavily on the test controller
- Improves control by maximizing connection to table structure
- Ability to control modeshapes in table using Matrix test controller

