

Optimisation of the Structural Dynamics using SIMPACK and Verification with the Roller Rig

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Siemens Transportation Systems, Krefeld

Trains

Dynamic Calculations and Testing

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Optimisation of the Structural Dynamics using SIMPACK and Verification with the Roller Rig

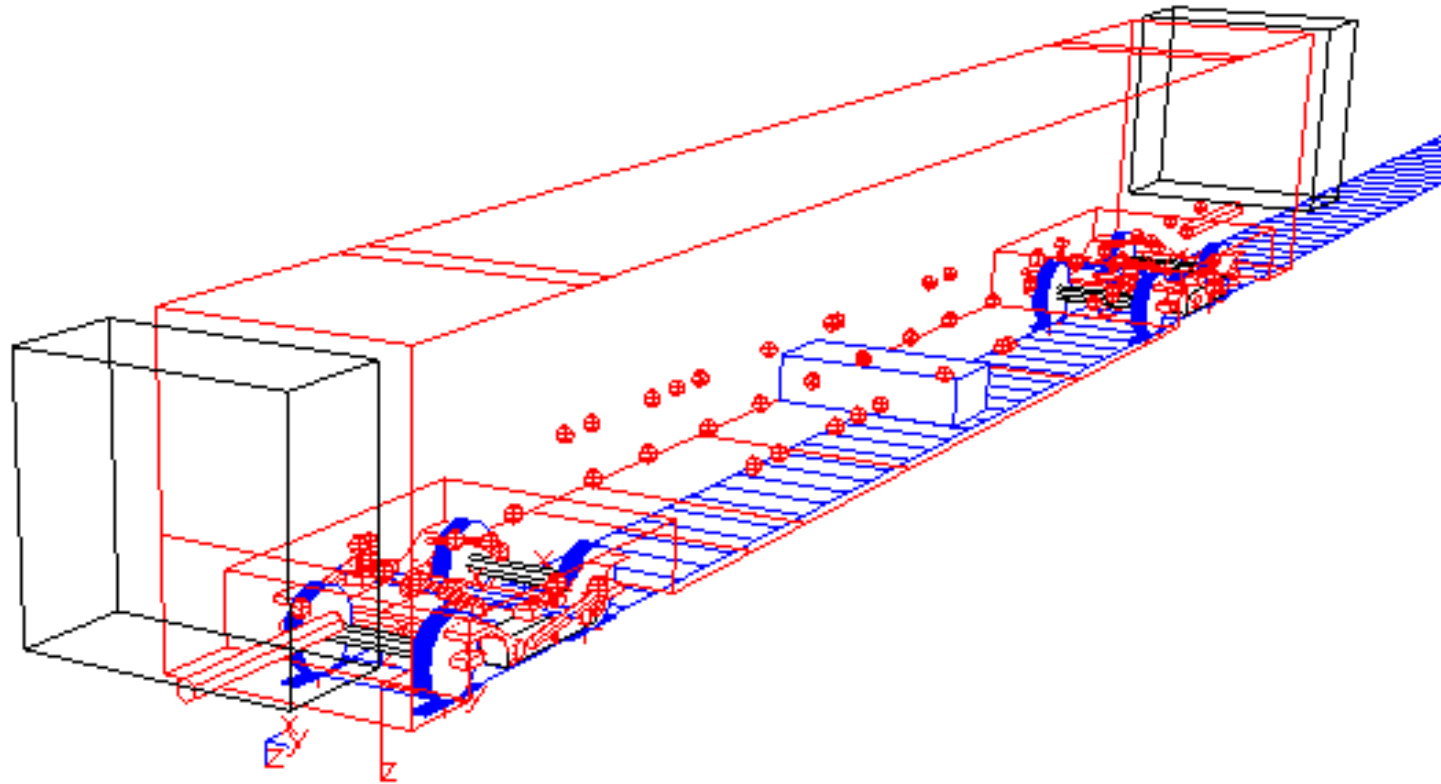


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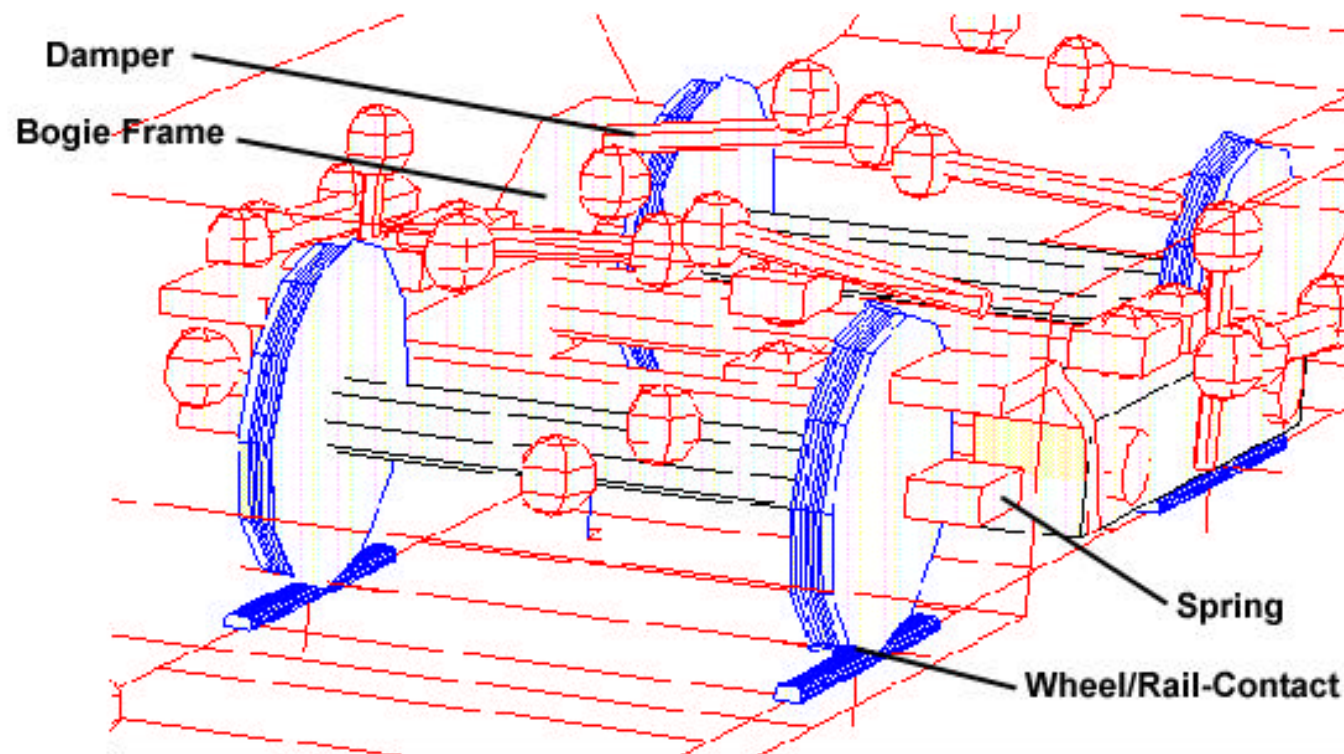
- Multi body model
- FEM model
- Verification of coupling elements
- Verification of structural behaviour
- Optimization steps
- Test & verification on roller rig
- On track test & verification
- Ride stabilityC

Multi body model

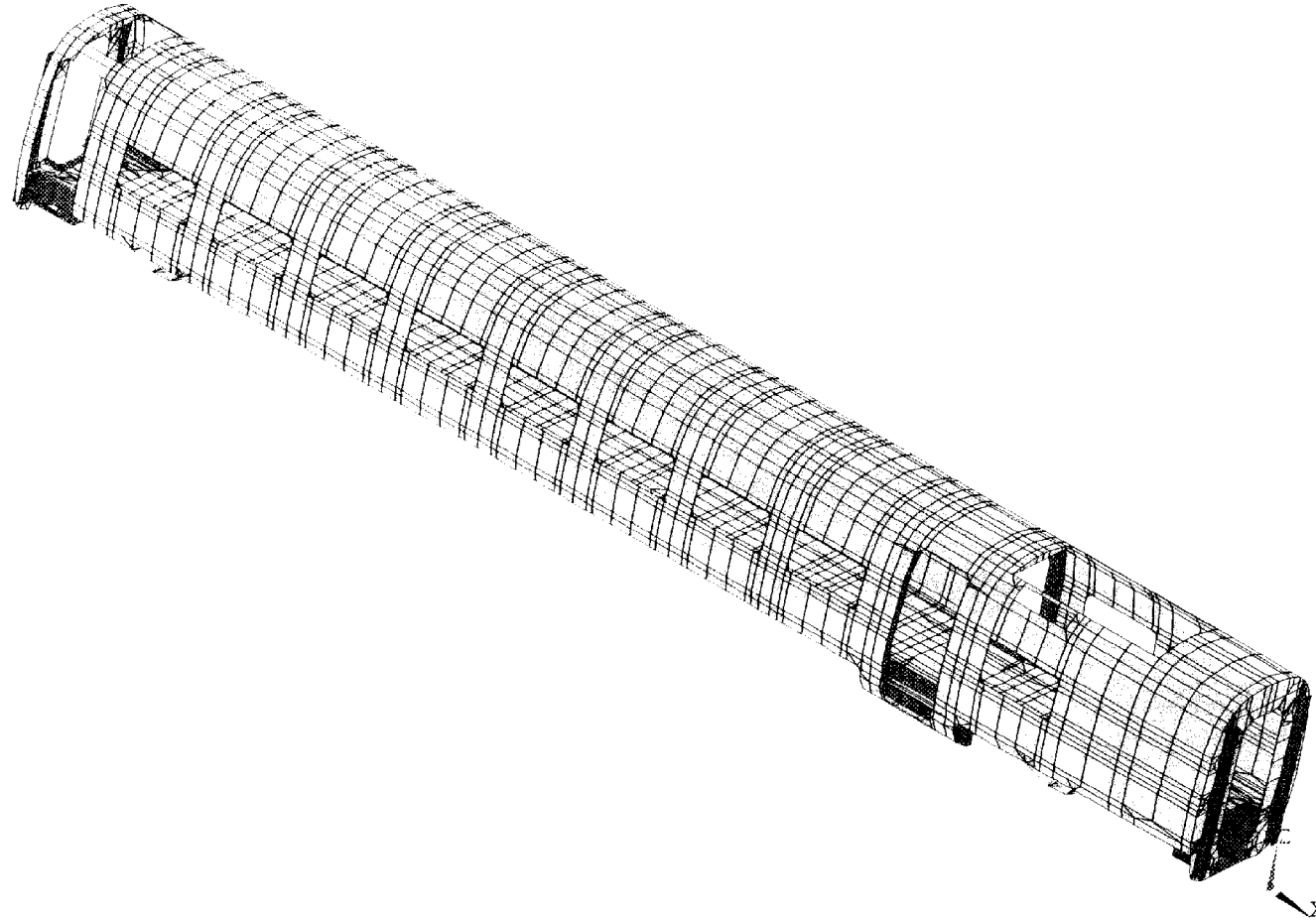


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Bogie Model



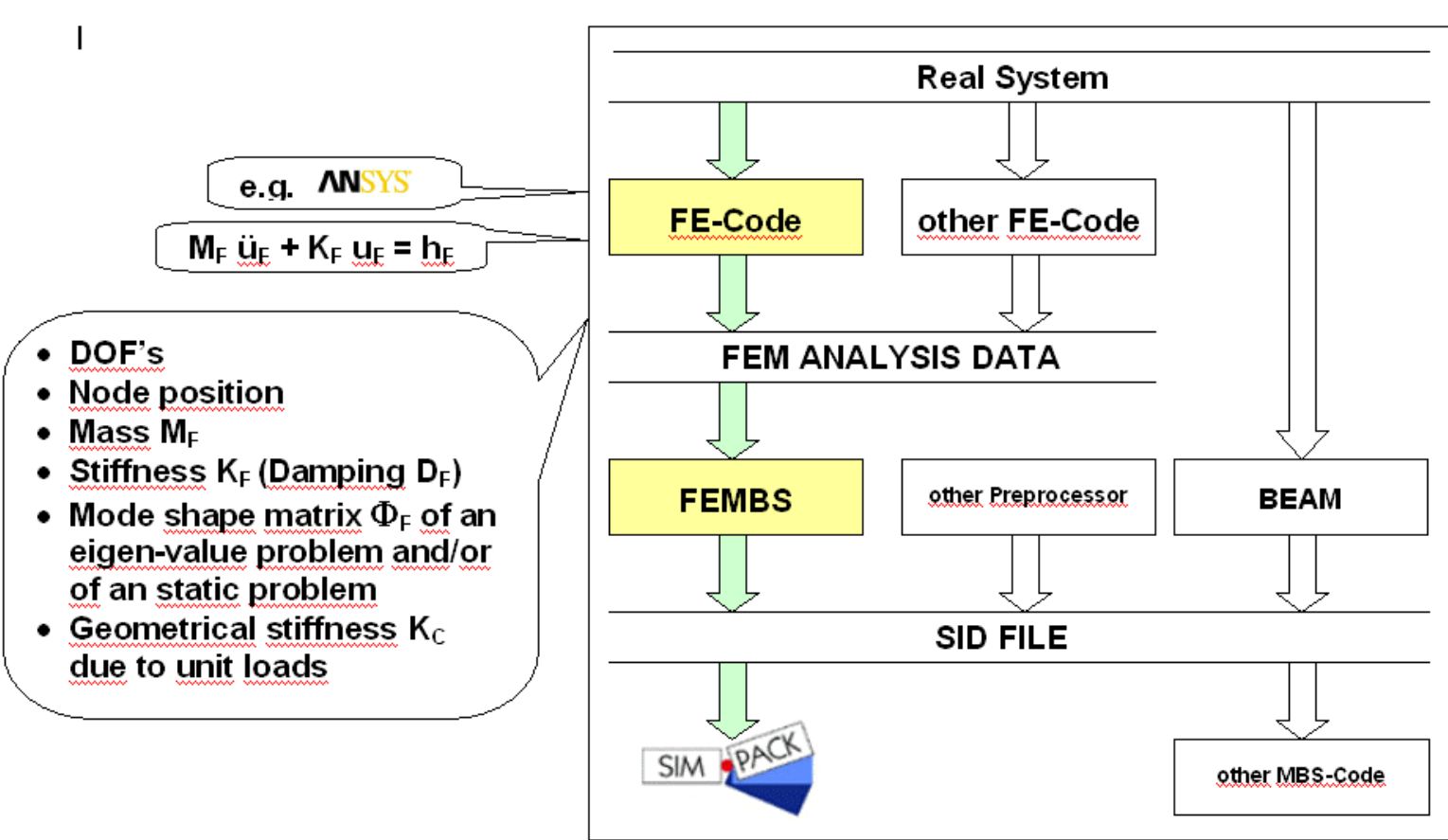
FEM model



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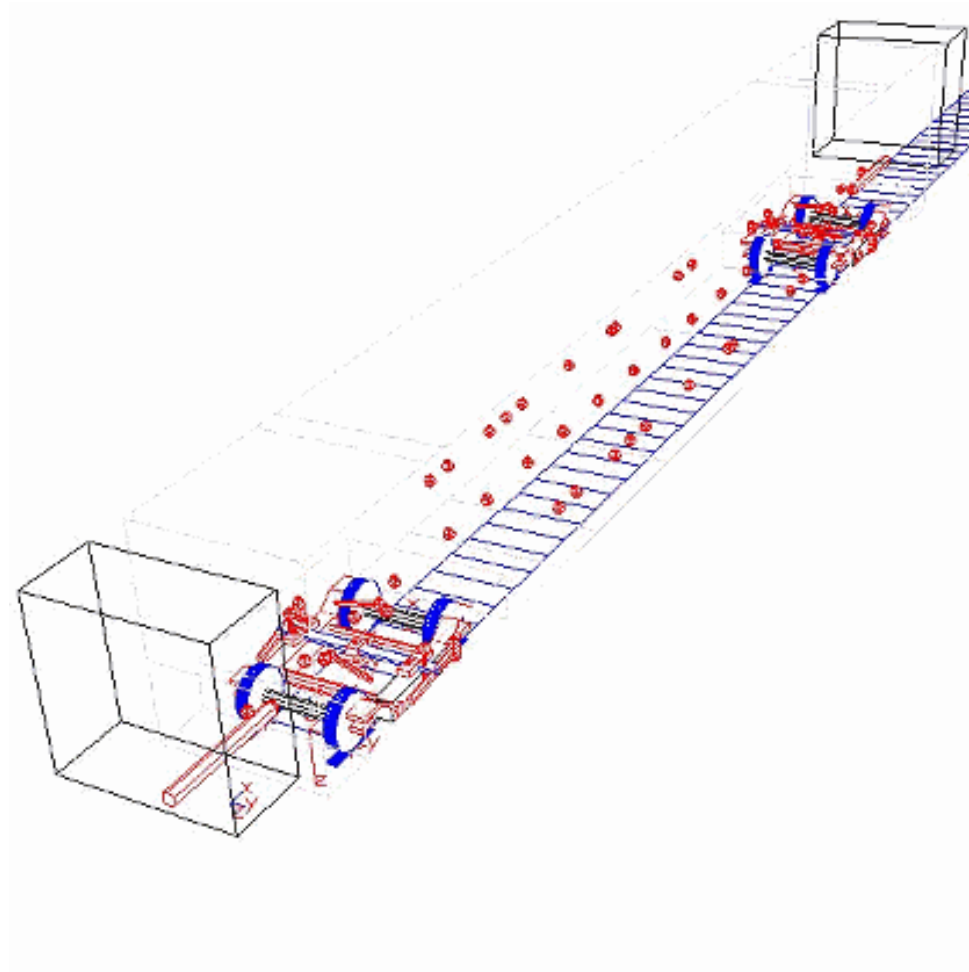
Transportation
Systems

FEMBS



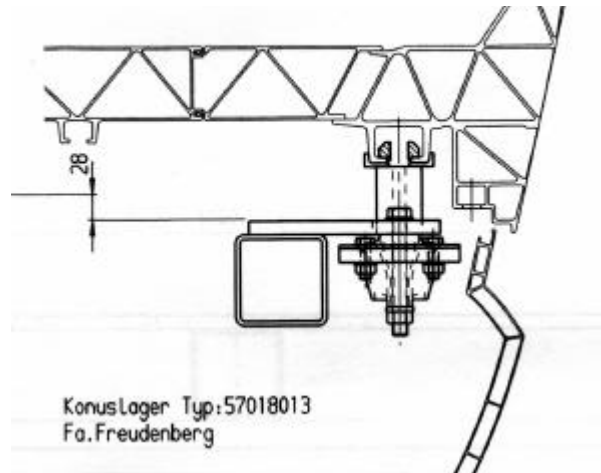
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Coupled MBS-FEM Modes

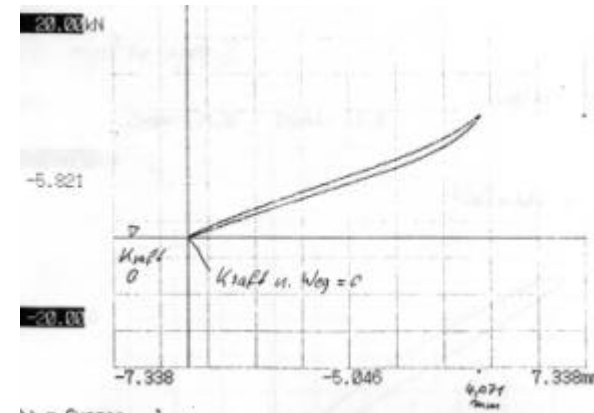


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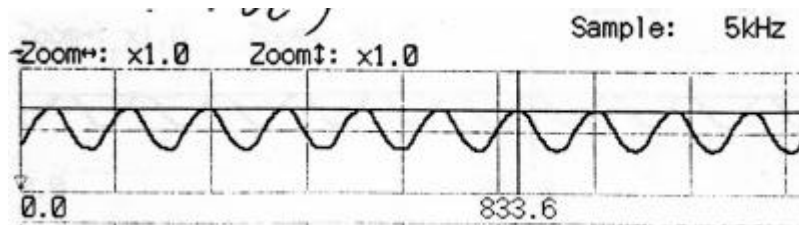
Verification of coupling elements



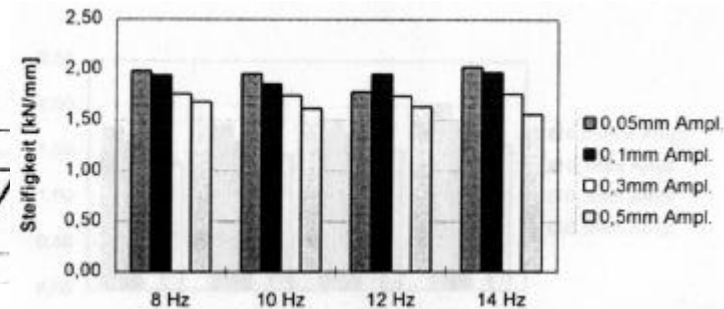
Conical rubber spring



Static test



Dynamic test

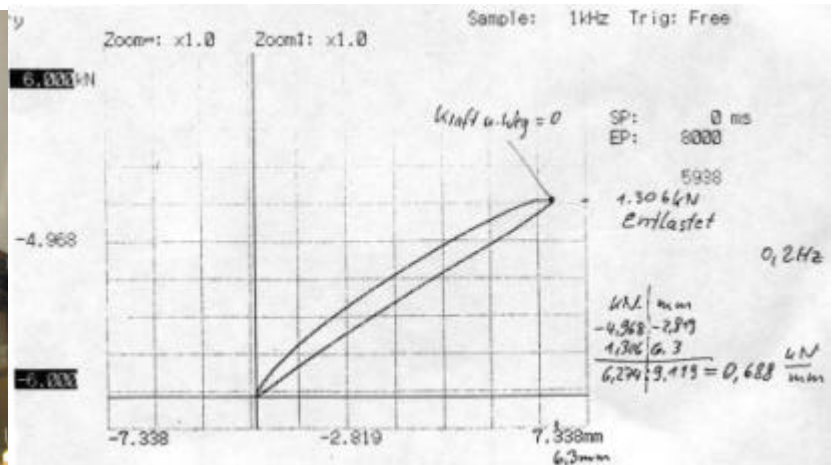


Result: stiffness depending on frequency and amplitude

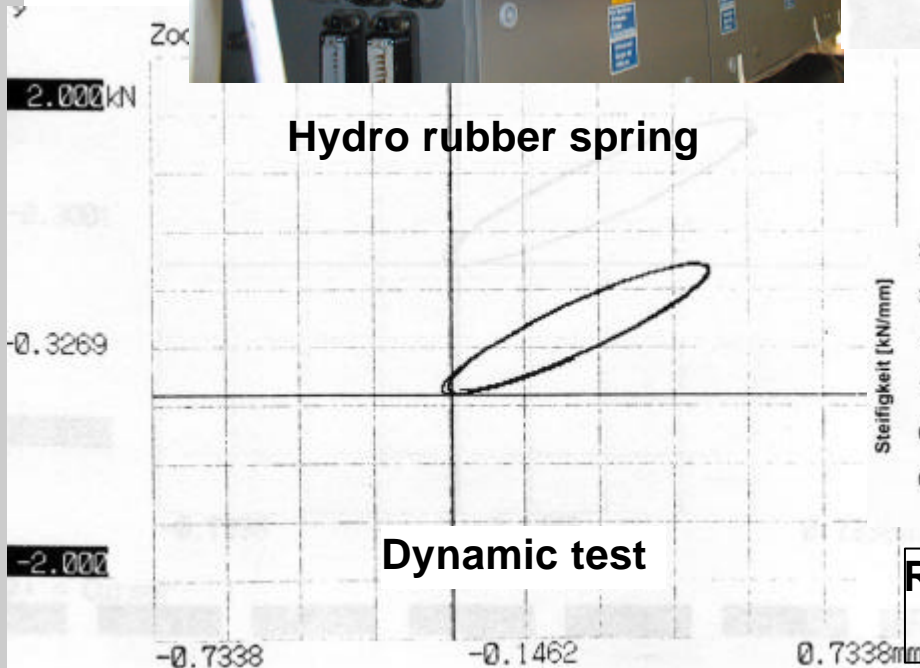
Verification of coupling elements



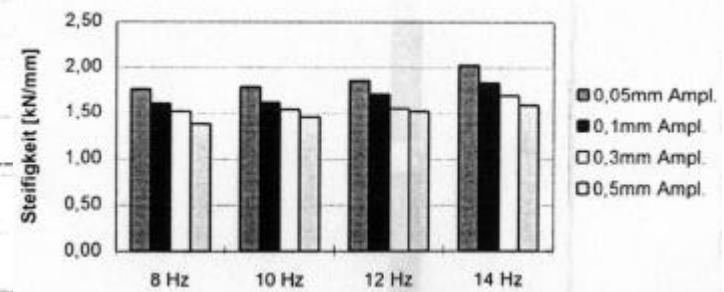
Hydro rubber spring



Static test

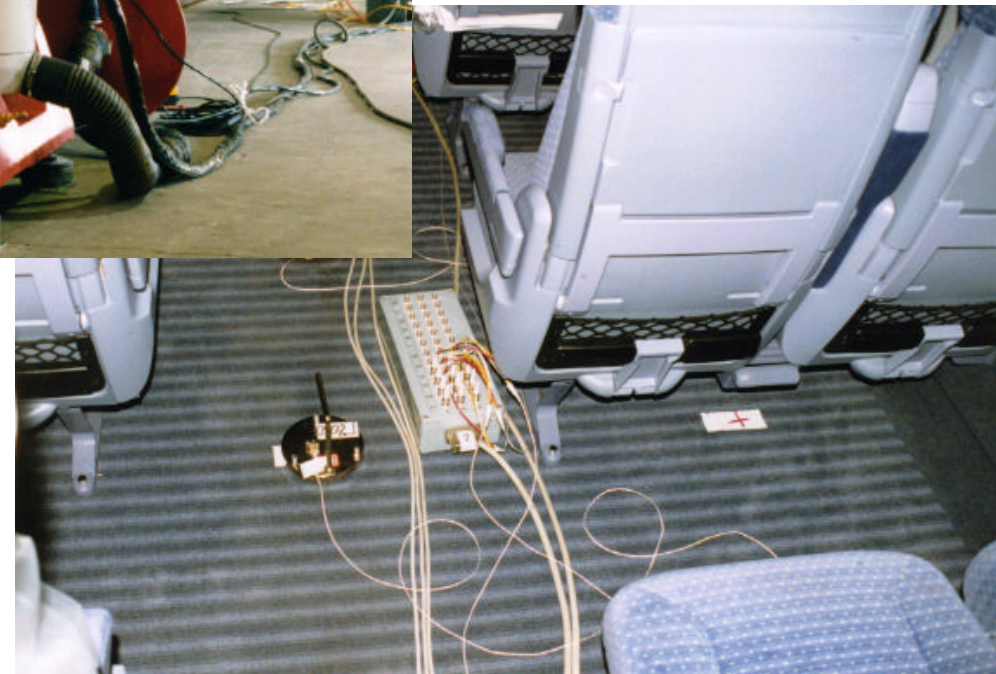


Dynamic test



Result: stiffness depending on frequency and amplitude

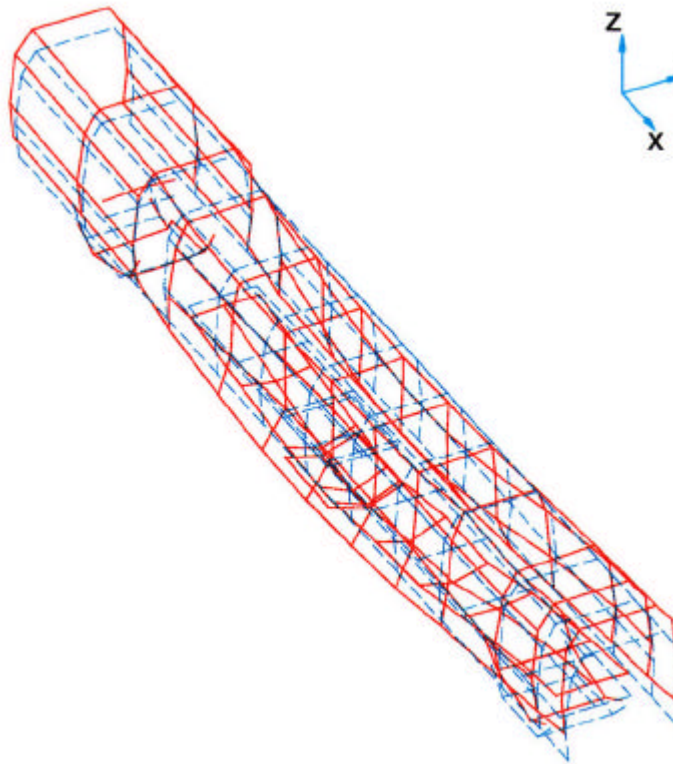
Verification of structural behaviour



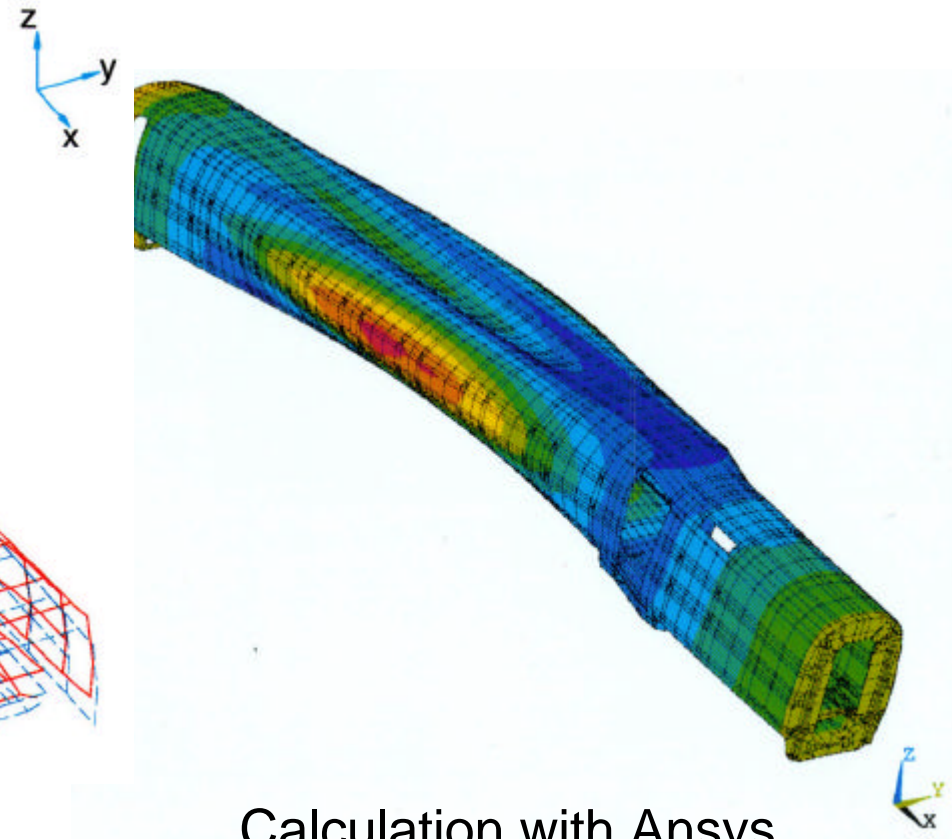
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Verification of structural behaviour

Bending mode



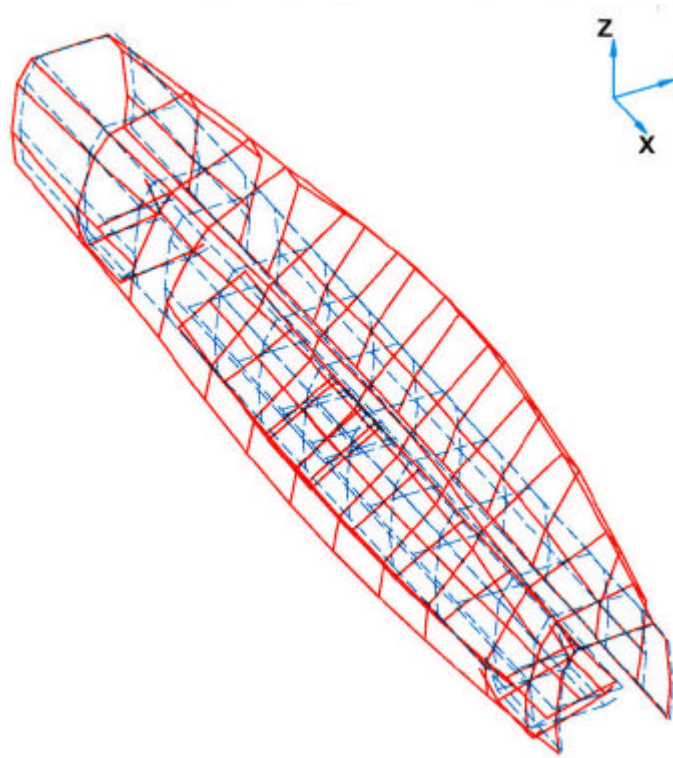
Measurement



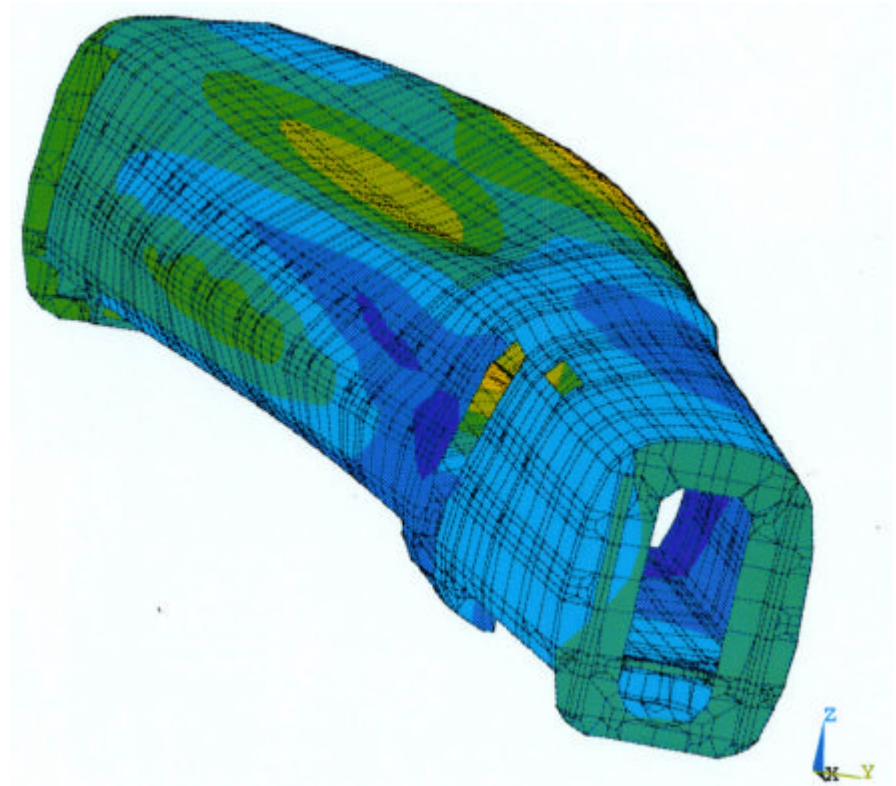
Calculation with Ansys

Verification of structural behaviour

Floor torsion mode



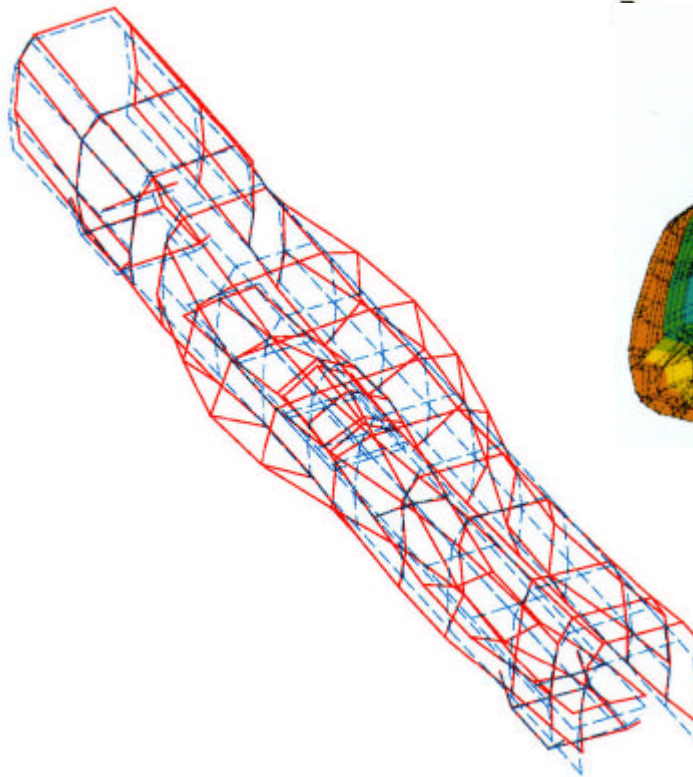
Measurement



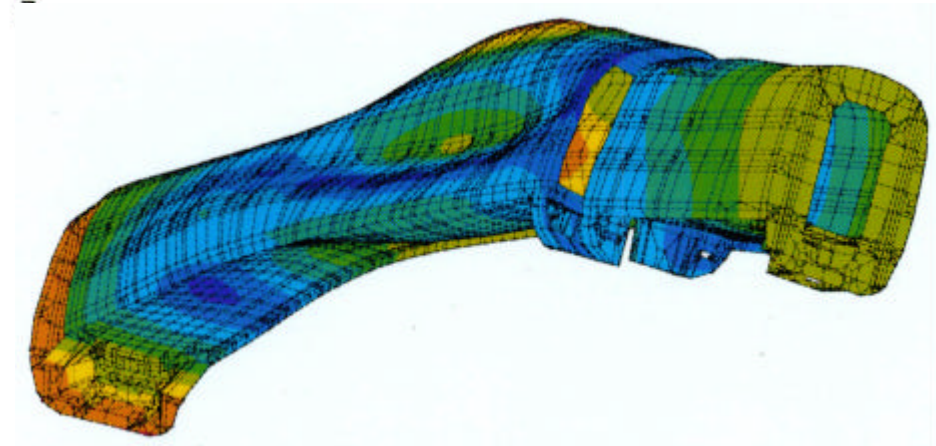
Calculation with Ansys

Verification of structural behaviour

Floor + side wall mode



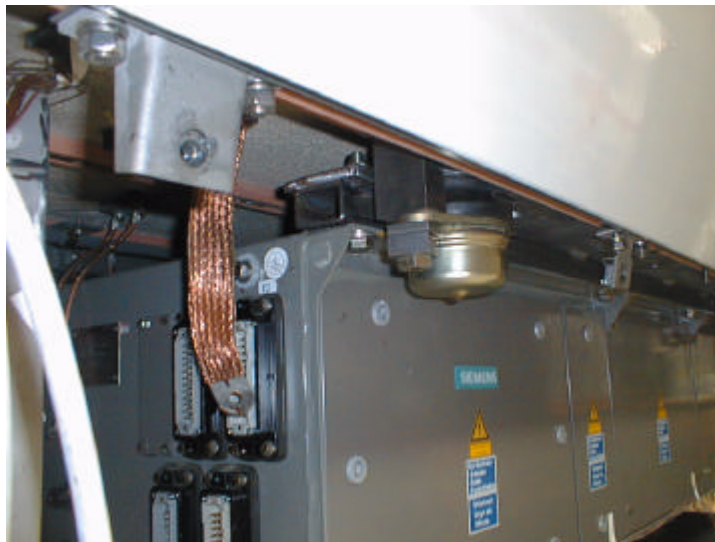
Measurement



Calculation with Ansys

Optimization

- Elastic suspension of main underfloor components



Ride comfort calculation

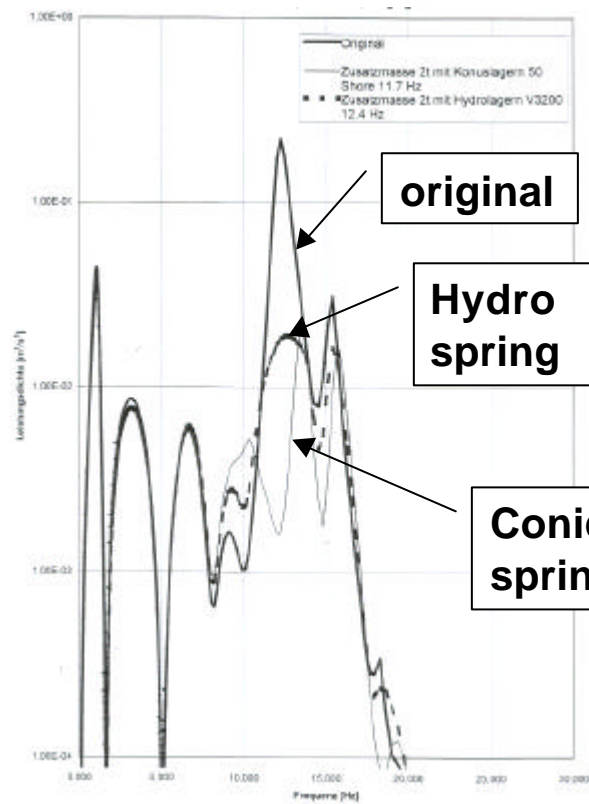


Test & verification on roller rig

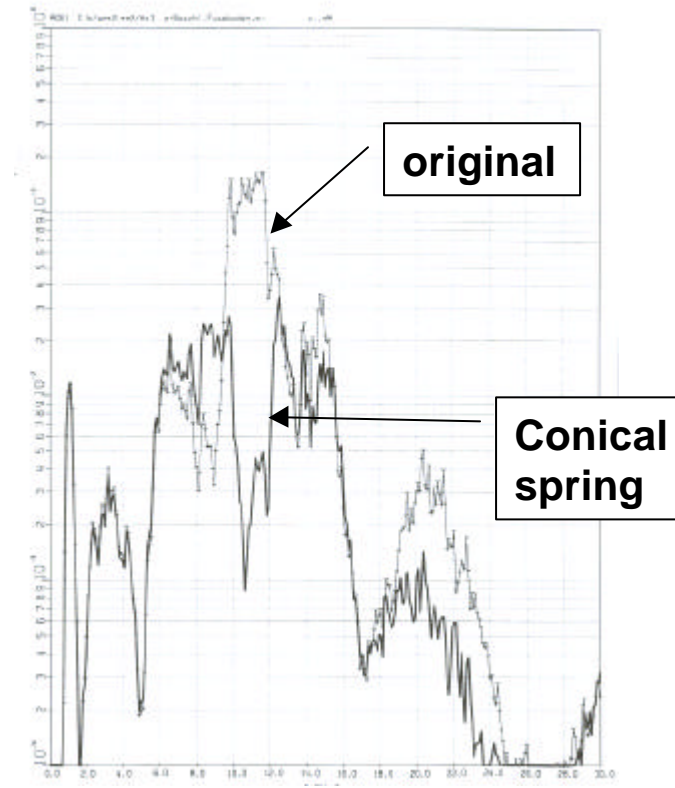


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Test & verification on roller rig

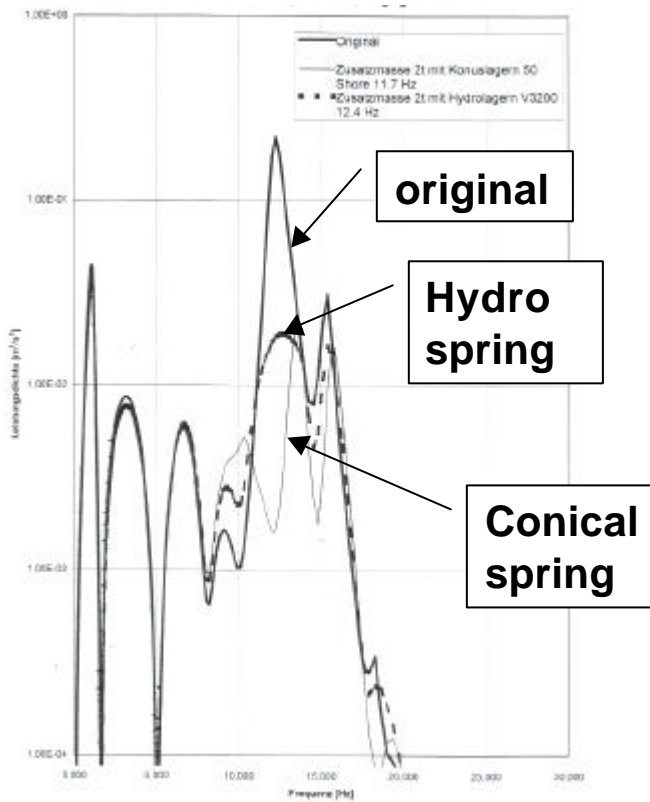


Calculation with SIMPACK

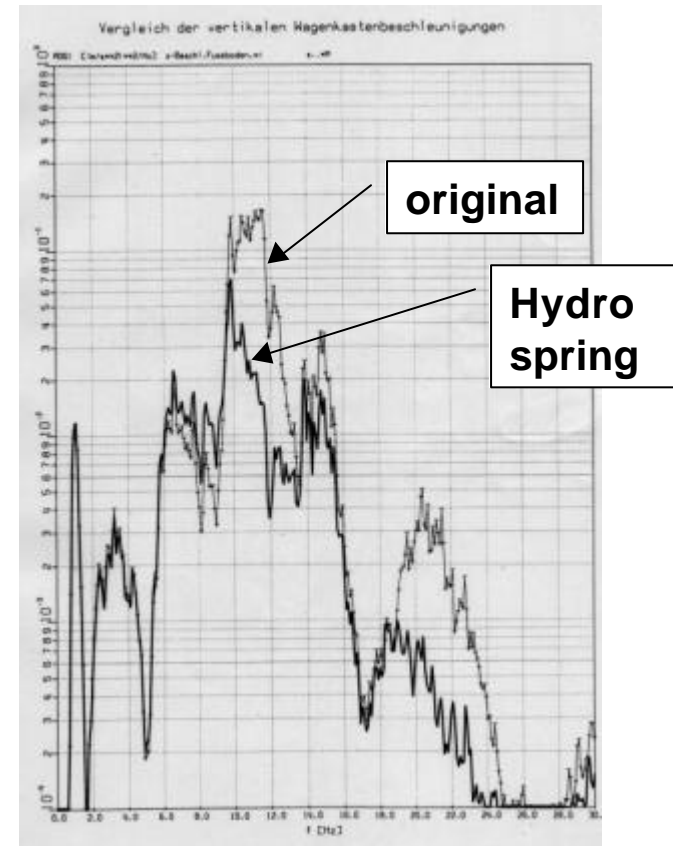


Measurement on roller rig

Test & verification on roller rig

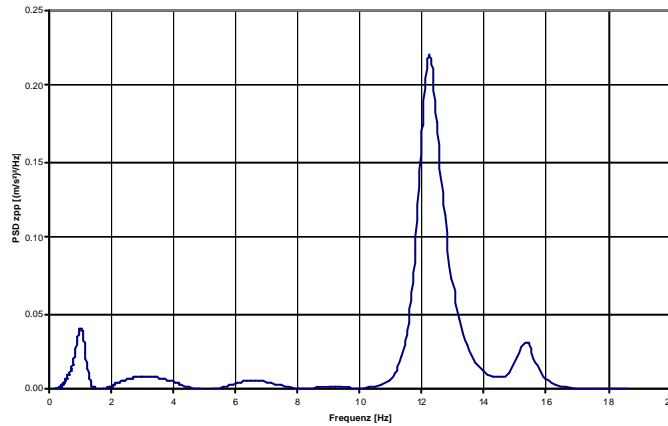


Calculation with SIMPACK

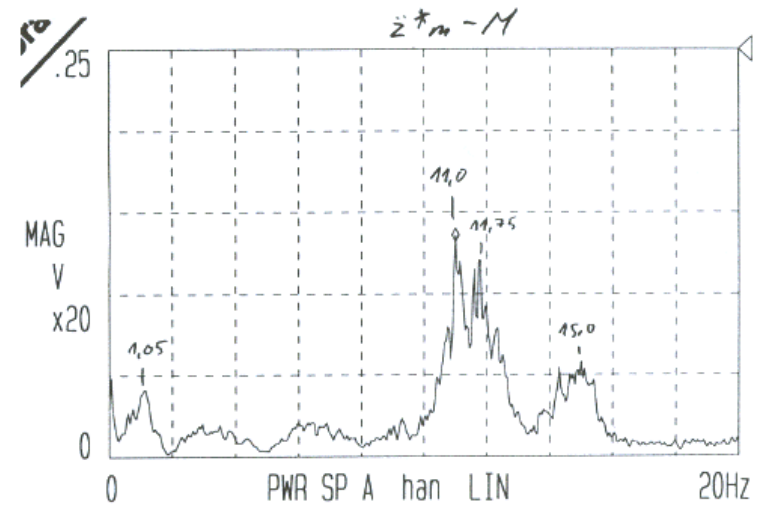


Measurement on roller rig

On track test & verification



Calculation with SIMPACK



Measurement on track