

Roadway Transportation Safety with FEA

Improving Roadway Transportation Safety

Unlocking the Power of Simulation: Optimize, Comply, and Innovate

Analysis: FEA, Nonlinear, and Transient

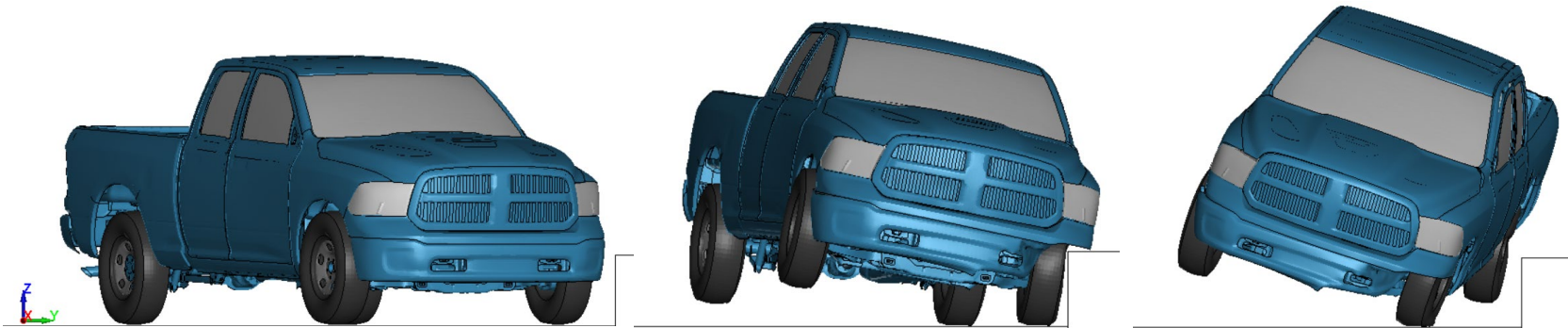
Objective: Provide Accurate Simulations for Transportation Safety

Transportation safety testing, particularly crash testing, is a complex and costly process. It involves replicating real-world scenarios that require highly advanced equipment and open-space test locations. Accurately determining whether test results reflect potential real-world outcomes is challenging. The key difficulty with finite element analysis (FEA) is ensuring the simulation accurately represents a real-life crash event rather than an approximation. Conducting transient, dynamic nonlinear simulations using advanced engineering software is cost-effective but demands extensive engineering expertise to ensure precision. Our nonlinear FEA consultants bring decades of validated experience to this intricate task.

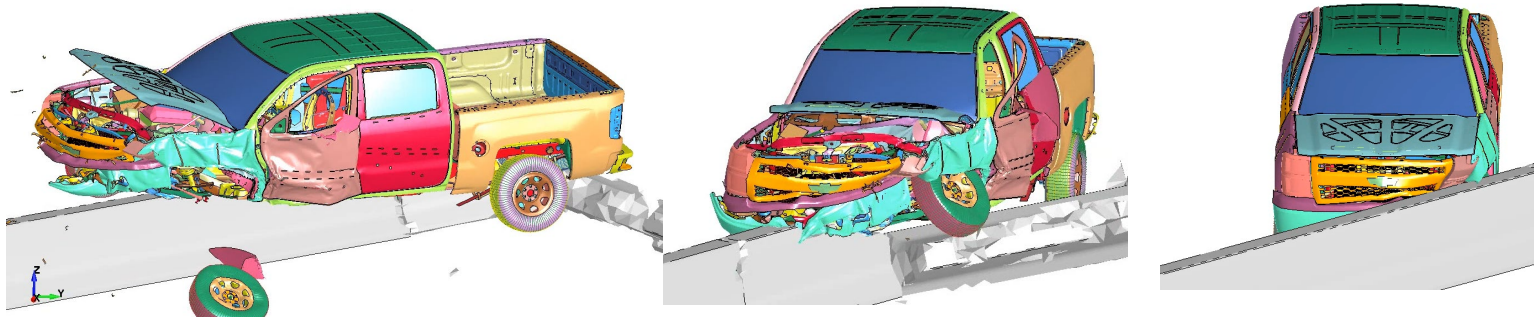
This overview highlights our engineering consulting services related to transportation safety simulations, including crash testing and cargo transportation simulation. We are proud that our simulation work, compliant with MASH standards, has been validated over time and contributed to improved safety measures and standards across various transportation sectors globally.

Transportation Safety: Crash Test Simulation

MASH Test Level 2: Pick Up Truck Impact to Barrier to Assess Vehicular Stability



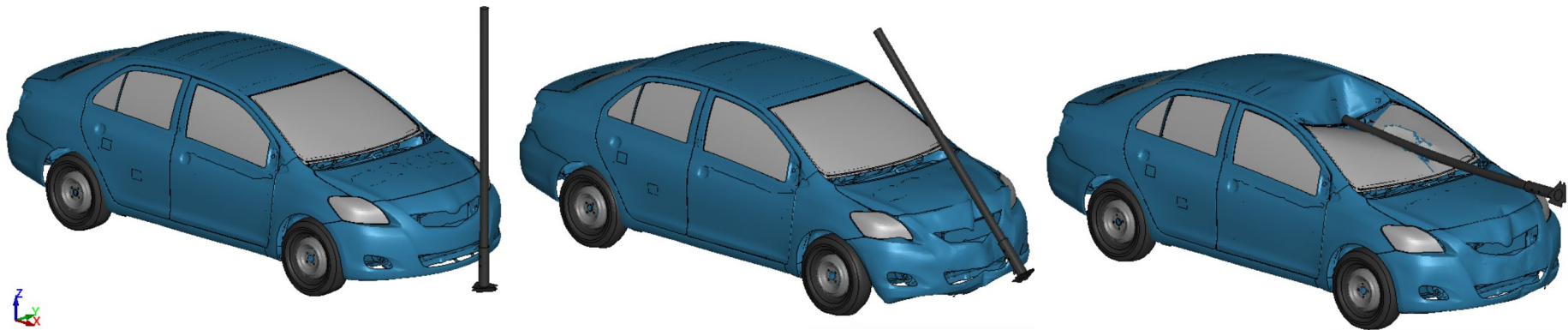
MASH Test Level 3: Pickup Truck Impact to Concrete barrier at 62.5 mph (100 km/h)



Crash test simulations at Predictive Engineering, adhering to AASHTO MASH standards, ensure the safety and durability of roadside structures by assessing barrier integrity under low and high-speed impacts. Our detailed simulations validate barrier effectiveness, enhancing real-world crash safety for vehicle occupants and road users.

Transportation Safety: Crash Test Simulation

MASH Test Level 3: Small Car Impact to Signage to Assess Passenger Safety



Crash test simulations ensure passenger safety during collisions with traffic signs and signals, prioritizing passenger safety according to requirements set forth by AASHTO MASH. Our expertise validates the performance and durability of these structures, ensuring optimal protection for vehicle occupants.

Transportation Safety: Crash Test Simulation

School Bus Crashing

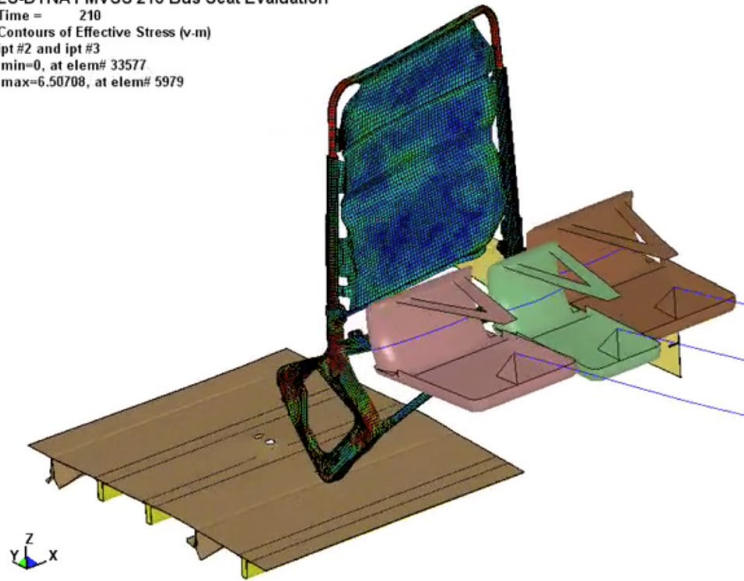


The school bus crash simulation at Predictive Engineering evaluates vehicle integrity and passenger protection in high-impact collisions, aiming to enhance safety standards and develop features that reduce injuries and save lives.

Transportation Safety: Vibration and Failure Analysis

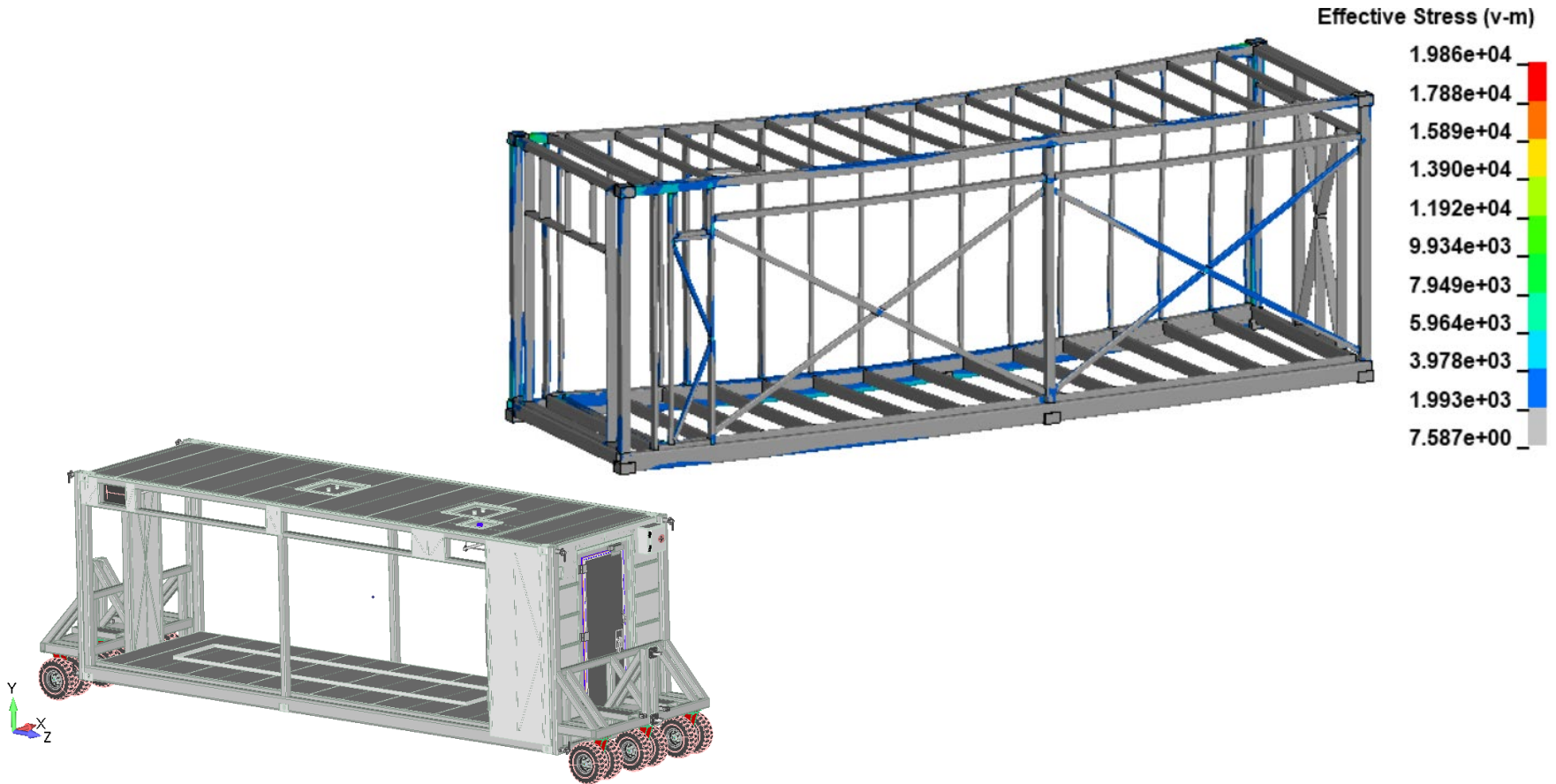
Bus Seat Vibration and Failure Analysis

LS-DYNA FMVSS 210 Bus Seat Evaluation
Time = 210
Contours of Effective Stress (v.m)
ipt #2 and ipt #3
min=0, at elem# 33577
max=6.50708, at elem# 5979



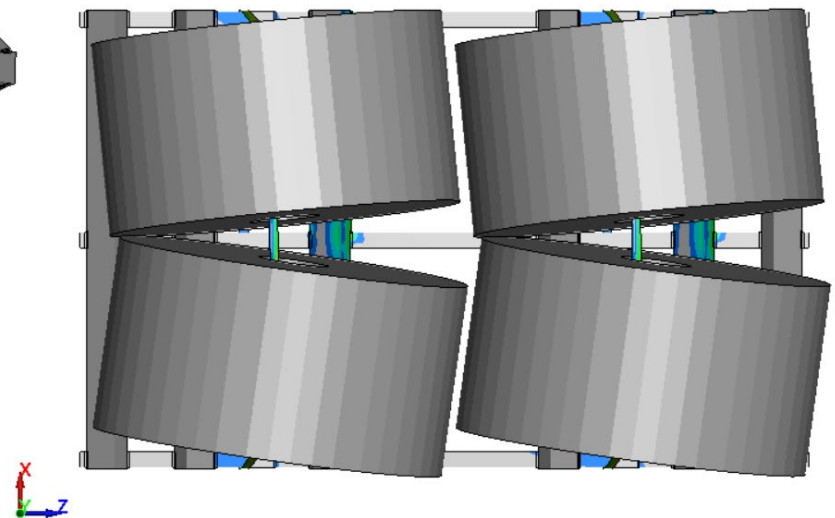
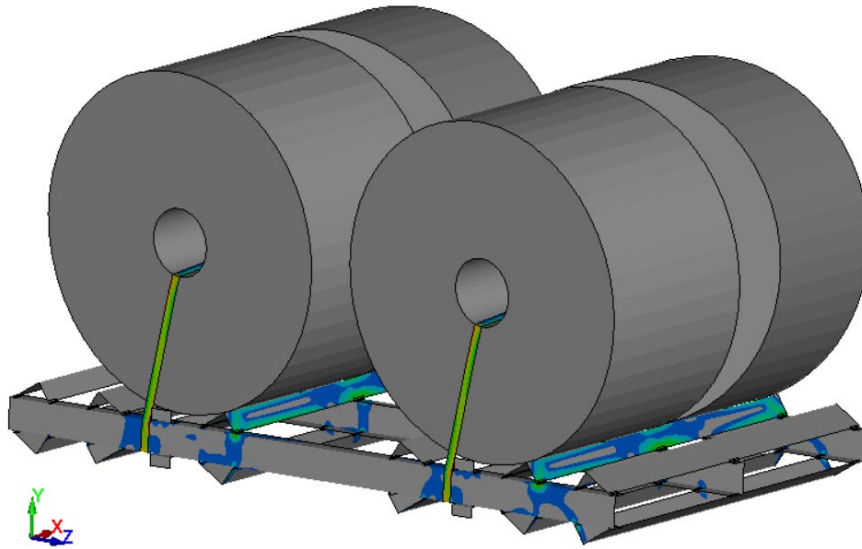
The bus seat safety evaluation at Predictive Engineering assesses seat resilience under transportation loads, identifying failure points to enhance safety and comfort. Our detailed analysis ensures seats withstand daily wear and emergency situations, maintaining high safety standards in public transportation.

Transportation Safety: Cargo and Caster Transportation



Ensuring transporter modules' mechanical integrity during cargo transportation is crucial, requiring rigorous testing per FMCSA regulations. At Predictive Engineering, our FEA experts conduct simulations to evaluate and ensure transporter module survivability, achieving design reliability under FMCSA guidelines.

Transportation Safety: Transportation of Pallets Loaded with Steel Spools



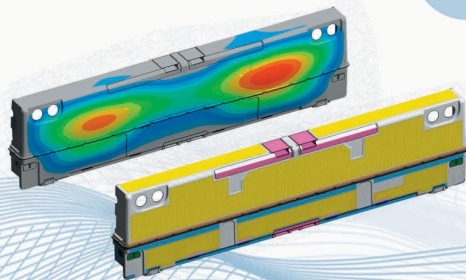
Transporting steel spool-loaded pallets demands structural integrity to meet FMCSA regulations. At Predictive Engineering, we use advanced simulations and ASME-standard fatigue and weld evaluations to ensure design reliability, validating the durability of transfer pallets under rigorous conditions.

Predictive Engineering – The Advantage of Getting it Right the First Time



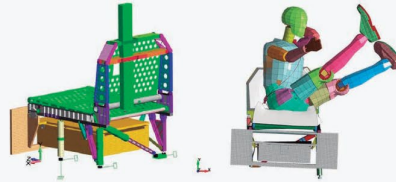
Finite element analysis consulting services, software, training and technical support.

- Composites, Pressure Vessels, Vibration.
- **NASTRAN**: Linear Dynamics.
- **LS-DYNA**: Drop-test, Impact, Burst Analysis.
- **STAR-CCM+**: CFD Thermal/Flow Analysis.



Project Examples

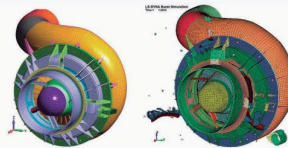
FAA 16G SLED TEST VERIFICATION



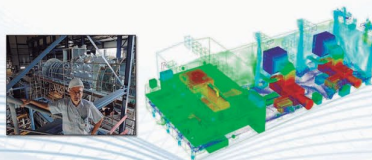
STRESS AND VIBRATION ANALYSIS OF SATELLITES



LS-DYNA TURBINE BURST SIMULATION



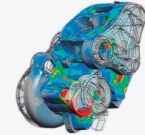
CFD STUDY ON CO-GENERATION POWER PLANT BUILDING



Our Services

FEA

Predictive Engineering brings to bear more than 20 years of finite element analysis FEA consulting experience in solving the most difficult mechanical engineering analysis challenges. Our validated experience ranges from transmissions to submarines to satellites.



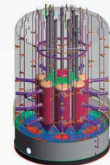
TRANSIENT NONLINEAR

At Predictive Engineering, we pride ourselves on the ability to idealize complex structures and systems into predictive numerical models. Our nonlinear, static and transient dynamic work has been validated against strain-gauges, drop and sled test results, accelerometers, crack growth and fracture and in extreme service environments.



ASME-BPVC

From seismic to buckling to cyclic service (fatigue), Predictive can assist in verifying the most challenging pressure vessel designs. Our hard-earned experience allows us to safely classify tanks and vessels as "fit-for-service" that would typically have required extensive redesign or re-work.



CFD

Our expertise in computational fluid dynamics (CFD) comes from hundreds of thermal-fluid projects in medical, aerospace, marine, HVAC (data centers), civil and automotive. This experience gives us the capability to quickly optimize and provide accurate digital prototypes.

