



InDepth

Engineering Solutions

**BUS & TRUCK
SERVICES**

DESIGN

ANALYZE

ENGINEER



WHAT WE DO

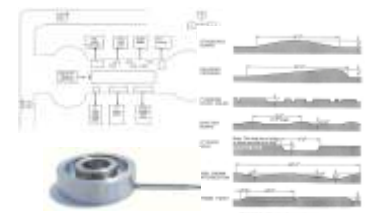
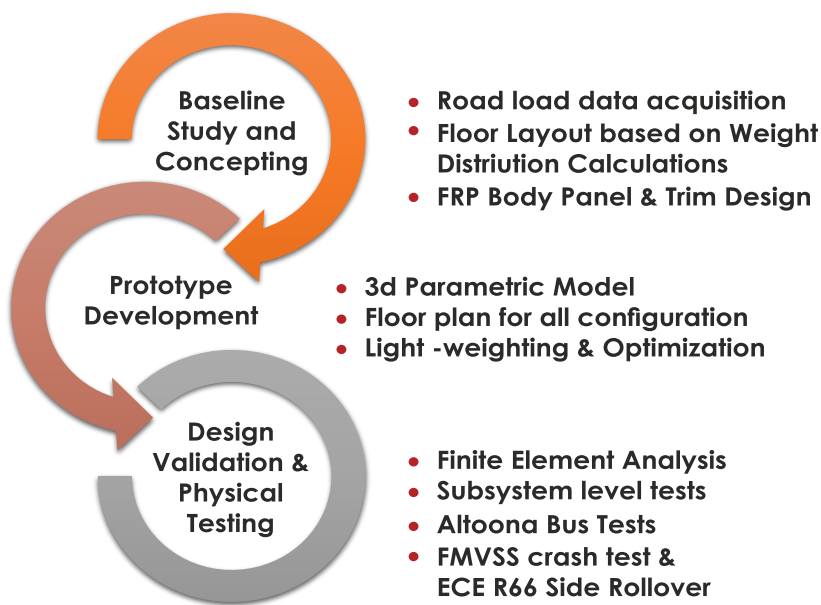
InDepth Engineering solutions is a mechanical engineering consulting firm recognized for its commitment to providing the highest level of quality service.

Founded in 2006, with focus on automotive industry, we have since spread our wings to provide innovative solutions to amusement park, medical device, alternative energy, consumer products and aerospace industry.

Our integrated design and development services cover all key aspects of a project, such as design (CAD), engineering and drafting, load development using multi-body dynamics (MBD), computer aided engineering (FEA/CFD). Through extensive detailing and rigorous root cause analyses, we explore creative ways to problem-solve and overcome difficult design challenges.

We approach every challenge with a passion for professionalism and excellence, which enables us to continuously exceed the expectations of our customers.

BUS BODY DEVELOPMENT



CAE SIMULATIONS

DURABILITY

- Pothole / Jounce
- Braking Over Bump
- Rearward Braking
- Cornering & Twist
- Modal Analysis

CRASH ANALYSIS

- Roof Crash: FMVSS 220
- Side Rollover: ECE R66
- Side Impact: FMVSS 214
- Seat & Seat belt
- Anchorage: FMVSS 207/210

SUBSYSTEM ANALYSIS

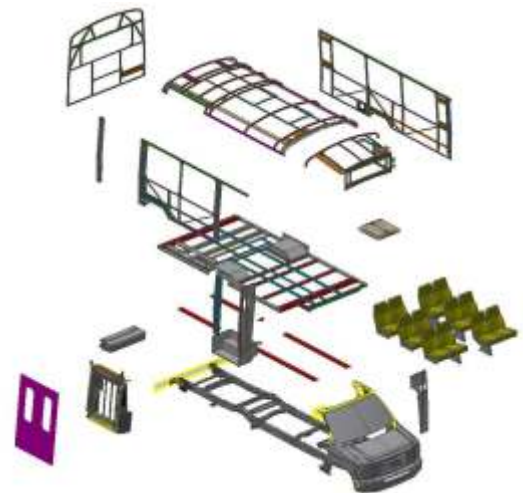
- Wheelchair Lift System: FMVSS 403
- Tow-Hook Tests
- Rear Bumper Analysis
- Plywood Floor Stiffness





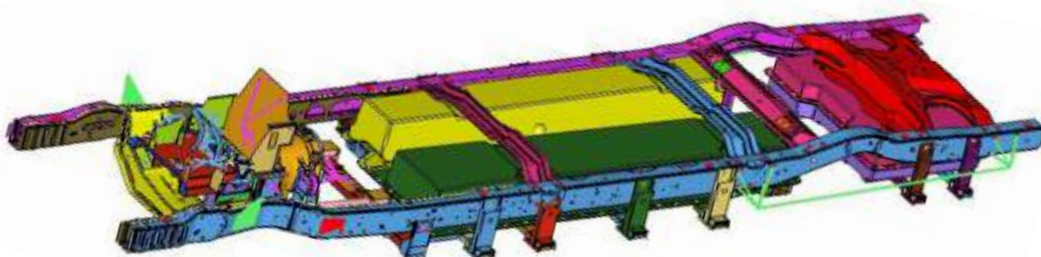
BUS BODY DESIGN FOR GLOBAL MARKET

- Bus body designed in such a way that it can be built on rolling chassis from multiple OEMs with minimum number of changes.
- More than 50 build options provided with different OEM rolling chassis, body length, wheel bases, entry door width, ADA lift design and positions, and floor heights.
- Significant reduction in total no. of sub-system variants, facilitating low cost country option.
- CAE simulations used rigorously to achieved for all durability, seat pull, roof crush, roll over, side impact, tow hook, etc. before testing.



ELECTRIC AND HYBRID PICKUP TRUCK

- Durability evaluation of battery cradle design for heavy battery packs as per SAE requirements.
- Crucial design decisions such as the number of mounts, mount spacing etc. for the bolt-on cradle made with accurate engineering calculations.
- Performance of the design under several loading scenarios, as per SAE is verified.
- All the fastener and adhesive bond evaluation with adequate conservative measures performed.
- Modal performance of the design also evaluated.



CHASSIS DEVELOPMENT

Design Features :Multiple wheel base, Multiple engine/transmission.

Modal Analysis: Modal Map

Suspension Loads: Inertia Relief Analysis

- Jounce
- Braking over Bump
- Brake Windup

Inertia Loads: Linear Statistic Analysis

- Lateral, Longitudinal and Vertical

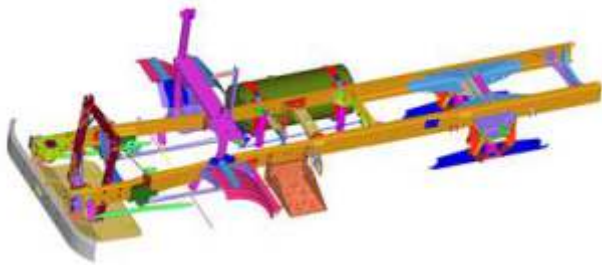
Handling Loads: Linear Statistic Analysis

- Aggressive Right/ Left turn
- Bogie and cross twist
- Racking

Tow-pin and Tow hook:

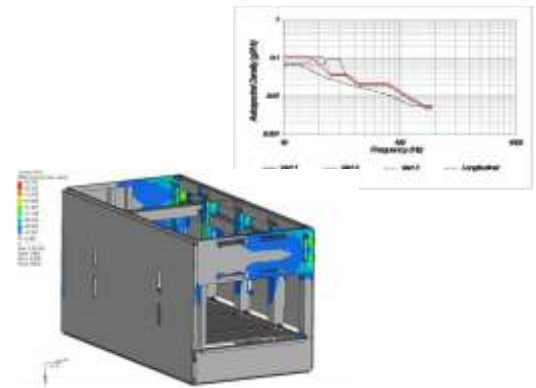
Non Linear Analysis

- Horizontal, vertical conical, horizontal conical pull
- Sub-system models of fuel tank, battery tray, engine mounts, shock and jounce brackets, skid plate etc.
- Bolt assessment based on bolt slip, shear and axial loads



HIGH VOLTAGE BATTERY PACKS

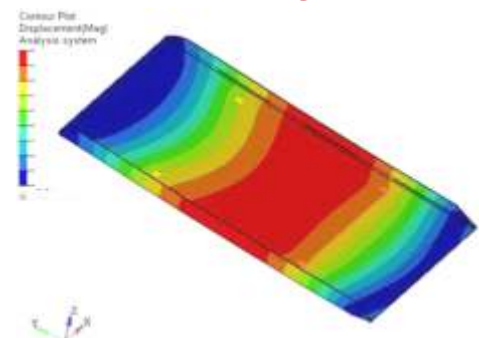
InDepth has successfully executed design and validation of the battery enclosures for class 8 trucks as well as for automotive applications. Our designs met all the performance and mass targets. We have experience with various construction of battery enclosures like sheet metal steel enclosure with composite cover, extruded aluminum constructions, cradle mounted enclosure systems. InDepth has performed steady state and transient heat transfer analyses at cell level, battery module level and battery pack level to optimize the battery cooling system.



COMPOSITE MATERIAL EXPERIENCE

InDepth has extensive experience in utilizing composite materials to achieve light weight designs of bumpers, commuter bus floors, mobility ramps etc.

- Worked with carbon fibers, glass fibers, honeycomb sandwich construction and SMC.
- Used FE software to predict static and dynamic failure of composites.
- Achieved up to 60% mass saving with the use of FRP and honeycomb materials.





WHY PARTNER WITH US??

Our advanced CAE capabilities and familiarity with the industry standards, have helped our customers achieve significant cost and mass savings with robust designs.

We assess each project individually, based on its objectives, parameters and drivers to develop specific methodologies that will add value and de-risk the project.

At InDepth, we bring advanced technologies for design synthesis, structural optimization, reliable manufacturing feasibility studies and innovative ways to meet even the most critical needs of our customer, at a cost effective and lower time development time.

Our engineers take personal pride in their work. We understand the nuances of the business and careful thought is put in to individual project by our experts. Thus, creating an excellent relationship that makes our clients come back to us, again and again.

InDepth Engineering is your one stop solution to all challenges.

OUR TOOLS



CAPABILITIES

Computer Aided Engineering (FEA/CFD)
Product Design and Development
Design Optimization
Mechanical System Design
Systems Integration
Reverse Engineering
Program Management

CAE EXPERTISE

Durability & Fatigue
Crash Analysis
Noise and Vibration
Computer Aided Optimization
Composite Material Simulations
Thermo - Mechanical Analysis
Computational Fluid Dynamics
Manufacturing Simulations

STANDARDS

FMVSS, NCAP, IIHS, SAE Guidelines,
ECE, FMCSR

INDUSTRIES SERVED

Automotive
Amusement Park
Aerospace
Alternative Energy
Medical Device
Consumer Products

AUTOMOTIVE EXPERTISE

Full Vehicle
Body Structure
Chassis and Suspension,
Seating Systems
Interior Trims
Powertrain,
EV / HEV

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