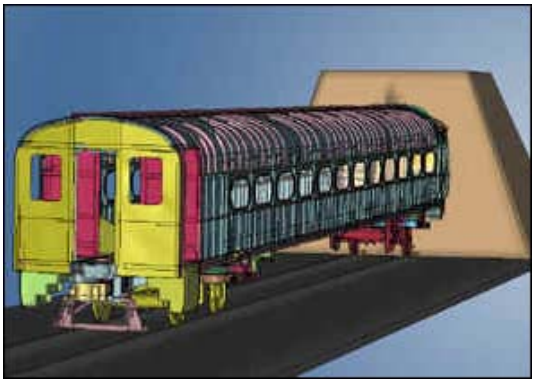
LS-DYNA

LS-DYNA (Transient Dynamic Analysis)

Overview

LS-DYNA by Livermore Software Technology Corporation (LSTC) is a general purpose multiphysics simulation software package capable of simulating complex real world problems. It is widely used in the automotive industry for crashworthiness and occupant safety, also for sheet metal forming, and in the aerospace industry to simulate bird strike, jet engine blade containment and structural failure. LS-DYNA comes with LS-PrePost and LS-OPT. LS-PrePost is an advanced interactive program for preparing input data for LS-DYNA and processing the results from LS-DYNA analyses. LS-OPT allows the user to structure the design process, explore the design space and compute optimal designs according to the specified constraints and objectives.



Solution Types:

- Nonlinear dynamics
- Rigid body dynamics
- Quasi-static simulations
- Normal modes
- Linear statics
- Thermal analysis
- Fluid analysis
  - Eulerian capabilities
  - ALE (Arbitrary Lagrangian-Eulerian)
  - Fluid-structure interactions
- FEM-rigid multi-body dynamics coupling (MADYMO, CAL3D)
- Underwater shock
- Failure analysis
- Crack propagation
- Real-time acoustics
- Design optimization
- Implicit springback
- Multiphysics coupling
- Structural-thermal coupling
- Adaptive remeshing
- Smooth particle hydrodynamics
- Element-free meshless method

Capabilities:

Material Library:

- Metals
- Plastics
- Glass
- Foams
- Fabrics
- Elastomers
- Honeycombs
- Composites
- Concrete & soils
- High explosives
- Propellants
- Viscous fluids
- User-defined materials

Element Library:

- Solids
- 8-node thick shell
- 4-node shells
- Beams
- Welds
- Discrete zero length beams
- Trusses and cables
- Nodal masses
- Lumped inertias

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Contact Algorithms:
- Flexible body contact
- Flexible body to rigid body contact
- Rigid body to rigid body contact
- Edge-to-edge contact
- Eroding contact
- Tied surfaces
- Rigid walls
- Draw beads

Specialized Automotive Features:
- Seatbelts
- Slip Rings
- Pretensioners
- Retractors
- Sensors
- Accelerometers
- Airbags
- Hybrid III dummy models
- Inflator models

Applications:

Automotive Crashworthiness & Occupant Safety:
- Predicts car's behavior in a collision and the effects of the collision upon the car's occupants
- Eliminates the experimental testing of prototypes, thus saving time and expense

Sheet Metal Forming:
- Predicts the stresses and deformations experienced by the metal, and determines if the metal will fail
- Refines the mesh during the analysis, as necessary, to increase accuracy and save time
- Types of metal forming applications
  - Metal stamping
  - Hydroforming
  - Forging
  - Deep drawing
  - Multi-stage processes

Military and Defense Applications:
- Penetration (projectile and armor)
- Explosives
- Weapon design
- Underwater simulations (using USA coupling)
- Hazardous
- Waste containment

Aerospace Applications:
- Blade containment
- Bird strike (windshield and engine blade)
- Failure analysis

Other Applications:
- Drop testing
- Can and shipping container design
- Electronic component design
- Glass forming
- Plastics, mold and blow forming
- Biomedical
- Metal cutting
- Earthquake engineering
- Sports equipment (golf clubs and balls, baseball bats, helmets)
- Civil engineering (offshore platforms, pavement design)

Platforms:
- PC
- Linux
- Unix

Add-ons:

LS-PrePost:
- Prepares input data for LS-DYNA and processes results from LS-DYNA analyses
- Utilizes OpenGL graphics standard to achieve fast rendering and XY plotting

LS-OPT:
- Graphically interfaces with LS-DYNA
- Provides an environment to specify optimization input, monitor and control parallel simulations and post-process optimization data as well as viewing multiple designs using LS-PrePost

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For more information about our company or our products, please contact:

Headquarters:

Noran Engineering, Inc
5555 Garden Grove Blvd., Suite 300
Westminster, CA 92683-1886
USA
Phone: 1.714.899.1220
Fax: 1.714.899.1369
Email: info@noraneng.com
Website: www.NENastran.com

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