

/ STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	SHERLOCK	MOTION
VIBRATIONS							
Modal	●	●	●		●	●	●
Modal - Pre-Stressed	●	●	●		●		●
Modal - Pre-Damped/UnSymmetric	●	●					●
Transient - Mode-Superposition	●	●			●		
Harmonic - Mode-Superposition	●	●			●	●	
Harmonic - Full	●	●			▲		
Spectrum	●	●			●		
Random Vibration	●	●			●	●	
Mistuning	●	●					
Rotordynamics	●	●			●		
Modal Acoustic	●	●			●		
Harmonic Acoustic	●				●		
WAVE HYDRODYNAMICS							
Diffraction and Radiation	●						
Frequency & Time Domain Motions Analysis	●						
Moorings, Joints & Tethers	●						
Load Transfer to Structural Analysis	●						
ADDITIONAL PHYSICS							
1-D Thermal-Flow	●	●	●				
1-D Coupled-Field Circuits	●						
1-D Electromechanical Transducer	●						
MEMS ROM	●						
Piezoelectric	●						
Piezoresistive	●						

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ADDITIONAL PHYSICS							
Electromagnetic	●						
Vibro-Acoustics	●				●		■ ²
Electro-Migration	●					●	
Advanced Acoustics-BEM and SEA					●		
Diffusion-Pore-Fluid	●						
Diffusion-Thermal-Electric-Magnetic	●						
1-Way Fluid Structure Interaction	■ ²	■ ²	■ ²				
2-Way Fluid-Structure Interaction	■ ²			●	●		
Incompressible Fluid Dynamics (ICFD)					●		
Arbitrary Lagrangian Eulerian Method (ALE)					●		
Electromagnetics (EM) - Boundary Element Method (BEM)					●		
Multi-scale Modeling	●				●		
Conservation Element/Solution Element (CESE)					●		

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COMPOSITE MATERIALS							
Material Definitions	●	●			●	●	●
Layers Definitions	●	▲			●	●	
Interface Plies	●						
Advanced Modeling	●						
Features	●						
Variable Material Data	●						
Solid Extrusion	●						
Lay-Up Mapping	●						
Draping	●						
Lay-Up Exchange Interfaces	●						
Advanced Failure Criteria Library	●						
First-Ply Failure	●	●					
Last-Ply failure	●						
Delamination	●				●	●	
Composite Cure Simulation	■ ⁹						
Honeycombs					●		

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DURABILITY							
Stress-Life (SN)	●	●	●		●		●
Strain-Life (EN)	●	●	●		●		●
Dang Van	■ ¹	■ ¹	■ ¹		■ ¹		
Safety Factor	●	●	●		●		●
Adhesive Bond	■ ¹	■ ¹	■ ¹		■ ¹		
Crack Growth Linear Fracture Mechanics	■ ¹	■ ¹	■ ¹		■ ¹		
Seam Weld	■ ¹	■ ¹	■ ¹		■ ¹		
Spot Weld	■ ¹	■ ¹	■ ¹		■ ¹		
Thermo-Mechanical Fatigue	■ ¹	■ ¹	■ ¹		■ ¹	▲	
Vibration Fatigue	■ ¹	■ ¹	■ ¹		■ ¹	●	●
Virtual Strain Gauge Correlation	■ ¹	■ ¹	■ ¹		■ ¹		
Python Scripting Customization	■ ¹	■ ¹	■ ¹		■ ¹		
EXPLICIT DYNAMICS							
FE (Lagrange) Solver	●			●	●		
Euler Solvers				●	●		
Implicit-Explicit Material States	●			●	●		
Mass Scaling	●			●	●		
Natural Fragmentation	●			●	●		
Erosion Based on Multiple Criteria	●			●	●		
De-Zoning				●	●		
Part Activation and Deactivation (Multi Stage Analysis)				●	●		
Explicit Time Integration	●			●	●		

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IMPLICIT DYNAMICS							
Implicit Time Integration	●	●			●	●	●
GEOMETRIC IDEALIZATION							
Spring	●	●	▲	●	●		●
Mass	●	●	●	●	●		●
Damper	●	●		●	●		●
Spar	●	●	●		●		
Beam	●	●	●	●	●		●
Cable	●	●	●		●		
Pipe/Elbow	●	●	●				
Shell - Thin	●	●	●	●	●		●
Layered Shell -Thin (Composite)	●	●		●	●		
Shell - Thick (Solid Shell)	●	●	●		●		
Layered Shell - Thick (Solid Shell) (Composite)	●	●	●		●		
2D Plane / Axisymmetric	●	●	●		●		●
3D Solids	●	●	●		●	●	●
Layered 3D Solids (Composite)	●	●					
Infinite Domain	●	●	●	●	●		●
2.5D Elements	●	●					
Reinforcement Elements	●	●		●	●	■	
Coupled Field ROM Element Technology	●	●					
Iso-Geometric Analysis (IGA)					●		
GEOMETRY AND STL FILE HANDLING							
SpaceClaim Direct Modeler	●						

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HPC - STRUCTURES							
Default Number of Cores	4 cores (DMP or SMP) MAPDL, 4 for Explicit, 4 for RBD, 4 for AQWA	4 cores (DMP or SMP) MAPDL, 4 for RBD	4 cores (DMP or SMP)	4 cores	1 core	Default Number of cores based on machine being used	
Parallel Solving on Local PC and Cluster	●	●	●	●	●	●	●
GPU Acceleration	■ ⁶ MAPDL - Yes Explicit - No RBD - No AQWA - No	■ ⁶	■ ⁶				
Ansys Cloud Support	MAPDL - Yes Explicit - No RBD - No AQWA - No	MAPDL - Yes RBD - No	MAPDL - Yes		●		
MATERIALS							
Basic Linear Materials (Linear, Anisotropic, Temperature Dependent)	●	●	●	●	●	●	●
Basic Nonlinear Materials (Hyperelastic, Plasticity, Rate Independent, Isotropic, Concrete, Viscoelasticity)	●	●	▲	●	●		●
Advanced Nonlinear Materials (Rate dependent, Anisotropic, Damage Models, Geomaterials, Multiphysics, Acoustics)	●			●	●		
Specialty Materials (Glass, Foam, Kevlar, Fabric, Biomechanic, Paper, Cardboard)					●		●
Field Dependent	●	●		●			
Reactive Materials (Equations of State, High Explosives, Propellants)				●	●		
User Defined Materials	●			●	●		●
Fracture Mechanics and Crack Growth	●				▲		
Material Designer	●						
Granta Materials Data for Simulation	■ ⁷	■ ⁷	■ ⁷				

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MISCELLANEOUS AND USABILITY							
Ansys SpaceClaim	●	■ ⁴	■ ⁴	■ ⁴	■ ⁴		
Ansys Customization Suite (ACS)	●						
Support ACT Extensions	●	●	●	●	●		
Journaling and Scripting	●	●	●		●	▲	
Command Snippet Support	●	●	●				
Batch run capability	●	●	●	●	●	●	●
Read/Write 3rd Party Matrix CAE Data	●	●		●	●		●
CDB and 3rd party FE Model Import	●	●	●		●		●
Nastran Bulk File Export	●	●	●			●	
Direct Input of Nastran Bulk Data Files					●		
Pre-stressing from Nastran Linear Solution					●		
Global/Selective Mass Scaling	●			●	●		
Keyword Input	●	●	●		●		
Splitting of Input File into Subfiles	●	●	●		●		
User Subroutines	●			●	●		●
Re-mapping	●			●	●		
Transmitting boundaries	●			●	●		
Dynamic Storage Allocation	●	●	●		●		
Extensive Output Data Controls (ascii/binary)	●	●	●		●		
Sense Switch Controls - Monitor Simulations Status	▲	▲	▲		●		
Interactive Real-Time Graphics	●	●	●	●	●		
Double Precision	●	●	●	●	●		

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MODELING CAPABILITIES							
Contact - Linear	●	●	●	●	●		●
Contact - Nonlinear	●	●	●	●	●		●
Joints	●	●	●	●	●		●
Spot Welds	●	●	●	●	●		●
Element Birth and Death	●	●					●
Gasket Elements	●						
Rezoning and Adaptive Remeshing	●						
Inverse Analysis	●						
MULTI ANALYSIS							
Submodeling	●	●	●				
Data Mapping	●	●	●				●
Multiphysics Data Mapping	●	●	▲				●
Initial State	●	●		●	●		●
Advanced Multi-Stage 2-D to 3-D Analysis	●	●					
NONLINEAR MULTI-BODY DYNAMICS							
Rigid Body Mechanisms	●	●					●
Rigid Body Dynamics with CMS Components for Flexible Bodies	●						●
Full Transient	●	●		●	●		●
CMS with Substructuring	●						●
Mixed Rigid - Flexible Systems							●
Function Expression							●
Drivetrain Creation							●
Links							●
Vehicle Dynamics							●

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OPTIMIZATION							
DesignXplorer included	●	●	●	■ ³	■ ³		
Parameters	●	●	●	●	●		
Design Point Studies	●	●	●	●	●		
Correlation Analysis	●	●	●	●			
Design of Experiments	●	●	●	●			
Sensitivity Analysis	●	●	●	●			
Goal Drive Optimization	●	●	●	●			
Six Sigma Analysis	●	●	●	●			
STRUCTURAL SOLVER CAPABILITIES							
Linear Static	●	●	●			●	●
Nonlinear Static	●	●	●				●
Pre-Stress Effect, Linear Perturbation	●	●	●	▲	▲		●
Nonlinear Geometry	●	●	●	●	●		●
Buckling - Linear Eigenvalue	●	●	●				●
Buckling - Nonlinear Post Buckling Behavior	●	●	●		●		
Buckling - Nonlinear Post Buckling Behavior - Arc Length	●	●					
Steady State Analysis Applied to a Transient Condition	●						
Advanced Wave Loading	●						
THERMAL							
Steady State Thermal	●	●	●		●		
Transient Thermal	●	●	●		●		●
Conduction	●	●	●	●	●		●
Convection	●	●	●		●		
Radiation to Space	●	●	●		●		
Radiation - Surface to Surface	●	●	●		●		
Phase Change	●	●	●	●	●		
Thermal Analysis of Layered Shells and Solids	●	●	●		●		

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TOPOLOGY AND LATTICE OPTIMIZATION							
Structural Optimization	●	●	●				
Modal Optimization	●	●	●				
Thermal Loads	●	●	●				
Inertial Loads	●	●	●				
Optimized Design Validation	●	●	●				
Manufacturing Constraints	●	●	●				
Stress Constraints	●	●	●				
Symmetry	●	●	●				
Lattice Optimization	■ ⁸						
Overhang/Additive Constraints	■ ⁸						
PARTICLE METHODS							
Smooth Particle Hydrodynamics (SPH)				●	●		
Smooth Particle Galerkin (SPG)					●		
Corpuscular Particle Method (CPM)					●		
Discrete Element Method (DEM)					●		
AUTOMOTIVE							
Seat-belts - including modeling of accelerometer, pretensioner, retractor, sensor, and slip ring					●		
Inflator Models					●		
Airbag Fabric Constitutive Models					●		
Accelerometers					●		
Airbag Sensors					●		
Airbag Breakout					●		
Eulerian Deployment of Airbags					●		
Airbag Folder					●		
Unfolded Reference Geometry for Airbags					●		

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AUTOMOTIVE							
Dummy Positioner					●		
Side-Impact Dummy Special Damper					●		
Airbag Deployment					●		

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