ANSYS 14.5 Capabilities Brochure

ANSYS®

Fluid Dynamics | Structural Mechanics | Electromagnetics | Systems & Multiphysics

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ANSYS® 14.5 Capabilities Chart

ANSYS Product Solutions

	ANSYS Multiphysics™	ANSYS Mechanical™	ANSYS Structural™	ANSYS Professional™ NLS	ANSYS Professional NLT	ANSYS DesignSpace®	ANSYS Explicit STR™	ANSYS Autodyn®	ANSYS LS-DYNA®	ANSYS CFD™		ANSYS CFD-Flo™	ANSYS Polyflow®	ANSYS HFSS™	ANSYS Maxwell®
										ANSYS Fluent®	ANSYS CFX®				
Structural Analysis															
Analysis Types															
Static	•	•	•	•	•	•									
Modal	•	•	•	•	•	•									
Buckling (linear)	•	•	•	•	•	•									
Buckling (nonlinear)	•	•	•	•			•	•	•						
Transient	•	•	•	Δ	Δ		•	•	•						
Spectrum	•	•	•	•	•										
Harmonic	•	•	•	Δ	Δ										
Random vibration	•	•	•												
Substructuring	•	•	•												
Geometric Nonlinearity															
Large strain	•	•	•	•			•	•	•						
Large deflection	•	•	•	•	Δ		•	•	•						
Material Model Highlights															
Linear material models	•	•	•	•	•	•	•	•	•						
Rate-dependent plasticity	•	•	•				•	•	•						
Rate-independent plasticity	•	•	•	Δ			•	•	•						
Hyperelasticity	•	•	•	Δ			•	•	•						
Viscoelasticity	•	•	•				•	•	•						
Creep	•	•	•												
Reactive materials							•	•							
Contact Modeling															
Bonded/no separation sliding	•	•	•	•	•	•	•	•	•						
Pretension (bolts, etc.)	•	•	•	•	•	•									
Joints	•	•	•	•	•										
Spot welds	•	•	•	•	•		•	•	•						
Nonlinear Contact Modeling															
Rough	•	•	•	•	•	Δ	•	•	•						
Frictionless	•	•	•	•	•	Δ	•	•	•						
Friction	•	•	•	•			•	•	•						
Gaskets	•	•	•												
Advanced Analysis															
Rotordynamics	•	•	•												
Component mode synthesis	•	•	•												
Cyclic symmetry analysis	•	•	•	•	•				•						
Rezoning	•	•	•					•							
Submodeling	•	•	•	•	•				•						
Element birth and death	•	•	•				Δ	Δ	Δ						

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Explicit Analysis															
Modeling Capabilities															
Interactive prep/post and solution								•							
Remapping in space								•							
Remapping solution methods								•							
Mass scaling							•	•	•						
Dezoning								•							
Part activation and deactivation								•							
Part addition/removal during a simulation								•							
Erosion based on multiple criteria							•	•	•						
Natural fragmentation							•	•							
Euler solver								•							
2-D solver							Δ	•							
Fluid–structure interaction (FSI)								•							
Implicit–explicit deformations							•	•	•						
Implicit–explicit material states							•	•							
Thermal Analysis															
Analysis Types															
Steady state	•	•		•	•	•				•	•	•	•		
Transient	•	•			•					•	•	•	•		
Thermal Modeling															
Conduction	•	•		•	•	•	•	•		•	•	•	•		
Convection	•	•		•	•	•				•	•	•	•		
Radiation	•	•			•					•	•	Δ	Δ		
Phase change	•	•			•		•	•	•	•	•				
Fluid Dynamics															
Modeling Capabilities															
Variety of inlet and outlet B.C.	•									•	•	•	•		
Steady-state flow	•									•	•	•	•		
Transient flow	•									•	•	•	•		
2-D flow (dedicated solver option)										•			•		
2-D flow (using thin 3-D segment)	•									•	•	•	•		
3-D flow	•									•	•	•	•		
Time-dependent boundary conditions	•									•	•	•	•		
Incompressible flow	•									•	•	•	•		
Compressible flow	•									•	•	•			
Natural convection	•									•	•	•			
Fan model	•									•	•	•			
Periodic domains	•									•	•	•	•		
Porous media	•									•	•	•	•		
Heat transfer	•									•	•	•	•		
Conjugate heat transfer	•									•	•	•	•		
Non-Newtonian viscosity	•									•	•	•	•		
Viscoelasticity													•		
Turbulence (isotropic)	•									•	•	•			

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Fluid Dynamics															
Modeling Capabilities (continued)															
Turbulence (anisotropic/RSM/LES)	•									•	•	•			
Turbulence (transitional/SAS/DES)										•	•				
Rotating equipment (MRF/frozen-rotor)										•	•				
Rotating equipment (sliding-mesh/stage)										•	•				
Dynamic/moving-deforming mesh	•									•	•	•	•		
Immersed-solid/MST method for moving parts	•										•	•	•		
Flow-driven solid motion (6DOF)										•	•	•			
Internal radiation (participating media)	•									•	•	•	•		
Internal radiation (transparent media)										•	•				
External radiation										•	•				
Solar radiation and load										•	•				
Species modeling	•									•	•	•	•		
Flow pathlines (massless)	•									•	•	•	•		
Particle tracking (with mass)										•	•				
Coupled discrete phase modeling										•	•				
Acoustics (source export)	•									•	•	•			
Acoustics (noise prediction)										•					
Chemical reaction										•	•		•		
Combustion										•	•				
Cavitation	•									•	•	•			
Multiphase (Eulerian)										•	•				
Multiphase (free surface)	•									•	•	•	•		
Fluid–structure interaction option	•									•	•	•	•		
Internal optimization for flow										•			•		
Specialty extrusion models													•		
Specialty blow molding models													•		
Specialty fiber spinning models										•					
Specialty fuel cell models										+					
Solver Options															
Pressure-based coupled solver	•									•	•	•	•		
Density-based coupled solver										•					
Pressure-based segregated solver										•					
Parallel solving on local PC option	•							•	•	•	•	•	•		
Parallel solving over network option	•							•	•	•	•	•			
Customizable, scripting and user functions	•									•	•	•	•		
Adjoint solver for sensitivity analysis										•					

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Electromagnetics – Low Frequency															
Electrostatics	•														•
AC conduction	•														•
DC conduction	•														•
DC insulator field															•
Magnetostatics	•														•
Adaptive field mesh															•
AC harmonic magnetic	•														•
AC harmonic electric	•														
Electric transient	•														•
Ion optics	•														
Magnetic Transient															
Rigid motion visualization															•
Translational motion	•														•
Rotational motion	•														•
Double-layer rotational motion															•
Cylindrical motion															•
Automatic matching boundaries															•
Winding definition															•
Automatic coil connections across boundaries															•
Advanced circuit coupling with ANSYS Simplorer®															•
Circuit coupling with adaptive time stepping															•
Advanced Material Characteristics															
Nonlinear anisotropic materials															•
Functional magnetization direction															•
Advanced permanent magnet demagnetization modeling															•
Nonlinear magnetization characteristics															•
Core loss modeling															•
Automatic project creation using UDPs															•
Insulation sheet to model cracks															•
Electromagnetics – High Frequency															
Frequency domain analysis														•	
Time domain analysis														•	
Eigenmode analysis														•	
Integral equation analysis														•	
Hybrid finite element integral equation analysis														•	
Wave port excitation														•	
Lumped port excitation														•	
Floquet excitations														•	
Plane wave excitation														•	

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Electromagnetics – High Frequency (continued)															
Hertzian dipole excitation														•	
Cylindrical wave excitation														•	
Gaussian beam excitation														•	
Linear antenna excitation														•	
Linked far-field excitation														•	
Linked near-field excitation														•	
Voltage source excitation														•	
Current source excitation														•	
Magnetic bias excitation														•	
Modal solutions														•	
Terminal solutions														•	
Perfect electric conductor boundary														•	
Perfect magnetic conductor boundary														•	
Finite conductivity boundaries														•	
Impedance boundary														•	
Layered impedance boundary														•	
RLC boundary														•	
Radiation boundary														•	
Symmetry boundary														•	
Master/slave boundary														•	
Screening impedance boundary														•	
Perfectly matched layer boundary														•	
Frequency-dependent materials														•	
Field calculation inside conductive materials														•	
Discrete-frequency sweep type														•	
Fast-frequency sweep type														•	
Interpolating sweep frequency sweep type														•	
Zero-, first-, second- and mixed-order element types														•	
True curvilinear mesh elements														•	
Fully automated meshing														•	
Fully automated adaptive mesh refinement														•	
S,Y, Z matrix results														•	
Propagation constant results														•	
E, H, J, P field results														•	
Field calculator														•	
Iterative matrix solver														•	
Direct matrix solver														•	
Distributed frequency sweep solver capability														•	
Distributed model solution capability														•	

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Electromagnetics – High Frequency (continued)															
Antenna parameter calculation														•	
Infinite antenna array calculation														•	
Finite antenna array calculation														•	
Radar cross section calculation														•	
Frequency selective surface calculation														•	
Metamaterial calculation														•	
Specific absorption rate calculation														•	
EMI/EMC calculation														•	
Imported geometry healing														•	
Fully scriptable														•	
Link to ANSYS Mechanical														•	
Dynamic link to Ansoft Designer®														•	
Link to ANSYS SIwave™														•	
Link to ANSYS Simplorer														•	
Coupled Physics (Sometimes requires two or more products)															
Acoustics	•	•								•	Δ	Δ			
Acoustics–structural	•	•													
Electric–magnetic	•													•	•
Fluid–structural	•	•						•		•	•	•			
Fluid–thermal	•									•	•	•			
Electromagnetic–fluid	•									+	+	+			•
Electrostatic–structural	•														
Magnetic–structural	•														•
Electromagnetic–thermal	•													•	•
Piezoelectric	•	•													
Piezoresistive	•	•													
Thermal–electric	•	•													•
Thermal–structural	•	•		•	•	•	•	•							
Thermal–electric–structural	•	•													•
Thermal–electric–fluids										•					
Electromagnetic–thermal–structural	•													•	•
Electromagnetic–thermal–fluids										•					
Reduced-order modeling (ROM)	•	•													•
Pre-Processing															
Modeling Capabilities															
IGES/STEP geometry reader	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Beam modeling	•	•	•	•	•	+	•	•	•						
Composite lay-up		•	•	•	•		•	•							
Meshing Capabilities															
Defeaturing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Surface meshing	•	•	•	•	•	•	•	•	•	•	•	•	•		
Tetrahedral meshing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

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Pre-Processing															
Meshing Capabilities (continued)															
Prism inflation layers	•	•	•	•	•		•	•	•	•	•	•	•		
Swept-hex meshing	•	•	•	•	•	•	•	•	•	•	•	•	•		
Thin-sweep meshing	•	•	•	•	•	•	•	•	•	•	•	•	•		
Multizone hex meshing	•	•	•	•	•		•	•	•	•	•	•	•		
Automatic hexa-core meshing	•	•	•	•	•		•	•	•	•	•	•	•		
Automatic hexa-dominant meshing	•	•	•	•	•		•	•	•	•	•	•	•		
Cut cell Cartesian meshing										•					
Curvilinear elements														•	•
Adaptive mesh refinement	•	•	•	•	•	•				•	•	•		•	•
Boundary Conditions															
Solid model loads and boundary conditions	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Tabular loads and boundary conditions	•	•	•	•	•		•	•	•	•	•	•	•	•	•
Function loads and boundary conditions	•	•	•	•	•		•	•	•	•	•	•	•	•	•
Apply temperature loads	•	•	•	•	•	•				•	•	•	•	•	•
Post-Processing															
Report generator	•	•	•	•	•	•	•	Δ	Δ	•	•	•	•	•	•
Contour displays	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Vector displays	•	•	•	•	•		•	•	•	•	•	•	•	•	•
Isosurface displays	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Slicing planes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Quantitative calculations	•	•	•	•	•		•	•	•	•	•	•	•	•	•
Particle tracing	•									•	•	•	•		
Animation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Output (images, Excel® data)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CFD turbomachinery										•	•	•			
General															
ANSYS Engineering Knowledge Manager™ (EKM) data management ready	+	+	+	+	+	+	+	+		+	+	+	+		
Parallel solvers (HPC licenses required)	+	+	+	+	+			•	+	+	+	+	+	+	+
Solver scripting language	•	•	•	•	•				•	•	•	•	•	•	•
Parameter manager	•	•	•	•	•	•	•	Δ		•	•	•	•	•	•

Δ = Limited set of feature capabilities + = Additional product required

ANSYS, Inc.
www.ansys.com
ansysinfo@ansys.com
866.267.9724

ANSYS is dedicated exclusively to developing engineering simulation software that fosters rapid and innovative product design. Our technology enables you to predict with confidence that your product will thrive in the real world. For more than 40 years, customers in the most demanding markets have trusted our solutions to help ensure the integrity of their products and drive business success through innovation.

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