

ANSYS 14.0 Capabilities Brochure

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Fluid Dynamics

Structural Mechanics

Electromagnetics

Systems & Multiphysics

**ANSYS® 14.0
Capabilities Chart**

	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 Fluent®	ANSYS CFX®	ANSYS CFD-Flo™	ANSYS Polyflow®	ANSYS HFSS™	ANSYS Maxwell®
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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	ANSYS Fluent®	ANSYS CFX®													
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

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