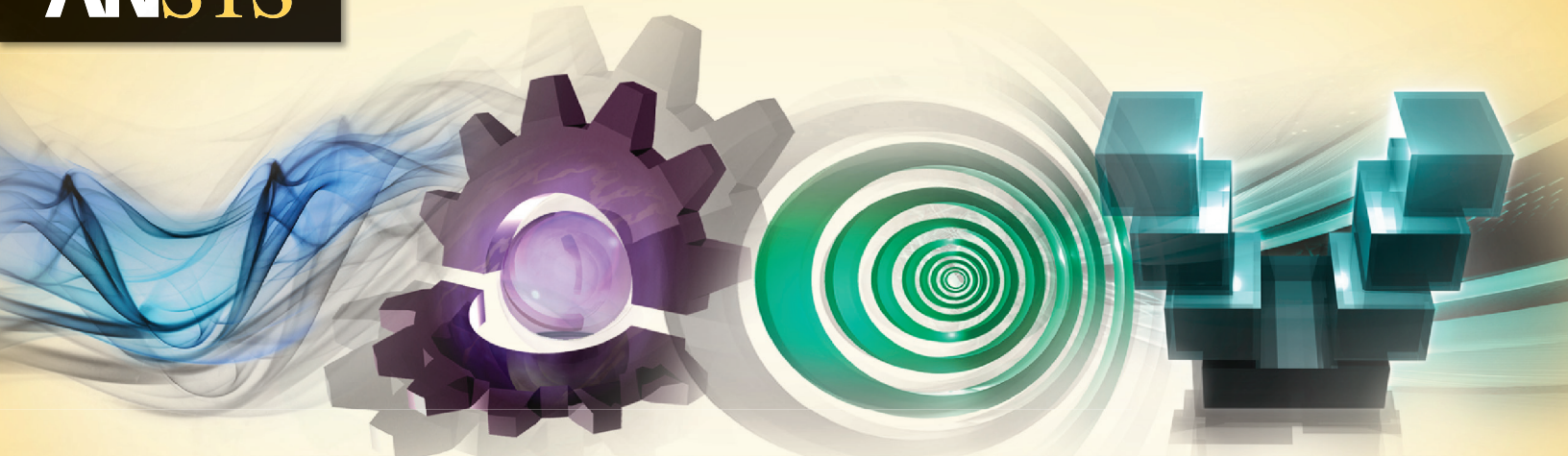


ANSYS 16.0 Capabilities

ANSYS®



FLUIDS

STRUCTURES

ELECTRONICS

SYSTEMS

**ANSYS® 16.0
Capabilities Chart**

	ANSYS Multiphysics™	ANSYS AIM	ANSYS Mechanical™	ANSYS Structural™	ANSYS Professional™ NLS	ANSYS DesignSpace®	ANSYS Explicit STR™	ANSYS Autodyn®	ANSYS LS-DYNA®	ANSYS CFD™		ANSYS CFD Professional	ANSYS Polyflow®	ANSYS HFSS™	ANSYS Maxwell®	ANSYS SI Wave	ANSYS Icepak
										ANSYS Fluent®	ANSYS CFX®	ANSYS CFD-Flo™					
Structures																	
Strength Analysis																	
Static	•	•	•	•	•	•											
Buckling (linear)	•		•	•	•	•											
Buckling (nonlinear)	•		•	•	•		•	•	•								
Substructuring	•		•	•													
Geometric Nonlinearity																	
Large strain	•		•	•	•		•	•	•								
Large deflection	•		•	•	•		•	•	•								
Material Model																	
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	•		•	•													
Cyclic symmetry analysis	•		•	•	•				•								
Rezoning	•		•	•				•									
Adaptive remeshing	•		•	•				•									
Submodeling	•		•	•	•				•								
Element birth and death	•		•	•			Δ	Δ	Δ								
Fracture mechanics	•		•	•													
Vibrations																	
Modal	•	•	•	•	•	•											
Spectrum	•		•	•	•												
Harmonic	•		•	•	Δ												
Random vibration	•		•	•													
Rotordynamics	•		•	•													
Super elements & component mode synthesis	•		•	•													
Mistuning	•		•	•													

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										ANSYS Fluent®	ANSYS CFX®	ANSYS CFD-Flo™						
Thermal																		
Conduction	•	•	•		•	•	•	•	•	•	•	•	•					
Convection	•	•	•		•	•				•	•	•	•					
Radiation	•	•	•							•	•	•		Δ				
Phase change	•		•				•	•	•	•	•							
Steady-state	•	•	•		•	•				•	•	•	•					
Transient	•		•							•	•	•		•				
Motion																		
Rigid body mechanisms																		
Rigid/flexible transient	•		•	•	Δ													
Impact																		
Interactive prep/post AND solution																		
Remapping in space										•								
Remapping solution methods										•								
Mass scaling							•	•	•									
De-zoning								•										
Part activation and deactivation								•										
Part addition/removal during a simulation								•										
Erosion based on multiple criteria							•	•	•									
Natural fragmentation							•	•										
Euler Solver								•										
2D Solver							Δ	•	•									
Implicit-explicit deformations							•	•	•									
Implicit-explicit material states							•	•										
Composite Materials																		
Material definitions			•	•	•		•	•	•									
Layers definitions			Δ	Δ	Δ		•	•	•									
Solid extrusion			Δ	Δ	Δ													
First-ply failure			•	•	•													
Last-ply failure			•	•	•													
Delamination			•	•	•		•	•	•									
Fluids																		
General Solver Capabilities																		
Variety of inlet and outlet b.c.	•	•								•	•	•	•	•				
Steady state flow	•	•								•	•	•	•	•				
Transient flow	•									•	•	•	•	•				
2-D AND 3-D flow										•	•	•	•	•				
Time dependent boundary conditions	•									•	•	•	•	•				
Customizable materials library		•								•	•	•	•					
Fan model	•									•	•	•	•					
Periodic domains	•									•	•	•	•	•				
Dynamic/moving-deforming mesh	•									•	•	•	•	•				

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										ANSYS Fluent®	ANSYS CFX®	ANSYS CFD-Flo™					
Immersed-solid/MST method for moving parts	•												•				
Flow-driven solid motion (6DOF)										•	•	•					
Pressure-based coupled solver	•	•								•	•	•	•				
Density-based coupled solver										•							
Single Phase, non reacting flows																	
Incompressible flow	•	•								•	•	•	•				
Compressible flow	•									•	•	•					
Porous media	•									•	•	•					
Non-Newtonian viscosity	•									•	•	•	•				
Turbulence - isotropic	•	•								•	•	•	•				
Turbulence - anisotropic (RSM)	•									•	•	•					
Turbulence - unsteady (LES/SAS/DES)										•	•						
Turbulence - laminar/turbulent transition		•								•	•						
Flow pathlines (massless)	•	•								•	•	•	•				
Fan model										•	•	•					
Acoustics (source export)	•									•	•	•					
Acoustics (noise prediction)										•							
Heat Transfer																	
Natural convection	•									•	•	•					
Conduction & conjugate heat transfer	•									•	•	•	•				
Internal radiation - participating media	•									•	•	•	•				
Internal radiation - transparent media										•	•						
External radiation		•								•	•						
Solar radiation & load										•	•						
Particles Flows (Multiphase)																	
Coupled discrete phase modeling										•	•	•					
Inert particle tracking (with mass)										•	•	•					
Liquid droplet (incl. evaporation)										•	•						
Combusting particles										•	•						
Multicomponent droplets										•	•						
Discrete element model (DEM)										•	•						
Break-up and coalescence										•	•						
Free Surface Flows (Multiphase)																	
Implicit and explicit VOF	•									•	•	•	•				
Coupled level set/VOF	•									•	•	•					
Open channel flow and wave										•	•	•					
Surface tension										•	•	•					
Phase change										•	•	•					
Cavitation	•									•	•	•					

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										ANSYS Fluent®	ANSYS CFX®	ANSYS CFD-Flo™					
Dispersed Multiphase Flows (Multiphase)																	
Mixture fraction										•	•						
Eulerian model										•	•						
Boiling model										•	•						
Surface tension										•	•						
Phase change										•	•						
Drag and lift										•	•						
Wall lubrication										•	•						
Heat and mass transfer										•	•						
Population balance										•	•						
Reactions between phases										•	•						
Reacting Flows																	
Species transport	•									•	•	•					
Non-premixed combustion										•	•						
Premixed combustion										•	•						
Partially premixed combustion										•	•						
Composition PDF transport										•	•						
Finite rate chemistry										•	•						
Pollutants and soot modeling										•	•						
Internal combustion engine specific solution										•	•						
Turbomachinery																	
MRF/frozen-rotor										•	•						
Sliding-mesh/stage										•	•						
Transient blade row											•						
Blade flutter analysis											•						
Forced response analysis			•	•							•						
Shape Optimization																	
Adjoint solver for sensitivity analysis										•							
Mesh Morphing																	
High Rheology Material																	
Viscoelasticity													•	•			
Speciality extrusion models													•	•			
Speciality blow molding models													•	•			
Specialty fiber spinning models										•							
HPC – Fluids																	
Parallel solving on local PC option	•	•							•	•	•	•	•	•			
Parallel solving over network option	•								•	•	•	•	•	•			
CPU support		•								•	•	•	•	•			
GPU support										•			•				



ANSYS 16.0
Capabilities Chart

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										ANSYS Fluent®	ANSYS CFX®	ANSYS CFD-Flo™					
Electronics																	
Low Frequency Electromagnetics																	
Electrostatics	•														•		
AC Conduction	•														•		
DC Conduction	•	•													•		
Magnetostatics	•														•		
Adaptive Field Mesh															•		
AC Harmonic Magnetic	•														•		
AC Harmonic Electric	•																
Electric Transient	•														•		
Ion optics	•																
HPC Frequency Sweeps															•		
Magnetic Transient																	
Translational Motion	•														•		
Fully Automatic Symmetrical Mesh Generation															•		
Layered Mesh Generation															•		
Rotational Motion	•														•		
Non-Cylindrical Motion															•		
Advanced Embedded Circuit Coupling															•		
Circuit Coupling with Adaptive Time Stepping															•		
Advanced Material Modeling																	
Vector Hysteresis Modeling															•		
Nonlinear Reduced Order Models															•		
Frequency Dependent Reduced Order Models															•		
Nonlinear Anisotropic Materials															•		
Functional Magnetization Direction															•		
Magnetization/De-magnetization Modeling															•		
Temperature de-magnetization modeling															•		
Core loss computation															•		
Lamination modeling															•		
High Frequency Electromagnetics																	
Frequency and time domain analysis															•		
Eigenmode analysis															•		
Hybrid finite element/integral equation analysis															•		
Modal wave port excitation															•		
Lumped, voltage and current excitations															•		
Floquet excitations															•		
Incident wave excitation															•		
Magnetic ferrite bias excitation															•		

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Capabilities Chart**

	ANSYS Multiphysics™		ANSYS Mechanical™				ANSYS STRUCTURAL™			ANSYS CFD™		ANSYS CFD Professional		ANSYS Polyflow®		ANSYS HFSS™		ANSYS Maxwell®		ANSYS SI Wave		ANSYS Icepak			
	ANSYS AIM	ANSYS Mechanical™	ANSYS Structural™	ANSYS Professional™ NLS	ANSYS DesignSpace®	ANSYS Explicit STR™	ANSYS Autodyn®	ANSYS LS-DYNA®	ANSYS Fluent®	ANSYS CFX®	ANSYS CFD-Flot™	ANSYS CFD Professional	ANSYS Polyflow®	ANSYS HFSS™	ANSYS Maxwell®	ANSYS SI Wave	ANSYS Icepak								
Terminal solutions																									
Perfect electric and magnetic boundary																									
Finite conductivity boundaries																									
Lumped RLC boundary																									
Symmetry boundary																									
Periodic boundary																									
Frequency dependant materials																									
Higher and mixed order elements																									
Curvilinear elements																									
Fully automated adaptive mesh refinement																									
S,Y,Z matrix results																									
E, H, J, P field results																									
Direct and iterative matrix solvers																									
HPC frequency sweeps																									
Antenna parameter calculation																									
Infnite and finite antenna array calculations																									
Radar cross section calculation																									
FSS, EBG and metamaterial calculation																									
Specific absorption rate calculation																									
EMI/EMC calculation																									
Board Simulation Capabilities																									
SIwave GUI & electronics desktop 3D layout GUI																									
ECAD translation (altium, cadence, mentor, & zuken)																									
MCAD (.sat) generation from ECAD																									
DC voltage, current and power analysis for PKG/PCB																									
DC joule heating with ANSYS icepak																									
Passive excitation plane resonance analysis																									
Driven excitation plane resonance analysis																									
Automated decoupling analysis																									
Capacitor loop inductance analysis																									
AC SYZ analysis - PI, SI, & EMI																									
Dynamically linked electromagnetic field solvers																									
Chip, package, PCB analysis (CPM)																									
HPC SYZ speed up																									
Near-field EMI analysis																									
Far-field EMI analysis																									
Characteristic impedance (Zo) PKG/PCB scan																									
TDR analysis																									

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Capabilities Chart**

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											ANSYS CFX®	ANSYS CFD-Flo™						
Transient IBIS circuit analysis																		•
SerDes IBIS-AMI circuit analysis																		•
Macro-modeling (network data explorer)																		•
Steady state AC (LNA) analysis																		•
Virtual compliance - DDRx, GDDRx, & LPDDRx																		•
Synopsys HSPICE integration																		•
Electromagnetically circuit driven field solvers																		•
RLCG Parasitic Extraction																		
DCRL, ACRL & CG solver																		•
IC Packaging RLCG IBIS extraction for signals & power																		•
Touchpanel RLCG unit cell extraction																		•
Electronics Cooling																		
Multi-mode heat transfer																		•
Steady-state and transient CFD analysis																		•
Turbulent heat transfer																		•
Multiple-fluid analysis																		•
Species transport																		•
Solar loading																		•
Reduced order flow and thermal network modeling																		•
Joule heating analysis																		•
Thermo-electric cooler modeling																		•
Thermostat modeling																		•
Package characterization																		•
Datacenter modeling																		•
Multiphysics																		
Platform Technologies																		
Advanced, Automated Data Exchange	•	•	•	•	•	•				•	•	•	•	•	•	•		
Accurate Data Interpolation Between Dissimilar Meshes	•	•	•	•	•	•				•	•	•	•	•	•	•		
Drag-n-Drop Multiphysics	•		•	•						•	•	•	•	•	•	•		
Direct Coupling Between Physics	•	•	•	•						•	•	•	•	•	•	•		
Collaborative Workflows	•	•	•	•						•	•	•	•	•	•	•		
Fully Managed Co-Simulation	•		•	•						•	•	•	•	•	•	•		
Flexible Solver Coupling Options	•		•	•						•	•	•	•	•	•	•		
Fluid-Structure Interaction																		
Force Induced Motion	•	•	Δ	Δ						Δ	Δ	Δ	Δ					
Fluid Thermal Deformation	•		Δ							Δ	Δ	Δ	Δ					



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										ANSYS Fluent®	ANSYS CFX®	ANSYS CFD-Flo™					
Electro-Thermal Interaction																	
Convection Cooled Electronics										Δ				Δ		Δ	Δ
Conduction Cooled Electronics			Δ							Δ				Δ		Δ	Δ
High Frequency Thermal Management			Δ							Δ				Δ			
Electromechanical Thermal Management			Δ							Δ					Δ		
Electro-Thermal-Structure Interaction																	
Electromagnetic-Thermal-Fluid-Structure Interaction			Δ							Δ				Δ	Δ	Δ	Δ
Other Coupled Interactions																	
Acoustics	•		•														
Acoustics-Structural	•		•														
Electric-Magnetic	•																
Fluid Magneto-HydroDynamics	•											•					
Electrostatic - Structural	•		•														
Magnetic-Structural	•																
Electromagnetic-Thermal	•		•														
Piezoelectric	•		•														
Piezoresitive	•		•														
Thermal-Electric	•	•	•														
Thermal-Structural	•	•	•		•	•											
Thermal-Electric-Structural	•	•	•														

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

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