



**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™					
<b>Structures</b>																	
<b>Strength Analysis</b>																	
Static	•	•	•	•	•	•											
Buckling (linear)	•		•	•	•	•											
Buckling (nonlinear)	•		•	•	•		•	•	•								
Substructuring	•		•	•													
<b>Geometric Nonlinearity</b>																	
Large strain	•		•	•	•		•	•	•								
Large deflection	•		•	•	•		•	•	•								
<b>Material Model</b>																	
Linear material models	•	•	•	•	•	•	•	•	•								
Rate-dependent plasticity	•		•	•			•	•	•								
Rate-independent plasticity	•		•	•	Δ		•	•	•								
Hyperelasticity	•		•	•	Δ		•	•	•								
Viscoelasticity	•		•	•			•	•	•								
Creep	•		•	•													
Reactive materials							•	•									
<b>Contact Modeling</b>																	
Bonded/no separation sliding	•	•	•	•	•	•	•	•	•								
Pretension (bolts, etc.)	•		•	•	•	•											
Joints	•		•	•	•												
Spot welds	•		•	•	•		•	•	•								
<b>Nonlinear Contact Modeling</b>																	
Rough	•		•	•	•	Δ	•	•	•								
Frictionless	•		•	•	•	Δ	•	•	•								
Friction	•		•	•	•		•	•	•								
Gaskets	•		•	•													
Cyclic symmetry analysis	•		•	•	•				•								
Rezoning	•		•	•				•									
Adaptive remeshing	•		•	•				•									
Submodeling	•		•	•	•				•								
Element birth and death	•		•	•			Δ	Δ	Δ								
Fracture mechanics	•		•	•													
<b>Vibrations</b>																	
Modal	•	•	•	•	•	•											
Spectrum	•		•	•													
Harmonic	•		•	•	Δ												
Random vibration	•		•	•													
Rotordynamics	•		•	•													
Super elements & component mode synthesis	•		•	•													
Mistuning	•		•	•													

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<b>Thermal</b>																	
Conduction	•	•	•		•	•	•	•	•	•	•	•	•				
Convection	•	•	•		•	•				•	•	•	•				
Radiation	•	•	•							•	•	•	Δ				
Phase change	•		•				•	•	•	•	•						
Steady-state	•	•	•		•	•				•	•	•	•				
Transient	•		•							•	•	•	•				
<b>Motion</b>																	
Rigid body mechanisms																	
Rigid/flexible transient	•		•	•	Δ												
<b>Impact</b>																	
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							•	•									
<b>Composite Materials</b>																	
Material definitions			•	•	•		•	•	•								
Layers definitions			Δ	Δ	Δ		•	•	•								
Solid extrusion			Δ	Δ	Δ												
First-ply failure			•	•	•												
Last-ply failure			•	•	•												
Delamination			•	•	•		•	•	•								
<b>Fluids</b>																	
<b>General Solver Capabilities</b>																	
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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Immersed-solid/MST method for moving parts	•												•				
Flow-driven solid motion (6DOF)										•	•	•					
Pressure-based coupled solver	•	•								•	•	•	•				
Density-based coupled solver										•							
<b>Single Phase, non reacting flows</b>																	
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)										•							
<b>Heat Transfer</b>																	
Natural convection	•									•	•	•					
Conduction & conjugate heat transfer	•									•	•	•	•				
Internal radiation - participating media	•									•	•	•	•				
Internal radiation - transparent media										•	•	•					
External radiation		•								•	•	•					
Solar radiation & load										•	•	•					
<b>Particles Flows (Multiphase)</b>																	
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										•	•	•					
<b>Free Surface Flows (Multiphase)</b>																	
Implicit and explicit VOF	•									•	•	•	•				
Coupled level set/VOF	•									•	•	•					
Open channel flow and wave										•	•	•					
Surface tension										•	•	•					
Phase change										•	•	•					
Cavitation	•									•	•	•					

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<b>Dispersed Multiphase Flows (Multiphase)</b>																	
Mixture fraction										•	•						
Eulerian model										•	•						
DDPM										•	•						
Boiling model										•	•						
Surface tension										•	•						
Phase change										•	•						
Drag and lift										•	•						
Wall lubrication										•	•						
Heat and mass transfer										•	•						
Population balance										•	•						
Reactions between phases										•	•						
<b>Reacting Flows</b>																	
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										•	•						
<b>Turbomachinery</b>																	
MRF/frozen-rotor										•	•						
Sliding-mesh/stage										•	•						
Transient blade row											•						
Blade flutter analysis											•						
Forced response analysis			•	•							•						
<b>Shape Optimization</b>																	
Adjoint solver for sensitivity analysis										•							
Mesh Morphing																	
<b>High Rheology Material</b>																	
Viscoelasticity													•				
Speciality extrusion models													•				
Speciality blow molding models													•				
Specialty fiber spinning models										•							
<b>HPC – Fluids</b>																	
Parallel solving on local PC option	•	•							•	•	•	•	•				
Parallel solving over network option	•								•	•	•	•					
CPU support		•															
GPU support																	



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<b>Electronics</b>																	
<b>Low Frequency Electromagnetics</b>																	
Electrostatics	•														•		
AC Conduction	•														•		
DC Conduction	•	•													•		
Magnetostatics	•														•		
Adaptive Field Mesh															•		
AC Harmonic Magnetic	•														•		
AC Harmonic Electric	•																
Electric Transient	•														•		
Ion optics	•																
HPC Frequency Sweeps															•		
<b>Magnetic Transient</b>																	
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															•		
<b>Advanced Material Modeling</b>																	
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															•		
<b>High Frequency Electromagnetics</b>																	
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															•		





ANSYS Product Solutions

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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																		•	
<b>RLCG Parasitic Extraction</b>																			
DCRL, ACRL & CG solver																		•	
IC Packaging RLCG IBIS extraction for signals & power																		•	
Touchpanel RLCG unit cell extraction																		•	
<b>Electronics Cooling</b>																			
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																			•
<b>Multiphysics</b>																			
<b>Platform Technologies</b>																			
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	•		•	•						•	•				•	•			
<b>Fluid-Structure Interaction</b>																			
Force Induced Motion	•	•	Δ	Δ							Δ	Δ	Δ						
Fluid Thermal Deformation	•		Δ								Δ	Δ							





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<b>Electro-Thermal Interaction</b>																	
Convection Cooled Electronics										Δ				Δ		Δ	Δ
Conduction Cooled Electronics			Δ											Δ		Δ	Δ
High Frequency Thermal Management			Δ											Δ			
Electromechanical Thermal Management			Δ												Δ		
<b>Electro-Thermal-Structure Interaction</b>																	
Electromagnetic-Thermal-Fluid-Structure Interaction			Δ							Δ				Δ	Δ	Δ	Δ
<b>Other Coupled Interactions</b>																	
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