ANSYS®

Realize Your Product Promise®

2019 R3

CAPABILITIES

CONTENT

STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM
GEOMETRIC IDEALIZATION						
Spring	●	●	▲	●	●	●
Mass	●	●	●	●	●	●
Damper	●	●		●	●	
Spar	●	●	●			
Beam	●	●	●	●	●	●
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	●	●				
Reinforced	●	●		●	●	
Coupled Field ROM Element Technology	●					
Substructuring / Matrix	●					

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Explicit = Autodyn
RBD = Rigid Body Dynamics
Aqwa = Aqwa

● Full Support ▲ Limited Capability ■ Requires more than 1 product

STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM
MODELING CAPABILITIES						
Contact - Linear	●	●	●	●	●	●
Contact - Nonlinear	●	●	●	●	●	●
Joints	●	●	●	●	●	●
Spot Welds	●	●	●	●	●	
Element Birth and Death	●	●				
Gasket Elements	●					
Rezoning and Adaptive Remeshing	●			●	●	
Inverse Analysis	●					
MATERIALS						
Basic Linear Materials (Linear, Anisotropic, Temperature Dependent)	●	●	●	●	●	●
Basic Nonlinear Materials (Hyper, Plasticity, Rate Independent,Isotropic, Concrete)	●	●	▲	●	●	▲
Advanced Nonlinear Materials (Rate dependent, Anisotropic, Damage Models,Geomechanics Materials, Multiphysics)	●	●		●	●	
Field Dependent	●			●		
Reactive Materials	●					
Fracture Mechanics and Crack Growth	●					
Material Designer	●					
GRANTA Materials Data for Simulation	■[7]	■[7]	■[7]			

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STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM
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]					
STRUCTURAL SOLVER CAPABILITIES						
Linear Static	●	●	●			●
Nonlinear Static	●	●	●			●
Pre-Stress Effects, Linear Perturbation	●	●	●	▲	▲	
Nonlinear Geometry	●	●	●	●	●	●

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STRUCTURAL SOLVER CAPABILITIES (CONTINUED)						
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	●					
TOPOLOGY OPTIMIZATION						
Structural Optimization	●	●	●			●
Modal Optimization	●	●	●			●
Thermal Loads	●	●	●			
Inertial Loads	●	●	●			
Optimized Design Validation	●	●	●			●
Manufacturing Constraints	●	●	●			▲
Stress constraints	●	●	●			●
Symmetry	●	●	●			●
Lattice Optimization	■[8]					
Overhang/Additive Constraints	■[8]					

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MULTI ANALYSIS						
Submodeling	●	●	●			
Data Mapping	●	●	●			●
Multiphysics Data Mapping	●	●				
Initial State	●	●		●	●	
Advanced Multi-Stage 2-D to 3-D Analysis	●	●				
VIBRATIONS						
Modal	●	●	●			●
Modal - Pre-Stressed	●	●	●			●
Modal - Damped/ Unsymmetric	●	●				
Transient - Mode-Superposition	●	●				
Harmonic - Mode-Superposition	●	●				
Harmonic - Full	●	●				
Spectrum	●	●				
Random Vibration	●	●				●
Mistuning	●	●				
Rotordynamics	●	●				
Modal Acoustic	●					
Harmonic Acoustic	●					

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NONLINEAR TRANSIENT DYNAMICS						
Rigid Body Mechanisms	●	●				
Rigid Body Dynamics with CMS L Components for Flexible Bodies	●					
Full Transient	●	●		●	●	
CMS with Substructuring	●					
EXPLICIT DYNAMICS						
FE (Lagrange) Solver	●			●	●	
Euler Solvers				●		
Meshless Solvers	●			●		
Implicit-Explicit Deformations	●			●	●	
Implicit-Explicit Material States	●			●		
Fluid-Structure Interaction (FSI)	●			●		
Mass Scaling	●			●	●	
Natural Fragmentation	●			●		
Erosion Based on Multiple Criteria	●			●	●	
De-Zoning				●	●	
Part Activation and Deactivation (Multi Stage Analysis)				●		
Remapping in Space				●		
Remapping Solution Methods				●		

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DURABILITY						
Stress-Life (SN)	●	●	●			●
Strain-Life (EN)	●	●	●			●
Dang Van	■[1]	■[1]	■[1]			
Safety Factor	●	●	●			●
Adhesive Bond	■[1]	■[1]	■[1]			
Crack Growth Linear Fracture Mechanics	■[1]	■[1]	■[1]			
Seam Weld	■[1]	■[1]	■[1]			
Spot Weld	■[1]	■[1]	■[1]			
Thermo-Mechanical Fatigue	■[1]	■[1]	■[1]			
Vibration Fatigue	■[1]	■[1]	■[1]			
Virtual Strain Gauge Correlation	■[1]	■[1]	■[1]			
Python Scripting Customization	■[1]	■[1]	■[1]			
WAVE HYDRODYNAMICS						
Diffraction and Radiation	●					
Frequency & Time Domain Motions Analysis	●					
Moorings, Joints & Tethers	●					
Load Transfer to Structural Analysis	●					

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THERMAL						
Steady State Thermal	●	●	●			●
Transient Thermal	●	●	●			●
Conduction	●	●	●	●	●	●
Convection	●	●	●			●
Radiation to Space	●	●	●			●
Radiation - Surface to Surface	●	●	●			
Phase Change	●	●	●	●	●	
Thermal Analysis of Layered Shells and Solids	●	●	●			
ADDITIONAL PHYSICS						
1-D Thermal-Flow	●	●	●			
1-D Coupled-Field Circuits	●					
1-D Electromechanical Transducer	●					
MEMS ROM	●					
Piezoelectric	●					
Piezoresistive	●					
Electroelastic	●					
Electromagnetic	●					▲
Vibro-Acoustics	●					
Electro-Migration	●					

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ADDITIONAL PHYSICS (CONTINUED)						
Diffusion-Pore-Fluid	●					
Diffusion-Thermal Structural-Electric	●					
Structural-Thermal-Electric-Magnetic	●					▲
1-Way Fluid-Structure Interaction	■[2]	■[2]	■[2]			●
2-Way Fluid-Structure Interaction	■[2]					
OPTIMIZATION						
DesignXplorer Included	●	●	●	■[3]	■[3]	●
Parameters	●	●	●	●	●	●
Design Point Studies	●	●	●	●	●	●
Correlation Analysis	●	●	●	●		●
Design of Experiments	●	●	●	●		●
Sensitivity Analysis	●	●	●	●		●
Goal Driven Optimization	●	●	●	●		●
Six Sigma Analysis	●	●	●	●		●
MISCELLANEOUS AND USABILITY						
ANSYS SpaceClaim	●	■[4]	■[4]	■[4]	■[4]	●
ANSYS Customization Suite (ACS)	●	■[5]	■[5]	■[5]	■[5]	●
Support ACT Extensions	●	●	●	●	●	●
Command Snippet Support	●	●	●			●

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MISCELLANEOUS AND USABILITY (CONTINUED)						
Batch run capability	●	●	●	●	●	
Read/Write 3rd Party Matrix CAE Data	●	●		●	●	
CDB and 3rd party FE Model Import	●	●	●		●	
Nastran Bulk File Export	●	●	●			
HPC - STRUCTURES						
Default Number of Cores	4 (DMP + SMP) MAPDL 4 for Explicit 4 for RBD MAPDL 4 for AQWA	4 (DMP + SMP)	4 (DMP + SMP)	1	1	4 (DMP + SMP) MAPDL
Parallel Solving on Local PC	●	●	●	●	●	●
Parallel Solving on Cluster	●	●	●	●	●	
GPU Acceleration	MAPDL - ■6 Explicit - No RBD - No AQWA - No	■6	■6			
Parallel Solving with ANSYS Cloud Launched from Desktop	MAPDL - Yes Explicit - No RBD - No AQWA - No	MAPDL - Yes RBD - No	MAPDL - Yes			

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	CFD PREMIUM		POLYFLOW	FORTE	FENSAP-ICE	AIM	
	FLUENT	CFX					
GENERAL SOLVER CAPABILITIES							
Comprehensive Inlet and Outlet Conditions	●	●	●	●	●	●	●
Steady-State Flow	●	●	●	●	●	●	●
Transient Flow	●	●	●	●	●	●	●
2-D and 3-D Flow	●	▲	●	▲	●	▲	▲
Reduced Order Models (ROM)	●						●
Time Dependent Boundary Conditions	●	●	●	●	●	▲	●
Customizable Materials Library	●	●	●	●	●	●	●
Fan Model	●	●			●		
Periodic Domains	●	●	●	●	●	●	●
Flow-Driven Solid Motion (6DOF)	●	●			●		
Pressure-Based Coupled Solver	●	●	●	●	●	●	●
Density-Based Coupled Solver	●	●					●
Dynamic/Moving-Deforming Mesh	●	●	●	●	●		●
Overset Mesh	●						
Immersed-Solid/MST Method for Moving Parts		●	●		●		
Automatic On-the-Fly Mesh Generation with Dynamic Refinement	●			●			●
Dynamic Solution-Adaptive Mesh Refinement	●	●		●	▲		●
Polyhedral Unstructured Solution-Adaptive Mesh Refinement	●						

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	CFD PREMIUM		POLYFLOW	FORTE	FENSAP-ICE	AIM	
	FLUENT	CFX					
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)	●	●	●			●	
Acoustics (Source Export)	●	●			●		
Acoustics (Noise Prediction)	●	▲					
HEAT TRANSFER							
Natural Convection	●	●			●	●	●
Conduction & Conjugate Heat Transfer	●	●			●	●	●
Shell Conduction (Including Multi-Layer Model)	●						
Internal Radiation - Participating Media	●	●	●		●		●
Internal Radiation - Transparent Media	●	●					●
External Radiation	●	●				●	●

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	CFD PREMIUM		POLYFLOW	FORTE	FENSAP-ICE	AIM	
	FLUENT	CFX					
HEAT TRANSFER (CONTINUED)							
Solar Radiation & Load	●	●					
Simplified Heat Exchanger Model	●						
Non-Equilibrium Thermal Model	●						
Prorous Media	●						
PARTICLES FLOWS (MULTIPHASE)							
Coupled Discrete Phase Modeling including Thin Wall Films	●	●		●	●	▲	●
Macroscopic Particle Model	●					▲	
Inert Particle Tracking (With Mass)	●	●				▲	
Liquid Droplet (Incl. Evaporation)	●	●		●	●		●
Combusting Particles	●	●		●	●		●
Multicomponent Droplets	●	●		●	●		●
Discrete Element Model (DEM)	●	●					
Break-Up And Coalescence	●	●		●	●		●
Erosion	●	●					
FREE SURFACE FLOWS (MULTIPHASE)							
Implicit VOF	●	●	●				
Explicit VOF	●	●	●				
Coupled Level Set/VOF	●	●			●		
VOF to DPM Spray Model	●						

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	FLUENT	CFX					
FREE SURFACE FLOWS (MULTIPHASE) (CONTINUED)							
Open Channel Flow and Wave	●	●					
Surface Tension	●	●		●	●		
Phase Change	●	●		●	●		
Cavitation	●	●		●	●		
Cavitation Where Multiple Fluids and Non-Condensing Gases are Present	●						
DISPERSED MULTIPHASE FLOWS (MULTIPHASE)							
Mixture Fraction	●	●					
Eulerian Model including Thin Wall Films	●	●		●	●		
Boiling Model	●	●		●			●
Surface Tension	●	●		●			●
Phase Change	●	●		●	●		●
Drag And Lift	●	●		●	●		●
Wall Lubrication	●	●		●			●
Heat And Mass Transfer	●	●		●	●		●
Population Balance	●	●		●			●
Reactions Between Phases	●	●		●			●
Granular Model for Dense Bed of Solids	●	●					
Dense Particulate Coupling (DDPM)	●	●					

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REACTING FLOWS							
Species Transport	●	●	●	●			●
Non-Premixed Combustion	●	●		●			●
Premixed Combustion	●	●		●			●
Partially Premixed Combustion	●	●		●			●
Composition PDF Transport	●	●					
Finite Rate Chemistry	●	●	●	●			●
Pollutants and Soot Modeling	●	●		●			●
Sparse Chemistry Solver with Dynamic Cell Clustering and Dynamic Adaptive Chemistry	●			●			●
Ability to Use Model Fuel Library Mechanisms	●			●			●
Flame-speed from Fuel-Component Library	●			●			●
DPIK Spark-Ignition Model				●			●
Flame-Propagation Using Level-Set Method (G-Equation)				●			●
Internal Combustion Engine Specific Solution	●			●			●
0-D/1-D/2-D Reactor Models and Reactor Networks							●
Plasma Reactions							●
Comprehensive Surface-Kinetics	●						●
Chemical and Phase Equilibrium	●						●
Flamelet table generation	●						●

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REACTING FLOWS (CONTINUED)							
Flamespeed and Ignition Table Generation							●
Reaction Sensitivity, Uncertainty and Path Analysis							●
Surrogate Blend Optimizer							●
Mechanism Reduction							●
TURBOMACHINERY							
MRF/Frozen-Rotor	●	●					
Sliding-Mesh/Stage	●	●					
Transient Blade Row		●					
Pitch Change		●					
Time Transformation		●					
Fourier Transformation		●					
Harmonic Analysis		●					
Blade Flutter Analysis		●					
Forced Response Analysis		●					
Flank Milled Blades		●					
IN-FLIGHT ICING							
Simulation of Standard Droplets, SLD, and Ice Crystals	●				●		
Inclusion of Vapor / Humidity Effects on Icing	●				●		

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IN-FLIGHT ICING (CONTINUED)							
Icing Environments of Appendices C, O (SLD), and D (Ice Crystals)	●				●		
Various Pre-Defined Droplet Size Distributions	●				●		
Simulation of Rime, Glaze, and Mixed Icing	●				●		
Single-and Multi-Shot Icing Simulations with Mesh Deformation for Prediction of Ice Accretion and Aerodynamic Performance Degradation	●				●		
Single-and Multi-Shot Icing Simulations with Automatic Re-Meshing for Prediction of Ice Accretion and Aerodynamic Performance Degradation					●		
Conjugate Heat Transfer (CHT) for Anti-and De-Icing Simulations					●		
Icing of Rotating Components of All Types: Rotors, Propellers, and Engines (Fan, Guide Vanes, and Any Number of Compressor Rows)					▲		
OPTIMIZATION							
Parameters	●	●	●			●	●
Design Point Studies	●	●	●			●	●
Correlation Analysis	●	●	●			●	
Design of Experiments	●	●	●			●	
Sensitivity Analysis	●	●	●			●	●
Goal Driven Optimization	●	●	●			●	

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OPTIMIZATION (CONTINUED)							
Six Sigma Analysis	●	●	●			●	
Adjoint Solver for Shape Optimization	●						
Adjoint Solver Supports Rotating Reference Frames & Conjugate Heat Transfer	●						
Multi-Objective-Constrained Optimization	●						
Mesh Morphing (RBF Morph)	■						
HIGH RHEOLOGY MATERIAL							
Viscoelasticity			●				
Specialty Extrusion Models			●			▲	
Specialty Blow Molding Models			●			▲	
Specialty Fiber Spinning Models	●						
HPC - FLUIDS							
Parallel Solving On Local PC Option	●	●	●	●	●	●	●
Parallel Solving Over Network Option	●	●	●	●	●	●	
Parallel Solving Over Cloud Launched from Desktop	●						
GPU Support	●		●				
Parallel mesh generation	●						

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PRE AND POST PROCESSING							
Photo Realistic Rendering	●	●	●	●	●	●	●
SpaceClaim Direct Modeler	●	●	●	●	●	●	●
Compare Multiple Runs, Datasets, Physics, Graphs in a Single Window	●	●	●	●	●	●	●
MULTIPHYSICS							
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/ Deformation	■	■	●			●	
Fluid Thermal Deformation	■	■				●	
ELECTRO-THERMAL INTERACTION							
Convection Cooled Electronics	●	●					
Conduction Cooled Electronics	●	●					
High Frequency Thermal Management	●	●					
Electromechanical Thermal Management	●	●					

● Full Support ▲ Limited Capability ■ Requires more than 1 product

FLUIDS	CFD ENTERPRISE						CHEMKIN ENTERPRISE
	CFD PREMIUM		POLYFLOW	FORTE	FENSAP-ICE	AIM	
	FLUENT	CFX					
OTHER COUPLED INTERACTIONS							
Aero-Vibro Acoustics	●						
Acoustics-Structural	●	●					
Fluid Magnetohydrodynamics	●	●					
EASE OF USE AND PRODUCTIVITY							
Support ACT Simulation Apps	●						
Mosaic-Enabled Meshing Technology	●						
Task-Based Workflow - Watertight Geometries	●						
Task-Based Workflow - Fault Tolerant Geometries	●						
Directly Enter Expressions	●	●				●	
Parallel Solving with ANSYS Cloud Launched from Desktop	●						

ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
LOW FREQUENCY ELECTROMAGNETICS						
Electrostatics	●					●
AC Conduction	●					●
DC Conduction	●					●
Magnetostatics	●					●
Adaptive Field Mesh	●	●	●	●		●
AC Harmonic Magnetic	●					●
Electric Transient	●					
MAGNETIC TRANSIENT						
Translational Motion	●					
Fully Automatic Symmetrical Mesh Generation	●					
Rotational Motion	●					
Non-Cylindrical Motion	●					
Advanced Embedded Circuit Coupling	●					
Circuit Coupling with Adaptive Time Stepping	●					
Direct and Iterative Matrix Solvers	●					
ADVANCED MAGNETIC MODELING						
Vector Hysteresis Modeling	●					
Hysteresis Modeling for Anisotropic Material	●					
Frequency Dependent Reduced Order Models	●					

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ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
ADVANCED MAGNETIC MODELING (CONTINUED)						
Equivalent Model Extraction (Linear-Motion, Rotational-Motion, No-Motion)	●					
Functional Magnetization Direction	●					
Magnetization/De-Magnetization Modeling	●					
Manufacturing Dependent Core L Loss Models	●					
Noise – Vibration Modeling	■					
Temperature De-Magnetization Modeling	●					
Core Loss Computation	●					
Lamination Modeling	●					
Magnetostriction and Magnetoelastic Modeling	●					
Hardware in the Loop modeling	●					
Integrated Motor Synthesis and Design Kit	●					
Integrated Planar Magnetics Synthesis and Design Kit	●					
Litz Wire Modeling	●					
HIGH FREQUENCY ELECTROMAGNETICS						
Fully Automated Adaptive Mesh Refinement		●				
Multi-Frequency Broadband Adaptive Meshing		●				
Frequency Domain Finite Element (FEM) Analysis		●				
Frequency Domain Integral Equation (MoM) Analysis		●				

ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
HIGH FREQUENCY ELECTROMAGNETICS (CONTINUED)						
Time Domain FEM Analysis		●				
FEM Eigenmode Analysis		●				
MoM Characteristic Mode Analysis		●				
Physical Optics (PO) Analysis		■				
Shooting and Bouncing Ray+ (SBR+) Analysis		■				
Physical Theory of Diffraction (PTD) Correction for SBR		■				
Uniform Theory of Diffraction (UTD) Correction for SBR		■				
Visual Ray Tracing for SBR+ Analysis		■				
SBR+ Creeping Wave Correction for RCS of Curved Obects		■				
Range Doppler Plots for Radar Scenario Analyses		■				
Accelerated Doppler Processing (ADP) for SBR+ Range Doppler Analyses		■				
Domain Decomposition Method (DDM) for Frequency Domain FEM Analysis		●				
Hybrid Finite Element/ Integral Equation Analysis		●				
UI Coupled Finite Element and/or IE with SBR+ Analysis		●				
Modal Wave Port Excitation		●				
Terminal Wave Port Excitations		●				
Lumped, Voltage and Current Excitations		●				

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ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
HIGH FREQUENCY ELECTROMAGNETICS (CONTINUED)						
Circuit Port Excitations		●				
Parametric Antenna Excitations for SBR+		●				
Floquet Excitations		●				
Incident Wave Excitation		●				
Magnetic Ferrite Bias Excitation		●				
Perfect Electric and Magnetic Boundary		●				
Finite Conductivity Boundary		●				
Lumped RLC Boundary		●				
Symmetry Boundary		●				
Periodic Boundary		●				
Frequency Dependant Materials		●				
Spatial XYZ Material Properties Via Dataset		●				
Higher and Mixed Order Elements		●				
Curvilinear Element Mesh Correction		●				
S,Y,Z Matrix Results		●				
E, H, J, P Field Results		●				
Direct and Iterative Matrix Solvers		●				
Antenna Parameter Calculation		●				
Infinite and Finite Antenna Array Calculations		●				
Radar Cross Section Calculation		●				

ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
HIGH FREQUENCY ELECTROMAGNETICS (CONTINUED)						
FSS, EBG and Metamaterial Calculation		●				
Specific Absorption Rate Calculation		●				
EMI/EMC Calculation		●				
System Level EMI and RFI Analysis		●				
Linear Circuit Analysis with EM Dynamic link		●				
Integrated Antenna Synthesis and Design Kit		●				
Radar Prep/Post Simulation Wizards		●				
3D Component Libraries with User Controled Parametrics		●				
3D Component with Encryption Creation		●				
3D Component with Encryption Utilization		●				
Mutlipaction Solver		●				
POWER AND SIGNAL INTEGRITY BOARD SIMULATION CAPABILITIES						
Electronics Desktop 3D Layout GUI		●	●		●	
ECAD Translation (Altium, Cadence, Mentor, Pulsonix, & Zuken)		●	●			
MCAD (.sat) Generation from ECAD		●	●			
Lead Frame Editor		●	●			
DC Voltage, Current and Power Analysis for PKG/PCB			●			
DC Joule Heating with ANSYS Icepak			●	●	●	

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ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
POWER AND SIGNAL INTEGRITY BOARD SIMULATION CAPABILITIES (CONTINUED)						
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)		●	●			
Near-Field EMI Analysis			●			
Far-Field EMI Analysis			●			
Characteristic Impedance (Zo) L PKG/PCB Scan			●			
Full PCB/PKG Cross-talk Scanning			●			
TDR Analysis		●	●	●		
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			●			

ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
POWER AND SIGNAL INTEGRITY BOARD SIMULATION CAPABILITIES (CONTINUED)						
Cadence PSPICE Support			●			
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				●		
Adaptive Meshing for Accurate Extraction				●		
Bus Bar RLCG Extraction				●		
Power Inverter & Converter Component Extraction				●		
Specialized Thin Plane Solver for Touchpanel Extraction				●		
3D Component Library		●		●		
Reduced RLCG Matrix Operations				●		
SPICE Equivalent Modeling Export				●		
DCRL & ACRL Joule Heating Analysis with Icepak				●		
Macro-Modeling (Network Data Explorer)				●	●	
2D Transmission Line Modeling Toolkit				●		
2D Cable Modeling Toolkit				●		

ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
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					●	
Data Center Modeling					●	
HPC FOR ELECTRONICS						
GPU Support	■	■				
HPC Accelerated Frequency Sweeps		●	●			
HPC Distributed Hybrid Solving		●				
HPC Enabled Domain Decomposition Method	●	●				
HPC Time Decomposition Method	●					
HPC Enabled Multi-port Excitation Acceleration		●				
HPC Acceleration for DCRL, ACRL and CG				●		
HPC Enabled Parallel Processing	●	●		●	●	

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ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
SYSTEMS MODELING - ELECTRONICS PRODUCTS						
SYSTEM MODELING FOR POWER ELECTRONICS						
Circuit Simulation	●	●	●	●	●	
Block Diagram Simulation	●	●	●	●	●	
State Machine Simulation	●	●	●	●	●	
VHDL-AMS Simulation	●	●	●	●	●	
Integrated Graphical Modeling Environment	●	●	●	●	●	
Power Electronics Component Libraries	●	●	●	●	●	
Reduced Order Modeling	●	●	●	●	●	
Power Electronic Device and Module Characterization	●	●	●	●	●	
Co-Simulation with MathWorks Simulink	●	●	●	●	●	
SYSTEM MODELING FOR RF/MICROWAVE						
Radio Frequency Interference (RFI) System Solver		■				
Electromagnetic Interference System Solver		■				
RF Link Budget Analysis		■				
RF Co-Site and Antenna Coexistence Analysis		■				
Automated Diagnostics for Rapid Root-Cause Analysis		■				
RF Component Library		■				
Wireless Propagation Models		■				
Multi-Fidelity Parametric Radio Models		■				
Antenna-to-Antenna Coupling Models		■				

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ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
SYSTEMS MODELING - ELECTRONICS PRODUCTS (CONTINUED)						
SYSTEM MODELING FOR SI/PI						
SerDes channel modeling - IBIS-AMI, QuickEye and VerifEye		■	●			
Multi-drop & parallel bus modeling - IBIS, HSPICE, Spectre, PSPICE, and Nexxim Transient		■	●			
Network Data Exploration		●	●	●		
TDR analysis		■	●			
Steady State AC (LNA) Analysis		■	●			
Virtual Compliance - DDRx, GDDRx, & LPDDRx		■	●			
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	●	●		●	●	

ELECTRONICS	MAXWELL	HFSS	SIWAVE	Q3D EXTRACTOR	ICEPAK	AIM
MULTIPHYSICS (CONTINUED)						
ELECTRO-THERMAL INTERACTION						
Convection Cooled Electronics		●			●	
Conduction Cooled Electronics		●			●	
High Frequency Thermal Management		●		●	●	
Electromechanical Thermal Management	●			●	●	
MISCELLANEOUS						
Integrated Windows HPC Support	●	●	●	●	●	
Integrated IBM Spectrum LSF Support	●	●	●	●	●	
Customizable 3rd Party Scheduler Support	●	●	●	●	●	
Support ACT Extensions	▲	▲	▲	▲	▲	▲
Parallel Solving with ANSYS Cloud Launched from Desktop	●	●	●	●		

SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXEPERIENCE HMI	VRXEPERIENCE PERCEIVED QUALITY	VRXEPERIENCE SOUND
SYSTEM SIMULATION, VALIDATION AND DIGITAL TWINS										
Integrated Graphical Modeling Environment	●									
Standard Modeling Languages and Exchange Formats	●									
Multi-domain Systems Modeler	●									
Extensive 0D Application-Specific Libraries	●									
3rd Party (1D) Tool Integrations	●									
3D ROM	●									
Embedded Software Integration	●									
Multi-Domain System Simulation	●									
Rapid HMI Prototyping	●									
System Optimization	●									
XIL Integration	●									
IIoT Connectivity	●									
Digital Twin Runtime Deployment	●									
FUNCTIONAL SAFETY ANALYSIS										
Safety Concept Modelling		●								
Model Based Safety Analysis		●								
Reliability Prediction and Analysis		●								
Traceability and Validation Teamwork		●								
Integration into Engineering Environment		●								

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SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXEPERIENCE HMI	VRXEPERIENCE PERCEIVED QUALITY	VRXEPERIENCE SOUND
FUNCTIONAL SAFETY ANALYSIS (CONTINUED)										
Customization and Process Adaption		●								
ANSYS Product Integration		●								
Reporting and Documentation		●								
MODEL-BASED SYSTEMS ENGINEERING										
Model-Based System Design			▲	▲						
Functional Decomposition			▲	▲						
Architecture Decomposition			●	●						
Allocation Of Functions To Components			●	●						
Model Checks			●	●						
Model Diff/Merge			●	●						
System / Software Bi-Directional Sync			●	●						
Model Sharing And IP Protection			●	●						
Model-Based Interface Control Document Production			●	●						
Configurable For Industry Standards (IMA, AUTOSAR, Etc.)			●	●						
Product Configuration for Automotive Developers			●	●						
EMBEDDED CONTROL SOFTWARE										
Data Flow and State Machine Design and Simulation Capabilities				●						
Extensive Set of Libraries Delivered as Design Examples				●						

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SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXEPERIENCE HMI	VRXEPERIENCE PERCEIVED QUALITY	VRXEPERIENCE SOUND
EMBEDDED CONTROL SOFTWARE (CONTINUED)										
Simulation Capabilities				●						
Record and Playback Scenarios				●						
Plant Model Co-Simulation Including FMI				●						
Coverage Analysis for Requirements Based Tests				●						
Formal Verification				●						
Timing and Stack Optimization				●						
Worst Case Execution Time Estimates on Target				●						
Verification of Stack Space Requirements				●						
Certified Code Generation for DO-178C, EN 50128, ISO 26262, IEC 61508				●						
Certification Kits for DO-178C, EN50128, ISO 26262, IEC 61508				●						
MAN-MADE INTERFACE SOFTWARE										
Model-Based Prototyping And Specification Of MMIs					●					
Support Of OpenGL, OpenGL SC and OpenGL ES					●					
Font Management					●					
Optimization Of Graphical Specifications					●					
Plant Model Co-Simulation Including FMI					●					
Automatic Generation of iOS and Android Projects					●					
Certified Code Generation For DO-178C, EN 50128, ISO 26262, IEC 61508					●					

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SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXEPERIENCE HMI	VRXEPERIENCE PERCEIVED QUALITY	VRXEPERIENCE SOUND
MAN-MADE INTERFACE SOFTWARE (CONTINUED)										
Certification Kits for DO-178C, EN50128, ISO 26262, IEC 61508					●					
Testing Capabilities					●					
AV PERCEPTION SOFTWARE TESTING										
AV Perception Software Robustness Testing						●				
Triggering Events Identification						●				
Automatic Safety Report Generation						●				
VRXPERIENCE										
HUMAN VISION										
Glare Simulation							●			
HEADLAMP SIMULATION										
Virtual Measurement							●			
Lamp Control							●	▲	▲	
IIHS Test							●			
OPTICAL SYSTEM SIMULATION										
Ground-Truth Sensor							●			
Camera Sensor							●	▲	▲	
LiDAR Sensor							●			
Virtual Display								●		
HUD								●	●	
Advanced Lighting Component									●	

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SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXEPERIENCE HMI	VRXEPERIENCE PERCEIVED QUALITY	VRXEPERIENCE SOUND
VRXPERIENCE (CONTINUED)										
CONTEXT SIMULATION										
Basic Driving Scenario							●	▲	▲	
Advanced Driving Scenario							■	■		
Advanced Vehicle Dynamic							■	■		
Environement Creation							■	●	●	
Trigger & Animation								●	●	
MiL/SiL Connectivity							●	●		
HiL Connectivity							●			
Virtual Display & Actuators Interaction								●		
RENDERING ENGINE										
Real-Time Physics-Based Lighting							●	●	●	
Advanced Raytraced Lighting								●	●	
Full Physics GPU Lighting									●	
VR										
HMD								●	●	
CAVE, Powerwall								●	●	
Finger Tracking								●		
SOLVER										
Tolerance Variation Engine									●	

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SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXEPERIENCE HMI	VRXEPERIENCE PERCEIVED QUALITY	VRXEPERIENCE SOUND
VRXPERIENCE (CONTINUED)										
ACOUSTICS & SOUND QUALITY										
Analyze, Listen & Modify										●
Psychoacoustics, Automatic Detection and Separation, Play 3D Sound										●
Engine Sound Design										●
3D Sound for Listening Room and VR										●
Interactive Sound for Driving Simulator										●
Measure Sound Perception with Listening Test										●
Listen to ANSYS Mechanical Simulation										●

GEOMETRY	DESIGN MODELER	SPACECLAIM DESIGN MODELER
Direct Modeling Technology		●
Feature Based Modeling Technology	●	
Open Data from All Major CAD Systems	●	●
Export Data to Neutral File Formats	●	●
Modify Imported Geometry	●	●
Defeaturing and Simplification Tools	●	●
Model Repair	●	●
Add Parameters for Design Exploration	●	●
Extract Mid-Surfaces/Shells and Beams	●	●
Extract Volumes & Create Inner Fluid Domains	●	●
Extract Outer Air Enclosures	●	●
Shared Topology for Conformal Meshing	●	●
Booleans and Slicing	●	●
Create Weld Bodies	●	●
Boundary Condition Mapping	●	●
Scripting	●	●
Sketching and Editing Tools	●	●
3D Comparison Tools		●
Repair and Edit Faceted Data		●
Icepak Integration	●	●
Reverse Engineering Faceted Data		●

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DESIGN TOOLS	DISCOVERY ESSENTIALS	DISCOVERY STANDARD	DISCOVERY ULTIMATE
STRUCTURAL			
Static Structural Analysis		●	●
Modal Analysis		●	●
Pre-Stressed Modal Analysis			●
Random Vibration			●
Linear Eigenvalue Buckling			●
Beams, Shells, Springs, Point Masses			●
Spatially Varying Loads			●
Nonlinear Contact & Joints			●
Pre-Tension Bolts & Multi-Step Analsysis			●
Basic Plasticity			●
Large Deformation			●
Fatigue Analysis			●
Topology Optimization		●	●
Linear Buckling			●
FLUID			
Steady-State Flow			●
Transient Flow		●	●
Time-dependent Fluid Conditions		●	●
Incompressible Flow[1]		●	●
Compressible Flow[1]			●
Non-Newtonian Fluids			●
Periodic Domains			●
Porous Media			●
Particle Flow			●

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DESIGN TOOLS	DISCOVERY ESSENTIALS	DISCOVERY STANDARD	DISCOVERY ULTIMATE
THERMAL			
Steady State Thermal		●	●
Transient Thermal		●	●
Time Dependent Thermal Conditions		●	●
Conduction		●	●
Convection		●	●
Radiation to Space			●
ELECTROMAGNETICS			
DC Conduction		●	●
AC Conduction			●
Electrostatics			●
Magnetostatics			●
AC Harmonic Magnetics			●
MULTIPHYSICS			
Thermal-Stress		●	●
Fluid-Structure Interaction			●
Fluid-Solid Thermal (Conjugate Heat Transfer)			●
Thermal-Electric		●	●
Thermal-Electric-Stress		●	●
Thermal-Electromagnetic			●
Thermal-Electromagnetic-Stress			●

DESIGN TOOLS	DISCOVERY ESSENTIALS	DISCOVERY STANDARD	DISCOVERY ULTIMATE
DESIGN & CONCEPT MODELING			
Concept Modeling or Detail Design	●	●	●
Part/Assembly Creation or Import	●	●	●
Large Assembly Importing	●	●	●
2-D Drawings, BOM, Exploded Views	●	●	●
Geometric Parameterization	●	●	●
Sheet Metal Design	●	●	●
MANUFACTURING			
Repair & Defeature Tools	●	●	●
Sheet Metal Editing and Unfolding	●	●	●
3D PRINTING[2]			
Import, Repair, Edit Faceted Data	●	●	●
Shelling and Infills	●	●	●
Thickness Detection	●	●	●
REVERSE ENGINEERING			
Autosurface of Scanned Data	●	●	●
Build Solid/Surfaces on Scanned Data	●	●	●
INTERFACES AND ADD-ONS			
Algoryx Momentum[3]	●	●	●
Keyshot Rendering[3]	●	●	●

(1) Discovery Live supports mildly compressible fluid flow up to ~Mach 0.3
(2) Included with Discovery Standard and Ultimate
(3) Add-on Module

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ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE
ADDITIVE PREP				
Define Build Envelope	●	■	●	
Multiple Parts	●	■	●	
Optimize Part Orientation based upon Distortion Tendency, Build Time, & Supports	●	■	●	
Support Regions Detection	●	●	●	
Control of Support Parameters	●	●	●	
Multiple Support Types	●	●	●	
Angled Supports	●	■	●	
Perforations, Tooth Patterns, Intrusion, Sizing and Distribution of Support Walls	●	■	●	
Automatic Support Generation	●	●	●	
Export of STL and SpaceClaim files	●	●	●	
TOPOLOGY AND LATICE OPTIMIZATION				
Structural Optimization				●
Modal Optimization				●
Thermal Loads				●
Inertial Loads				●
Optimized Design Validation				●
Manufacturing Constraints				●
Stress Constraints				●
Symmetry				●

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ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE
TOPOLOGY AND LATICE OPTIMIZATION (CONTINUED)				
Lattice Optimization			●	■
Overhang / Additive Constraints			●	■
GEOMETRY AND STL FILE HANDLING				
SpaceClaim Direct Modeler		●	●	●
WORKBENCH ADDITIVE				
Nonlinear and Temperature Dependent Material Properties			●	
Thermo-Mechanical Coupled Strain Solution			●	
Native Mechanical Environment			●	
Stress-Based Automatically Generated Supports			●	
Part Distortion & Residual Stress (As-Built)			●	
Part Distortion & Residual Stress After Support Removal			●	
Blade Crash Detection			▲	
Identification of High Strain (Crack) Locations			●	
Layer by Layer Stress & Distortion Visualizations			●	
Option to Output Only the Last Layer of the Build or Every Nth Layer			●	
User-Defined Step Option as 1st or Last Sequence Step			●	
Layered Tetrahedral Meshing			●	
Post Build Heat Treatment			●	
Import of STL Supports			●	

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ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE
ADDITIVE PRINT				
Nonlinear and Temperature Dependent Material Properties		●	●	
Uniform Assumed Isotropic Strain		●	●	
Scan Pattern Based Anisotropic Strain		●	●	
Thermal Ratcheting Based Anisotropic Strain		●	●	
Desktop & Cloud Stand-Alone Environments		●	●	
Stress-Based Automatically Generated Supports		●	●	
Part Distortion & Residual Stress (As-Built)		●	●	
Part Distortion & Residual Stress After Support Removal		●	●	
Distortion Compensation		●	●	
Blade Crash Detection		●	●	
Identification of High Strain (Crack) Locations		●	●	
Layer by Layer Stress, Distortion & Blade Crash Visualizations		●	●	
Build File Readers for Multiple AM Machines		●	●	
Auto Queue Multiple Successive Simulations		●	●	
Input Strain Hardening Factor		●	●	
Import of STL Supports		●	●	
Subvoxel Material Density Assignment		●	●	

ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE
ADDITIVE SCIENCE				
Meltpool Dimensions			●	
Detailed Thermal History			▲	
% Porosity			●	
Sensor Measurement Predictions			▲	

* Additive Suite requires a Mechanical Enterprise license

OPTICAL	SPEOS PRO	SPEOS PREMIUM PREP-POST PACKAGE	SPEOS ENTERPRISE	SPEOS OPTICAL PART DESIGN	SPEOS OPTICAL SENSOR TEST	SPEOS HUD DESIGN & ANALYSIS	SPEOS FAR INFRARED EXTENSION	SPEOS OPTICAL DESIGN OPTIMIZER (1)
	PrepPOST PACKAGE			ADD-ONS				
GENERAL SOLVER CAPABILITIES								
Monte-Carlo Forward Ray Tracing	●	●	●					
Monte-Carlo Backward Ray Tracing		●	●					
Deterministic Simulation	▲	●	●					
Spectral Propagation	●	●	●					
Polarisation propagation	●	●	●					
Dispersion	●	●	●					
Surface Diffusion	●	●	●					
Volumic Diffusion	●	●	●					
Ambiant Material	●	●	●					
SPEOS Live Preview (GPU Acceleration)		●(2)	●(2)					
Virtual BSDF			●					
PHOTOMETRY								
Intensity	●	●	●					
Illuminance	●	●	●					
3D Illuminance	●	●	●					
Luminance	▲	●	●					
3D Energy Density		●	●					
360° View - Observer		●	●					
360° View - Immersive		●	●					

● Full Support ▲ Limited Capability ■ Requires more than 1 product

OPTICAL	SPEOS PRO	SPEOS PREMIUM PREP-POST PACKAGE	SPEOS ENTERPRISE	SPEOS OPTICAL PART DESIGN	SPEOS OPTICAL SENSOR TEST	SPEOS HUD DESIGN & ANALYSIS	SPEOS FAR INFRARED EXTENSION	SPEOS OPTICAL DESIGN OPTIMIZER (1)
	PrepPOST PACKAGE			ADD-ONS				
HUMAN VISION								
Dynamic Adaptation			●					
Glare Simulation			●					
High Dynamic Range Screen support			●					
WAVELENGTH RANGE								
Visible (360nm - 830nm)	●	●	●					
UV (50nm-360 nm)		●	●					
Near IR (830nm - 2.5µm)		●	●					
Far Infra-Red (2.5µm - 100µm)							●	
OPTICAL DESIGN								
Parabolic Surface	●	●	●					
TIR Lens	●	●	●					
Projection Lens	●	●	●					
Optical Lens				●				
Optical Surface				●				
Light Guide				●				
Sharp Cut-Off Reflector				●				
Poly-Ellipsoidal Surface				●				
Micro Optical Stripes				● (1)				
Honeycomb Lens				●				

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OPTICAL	SPEOS PRO	SPEOS PREMIUM PREP-POST PACKAGE	SPEOS ENTERPRISE	SPEOS OPTICAL PART DESIGN	SPEOS OPTICAL SENSOR TEST	SPEOS HUD DESIGN & ANALYSIS	SPEOS FAR INFRARED EXTENSION	SPEOS OPTICAL DESIGN OPTIMIZER (1)
	PrepPOST PACKAGE			ADD-ONS				
OPTICAL SENSORS								
Field Of View					●			
Export Sensor Grid as Geometry					● (1)			
Camera Sensor					●			
LiDAR Sensor					●			
Camera Sensor Post Processing					●			
HEAD-UP DISPLAY								
HUD Optical Analysis						●		
HUD Optical Design						●		
HUD Visualisation						●		
HPC- SPEOS								
Default Number of Cores	(4)	(4)	(4)					
Parallel Solving on Local PC	●	●	●					
Parallel Solving on Cluster	●	●	●					
ANSYS RSM Compatibility	●	●	●					
SIMULATION PREPARATION								
Source Group	● (1)	● (1)	● (1)					
Geometry Group	● (1)	● (1)	● (1)					
Local Meshing	● (1)	● (1)	● (1)					
3D Textures	●	●	●					

OPTICAL	SPEOS PRO	SPEOS PREMIUM PREP-POST PACKAGE	SPEOS ENTERPRISE	SPEOS OPTICAL PART DESIGN	SPEOS OPTICAL SENSOR TEST	SPEOS HUD DESIGN & ANALYSIS	SPEOS FAR INFRARED EXTENSION	SPEOS OPTICAL DESIGN OPTIMIZER (1)
	PrepPOST PACKAGE			ADD-ONS				
SIMULATION PREPARATION (CONTINUED)								
Polarisation Plate		● (1)	● (1)					
Fluorescent Converter		●	●					
Texture Mapping (Bump, Multi-Layer)		● (1)	● (1)					
Sky		●	●					
Thermic Source							●	
Earth Atmosphere Model							■	
POST PROCESSING								
Virtual Lighting Controller		●	●					
Photometric Numerical Certification	●	●	●					
Colorimetric Analysis	●	●	●					
Spectral Analysis		●	●					
Light Expert	●	●	●					
Layer by Source		●	●					
Layer by Face		●	●					
Layer by Sequence		●	●					
Stray Light Analysis		●	●					
Layer by Polarisation		●	●					
Visibility & Legibility			●					
Night Vision Goggle							●	
Script Automation	●	●	●					

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OPTICAL	SPEOS PRO	SPEOS PREMIUM PREP-POST PACKAGE	SPEOS ENTERPRISE	SPEOS OPTICAL PART DESIGN	SPEOS OPTICAL SENSOR TEST	SPEOS HUD DESIGN & ANALYSIS	SPEOS FAR INFRARED EXTENSION	SPEOS OPTICAL DESIGN OPTIMIZER (1)
	PrepPOST PACKAGE			ADD-ONS				
OPTIMIZATION								
Parameters	●	●	●					
Design of Experiment	●	●	●					
Design Optimisation								●
ANSYS Design Xplorer(2)	●	●	●					
ANSYS optiSLang Interface(2)	■	■	■					

(1) Not available for ANSYS SPEOS

(2) Only for ANSYS SPEOS

MATERIALS	GRANTA MI	GRANTA SELECTOR	GRANTA EDUPAK	MECHANICAL & ELECTRONICS DESKTOP	ONLINE SUBSCRIPTION
MATERIALS DATA MANAGEMENT					
GRANTA MI Database - 'Gold Source' System to Store Corporate Materials Information	●				
Manage Specialist Materials Data Types: Single Point, Multi-Value, Ranges, Functional, Equations	●				
Manage Meta-Data and Context for Materials: Documents, Images, Multimedia, Hyperlinks	●				
Traceability for All Materials Data	●				
Access Control	●				
Version Control	●				
Large File Storage (Via Link to Binary Large Object Stores)	●				
Multiple Unit System Support	●	●	●		
Admin UI to Setup and Configure Materials Database	●				
Template Data Structures for Key Materials Use Cases: Metals, Composites, AM, Restricted Substances	●				
Toolbox for Import, Export, Manipulation of Materials Data	●				
Web App for Fast Upload of Materials Data	●				
Browse Materials Data	●	●	●		
Edit and Update Materials Data	●	▲	▲		
Search and Query Materials Data	●	●	●		

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MATERIALS	GRANTA MI	GRANTA SELECTOR	GRANTA EDUPAK	MECHANICAL & ELECTRONICS DESKTOP	ONLINE SUBSCRIPTION
MATERIALS DATA MANAGEMENT (CONTINUED)					
Represent Property Data in Interactive Charts, Where Relevant	●	●	●		
Comparison Tables and Comparison Charts	●	●	●		
Generate Reports on Selected Materials Records	●				
Export Data to Excel and Third-Party Software	●	●	●		
Personalize System Homepages and User Profiles	●				
Configure Web App UI for Specific User Groups	●				
MATERIALS DATA ANALYSIS					
Interactive Plotting of Data: Scatter, Contour, Error Bar, Surface, Plotyy, Semilogx, Semilogy, Loglog	●				
Curve Fitting	●				
Cross-Table Comparisons of Materials Data	●				
Scripting Toolkit for Python and MATLAB	●				
WORKFLOW MANAGEMENT					
Design and Develop Workflows	●				
Execute Workflows - Processes, Approvals, Notifications	●				
INTEGRATION WITH CAD, CAE, PLM					
MI:Materials Gateway Embedded App in CAE: ANSYS, Abaqus, HyperMesh, NX	●				
MI:Materials Gateway Embedded App in CAD: Creo, NX, Catia	●				

MATERIALS	GRANTA MI	GRANTA SELECTOR	GRANTA EDUPAK	MECHANICAL & ELECTRONICS DESKTOP	ONLINE SUBSCRIPTION
INTEGRATION WITH CAD, CAE, PLM (CONTINUED)					
MI:Materials Gateway Embedded App in PLM: Windchill, Teamcenter	●				
MI:Enterprise Connect Data Synchronization for PLM: Teamcenter, 3DEXPERIENCE	●				
Export Data in CAE File Formats	●	●	●		
Where Used? Reporting Capability for PLM	▲				
RESTRICTED SUBSTANCES					
Data structures to Support Restricted Substance Analytics: Store Specs, Materials, Legislations, Substances, Parts	●				
Report on Restricted Substance Risk for Materials and Process Portfolio	●				
Build and Edit Bills of Materials within a Web App	●				
At-a-Glance Restricted Substance Compliance for a BoM	▲				
Run Reports Across Multiple BoMs	▲				
Integrate Restricted Substance Reporting with PLM, CAD	▲				
MATERIALS SELECTION & RELATED TOOLS					
Reference Data for Materials Selection on PC/Laptop		●	●		
Interactive 'Ashby Charts' of Materials Property Space	▲	●	●		
Systematic Materials Selection Methodology		▲	●		
Filter Materials Based on Property Profile	●	●	●		

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MATERIALS	GRANTA MI	GRANTA SELECTOR	GRANTA EDUPAK	MECHANICAL & ELECTRONICS DESKTOP	ONLINE SUBSCRIPTION
MATERIALS SELECTION & RELATED TOOLS (CONTINUED)					
Filter Materials Based on Links to Other Materials / Processes / Objects	▲	●	●		
Materials Substitution & Equivalency - 'Find Similar'		●			
Performance Index Finder		●	●		
Engineering Solver - Convert Engineering Requirements to Materials Properties		●			
Hybrid Synthesizer - Predict Properties of Hybrid Materials		●	●		
Part Cost Estimator		●	●		
Selection Reports & Export of Charts for Presentations		●	●		
Eco Audit for a Product or Conceptual Design		●	●		
Edit a CES Database (CES Constructor)		●			
DATA LIBRARY - ANSYS ADVANCED MATERALS DATA BUNDLES					
MaterialUniverse - GRANTA Generic Data for Selection	●	●	●		
GRANTA Materials Data for Simulation				●	
Metals Bundle - ASM Alloy Finder	●	●			
Metals Bundle - MI-21	●	●			
Metals Bundle - StahlDat SX (European Steels)	●	●			
Metals Bundle - Steelspec (UK Steels)	●	●			
Metals Bundle - JAHM Curve Data	●	●			
Polymers Bundle - M-Base Plastics	●	●	●		

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MATERIALS	GRANTA MI	GRANTA SELECTOR	GRANTA EDUPAK	MECHANICAL & ELECTRONICS DESKTOP	ONLINE SUBSCRIPTION
DATA LIBRARY - ANSYS ADVANCED MATERALS DATA BUNDLES (CONTINUED)					
Polymers Bundle - Prospector Plastics	●	●	●		
Aero Bundle - MMPDS Aero Alloys	●	●	●		
Aero Bundle - CMH-17 Composites	●	●	●		
Composites Bundle - Composites QED (AGATE & NCAMP projects)	●				
Composites Bundle - Firehole Composites	●	●			
Additive Manufacturing Bundle - Senvol Database	●	●			
DATA LIBRARY - STANDALONE DATA MODULES					
ASM Medical Materials Database	●				●
ASME Boiler & Pressure Vessels Code	●	●			
Coatings Data Module	●	●			
Ecoinvent Key Materials Indicators	●	●			
ESDU MMDH Aerospace Alloys	●	●			
Global Powder Metallurgy	●	●			
Human Biological Materials	●				
NCS Colors Database	●				
NIMS Creep & Fatigue Data	●				
Product Risk Database	●				
Pantone Colors	●				
Prospector Plastics and UL Yellow Cards	●				

MATERIALS	GRANTA MI	GRANTA SELECTOR	GRANTA EDUPAK	MECHANICAL & ELECTRONICS DESKTOP	ONLINE SUBSCRIPTION
DATA LIBRARY - STANDALONE DATA MODULES (CONTINUED)					
RAL Colorsets	●				
Sheet Steels	●	●			
SERVICES					
GRANTA MI Getting Started Services	●				
GRANTA MI Implementation Services	●				
Data Migration Services	●				
Product Training / Workshops	●	●	●		
Product Support	●	●	●		
MDMC Consortium Membership	●				
EMIT Consortium Membership	●				
AutoMatIC Consortium Membership	●				
TEACHING RESOURCES					
CES EduPack Level 1-3 Teaching Databases			●		
The Elements Teaching Database			●		
Materials Science & Engineering Teaching Database			●		
Sustainability Teaching Database			●		
Bioengineering Teaching Database			●		
Architecture Teaching Database			●		
Lecture Units			●		

MATERIALS	GRANTA MI	GRANTA SELECTOR	GRANTA EDUPAK	MECHANICAL & ELECTRONICS DESKTOP	ONLINE SUBSCRIPTION
TEACHING RESOURCES (CONTINUED)					
Student Exercises			●		
Videos			●		
Micro-Projects			●		
White Papers			●		
Case Studies			●		
Active Learning Toolkits			●		
Data Booklets			●		
Sample Project Files			●		
Phase Diagram Tool			●		