



Realize Your Product Promise®

2019 R3

C A P A B I L I T I E S

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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	●					

1 = ANSYS nCode DesignLife Products
2 = ANSYS Fluent
3 = ANSYS DesignXplorer
4 = ANSYS SpaceClaim
5 = ANSYS Customization Suite (ACS)
6 = ANSYS HPC, ANSYS HPC Pack or ANSYS HPC Workgroup
7 = ANSYS GRANTA Materials Data for Simulation
8 = ANSYS Additive Suite
9 = ANSYS Composite Cure Simulation

DMP = Distributed-memory parallel
SMP = Shared-memory parallel
MAPDL = Mechanical APDL
Explicit = Autodyn
RBD = Rigid Body Dynamics
Aqwa = Aqwa

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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STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM
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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STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM
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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FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●									

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●	●				●	●			

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●									

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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)	●	●								

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●						●			

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

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●				●					

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●	●	●			●				

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●									

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●	●								

FLUIDS	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE			
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	●									

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 Objects		■								
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		●								

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

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		●								

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

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 Controlled Parametrics		●								
3D Component with Encryption Creation		●								
3D Component with Encryption Utilization		●								
Multipaction 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			●	●	●					

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	●	●		●	●					

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		■								

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	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE SOUND
SYSTEM SIMULATION, VALIDATION AND DIGITAL TWINS										
Integrated Graphical Modeling Environment	●									
Standard Modeling Languages and Exchange Formats	●									
Multi-domain Systems Modeler	●									
Extensive OD 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		●								

SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE 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				●						

SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE 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					●					

SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE 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									●	

SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE 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									●	

SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE SOUND
<i>VRXPERIENCE (CONTINUED)</i>										
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		●								

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 Analysis			●						
Basic Plasticity			●						
Large Deformation			●						
Fatigue Analysis			●						
Topology Optimization		●	●						
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			●						

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 PRINTING²									
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

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				●						

ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE						
TOPOLOGY AND LATTICE 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			●							

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

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		●	●								

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				●							

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	●	●	●								

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	●	●	●							

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, Plotxy, 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	●	●	●							

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 MATERIALS 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	●	●	●							

MATERIALS	GRANTA MI	GRANTA SELECTOR	GRANTA EDUPAK	MECHANICAL & ELECTRONICS DESKTOP	ONLINE SUBSCRIPTION				
DATA LIBRARY - ANSYS ADVANCED MATERIALS 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			●							