

Ansys

CAPABILITIES

2020/R2

CONTENT

STRUCTURES		
Geometric Idealization.....	3	
Modeling Capabilities.....	4	
Materials.....	4	
Composite Materials.....	5	
Structural Solver Capabilities.....	5	
Topology Optimization.....	6	
Multi Analysis.....	7	
Vibrations.....	7	
Nonlinear Transient Dynamics.....	8	
Explicit Dynamics.....	8	
Durability.....	9	
Wave Hydrodynamics.....	9	
Thermal.....	10	
Additional Physics.....	10	
Optimization.....	11	
Miscellaneous And Usability.....	11	
HPC – Structures.....	12	
FLUIDS		
General Solver Capabilities.....	13	
Single Phase, Non-Reacting Flows.....	14	
Heat Transfer.....	14	
Particles Flows (Multiphase).....	15	
Free Surface Flows (Multiphase).....	15	
Dispersed Multiphase Flows (Multiphase).....	16	
Reacting Flows.....	17	
Turbomachinery.....	18	
In-Flight Icing.....	18	
Optimization.....	19	
High Rheology Material.....	20	
HPC – Fluids.....	20	
Pre And Post Processing.....	21	
Multiphysics.....	21	
Fluid-Structure Interaction.....	21	
Electro-Thermal Interaction.....	21	
Other Coupled Interactions.....	22	
Ease of Use and Productivity.....	22	
ELECTRONICS		
Low Frequency Electromagnetics.....	23	
Magnetic Transient.....	23	
Advanced Magnetic Modeling.....	23	
Concept Design Solution for Electrical Machine.....	24	
High Frequency Electromagnetics.....	25	
Power and Signal Integrity Board Simulation Capabilities.....	28	
Rlcg Parasitic Extraction.....	29	
Electronics Cooling.....	30	
Cable Modeling.....	31	
HPC For Electronics.....	31	
Systems Modeling - Electronics Products		
System Modeling for Power Electronics.....	32	
System Modeling for RF/Microwave.....	32	
System Modeling for SI/PI.....	33	
Platform Technologies.....	33	
Electro-Thermal Interaction.....	34	
Materials Database For Electronics.....	34	
Miscellaneous.....	34	
SYSTEMS & EMBEDDED SOFTWARE		
System Simulation, Validation and Digital Twins.....	35	
Functional Safety Analysis.....	35	
Cybersecurity Analysis.....	36	
Model-Based Systems Engineering.....	36	
Embedded Control Software.....	37	
Man-Made Interface Software.....	38	
AV Perception Software Testing.....	38	
VREXPERIENCE		
Human Vision.....	38	
Headlamp Simulation.....	39	
System Simulation.....	39	
Context Simulation.....	39	
Rendering Engine.....	40	
VR.....	40	
Solver.....	40	
Acoustics & Sound Quality.....	40	
Geometry.....	41	
GEOMETRY	41	
DESIGN TOOLS		
Structural.....	42	
Fluid.....	42	
Thermal.....	42	
Electromagnetics.....	42	
Multiphysics.....	42	
Design & Concept Modeling.....	43	
3D Printing.....	43	
Reverse Engineering.....	43	
Interfaces And Add-Ons.....	43	
Materials Data for Designers and Simulation.....	43	
ADDITIVE SOLUTIONS		
Additive Prep.....	44	
Topology and Lattice Optimization.....	44	
Geometry and STL File Handling.....	45	
Workbench Additive.....	45	
Additive Print.....	46	
Additive Science.....	47	
Granta MI- Additive.....	47	
OPTICAL		
Ansys Products Embedded.....	48	
General Solver Capabilities.....	48	
Photometry / Radiometry.....	48	
Human Vision.....	49	
Wavelength Range.....	49	
Optical Design.....	49	
Optical Sensors.....	50	
Head-Up Display.....	50	
HPC – Speos.....	50	
Simulation Preparation.....	51	
Post Processing.....	51	
Optimization.....	52	
Optical Measurement Device		
Included.....	53	
Measurement Capability.....	53	
Use Cases.....	54	
Post Processing.....	54	
MATERIALS		
Materials Data Management.....	55	
Materials Data Analysis.....	56	
Workflow Management.....	56	
Integration with CAD, CAE, PLM.....	56	
Restricted Substances.....	57	
Materials Selection & Related Tools.....	57	
Data Library for Industry.....	58	
Teaching Resources.....	59	
PLATFORM		
optiSLang.....	60	
Minerva.....	60	

STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA
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					
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					
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					
Parallel Solving on Local PC	●	●	●	●	●					
Parallel Solving on Cluster	●	●	●	●	●					
GPU Acceleration	MAPDL - ⁶ Ex- plicit - 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	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
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	●	●	●	●	●	●			
GRANTA Materials Data for Simulation	●								
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	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
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	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
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	●	●			●				
Complex Multiphase Regime Transitions (AIAD and GENTOP Model)	●								

/ FLUIDS	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
FREE SURFACE FLOWS (MULTIPHASE) (CONTINUED)									
VOF to DPM Spray Model	●								
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	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
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	●					●			

/ FLUIDS	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
REACTING FLOWS (CONTINUED)									
Flamespeed and Ignition Table Generation						●			
Reaction Sensitivity, Uncertainty and Path Analysis						●			
Surrogate Blend Optimizer						●			
Mechanism Reduction						●			
Detailed Electrochemistry Model for Li-Ion Batteries	●								
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		●							
Performance Maps		●							
IN-FLIGHT ICING									
Simulation of Standard Droplets, SLD, and Ice Crystals	●					●			
Inclusion of Vapor / Humidity Effects on Icing	●					●			

/ FLUIDS	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
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)						▲			
Ice Cracking						●			
Ice Shedding						●			
OPTIMIZATION									
Parameters	●	●			●			●	
Design Point Studies	●	●			●			●	
Correlation Analysis	●	●			●				
Design of Experiments	●	●			●				
Sensitivity Analysis	●	●			●			●	
Goal Driven Optimization	●	●			●				

/ FLUIDS	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
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	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
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	■	■							
Intrinsic FSI	●								
ELECTRO-THERMAL INTERACTION									
Convection Cooled Electronics	●	●							
Conduction Cooled Electronics	●	●							
High Frequency Thermal Management	●	●							
Electromechanical Thermal Management	●	●							

/ FLUIDS	CFD ENTERPRISE					CHEMKIN ENTERPRISE			
	CFD PREMIUM			POLYFLOW	FENSAP-ICE				
	FLUENT	CFX	FORTE						
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	Electronics Premium MAXWELL	Electronics Premium HFSS	Electronics Premium SIWAVE	Electronics Premium Q3D EXTRACTOR	Electronics Premium ICEPAK	Motor-CAD	Electronics Pro 2D	Electronics Enterprise	EMA3D Cable
LOW FREQUENCY ELECTROMAGNETICS									
Electrostatics	●						● (2D Only)	●	
AC Conduction	●						● (2D Only)	●	
DC Conduction	●						● (2D Only)	●	
Magnetostatics	●						● (2D Only)	●	
Adaptive Field Mesh	●						● (2D Only)	●	
AC Harmonic Magnetic	●						● (2D Only)	●	
Electric Transient	●						● (2D Only)	●	
MAGNETIC TRANSIENT									
Translational Motion	●						● (2D Only)	●	
Fully Automatic Symmetrical Mesh Generation	●						● (2D Only)	●	
Rotational Motion	●						● (2D Only)	●	
Non-Cylindrical Motion	●						● (2D Only)	●	
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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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	●						●	●	
CONCEPT DESIGN SOLUTION FOR ELECTRICAL MACHINE									
Template-Based Magnetic Topologies						●			
Template-Based Cooling Topologies						●			
Magnetic 2D FEA with Analytical Solution						●			
Thermal 2D FEA with Analytical Solution						●			

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CONCEPT DESIGN SOLUTION FOR ELECTRICAL MACHINE (CONTINUED)									
3D Thermal and Fluid Network						●			
Temperature Dependent Duty-Cycle Analysis						●			
Manufacturing Effects Due to Winding Impregnation and Housing Interfaces						●			
Linear Structural 2D FEA						●			
Electrothermal Reduced Order Model (FMU)						●			
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		●						●	
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		●						●	

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HIGH FREQUENCY ELECTROMAGNETICS (CONTINUED)									
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		●						●	
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		●						●	

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HIGH FREQUENCY ELECTROMAGNETICS (CONTINUED)									
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		●						●	
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		●						●	
5G SAR Standards Toolkit		●						●	
Power Density and CDF		●						●	
Radar Prep/Post Simulation Wizards		●						●	
3D Component Libraries with User Controlled Parametrics		●						●	
3D Component with Encryption Creation		●						●	

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HIGH FREQUENCY ELECTROMAGNETICS (CONTINUED)									
3D Component with Encryption Utilization		●						●	
Multipaction Solver		●						●	
Accelerated Doppler Processing (ADP) for SBR+ Range-Doppler Analysis								●	
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			●	●	●			●	
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			●					●	
EMI/EMC Full Board Scan								●	

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POWER AND SIGNAL INTEGRITY BOARD SIMULATION CAPABILITIES (CONTINUED)									
Characteristic Impedance (Zo) L PKG/PCB Scan			●					●	
Full PCB/PKG Cross-Talk Scanning			●					●	
TDR Analysis		●	●	●			●	●	
Transient IBIS Circuit Analysis		●	●					●	
Signal Net Analyzer								●	
SerDes IBIS-AMI Circuit Analysis			●					●	
Macro-Modeling (Network Data Explorer)	●	●	●	●				●	
Steady State AC (LNA) Analysis			●					●	
Virtual Compliance - DDRx, GDDRx, & LPDDRx			●					●	
SPISIM Com and USB-C Compliance								●	
SPISIM IBIS AMI Generation								●	
Synopsys HSPICE Integration			●					●	
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				●				●	
3D Component Library				●				●	

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RLCG PARASITIC EXTRACTION (CONTINUED)									
Reduced RLCG Matrix Operations				●				●	
SPICE Equivalent Modeling Export				●			●	●	
DCRL & ACRL Joule Heating Analysis with Icepak				●				●	
Macro-Modeling (Network Data Explorer)				●				●	
2D Cable Modeling Toolkit				●				●	
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					●			●	
Joule Heating Analysis	■	■	■	■	●			●	
Thermo-Electric Cooler Modeling					●			●	
Thermostat Modeling					●			●	
Package Characterization					●			●	
Data Center Modeling					●			●	

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CABLE MODELING									
Finite Difference Time Domain Analysis									●
Multi-Conductor Transmission Line Analysis	●	●	●	●	●		●	●	●
Two-Way Coupling FDTD and Transmission Line Solver		▲						▲	●
Twisted Conductors									●
Seam Impedance									●
Cable Junctions									●
Braided Shield Support									●
Pin Voltage, Current Density, Plane Wave Excitations		●						●	●
Multi-Conductor and Multi-Shield Support									●
Uses SpaceClaim Design Modeler UI									●
Thin Surface and Thin Wire Algorithms									●
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	Electronics Premium MAXWELL	Electronics Premium HFSS	Electronics Premium SIWAVE	Electronics Premium Q3D EXTRACTOR	Electronics Premium ICEPAK	Motor-CAD	Electronics Pro 2D	Electronics Enterprise	EMA3D Cable
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 Low Frequency Electromagnetics	●						●	●	
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		●					●	●	

/ ELECTRONICS	Electronics Premium MAXWELL	Electronics Premium HFSS	Electronics Premium SIWAVE	Electronics Premium Q3D EXTRACTOR	Electronics Premium ICEPAK	Motor-CAD	Electronics Pro 2D	Electronics Enterprise	EMA3D Cable
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	●	●	●	●	●			●	
Drag-n-Drop Multiphysics	●	●	●	●	●			●	
Direct Coupling Between Physics	●	●	●	●	●			●	
Collaborative Workflows	●	●	●	●	●			●	
Fully Managed Co-Simulation	●	●	●	●	●			●	
Flexible Solver Coupling Options	●	●	●	●	●			●	

/ ELECTRONICS	Electronics Premium MAXWELL	Electronics Premium HFSS	Electronics Premium SIWAVE	Electronics Premium Q3D EXTRACTOR	Electronics Premium ICEPAK	Motor-CAD	Electronics Pro 2D	Electronics Enterprise	EMA3D Cable
ELECTRO-THERMAL INTERACTION									
Convection Cooled Electronics		●			●			●	
Conduction Cooled Electronics		●			●			●	
High Frequency Thermal Management		●		●	●			●	
Electromechanical Thermal Management	●			●	●			●	
MATERIALS DATABASE FOR ELECTRONICS									
GRANTA Materials Data for Simulation	■	■			■		■	■	
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	MEDINI ANALYZE FOR CYBERSECURITY	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	MEDINI ANALYZE FOR CYBERSECURITY	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		●									
Safety of Intended Functionality Analysis		●									
CYBERSECURITY ANALYSIS											
Analysis Context Establishment and Asset Identification			●								
Threat Identification			●								
Attack Trees and Attack Collections			●								
Threat Assessment and Treatment			●								
Requirement Analysis and Management			●								
Rich Traceability			●								
Teamwork and Integrated Task Management			●								
Reporting and Customization			●								
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				●	●						

/ SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	MEDINI ANALYZE FOR CYBERSECURITY	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE SOUND
MODEL-BASED SYSTEMS ENGINEERING (CONTINUED)											
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					●						
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					●						

/ SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	MEDINI ANALYZE FOR CYBERSECURITY	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE SOUND
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						●					
Certification Kits for DO-178C, EN50128, ISO 26262, IEC 61508						●					
Solutions for ARINC 661						●					
Testing Capabilities						●					
AV PERCEPTION SOFTWARE TESTING											
Perception Software Robustness Testing							●				
Triggering Conditions Identification							●				
Automatic Safety Report Generation							●				
VRXPERIENCE											
HUMAN VISION											
Glare Simulation								●			

/ SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	MEDINI ANALYZE FOR CYBERSECURITY	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE SOUND
HEADLAMP SIMULATION											
Virtual Measurement								●			
Lamp Control								●	▲	▲	
IIHS Test								●			
SYSTEM SIMULATION											
Ground-Truth Sensor								●			
Camera Sensor								●	▲	▲	
LiDAR Sensor								●			
Radar Sensor								●			
Virtual Display Prototype									●		
Display software in the Loop (SCADE)									●		
HUD									●	●	
Advanced Lighting Component										●	
CONTEXT SIMULATION											
Basic Driving Scenario								●	▲	▲	
Advanced Driving Scenario								■	■		
Advanced Vehicle Dynamic								■	■		
Environement Creation								■	●	●	
Trigger & Animation									●	●	
MiL/SiL Connectivity								●	●		
HiL Connectivity								●			
Virtual Display & Actuators Interaction									●		

/ SYSTEMS & EMBEDDED SOFTWARE	TWIN BUILDER	MEDINI ANALYZE	MEDINI ANALYZE FOR CYBERSECURITY	SCADE ARCHITECT	SCADE SUITE	SCADE DISPLAY	SCADE VISION	VRXPERIENCE FOR AV/ADAS	VRXPERIENCE HMI	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE SOUND
VRXPERIENCE (CONTINUED)											
RENDERING ENGINE											
Real-Time Physics-Based Lighting								●	●	●	
Advanced Raytraced Lighting									●	●	
Full Physics GPU Lighting										●	
VR											
HMD									●	●	
CAVE, Powerwall									●	●	
Finger Tracking									●		
SOLVER											
Tolerance Variation Engine										●	
ACOUSTICS & SOUND QUALITY											
Analyze, Listen & Modify											●
Psychoacoustics, Automatic Detection and Separation, Play 3D Sound											●
Engine Sound Design and Engine Sound Enhancement											●
Active Sound Design for Electric Vehicles											●
3D Sound for Listening Room and VR											●
Interactive Sound for Driving Simulator											●
Measure Sound Perception with Listening Test											●
Listen to Ansys Mechanical, Fluent, LSDyna and Motion Simulations											●
Generate, Filter and Mix Acoustic Measurements and CAE Simulations											●

/ GEOMETRY	DESIGN MODELER	SPACECLAIM								
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																		
STRUCTURAL																				
Static Structural Analysis	●																			
Modal Analysis	●																			
Pre-Stressed Modal Analysis	■																			
Point Masses	●																			
Nonlinear Contact & Joints	■																			
Pre-Tension Bolts	■																			
Large Deformation	■																			
Topology Optimization	●																			
FLUID																				
Steady-state Flow	●																			
Transient Flow	●																			
Incompressible Flow	●																			
Compressible Flow	▲																			
THERMAL																				
Steady-state Thermal	●																			
Transient Thermal	●																			
Conduction	●																			
Convection	●																			
ELECTROMAGNETICS																				
DC Conduction	●																			
MULTIPHYSICS																				
Thermal-Stress	●																			
Thermal-Electric	●																			
Thermal-Electric-Stress	●																			

/ DESIGN TOOLS		DISCOVERY												
DESIGN & CONCEPT MODELING														
Concept Modeling or Detail Design	●													
Part/Assembly Creation or Import	●													
Large Assembly Import	●													
Geometric Parameterization	●													
3D PRINTING														
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														
Transfer to Mechanical	●													
Transfer to Fluent	●													
Algoryx Momentum	■													
MATERIALS DATA FOR DESIGNERS AND SIMULATION														
Materials Data for Simulation	●													

/ 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 Region Detection and Manual Modification	●	●	●							
Create Multiple Support Types in One Region	●	●	●							
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	●	●	●							
Export of Additive Manufacturing Equipment (OEM) Build Files	●	●	●							
Cost Estimation	●	●	●							
Layer/Scan Vector Visualization	●	●	●							
TOPOLOGY AND LATICE OPTIMIZATION										
Structural Optimization				●						
Modal Optimization				●						
Thermal Loads				●						
Inertial Loads				●						

/ ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE						
TOPOLOGY AND LATTICE OPTIMIZATION (CONTINUED)										
Optimized Design Validation				●						
Manufacturing Constraints				●						
Stress Constraints				●						
Symmetry				●						
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			●							

/ ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE						
WORKBENCH ADDITIVE (CONTINUED)										
User-Defined Step Option as 1st or Last Sequence Step			●							
Layered Tetrahedral Meshing			●							
Post Build Heat Treatment			●							
Import of STL Supports			●							
Inherent Strain Isotropic and Anisotropic released			●							
Strain Scaling Factor for Thermal and Structural Analyses			●							
STL Files Can Be Exported from STL Supports			●							
Voxel Mesh Generation			●							
Wizard to transfer Results from Additive Print to Workbench Additive			●							
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		●	●							

/ ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE	GRANTA MI					
ADDITIVE PRINT (CONTINUED)										
Input Strain Hardening Factor		●	●							
Import of STL Supports		●	●							
Subvoxel Material Density Assignment		●	●							
Layer by Layer Stress, Distortion & Blade Crash Visualizations		●	●							
Build File Readers for Multiple AM Machines		●	●							
Auto Queue Multiple Successive Simulations		●	●							
Additive Print to Workbench Additive Transfer for Post Processing		●	●							
ADDITIVE SCIENCE										
Meltpool Dimensions			●							
Detailed Thermal History			▲							
% Porosity			●							
Sensor Measurement Predictions			▲							
Ability for add User-Defined Materials			●							
Material Tuning Wizard			●							
Morphology Prediction			●							
Microstructure Prediction			▲							
GRANTA MI- ADDITIVE										
Traceability and Capture of Additive Manufacturing Data					●					
AM Data Analytics					●					
Integration with CAD CAE and PLM Systems					●					

* Additive Suite requires a Mechanical Enterprise license

/ OPTICAL	SPEOS PRO	SPEOS PREMIUM	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							
ANSYS PRODUCTS EMBEDDED											
Anslys SpaceClaim Direct Modeler	●	●	●								
ANSYS SpaceClaim Catia V5 Interface	●	●	●								
ANSYS DesignXplorer	●	●	●								
ANSYS License Manager	●	●	●								
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			●(1)								
PHOTOMETRY / RADIOMETRY											
Intensity	●	●	●								
Illuminance	●	●	●								
3D Illuminance	●	●	●								

/ OPTICAL	SPEOS PRO	SPEOS PREMIUM	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							
PHOTOMETRY / RADIOMETRY (CONTINUED)											
Luminance	▲	●	●								
3D Energy Density		●	●								
360° View - Observer		●	●								
360° View - Immersive		●	●								
HUMAN VISION											
Dynamic Adaptation			●								
Glare Simulation			●								
High Dynamic Range Screen support			●								
WAVELENGTH RANGE											
Visible (360nm - 830nm)	●	●	●								
UV (100nm-360 nm)		●	●								
Near IR (830nm - 2.5µm)		●	●								
Far Infra-Red (2.5µm -100µm)							●				
OPTICAL DESIGN											
Parabolic Surface	●(3)	●(3)	●(3)								
TIR Lens	●(3)	●(3)	●(3)								
Projection Lens	●(3)	●(3)	●(3)								
Optical Lens				●							
Optical Surface				●							
Light Guide				●							

/ OPTICAL	SPEOS PRO	SPEOS PREMIUM	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 DESIGN (CONTINUED)											
Sharp Cut-Off Reflector				●							
Poly-Ellipsoidal Surface				●							
Micro Optical Stripes				●							
Freeform Lens				●(2)							
Honeycomb Lens				●							
OPTICAL SENSORS											
Field Of View					●						
Export Sensor Grid as Geometry					●						
Camera Sensor					●						
Camera Raw Signal Export					●						
SPEOS Lens System Importer (ZEMAX OpticStudio)					●						
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	●	●	●								

/ OPTICAL	SPEOS PRO	SPEOS PREMIUM	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							
HPC - SPEOS (CONTINUED)											
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		●	●								
Polarisation Plate		●(1)	●(1)								
Fluorescent Converter		●	●								
Texture Mapping (Bump, Multi-Layer)		●	●								
Uniform Ambient Source	●	●	●								
HDRI Source	●	●	●								
CIE Sky Source		●	●								
Natural Light Source		●	●								
Near Infrared Extended Ambient Source		●	●								
Thermic Source								●			
Earth Atmosphere Model								■			
POST PROCESSING											
Virtual Lighting Controller		●	●								
Photometric Numerical Certification	●	●	●								
Colorimetric Analysis	●	●	●								

/ OPTICAL	SPEOS PRO	SPEOS PREMIUM	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							
POST PROCESSING (CONTINUED)											
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	●	●	●								
OPTIMIZATION											
Parameters	●	●	●								
Design of Experiment	●	●	●								
Design Optimisation (1)								●			
Design Optimisation through ANSYS DesignXplorer (2)	●	●	●								
Ansys optiSLang Interface(2)	■	■	■								

Notes:

(1) Not available for ANSYS SPEOS

(2) Only for ANSYS SPEOS

(3) Not available for SPEOS for CREO Parametric

/ OPTICAL	OMD PRO	OMD PREMIUM	OMD ENTERPRISE
OPTICAL MEASUREMENT DEVICE			
INCLUDED			
OMS2 Hardware	●		
OMS4 Hardware		●	●
Broadband Visible White Source Addon			●
Portable OMD Software	●		
Laboratory OMD Software		●	●
Labs Viewers	Included	Included	Included
MEASUREMENT CAPABILITY			
BRDF	●	●	●
BTDF		●	●
Reflective & Transmission spectrum (380-1000nm)		●	●
Roughness (Unpolished)		●	●
Volume Absorption		●	●
Volume Diffusion		●	●
Wavelength Range 380-725nm	RGB - Interpolate	Pectrum - Interpolate	Full Acquisition
Max Measurement Time	1min	4hours	32hours
Min Measurement Time	1min	5min	5min
Target Dynamic Range	10 ⁶	10 ⁸	10 ⁸
Angular Optical Resolution (FWHM)	0.5°	0.1°	0.1° (or 0.5°)
Max Dimension	30cm	2.2m	2.2m

/ OPTICAL	OMD PRO	OMD PREMIUM	OMD ENTERPRISE							
MEASUREMENT CAPABILITY (CONTINUED)										
White Led Light Sources	●									
Laser Light Source		●	●							
USE CASES										
Light Modelling & Photometrical Simulations		●	●							
Visual Ergonomics & Style Studies	●	●	●							
POST PROCESSING										
Interpolation Enhancement	Automated	Tunable	Tunable							
Effective Anisotropy Reconstruction from 2 Measures	●	●	●							
Labs Viewer & Editor	Included	Included	Included							
Theoretical Peak Reconstruction	●	●	●							
BRDF Visualisation & Processing	●	●	●							

/ MATERIALS	GRANTA MI ENTERPRISE	GRANTA MI PRO	GRANTA SELECTOR	GRANTA EDUPACK	PLATFORM (optiSLang, Minerva, Cloud)					
MATERIALS DATA MANAGEMENT										
GRANTA MI Database - 'Gold Source' System to Store Corporate Materials Information	●	●								
Manage Specialist Materials Data Types	●	●								
Manage Meta-Data and Context for Materials	●									
Traceability for All Materials Data	●	●								
Access Control	●	▲								
Version Control	●									
Multiple Unit System Support	●	●	●	●						
Admin UI to Setup and Configure 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	●	●	●	●						
Represent Property Data in Interactive Charts	●	▲	●	●						
Comparison Tables and Comparison Charts	●	▲	●	●						
Generate Reports on Selected Materials Records	●									

/ MATERIALS	GRANTA MI ENTERPRISE	GRANTA MI PRO	GRANTA SELECTOR	GRANTA EDUPACK	PLATFORM (optiSLang, Minerva, Cloud)					
MATERIALS DATA MANAGEMENT (CONTINUED)										
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										
ANSYS	●	●								
Abaqus	●									
ANSA	●									
HyperMesh	●									
Creo	●									
NX	●	●								
CATIA v5	●									

/ MATERIALS	GRANTA MI ENTERPRISE	GRANTA MI PRO	GRANTA SELECTOR	GRANTA EDUPACK	PLATFORM (optiSLang, Minerva, Cloud)					
INTEGRATION WITH CAD, CAE, PLM (CONTINUED)										
Windchill	●									
Teamcenter	●									
3DEXPERIENCE	●									
File Export	●	▲	●	●						
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 ENTERPRISE	GRANTA MI PRO	GRANTA SELECTOR	GRANTA EDUPACK	PLATFORM (optiSlang, Minerva, Cloud)					
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 GRANTA Selector Database			●							
DATA LIBRARY FOR INDUSTRY										
MaterialUniverse Generic Data for Selection	●		●							
MI Pro Simulation Data		●								
JAHM Curve Data for Simulation	●		●							
Metals Data Bundle	●		●							
Polymers Data Bundle	●		●							
Composites Data Bundle	●		●							
Medical Data Bundle	●									
Aero Data Bundle	●		●							
Additive Data Bundle	●		●							
ESDU MMDH Aero Alloys	●									
UL Yellow Cards	●									

/ MATERIALS	GRANTA MI ENTERPRISE	GRANTA MI PRO	GRANTA SELECTOR	GRANTA EDUPACK	PLATFORM (optiSLang, Minerva, Cloud)					
TEACHING RESOURCES										
GRANTA 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				●						
Student Exercises				●						
Videos				●						
Micro-Projects				●						
White Papers				●						
Case Studies				●						
Active Learning Toolkits				●						
Data Booklets				●						
Sample Project Files				●						
Phase Diagram Tool				●						

/ PLATFORM	optiSLang	Minerva							
Process Integration	●								
Simulation Workflows & Process Automation	●								
Design & Data Exploration	●								
Reduced-Order Modeling	●								
Design Optimization & Parameter Identification (Calibration)	●								
Robust Design & Reliability	●								
Simulation Process & Data Management		●							
Hybrid Deployment and Simulations Apps		●							
Interoperability		●							
Multiphysics Process Integration & Robust Design		●							
Integration with Ansys GRANTA MI Materials Data Management		●							