Ansys

2021 R1

Engineering What's Ahead.

CAPABILITIES

/ CONTENTS

/ STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	SHERLOCK
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	●				●	
WAVE HYDRODYNAMICS						
Diffraction and Radiation	●					
Frequency & Time Domain Motions Analysis	●					
Moorings, Joints & Tethers	●					
Load Transfer to Structural Analysis	●					
ADDITIONAL PHYSICS						
1-D Thermal-Flow	●	●	●			
1-D Coupled-Field Circuits	●					
1-D Electromechanical Transducer	●					
MEMS ROM	●					
Piezoelectric	●					
Piezoresistive	●					

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Explicit = Autodyn

RBD = Rigid Body Dynamics

Aqwa = Aqwa

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

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ADDITIONAL PHYSICS						
Electromagnetic	●					
Vibro-Acoustics	●					
Electro-Migration	●					●
Diffusion-Pore-Fluid	●					
Diffusion-Thermal-Electric-Magnetic	●					
1-Way Fluid Structure Interaction	■[2]	■[2]	■[2]			
2-Way Fluid-Structure Integration	■[2]					
ICFD					●	
EM - BEM (Boundary Element Method)					●	
Manufacturing Solutions					●	
ALE					●	
Multi-scale modeling					●	
CESE					●	
Thermal					●	
NVH					●	
Acoustics - BEM					●	
Acoustics -SEA					●	

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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]									
Honeycombs					●					

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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]		■[1]	
EXPLICIT DYNAMICS						
FE (Lagrange) Solver	●			●	●	
Euler Solvers				●		
Meshless Solvers	●			●		
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				●		
Explicit Time Integration					●	

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IMPLICIT DYNAMICS						
Implicit Time Integration					●	
GEOMETRIC IDEALIZATION						
Spring	●	●	7	●	●	
Mass	●	●	●	●	●	
Damper	●	●		●	●	
Spar	●	●	●			
Beam	●	●	●	●	●	
Cable	●	●	●			
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 Elements	●	●				
Reinforcement Elements	●	●		●	●	●
Coupled Field ROM Element Technology	●	●				■
Iso-Geometric Analysis (IGA)					●	
GEOMETRY AND STL FILE HANDLING						
SpaceClaim Direct Modeler	●					

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HPC - STRUCTURES						
Default Number of Cores	4 (DMP or SMP) MAPDL 4 for Explicit 4 for RBD MAPDL 4 for AQWA	4 (DMP or SMP)	4 (DMP or SMP)	1	1	
Parallel Solving on Local PC	●	●	●	●	●	●
Parallel Solving on Cluster	●	●	●	●	●	●
GPU Acceleration	MAPDL - Yes 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		●	
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, Geomaterials, Multiphysics)	●			●	●	
Field Dependent	●	●		●		
Reactive Materials	●					
Fracture Mechanics and Crack Growth	●				▲	
Material Designer	●					
Granta Materials Data for Simulation	■[7]	■[7]	■[7]			
Elastic					●	
Metals					●	
Plastics					●	
Linear visco-elasticity					●	
Elasto-viscoplastic					●	

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MATERIALS										
Elastomers and rubbers					●					
Glass models					●					
Foams					●					
Fabrics					●					
Kevlar material with damage					●					
Equations-of-state hydrodynamic models					●					
Acoustic pressure material/element					●					
Concrete & soils					●					
High explosives					●					
Propellants					●					
Viscous fluids					●					
Biomechanic material models					●					
Failure models					●					
User-defined materials					●					
Soil, paper/ cardboard					●					
MISCELLANEOUS AND USABILITY										
Ansys SpaceClaim	●	■[4]	■[4]	■[4]	■[4]					
Ansys Customization Suite (ACS)	●			■[5]	■[5]					
Support ACT Extensions	●	●	●	●	●					
Command Snippet Support	●	●	●							
Batch run capability	●	●	●	●	●	●				
Read/Write 3rd Party Matrix CAE Data	●	●		●	●					
CDB and 3rd party FE Model Import	●	●	●		●					
Nastran Bulk File Export	●	●	●							

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MISCELLANEOUS AND USABILITY										
Global/ selective mass scaling					●					
Keyword input					●					
Direct input of Nastran bulk data files					●					
Splitting of input file into subfiles					●					
User subroutines					●					
Re-mapping					●					
Transmitting boundaries					●					
Dynamic storage allocation					●					
Extensive output data controls (ascii/ binary)					●					
Sense switch controls - monitor simulations status					●					
Interactive real-time graphics					●					
Pre-stressing from Nastran Linear Solution'					●					
Double Precision					●					
MODELING CAPABILITIES										
Lumped inertias/masses					●					
Beams					●					
Discrete Elements (DEM)					●					
Solid elements					●					
8-node thick shells					●					
4-node thin shells					●					
Triangular shells					●					
Membranes					●					
Seatbelt elements					●					
Sensor, accelerometer					●					
SPH elements					●					

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MODELING CAPABILITIES						
Contact - Linear	●	●	●	●	●	
Contact - Nonlinear	●	●	●	●	●	
Joints	●	●	●	●	●	
Spot Welds	●	●	●	●	●	
Element Birth and Death	●	●				
Gasket Elements	●					
Rezoning and Adaptive Remeshing	●			●	●	
Inverse Analysis	●					
Spotwelds					●	
SPG,					●	
Element Free Gelerkin					●	
Adaptive remeshing					●	
MULTI ANALYSIS						
Submodeling	●	●	●			
Data Mapping	●	●	●			
Multiphysics Data Mapping	●	●	▲			
Initial State	●	●		●	●	
Advanced Multi-Stage 2-D to 3-D Analysis	●	●				
NONLINEAR TRANSIENT DYNAMICS						
Rigid Body Mechanisms	●	●				
Rigid Body Dynamics with CMS Components for Flexible Bodies	●					
Full Transient	●	●		●	●	
CMS with Substructuring	●					

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OPTIMIZATION						
DesignEplorer Included	●	●	●	■[3]	■[3]	
Parameters	●	●	●	●	●	
Design Point Studies	●	●	●	●	●	
Correlation Analysis	●	●	●	●		
Design of Experiments	●	●	●	●		
Sensitivity Analysis	●	●	●	●		
Goal Drive Optimization	●	●	●	●		
Six Sigma Analysis	●	●	●	●		
STRUCTURAL SOLVER CAPABILITIES						
Linear Static	●	●	●			●
Nonlinear Static	●	●	●			
Pre-Stress Effect, Linear Perturbation	●	●	●	▲	▲	
Nonlinear Geometry	●	●	●	●	●	
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	●					
THERMAL						
Steady State Thermal	●	●	●			
Transient Thermal	●	●	●			
Conduction	●	●	●	●	●	
Convection	●	●	●			
Radiation to Space	●	●	●			
Radiation - Surface to Surface	●	●	●			
Phase Change	●	●	●	●	●	
Thermal Analysis of Layered Shells and Solids	●	●	●			

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TOPOLOGY AND LATTICE OPTIMIZATION						
Structural Optimization	●	●	●			
Modal Optimization	●	●	●			
Thermal Loads	●	●	●			
Inertial Loads	●	●	●			
Optimized Design Validation	●	●	●			
Manufacturing Constraints	●	●	●			
Stress Constraints	●	●	●			
Symmetry	●	●	●			
Lattice Optimization	■[8]					
Overhang/Additive Constraints	■[8]					
PARTICLE METHODS						
SPH elements					●	
SPG					●	
CPM					●	
AUTOMOTIVE						
Seat-belts - including modeling of accelerometer, pretensioner, retractor, sensor, and slip ring					●	
Inflator Models					●	
Airbag Fabric Constitutive Models					●	
Accelerometers					●	
Airbag Sensors					●	
Airbag Breakout					●	
Eulerian Deployment of Airbags					●	
Airbag Folder					●	
Unfolded Reference Geometry for Airbags					●	
Dummy Positioner					●	
Side-Impact Dummy Special Damper					●	
Airbag Deployment					●	

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/ SOUND SIMULATION

	VRXPERIENCE SOUND
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 ad Motion Simulations	●
Generate, Filter and Mix Acoustic Measurements and CAE Simulations	●

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/ ADDITIVE MANUFACTURING	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE
ADDITIVE PREP			
Define Build Envelope	●	■	●
Multiple Parts	●	■	●
Optimize Part Orientation Based upon Distortion Tendency, Build Time and Supports	●	■	●
Support Region Detection and Manual Modification	●	●	●
Created 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	●	●	●
WORKBENCH ADDITIVE			
Nonlinear and Temperature Dependent Material Properties			●
Thermo-Mechanical Coupled Strain Solution			●
Native Mechanical Environment			●
Stress-Based Automatically Generated Supports			●
Part Distortion and Residual Stress after Support Removal			●
Blade Crash Detection			●
Identification of High Strain (Crack) Locations			●
Layer by Layer Stress and Distortion Visualizations			●
Option to Output Only the Last Layer of the Build or Every Nth Layer			●

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/ ADDITIVE MANUFACTURING

	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE
WORKBENCH ADDITIVE			
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			●
Wizards to Transfer Results from Additive Print to Workbench Additive			●
Calibration setup in AM Wizard			●
AM Bond Implementation			●
Recoater interference detection and layer end temperature output			●
ADDITIVE PRINT			
Nonlinear and Temperature Dependent Material Properties		●	●
Uniform Assumed Isotropic Strain		●	●
Scan Pattern Based Anisotropic Strain		●	●
Thermal Ratcheting Based Anisotropic Strain		●	●
Desktop and Cloud Stand-Alone Environments		●	●
Stress-Based Automatically Generated Supports		●	●
Part Distortion and Residual Stress (as-built)		●	●
Part Distortion and Residual Stress after Support Removal		●	●
Distortion Compensation		●	●
Blade Crash Detection		●	●
Identification of High Strain (Crack) Locations		●	●

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ADDITIVE PRINT			
Input Strain Hardening Factor		●	●
Import of STL Supports		●	●
Subvoxel Material Density Assignment		●	●
Layer by Layer Stress, Distortion and Blad 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			●

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/ MATERIALS	GRANTA MI	GRANTA MI ENTERPRISE	GRANTA MI PRO	GRANTA SELECTOR	GRANTA OR CES EDUPACK	MATERIALS DATA FOR SIMULATION	
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		●					
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		●					
Custom Curve Fitting		●					
Cross-Table Comparisons of Materials Data		●					
Scripting Toolkit for Python		●					

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DATA FLOW MANAGEMENT							
Design and develop material data flow		●					
Execute material data flows - Processes, Approvals, Notifications		●					
INTEGRATION WITH CAD, CAE, PLM							
Ansys Workbench		●	●	▲	▲		
Abaqus		●					
ANSA		●					
HyperMesh		●	●				
Creo		●	●				
NX		●	●				
Windchill		●					
Teamcenter		●					
File Export (CATIA v5, SOLIDWORKS, and others)		●	▲	▲	▲		
RESTRICTED SUBSTANCES							
Data Structures to Support Restricted Substance Analytics, Store Specs, Materials, Legislations, Substances, Parts		●					
Report on Restricted Substance Risk for Materils and Process Portfolio		●					
Build and Edit Bills of Materials within a Web App		●					
At-a-Glance Restricted Substance Complaince 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		●	●	●	●		
Flilter Materials Based on Links to Other Materials / Processes / Objects		▲		●	●		

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MATERIALS SELECTION & RELATED TOOLS							
Materials Substitution and Equivalency - 'Find Similar'				●	●		
Performance Index Finder				●	●		
Engineering Solver - Convert Engineering Requirements to Materials Properties				●	●		
Synthesizer - Predict Properties of Hybrid Materials				●	●		
Part Cost Estimator				●	●		
Selection Reports and Export of Charts for Presentations				●	●		
Eco Audit for a Product or Conceptual Design				●	●		
Early stage batter pack design, configuration and performance evaluation - incl. battery cells database				●	●		
DATA LIBRARY FOR INDUSTRY							
Core MaterialUniverse™ Data		●		●			
Core JAHM Curve Data		●		●			
MI Pro Simulation Data			●				
Advanced Metals Data		■		■			
Advanced Polymers Data		■		■			
Advanced Composites Data		■		■			
Advanced Medical Data		■		■			
Advanced Aero Data		■		■			
Advanced ESDU Aero Alloys		■		■			
Advanced Additive Manufacturing Data		■		■			
Advanced Eco Design		■		■			
TEACHING RESOURCES							
Granta EduPack Level 1-3 Teaching Databases					●		
The Elements Teaching Database					●		
Materials Science and Engineering Teaching Database					●		
Sustainability Teaching Database					●		
Bioengineering Teaching Database					●		

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TEACHING RESOURCES							
Architecture Teaching Database					●		
Lecture units					●		
Student exercises					●		
Videos					●		
Mciro-Projects					●		
White Papers					●		
Case Studies					●		
Active Learning Toolkits					●		
Data Booklets					●		
Sample Project Files					●		
Phase Diagram Tool					●		
Medical Devices Teaching Database					●		
Design Teaching Database					●		
GRANTA MI - ADDITIVE							
Traceability and Capture of Additive Manufacturing Data	●						
AM Data Analytics	●						
Integration with CAD CAE and PLM Systems	●						

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	FLUENT*13	FLUENT	CFX	CHEMKIN-PRO	FORTE	POLYFLOW	FENSAP-ICE
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	■[7]	■[7]					
Fan Model	●	●	●				●
Periodic Domains		●	●	●	●	●	●
Flow-Drive Solid Motion (6DOF)		●	●		▲		●
Presuure-Based Coupled Solver	●	●	●	●	●	●	●
Density-Based Coupled Solver		●	●	●			
Dymanic/Moving-Deforming Mesh		●	●		●	●	●
Oveset Mesh		●					
Immersed-Soild/MST Method for Moving Parts			●			●	●
Automatic On-the-fly Mesh Generation with Dynamic Refinement		●		●	●		
Dynamic Solution-Adaptive Mesh Refinement		●	●	●	●		▲
Polyhedral Unstructured Solution-Adpative Mesh Refinement		●					
SINGLE PHASE, NON-REACTING FLOWS							
Incompressible Flow	●	●	●	●		●	
Compressible Flow	●	●	●	●	●		●
Porous Media	●	●	●	▲		●	▲
Non-Newtoniam Viscosity	●	●	●			●	
Turbulence -Isotropic	●	●	●		●	●	●
Turbulence - Anisotropic (RSM)		●	●				

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SINGLE PHASE, NON-REACTING FLOWS							
Turbulence - Unsteady (LES/SAS/DES)		●	●				●
Turbulence - Laminar/Turbulent Transition		●	●	●			●
Flow Pathlines (Massless)	●	●	●			●	
Acoustics (Source Expert)		●	●				●
Acoustics (Noise Prediction)		●	▲				
HEAT TRANSFER							
Natural Convection	●	●	●	●	●		●
Conduction & Conjugate Heat Transfer	●	●	●	●			●
Shell Conduction (inlcuding Multi-Layer Model)		●					
Internal Radiation - Participating Media		●	●	●		●	●
Internal Radiation - Transparent Media		●	●	●	●		
External Radiation		●	●				
Solare Radiation & Load		●	●				
Simplified Heat Exchange Model		●					
Non- Equilibrium Thermal Model		●					
Porous Media	●	●					
PARTICLES FLOWS (MULTIPHASE)							
Coupled Discrete Phase Modeling including Thin Wall Films		●	●	▲	●		●
Macroscopic Particle Model		●					
Inert Particle Tracking (with Mass)		●	●				
Liquid Droplet (including Evaporation)		●	●	▲	●		●
Combusting Particles		●	●	●	●		●
Multicomponent Droplets		●	●	▲	●		●
Discrete Element Model (DEM)		●	●				
Break-Up and Coalescence		●	●	▲	●		●
Erosion		●	●				

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FREE SURFACE FLOWS (MULTIPHASE)							
Implicit VOF		●	●			●	
Explicit VOF		●	●			●	
Coupled Level Set/VOF		●	●				●
Complex Multiphase Regime Transitions (AIAD and GENTOP Model)		●					
VOF to DPM Spray Model		●					
DPM to VOF Model		●					
Open Channel Flow and Wave		●	●				
Surface Tension		●	●		●		●
Phase Change		●	●		●		●
Cavitation		●	●		●		●
Cavitation Where Mulitple Fluids and Non-Condensing Gases are Present		●					
DISPERSED MULTIPHASE FLOWS (MULTIPHASE)							
Mixture Fraction		●	●				
Eulerian Model including Thin Wall Films		●	●		●		●
Boiling Model		●	●	▲	●		
Surface Tension		●	●		●		
Phase Change		●	●	▲	●		
Drag and Lift		●	●		●		
Wall Lubrication		●	●		●		
Heat and Mass Transfer		●	●	●	●		
Population Balance		●	●	●	●		
Reactions Between Phases		●	●	●	●		
Granular Model for Dense Bed of Solids		●	●				
Dense Particulate Coupling (DDPM)		●	●				

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REACTING FLOWS							
Species Transport		●	●	●	●	●	
Non-Premixed Combustion		●	●	●	●		
Premixed Combustion		●	●	●	●		
Partially Premixed Combustion		●	●	●	●		
Composition PDF Transport		●	●				
Finite Rate Chemistry		●	●	●	●	●	
Polluntants and Soot Modelig		●	●	●	●		
Sparse Chemistry Solver with Dynamic Cell Clustering and Dynamic Adaptive Chemistry		●		●	●		
Ability to Use Model Fuel Library Mechansisms		●		●	●		
Flame-speed from Fuel-Component Library		●		●	●		
DPIK Spark-Ignition Model				●	●		
Flame-Propogation 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		●		●			
Flamespeed and Ignition Table Generation				●			
Reaction Sensitivity, Uncertainty and Path Analysis				●			
Surrogate Blend Formulation and Optimization				●			
Mechanism Reduction				●			
Detailed Electrochemistry Model for Li-ion Batteries		●		●			

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TURBOMACHINERY							
MRF/Frozen-Rotor	●	●	●				
Sliding-Mesh/Stage		●	●				
Transient Blade Row			●				
Pitch Change			●				
Time Transformation			●				
Fourier Transformation			●				
Harmonic Analysis			●				
Blade Flutter Analysis			●				
Performance Maps			●				
IN-FLIGHT ICING							
Simulation of Standard Droplets, SLD and Ice Crystals		●					●
Inclusion of Vapor/Humidity Effects on Icing		●					●
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 Accredtion and Aerodynamic Performance Degradation		●					●
Single and Multi-Shot Icing Simulations with Automatic Re-Mesh-ing for Prediction of Ice Accredtion and Aerodynamic Performance Degradation							●
Conjugate Heat Transfer (CHT) for Anti and De-Icing Simulations			■				▲
Ice Cracking							●
Ice Shedding							●
OPTIMIZATION							
Parameters		●	●	●	●	●	
Design Point Studies		●	●	●		●	
Correlation Analysis		●	●			●	
Design of Experiments		●	●			●	

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OPTIMIZATION							
Sensitivity Analysis		●	●	●		●	
Goal Drive Optimization		●	●			●	
Six Sigma Analysis		●	●			●	
Adjoint Solver for Shape Optimization		●					
Adjoint Solver Supports Rotating Reference Frames and Conjugate Heat Transfer		●					
Mulit-Objective Constrained Optimization		●					
Mesh Morphing (RBF Morph)							
HIGH RHEOLOGY MATERIAL							
Viscoelasticity						●	
Specialty Extrusion Models						●	
Specialty Blow Molding Models						●	
Speciality 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		●				●	
Parallet Mesh Generation		●					
PRE AND POST PROCESSING							
Photo Realistic Rendering	●	●	●	●	●	●	●
SpaceClaim Direct Modeler		●	●	●	●	●	●
Compare Multiple Runs, Datasets, Physics, Graphs in a Single Window		●	●	●	●	●	●
Simulation Reports	●	●					

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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		●	●				
Flexiable Solver Coupling Options		●	●				●
Functional Mock Up Unit (FMU) Coupling		●					
FLUID-STRUCTURE INTERACTION							
Force Induced Motion/Deformation		■	■				
Fluid Thermal Deformation		■	■			●	
Intrinsic FSI		●			●		
Thermo-elasticity		●					
ELECTRO-THERMAL INTERACTION							
Convection Cooled Electronics		●	●				
Conduction Cooled Electronics		●	●				
Hihg Frequency Thermal Management		●	●				
Electromechanical Thermal Management		●	●				
OTHER COUPLED INTERACTIONS							
Aero-Vibro Acoustics		●					
Acoustic-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		●					

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EASE OF USE AND PRODUCTIVITY							
Directly Enter Expressions	●	●	●				
Parallel Solving with Ansys Cloud Launched from Desktop		●					
Parallel Solving with Ansys Cloud Launched from VDI	●	●	●				

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HUMAN VISION			
Glare Simulation			●
HEADLAMP SIMULATION			
Virtual Measurement			●
Lamp Control			●
IIHS Test			●
SYSTEM SIMULATION			
Ground-Truth Sensor	●		
Camera Sensor	▲	●	
LiDAR Sensor	▲	●	
Radar Sensor	▲	●	
HUD	▲		
Advanced Lighting Component			●
CONTEXT SIMULATION			
Basic Driving Scenario	●		●
Advanced Driving Scenario	●	■	■
Advanced Vehicle Dynamic	●	■	■
Environement Creation	●	●	▲
MiL/SiL Connectivity	●	■	●
HiL Connectivity	●	■	■
RENDERING ENGINE			
Real-Time Physics-Based Lighting		●	●
VR			
HMD	●		
CAVE, Powerwall	●		

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Aqwa = Aqwa

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

/ DIGITAL TWIN	TWIN BUILDER
SYSTEM SIMULATION, VALIDATION AND DIGITAL TWINS	
Integrated Graphical Modeling Environment	●
Standard Modeling Languages and Exchange Formats	●
Mulit-domain Systems Modeler	●
Extensive 0D Application-Specific Libraries	●
3rd Party Tool Integrations	●
3D ROM	●
Embedded Software Integration	●
Mulit-Domain System Simulation	●
Rapid HMI Prorotyping	●
System Optimization	●
XIL Integration	●
IIOT Connectivity	●
Digital Twin Runtime Deployment	●

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/ EMBEDDED SOFTWARE	SCADE Architect	SCADE Suite	SCADE Display	SCADE Vision	SCADE Test	SCADE Lifecycle	SCADE for A661 Applications
MODEL-BASED SYSTEMS ENGINEERING							
Systems Requirements Analysis	▲	▲					
System & Software Architecture Design	▲	●					
SysML Models Import	●	●					
Collaborative Work through Libraries and Model Synchronizations	●	●					
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 & HMI SOFTWARE							
Traceability with Requirement Management Tools	●	●	●		●	●	●
Automatic Document Generation	●	●	●		●	●	●
Data Flow and State Machine Design and Simulation Capabilities		●					●
Extensive Set of Libraries		●	●		●		●
Record and Playback Scenarios		●	●		●		
Plant Model co-Simulation including FMI		●	●		●		●
On Host and on Target Testing		●	●		●		
Model and Code Structural Coverage		●	●		●		
Formal Verification		●					
Timing and Stack Optimization		●					
Worst Case Execution Time Estimates on Target		●					
Integration with Real-Time Operating Systems		●					

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EMBEDDED CONTROL & HMI SOFTWARE							
Certified Code Generation for DO-178C, EN 50128, ISO26262, IEC 61508		●	●				
Certification Kits for DO-178C, EN50128, ISO 26262, IEC 61508		●	●		●	●	●
Model-Based Prototyping and Specification of HMIs			●				●
Support of OpenGL, OpenGL SC and OpenGL ES			●				●
Font Management			●				●
Optimization of Graphical Specifications			●				
Solutions for ARINC 661			●				●
PERCEPTION SOFTWARE TESTING							
Preception Software Robustness Testing				●			
Triggering Conditions Identification				●			
Automatic Safety Report Generation				●			

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/ PLATFORM	Ansys Cloud	Ansys optiSLang	Minerva
LICENSING			
Support of HPC solver licenses		●	
Elastic Licensing	●		
PROCESS INTEGRATION			
DPS connector		●	
AEDT node: Simulation data purge options		●	
AEDT node: Remote simulation using scheduler submission option		●	
AEDT node: Support of post-processing variables		●	
ANSYS Workbench Node: Reuse of project data		●	
WORKBENCH CONNECTOR			
Data Receive to External Data		●	
Extract and reuse of DX data in optiSLang components		●	
POST PROCESSING			
Fitting of discrete distributions		●	
CSVImportWizard		●	
Residual plot: Fitting Residuals		●	
design comparison plot		●	
Reliability input importance plot for adaptive sampling		●	
Design set 'All archive designs' for new NOA-EA		●	
Cloud-based 3D results visualization	●		
WEBSERVICE			
Basic web-based postprocessing		●	
Download and/or preview project and node result files		●	
Install as a service on Windows platforms and a daemon on Linux platforms		●	
PyOWA wizard			

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/ PLATFORM	Ansys Cloud	Ansys optiSLang	Minerva
GENERAL			
Added node status overview table for displaying and altering status per node/designs		●	
Import/export designs of Json format		●	
Python-API documentation: examples and descriptions		●	
DESIGN OPTIMIZATION AND PARAMETER IDENTIFICATION (CALIBRATION)			
AMOP: multi-objective refinement		●	
AMOP: Convergence criteria for single-objective refinement		●	
Nature inspired optimization algorithm		●	
Evolution Strategy with Covariance Matrix Adaptation		●	
Simulation Process and Data Management			●
Hybrid Deployment and Simulations Apps			●
Interoperability			●
Multiphysics Process Intergration and Robust Design			●
Integration with Ansys GRANTA MI Materials Data Management			●
WORKFLOW MANAGEMENT			
Completely secure workflows	●		
Job Monitoring	●		
TOOL INTEROPERABILITY			
Ability to submit HPC jobs from desktop apps to Ansys Cloud	●	●	
Supported running Ansys Cloud In browser interactively	●	●	
Improved submission in AEDT	●		

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/ SAFETY ANALYSIS	medini analyze	medini analyze for Semiconductors	medini analyze for Cybersecurity
FUNCTIONAL SAFETY ANALYSIS			
Safety Concept Modeling	●	●	
Model Based Safety Analysis	●	●	
Reliability Prediction and Analysis	●	●	
Traceability and Validation Teamwork	●	●	
Integration into Engineering Environment	●	●	
Customization and Process Adaption	●	●	
Ansys Product Integration	●	●	
Reporting and Documentation	●	●	
Safety of Intended Functional Analysis	●	●	
CYBERSECURITY ANALYSIS			
Analysis Contect Establishment and Asset Identification			●
Systems Vulnerability Analysis			●
Threat Identification			●
Attack Trees, Attack Path Calculation and Attack Collections			●
Threat Assessment and Treatment			●
Requirement Analysis and Management			●
Rich Traceability			●
Teamwork and Integrated Task Management			●
Reporting and Customization			●

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/ OPTICS AND VR	SPEOS PRO	SPEOS PREMIUM	SPEOS ENTERPRISE	SPEOS OPTICAL PART DESIGN	SPEOS OPTICAL SENSOR TEST	SPEOS HUD DESIGN AND ANALYSIS	SPEOS FAR INFARED EXTENSION	SPEOS OPTICAL DESIGN OPTIMIZER	OMD PRO	OMD PREMIUM	OMD ENTERPRISE	VRXPERIENCE PERCEIVED QUALITY	VRXPERIENCE LIGHT SIMULATION	VRXPERIENCE HMI
ANSYS PRODUCTS EMBEDDED														
Ansys 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	●	●	●											
Dispersion	●	●	●											
Surface Diffusion	●	●	●											
Volumic Diffusion	●	●	●											
Ambiant Material	●	●	●											
SPEOS Live Preview (GPU Acceleration)		●[11]	●[11]											
Virtual BSDF			●[10]											
PHOTOMETRY / RADIOMETRY														
Intensity	●	●	●											
Illuminance	●	●	●											
3D Illuminance	●	●	●											
Luminance	▲	●	●											
3D Energy Density		●	●											
360 View - Observer		●	●											
360 View - Immersive		●	●											

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HUMAN VISION														
Dynamic Adaption			●											
Glare Simulation			●											
HDR10 Screen Support			●											
High Dynamic Range Screen Support			●											
WAVELENGTH RANGE														
Visible (360nm - 830nm)	●	●	●											
UV (100nm - 360 nm)		●	●											
Near IR (830nm - 2.5um)		●	●											
Far Infra-Red (2.5um - 100um)							●							
OPTICAL DESIGN														
Parabolic Surface	●[12]	●[12]	●[12]											
TIR Lens	●[12]	●[12]	●[12]											
Projection Lens	●[12]	●[12]	●[12]											
Optical Lens				●										
Optical Surface				●										
Light Guide				●										
Sharp Cut-Off Reflector				●										
Poly-Ellipsoidal Surface				●										
Micro Optical Stripes				●										
Freeform Lens				●[11]										
Honeycomb Lens				●										
OPTICAL SENSORS														
Field of View					●									
Export Sensor Grid as Geometry					●									

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OPTICAL SENSORS														
Camera Sensor					●									
Camera Raw Signal Export					●									
Camera Sensor Post Processing					●									
SPEOS Lens System Importer (ZEMAX OpticStudio)					●									
LiDAR Sensor					●									
LiDAR Rotating & Scanning					●									
LIDAR Raw Time of Flight generation					●									
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	●	●	●											
Parallel Solving with Ansys Cloud Launched from Desktop	●	●	●											
Ansys RSM Compatibility	●	●	●											
SIMULATION PREPARATION														
Source Group	●	●	●											
Geometry Group	●	●	●											
Local Meshing	●	●	●											
3D Textures		●	●											
Polarisation Plate		●	●											
Fluorescent Converter		●	●											

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SIMULATION PREPARATION														
Texture Mapping (Bamp, Multi-Layer)		●	●											
Uniform Ambiant 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	●	●	●											
Spectral Analysis		●	●											
Light Expert	●	●	●											
Layer by Source		●	●											
Layer by Face		●	●											
Layer by Sequence		●	●											
Stray Light Analysis		●	●											
Layer by Polarisation		●	●											
Visibility and Legilbility			●											
Night Vision Goggle							●							
Script Automation	●	●	●											
Interpolation Enhancement									▲	●	●			
SPEOS Labs									●	●	●			

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OPTIMIZATION														
Parameters	●	●	●											
Design of Experiment	●[3]	●[3]	●[3]											
Design Optimisation	●[3]	●[3]	●[3]					●[10]						
Ansys optiSLang Interface (12)	■	■	■											
OPTICAL MEASUREMENT DEVICE INCLUDED														
OMS2 Hardware									●					
OMS4 Hardware										●	●			
Portable OMD Software									●					
Laboratory OMD Software										●	●			
MEASUREMENT CAPABILITY														
BRDF									●	●	●			
BTDF										●	●			
380 - 725nm									●					
380 - 1000nm											●			
Roughness (Unpolished)										●	●			
Volume Absorption										●	●			
Volume Diffusion										●	●			
Anisotropic Measurement										●	●			
Target Dynamic Range									10^6	10^8	10^8			
Angular Optical Resolution (FWHM)									0.5	0.1	0.1 (or 0.5)			
White LED Light Sources									●					
Laser Light Source										●	●			
Broadband Visible White Source											●			
USE CASES														
Light Modelling and Photometrical Simulations										●	●			
Visual Ergonomics and Style Studies									●	●	●			

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SYSTEM SIMULATION														
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														●
Virtual Display & Actuators Interaction														●
RENDERING ENGINE														
Real-Time Physics-Based Lighting												●	●	●
Advanced Raytraced Lighting												●		●
Full Physics GPU Lighting												●		
VR														
HMD												●		●
CAVE, Powerwall												●		●
Finger Tracking														●
SOLVER														
Tolerance Variation Engine												●		

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/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
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	●							●	●
Reduced Order 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 Dependent De- Magnetization Modeling	●							●	●

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/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
ADVANCED MAGNETIC MODELING									
Temperature Dependent 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						●			
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		●							●

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/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
HIGH FREQUENCY ELECTROMAGNETICS									
Physical Optics (PO) Analysis		●							●
Shooting and Bouncing Ray+ (SBR+) Analysis		●							●
Physical Theory of Diffraction (PTD) Correction for SBR		●							●
Uniform Theory of Diffraction (UTD) Correction for SBR		●							●
Visual Ray Tracing for SBR+ Analysis		●							●
SBR+ Creeping Wave Correction for RCS of Curved Obects		●							●
Range Doppler Plots for Radar Scenario Analyses									●
Accelerated Doppler Processing (ADP) for SBR+ Range Doppler Analyses									●
Domain Decomposition Method (DDM) for Frequency Domain FEM Analysis		●							●
Hybrid Finite Element/ Integral Equation Analysis		●							●
UI Coupled Finite Element and/or IE with SBR+ Analysis		●							●
Modal Wave Port Excitation		●							●
Terminal Wave Port Excitations		●							●
Lumped, Voltage and Current Excitations		●							●
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		●							●

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/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
HIGH FREQUENCY ELECTROMAGNETICS									
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 Controled Parametrics		●							●
3D Component with Encryption Creation		●							●
3D Component with Encryption Utilization		●							●
Mutlipaction Solver		●							●
Accelerated Doppler Processing (ADP) for SBR+ Range-Doppler Analysis									●

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

/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
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			●						●
Dynamically Linked Electromagnetic Field Solvers			●						●
Chip, Package, PCB Analysis (CPM)		●	●						●
Near-Field EMI Analysis									●
Far-Field EMI Analysis									●
EMI/EMC Full Board Scan									●
Characteristic Impedance (Zo) L PKG/PCB Scan									●
Full PCB/PKG Cross-Talk Scanning			●						●
TDR Wizard									●
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									●

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/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
POWER AND SIGNAL INTEGRITY BOARD SIMULATION CAPABILITIES									
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				●					●
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					●				●

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

/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
ELECTRONICS COOLING									
Reduced Order Flow and Thermal					●				●
Network Modeling	■	■	■	■	●				●
Joule Heating Analysis					●				●
Thermo-Electric Cooler Modeling					●				●
Thermostat Modeling					●				●
Package Characterization					●				●
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	●	●		●	●			●	●

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/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
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		●						●	●
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									●

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

/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	Electronics Pro 2D	Electronics Enterprise
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	●	●	●	●	●				●
MULTIPHYSICS 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	●	●	●	●	●				

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

/ PHOTONICS	Charge	CML Compliler	DGTD	FDTD	FEEM	Heat	Interconnect	MODE	MQW	STACK	Verilog-A Platform
DESIGN ENVIRONMENT											
Finite Element IDE (with 2D/3D modeling)	●		●		●	●					
Finite Difference IDE (with 2D/3D modeling)				●				●		●	
Hierarchical Schematic Editor							●				
GENERAL											
HPC-ready / compatible with cloud providers				●				●			
PIC Element Library							●				
Supports CML development and distribution		●					●				
Automated CML generation		●									
Version controlled CMLs		●									
Structured input with template and data validation		●									
Automated test case generation		●									
IP protected CMLs		●									
INTERCONNECT and Verilog-A models from single source		●									●
Leverage build-in analysis from 3rd party EDA tools											●
Design and model using Verilog-A in 3rd party EDA tools											●
GENERAL SOLVER CAPABILITIES											
Charge transport (electrostatic potential and drift diffusion)	●										
Self-consistent heat/charge modeling	●					●					
Heat transport (heat flux, convention, and radiation)						●					
Finite Element Eigenmode Solver					●						
Discontinuous Galerkin Time Domain Solver			●								
Finite Different Time Domain solver											
Bidirectional eigenmode expansion								●			
varFDTD								●			
Advanced conformal meshing				●				●			
Quantum mechanical band structure calc. (kp method)									●		

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

/ PHOTONICS	Charge	CML Compliler	DGTD	FDTD	FEEM	Heat	Interconnect	MODE	MQW	STACK	Verilog-A Platform
GENERAL SOLVER CAPABILITIES											
Waveguide and band diagram calculation									●		
Gain and spontanious emission calculation									●		
Temperature, strain, and field effects									●		
Analytic solver for rapid multilayer thin-film analysis										●	
Planewave and dipole illumination										●	
Capture Interface and microcavity effects										●	
Circuit frequency domain analysis							●				
Circuit transient mode simulator							●				
Circuit transient block mode simulator							●				
Circuilt multi-mode and multi-channel support							●				
Circuit mixed signal representation							●				
Laser library with TWLM solver							●				
System library for optical fibre related applications							●				
MATERIALS SELECTION & RELATED TOOLS											
Comprehensive Material Models	●		●	●	●	●		●	●		
Multi-coefficient models				●				●			
Non-linearity and Anisotropy modeling				●							
OPTIMIZATION											
Inverse Design with lumopt				●							
Particle Swarm	●		●	●	●	●	●	●			
POST PROCESSING											
Far-Field Projection				●							
Band Structure Analysis				●							
Bidirectional Scattering Distribution Function				●							
Q-Factor Analysis				●							
Charge Generation Rate				●							
Bend Loss Analysis								●			

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

/ PHOTONICS	Charge	CML Compliler	DGTD	FDTD	FEEM	Heat	Interconnect	MODE	MQW	STACK	Verilog-A Platform
POSTPROCESSING											
Overlap analysis								●			
Model area analysis								●			
Helical waveguides								●			
Extract key parametes to TWLM solver (INTERCONNECT)									●		
Parameter sweeps							●				
Statistical Support (MC and Corner analysis)	●	●	●	●	●	●	●	●			
TOOL INTEROPERABILITY											
Multiphysics Solver Interoperabilty	●		●	●	●	●					
Automation API (Lumerical script/Matlab/Python)	●		●	●	●	●		●	●	●	
Circuit electronic photonic co-simulation (3rd party tools)							●				●

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

/ DESIGN TOOLS	SpaceClaim	DesignModeler	Discovery
3D PRINTING			
Import, Repair, Edit Faceted Data	●		●
Shelling and Infills	●		●
Thickness Detection	●		●
DESIGN & CONCEPT MODELING			
Part/Assembly Creation or Import	●	●	
Large Assembly Import	●	●	●
FLUID			
Steady-state Flow			●
Transient Flow			●
Incompressible Flow			●
Compressible Flow			▲
INTERFACES AND ADD-ONS			
Simulation Transfer to Mechanical			●
Simulation Transfer to Fluent			●
Workbench Plugin	●	●	
Algoryx Momentum	●		
MATERIALS DATA FOR DESIGNERS AND SIMULATION			
Materials Data for Simulation			■
MULTIPHYSICS			
Conjugate Heat Transfer			■
Thermal-Stress			●

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

10 = Ansys SPEOS for NX & ANSYS SPEOS for Creo Parametric

11 = Ansys SPEOS

12 = Ansys SPEOS & Ansys SPEOS for NX

13 = Ansys CFD Pro - Ansys Fluent with a reduced set of capabilities

DMP = Distributed-memory parallel

SMP = Shared-memory parallel

MAPDL = Mechanical APDL

Explicit = Autodyn

RBD = Rigid Body Dynamics

Aqwa = Aqwa

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

/ DESIGN TOOLS	SpaceClaim	DesignModeler	Discovery
STRUCTURAL			
Static Structural Analysis			●
Modal Analysis			●
Pre-Stressed Modal Analysis			■
Point Masses			●
Nonlinear Contact and Joints			■
Pre-Tension Bolts			■
Large Deformation			■
Topology Optimization			●
THERMAL			
Steady-state Thermal			●
Transient Thermal			●
Conduction			●
Convection			●

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/ GEOMETRY	SpaceClaim	DesignModeler	Discovery
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 Deisgn Exploration	●	●	●
Extract Mid-Surfaces/Shells and Beams	●	●	
Extract Volumes and Create Inner Fluid Domains	●	●	●
Extract Outer Air Enclosures	●	●	●
Shared Topology for Conformal Meshing	●	●	
Booleans and Slicing	●	●	●
Create Weid Bodies	●	●	
Boundary Condition Mapping	●	●	
Scripting	●	●	▲
Sketching and Editing Tools	●	●	●
3D Comparison Tools	●		
Repair and Edit Faceted Data	●		●
Icepak Integration	●	●	
Reverse Engineering Faceted Data	●		

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