Ansys

2022 R2

Engineering What's Ahead.

CAPABILITIES

/ CONTENTS

/ STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	SHERLOCK	MOTION	FORMING PRO
VIBRATIONS								
Modal	●	●	●		●	●	●	
Modal - Pre-Stressed	●	●	●		●		●	
Modal - Pre-Damped/UnSymmetric	●	●					●	
Transient - Mode-Superposition	●	●			●	●		
Harmonic - Mode-Superposition	●	●			●	●		
Harmonic - Full	●	●			▲			
Spectrum	●	●			●			
Random Vibration	●	●			●	●		
Mistuning	●	●						
Multi-Stage Cyclic Symmetry	●							
Rotordynamics	●	●			●			
ACOUSTICS								
Modal Acoustics	●	●			●		●	
Harmonic Acoustics	●				●			
Transient Acoustics	●				●			
Boundary Element Method Acoustics					●			
Spectral Element Method Acoustics					●			
Statistical Energy Analysis Acoustics					●			
Piezoelectric Acoustics	●							
Generation of Acoustic Signature from Contact Regions	●				●		●	
Acoustics Element Library	●	●			●		●	
Acoustics Material Models	●	●			●			

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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

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

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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

/ STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	SHERLOCK	MOTION	FORMING PRO
WAVE HYDRODYNAMICS								
Diffraction and Radiation	●							
Frequency & Time Domain Motions Analysis	●							
Moorings, Joints & Tethers	●							
Internal Tanks	●							
Load Transfer to Structural Analysis	●							
ADDITIONAL PHYSICS								
1-D Thermal-Flow	●	●	●		●			
1-D Coupled-Field Circuits	●							
1-D Electromechanical Transducer	●							
MEMS ROM	●							
Piezoelectric	●				●			
Piezoresistive	●							
Electromagnetic	●							
Electro-Migration	●					●		
Diffusion-Pore-Fluid	●							
Diffusion-Thermal-Electric-Magnetic	●							
1-Way Fluid Structure Interaction	■[2]	■[2]	■[2]					
2-Way Fluid-Structure Interaction	■[2]			●	●			
Incompressible Fluid Dynamics (ICFD)					●			
Arbitrary Lagrangian Eulerian Method (ALE)					●			
Electromagnetics (EM) - Boundary Element Method (BEM)					●			
Multi-scale Modeling	●				●			
Conservation Element/Solution Element (CESE)					●			

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COMPOSITE MATERIALS								
Material Definitions	●	●		●	●	●	●	
Ply Definitions	●	▲		●	●	●		
Interface Layers	●				●			
Advanced Ply-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]				▲			
Sandwich Modeling	●				●			
Automation / Run Scripts	●				●			
Short Fiber Composites	●				●			

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DURABILITY								
Stress-Life (SN)	●	●	●		●		●	
Strain-Life (EN)	●	●	●		●		●	
Dang Van	■[1]	■[1]	■[1]		■[1]			
Safety Factor	●	●	●		●		●	
Adhesive Bond	■[1]	■[1]	■[1]		■[1]			
Crack Growth Linear Fracture Mechanics	■[1]	■[1]	■[1]		■[1]			
Seam Weld	■[1]	■[1]	■[1]		■[1]			
Spot Weld	■[1]	■[1]	■[1]		■[1]			
Thermo-Mechanical Fatigue	■[1]	■[1]	■[1]		■[1]	▲		
Vibration Fatigue	■[1]	■[1]	■[1]		■[1]	●	●	
Virtual Strain Gauge Correlation	■[1]	■[1]	■[1]		■[1]			
Python Scripting Customization	■[1]	■[1]	■[1]		■[1]	▲		
EXPLICIT DYNAMICS								
FE (Lagrange) Solver	●			●	●			
Euler Solvers				●	●			
Implicit-Explicit Material States	●			●	●			
Mass Scaling	●			●	●			
Natural Fragmentation	●			●	●			
Erosion Based on Multiple Criteria	●			●	●			
De-Zoning				●	●			
Part Activation and Deactivation (Multi Stage Analysis)				●	●			
Explicit Time Integration	●			●	●			

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IMPLICIT DYNAMICS								
Implicit Time Integration	●	●			●	●	●	
GEOMETRIC IDEALIZATION								
Spring	●	●	▲	●	●		●	
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 cores (DMP or SMP) MAPDL, 4 for Explicit, 4 for RBD, 4 for AQWA	4 cores (DMP or SMP) MAPDL, 4 for RBD	4 cores (DMP or SMP)	4 cores	1 core	Default Number of cores based on machine being used	1 core	4 cores
Parallel Solving on Local PC and Cluster	●	●	●	●	●	●	●	▲
MAPDL GPU Offload Acceleration	■[6]	■[6]	■[6]					
Ansys Cloud Support	MAPDL - Yes Explicit - No RBD - No AQWA - No	MAPDL - Yes RBD - No	MAPDL - Yes		●			
Hybrid Parallel	●	●	●					
MATERIALS								
Basic Linear Materials (Linear, Anisotropic, Temperature Dependent)	●	●	●	●	●	●	●	
Basic Nonlinear Materials (Hyperelastic, Plasticity, Rate Independent, Isotropic, Concrete, Viscoelasticity)	●	●	▲	●	●		●	
Advanced Nonlinear Materials (Rate dependent, Anisotropic, Damage Models, Geomaterials, Multiphysics, Acoustics	●			●	●			
Specialty Materials (Glass, Foam, Kevlar, Fabric, Biomechanic, Paper, Cardboard)					●		●	
Field Dependent	●	●		●				
Reactive Materials (Equations of State, High Explosives, Propellants)				●	●			
User Defined Materials	●			●	●	●	●	
Fracture Mechanics and Crack Growth	●				▲			
Materials Multiscale Homogenization	●				●			
Materials Database	■[7]	■[7]	■[7]	■[7]	■[7]	●	■[7]	

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MISCELLANEOUS AND USABILITY								
Ansys SpaceClaim	●	■[4]	■[4]	■[4]	■[4]		■[4]	
Ansys Customization Suite (ACS)	●							
Support ACT Extensions	●	●	●	●	●			
Journaling and Scripting	●	●	●		●	●		
Command Snippet Support	●	●	●					
Batch run capability	●	●	●	●	●	●	●	
Read/Write 3rd Party Matrix CAE Data	●	●		●	●		●	
CDB and 3rd party FE Model Import	●	●	●		●		●	
Nastran Bulk File Export	●	●	●			●		
Direct Input of Nastran Bulk Data Files					●			
Pre-stressing from Nastran Linear Solution					●			
Global/Selective Mass Scaling	●			●	●			
Keyword Input	●	●	●		●			
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	●	●	●	●	●			
Double Precision	●	●	●	●	●			

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MODELING CAPABILITIES								
Contact - Linear	●	●	●	●	●		●	
Contact - Nonlinear	●	●	●	●	●		●	
Joints	●	●	●	●	●		●	
Seam Welds	●	●	●	●	●		●	
Spot Welds	●	●	●	●	●		●	
Element Birth and Death	●	●			●		●	
Gasket Elements	●				●			
Rezoning and Adaptive Remeshing	●				●			
Inverse Analysis	●							
MULTI ANALYSIS								
Submodeling	●	●	●		●	▲		
Data Mapping	●	●	●		●		●	
Multiphysics Data Mapping	●	●	▲				●	
Initial State	●	●		●	●		●	
Advanced Multi-Stage 2-D to 3-D Analysis	●	●						
NONLINEAR MULTI-BODY DYNAMICS								
Rigid Body Mechanisms	●	●			●		●	
Rigid Body Dynamics with CMS Components for Flexible Bodies	●						●	
Full Transient	●	●		●	●		●	
CMS with Substructuring	●						●	
Mixed Rigid - Flexible Systems	●	●	●	●	●		●	
Function Expression					●		●	
Drivetrain Creation							●	
Links							●	
Vehicle Dynamics					●		●	

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OPTIMIZATION								
DesignXplorer 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								
Smooth Particle Hydrodynamics (SPH)				●	●			
Smooth Particle Galerkin (SPG)					●			
Corpuscular Particle Method (CPM)					●			
Discrete Element Method (DEM)					●			
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					●			

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AUTOMOTIVE								
Dummy Positioner					●			
Side-Impact Dummy Special Damper					●			
Airbag Deployment					●			
METAL STAMPING								
Multi-Stage Forming Process Validation								●
Material Data Library and Management								●
Process Definition								●
Tool Setup and Preview								●
Drawbead Definition								●
Multiple Lancing Operation								●
Stamping Specific Post Processing (FLD, Formability Index, Wrinkling, Skidmark)								●

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/ ACOUSTICS SIMULATION

	ANSYS SOUND ENTERPRISE	ANSYS SOUND PREMIUM	ANSYS SOUND PRO
ACOUSTICS & SOUND QUALITY			
Listen and Modify Sound (SAS)	●	●	●
Perform Acoustic Analysis and Psychoacoustic Criteria Calculations (SAS)	●	●	●
Automatic Sound Component Detection and Separation (SAS)	●	●	●
Connect and Listen to Ansys Mechanical, LS-DYNA, Fluent and Motion CAE Simulations (SAS)	●	●	●
3D Sound for Listening Room and VR (VR Sound)	●	●	
Interactive Sound for Driving Simulator (Car Sound Simulator)	●	●	
Measure Sound Perception with Listening Test (Jury Listening Test)	●	●	
Engine Sound Design and Engine Sound Enhancement for ICE Vehicle (ASD)	●		
Active Sound Design for Electric Vehicles (ASD for EV)	●		
Combine Test and Simulation Data to Assess Sound Quality	●	●	●

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/ ADDITIVE MANUFACTURING	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		●
Part Distortion and Residual Stress after Baseplate Cut-Off and/or Support Removal		●
Directional Part and Support Removal		●
Recoater Interference 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		●
Distortion Compensation		

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/ ADDITIVE MANUFACTURING

	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		●
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		●
Layer End Temperature Output		●
Process Simulation for Directed Energy Deposition		●
Direct Energy Deposition - Wizard		●
Direct Energy Deposition - G-Code Clustering		●
Direct Energy Deposition - Manual Clustering		●
Automatic Distortion Compensation Optimization		●
Scan Pattern Based Anisotropic Strain		●
Machine Learning Thermal Strain		●
“Binder Jet Sintering		●
Sintering Material Model		●
Sintering Material Model - Wizard		●
ADDITIVE PRINT		
Nonlinear and Temperature Dependent Material Properties	●	●
Uniform Assumed Isotropic Strain	●	●
Scan Pattern Based Anisotropic Strain	●	●
Thermal Ratcheting Based Anisotropic Strain	●	●

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/ ADDITIVE MANUFACTURING

	ADDITIVE PRINT	ADDITIVE SUITE
ADDITIVE PRINT		
Stress-Based Automatically Generated Supports	●	●
Part Distortion and Residual Stress (as-built)	●	●
Directional Part and Support Removal	●	●
Part Distortion and Residual Stress after Baseplate Cut-Off and/or Support Removal	●	●
Distortion Compensation	●	●
Recoater Interference Detection	●	●
Identification of High Strain (Crack) Locations	●	●
Input Strain Hardening Factor	●	●
Import of STL Supports	●	●
Subvoxel Material Density Assignment	●	●
Layer by Layer Stress, Distortion and 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		▲
% Lack of Fusion Porosity		●
Sensor Measurement Predictions		▲
Ability to Add User-Define Materials		●
Material Tuning Wizard		▲
Microstructure Prediction		●
Parallel Solving of 2D Microstructure		●

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/ MATERIALS

MATERIALS DATA MANAGEMENT	GRANTA MI ENTERPRISE	GRANTA MI PRO	GRANTA SELECTOR	GRANTA EDUPACK	MATERIALS DATA FOR SIMULATION
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	●	●			
Favorites List: Personal, Public	●	●	▲	▲	
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, Additive Manufacturing	●				
Template for Simulation		●			
Web App for Fast Upload and Export 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	●				
Private Cloud with Azure and AWS	●	●			
Single Sign On	●	●			
Ansys Material Calibration	●				

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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	●				
Machine Learning	●				
DATA FLOW MANAGEMENT					
Design and develop material data flow	●				
Execute material data flows - Processes, Approvals, Notifications	●				
INTEGRATION WITH CAD, CAE, PLM					
Ansys Workbench	●	●	▲	▲	■
Ansys Electronics Desktop	●	●	●	●	■
Ansys Discovery	●	●	▲	▲	■
Ansys Minerva	●				
Ansys optiSLang	●				
Abaqus	●	●			
ANSA	●				
HyperMesh	●	●			
Creo	●	●			
NX	●	●			
Windchill	●				
Teamcenter	●				
Material Card Connect - Automated File Export	●				
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 Materials and Process Portfolio	●				

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RESTRICTED SUBSTANCES					
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	▲				
GRANTA MI - ADDITIVE					
Traceability and Capture of Additive Manufacturing Data	●				
AM Data Analytics Including Machine Learning	●				
Integration with CAD CAE and PLM Systems	●				
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	▲		●	●	
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	●		●		
Advanced Metals Data	■		■		

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DATA LIBRARY FOR INDUSTRY					
Advanced Polymers Data	■		■		
Advanced Composites Data	■		■		
Advanced Medical Data	■		■		
Advanced Aero Data	■	■	■		
Advanced ESDU Aero Alloys	■		■		
Advanced Additive Manufacturing Data	■		■		
Advanced Eco Design	■		■		
Advanced Electromagnetic Data	■		■		●
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				●	
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				●	
Medical Devices Teaching Database				●	
Design Teaching Database				●	

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GENERAL SOLVER CAPABILITIES							
Comprehensive Inlet and Outlet Conditions	●	●	●	●	●	●	●
Steady-State Flow	●	●	●	●	●	●	●
Transient Flow		●	●	●	●	●	●
2-D and 3-D Flow	●	●	▲	▲	▲	●	●
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							
Compare Multiple Runs, Datasets, Physics, Graphs in a Single Window		●	●	●	●	●	●
Simulation Reports	●	●	●				
Advanced, Automated Data Exchange		●	●			●	●
Accurate Data Interpolation between Dissimilar Meshes		●	●				●

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

/ FLUIDS	FLUENT*13	FLUENT	CFX	CHEMKIN-PRO	FORTE	POLYFLOW	FENSAP-ICE
MULTIPHYSICS							
Drag-n-Drop Multiphysics		●	●			●	
Direct Coupling between Physics		●	●	●			
Collaborative Workflows		●	●				
Fully Managed Co-Simulation		●	●				
Flexiable Solver Coupling Options		●	●				●
Functional Mock Up Unit (FMU) Coupling		●	●				
Force Induced Motion/Deformation		■	■				
Fluid Thermal Deformation		■	■			●	
FLUID-STRUCTURE INTERACTION							
Intrinsic FSI		●			●		
Thermo-elasticity		●					
Convection Cooled Electronics		●	●				
Conduction Cooled Electronics		●	●				
ELECTRO-THERMAL INTERACTION							
High Frequency Thermal Management		●	●				
Electromechanical Thermal Management		●	●				
Aero-Vibro Acoustics		●					
Acoustic-Structural		●	●				
OTHER COUPLED INTERACTIONS							
Fluid Magnetohydrodynamics		●	●				
Support ACT Simulation Apps		●					
Mosaic-Enabled Meshing Technology	●	●					
EASE OF USE AND PRODUCTIVITY							
Task-Based Workflow - Watertight Geometries	●	●					
Task-Based Workflow - Fault Tolerant Geometries		●					
Directly Enter Expressions	●	●	●				
Parallel Solving with Ansys Cloud Launched from Desktop		●					
Parallel Solving with Ansys Cloud Launched from VDI	●	●	●			●	

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/ AUTONOMOUS VEHICLE SIMULATION	AVxcelerate for Headlamp	AVxcelerate for Sensors
HUMAN VISION		
Glare Simulation	●	
HEADLAMP SIMULATION		
Advanced Lighting System	●	●
Lamp Control	●	●
Virtual Measurement	●	
Glaring Simulation	●	
IIHS / C-IASI Regulation Validation	●	
SENSORS SIMULATION		
Ground-Truth Sensor	▲	▲
Optical Camera Sensor		●
LiDAR Sensor		●
Radar Sensor		●
Multi Sensors		●
ENVIRONMENT SIMULATION		
Basic Driving Scenario	●	■
Advanced Driving Scenario	■	■
Advanced Vehicle Dynamic	■	■
MiL/SiL Connectivity	●	●
HiL Connectivity		●
PREPARATION		
Environment Preparation		●
Headlamp Preparation	●	
Sensor Models Preparation		●
Libraries of Assets	●	●

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/ 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 (Microsoft® Azure® IoT, Microsoft Azure Digital Twins , PTC ThingWorx®, SAP Predictive Asset Insights, Rockwell Automation Emulate 3D and Rockwell Studio 5000)	●
Digital Twin Runtime Deployment	●
Hybrid Analytics	●

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/ EMBEDDED SOFTWARE	SCADE Architect	SCADE Suite	SCADE Display	SCADE Test	SCADE Lifecycle	SCADE for A661 Applications	SCADE Vision
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		●	●	●		●	
AUTOSAR-Compliant Code Generation		●					
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							●

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LICENSING AND INSTALLATION								
Upgrade to Aras SP14		●						
Elastic Licensing	●							
Scalar Variations for Parametric Design Study				●	●			
DATA MANAGEMENT								
Data and Project Comparison		●						
Enhanced Branching		●						
Custom Digital Thread Configurability		●						
Automatic file conversion		●						
New folder widget, saved search for details list		●						
Added file support for metadata extraction		●						
Query Builder		●						
Metadata Extraction		●						
3D Viewer with Rich Exploration Options		●						
ECAD Viewer		●						
SCADE Project File Support		●						
Revision Management		●						
File Format Conversion		●						
PROCESS MANAGEMENT								
Work Request History Report		●						
New Voting Dialog		●						
Enhanced Gantt Chart		●						
Change Notice Comparison		●						
Task Completion		●						
Simulation Task Review		●						
APPLICATION MANAGEMENT								
New Applications Page Layout		●						
Publish and Deploy Apps (optiSLang supported out-of-the-box)		●						
Ansys LS-Dyna Batch Job Template		●						

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APPLICATION MANAGEMENT								
Job Submission to Ansys HPC Cluster or Ansys Cloud		●						
Access Local Applications		●						
Run Apps without Input Files		●						
Remote Virtual Desktop		●						
INTEGRATIONS								
Ansys Electronics Desktop Add-In		●	●					
Integration with Ansys Workbench			●	●	●			
Integration with Ansys Materials Product Family		●	●	●	●			
Two-Way Integration with ModelCenter				●	●			
Integration with optiSLang		●						
German Language Support		●						
Integration with LS-OPT			●	●	●			
WORKFLOW MANAGEMENT								
Completely Secure Workflows	●							
Enhanced File Management	●							
TOOL INTEROPERABILITY								
Ability to submit HPC jobs from desktop apps to Ansys Cloud	●							
Supported running Ansys Cloud In browser interactively	●							
Support of HPC Solver Licenses	●			●	●			
Improved submission in AEDT	●							
ORCHESTRATION AND AUTOMATION								
Build and Automate Workflows				●	●			
Integrate 3rd Party Tools				●	●			
App Generation Wizard					●			
Test-Run and Desktop App				●	●			
Classic Design of Experiments			●	●	●			
Sampling and Sensitivity Analysis			●	●	●			
Robust Design Optimization			●	●	●			

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PRODUCT IMPROVEMENT								
Scalar Meta-Modeling (including test data)			●	●	●			
Signal/Field Meta-Modeling (including sensor & 3D scan data)					●			
Modeling of Imperfect Surfaces for UQ					●			
AI for Metamodeling (including algorithms from Probaligence)					●			
Optimization & Sensitivity Analysis				●	●			
Model Calibration				●	●			
Concurrent Design Point Variations				●	●			
Linux Support for DesignXplorer Algorithms				●	●			
PRODUCT ROBUSTNESS								
Robust Design & Reliability Analysis				●	●			
Reliability Importance				●	●			
Poisson Distribution for Stochastic Parameters				●	●			
DASHBOARDS AND REPORTS								
Dashboard 2.0		●						
Custom Widget Framework		●						
Bookmark Dashboards		●						
AUTOMATE ANY MODELING AND SIMULATION TOOL								
Automate File I/O tools						●	●	●
Scripting with VBScript, JScript, Java, Perl, and Python						●	●	●
Integration with 3rd Party Tools						●	●	●
AUTHOR ENGINEERING WORKFLOWS								
Sequence						●	●	●
Loop						●	●	●
If-Then Branch						●	●	●
Parallel Branch						●	●	●
Link Editor						●	●	●

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AUTOMATICALLY EXECUTE THE WORKFLOW										
Single Execution						●	●	●		
Multi-Run Trade Studies						●	●	●		
Run in Parallel						●	●	●		
SHARE AUTOMATED ANALYSES AND WORKFLOWS										
Remote Execution						●	●	●		
Protect Intellectual Property						●	●	●		
GAIN INSIGHT TO THE DESIGN PROBLEM										
Trade Study: Parametric Study							●	●		
Trade Study: Design of Experiments (DOE)							●	●		
Trade Study: Adaptive Design of Experiments							●	●		
Sensitivity Analysis							●	●		
VISUALIZE THE DESIGN SPACE										
2D Bar Plot							●	●		
2D Line Plot							●	●		
2D Scatter Plot							●	●		
3D Scatter Plot							●	●		
Carpet Plot							●	●		
Contour Plot							●	●		
Histogram Plot							●	●		
Interaction Effects Plot							●	●		
Main Effects Plot							●	●		
Main Effects Summary Plot							●	●		
Parallel Coordinates							●	●		
Prediction Profiler Contour Plot							●	●		
Prediction Profiler XY Plot							●	●		
Scatter Matrix							●	●		
Variable Importance Plot							●	●		
Variable Importance Summary Plot							●	●		

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/ CONNECT	Ansys Cloud	Minerva	optiSLang Pro	optiSLang Premium	optiSLang Enterprise	ModelCenter Pro	ModelCenter Premium	ModelCenter Enterprise
PROBABILISTIC ANALYSIS								
Monte Carlo Analysis							●	●
SURROGATE MODELING (COMMON)								
Polynomial							●	●
SURROGATE MODELING (NORTH AMERICA ONLY)								
Noesis Kriging							●	●
Noesis Lightweight Neural Net							●	●
Noesis Deep Neural Net							●	●
Noesis AIC RSM							●	●
Noesis Best Model							●	●
Noesis Ensemble							●	●
SURROGATE MODELING (NORTH AMERICA ONLY)								
Noesis Optimal RSM							●	●
Noesis Radial Basis Function (RBF) RSM							●	●
Noesis RFR RSM							●	●
Noesis RVR RSM							●	●
Noesis Taylor Polynomial							●	●
Noesis User Defined Terms							●	●
SURROGATE MODELING (GLOBAL)								
Design Explorer Kriging							●	●

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DESIGN OPTIMIZATION (COMMON)								
Broyden Algorithm							●	●
DAKOTA Asynchronous Parallel Pattern Search							●	●
DAKOTA Coliny DIRECT							●	●
DAKOTA Coliny Evolutionary Search							●	●
DAKOTA Coliny Pattern Search							●	●
DAKOTA Coliny Solis-Wets							●	●
DAKOTA CONMIN Methods							●	●
DAKOTA Multiobjective Genetic Algorithm (MOGA)							●	●
DAKOTA NCSU DIRECT							●	●
DAKOTA OPT++ Finite Differences Newton							●	●
DAKOTA OPT++ Parallel Direct Search							●	●
DAKOTA OPT++ Polak-Ribiere Conjugate Gradient							●	●
DAKOTA OPT++ Quasi Newton							●	●
Darwin Algorithm							●	●
EVOLVE							●	●
Hooke-Jeeves Algorithm							●	●
Nelder-Mead Algorithm with Bounded Variables							●	●
NSGA II – Non-dominated Sorting Genetic Algorithm II							●	●

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DESIGN OPTIMIZATION (NORTH AMERICA ONLY)								
Noesis Adaptive Region Model							●	●
Noesis Covariance Matrix Adaption Evolution Strategy Algorithm							●	●
Noesis Differential Evolution							●	●
Noesis Global Optimization							●	●
Noesis Generalized Reduced Gradient							●	●
Noesis Global Criterion Method							●	●
Noesis Hierarchical Optimization Method							●	●
Noesis Method of Distance Functions							●	●
Noesis Min Max Optimum							●	●
Noesis Mixed Integer Programming							●	●
Noesis MPSO Algorithm							●	●
Noesis NAVIRUN							●	●
Noesis Normal Boundary Intersection Method							●	●
Noesis NSEA+							●	●
Noesis Self Adaptive Evolution							●	●
Noesis Sequential Quadratic Programming							●	●
Noesis Simulated Annealing							●	●
Noesis SOMBAS Algorithm							●	●
Noesis SPSO							●	●
Noesis TradeOff Method							●	●
Noesis Weight Objective Method							●	●
Noesis Weighted Tchebycheff Method							●	●
DESIGN OPTIMIZATION (GLOBAL)								
Design Explorer							●	●
OPTLIB Gradient Optimizer							●	●

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DESIGN OF EXPERIMENTS (COMMON)								
Box-Behnken							●	●
Custom							●	●
Central Composite							●	●
Eighth Fractional Factorial							●	●
Face Centered Central Composite							●	●
Foldover							●	●
Franklin-Bailey 2 Level Fractional Factorial							●	●
Full Factorial							●	●
Half Factorial							●	●
Latin-Hypercube							●	●
Parameter Scan							●	●
Plackett-Buman							●	●
Selected 2 Level Fractional Factorial							●	●
Sixteenth Factional Factorial							●	●
Taguchi 2 Level Orthogonal Array							●	●
DESIGN OF EXPERIMENTS (NORTH AMERICA ONLY)								
Noesis Adaptive DOE							●	●
Noesis Space Filing DOE							●	●
DESIGN OF EXPERIMENTS (GLOBAL)								
Design Explorer Orthogonal Array							●	●
Design Explorer Orthogonal Array + LHS							●	●
CONNECT ANY ENGINEERING ANALYSIS TO SYSTEMS ARCHITECTURE MODEL								
NoMagic MagicDraw® / Cameo®						●	●	●
IBM Rhapsody®						●	●	●
PTC Windchill Modeler®						●	●	●
Vitech (Zuken) GENESYS®						●	●	●
Capella						●	●	●

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SIMULATE COMPLEX SYSTEM BEHAVIOR								
Execute State Machine Diagrams (Cameo®)								●
VERIFY REQUIREMENTS								
Physical Requirements						●	●	●
Behavioral Requirements (Cameo® and Windchill Modeler®)						●	●	●

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/ SAFETY ANALYSIS	medini analyze	medini analyze for Semiconductors	medini analyze for Cybersecurity	Digital Safety Manager			
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			●				
SAFETY MANAGEMENT							
Tool Guided Safety Planning				●			
Assignment & Assested Reuse of Analysis Results for Safety Activities				●			
Task Based Safety Plan Execution				●			
Dashboard with KPI Monitoring and Reporting				●			

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

/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
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	●	●	●									
Non-Homogeneous Materials	●	●	●									
SPEOS Live Preview (GPU Acceleration)		●[12]	●[12]									
Speos GPU Compute (GPU Acceleration)		●[12]	●[12]									
Virtual BSDF			●[10]									
PHOTOMETRY / RADIOMETRY												
Intensity	●	●	●									
Illuminance	●	●	●									
3D Illuminance	●	●	●									
Luminance	▲	●	●									
3D Energy Density		●	●									
360 View - Observer		●	●									
360 View - Immersive		●	●									

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

/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
HUMAN VISION												
Dynamic Adaption			●									
Glare Simulation			●									
HDR10 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 SENSOR												
Field of View					●							
Export Sensor Grid as Geometry					●							
Camera Sensor					●							
Camera Raw Signal Export					●							
Camera Sensor Post Processing					●							
Dynamic Effects in Camera Simulation	●	●	●									
Dynamic Effects in LiDAR Simulation	●	●	●									

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/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
OPTICAL SENSOR												
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						●						
SOLVER PERFORMANCES												
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	●	●	●									
Multi-GPU Solving on Local PC		●	●									
SIMULATION PREPARATION												
Source Group	●	●	●									
Geometry Group	●	●	●									
Local Meshing	●	●	●									
3D Textures		●	●									
Polarizer		●	●									
Fluorescent Converter		●	●									
Light Field	●	●	●									
Preset Manager	●	●	●									

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/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
SIMULATION PREPARATION												
Texture Mapping (Bump, Multi-Layer)		●	●									
Uniform Ambiant Source	●	●	●									
HDRI Source	●	●	●									
CIE Sky Source		●	●									
Natural Light Source		●	●									
Near Infrared Extended Ambient Source		●	●									
Thermic Source							●					
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	●	●	●									
OPTIMIZATION												
Parameters	●	●	●									
Design of Experiment	●[3]	●[3]	●[3]									
Design Optimisation	●[3]	●[3]	●[3]					●[10]				
Ansys optiSLang Interface (12)	■	■	■									

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

/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
TOOL INTEROPERABILITY												
Shared Workflows with Ansys Lumerical Products	●	●	●									
Shared Workflows with Ansys Zemax OpticStudio	●	●	●									
Shared Workflows with Ansys Mechanical	●	●	●									
IMAGING & AFOCAL DESIGN												
Sequential Ray Tracing										●	●	●
12 Field Points										●	●	●
50 Field Points (Best For Aspheric Design)										●	●	●
2000+ Field Points (Best For Freeforms)											●	●
Optimization										●	●	●
Contrast Optimization										●	●	●
High-Yield Optimization										●	●	●
Tolerancing										●	●	●
Quick Yield Analysis										●	●	●
Tolerance Data Viewer										●	●	●
Tolerance Data Analysis										●	●	●
Black Box Encryption										●	●	●
Image Quality Analysis										●	●	●
Image Simulation Analysis										●	●	●
Full-Field Aberration Analysis										●	●	●
Aspheric Design										●	●	●
Freeform Optics										●	●	●
Diffractive Optics										●	●	●
Ghost Focus Generator										●	●	●
Multiple Configerations										●	●	●
Birefringence										●	●	●
Stock Lens Matching Tool										●	●	●
TrueFreeform											●	●

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

/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
LIGHTING AND ILLUMINATION DESIGN												
Non-sequential ray tracing										●	●	●
Geometic light sources										●	●	●
Measured light sources										●	●	●
Objects										●	●	●
Detectors										●	●	●
Optimization										●	●	●
Freeform Optics										●	●	●
Tolerancing										●	●	●
Colorimetry										●	●	●
Ray splitting										●	●	●
Ray scattering										●	●	●
Measured source models											●	●
Measured surface scattering models											●	●
LightningTrace											●	●
Source Illumination Map											●	●
Phosphor & fluorescence modeling											●	●
Path analysis											●	●
PROGRAMMING AND INTERFACE												
Zemax Programming Language										●	●	●
User-configurable shortcut keys										●	●	●
MATLAB interoperability										●	●	●
User-defined surfaces and objects										●	●	●
User-defined scatter profiles and sources										●	●	●
Programmable interface (ZOS-API)										●	●	●

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/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
LASERS & FIBERS												
Gaussian beams										●	●	●
Scanning systems										●	●	●
Single mode fiber coupling										●	●	●
Multi-mode fiber coupling										●	●	●
Optimization										●	●	●
Tolerancing										●	●	●
Physical Optics Propagation										●	●	●
M2 & beam quality										●	●	●
CAD INTEGRATION												
Export to STEP, IGES, SAT, STL										●	●	●
Import STEP, IGES, SAT, STL										●	●	●
Dynamic link to CAD Software											●	●
Part-designer - static parts										●	●	●
Part-designer - dynamic parts											●	●
DATA LIBRARIES												
Design Templates collection										●	●	●
Lens Catalog										●	●	●
Materials Catalog										●	●	●
Coatings Catalog										●	●	●
Test Plate Lists										●	●	●
Spectrum Data Files										●	●	●
IS Scatter Catalog											●	●
Radiant Source Models											●	●
IES Source Models											●	●

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

/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
STAR												
FEA Data Viewer												●
Load FEA Data tool												●
Fit Assessment tool												●
Alignment Check												●
Structural Data Summary												●
Thermal Data Summary												●
STAR System Viewer												●
Performance Analysis												●
2D Deformation Plot												●
Thermal Index Plot												●
OPTICSBUILDER												
Import .ZBD file									●			
Update .ZBD file									●			
Export .ZBD file									●			
Static Boundary Rays									●			
Generate reference geometry									●			
Add mounting edge									●			
Add fold mirror									●			
Add sources and detectors									●			
Region of interest									●			
Apply surface properties									●			
Create ray filter									●			
Animate rays									●			
Hide/Show Rays									●			
Partial Rays									●			
Ray Geometry									●			
Chief Rays									●			

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/ OPTICS	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	OpticsBuilder	OpticStudio Professional	OpticStudio Premium	OpticStudio Enterprise
OPTICSBUILDER												
Ray Footprints									●			
Show Tolerances									●			
Generate lens drawings									●			
Optical geometry properties									●			
Editable optics									●			
System settings									●			
Optomechanical Packaging Analysis									●			
Simulation									●			
Results									●			
Show detectors									●			
Report									●			
Show Clipping Rays									●			
Show Contaminating Rays									●			
Print									●			

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

/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	EMA3D Charge	Nuhertz FilterSolutions	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	●									●	●
Multi-Conductive Terminals Modelling (PCBs, Busbars etc.) / A-Phi Solver	●										●
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	●									●	●

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

/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	EMA3D Charge	Nuhertz FilterSolutions	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	●									●	●
Temperature Dependant Litz Wire Modeling	●									●	●
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						●					
Optimization Workflow						■					
Temperature Dependent Duty-Cycle Analysis						●					
Manufacturing Effects Due to Winding Impregnation and Housing Interfaces						●					
Linear Structural 2D FEA						●					
Noise Vibration Harness Analytical Modelling						●					
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		●									●

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

/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	EMA3D Charge	Nuhertz FilterSolutions	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											●
RF and Digital Filter Synthesis and Design									●		
Domain Decomposition Method (DDM) for Frequency Domain FEM Analysis		●									●
Hybrid Finite Element/ Integral Equation Analysis		●									●
Efficient Wirebond Package Meshing		●									●
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	EMA3D Charge	Nuhertz FilterSolutions	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		●									●
RF Discharge Solver		●									●
Mutli-paction Solver		●									●
Volumetric SBR+ for 3D Dielectrics		●									●
Surface Roughness Model for SBR+		●									●
Accelerated Doppler Processing (ADP) for SBR+ Range-Doppler Analysis											●

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/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	EMA3D Charge	Nuhertz FilterSolutions	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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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					●						●
Reduced Order Flow and Thermal					●						●

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

/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	EMA3D Charge	Nuhertz FilterSolutions	Electronics Pro 2D	Electronics Enterprise
ELECTRONICS COOLING											
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 Meshing, Multi-Domain, Multi-Technology		●									●
HPC Accelerated Frequency Sweeps	●	●	●								●
HPC Accelerated Broadband Fast Frequency Sweep		●									●
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 2D Skew Parallel Processing	●									●	●
HPC Enabled Parallel Processing	●	●		●	●					●	●

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

/ ELECTRONICS	Maxwell	HFSS	SIwave	Q3D Extractor	Icepak	Motor-CAD	EMA3D Cable	EMA3D Charge	Nuhertz FilterSolutions	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	●	●	●	●	●					●	●
Push-Back Excitation	●	●								●	●
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											●

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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 FOR ELECTRONICS											
Granta Materials Data for Simulation	■	■	■	■	■	■				■	■
Granta MI Materials Gateway	■	■	■	■	■	■				■	
Ansys Granta Advanced Materials – Electromagnetic	■	■	■	■	■	▲					■
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	●	●	●	●	●						
Elastic Licensing		●	●	●	●	●					
CHARGING AND DISCHARGING MODELING											
Internal Charging								●			
Electrostatic Discharge in Air								●			
Surface Charging								●			
3D Particle Transport								●			
Arcing in Solid Dielectrics								●			
Coupled Charging Simulations								●			

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/ PHOTONICS	CHARGE	CML Compiler	DGTD	FDTD	FEEM	HEAT	INTER-CONNECT	qINTER-CONNECT	MODE	MQW	STACK	RCWA	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													●
Available in Ansys Cloud	●	●	●	●	●	●	●		●	●	●	●	●
Ansys Cloud HPC Services Integration	●		●	●	●	●			●	●	●	●	
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 Difference Time Domain solver				●									
Finite Difference Eigenmode solver				●					●				
Bidirectional eigenmode expansion									●				
2.5D variational FDTD (varFDTD)									●				
Advanced Finite Difference Conformal Meshing				●					●			▲	

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GENERAL SOLVER CAPABILITIES													
Quantum mechanical band structure calc. (kp method)										●			
Waveguide and band diagram calculation										●			
Gain and spontanious emission calculation										●			
Temperature, strain, and field effects										●			
Closed form 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 including optical fibre, FEC and MLSE models							●						
Rigorous Coupled-Wave Analysis Solver												●	
Waveguide Bend Calculation for Bend Loss and Ring Analysis					●								
Quantum Logic Gate Simulation								●					
Quantum Loss Extraction								●					
MATERIALS SELECTION & RELATED TOOLS													
Comprehensive Material Models	●		●	●	●	●			●	●	●	●	
Multi-coefficient Models			●	●					●				
Non-linearity Modeling				●	▲				▲				
Anisotropy Modeling				●	▲				▲		●		
OPTIMIZATION													
Inverse Design with lumopt				●					▲				
Particle Swarm	●		●	●	●	●	●		●		▲	▲	
Parameter Sweeps	●		●	●	●	●	●		●	▲	▲	▲	
POST PROCESSING													
Far-Field Projection			●	●	●				●				
Band Structure Analysis				●									
Bidirectional Scattering Distribution Function				●									

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POSTPROCESSING													
Q-Factor Analysis			●	●									
Charge Generation Rate			●	●									
Bend Loss Analysis									●				
Overlap analysis									●				
Model area analysis									●				
Helical waveguides									●				
Extract gain/absorption and spontaneous emission coefficients for TWLM model (INTERCONNECT)										●			
Statistical support (Monte-Carlo Analysis)	●		●	●	●	●	●		●				
Statistical Support (Corner analysis)							●						
Small-signal analysis	●												
Steady-state and transient analysis	●					●							
Laser Self-Heating							●						
TOOL INTEROPERABILITY													
Multiphysics Solver Interoperabilty	●		●	●	●	●			●				
Automation API (Lumerical script/Matlab/Python)	●		●	●	●	●	●		●	●	●	●	
Circuit electronic photonic co-simulation (3rd party tools)							●						●
optiSLang Integration	●		●	●	●	●	●		●	●	●	●	
Shared workflows with Speos				●							●	●	
Speos Surface Models: BSDF/BRDF format exchange				●									
Speos Surface Models: Diffraction Grating SOP Plugin				●							●	●	
Optics Interoperability Workflows with Speos and/or Zemax				●							●	●	
Process Enabled Photonic Component Design Workflows	●		●	●	●	●			●				
Virtuoso layout integration				●					●				
KLayout integration							●						

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/ DESIGN TOOLS	SpaceClaim	DesignModeler	Discovery
FLUIDS			
Inlet and Outlet Conditions			●
Steady-state Flow			●
Transient Flow			●
Incompressible Flow			●
Compressible Flow			▲
Porous Media			●
GEOMETRY			
Direct Modeling Technology	●		●
Feature Based Modeling Technology	●	●	●
Open Data from All Major CAD Systems	●	●	●
Modify Imported Geometry	●	●	●
Defeaturing and Simplification Tools	●	●	●
Model Repair	●	●	●
Add Parameters for Design Exploration	●	●	●
Extract Mid-Surfaces/Shells and Beams	●	●	●
Extract Fluid Volumes	●	●	●
Shared Topology for Conformal Meshing	●	●	●
Boundary Condition Mapping	●	●	●
Reverse Engineering Faceted Data	●		●
Prep for Additive Manufacturing	●		●
HEAT TRANSFER			
Steady-state Solid Conduction			●
Transient Solid Conduction			●
Natural Convection			●
Conjugate Heat Transfer			●
External Radiation			●

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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

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/ DESIGN TOOLS	SpaceClaim	DesignModeler	Discovery
GRANTA MATERIALS DATA FOR SIMULATION			
Materials Data for Simulation			■
MULTIPHYSICS			
Conjugate Heat Transfer			●
Thermal-Stress			●
STRUCTURAL			
Static Structural Analysis			●
Modal Analysis			●
Pre-Stressed Modal Analysis			■
Point Masses			●
Springs			●
Joints			●
Nonlinear Contact			■
Pre-Tension Bolts			■
Large Deformation			■
Topology Optimization			●
TOOL INTEROPERABILITY			
Supported running on the Ansys Cloud In browser interactively	●	●	●
Geometry Transfer to Workbench (WB), Fluent, and Mechanical	●	●	●
Physics Transfer to Fluent, Mechanical, and HFSS			●
HIGH FREQUENCY ELECTROMAGNETICS			
Automated Antenna Simulation Workflow			●
FDTD Solution with Automated Graded Cartesian Grid			●
Circuit Port Excitations			●
Mode Port Excitations			●
Electric and Magnetic Material Properties			●
S Parameters Including Smith Charts and Touchstone Export			●
Electric and Magnetic Field Results			●
Antenna Parameter Calculation			●

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/ DIGITAL MISSION ENGINEERING

	STK Pro	STK Premium (Space)	STK Premium (Air)	STK Enterprise	STK Scheduler	STK Solis	STK Missle Tool Kit	PropNav	ODTK	ODTK SSA
MODELING CAPABILITIES										
Physics-Based Object Modeling	●	●	●	●					●	
Full 3D and 2D Visualization	●	●	●	●						
Streaming Imagery	●	●	●	●						
Integrated Timeline View	●	●	●	●						
Reporting and Graphing	●	●	●	●					●	
Moviemaking	●	●	●	●						
Geometric Sensor Models (Rectangular, Complex Conic, SAR, Etc.)	●	●	●	●						
Platform Attitude Profiles (Aligned, Ecf, Eci, Fixed in Axes, External-File, etc.)	●	●	●	●						
System Constraints (Azimuth, Elevation, Range, Line of Sight, Temporal, Lighting, Etc.)	●	●	●	●						
Single Object Access Calculations	●	●	●	●						
Many vs. Many, Multinode Access Computations	●	●	●	●						
Body Masking	●	●	●	●						
Sensor Obscuration Tool	●	●	●	●						
Import Digital Terrain Data	●	●	●	●						
Terrain-Based Analysis and Route Following	●	●	●	●						
RF Communications System Modeling	●	●	●	●						
Radar System Modeling	●	●	●	●						
Urban Environment Signal Attenuation	●	●	●	●						
User-Defined Coverage Grids for Data Visualization	●	●	●	●						
Advanced Orbit Trajectory Design	▲	●	▲	●						
Test and Evaluation Planning and Results Analysis	▲	▲	▲	●						
Parallel Computing	▲	●	●	●						
Missile and Launch Vehicle Modeling	●	●	●	●			■[1]			
Real-Time Tracking Data Feeds		●	●	●						
DIS and HLA Interfaces		●	●	●						
Electro-Optical and Infrared Sensor Modeling		●	●	●						

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MODELING CAPABILITIES										
Model Advanced Space Environment Effects		●								
Consider Spacecraft Perturbation Effects (e.g., Solar Radiation Pressure Drag)		●		●						
Spacecraft Rendezvous and Proximity Operation Maneuver Planning Templates		●		●						
Solar Panel Power Estimation Tool		●		●						
Performance-Based Aircraft Route Design			●	●						
Wind Effects on Airborne Vehicle Trajectories			●	●						
Runway and Waypoint Catalogs			●	●						
Enterprise Hosted Content Management System				●						
Integrate Analysis with SysML State Machine Simulations				●						
Software Development Kit APIs	●	●	●	●	●	●	●	●	●	
Resource and Asset Scheduling in STK-Modeled Missions					■[1]					
Dynamic Spacecraft Attitude System Modeling						■[1]				
Emulate Onboard Spacecraft Attitude Flight Control Systems						■[1]				
Design Attitude System P-I-D Controls						■[1]				
Model Onboard Spacecraft Reaction Wheels and Gyros						■[1]				
Advance Multi-Stage Missile System Modeling							■[1]			
Proportional Navigation and Guidance Simulation								■[1]		
Process Spacecraft Tracking and Measurement Data									●	
Resolve Spacecraft Maneuvers from Tracking Measurements									●	
Multiple Simultaneous Orbit Solutions									●	
Combine Multisource Satellite Tracking Data									●	
Collection of Common Automation Routines for On-Orbit Operations									●	
Object Association and Correlation Against Existing Catalog									■[1]	●
Automated Maneuver Processing, Characterization,and Refined Orbit Estimations										●

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MODELING CAPABILITIES										
Model Advanced Space Environment Effects		●								
Consider Spacecraft Perturbation Effects (e.g., Solar Radiation Pressure Drag)		●		●						
Spacecraft Rendezvous and Proximity Operation Maneuver Planning Templates		●		●						
Solar Panel Power Estimation Tool		●		●						
Performance-Based Aircraft Route Design			●	●						
Wind Effects on Airborne Vehicle Trajectories			●	●						
Runway and Waypoint Catalogs			●	●						
Enterprise Hosted Content Management System				●						
Integrate Analysis with SysML State Machine Simulations				●						
Software Development Kit APIs	●	●	●	●	●	●	●	●	●	
Resource and Asset Scheduling in STK-Modeled Missions					■[1]					
Dynamic Spacecraft Attitude System Modeling						■[1]				
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Advance Multi-Stage Missile System Modeling							■[1]			
Proportional Navigation and Guidance Simulation								■[1]		
Process Spacecraft Tracking and Measurement Data									●	
Resolve Spacecraft Maneuvers from Tracking Measurements									●	
Multiple Simultaneous Orbit Solutions									●	
Combine Multisource Satellite Tracking Data									●	
Collection of Common Automation Routines for On-Orbit Operations									●	
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