



Realize Your Product Promise®

2019 R2

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STRUCTURES

	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM		
Geometric Idealization								
Spring	•	•	▲	•	•	•		
Mass	•	•	•	•	•	•		
Damper	•	•		•	•			
Spar	•	•	•					
Beam	•	•	•	•	•			
Pipe/Elbow	•	•	•					
Shell - Thin	•	•	•	•	•	•		
Layered Shell - Thin (Composite)	•	•		•	•			
Shell - Thick (Solid Shell)	•	•	•					
Layered Shell - Thick (Solid Shell) (Composite)	•	•						
2D Plane / Axisymmetric	•	•	•	•	•			
3D Solids	•	•	•	•	•	•		
Layered 3D Solids (Composite)	•	•						
Infinite Domain	•	•	•	•	•			
2.5D	•	•						
Reinforced	•	•		•	•			
ROM	•							
Substructuring / Matrix	•							
Modeling Capabilities								
Contact - Linear	•	•	•	•	•	•		
Contact - Nonlinear	•	•	•	•	•	•		
Joints	•	•	•	•	•	•		
Spot Welds	•	•	•	•	•			
Element Birth and Death	•	•						
Gasket Elements	•							
Rezoning and Adaptive Remeshing	•			•	•			

STRUCTURES

	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM		
Materials								
Basic Linear Materials (Linear, Anisotropic, Temperature Dependent)	•	•	•	•	•	•		
Basic Nonlinear Materials (Hyper, Plasticity, Rate Independent, Isotropic, Concrete)	•	•	▲	•	•	▲		
Advanced Nonlinear Materials (Rate dependent, Anisotropic, Damage Models, Geomechanics Materials, Multiphysics)	•			•	•			
Field Dependent	•	•						
Reactive Materials	•			•				
Fracture Mechanics and Crack Growth	•							
Material Designer	•							
Granta Materials Data for Simulation	□ ⁷	□ ⁷	□ ⁷					
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							

STRUCTURES

	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM		
Structural Solver Capabilities								
Linear Static	•	•	•			•		
Nonlinear Static	•	•	•			•		
Pre-Stress effects, 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	•							
Topology Optimization								
Structural optimization	•	•	•			•		
Modal optimization	•	•	•			•		
Thermal Loads	•	•	•					
Inertial Loads	•	•	•					
Optimized Design Validation	•	•	•			•		
Manufacturing Constraints	•	•	•			▲		
Stress Constraints	•	•	•			•		
Symmetry	•	•	•			•		
Lattice Optimization	◻ ⁸							
Overhang/Additive constraints	◻ ⁸							
Multi Analysis								
Submodeling	•	•	•					
Data Mapping	•	•	•			•		
Multiphysics Data Mapping	•	•						
Initial State	•	•		•	•			
Advanced Multi-Stage 2D to 3D Analysis	•	•						

STRUCTURES

	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM		
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	•							
Nonlinear Transient Dynamics								
Rigid Body Mechanisms	•	•						
Rigid Body Dynamics with CMS I Components for Flexible Bodies	•							
Full Transient	•	•		•	•			
CMS with Substructuring	•							

STRUCTURES

	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM		
Explicit Dynamics								
FE (Lagrange) Solver	•			•	•			
Euler Solvers	▲			•				
Meshless Solvers				•				
Implicit-Explicit Deformations	•			•	•			
Implicit-Explicit Material States	•			•				
Fluid-Structure Interaction (FSI)	•			•				
Mass Scaling	•			•	•			
Natural Fragmentation	•			•				
Erosion Based on Multiple Criteria	•			•	•			
De-Zoning				•	•			
Part Activation and Deactivation (Multi Stage Analysis)				•				
Remapping in Space				•				
Remapping Solution Methods				•				
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					

• = Fully Support ▲ = Limited Capability □ = Requires more than 1 product (see table)

STRUCTURES

	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM		
Wave Hydrodynamics								
Diffraction and Radiation	•							
Frequency & Time Domain Motions Analysis	•							
Moorings, Joints & Tethers	•							
Load Transfer to Structural Analysis	•							
Thermal								
Steady State Thermal	•	•	•			•		
Transient Thermal	•	•	•			•		
Conduction	•	•	•	•	•	•		
Convection	•	•	•			•		
Radiation to Space	•	•	•			•		
Radiation - Surface to Surface	•	•	•					
Phase Change	•	•	•	•	•			
Thermal Analysis of Layered Shells and Solids	•	•						
Additional Physics								
1-D Thermal-flow	•	•	•					
1-D Coupled-field Circuits	•							
1-D Electromechanical Transducer	•							
MEMS ROM	•							
Piezoelectric	•							
Piezoresistive	•							
Electroelastic	•							
Electromagnetic	•					▲		
Vibro-acoustics	•							
Electro-Migration	•							
Diffusion-Pore-Fluid	•							
Diffusion-Thermal Structural-Electric	•							
Structural-Thermal-Electric-Magnetic	•					▲		
1-Way Fluid-Structure Interaction	□ ²	□ ²	□ ²			•		
2-Way Fluid-Structure Interaction	□ ²							

STRUCTURES	MECHANICAL ENTERPRISE	MECHANICAL PREMIUM	MECHANICAL PRO	AUTODYN	LS-DYNA	AIM		
Optimization								
DesignXplorer Included	•	•	•	□ ³	□ ³	•		
Parameters	•	•	•	•	•	•		
Design Point Studies	•	•	•	•	•	•		
Correlation Analysis	•	•	•	•		•		
Design of Experiments	•	•	•	•		•		
Sensitivity Analysis	•	•	•	•		•		
Goal Driven Optimization	•	•	•	•		•		
Six Sigma Analysis	•	•	•	•		•		
Miscellaneous and Usability								
ANSYS SpaceClaim	•	□ ⁴	□ ⁴	□ ⁴	□ ⁴	•		
ANSYS Customization Suite (ACS)	•	□ ⁵	□ ⁵	□ ⁵	□ ⁵	•		
Support ACT Extensions	•	•	•	•	•	•		
Command Snippet Support	•	•	•			•		
Batch run capability	•	•	•	•	•	•		
External Code Interfaces	•	•		•	•			
CDB and 3rd Party FE Model Import	•	•			•			
HPC - Structures								
Default Number of Cores	4 (DMP + SMP) MAPDL 4 for Explicit 4 for RBD MAPDL 4 for AQWA	4 (DMP + SMP)	4 (DMP + SMP)	1	1	4 (DMP + SMP) MAPDL	1 = ANSYS nCode DesignLife Products 2 = ANSYS Fluent 3 = ANSYS DesignXplorer 4 = ANSYS SpaceClaim 5 = ANSYS Customization Suite (ACS) 6 = ANSYS HPC, ANSYS HPC Pack or ANSYS HPC Workgroup 7 = ANSYS Granta Materials Data for Simulation 8 = ANSYS Additive Suite 9 = ANSYS Composite Cure Simulation DMP = Distributed-memory parallel SMP = Shared-memory parallel MAPDL = Mechanical APDL Explicit = Autodyn RBD = Rigid Body Dynamics Aqwa = Aqwa	
Parallel Solving on Local PC	•	•	•	•	•	•		
Parallel Solving on Cluster	•	•	•	•	•			
GPU Acceleration	□ ⁶ MAPDL - Yes Explicit - No RBD - No Aqwa - No	□ ⁶	□ ⁶					
Parallel Solving Over Cloud Launched from Desktop	MAPDL - Yes Explicit - No RBD - No Aqwa - No							

FLUIDS

	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE
General Solver Capabilities							
Comprehensive Inlet and Outlet Conditions	•	•	•	•	•	•	•
Steady-State Flow	•	•	•	•	•	•	•
Transient Flow	•	•	•	•	•	•	•
2D and 3D Flow	•	▲	•	▲	•	▲	▲
Reduced Order Models (ROM)	•						•
Time Dependent Boundary Conditions	•	•	•	•	•	▲	•
Customizable Materials Library	•	•	•	•	•	•	•
Fan Model	•	•			•		
Periodic domains	•	•	•	•	•	•	•
Flow-Driven Solid Motion (6DOF)	•	•			•		
Pressure-Based Coupled Solver	•	•	•	•	•	•	•
Density-Based Coupled Solver	•						•
Dynamic/Moving-Deforming Mesh	•	•	•	•	•		•
Overset Mesh	•						
Immersed-Solid/MST Method for Moving Parts		•	•		•		
Automatic On-the-Fly Mesh Generation with Dynamic Refinement	•			•			•
Dynamic Solution-Adaptive Mesh Refinement	•	•		•	▲		•
Polyhedral Unstructured Solution-Adaptive Mesh Refinement	•						
Single Phase, Non-Reacting Flows							
Incompressible Flow	•	•	•			•	•
Compressible Flow	•	•		•	•	•	•
Porous Media	•	•	•				
Non-Newtonian Viscosity	•	•	•				
Turbulence - Isotropic	•	•	•	•	•	•	•
Turbulence - Anisotropic (RSM)	•	•					
Turbulence - Unsteady (LES/SAS/DES)	•	•					•
Turbulence - Laminar/Turbulent Transition	•	•			•	•	•
Flow Pathlines (Massless)	•	•	•			•	
Fan Model	•	•			•		
Acoustics (Source Export)	•	•			•		
Acoustics (Noise Prediction)	•	▲					

FLUIDS

	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE
Heat Transfer							
Natural Convection	•	•			•	•	•
Conduction & Conjugate Heat Transfer	•	•			•	•	•
Shell Conduction (Including Multi-Layer Model)	•						
Internal Radiation - Participating Media	•	•	•		•		•
Internal Radiation - Transparent Media	•	•					•
External Radiation	•	•				•	•
Solar Radiation & Load	•	•					
Simplified Heat Exchanger Model	•						
Non-equilibrium Thermal Model	•						
Prorous Media	•						
Particles Flows (Multiphase)							
Coupled Discrete Phase Modeling Including Thin Wall Films	•	•		•	•	▲	•
Macroscopic Particle Model	•					▲	
Inert Particle Tracking (with Mass)	•	•				▲	
Liquid Droplet (Incl. Evaporation)	•	•		•	•		•
Combusting Particles	•	•		•			•
Multicomponent Droplets	•	•		•	•		•
Discrete Element Model (DEM)	•						
Break-Up And Coalescence	•	•		•	•		•
Erosion	•	•					
Free Surface Flows (Multiphase)							
Implicit VOF	•	•	•				
Explicit VOF	•	•	•				
Coupled Level Set/VOF	•	•			•		
VOF to DPM Spray Model	•						
Open Channel Flow And Wave	•	•					
Surface Tension	•	•		•	•		
Phase Change	•	•		•	•		
Cavitation	•	•		•	•		
Cavitation Where Multiple Fluids and Non-Condensing Gases Are Present	•						

FLUIDS

	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE
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)	•	•					
Reacting Flows							
Species Transport	•	•	•	•			•
Non-Premixed Combustion	•	•		•			•
Premixed Combustion	•	•		•			•
Partially Premixed Combustion	•	•		•			•
Composition PDF Transport	•	•					
Finite Rate Chemistry	•	•	•	•			•
Pollutants and Soot Modeling	•	•		•			•
Sparse Chemistry Solver with Dynamic Cell Clustering and Dynamic Adaptive Chemistry	•			•			•
Ability to Use Model Fuel Library Mechanisms	•			•			•
Flame-Speed from Fuel-Component Library	•			•			•
DPIK Spark-Ignition Model				•			•
Flame-Propagation Using Level-Set Method (G-Equation)				•			•
Internal Combustion Engine Specific Solution	•	•		•			•
0-D/1-D/2-D Reactor Models and Reactor Networks							•
Plasma Reactions							•
Comprehensive Surface-Kinetics	•						•
Chemical and Phase Equilibrium	•						•
Flamelet Table Generation	•						•
Flamespeed and Ignition Table Generation							•
Reaction Sensitivity, Uncertainty and Path Analysis							•
Surrogate Blend Optimizer							•
Mechanism Reduction							•

FLUIDS

	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE
Turbomachinery							
MRF/Frozen-Rotor	•	•					
Sliding-Mesh/Stage	•	•					
Transient Blade Row		•					
Pitch Change		•					
Time Transformation		•					
Fourier Transformation		•					
Harmonic Analysis		•					
Blade Flutter Analysis		•					
Forced Response Analysis		•					
Flank Milled Blades		•					
In-Flight Icing							
Simulation of standard droplets, SLD, and ice crystals	•				•		
Inclusion of vapor / humidity effects on icing	•				•		
Icing environments of Appendices C, O (SLD), and D (Ice Crystals)	•				•		
Various pre-defined droplet size distributions	•				•		
Simulation of rime, glaze, and mixed icing	•				•		
Single - and multi-shot icing simulations with mesh deformation for prediction of ice accretion and aerodynamic performance degradation	•				•		
Single- and multi-shot icing simulations with automatic re-meshing for prediction of ice accretion and aerodynamic performance degradation					•		
Conjugate Heat Transfer (CHT) for anti- and de-icing simulations					•		
Icing of rotating components of all types: rotors, propellers, and engines (fan, guide vanes, and any number of compressor rows)					▲		

FLUIDS

	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE
Optimization							
Parameters	•	•	•			•	•
Design Point Studies	•	•	•			•	•
Correlation Analysis	•	•	•			•	
Design of Experiments	•	•	•			•	
Sensitivity Analysis	•	•	•			•	•
Goal Driven Optimization	•	•	•			•	
Six Sigma Analysis	•	•	•			•	
Adjoint Solver for Shape Optimization	•						
Adjoint Solver Supports Rotating Reference Frames & Conjugate Heat Transfer	•						
Multi-Objective-Constrained Optimization	•						
Mesh Morphing (RBF Morph)	◻						
High Rheology Material							
Viscoelasticity			•				
Specialty Extrusion Models			•			▲	
Specialty Blow Molding Models			•			▲	
Specialty Fiber Spinning Models	•						
HPC – Fluids							
Parallel Solving on Local PC Option	•	•	•	•	•	•	•
Parallel Solving Over Network Option	•	•	•	•	•	•	
Parallel Solving Over Cloud Launched from Desktop	•						
GPU Support	•		•				
Pre and Post Processing							
Photo Realistic Rendering	•	•	•	•	•	Option	•
SpaceClaim Direct Modeler	•	•	•	•	•	•	•
Compare Multiple Runs, Datasets, Physics, Graphs in a Single Window	•	•	•	•	•	Option	•

FLUIDS

	FLUENT	CFX	POLYFLOW	FORTE	FENSAP-ICE	AIM	CHEMKIN ENTERPRISE
Multiphysics							
Advanced, Automated Data Exchange	•	•	•		•	•	
Accurate Data Interpolation Between Dissimilar Meshes	•	•			•	•	
Drag-n-Drop Multiphysics	•	•	•				
Direct Coupling Between Physics	•	•				•	
Collaborative Workflows	•	•				•	
Fully Managed Co-Simulation	•	•					
Flexible Solver Coupling Options	•	•			•		
Fluid-Structure Interaction							
Force Induced Motion/Deformation	□	□	•			•	
Fluid Thermal Deformation	□	□				•	
Electro-Thermal Interaction							
Convection Cooled Electronics	•	•					
Conduction Cooled Electronics	•	•					
High Frequency Thermal Management	•	•					
Electromechanical Thermal Management	•	•					
Other Coupled Interactions							
Aero-Vibro Acoustics	•						
Acoustics-Structural	•	•					
Fluid Magnetohydrodynamics	•	•					
Ease of Use and Productivity							
Support ACT Extensions	•						
Mosaic-Enabled Meshing Technology	•						
Task-Based Workflow - Watertight Geometries	•						
Task-Based Workflow - Fault Tolerant (Beta)	•						
Directly Enter Expressions	•	•				•	

ELECTRONICS

	MAXWELL	HFSS	SIwave	Q3D EXTRACTOR	ICEPAK	AIM		
Low Frequency Electromagnetics								
Electrostatics	•					•		
AC Conduction	•					•		
DC Conduction	•					•		
Magnetostatics	•					•		
Adaptive Field Mesh	•	•	•	•		•		
AC Harmonic Magnetic	•					•		
Electric Transient	•							
Magnetic Transient								
Translational Motion	•							
Fully Automatic Symmetrical Mesh Generation	•							
Rotational Motion	•							
Non-Cylindrical Motion	•							
Advanced Embedded Circuit Coupling	•							
Circuit Coupling with Adaptive Time Stepping	•							
Direct and Iterative Matrix Solvers	•							
Advanced Magnetic Modeling								
Vector Hysteresis Modeling	•							
Hysteresis Modeling for Anisotropic Material	•							
Frequency Dependent Reduced Order Models	•							
Equivalent Model Extraction (Linear-Motion, Rotational-Motion, No-Motion)	•							
Functional Magnetization Direction	•							
Magnetization/De-magnetization Modeling	•							
Manufacturing Dependent Core Loss Models	•							
Noise - Vibration Modeling	□							
Temperature De-magnetization Modeling	•							
Core Loss computation	•					•		
Lamination Modeling	•							
Magnetostriction and Magnetoelastic Modeling	•							
Hardware in the Loop modeling	•							
Integrated Motor Synthesis and Design Kit	•							
Integrated Planar Magnetics Synthesis and Design Kit	•							

ELECTRONICS

	MAXWELL	HFSS	SIwave	Q3D EXTRACTOR	ICEPAK	AIM		
High Frequency Electromagnetics								
Fully Automated Adaptive Mesh Refinement		•						
Multi-Frequency Broadband Adaptive Meshing		•						
Frequency Domain Finite Element (FEM) Analysis		•						
Frequency Domain Integral Equation (MoM) Analysis		•						
Time Domain FEM Analysis		•						
FEM Eigenmode Analysis		•						
MoM Characteristic Mode Analysis		•						
Physical Optics (PO) Analysis		□						
Shooting and Bouncing Ray+ (SBR+) Analysis		□						
Physical Theory of Diffraction (PTD) for SBR		□						
Uniform Theory of Diffraction (UTD) for SBR		□						
Visual Ray Tracing for SBR+ Analysis		□						
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		•						
Continued on next page								

ELECTRONICS

	MAXWELL	HFSS	SIwave	Q3D EXTRACTOR	ICEPAK	AIM		
High Frequency Electromagnetics (continued)								
Periodic Boundary		•						
Frequency Dependant Materials		•						
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		•						
Accelerated doppler processing (ADP) for near field radar		•						
Auto-fast and advanced user solution setups		•						
Linear Circuit Analysis with EM Dynamic Link		•						
Integrated Antenna Synthesis and Design Kit		•						
3D Component Libraries with User Controlled Parametrics		•						
3D Component with Encryption Creation		•						
3D Component with Encryption Utilization		•						
EMI Layout Rules Scanner		•						

ELECTRONICS

	MAXWELL	HFSS	SIwave	Q3D EXTRACTOR	ICEPAK	AIM		
Power and Signal Integrity Board Simulation Capabilities								
Electronics Desktop 3D Layout GUI		•	•		•			
ECAD Translation (Altium, Cadence, Mentor, Pulsonix, & Zuken)		•	•					
MCAD (.sat) Generation from ECAD		•	•					
Lead Frame Editor		•	•					
DC Voltage, Current and Power Analysis for PKG/PCB			•					
DC Joule Heating with ANSYS Icepak			•	•	•			
Passive Excitation Plane Resonance Analysis			•					
Driven Excitation Plane Resonance Analysis			•					
Automated Decoupling Analysis			•					
Capacitor Loop Inductance Analysis			•					
AC SYZ Analysis - PI, SI, & EMI			•					
Dynamically Linked Electromagnetic Field Solvers			•					
Chip, Package, PCB Analysis (CPM)		•	•					
Near-Field EMI Analysis			•					
Far-Field EMI Analysis			•					
Characteristic Impedance (Zo) PKG/PCB Scan			•					
Full PCB/PKG Cross-talk Scanning			•					
EMI Layout Rules Scanner		•	•					
Electromigration Analysis		•	•					
TDR Analysis		•	•	•				
Transient IBIS Circuit Analysis		•	•					
SerDes IBIS-AMI Circuit Analysis			•					
Macro-Modeling (Network Data Explorer)			•					
Steady State AC (LNA) Analysis			•					
Virtual Compliance - DDRx, GDDRx, & LPDDRx			•					
Synopsys HSPICE Integration			•					
Cadence PSPICE Support			•					
Electromagnetically Circuit Driven Field Solvers		•	•					

ELECTRONICS

	MAXWELL	HFSS	SIwave	Q3D EXTRACTOR	ICEPAK	AIM		
RLCG Parasitic Extraction								
DCRL, ACRL & CG Solver				•				
IC Packaging RLCG IBIS Extraction for Signals & Power				•				
Touchpanel RLCG Unit Cell Extraction				•				
Adaptive Meshing for Accurate Extraction				•				
Bus Bar RLCG Extraction				•				
Power Inverter & Converter Component Extraction				•				
Specialized Thin Plane Solver for Touchpanel Extraction				•				
3D Component Library		•		•				
Reduced RLCG Matrix Operations				•				
SPICE equivalent Modeling Export				•				
DCRL & ACRL Joule Heating Analysis with Icepak				•				
Macro-Modeling (Network Data Explorer)				•	•			
2D Transmission Line Modeling Toolkit				•				
2D Cable Modeling Toolkit				•				
Electronics Cooling								
Multi-Mode Heat Transfer					•			
Steady-State and Transient					•			
CFD Analysis					•			
Turbulent Heat Transfer					•			
Multiple-Fluid Analysis					•			
Species Transport					•			
Solar Loading					•			
Reduced Order Flow and Thermal					•			
Network Modeling					•			
Joule Heating Analysis	□	□	□	□	•			
Thermo-electric Cooler Modeling					•			
Thermostat Modeling					•			
Package Characterization					•			
Data Center Modeling					•			

ELECTRONICS

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

ELECTRONICS

	MAXWELL	HFSS	SIwave	Q3D EXTRACTOR	ICEPAK	AIM		
System Modeling for SI/PI								
SerDes Channel Modeling - IBIS-AMI, QuickEye and VerifEye		□	•					
Multi-Drop & Parallel Bus Modeling - IBIS, HSPICE, Spectre, PSPICE, and Nexxim Transient		□	•					
Network Data Exploration		•	•	•				
TDR Analysis		□	•					
Steady State AC (LNA) Analysis		□	•					
Virtual Compliance - DDRx, GDDRx, & LPDDRx		□	•					
MULTIPHYSICS								
Platform Technologies								
Advanced, Automated Data Exchange	•	•		•	•			
Accurate Data Interpolation Between	•	•		•	•			
Dissimilar Meshes	•	•		•	•			
Drag-n-Drop Multiphysics	•	•		•	•			
Direct Coupling Between Physics	•	•		•	•			
Collaborative Workflows	•	•		•	•			
Fully Managed Co-Simulation	•	•		•	•			
Flexible Solver Coupling Options	•	•		•	•			
Electro-Thermal Interaction								
Convection Cooled Electronics		•			•			
Conduction Cooled Electronics		•			•			
High Frequency Thermal Management		•		•	•			
Electromechanical Thermal Management	•			•	•			
Miscellaneous								
Integrated Windows HPC Support	•	•	•	•	•			
Integrated IBM Spectrum LSF Support	•	•	•	•	•			
Customizable 3rd Party Scheduler Support	•	•	•	•	•			
Support ACT Extensions	▲	▲	▲	▲	▲	▲		

SYSTEMS & EMBEDDED SOFTWARE

	TWIN BUILDER	medini ANALYZE	ARCHITECT	SCADE SUITE	SCADE DISPLAY	VRXPERIENCE AV / ADAS	VRXPERIENCE HMI	VRXPERIENCE Perceived Quality	VRXPERIENCE Sound
System Simulation, Validation and Digital Twins									
Integrated Graphical Modeling Environment	•								
Standard Modeling Languages and Exchange Formats	•								
Multi-Domain Systems Modeler	•								
Extensive OD Application-Specific Libraries	•								
3rd Party (1D) Tool Integrations	•								
3D ROM	•								
Embedded Software Integration	•								
Multi-Domain System Simulation	•								
Rapid HMI Prototyping	•								
System Optimization	•								
XIL Integration	•								
IIoT Connectivity	•								
Digital Twin Runtime Deployment	•								
Functional Safety Analysis									
Safety Concept Modelling		•							
Model Based Safety Analysis		•							
Reliability Prediction and Analysis		•							
Traceability and Validation Teamwork		•							
Integration into Engineering Environment		•							
Customization and Process Adaption		•							
ANSYS Product Integration		•							
Reporting and Documentation		•							

SYSTEMS & EMBEDDED SOFTWARE

	TWIN BUILDER	medini ANALYZE	ARCHITECT	SCADE SUITE	SCADE DISPLAY	VRXPERIENCE AV / ADAS	VRXPERIENCE HMI	VRXPERIENCE Perceived Quality	VRXPERIENCE Sound
Model-based Systems Engineering									
Model-Based System Design			▲	▲					
Functional Decomposition			▲	▲					
Architecture Decomposition			•	•					
Allocation of Functions to Components			•	•					
Model Checks			•	•					
Model Diff/Merge			•	•					
System / Software Bi-Directional Sync			•	•					
Model Sharing and IP Protection			•	•					
Model-Based Interface Control Document Production			•	•					
Configurable for Industry Standards (IMA, AUTOSAR, Etc.)			•	•					
Product Configuration for Automotive Developers			•	•					
Embedded Control Software Development									
Data Flow and State Machine Design and Simulation Capabilities				•					
Extensive Set of Libraries Delivered as Design Examples				•					
Simulation Capabilities				•					
Record and Playback Scenarios				•					
Plant Model Co-Simulation Including FMI				•					
Coverage Analysis For Requirements Based Tests				•					
Formal Verification				•					
Timing And Stack Optimization				•					
Worst Case Execution Time Estimates On Target				•					
Verification of Stack Space Requirements				•					
Certified Code Generation for DO-178C, EN 50128, ISO 26262, IEC 61508				•					
Certification Kits For DO-178C, EN50128, ISO 26262, IEC 61508				•					

SYSTEMS & EMBEDDED SOFTWARE

	TWIN BUILDER	medini ANALYZE	ARCHITECT	SCADE SUITE	SCADE DISPLAY	VRXPERIENCE AV / ADAS	VRXPERIENCE HMI	VRXPERIENCE Perceived Quality	VRXPERIENCE Sound
Man-Machine Interface Software									
Model-Based Prototyping and Specification of MMIs					•				
Support Of OpenGL, OpenGL SC and OpenGL ES					•				
Font Management					•				
Optimization of Graphical Specifications					•				
Plant Model Co-Simulation Including FMI					•				
Automatic Generation of iOS and Android Projects					•				
Certified Code Generation For DO-178C, EN 50128, ISO 26262, IEC 61508					•				
Certification Kits For DO-178C, EN50128, ISO 26262, IEC 61508					•				
Testing Capabilities					•				
VRXPERIENCE									
Human Vision									
Glare Simulation						•			
Headlamp Simulation									
Visual Measurement						•			
Lamp Control						•	▲	▲	
IIHS Test						•			
Optical System Simulation									
Ground-Truth sensor						•			
Camera Sensor						•	▲	▲	
LiDAR Sensor						•			
Virtual Display							•	•	
HUD								•	
Advanced Lighting Component									

SYSTEMS & EMBEDDED SOFTWARE

	TWIN BUILDER	medini ANALYZE	ARCHITECT	SCADE SUITE	SCADE DISPLAY	VRXPERIENCE AV / ADAS	VRXPERIENCE HMI	VRXPERIENCE Perceived Quality	VRXPERIENCE Sound
Context Simulation									
Basic driving scenario						•	▲	▲	
Advanced driving scenario						•	□		
Advanced vehicle dynamic						•	□		
Environment creation						•	•	•	
Trigger & animation							•	•	
HiL connectivity						•			
Virtual display&actuators interaction							•		
Render Engine									
Real-time physics-based lighting						•	•	•	
Advanced raytraced lighting							•	•	
Full physics GPU lighting								•	
VR									
HMD							•	•	
CAVE, Powerwall							•	•	
Finger tracking							•		
Solver									
Tolerance Variation Engine								•	
Acoustics & Sound Quality									
Analyze, Listen & Modify									•
Psychoacoustics, Automatic detection and separation, Play 3D sound									•
Engine Sound Design									•
3D sound for listening room and VR									•
Interactive sound for driving simulator									•
Measure sound perception with listening test									•
Listen to ANSYS Mechanical simulation									•

GEOMETRY

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

DESIGN TOOLS	DISCOVERY ESSENTIALS	DISCOVERY STANDARD	DISCOVERY ULTIMATE					
Structural								
Static Structural Analysis		•	•					
Modal Analysis		•	•					
Pre-Stressed Modal Analysis			•					
Random Vibration			•					
Shells, Springs, Point Masses			•					
Spatially Varying Loads			•					
Nonlinear Contact & Joints			•					
Pre-tension Bolts & Multi-step Analysis			•					
Basic Plasticity			•					
Large Deformation			•					
Fatigue Analysis			•					
Topology Optimization		•	•					
Fluid								
Steady-State Flow		•	•					
Transient Flow		•	•					
Time-dependent Fluid Conditions			•					
Incompressible Flow			•					
Compressible Flow ¹		▲	•					
Non-Newtonian Fluids			•					
Periodic Domains			•					
Porous Media			•					
Particle Flow			•					
Thermal								
Steady State Thermal		•	•					
Transient Thermal		•	•					
Time Dependent Thermal Conditions			•					
Conduction		•	•					
Convection		•	•					
Radiation to Space			•					

DESIGN TOOLS	DISCOVERY ESSENTIALS	DISCOVERY STANDARD	DISCOVERY ULTIMATE					
Electromagnetics								
DC Conduction		•	•					
AC Conduction			•					
Electrostatics			•					
Magnetostatics			•					
AC Harmonic Magnetics			•					
Multiphysics								
Thermal-Stress		•	•					
Fluid-Structure Interaction			•					
Fluid-Solid Thermal (Conjugate Heat Transfer)			•					
Thermal-Electric		•	•					
Thermal-Electric-Stress		•	•					
Thermal-Electromagnetic			•					
Thermal-Electromagnetic-Stress			•					
Design & Concept Modeling								
Concept Modeling or Detail Design	•	•	•					
Part/Assembly Creation or Import	•	•	•					
Large Assembly Importing	•	•	•					
2-D Drawings, BOM, Exploded Views	•	•	•					
Geometric Parameterization	•	•	•					
Sheet Metal Design	•	•	•					
Manufacturing								
Repair & Defeature Tools	•	•	•					
Sheet Metal Editing and Unfolding	•	•	•					

DESIGN TOOLS

	DISCOVERY ESSENTIALS	DISCOVERY STANDARD	DISCOVERY ULTIMATE					
3-D Printing²								
Import, Repair, Edit Faceted Data	•	•	•					
Shelling and Infills	•	•	•					
Thickness Eetection	•	•	•					
Reverse Engineering								
Autosurface of Scanned Data	•	•	•					
Build Solid/Surfaces on Scanned Data	•	•	•					
Interfaces and Add-ons								
Algoryx Momentum ³	•	•	•					
Keyshot Rendering ³	•	•	•					
(1) Discovery Live supports mildly compressible fluid flow up to ~Mach 0.3								
(2) Included with Discovery Standard and Ultimate								
(3) Add-on Module"								

ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE				
Additive Prep								
Define Build Envelope	•	•	•					
Multiple Parts	•	•	•					
Optimize Part Orientation based upon Distortion Tendency, Build Time, & Supports	•	•	•					
Support Regions Detection	•	•	•					
Control of Support Parameters	•	•	•					
Multiple Support Types	•	•	•					
Angled Supports	•	•	•					
Perforations, Tooth Patterns, Intrusion, Sizing and distribution of support walls	•	•	•					
Automatic Support Generation	•	•	•					
Export of STL and SpaceClaim files	•	•	•					
Topology and Lattice Optimization								
Structural Optimization				•				
Modal Optimization				•				
Thermal Loads				•				
Inertial Loads				•				
Optimized Design Validation				•				
Manufacturing Constraints				•				
Stress Constraints				•				
Symmetry				•				
Lattice Optimization			•	□				
Overhang/Additive Constraints			•	□				
Geometry and STL File Handling								
SpaceClaim Direct Modeler		•	•	•				

ADDITIVE SOLUTIONS

	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE				
Workbench Additive								
Nonlinear and Temperature Dependent Material Properties			•					
Thermo-Mechanical Coupled Strain Solution			•					
Native Mechanical Environment			•					
Stress-Based Automatically Generated Supports			•					
Part Distortion & Residual Stress (As-Built)			•					
Part Distortion & Residual Stress After Support Removal			•					
Blade Crash Detection			▲					
Identification of High Strain (Crack) Locations			•					
Layer by Layer Stress & Distortion Visualizations			•					
Option to Output Only the Last Layer of the Build or Every Nth Layer			•					
User-Defined Step Option as 1st or Last Sequence Step			•					
Layered Tetrahedral Meshing			•					
Post Build Heat Treatment			•					

ADDITIVE SOLUTIONS	ADDITIVE PREP	ADDITIVE PRINT	ADDITIVE SUITE*	MECHANICAL ENTERPRISE				
Additive Print								
Nonlinear and Temperature Dependent Material Properties		•	•					
Uniform Assumed Isotropic Strain		•	•					
Scan Pattern Based Anisotropic Strain		•	•					
Thermal Ratcheting Based Anisotropic Strain		•	•					
Desktop & Cloud Stand-Alone Environments		•	•					
Stress-Based Automatically Generated Supports		•	•					
Part Distortion & Residual Stress (As-Built)		•	•					
Part Distortion & Residual Stress After Support Removal		•	•					
Distortion Compensation		•	•					
Blade Crash Detection		•	•					
Identification Of High Strain (Crack) Locations		•	•					
Layer by Layer Stress, Distortion & Blade Crash Visualizations		•	•					
Build File Readers for Multiple AM Machines		•	•					
Auto Queue Multiple Successive Simulations		•	•					
Input Strain Hardening Factor		•	•					
User Defined Support Import		•	•					
Subvoxel Material Density Assignment		•	•					
Additive Science								
Meltpool Dimensions			•					
Detailed Thermal History			▲					
% Porosity			•					
Sensor Measurement Predictions			▲					
* Additive Suite requires a Mechanical Enterprise license								

OPTICAL

	SPEOS Pro	SPEOS Premium PrepPost Package	SPEOS Enterprise	SPEOS Optical Part Design	SPEOS Optical Sensor Test	SPEOS HUD Design & Analysis Add-Ons	SPEOS Far Infrared Extension	SPEOS Optical Design Optimizer
General Solver Capabilities								
Monte-Carlo Forward Ray Tracing	•	•	•					
Monte-Carlo Backward Ray Tracing		•	•					
Deterministic Simulation	▲	•	•					
Spectral Propagation	•	•	•					
Polarisation propagation	•	•	•					
Dispersion	•	•	•					
Surface Diffusion	•	•	•					
Volumic Diffusion	•	•	•					
Virtual BSDF			•					
Photometry								
Intensity	•	•	•					
Illuminance	•	•	•					
3D Illuminance	•	•	•					
Luminance	▲	•	•					
3D Energy Density		•	•					
360° View - Observer		•	•					
360° View - Immersive		•	•					
Human Vision								
Dynamic Adaptation			•					
Glare Simulation			•					
High Dynamic Range Screen support			•					
Wavelength Range								
Visible (360nm - 830nm)	•	•	•					
UV (50nm-360 nm)		•	•					
Near IR (830nm - 2.5µm)		•	•					
Far Infra-Red (2.5µm - 100µm)							•	

OPTICAL

	SPEOS Pro	SPEOS Premium PrepPost Package	SPEOS Enterprise	SPEOS Optical Part Design	SPEOS Optical Sensor Test	SPEOS HUD Design & Analysis Add-Ons	SPEOS Far Infrared Extension	SPEOS Optical Design Optimizer
Optical Design								
Parabolic Surface	•	•	•					
TIR Lens	•	•	•					
Projection Lens	•	•	•					
Optical Lens				•				
Optical Surface				•				
Light Guide				•				
Sharp Cut-Off Reflector				•				
Poly-Ellipsoidal Surface				•				
Micro Optical Stripes				•				
Optical Sensors								
Field Of View					•			
Camera Sensor					•			
LiDAR Sensor					•			
Camera Sensor Post Processing					•			
Head-up Display								
HUD Optical Analysis						•		
HUD Optical Design						•		
HUD Visualisation						•		
Manufacturing Variation								
Target Specification								
Tolerance Study								
HPC - SPEOS								
Default Number of Cores	4	4	4					
Parallel Solving on Local PC	•	•	•					
Parallel Solving on Cluster	•	•	•					

OPTICAL

	SPEOS Pro	SPEOS Premium PrepPost Package	SPEOS Enterprise	SPEOS Optical Part Design	SPEOS Optical Sensor Test	SPEOS HUD Design & Analysis Add-Ons	SPEOS Far Infrared Extension	SPEOS Optical Design Optimizer
Simulation Preparation								
Source Group	•	•	•					
Geometry Group	•	•	•					
3D Textures	•	•	•					
Polarisation Plate		•	•					
Fluorescent Converter		•	•					
Sky		•	•					
Thermic Source							•	
Earth Atmosphere model							□	
Post Processing								
Virtual Lighting Controller		•	•					
Photometric Numerical Certification	•	•	•					
Colorimetric Analysis	•	•	•					
Spectral Analysis		•	•					
Light Expert	•	•	•					
Layer by Source		•	•					
Layer by Face		•	•					
Layer by Sequence		•	•					
Stray Light Analysis		•	•					
Layer by Polarisation		•	•					
Visibility & Legibility			•					
Night Vision Goggle							•	
Optimization								
Parameters	•	•	•					
Design of Experiment	•	•	•					
Design Optimisation								•
ANSYS Design Xplorer (2)	•	•	•					
optiSLang (2)	□	□	□					
Notes: (1) Not available for ANSYS SPEOS (2) Only for ANSYS SPEOS								

MATERIALS

	GRANTA MI	CES Selector	CES EduPack	ANSYS Mechanical	Online Subscription			
Materials Data Management								
GRANTA MI database - create 'gold source' system to store all of your materials information	•							
Support for specialist materials data types: Single point, multi-value, ranges, functional, equations	•							
Store meta-data and context for materials: Documents, images, multimedia, hyperlinks								
Traceability for all materials data	•							
Access control	•							
Version control	•							
Large file storage (via link to Binary Large Object stores)	•							
Multiple unit system support	•	•	•					
Admin UI to setup and configure your materials database	•							
Template data structures for key materials use cases: Metals, Composites, AM, Restricted Substances	•							
Toolbox for import, export, manipulation of materials data	•							
Web app for fast upload of materials data	•							
Browse materials data	•	•	•					
Edit and update materials data	•	▲	▲					
Search and query materials data	•	•	•					
Represent property data in interactive charts, where relevant	•	•	•					
Comparison tables and comparison charts	•	•	•					
Generate reports on selected materials records	•							
Export data, e.g., to CAE, Excel	•	•	•					
Personalize system homepages and user profiles	•							
Configure web app UI for specific user groups	•							

MATERIALS

	GRANTA MI	CES Selector	CES EduPack	ANSYS Mechanical	Online Subscription			
Materials Data Analysis								
Interactive plotting of data: scatter, contour, error bar, surface, plotyy, semilogx, semilogy, loglog	•							
Curve fitting	•							
Cross-table comparisons of materials data	•							
Scripting Toolkit for Python and MATLAB	•							
Workflow Management								
Design and develop workflows	•							
Execute workflows - processes, approvals, notifications	•							
Integration with CAD, CAE, PLM								
MI:Materials Gateway embedded app in CAE: ANSYS, Altair, HyperMesh, NX	•							
MI:Materials Gateway embedded app in CAD: Creo, NX, Catia	•							
MI:Materials Gateway embedded app in PLM: Windchill, Teamcenter	•							
MI:Enterprise Connect data synchronization for PLM: Teamcenter, 3DEXPERIENCE	•							
Where used? reporting capability for PLM	▲							
Restricted Substances								
Data structures to support restricted substance analytics: store specs, materials, legislations, substances, BoMs	•							
Report on restricted substance compliance for materials	•							
Build and edit Bills of Materials within a web app	•							
At-a-glance restricted substance compliance for a BoM	•							
Run restricted substance reports across multiple BoMs	•							
Integrate restricted substance reporting with PLM, CAD	▲							

MATERIALS

	GRANTA MI	CES Selector	CES EduPack	ANSYS Mechanical	Online Subscription			
Materials Selection & Related Tools								
CES database - encyclopedia of materials property data on your PC/laptop		•	•					
Interactive 'Ashby charts' of materials property space		•	•					
Systematic materials selection methodology		•	•					
Filter materials based on property profile	•	•	•					
Filter materials based on links to other materials / processes / objects	•	•	•					
Materials substitution & equivalency - 'Find Similar'	•	•	•					
Performance Index Finder		•	•					
Engineering Solver - convert engineering requirements to materials properties		•						
Hybrid Synthesizer - predict properties of hybrid materials		•	•					
Part Cost Estimator		•	•					
Selection reports & export of charts for presentations		•	•					
Eco Audit for a product or conceptual design		•	•					
Edit a CES database (CES Constructor)		•						

MATERIALS

	GRANTA MI	CES Selector	CES EduPack	ANSYS Mechanical	Online Subscription			
Reference Data Library								
MaterialUniverse - Granta generic data for selection	•	•	•					
ASM Medical Materials Database	•				•			
ASME Boiler & Pressure Vessels Code	•	•						
CMH-17 composites data	•	•	•					
Coatings Data Module	•	•						
Composites Design (AGATE & NCAMP project data)	•							
Composites QED (AGATE & NCAMP project data)	•							
ecoinvent Key Materials Indicators	•	•						
ESDU MMDH aerospace alloys	•	•						
Firehole Composites	•	•						
Global Powder Metallurgy	•	•						
Granta Materials Data for Simulation				•				
Human Biological Materials	•							
JAHM Curve Data	•	•						
M-Base Plastics	•	•	•					
MI-21 Metals & Consumables	•	•						
MMPDS aerospace alloys	•	•	•					
NCS colors database	•							
NIMS Creep & Fatigue data	•							
Product Risk Database	•							
Pantone colors	•							
Prospector Plastics	•	•						
Prospector Plastics and UL Yellow Cards	•		•					
RAL Colorsets	•							
Senvol Database (Additive Manufacturing)	•	•						
Sheet Steels	•	•						
StahlDat SX (European Steels Register)	•	•						
SteelSpec (UK Steels)	•	•						

MATERIALS

	GRANTA MI	CES Selector	CES EduPack	ANSYS Mechanical	Online Subscription			
Services								
GRANTA MI Getting Started Services	•							
GRANTA MI Implementation Services	•							
Data Migration Services	•							
Product training / workshops	•	•	•					
Product support	•	•	•					
MDMC Consortium membership	•							
EMIT Consortium membership	•							
AutoMatIC Consortium membership	•							
Teaching Resources								
CES EduPack Level 1-3 teaching databases			•					
The Elements teaching database			•					
Materials Science & Engineering teaching database			•					
Bioengineering Teaching Database			•					
Architecture Teaching Database			•					
Sustainability teaching database			•					
Lecture units			•					
Student exercises			•					
Videos			•					
Micro-projects			•					
White papers			•					
Case studies			•					
Active learning toolkits			•					
Data booklets			•					
Sample project files			•					
Phase Diagram Tool			•					