

# ABAQUS/CAE 6.14 DATA SHEET

## GEOMETRY

### Geometry Creation Tools

- Solid features
  - Extrude
  - Loft
  - Revolve
  - Sweep
  - Draft, twist, and pitch
  - Fillet/chamfer
- Cut features
  - Extrude
  - Loft
  - Revolve
  - Sweep
  - Circular hole
- Shell features
  - Planar surface
  - Extrude
  - Loft
  - Revolve
  - Sweep
  - Fillet/chamfer
- Wire features
  - Planar
  - Poly line
  - Spline
  - Fillet
  - From edge
- Mirror feature
- Datum geometry
- Partitioning tools
  - Edge
  - Face
  - Cell

### 2-D Sketcher

- Point
- Line
- Circle
- Rectangle
- Arc
- Fillet
- Spline
- Ellipse

### Sketch Tools and Options

- Constraints
- Parameters
- Translate/rotate/mirror/scale
- Trim/extend/break/merge
- Project edges

- Offset entities
- Linear/radial pattern
- Dimensioning
- Construction geometry
- Sketch origin placement
- Sketch cleanup
- Sketch import/export

### Geometry Import/Export

- CAD Associative Interfaces (add-on modules)
  - CATIA V6
  - CATIA V5
  - SolidWorks
  - Pro/ENGINEER
    - CAD feature parameter update
- CAD geometry translators (add-on modules)
  - CATIA V4
  - I-deas NX
  - Parasolid
- Assembly import
- Neutral format import
  - SAT, IGES, STEP, or VDA
- Import of parts from Abaqus files
  - Input (.inp)
  - Output database (.odb)
  - Linear dynamics (substructure) data (.sim)
- Geometry export
  - SAT, IGES, STEP, or VDA

### Model Import/Export

- Model database (.cae) files
- Models from Abaqus input (.inp) files
- Nastran bulk data files
- Ansys input file import
- Wavefront (.obj) export

### Geometry Edit Tools

- Automated repair during import
- Stitch edges
- Repair small/invalid edges
- Merge edges
- Remove redundant entities
- Remove wire edges
- Remove/cover/replace faces
- Repair small faces/slivers/face normals

- Offset faces
- Extend faces
- Blend faces
- Solid from shell
- Convert to analytical
- Convert to precise
- Faces from element faces

### Midsurfacing

- Offset/extend/blend faces (geometry edit tools)
- Assign thickness and offset

## ASSEMBLY

### Instance Tools

- Create/suppress/restore/delete
- Linear/radial pattern
- Translate/rotate
- Replace
- Model instancing

### Merge/Cut Tools

- Geometric parts
- Merge orphan mesh
- Merge geometric and orphan mesh parts

### Sets and Surfaces

- Geometric sets containing vertices, edges, faces, skins, or cells
- Orphan mesh sets containing nodes or elements
- Native mesh sets and surfaces
- Surface regions
- Merge sets/surfaces
  - Union
  - Intersection
  - Difference

### Model Display

- Display groups
- Selection tools
- Pick filters
- Translucency control
- View cuts
- View center setting

### Color Coding

- Display model geometry and mesh elements in configurable colors
- Color by attribute

## PROPERTIES

### Material Models

- General
- Elasticity
- Electrical properties
- Mass diffusion
- Magnetic properties
- Plasticity
- Electromagnetic properties
- Pore fluid properties
- Thermal properties
- Gasket
- Acoustic medium
- Damage initiation criteria and evolution
- Brittle cracking
- Equation of state (EOS) materials
- User materials
- Hyperelastic/viscoelastic material evaluation
- Anisotropic hyperelasticity

### Materials Management and Calibration

- User libraries
- Import/process test data and define calibration behaviors

### Sections

- Solid
  - Homogeneous
  - Composite
  - Eulerian
  - Generalized plane strain
- Shell
  - Homogeneous
  - Composite
  - Membrane
  - Surface (rebar layers)
  - Shell offset
- Beam
  - Beam
  - Truss
  - Other
  - Gasket
  - Cohesive
- Gasket
- Beam section profiles
  - Profile library
  - Arbitrary
  - Generalized
  - Tapered

# ABAQUS/CAE 6.14 DATA SHEET

- Fluid section
- Beam profile and shell thickness rendering
- Electromagnetic, solid section

## Composites

- Ply layup definition and management
- Layer orientation and thickness distributions
- Ply stack plots
- Classic laminate theory
- Nonlinear progressive damage and failure
- Ply-based output request

## Orientations

- Beam section
- Material
- Rebar
- Shell normal
- Surface- and direction-based

## Special Engineering Features

- Fasteners
  - Point-based
  - Discrete
  - Assembled
  - Points import and definition
  - Projection, offset, and patterning tools
- Skins and stringers
- Inertia
  - Point mass/inertia
  - Nonstructural mass
  - Heat capacitance
- Springs/dashpots

## Queries

- Point/node/distance/angle
- Geometry diagnostics
- Section assignment

## ANALYSIS FEATURES

### General, Linear, and Nonlinear Analyses

- Static stress/displacement analysis
- Viscoelastic/viscoplastic response
- Dynamic stress/displacement analysis
- Heat transfer analysis (transient and steady-state)
- Mass diffusion analysis (transient and steady-state)
- Direct cyclic
  - Low-cycle fatigue
- Acoustic analysis
- Coupled problems
  - Thermo-mechanical
  - Thermo-electrical
  - Piezoelectric

- Coupled thermal-electrical-structural
- Pore fluid flow-mechanical
- Thermo-mechanical mass diffusion
- Shock and acoustic structural
- Cosimulation
  - Abaqus/Standard to Abaqus/Explicit cosimulation
  - Abaqus/CFD to Abaqus/Standard or Abaqus/Explicit
    - Fluid structure interaction (FSI)
    - Conjugate heat transfer (CHT)
- Flow analysis (incompressible)
  - Laminar and turbulent

## Linear Perturbation Analyses

- Static stress/displacement analysis
  - Linear static stress/displacement analysis
  - Eigenvalue buckling estimates
- Dynamic stress/displacement analysis
  - Natural frequency extraction
  - Complex eigenvalue extraction
  - Transient response via modal superposition
  - Steady-state response to harmonic loading
  - Response spectrum analysis
  - Random response analysis
- Substructure Generation
- Electromagnetic, time harmonic

## Multi-Step Setup

- Step suppression

## Analysis Controls

- General solution controls
- Solver controls
- Adaptive mesh domain
- Adaptive mesh controls

## Output Requests

- Field output
- History output
- Integrated output sections
- Contact status output
- Restart, diagnostic, and monitor output
- Sensors

## CONSTRAINTS AND INTERACTIONS

### Contact

- Automatic contact detection and setup

- General contact (Abaqus/Standard and Abaqus/Explicit)
- Surface-to-surface contact
- Self-contact
- Contact deactivation/reactivation

## Contact Properties

- Mechanical
  - Normal
  - Tangent
  - Damping
  - Clearance-dependent
  - Surface-based cohesive contact and damage
  - VCCT for Abaqus/Standard
- Thermal
  - Conductance
  - Heat generation
  - Boundary radiation
- Film coefficient

## Interactions

- Cyclic symmetry
- Cavity/surface radiation
- Surface/concentrated film condition
- Elastic foundations
- Acoustic impedance
- Actuator/sensor
- XFEM crack growth
- Model change
- Pressure penetration
- Abaqus/Standard-Abaqus/Explicit co-simulation boundary
- Fluid-Structure co-simulation boundary
- Fluid cavity

## Constraints

- Tied surfaces
- Equations
- Display body
- Rigid and isothermal bodies
- Coupling
- Multi-point constraints
- Shell-to-solid coupling
- Embedded regions

## Connectors

- Basic
  - Translational
  - Rotational
- Assembled/complex
- Connector and coincident builder

## Boundary Conditions

- Nodal
- Velocity
- Acceleration
- Velocity/angular velocity
- Submodel
- Pore pressure

- Electric potential
- Temperatures
- Fluid inlet/outlet
- Fluid wall condition
- Spatially varying boundary conditions
- Eulerian (inflow/outflow/motion)
- Magnetic
- Electromagnetic loads

## Predefined fields

- Velocity/Temperature/Hardening
- Initial state (from previous analysis)
- Material assignment
- Fluid density/thermal energy/turbulence/velocity
- Initial stress
- Geostatic stress/void ratio/saturation/pore pressure

## Loads

- Mechanical
- Bolt load
- Thermal
- Acoustic
- Fluid
- Electrical
- Mass diffusion
- Fields
- Multiple load cases
- Spatially varying loads
- Electromagnetic properties

## Analytical and Discrete Fields

- Analytical fields for prescribed conditions
- Mapped fields
- Discrete fields for prescribed conditions, orientations, offset, and shell thicknesses
  - Volume fraction discrete field

## Amplitude Curves

- Tabular
- Equally-spaced
- Periodic
- Modulated
- Decay
- Solution-dependent
- Smooth-step
- Actuator
- User

## Fracture Mechanics

- Contour integral
- Extended finite element method (XFEM)
- Seams and cracks

## MESHING

### Mesh Seeding

- Global seed size

# ABAQUS/CAE 6.14 DATA SHEET

- Curvature-based refinement
- Minimum element size
- Edge seed
  - Uniform
  - Biased
  - By size
  - By number

## Structured Meshing

- 1-D
- 2-D regions
- 3-D solid regions

## Surface Meshing

- Automatic quadrilateral meshing Medial axis
  - Advancing front
- Automatic triangular meshing
- Mapped meshing
- Mesh pattern copying

## Solid Meshing

- Fully automatic tetrahedral meshing
- Fully automatic swept meshing
  - Medial axis
- Bottom-up hexahedral meshing
- Boundary layer meshing

## Virtual Topology

- Combine faces/edges
- Automatic creation/restore tools

## Element Quality

- Statistical and analysis checks
- Stable time increment
- Maximum allowable frequency
- Mesh deviation computation

## Queries

- Mass and mesh
- Stable time increment
- Maximum allowable frequency
- Mesh stack orientation
- Mesh gap/intersections
- Free/non-manifold edges
- Unmeshed regions

## Mesh Edit

- Node
  - Create
  - Edit
  - Drag
  - Delete
  - Merge
  - Adjust midside
  - Project
  - Renumber
- Element
  - Create

- Delete
- Flip surface normal
- Orient stack direction
- Collapse/split edge
- Swap diagonal
- Split/combine elements
- Renumber
- Merge/subdivide layers
- Offset (create shell/solid layers)
- Automatic collapse of sliver edges
- Convert triangular elements to tetrahedral elements
- Refine 2-D planar meshes

## Adaptive Remeshing

- Automatic and manual

## Element Library

- Beam
- Truss
- Connector
- Shell
- Membrane
- Cohesive
- Continuum shell
- Continuum
- Elbow
- Gasket
- Pipe
- Eulerian
- Cylindrical
- Fluid
- Electromagnetic

## JOB MANAGEMENT

- Submission
- Parallel computing options
- Restart
- Monitor and view job files
- Co-execution
  - Abaqus/Standard to Abaqus/Explicit
  - Abaqus/CFD to Abaqus/Standard or Abaqus/Explicit

## VISUALIZATION OF MODEL AND OUTPUT DATA

- Model plotting
- Model and results data
- Deformed, contour, vector/tensor, path, extreme value, ply-stack, through thickness, tick mark, overlay, material orientation, and X-Y plots
- Loads display
- View manipulation, linked viewports, view center setting and camera options
- Multiple viewports and view synchronization
- Automatic color coding

- View cuts
  - Planar/cylindrical/spherical
  - Isosurface
  - Resultant force/moment output
  - Multiple cuts
  - Free bodies at all view cuts
- Beam profile and shell thickness display
- Results display on beam sections
- Free-body cuts
- Nodal force plot, history plot and multiple free-body display
- Animations
  - Movie import/export and overlay
- Mirroring and patterning of symmetric models
- Failed element removal
- Stress linearization
- Streamlines
- X-Y data operators and data filtering
- Tabular data reports
- Probe/query tools and annotations
- Network connection to remote output databases
- Diagnostics and constraints visualization
- Automatic report generation
- Abaqus/Aqua gravity wave visualization
- DEM visualization

## PROCESS AUTOMATION

- Python scripting
- GUI toolkit
- Macro manager
- Plug-ins architecture
- Python Development Environment (PDE)

## PLUG-INS

- Examples
- Interactive plug-in GUI builder (RSG)
- Script upgrade
- Excel utilities
- NVH postprocessing
- Adaptivity plotter
- ODB combine tool
- STL import/export

## PRINTING AND OUTPUT

- PS/EPS/PNG/TIFF/SVG
- 3D XML/VRML
- Hardcopy

## DOCUMENTATION AND ONLINE HELP

- User's Manual

- Getting Started Manual
- Release Notes

## SUPPORTED PLATFORMS

- Windows/x86-64
- Linux/x86-64

## PRODUCT SUPPORT

- Maintenance and support
- Quality Monitoring Service
- Installation
- Training and users' meetings

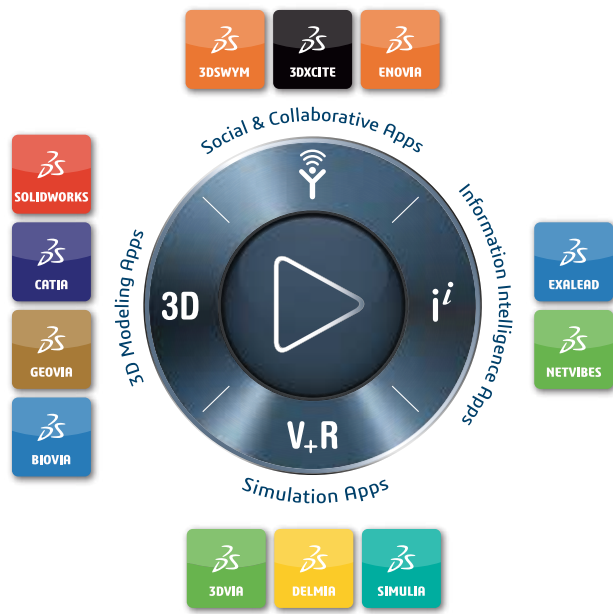
## RELATED PRODUCTS

### Abaqus/CAE Topology Optimization Module (ATOM), CAD Associative Interfaces, and Geometry Translators

- CAD Associative interfaces for CATIA V6, CATIA V5, SolidWorks, and Pro/ENGINEER
  - Enables synchronization of CAD and CAE assemblies and seamless updates
- Geometry translators for CATIA V4, I-deas NX, and Parasolid

Our **3DEXPERIENCE** Platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE** Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 170,000 customers of all sizes in all industries in more than 140 countries. For more information, visit [www.3ds.com](http://www.3ds.com).



©2014 Dassault Systèmes. All rights reserved. 3DEXPERIENCE, the Compass icon and the 3DS logo, CATIA, SOLIDWORKS, ENOVIA, DELMIA, SIMULIA, GEOVIA, EXALEAD, 3D VIA, BIOVIA, NETVIBES, and 3DXCITE are commercial trademarks or registered trademarks of Dassault Systèmes or its subsidiaries in the U.S. and/or other countries. All other trademarks are owned by their respective owners. Use of any Dassault Systèmes or its subsidiaries trademarks is subject to their express written approval.