# ◆ ALGOR.

# CAD Support

ALGOR's InCAD technology provides direct CAD/CAE data exchange and full associativity with most CAD solid modelers and for all analysis types, allowing users to simply choose the analysis tools they need. Our wide range of simulation capabilities includes static stress and Mechanical Event Simulation (MES) with linear and nonlinear material models, linear dynamics, fatigue, steady-state and transient heat transfer, steady and unsteady fluid flow, electrostatics and full multiphysics. All analysis types work within FEMPRO, ALGOR's easy-to-use, single user interface for finite element modeling, results evaluation and presentation.
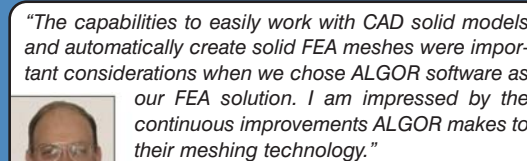
## MODELING

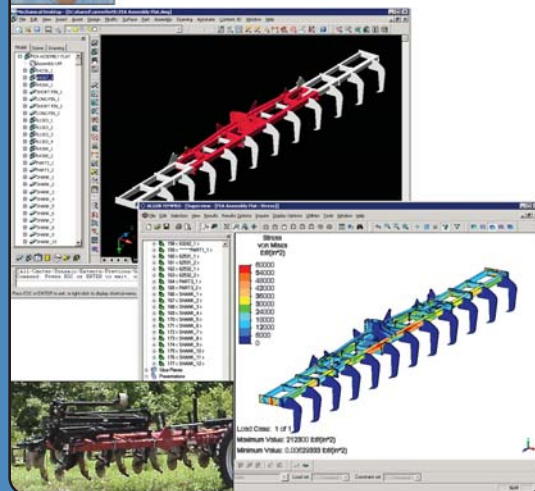A suite of modeling capabilities includes:

- InCAD technology for direct CAD/CAE data exchange with:
  - Alibre Design
  - Autodesk Inventor
  - Inovate
  - IronCAD
  - KeyCreator
  - Mechanical Desktop
  - Pro/ENGINEER
  - Rhinoceros
  - Solid Edge
  - SolidWorks
- full associativity with each design change for:
  - Alibre Design
  - Autodesk Inventor
  - Inovate
  - IronCAD
  - Pro/ENGINEER
  - Rhinoceros
  - Solid Edge
  - SolidWorks
- support for CAD universal files including 3-D solid models in the ACIS, IGES, STEP and STL file formats and 2- and 3-D wireframe geometry in the CDL, DXF and IGES file formats
- a user-controlled feature suppression tool with the option to suppress details either manually or based on feature size
- Superdraw 2- and 3-D sketching tools
- 2- and 3-D parametric structured meshing
- automatic, unstructured 2- and 3-D meshing
- automatic, intelligent, feature-based mesh refinement and point-and-click definition of areas where a finer mesh is desired
- a midplane mesh engine for reducing thin, solid features in a CAD model to plate/shell elements with automatic handling of parts, assemblies, multi-thickness regions and mixed element type models
- an automatic, hex-dominant hybrid solid meshing tool to produce higher quality elements on the first pass and more accurate results



*"ALGOR helped us keep our commitment to high-quality, innovative and robust games that challenge game users but won't break during use."*

John Rotharmel
Stern Pinball, Inc.

Pinball Machine Drop Target
von Mises Stress
Time = 0.011 s

**John Rotharmel of Stern Pinball modeled a pinball and plastic drop-target assembly in SolidWorks (upper left) and used ALGOR Mechanical Event Simulation to analyze the action of the pinball striking the drop target (lower right). The ALGOR results confirmed that the part needed strengthened before use in a new pinball machine.**



*"The capabilities to easily work with CAD solid models and automatically create solid FEA meshes were important considerations when we chose ALGOR software as our FEA solution. I am impressed by the continuous improvements ALGOR makes to their meshing technology."*

Richard R. Anderson
Unverferth Manufacturing Company, Inc.

**Engineers at Unverferth Manufacturing created a 177-part assembly of the 12-row Ripper-Stripper® subsoiler in Mechanical Desktop (upper left) and used ALGOR linear static stress analysis (lower right) to optimize the thickness, shape and material of the frame, hitch and hinge components to reduce high stresses.**

# CAD SUPPORT FEATURES

## Modeling

- InCAD technology for direct CAD/CAE data exchange with Alibre Design, Autodesk Inventor, Inovate, IronCAD, KeyCreator, Mechanical Desktop, Pro/ENGINEER, Rhinoceros, Solid Edge and SolidWorks
- Full associativity with each design change for most CAD solid modelers
- CAD support for 3-D solid models in ACIS, IGES, STEP and STL file formats
- CAD support for 2- and 3-D wireframe geometry in CDL, DXF and IGES file formats
- Ability to create a CAD Transfer Utility installation package to provide direct data exchange even when ALGOR and the CAD package reside on separate computers
- Part names, part colors and unit of length from a CAD solid model are captured in the FEA model
- Superdraw 2- and 3-D sketching tools including capabilities to draw points, lines, rectangles, arcs, circles, splines and tangent lines and modify sketch objects with commands including copy, divide, fillet, intersect, rotate, mirror, move, parallel, trim/extend and delete
- Complex surface modeling
- Joint Creation Utility for automatically creating pin and ball joints based on either two specified endpoints or a mid-point
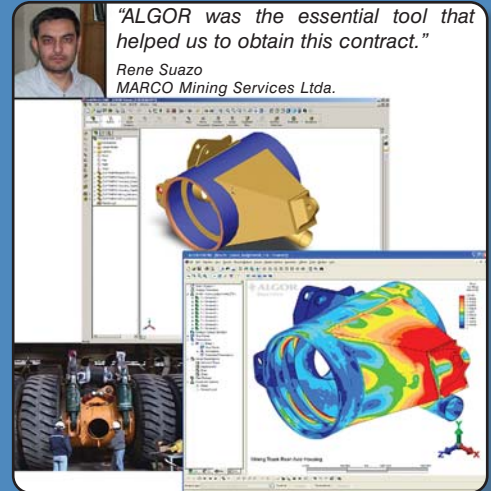
## Meshing

- 2- and 3-D parametric, structured meshing options for 3-point triangular, 4-point rectangular, 8-point 3-D, between two objects and 4-object 3-D meshing
- Automatic, unstructured 2-D meshing
- Automatic, unstructured 3-D quadrilateral or triangular surface mesh generation and refinement
- Automatic, intelligent, feature-based mesh refinement and point-and-click definition of areas where a finer mesh is desired
- Mesh seed points for specifying locations of nodes (e.g., to apply loads and constraints)
- A midplane mesh engine for reducing thin, solid features in a CAD model to plate/shell elements with automatic handling of parts, assemblies, multi-thickness regions and mixed element type models
- Automatic, hex-dominant hybrid solid meshing to produce higher quality elements on the first pass and more accurate results

## User Interface

- See the FEMPRO product data sheet (Part No. 3201.326) for the complete list of user interface features

*Note: For complete details on our CAD support features, see the "Products" section of www.ALGOR.com. ALGOR's web site contains additional information about our wide range of simulation capabilities including static stress and Mechanical Event Simulation (MES) with linear and nonlinear material models, linear dynamics, fatigue, steady-state and transient heat transfer, steady and unsteady fluid flow, electrostatics, full multiphysics and piping.*



*"ALGOR was the essential tool that helped us to obtain this contract."*
Rene Suazo
MARCO Mining Services Ltda.

***Using SolidWorks and ALGOR, engineer Rene Suazo of MARCO Mining verified that the cause of a failure in the axle housing of a mining truck was due to very high stresses caused by torsional loads.***



*"Given its CAD compatibility and portability, ALGOR is an essential research tool."*
Andrew Farke
Stony Brook University

***As part of doctoral dissertation research at Stony Brook University, Andrew Farke used SolidWorks and ALGOR to model and analyze the effects of strain on the brainpans of goat skulls.***

### ALGOR CUSTOMERS SAY

*"I chose ALGOR because it is a complete package with CAD support, meshing and easy-to-use analysis tools."*
C. Scott Nelson
Delphi Corporation

*"Full associativity is a very useful addition to ALGOR's InCAD technology because it speeds up the iterative analysis process, in which I typically evaluate several geometric variations on a pre-production design."*
Mike Hagland
Gyrus Medical, Ltd.



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