

## A New CADAM CAE Workstation Product

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### Abstract

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CADAM, INC, a leader in the CAD/CAM/CAE marketplace for over 20 years, is now positioned to increase its strong presence with the development of a new full featured workstation CAE product. At the core of this new product will be direct support of MSC NASTRAN including the latest release. As this new product is not a derivative of the old CADAM 3D Mesh product, but a completely new development, it will be able to take advantage of the latest hardware and software support. This paper provides a comprehensive overview of this product.

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### Introduction

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As one of the original developers of CAD/CAM technology, CADAM has provided manufacturing with production design software tools for many years. Early in this development cycle, 3D wireframe capability was introduced along with surface and FEM analysis preprocessing support. Since manufacturing was the focus of the company, however, development of the 3D MESH product, in particular, languished until more recently when a number of enhancements and interfaces were added.

Currently, CADAM's mainframe 3D MESH product provides strong support for MSC/NASTRAN users in both pre- and post-processing for FEM analysis. The latest available (Release 21.0) version provides powerful and easy to use mesh geometry construction, including

meshing of arbitrary surfaces and general projection tools. The ability to work with all 2D and 3D geometry in a natural way provides the analyst/designer with a great deal of flexibility. Display prisms, a wide variety of display options, easy 3D manipulation, use of 2D views, panel checking, attribute support, MSC/NASTRAN elements, user definable elements, and more provide a productive environment for FEA pre-processing. Postprocessing allows direct access to the MSC/NASTRAN results database for presentation of results as shaded stress contour plots or deformed geometry overlays. These results may be permanently stored as CADAM models for future use.

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## Requirements

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Extensive customer feedback over the past few years has shown that any MCAE product must:

- (1) Provide significant pre- and post-processing function,
- (2) Be easy to use, yielding good cost benefits,
- (3) Run on a wide range of platforms, both workstation and mainframe,
- (4) Provide good data access flexibility both internally and externally - the ability to move data around in a "transparent" manner is critical.

As the necessity for supporting more than mainframe environments crystallized to support (3), it became clear that there was also an opportunity to satisfy customer requirements in all the other areas. The decision was then made to build a new CAE product which satisfied the these four major requirements. There follows a summary of the first release of this product.

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New CAE Product Summary

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(1) Function

Pre-processing

Geometry construction

Full range of CADAM's industry leading capabilities

Mesh Generation

MAPMESH for mapping 3D surfaces

Pierce and projection capabilities

Symmetry support

Node spacing

Copy by rigid motions (automatic renumbering)

Supports full range of MSC/NASTRAN elements and allows the use of arbitrary user defined elements

Allows construction in local coordinates

Generates PCOMP cards for laminate simulation

Loads

Nodal, concentrated & distributed beam, uniform pressure, gravity, temperature, nonuniform traction

Constraints

Including multipoint

Material Library

Stores Young's Modulus, etc.

Generates isotropic, anisotropic and orthotropic material properties

Standard materials provided, modifiable by user

Property Table

Provides material densities

User modifiable

Case Control

Case combinations

Supports MSC/NASTRAN conventions

## Post-processing

Deformed Geometry

Results are automatically displayed on deformed mesh

Color shaded stress contour plots

Fringe or smooth, with contours or without, user definable stress intervals as percentages of max and min stress, shaded display of ROD, BAR and BEAM elements

Direct access to MSC/NASTRAN database

User may query the MSC/NASTRAN database and select exactly the results to be displayed in CADAM

Tabular display of data and XY Plots

On line display with CADAM plotting available

## (2) Ease of Use

Manipulation

Long a CADAM strength - an extensive suite of tools

Groups/Layers

Groups are supported throughout the product to greatly simplify most operations by compartmentalizing information

Checking

Verification includes coincident node checks, checks for plate and solid distortion, free edges, aspect ratios, out of face planes and more

Enhanced display options

Loads, constraints, highlighted picks, complete color control by user, shrink, show-no-show, clear symbols for one dimensional elements (springs, masses, dampers), shaded and hidden line representations, etc.

Pop-up and parameter panels

To minimize menu depth, and user interaction while maximizing access to necessary function, data and parameters, a new dimension for CADAM users

High Performance

CADAM consistently been the vendor providing the fastest response time and most reliable data management facilities - CADAM is a PRODUCTION product

### (3) Multiplatform Support

#### Mainframe

CADAM has historically had the strongest support for the full range of IBM mainframes and products

#### Workstation

Availability on the leading vendors' hardware

#### Compatibility

The user may move data among all currently supported platforms as well as maintain upward compatibility with all previous CADAM 3D MESH data

#### Standards

This product supports the following industry standards to provide hardware and software independence for the user

UNIX - operating system

PHIGS - graphics

IGES - data

### (4) Flexibility

#### Internal

##### Solver Libraries

Fully supports MSC/NASTRAN and maintains data to allow users of other analysis products interactive access their data types

##### User Profiles

Allows the user to keep his own set of working data so that the system is automatically seeded to reflect his needs - there can be multiple profiles per user or project

##### Availability of both 2D and 3D geoemtry

Depending on the experience and needs of the customer both these environments are available

#### External

## Universal input and output files

Allows the portation and importation of CADAM data to and from other analysis systems

## Direct MSC/NASTRAN support

MSC/NASTRAN is the analysis package for which we directly support all interfaces

## User programmable application interface

The user can construct his own CADAM interactive applications using IUE facilities

## Kinematics and Plastic Mold support

Support for the leading kinematics and injection mold design products (currently available in Release 21.0)

## IGES

Commitment to IGES as the industry standard for porting data across all environments