



### Automotive Engineering Software

In recent years, automotive equipment manufacturers have greatly increased their use of computer techniques in designing, engineering and manufacturing autos, trucks and other vehicles. Ford Motor Company, for example, completed in 1979 a multimillion dollar facility at Dearborn, Michigan, which houses under one roof all of Ford's rapidly expanding engineering computer activities. Ford's North American Automotive Operations has taken advantage of computer programs supplied by NASA's Computer Software Management and Information Center (COSMIC)<sup>®</sup>. Located at the University of Georgia, COSMIC maintains a large library of programs developed by NASA and other technology-generating government agencies. They are made available to industry at a fraction of their original cost, saving industry the time and expense of developing entirely new programs.

Ford has made particular use of the NASTRAN<sup>®</sup> (NASA Structural Analysis) program, which electronically analyzes a computerized design and predicts its reaction to many different conditions of stress and strain. For example, Ford used NASTRAN to analyze the combined torsional, bending and axial loading conditions of a new automobile (above left); as a result of the analytical solutions, fewer prototypes had to be built and tested, with resultant reduction of development time and cost. Company engineers have used NASTRAN for such other jobs as auto frame buckling and stress analysis (computer representation top right); defining high stress points and vibrational characteristics of sheet

metal components in passenger car and truck bodies; and static analyses of various suspension components.

Ford's Turbine Engineering Department has made use of other COSMIC programs in analyzing designs of metal and ceramic turbines intended for automotive applications. Example: engineers applied a COSMIC Fortran program to analysis of a cast aluminum turbine (above). A computer representation of the stress on a turbine blade is shown below.

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