

Computer Programs For Construction NASA and its contractors have long used computer design techniques in the construction of airplanes and spacecraft. Computers enable engineers to make mathematical models of an aerospace vehicle and simulate its flight. In this manner, they can study the performance and structural behavior of many different designs before making a decision as to final configuration.

The technology is widely applicable to non-aerospace use. NASA has developed a number of general purpose computer programs that are available to the civil sector. Best known and most widely used is NASTRAN, an acronym for NASA Structural Analysis Program. Developed by Goddard Space Flight Center and now being maintained by Langley Research Center, NASTRAN electronically analyzes a computerized design and predicts how it will react to many different conditions of stress and strain. It can, for example, predict the effects

of high temperature on metal components. By minimizing error in the design process, NASTRAN makes possible better, safer, lighter structures and offers substantial savings in reduced development time and materials requirements.

NASTRAN and other computer programs are available to private industry through NASA's Computer Software Management and Information Center (COSMIC) at the University of Georgia. COSMIC maintains a library of NASA computer programs and those of other technology-generating federal agencies. The programs are offered for sale at a fraction of their original cost and in most instances the return is many times the investment; sometimes savings run to several million dollars. These computer programs represent one of the broadest areas of economic benefit from the secondary use of aerospace technology. They have found special utility in the field of construction; some typical applications are shown on these two pages.

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Piping Flexibility A NASA computer program aids Hudson Engineering Corporation, Houston, Texas, in the design and construction of huge petrochemical processing plants like the one shown, which is located at Ju'aymah, Saudi Arabia. The pipes handling the flow of chemicals are subject to a variety of stresses, such

as weight and variations in pressure and temperature. Hudson Engineering uses a COSMIC piping flexibility analysis computer program to analyze stresses and insure the necessary strength and flexibility of the pipes. This program helps the company realize substantial savings in reduced engineering time.