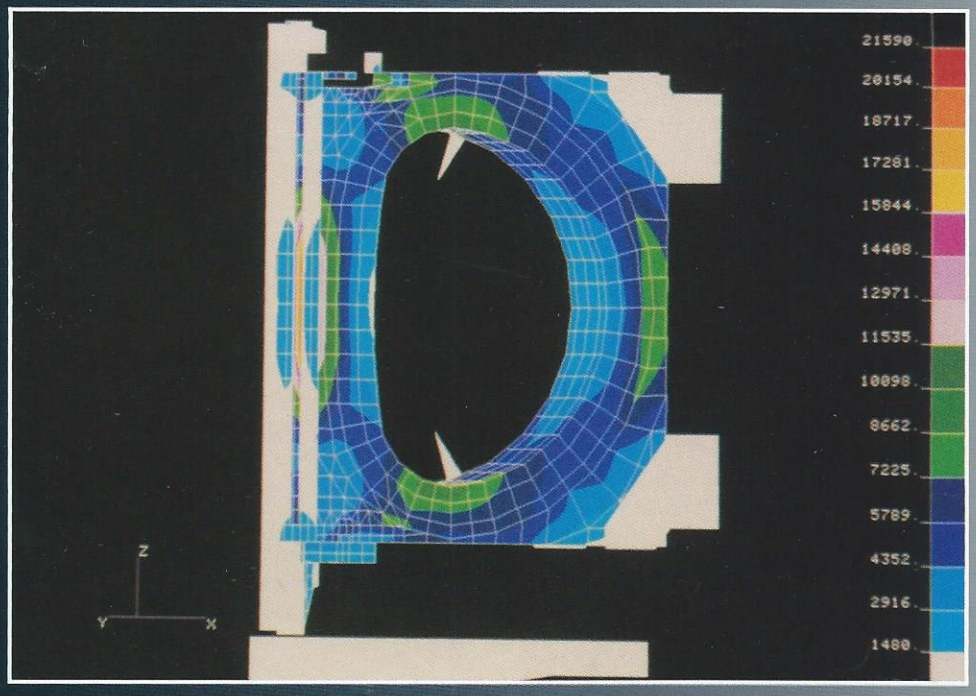
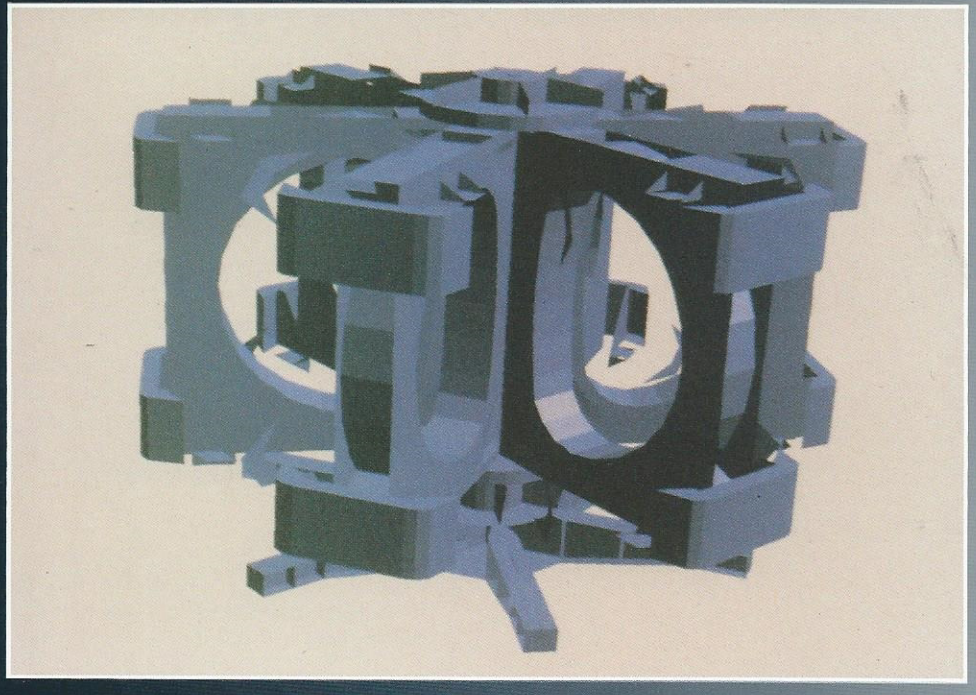
The Imagined Becomes a Reality...





Large-scale Modeling

Cray supercomputers play an important role in the design and analysis of large-scale engineering problems. As the complexity of these problems grows, the sophistication of graphic tools must also grow, because graphics postprocessing is crucial for examining analysis results. Cray systems provide an efficient and flexible environment for moving from analysis to images.

The power of Cray supercomputers for large-scale engineering and scientific modeling was recently illustrated with the analysis of a large fusion reactor design. Oak Ridge National Laboratory was studying several design proposals for a multi-billion-dollar nuclear fusion reactor. One design, often referred to as a Tokamak, contains six magnetic coils which create a toroidal magnetic field which will contain the extremely hot fusion plasma.

On a CRAY X-MP/48 supercomputer, MSC/NASTRAN was used to calculate stresses created from the enormous magnetic forces. High-speed Cray graphics were then used to understand better how this complex structure behaves under such tremendous loads. In the image at upper left, the MSC/NASTRAN output is displayed with the PATRAN postprocessor, and areas of high stress are shown, providing new insight into the performance of this complex model.

To display the complex structure of the Tokamak even better, MOVIE.BYU was then used to produce detailed shaded color images. Using MOVIE.BYU, the full, six-coil Tokamak model, containing over 38,000 elements (the largest MOVIE.BYU image calculated to date), was quickly produced; this is the image at lower left. Later, engineers from Oak Ridge "X-rayed" the inner structure of the MSC/NASTRAN model, using the transparency option of MOVIE.BYU. The transparency option allows engineers to examine the modeling and interaction of interior portions of structures.

Imagine the large-scale models that you could analyze with a Cray supercomputer!

Credit: John Clinard, Oak Ridge National Laboratory

Making the Imagined a Reality. . .

Making the imagined a reality has become commonplace using Cray supercomputers. Previously insolvable problems in the aerospace, petroleum, and automotive industries and in science, engineering, and graphics are being solved today using the power and flexibility of Cray supercomputer systems. In each discipline the Cray supercomputer is used to simulate a real-world process in less time and at less cost.

To support these applications, a wide range of graphic software systems is offered for Cray supercomputers by third-party vendors. Device-independent line-drawing systems like GK-2000 and DI-3000 from Precision Visuals, Inc., TEMPLATE from Megatek, Inc., and DISSPLA from ISSCO, Inc., are being used now on many Cray supercomputers.

Systems for CAD/CAM and pre- and postprocessing like PATRAN from PDA Engineering and MOVIE.BYU from Brigham Young University support a variety of engineering design activities. In those cases where photographic-quality scene generation is the objective, the designers, artists, scientists, and movie-makers are turning to Cray systems to do what could not otherwise be done.

If your application or graphics task requires extraordinary computer power . . . the problems you **can** do are much smaller than the problems you **would** like to do . . . if you need a general purpose powerhouse to run a variety of simulation, engineering, or scientific codes . . . you need a Cray supercomputer!

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