

## APPAREL MANUFACTURE

In pursuing its multiple responsibilities to the U.S. space program, Marshall Space Flight Center (MSFC) has of necessity developed new technologies over a broad spectrum of disciplines. Among these technologies is computer software for simulations, an area of particular importance to MSFC's primary responsibility of conducting R&D on space launch vehicles and methods of integrating vehicles and payloads. Adaptations of MSFC's simulation technology, now in wide use among America's clothing manufacturers, are enhancing the competitiveness of the U.S. apparel industry.

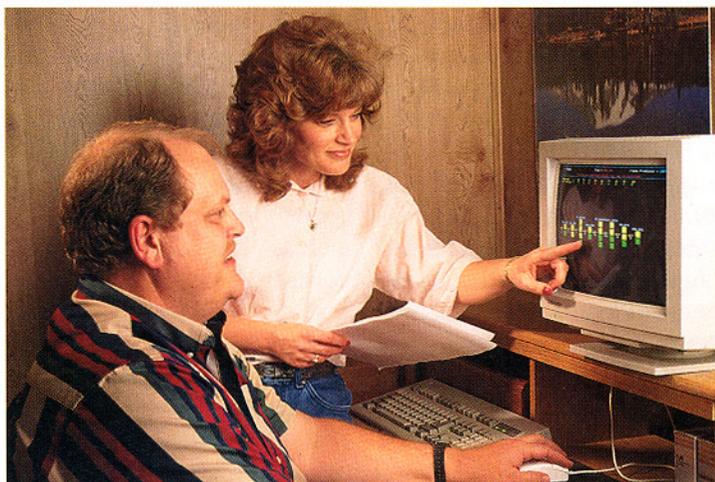
This technology transfer had its beginnings in 1989, when MSFC teamed with the University of Alabama in Huntsville (UAH) on a program involving development of advanced simulation software. In a separate action that occurred at about the same time, UAH was chartered by the State of Alabama's Department of Economic and Community

Affairs to conduct a technology advancement program in support of the state's apparel manufacturers.

As UAH researchers worked on the two projects, engineers noted that certain major problems of the apparel industry might be solved by adapting the MSFC simulation software. For example, one prime need was a "try before you buy" computer simulation system that could analyze various apparel production layouts before implementing them on the sewing floor. A proposed production module could be pre-tested to determine its effectiveness; numerous options could be simulated on a "what if" basis to achieve optimum efficiency and productivity.

The possibility of adapting the NASA software to unit production systems and modular manufacturing systems was tested in several Alabama plants and found to

be feasible. Therefore, in June 1992, MSFC awarded UAH a contract to develop an apparel-specific software package, one that would allow manufacturers to design and analyze modules without making an actual investment, and one that would work in ordinary PC equipment without the expense of additional software or specialized operator training. Completed and first made available to industry in mid-1993, the package includes two diskettes containing three different programs, along with instruction manuals and articles by UAH engineers on the implementation of modular manufacturing and its simulation in the apparel industry. Since then, MSFC has responded to requests for the package from more than 400 companies in 36 states; some of them have subsequently reported savings up to \$2 million.





program usage. The MSFC visitors returned to NGC to teach the program to other company employees. The company has since extended the educational effort to include its engineering staff and all plant managers and supervisors. **At far left,** Larry Bannister, director of the engineering department, instructs costing engineer Donna Pilkington on the use of the software.



A typical user is National Garment Company (NGC), St. Louis, Missouri, which specializes in children's apparel. Late in 1993, while engaged in a switchover to modular manufacturing, NGC learned of the MSFC/UAH technology, obtained the package, and sent representatives to MSFC to learn further details of

NGC uses a modular manufacturing process in which modular "action teams" perform the cutting, sewing, finishing, tagging and packing; teams receive bonuses for achieving target production rates. The MSFC/UAH software is used to design and balance a modular line before committing to expensive hardware and logistics costs; to set up sewing lines; to predict production expectancy for an action team; to determine the composition of a new team; to

vary the makeup of a team to allow adjustment of goals; and to determine the amount of time it takes to move a worker from one job to another.

Says Larry Martin, NGC vice president-manufacturing:

"We are impressed by the program's fairly simple operation, the amount of information we can apply to real-time situations, and the accurate and logical team working results."