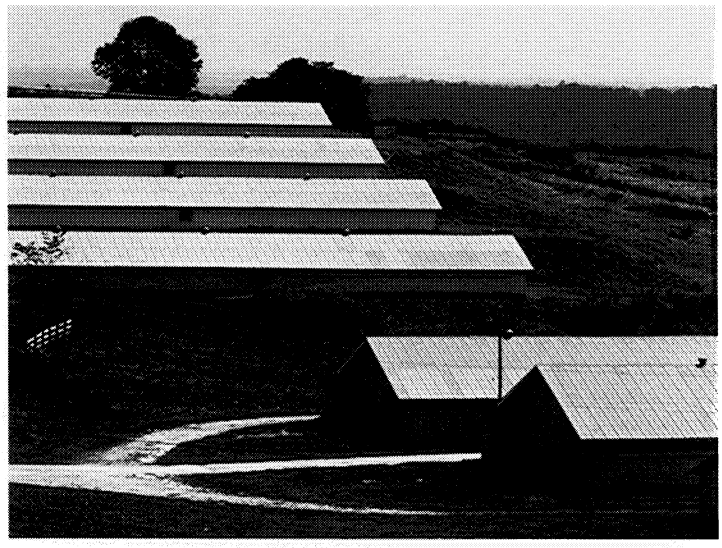
The accompanying photos illustrate research by the University of Georgia's Agricultural Engineering Department on new designs for poultry houses. Improved housing offers great potential benefit for Georgia's poultry farmers, whose industry is a billion-dollar-a-year business. One investigation involved winter use of passive solar heating for the poultry houses, using a southern exposure with concrete walls; the design process could be most efficiently handled by computer thermal models based on the thermal analysis capabilities of the NASA Structural Analysis System (NASTRAN)®.

The NASTRAN program, originally developed for aerospace design applications by Langley Research Center and supplied by NASA's Computer Software Management and Information Center (COSMIC), is a general purpose program that mathematically analyzes a design and predicts how it will stand up under the various stresses and strains it will encounter in operational service. This permits engineers to study the structural behavior of many different designs before settling on a final design.

At the University of Georgia—and other universities—students are being trained to use the NASTRAN system for a variety of new and different applications, including thermal analysis of agribusiness-related structures, nursery containers and post-harvest handling of vegetables. In the latter application, NASTRAN is used to develop a model for monitoring the transient cooling of vegetables that have been harvested and stored in bins. The produce can deteriorate in quality because of the high temperatures often experienced. The University of Georgia's Agricultural Engineering Department is investigating the use of convective and evaporative cooling to reduce temperatures, thereby reducing quality loss.

Another study at the University of Georgia involved thermal analysis of black and green nursery containers commonly used by commercial nurseries to grow plants. The growth media in the containers can be subjected to temperatures of 110 degrees Fahrenheit or more due to solar radiation. Plant root growth is generally retarded above 85 degrees and ceases above 100 degrees. Attempts have been made to reduce heat-induced stress on plant roots through use of perforated containers, white plastic containers and evaporative cooling. Using NASTRAN, a thermal analysis was conducted to quantify the thermal environment of a nursery container exposed to summer solar radiation; researchers explored the potential for reducing media temperatures of such parameters as different media composition and different container surface colors, geometry and dimensions.



The Agricultural Engineering Department faculty reports that use of NASTRAN and exposure to finite element analysis has encouraged student appreciation of numerical problem solving techniques. The department plans additional applications of NASTRAN in its continuing program for teaching and applying sophisticated computer analysis. ▲

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