

In addition to these joint studies, other **electro-**technology projects are being conducted at specific sites. Work in these related projects includes use of ultrasound in dye applications, computer simulation of dyeing processes, and dye fixation using radio frequency energy.

A summary of activities at each site follows:

**Auburn - The** fabrics described above were obtained and dyed. Single fiber FTIR measurements were made on all samples on samples conditioned in a standard, controlled atmosphere. Reflectance and transmittance of spectra of the samples in the visible region were also made using fabrics containing three different levels of moisture. Transmission and reflection of visible light were significantly affected by moisture content of the material.

Work is continuing on fixation of dyes using radio **frequency** (RF) energy. Disperse dyes have been fixed on polyester and reactive dyes have been fixed on cotton using RF energy. The next goal is to simultaneously dye both polyester and cotton in a blend fabric using RF energy for the fixation stage. Experiments which address this goal will be performed during the next quarter.

**Ga Tech - FTIR** instrumentation required for large area measurements of IR transmittance and reflectance has been installed. Personnel are being trained to use the equipment and experience in its use is being obtained. Instrumentation for measurement of dielectric properties of materials has also been ordered.

NCSU - Work continues on several projects partially funded by the NTC. Especially notable progress has been made in Optimization of Radio Frequency Drying by Utilizing Intelligent Automated Handling and Controls. This project focuses on the design and development of a **low-**cost robotics system capable of controlling and loading a RF dryer to maximize energy savings and throughput. The system uses sensors to categorize package size, weight and material type. The information will be used by the system to adjust the loading and frying parameters to optimize the entire process. The system uses a Gantry type manipulator to pick packages from a pallet and place them at an optimum configuration in the RF conveyor belt based on the strategy defined by package considerations.

Significant progress was also made in **ultrasound-**assisted dyeing. Work has been directed toward moving up to large scale processing equipment. Progress has been made in understanding the principles and limitations of large scale ultrasound tanks and generators. Three companies- Greenville Machinery, Blackstone Ultrasonics, and **Branson** Ultrasonics have joined in a consortium to assist in development of this technology.

## Projection Of U.S. Apparel Demand And Consumer Profiles Based On Demographic Changes For The Period 1991 - 2010.

File: S92C7

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### OBJECTIVES:

Long-Term -- 1) To create a public sector **apparel/textile** business database, and 2) design a demand forecasting system which will make the U.S. apparel and textile industries competitive within and outside the U.S. Specifically, this research is aimed at forecasting the apparel demands in the U.S. during the period 1991-2010 based on the anticipated changes in the demographic profiles, make-up of U.S. households and the apparel purchase patterns.

This (2nd) Year -- The first year's activities included: 1) definition of the database, 2) acquisition of the needed census data, labor statistics, retail data, and marketing data, 3) design and implementation (partial) of the system hardware/software, and 4) development of graphical capabilities. Having accomplished these major tasks, the second year's activities will focus on design of data storage/retrieval systems and development and validation of statistical models for forecasting the U.S. apparel demands in a number of key categories. It is expected that a prototype forecasting system will be made available at the end of the second year.

### SUMMARY:

1. The activities during the last quarter were centered around formation of the database by pooling all data resources. All data were stored on a 1 Gb disk using ASCII format, and read into SAS datasets. We named the system as "Textile/Apparel Business Information System (**TABIS**)" Both the size and utility of the system were significantly enhanced by the following activities:

- a) Growth in the size of **TABIS** database -- The **TABIS** database now includes the following **data-**sets with a user-friendly interface program to help the user select data **from** each:
  - Census population projections
  - National Income & Product Accounts (consumer expenditures)
  - Bureau of Labor Statistics (employment & earnings)

- Bureau of Labor Statistics (consumer expenditures) o Apparel Expenditures from Sales & Marketing Mgmt. Magazine
- **AAMA Topline** Reports on Apparel Expenditures

In addition, we are in the process of adding the following **datasets**:

- Bureau of Census Monthly Retail Sales & Inventories o Monthly data from Textile **Hilights** for the past 10 years o County Business Patterns o 22 & 23 U.S. Domestic Production

b) Enhancement in the utility of **TABIS** -- Much work has been done to make the **TABIS datasets** more usable. Below are descriptions of several of the main efforts made to date:

- The user-interface programs are becoming much more user-friendly and robust. There is a menu program to show the user which **datasets** are available. Samples of the current menu include:

*Welcome to the NCSU*

*Textile/Apparel Business Information System*

- 1 - select data from the Census population projections
- 2 - select data from the NIPA consumer expenditure
- 3 - select data from the BLS employment and earnings
- 4 - select data **from** the BLS consumer expenditure
- 5 - map data **from** the Census population projections
- 6 - select data from the NPA summaries
- 7 - select data from the SMM summaries
- 8 - select data from the ATR summaries

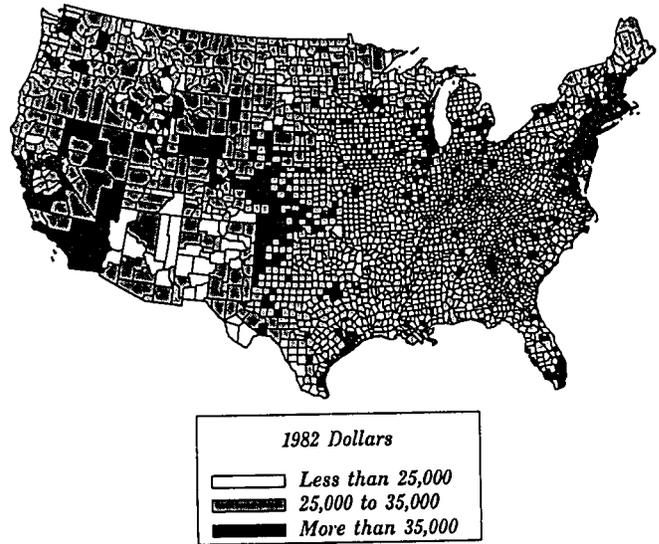
Enter choice:

- **The** database has also been through several rounds of speed enhancements. The latest round involved 'indexing' the largest datasets. A typical query to the Census Population **dataset** used to take 50 seconds, but requires only 10 seconds on the indexed **dataset**.

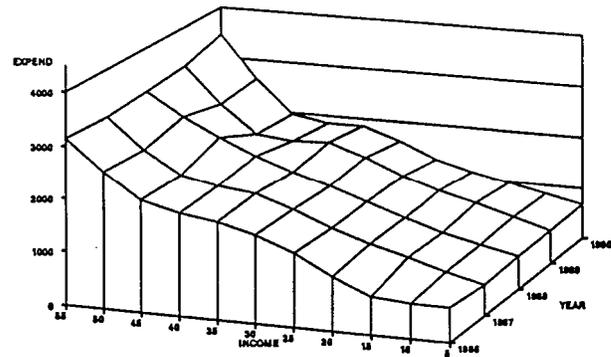
- Several sample programs are being written to let the user view the data graphically. The figures contained in this report were obtained from some **datasets** stored.

*Income per Household, 1990*

Source: NPA Data Services, Inc.



Average Apparel Expenditure (In 1987 dollars) per Household by Income Level (in Thousand dollars) After Taxes  
Source: Private Market Survey Data



2. Prepared and presented a paper to the Fourth Annual Academic Apparel Research Conference on February 8, 1993. The paper was titled "Creation of an Apparel/Textile Business Information System and Forecasting of U.S. Apparel Demand for 1991-2010" (by R. E. Allison, M. W. Suh, C. H. Priestland and M. Davidian).

3. This project was the center of discussion during the group session at NTC annual meeting. Much interest and encouragement were shown to our work by all parties attending the meeting. The scope of the project needs to be expanded even beyond what we have outlined for this year.

4. We have just received the consumer panel data on apparel purchases from NPD. This will accelerate our modeling and validation processes in the next few months.