Report to the North Carolina State Board of Community Colleges on

Options and Recommendations for the North Carolina Center for Applied Textile Technology

October 28, 2004

Regional Technology Strategies, Inc.
205 Lloyd Street #210
Carrboro, NC 27510
919 933-6699
www.rtsinc.org

I. Purpose of the Report

Regional Technology Strategies, Inc. received a contract from the North Carolina State Board of Community Colleges to undertake a comprehensive study of the North Carolina Center for Applied Textile Technology (NCCATT). The purpose of the study is to recommend whether NCCATT should remain an independent institution, be administered by a community college, be dissolved, or be otherwise administered. This report provides background on trends and the future of the textile industry; gives a history of NCCATT and its current governance structure; analyzes current and recent NCCATT activities; describes textile industry technical assistance and workforce needs, and presents options and recommendations for the future of the Center.

For this study, the project team interviewed more than two dozen textile industry experts, representatives from industry, economic developers, community college leaders, and NCCATT Board of Trustee members, Foundation Directors and staff. The team also examined detailed program and course data provided by NCCATT and analyzed government and private textile data.

II. Textile Industry Background

The U.S. textile sector is composed of companies that produce cotton, wool and man-made fibers and knit, weave or otherwise combine them for a wide range of uses, including apparel, home furnishings, footwear and other industrial purposes.[1] Textile mills produce a vast range of finished and intermediate textile products but center on broadwoven fabrics from cotton, wool, and other natural and synthetic fibers and materials. These textiles are used in such diverse applications as clothing, household linens, furniture, roofing products, insulation, and motor vehicle interiors.[2]

This section provides a brief overview of recent trends in the textiles industry, summarizes projections and outlooks for the future, and presents some pockets of promise. The analysis focuses on the broader textile industry and does not include a detailed discussion of the apparel sector, which has suffered the most job loss in recent years.

The Textile Industry and its Supply Chain

North Carolina has a well-established presence, tradition, and expertise in all industry sectors that are part of the textile industry's supply chain. It begins with fiber manufacturers that produce either organic or synthetic fibers and filaments that are key inputs for textile mills. The fibers are either used by nonwoven fabric mills to manufacture consumer and industrial products, or by yarn spinning mills. The yarns and threads produced by those mills serve as key inputs for hosiery manufacture, broadwoven and narrow fabric mills and knitting mills that manufacture a number of different types of fabrics. The complete production cycle can include a number of processes such as dyeing, bleaching, and stonewashing the fabrics. These can be performed by vertically integrated textile mill or separate specialized finishing mills. At the end of the textiles supply chain other industries convert the fabrics into a wide range of final products. The apparel and home furnishings industries are among the largest customers, but textiles products also include automobile, aerospace, and space industries as well as many industrial applications such as industrial belts, fire hoses, and medical supplies. The process of converting raw fibers into finished non-apparel textile products is complex, and therefore many textile mills are highly specialized. There is little overlap between knitting and weaving mills or among the companies that use different nonwoven processes to turn synthetic materials into special fabrics.

National Textile Trends

There is no doubt that the textile industry in the United States is in the midst of a tremendous upheaval. In 2001 alone more than 100 U.S. textile mills closed their doors and at least 60,000

---

[1] Datamonitor "Global Textiles" Industry Profile May 2004

[2] Enclycopedia of Global Industries, Third Edition "Textile Mills"

U.S. textile workers were laid off. After heavily investing in newer and more efficient but costly technology and equipment, U.S. textile mills are finding it harder to compete with lower-priced textile imports from Asia, which have been entering U.S. markets since the end of the 1990s. While demand for industrial textiles remained high in the U.S., many textile mills lost their most important customers with the rapid decline of the domestic apparel industry. As a result, large numbers of U.S. mills have shifted production to emphasize non-apparel textiles such as designer home-furnishings and specialty industrial textiles.

According to the Bureau of Labor Statistics, the largest occupations in the national textile industry—more than 160,000—are machine setters and operators. Another 40,000 employees are more highly skilled supervisors, mechanics and industrial maintenance workers.

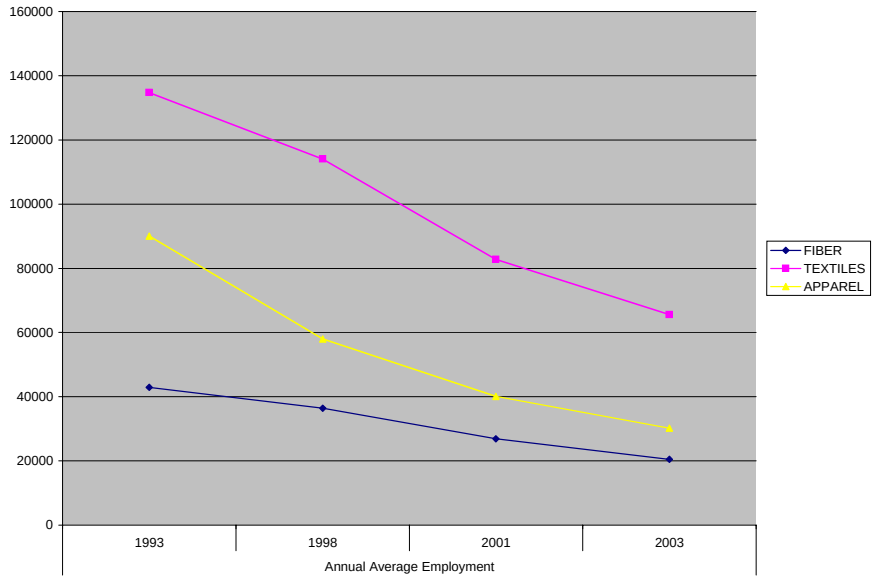
Despite the recent job losses and plant closing the textile industry is still a major manufacturing employer. Most of the 489,000 U.S. wage and salary workers who are employed in the textile mills and products industry in 2002 were located in the southeastern region. North Carolina has the nation's largest share of the sector with 28 percent of all U.S. textile jobs. It southern neighbor, South Carolina, is second with 16 percent. Most textile production is concentrated in large mills; establishments that employ more than 500 persons account for only one percent of the textile companies, but 22.5 percent of all textile workers. More than 57 percent of the textile workers are employed in the less than 14 percent of establishments with 50-499 employees.[3]

North Carolina Textile Industry Trends

North Carolina, as is the rest of the nation, is experiencing significant job losses in textiles and in textile-related industries. As Figure 1 shows, the apparel sector suffered the most dramatic job losses between 1993 and 2003. Employment in apparel declined by two-thirds over this ten-year period, from 90,043 employees to 30,186. The larger textile sector lost about half of its almost 135,000 employees between 1993 and 2003; it now employs 65,610 people across the state. Fiber yarn and thread mills—listed separately from the other textile mills in this chart—saw their employment shrink from almost 43,000 in 1993 to 20,513 in 2003.

[3] U.S. Department of Labor, Bureau of Labor Statistics, www.bls.gov/oco/cg/cgs015.htm

Figure 1: Annual Average Employment in Fiber, Textiles, and Apparel, 1993 - 2003



Source: NC Employment Security Commission

While overall the textile industry lost a large number of jobs, the apparel sector, which includes more small and mid-sized establishments, suffered proportionally higher losses not only in employment but also in numbers of establishments. The number of apparel plants declined from 921 in 1993 to 475 in 2003, a loss of 48 percent. Many apparel production facilities were shut down completely and production moved overseas. Over the same time period, 16 percent of North Carolina's fiber yarn and thread mills and 17 percent of the other textile mills closed their doors. Overall, the textile industry has not experienced as devastating a scale of job losses and plant closings as has the apparel industry, perhaps because it is less labor intensive.

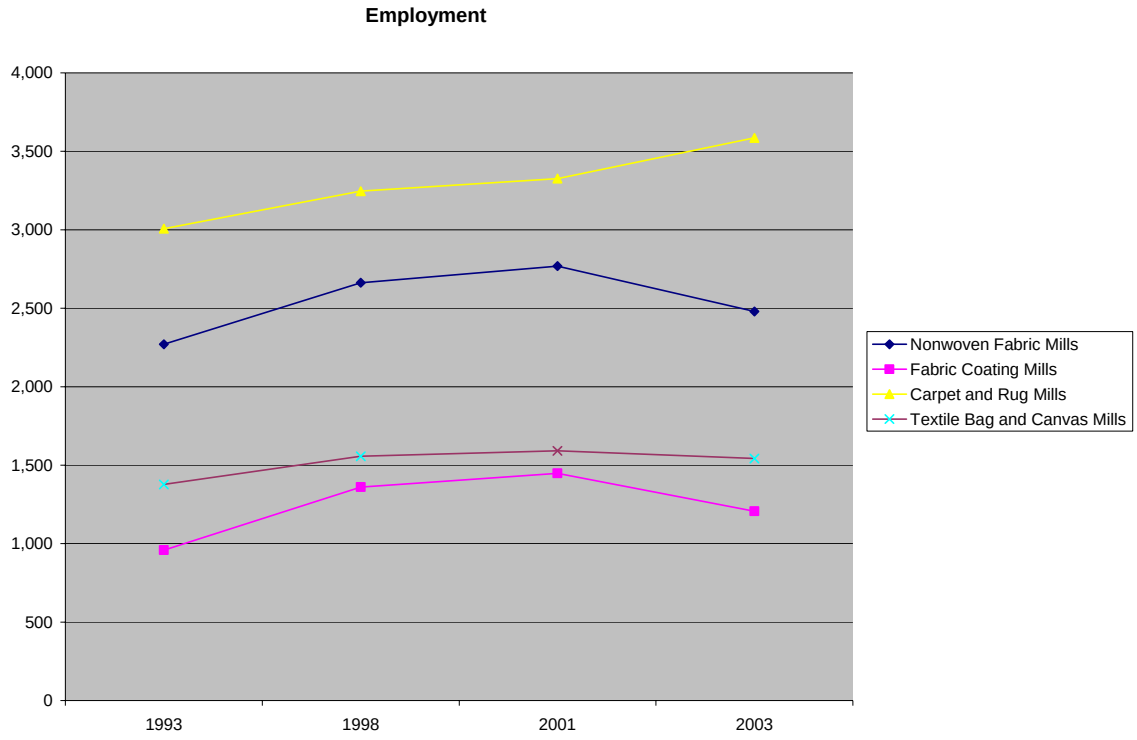
But the competition is heating up. The Dongguan Province of China, for example, is home to many of China's thousands of textile companies, which include more than 2,000 making 15 different types of chemical textiles. Further, the shrinking domestic apparel production has affected textile mill production, some more than others. Broadwoven fabric mills, textile and fabric finishing mills, knit fabric mills, and curtain and linen mills lost between 57 and 60 percent of their employment between 1993 and 2003. In contrast, however, nonwoven fabric mills, fabric coating mills, carpet and rug mills, and textile bag and canvas mills now employ *more* people than they did ten years ago (see Figure 2). Nonwoven fabric mills have added new production sites in North Carolina and even higher wage jobs (see Table 1).

Table 1: NC Establishments, Employment, and Average Wages in Selected Fiber Manufacturing and Textile Mill Sectors, 2003

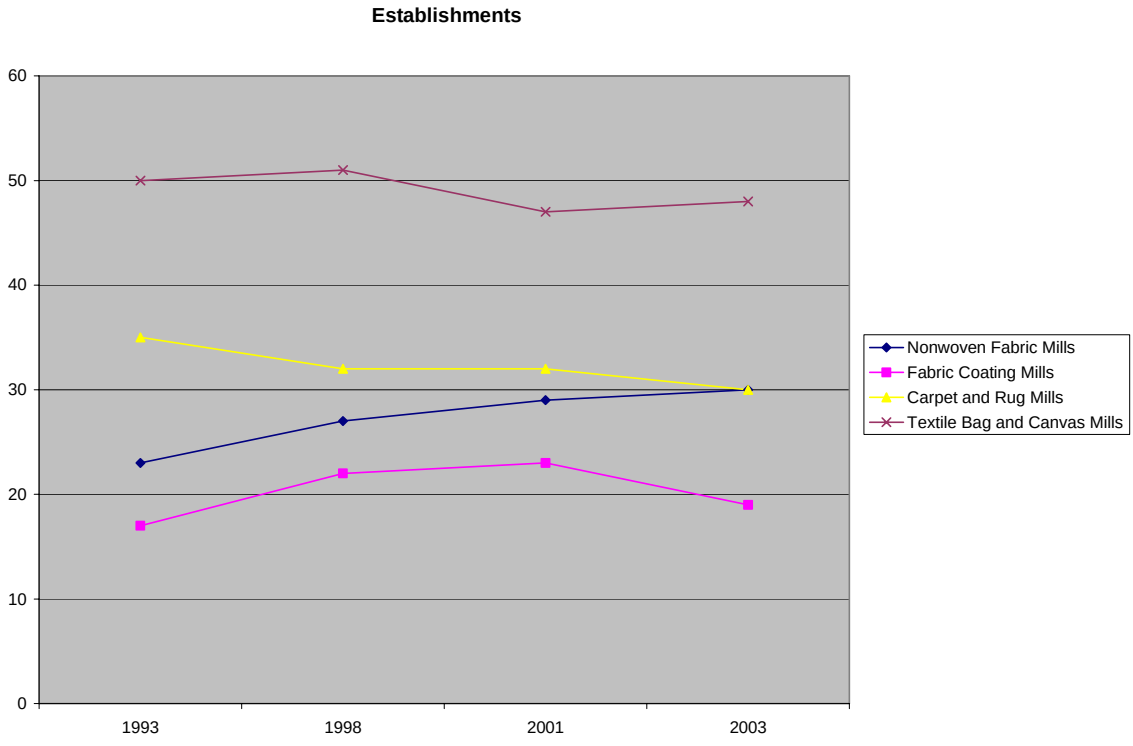
NAICS	Industry Description	Number of Plants	Annual Average Employment	Average Annual Wage per Employee
32522	Fiber and Filaments Manufacturing	46	5,175	$47,528
31323	Nonwoven Fabric Mills	30	2,480	$45,649
31332	Fabric Coating Mills	19	1,207	$35,204
31411	Carpet and Rug Mills	30	3,586	$27,048
31491	Textile Bag and Canvas Mills	48	1,543	$23,740

Source: NC Employment Security Commission

Figure 2: Establishments and Employment in Selected Textile Mill Sectors 1993-2003



Source: NC Employment Security Commission



Source: NC Employment Security Commission

Despite the recent decline and the dramatic job losses, the textile industry remains the largest manufacturing sector in North Carolina. With more than 86,000 employees, textile mills account for over 14 percent of all manufacturing employment and 3 percent of all private sector employment. One in every seven manufacturing employees in North Carolina works in textiles. The industry employs 25,000 more people than the next largest industry, furniture and related products, and more than twice the number of workers in computer and electronic product manufacturing. Total employment in the entire pharmaceutical and medicine manufacturing industry is just over 21,000, which is less than one quarter the employment in the state's textile industry.

According to state Employment Security Commission data, the average annual textile wage is $29,000, compared to $33,000 for all private sector jobs in the state. The growing nonwoven textile sector pays an average of $46,000, which is higher than the state's average manufacturing wage of almost $40,000. The state's retail sector pays an average annual wage of $22,000.

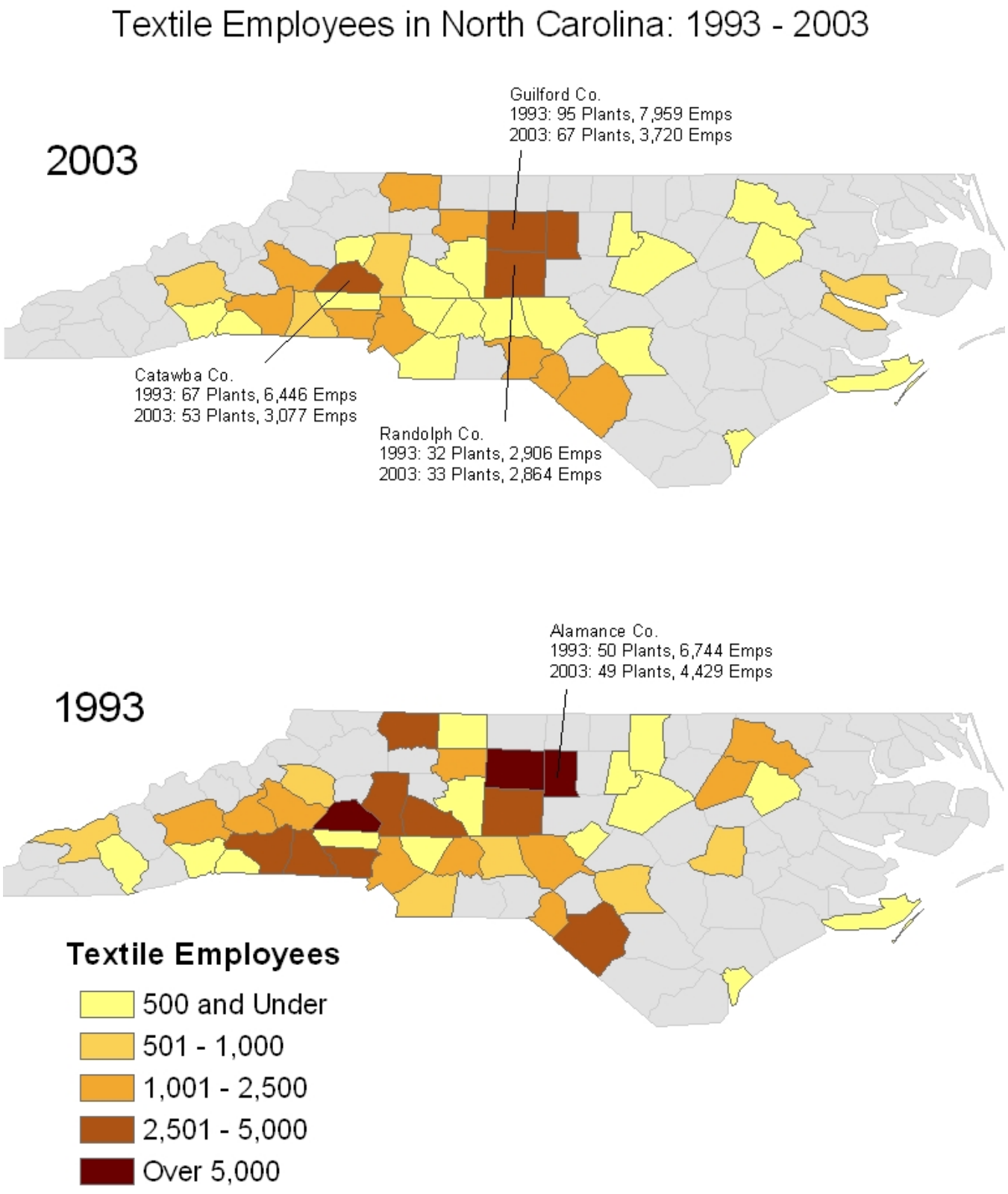
Table 2 and Figure 3 shows the distribution of textile plants in North Carolina and how heavily concentrated they are in particular counties. Mecklenburg, Catawba, and Guilford Counties each had more than 50 plants in 2003, followed by Randolph, Alamance, and Cabarrus Counties with 26-50 establishments each. The North Carolina Center for Applied Textile Technology is located within the Charlotte-Gastonia-Rock Hill Metropolitan Statistical Area (MSA)—which includes two South Carolina counties. The concentration of establishments in this area is substantial, yet the North Carolina part of this MSA accounts only for 17 percent of North Carolina's total textile employment and 14 percent of textile plants.

Table 2: Establishments and Employment in Textile Mill Products in the Charlotte-Gastonia-Rock Hill MSA

Industry Description	Establishments	Employees
Broadwoven fabric mills, cotton	17	1,157
Broadwoven fabric mills, synthetic fiber, & silk	14	932
Broadwoven fabric mills, wool	2	7
Narrow fabric mills	10	352
Knitting mills	52	3,181
Textile finishing, except wool	25	400
Carpets and rugs	8	18
Yarn and thread mills	65	7,279
Miscellaneous textile goods	33	479
Total	**226**	**13,805**

Source: Dun & Bradstreet

Figure 3: Distribution of Textile Employees in North Carolina



Textile Outlook and Projections

Total textile industry employment is expected to continue to decline, but losses will not be spread evenly across industry segments. The end of apparel quotas in 2005 will place increased pressure on that sector for semi-skilled labor. At the same time, an accelerated rate of implementation of technological and engineering advancements in textile production over the coming years is expected to create a higher-tech environment, resulting in the need for much more highly skilled technical workers. The textile jobs that remain or will be created are very likely going to be, on average, better paying and require higher level and different technical skills than current textile jobs. This trend is similar to all manufacturing in the US in which low-skill, low-wage jobs are quickly disappearing.

Pockets of Promise in the Textile Industry

As the U.S. textile industry transitions away from nearly all labor-intensive manufacturing activities, a few pockets of promise related to advanced textiles remain in play in the United States. Most of these are oriented towards one of two sub-sectors of the Engineered Fabrics and Fibers industry: nonwoven fabrics and nanotextiles.

Nonwovens

According to the Association of the Nonwoven Fabric Industry, nonwovens are "sheet or web structures bonded together by entangling fiber or filaments (and by perforating films) mechanically, thermally or chemically or by lamination. Most are flat, porous sheets that are made directly from separate fibers or from molten plastic or plastic film. They are not made by weaving or knitting and do not require converting the fibers to yarn." Nonwovens are engineered fabrics designed for specific uses ranging from consumer products such as disposable diapers and air filtration to durable goods manufacturing including automotive and home furnishings, to medical and health care applications. INDA (the Association of the Nonwoven Fabrics Industry), located in Cary, North Carolina, has represented this industry since 1968. It is growing in the state but is more dispersed than the woven sectors and less labor intensive. The industry works closely with the North Carolina Nonwoven Cooperative Research Center at North Carolina State University to meet its research and training needs. Many of the largest companies entering this market are branches of large multi-nationals. Examples of North Carolina companies in this field are Avgol America in Mocksville, Precision Fabrics Group in Greensboro, Freudenberg Nonwovens in Durham, Saertex USA in Mooresville, ASC International in Charlotte, and Slosman Corporation in Asheville.

Nanotextiles or "Smart Fabrics"

Nanotextiles are products in which "nanotechnology" (engineering at the nanometer scale, or one one-billionth of a meter – about five atoms wide) is used to create fabrics or fibers with innovative properties. According to Ineurotex, the Nano-Textiles Interest Group in Great Britain, textiles represent the first commercial applications of nanotechnology. Nanotextiles are engineered textiles: the main difference between these and traditional textile products is the

molecular scale at which they are produced. They represent a new component in both woven and nonwoven fabrics, as they can be implanted in many types of materials.

In the near term, these fabrics are being engineered to produce characteristics such as strength (anti-ballistic protection), temperature sensitivity, stain or wrinkle resistance, water repellence, antibacterial and antifungal properties, or comfort. In the long term, the technology is expected to advance to where it develops a new generation of "programmable materials" that are able to interact with other technologies such as computer sensors or microchips and produce even new applications. Key anticipated applications include smart garments for military (camouflage and energy storage), medical/health applications, and high performance clothing for consumer use. The technology underlying their development and production has as much in common with the biotechnology industry as with the traditional textiles industry.

Many of these new technologies, however, are still in the research and development phase, and few have as yet reached the market. A key industry leader is Nano-Tex, the first company to apply nanotechnology to the clothing industry. Its products are used in clothing made by Levis (Dockers), Eddie Bauer, and numerous other clothing companies. The company has global sales and marketing activities in North Carolina with R&D capacity in California, and manufacturing facilities throughout the globe. Nano-Tex is a spin-off from Burlington industries. Other companies leading development of nanotextile applications include W.L. Gore and Associates (Goretex), Ciba Specialty Chemicals, Kanebo Spinning Corp. of Japan, Toray Industries of Japan, and Teijin Fibers of Japan.

It is clear that there is an emerging "new" textile industry that will focus on industrial, medical, and military applications and that will require higher skills and pay higher wages than traditional textile companies. North Carolina, with its rich history and a mature textile cluster comprising a well-established supply chain and a sizable textile and biotech research base, is well positioned to be a major player in this future.

It is also important to bear in mind, however, that the success of traditional textile companies is still very important to the emerging future industry in the state (these companies require fibers and/or yarn) and that these companies should not be "counted out." While cut-and-sew apparel has largely disappeared, experts believe that less labor-intensive textile companies such as the fabric mills and knitted products (notably hosiery products) will be able to successfully compete with foreign producers based on advantages related to quality of product and speed to market. Further, the many North Carolinians who work in these companies, many of whom have low levels of education, receive higher wages than most other jobs for which they are qualified.

III. History and Governance of NCCATT

The North Carolina Center for Applied Textile Technology traces its origins to 1941, when the General Assembly authorized the establishment of a textile school in Gaston County. At that time, Gaston County, along with other parts of the Piedmont region of North Carolina, had a large number of textile mills. The school was built in Belmont, North Carolina on land donated by textile manufacturers and originally named the North Carolina Vocational Textile School. Its first classes were offered in 1943.

Legislative action in 1972 attached the Center, for administrative purposes, to the North Carolina Department of Community Colleges. In 1991, further legislative action made the Center the 59th institution in the Community College System. Though not designated a comprehensive community college, it was to continue its emphasis on the special training needs of textile workers.

Since its creation, the Center has operated under the control of a relatively autonomous Board of Trustees. The Board was established under the 1941 authorizing legislation. Statutorily assigned powers of the Board include holding title to property, directing and managing the affairs of the Center in accordance with policies and regulations of the State Board of Community Colleges, appointing a managing head (president), and appointing other employees of the Center. As a public institution, current statutes direct the Center to operate within the requirements of the Constitution and statutes of North Carolina.

The Board of Trustees comprises nine members as mandated by state statute, all of whom are appointed by the Governor. Trustees appointed by the Governor serve terms of four years, without compensation.

The Center's Board of Trustees operates under bylaws established by the Board. Officers of the Board include the Chairman, Vice Chairman, and Secretary. The first two are elected annually, with the President of the Center serving as Secretary to the Board and as an ex officio member. The bylaws call for six meetings per year on a bimonthly schedule. Powers and duties of the Board of Trustees, as listed in the bylaws, include the following:

1. To establish the mission and goals of the Center and to approve long-range plans.
2. To appoint the President of the Center, to assign presidential duties, and to evaluate the President.
3. To delegate to the President the appointment of other members of the faculty and staff. This must be done within legislative appropriations and in accordance with the regulations of the Board of Trustees, the State Board of Community Colleges, and State law.

4. To regulate the admission of students, tuition and fees, and all other matters pertaining to governance and administration of the Center. This is to be done by the adoption and publication of Board policies.
5. To issue certificates, diplomas, and degrees to qualified students on the recommendation of the faculty.
6. To provide and maintain suitable quarters and equipment for the Center.
7. To provide for the care, custody, control, management, and improvement of the assets of the Center.
8. To adopt curricula, subject to the laws and regulations of North Carolina.
9. To establish a private, non-profit foundation as a fund raising mechanism for the Center. The Board of Trustees appoints directors to the foundation's board.

As authorized in the bylaws, The North Carolina Center for Applied Textile Technology Foundation, Inc., was established as a private, non-profit foundation. It evolved out of a board of advisors that for many years provided advice to the trustees. Net assets as of June 30, 2004 were $207,000. The Foundation's bylaws include a dissolution section stating that in the event of dissolution any remaining assets would be distributed to another charitable organization. Foundation proceeds are used to provide staff development opportunities for Center personnel.

IV. Services and Activities of NCCATT

For much of its history, the Center's primary activity was a two-year unaccredited associate's program in textile technology. This program was intended to serve the industry by creating a pipeline of textile-specific entry-level workers, and was popular with both industry and employees. The latter filled its classes and the former hired from them—sometimes before completion. It was not, however, an accredited degree, because of to the industry-based (rather than academic) qualifications of the instructors and the lack of other degree offerings at the Center. This program was not accredited by the Southern Association of Colleges and Schools, meaning that (a) students' ability to transfer to other higher education institutions was problematic because other institutions did not need to accept the program of study and give students credits for coursework, and (b) no federal student grants or loans could be made to students. When the Center became part of the North Carolina Community College System in 1991, the System and Center worked to find ways to secure accreditation, but were unsuccessful. Ultimately, the Center stopped offering the two-year program after several efforts to deliver it with partner institutions and gain accreditation in other ways.

The Center subsequently shifted its focus to continuing education. It was at this stage that the Center began to experience "mission creep." In addition to the textile-related continuing education that it provided, the Center also began expanding its training offerings to textile companies to include, for example, computer courses and "soft" skills courses contextualized for the textile industry. In general, contextualizing courses for the industry can be valuable because it makes the learning more pertinent and useful to students. However, the Center next began to extend its computer and other courses to non-textile firms and to public institutions such as local schools and governmental agencies. As a result, conflict arose between the Center and Gaston College, especially at the leadership levels. The college pointed out that these classes were similar to what the college's Corporate Education department offered and had at least the potential for creating duplication of services. In 2003 the North Carolina Community College System office directed the Center to stop providing classes that duplicated Gaston's offerings.

Consequently, NCCATT is now in the early stages of a transition from a focus on education and training to providing a greater array of technical assistance and services to the textile industry. The main catalyst for the shift, which began only a few months before this study was conducted, appears to have been an audit that was conducted by the Community College System in September 2003. One of the primary findings of this audit was that the distribution of the Center's training activities and service activities was about 80 percent and 20 percent, respectively. The Center has begun efforts to reverse this distribution and offer more technical assistance to textile companies in light of the auditors' recommendation that these proportions be switched in order to emulate the mix of services and training offered by the state's Hosiery Technology Center. The transition has been assisted by contributions of more up-to-date textile machinery by several textile companies close to the Center.

There are several reasons behind the transition underway at the Center, the foremost being that its client companies have experienced a shift in priorities themselves. The decline in the U.S. textile industry in recent years has meant that even some of the largest textile companies have had to eliminate or reduce their capacity in some functions such as product testing and development, that they previously performed in house. This capacity reduction has created a need for an external source of these and other services that could help textile companies save expenses and become more competitive with foreign firms. Meanwhile, demand for formal training programs has significantly declined because there are fewer companies and because textile companies are seeking less formal, degree-based preparatory training for their employees, looking instead for focused, skill-specific training for both new and incumbent workers.

Table 3 below provides an overview of the Center's projects for industry from 2001 to 2004 (2004 data are necessarily incomplete). Because the table is only for the previous three and a half years, these data do not represent the degree-focused phase of the Center's history; they do, however, show the transition that began in 2004.

The time NCCATT staff spends on non-textile specific activities has declined significantly. Their agreement not to offer courses that duplicate Gaston College's offerings appears to refer primarily to computer-related courses, which have all but disappeared from their project list. However, Center staff members still teach some courses that seem at best tangential, such as memory enhancement and management organization techniques for textile executives, and some that are clearly unrelated to textiles, such as personal finance for high school students. While there is little doubt that these classes are useful and well intentioned, they are of concern for two reasons. The first is that it will be nearly impossible for the Center to succeed, in any form or incarnation, as an innovative resource for industry without an extremely targeted and streamlined focus on textile technologies, and on developing and maintaining the capabilities and expertise that it will need to order to be a leader for innovation and competitiveness in the textile industry.

The second concern is that providing classes such as these still leaves room for future conflict with Gaston College over which institution should be handling which kinds of training and service. It may well be that there is an argument for teaching soft skills and professional skills in the specific industry context in which they will be used, which would suggest that the Center staff have the best expertise to offer such training. At the very least, however, these issues should be examined collaboratively and a very clear understanding reached about the purviews of each institution and processes for handling industry services that are not textile technology specific.

Table 3: Scale of NCCATT Training and Services by Type of Training

Type of class/service	Number of classes/ projects	Number of companies served	Total number of trainees	Total number of training/project hours
2001				
Job Readiness Skills	10	2	125	118
Information Technology	198	19	1782	2125
Professional/Management	50	11	677	350
Technical – Textile	37	7	246	864
Technical – Non-textile	18	3	103	675
Total	**313**	**42**	**2933**	**4132**
2002				
Job Readiness Skills	8	3	132	99
Information Technology	164	13	1183	1715
Professional/Management	68	11	1431	351
Technical – Textile	74	9	541	2199
Technical – Non-textile	11	3	93	503
Total	**325**	**39**	**3380**	**4867**
2003				
Job Readiness Skills	12	4	83	163
Information Technology	98	5	432	684
Professional/Management	33	5	346	179
Technical – Textile	57	5	481	2403
Technical – Non-textile	7	1	24	120
Total	**207**	**20**	**1366**	**3549**
2004				
Job Readiness Skills	2	1	11	98
Information Technology*	6	3	3	16
Professional/Management**	145	73	66	314
Technical – Textile***	157	58	23	2269
Technical – Non-textile	1	1	1	20
Total	**311**	**136**	**104**	**2716**

Source: NCCATT

* In this case, six IT projects were logged. Three involved individual training, and three required specific assistance (i.e. spreadsheet development). Individual students were not counted as a "firm" but instead were counted in the "trainees" column.

** Firms requesting technical assistance were not counted in the "number of trainees" column

***includes product development totals and product testing (some testing hours are an average)

Although NCCATT has started to adopt a new approach for focusing more on the industry's competitiveness needs, it has not created a strategic or business plan that outlines its approach to find new markets, reach a broader and more geographically dispersed group of companies, or analyze evolving staffing needs. The Center will need a concrete and detailed plan if it is to succeed in the transition and adjust to the changes in the North Carolina textile industry as it evolves from a mass-production, commodity-based products industry to one based on more highly specialized fabrics, niche markets, and non-woven materials.

NCCATT's Client Base

The Center appears to have a quite concentrated client base, which limits its impact on the textile industry in North Carolina. The Center's mission calls for it to be a statewide organization, serving and promoting the textile industry throughout North Carolina. Most of the Center's services, however, are provided to firms in the greater Charlotte-Gastonia-Rock Hill area. In fact, of the total 5,192 training and service hours provided by the Center from 2001 to 2004, 86 percent were provided to clients within 20 miles of the Center. Considering only textile firms, 84 percent of service hours were provided to firms within 20 miles of the Center. Of the 156 client firms and organizations that the Center served during this time period, 48 of them were textile companies—out of 226 textile establishments statewide.* Table 4 below shows the distribution of the Center's North Carolina clients by location. (Because this information concerns the fulfillment of the Center's statewide mission, data from six out-of-state clients were not included.)

Table 4: NCCATT North Carolina Clients by Distance from Center, 2001-2004

		0 – 20 miles from Center		21 – 100 miles from Center		More than 100 miles from Center	
		#	% of total	#	% of total	#	% of total
All clients	Clients	80	62%	28	21%	22	17%
	Contact hours	5,192.95	86%	449.25	7%	440.25	7%
Textile firms only	Clients	24	50%	14	29%	10	21%
	Contact hours	4,134.2	84%	420	9%	376.75	8%

Source: NCCATT

This concentration in the region is due, to some extent, to the textile industry's considerable concentration in the Charlotte region. However, as noted earlier, the North Carolina counties within this MSA are home to only 14 percent of the state's textile plants. Of the 48 textile companies that the Center served from 2001 to 2004, six have representatives on the Center's Board of Trustees, on the Foundation Board of Directors, or both. Importantly, of the approximately 4,134 service hours that the Center provided to textile firms over this time period, 2,576 of them (79 percent) were delivered to Board member firms. (The vast majority of

* To produce the most liberal estimate possible, when a client firm's status was undetermined, we assumed it to be a textile firm.

these hours – 2,048 – were provided to one Board member firm.) Another 140 hours were provided to educational institutions that are represented on the Board of Trustees.

NCCATT's Relationship with the Community College System and Institutions

One recommendation of the System auditors that does not appear to have come to fruition is for more extensive and formalized cooperation between the Center and Gaston College. If anything, the directive to curtail some of its non-textile activities has placed more distance between the college and the Center, especially at the leadership level.

The staff members of the two institutions occasionally collaborate and appear to work well together, and Center staff also work at times with other community colleges when asked to provide training or expertise through the Community College System's industry training programs. In general, however, the Center has remained—though formally a part of the System—separate from its fellow member institutions. While over the past 12 years, NCCATT reports working with more than half of the state's community colleges on training projects at some point, on average it only happens to happen about five times a year. Since becoming part of the System in 1991, there has been little transfer of textile expertise to other community colleges.

For much of its existence, the Center did no formal effectiveness accounting to the System or any other body (including its own Board). The Center does not produce an annual report. The audit of September 2003 noted that the Center does not regularly submit the same student and class data that the community colleges do, and recommended that the System devise some way of collecting these data from the Center.

One exception to the Center's removed relationship with other System institutions is the Hosiery Technology Center at Catawba Valley Community College. When interviewed, the leadership of both institutions and the staff of the Center reported that the two institutions have collaborated several times with good outcomes, and have always worked well together.

Collaboration with Gaston County Public Schools

The Textile Center also has an arrangement with the Gaston County Public School System to provide instructors and facilities for two vocational education programs: construction and electrical trades. This program has been in place for nearly ten years. The Center employs two full-time instructors, at a yearly cost of $79,404,* to serve as the teachers for these programs, in return for which the school system pays the Center a fee that is equivalent to the cost of 1.2 full-time secondary-level teaching positions. The Center provides the facilities for the classes, which are taught on-site in the Center's original building, and also provides all facilities and equipment for the classes. The advantages to the school system of working with the Textile

* Figures taken from North Carolina Community College System salary data.

Center as opposed to a community college or other institution, as expressed by the system's Director of Career and Technical Education (who has sat on the Center's Board for six years), are significant: free use of Center facilities and equipment, savings on teachers' salaries, and instructors who replicate the high school curriculum even though the courses are taught off-site. Table 5 below shows the utilization of these two courses over a four-year span.

Table 5: Students and Enrollments in Secondary-Level Trades Courses Taught at NCCATT, 2001 – 2005

School Year	Number of Students	Number of Enrollments*
2001-02	68	95
2002-03	93	108
2003-04	83	106
2004-05	177	204

Source: Gaston County Public Schools

*Because some students are enrolled in multiple classes or multiple semesters of the same class, the number of enrollments per year is higher than the number of students.

The jump in enrollments in the current year is due to the expansion of the foundation trades course taught at the Center, Introduction to Trades and Industrial Education. The school system expects that this increase will produce higher enrollments in the higher-level construction and electrical trades courses in coming years.

Critical Success Factors

NCCATT recently established performance measures called Critical Success Factors in order to increase accountability for the organization. Rather than impact or outcome measures, these are primarily throughput measures related to the number of companies served and individuals trained. One measure is the percentage of clients that express satisfaction with the service they received from NCCATT, a number that exceeded 95 percent in both 2002 and 2003, the only years it has been tracked.

V. Hosiery Technology Center

The scope of work for this report specifically directed the project team to interview and consider the Hosiery Technology Center (HTC) located at Catawba Valley Community College and with a small satellite facility in Asheboro at Randolph Community College to serve the firms clustered there. Since 1990 the HTC has focused on meeting the needs of hosiery companies. While it conducts training, the major focus is helping manufacturers to adapt to a new intensely competitive global culture, seeking new efficiencies and undertaking aggressive marketing strategies. HTC traces its origin to leadership at the Carolina Hosiery Association, which organized and lobbied for a dedicated Center to help the highly networked hosiery companies maintain their competitiveness.

When making comparisons between North Carolina's hosiery cluster and the more broadly defined textile industry it is important to bear in mind that hosiery is, obviously, a more narrowly defined sector and that the companies that HTC serves are more homogenous in their products and processes than the more diverse textile cluster. Further, hosiery companies are more concentrated around one geographic area, Hickory, than is textiles. The two tables below provide baseline information for HTC and NCCATT. Overall, HTC has a smaller staff and budget. It receives a much larger percentage of its total budget from fees for service than NCCATT—35 percent compared to 12 percent. HTC served 165 companies in 2003, about 145 of which received technical assistance. NCCATT started providing technical assistance services in late 2003 and has served 122 companies or organizations to date. However, analysis shows that only 36 received more than 5 hours of assistance. The exact comparable figure for HTC is not known; however, the "145" for HTC includes only companies who paid for the assistance, meaning it was a substantive engagement.

Table 6: Key Hosiery Technology Center Data

Staff	13
Self Supporting Revenue Budget ('04)	$335, 918
State Support Budget ('04)	$600,000
Total Non-Capital Revenue Budget ('04)	**$935, 918**
Number of Companies Receiving Technical Assitance ('03)	145

Source: HTC

Table 7: Key NCCATT Data

Staff	19
Self-Supporting Revenue ('03)	$187,666
State Support ('03)	$1,402,034
Total Non-Capital Revenue ('03)	**$1,589,700**
Number of Companies Receiving Technical Assistance ('04 to date)	122*

Source: NCCATT

*Only 36 of these received more than 5 hours of assistance and many were non-textile companies or community organizations.

VI. Facilities and Equipment at NCCATT

NCCATT facilities, owned by the State of North Carolina, comprise two buildings with 90,000 square feet of space. The original structure, built in 1941, is the larger of the two. It has four classrooms and 13 labs. The Lab and Administration Building (LAB) was built in 2003 and has two classrooms, four labs, and an auditorium. The newer LAB, however, was not built with "smart" classrooms, thereby somewhat limiting technical capabilities for educational programming. Videoconferencing and internet teaching capacity, in particular, would enhance the Center's ability to fulfill its statewide mandate by virtually reaching distant in-state clients.

While the configuration of these buildings may have suited the NCCATT in the past, a change in mission may require some facility renovation. The number and configuration of labs may require alteration in order to maximize efficiency. The details of these changes will be clear once it is decided exactly how the facilities will be used. It is not clear at this point, given the Center's ongoing transition from education programs to technical services, exactly how the Center's future textile-specific activities should be allocated between the two facilities. The Center is in the process of installing several pieces of textile equipment and machinery, which have been loaned by local textile firms, in the original building. The Center has also made the original building available for a wide variety of community users, including some local textile companies, the Gaston County high schools, the local sheriff's department, and the local Department of Motor Vehicles.

Table 8: Characteristics of NCCATT's Two Buildings

Building	Date Built	Value, $	# of Stories	Gross Square Feet	Number of Class-rooms	Total Seating Capac.	# of Labs	Lab Square Feet	Addition-al Space
Main Building	1941	4.34 m	3	64,000	4	106	13	23,600	N/A
Lab and Adminis-tration	2003	3.19 m	2	26,000	2	30	4	6,600	Audit. seating 98
Totals:				90,000	6	136	17	30,200	N/A

Source: NCCATT

NCCATT estimates the yearly maintenance expenses for operating and maintaining the Center to be about $420,000, about one third of its yearly state support. This includes three full-time and one part-time maintenance personnel, utilities, and three state-owned vehicles. The Center also cites a current need for about $75,000 in necessary repairs.

NCCATT Equipment

Most equipment at the NCCATT is on loan from the State, NCCATT's foundation, or from local businesses. It is estimated that the total value of this machinery is over $5 million. NCCATT owns several pieces of equipment. According to Center staff, however, most of it is obsolete. Although the State and the foundation contribute some machinery to NCCATT, the vast majority of equipment is on-loan from local industry. It is a testament to NCCATT's relationship with certain companies, especially Wellman, that this equipment is available: without it, it is unlikely that NCCATT would be able to offer the testing services it recently began. A complete listing of this equipment, as well as the pieces owned by the Center and the State, is in Appendix B.

VII. NCCATT Personnel

The Center has recently been downsizing, due in part to its ongoing transition toward an emphasis on technical assistance and industry services. A year ago, its staff included 26 positions, most of which were full-time. The staff today includes 19 positions below the rank of President, of which three are part-time. All positions but one were filled at the time of this report. The positions that have been eliminated include two Computer Instructors, Director of Marketing and Public Relations, Marketing Coordinator/Media Specialist, Sales Coordinator, one adjunct faculty, and a part-time receptionist. Even with the smaller staff, the Center still spends 80 percent of its budget on salaries (see financial section). Of the 19 current positions, seven of them are textile-specific, one of which is vacant. The sum total of filled full-time positions, filled part-time positions, and the president's position is 17 full-time equivalent positions.

The Center staff is divided into two branches: Financial and Administrative Services and Business Support Services. The former branch is led by the Dean of Financial and Administrative Services, who holds an MBA and a Ph.D. in higher education. She supervises two financial, two administrative, and four maintenance positions. Approximately 40 percent of the Center's staff plays administrative roles. (The leader of the second branch is the Dean of Continuing Education and Business Support Services, described below.)

Since the focus of this study is on the textile-specific capacities of the Center, the detail given will focus on the six textile-focused Center employees in the second branch. The organizational system of the Center is in flux; currently all of the textile-focused personnel carry the title Textile Technologist under the NC Community College System structure, but a system is under consideration that would distinguish between the higher-level personnel according to function. These personnel are more distinguished by their particular areas of expertise within the textile industry, however, than the functions they perform; most high-level personnel perform a range of functions on the projects they manage. The following profiles of key textile-related staff at NCCATT, which show both titles, give a picture of the education, experience, and expertise of these personnel.

- **Textile Technologist/Dean of Continuing Education and Business Support Services.** B.S. in Textile Chemistry from N.C. State University and has pursued graduate studies in the same department. More than twenty years of experience in the textile industry, including positions directing textile research and development activities. Areas of expertise: textile chemistry, quality control, product development, dyeing and finishing, product formation (knitting and weaving). Supervises positions below.
- **Textile Technologist/Director of Product Development Services.** A.S. in engineering from Catawba Valley Community College, a B.S. in Textile Chemistry from N.C. State, and an MBA from Pfeiffer University. Seven years of industry experience as a textile chemist, including department manager and quality control positions; areas of expertise

include synthetic fibers and dyeing and finishing. Supervises Process Specialist (see below).

- **Textile Technologist/Director of Technical Assistance and Instructional Services.** A.S. in electronics from Bell & Howell Correspondence School and a number of IT certifications. More than 30 years of industrial experience, of which five years have been in the textile industry. Areas of expertise include industrial maintenance and textile machinery. Supervises Technical Specialist (see below).

- **Textile Technologist/Director of Physical Testing Services.** B.S. in Textile Technology from N.C. State University. Thirty years' experience in the textile industry, including a nine-year stint as Plant Manager and Director of Quality. Areas of expertise: yarn manufacturing and quality control. Supervises Testing Specialist (currently vacant).

- **Textile Technologists/Process Specialist (part-time).** Thirty years' experience in the textile industry. Areas of expertise: textile machinery and yarn.

- **Textile Technologist/Technical Specialist.** Certificate in Electrical Installation and Maintenance. Twenty-five years' experience in the textile industry. Areas of expertise: electrical and industrial maintenance and textile machinery.

The table below offers an analysis of the salary structure of the Textile Center, compared to that of the rest of the North Carolina Community College System. As the dual titles above suggest, it is difficult to make direct comparisons between the two structures, due to the textile-specific experience and expertise that are required of the Center's staff. When the staff positions are grouped into general categories, however, we can see that in several categories, particularly continuing education and technical/paraprofessional, NCCATT's salaries are significantly higher on average than those in the rest of the System. These categories capture the majority of the Center employees with textile-specific expertise.

The overall salary average of the Textile Center is only slightly higher than that of the system as whole, due to the lower salary that the position of president carries at the Center compared to the other community college presidents.

Table 9: Salary Comparisons Between NCCATT and the North Carolina Community College System*

Employee Category	NCCATT Positions	Average NCCATT Salary (FTE)	Average NCCCS Salary (FTE)
President	1	$114,480	$126,782
Senior Administrators	2	$77,766	$77,187
Staff	1	$52,308	$44,085
Continuing Education Faculty	5	$41,634	$28,818
Technical/Paraprofessional	2.5	$44,388	$30,044
Support	1.5	$28,788	$25,518
Maintenance	4	$25,209	$22,726
Total	**17**	**$54,006**	**$50,737**

*Source: Salary data from North Carolina Community College System. Categorization of NCCATT employees confirmed by Center president.

VIII. NCCATT's Finances

NCCATT receives almost all of its state support from state dollars. The amount of state funding decreased from just over $1.6 million in 2001 to closer to $1.4 million in 2002 and 2003 (see Table 10). The 2004 appropriation was just over $1.3 million. What NCCATT calls Operating Revenues comprise the fees and other income that the Center recovers for its services. This amount has decreased substantially since 2001 from more than $258,000 to about $188,000, a drop of almost 30 percent. This decline in revenue coincides with when the Center was asked to stop offering computer courses that duplicated those offered by area community colleges, a move which decreased very significantly the amount of training the Center did and hence its fee-generated revenues.

NCCATT opened its second building in 2003; a facility constructed through funding from the higher education capital improvements bonds approved by North Carolina citizens about five years ago. The significant decrease in net assets over the last three years is a result of drawing down the funds for the new building as construction continued and then was completed.

Table 10: Statement of Revenues, Expenses, and Changes in Net Assets
North Carolina Center for Applied Textile Technology
Fiscal Years Ending June 30, 2003, 2002, 2001

	2003	2002	2001
Operating Revenues	$ 187,666.48	$ 220,621.05	$ 258,876.50
Operating Expenses	(2,312,863.82)	(3,930,843.37)	(1,946,397.29)
Non-operating Revenues*	1,402,033.76	1,427,797.08	1,645,365.84
Due from Capital Grants	198,955.06	697,045.40	2,029,447.00
Change in Net Assets	(524,208.52)	(1,585,379.84)	1,987,292.05
Net Assets – Beginning of Year	843,078.11	2,428,457.95	(441,165.90)
Net Assets – End of Year	$ 318,869.59	843,078.11	$ 2,428,457.95

Source: NCCATT Financial Audits, 2001, 2002, 2003

*Non-operating Revenues = State and nongovernmental contracts and grants, restricted and unrestricted investment income, and other revenues and additions

IX. Textile Industry Needs

General training and technical assistance needs

As the textile industry changes in North Carolina, the training and technical assistance needs of the state's firms are also evolving. Currently, the demand among textile firms for specialized textile training, either credit or non-credit, is not particularly high. The low demand for training is a result of a decline in number of companies and because of the survival mode in which many traditional textile firms in the state are now forced to operate. Industry stresses cause firms to run much leaner operations and they no longer believe they can afford to devote as many resources to training opportunities for employees.

As discussed earlier, both the recent growth that has occurred in the state's textile industry and forecasted potential growth are focusing on relatively new textile sectors, such as nonwoven products, medical textiles, defense textiles, nano-textiles and fiber-based manufacturing (e.g. tires, golf clubs, etc.). Firms specializing in these areas recently have moved into the state, and economic development officials report growing interest in the state from these types of firms. The newer textile products use a variety of industrial manufacturing processes, many of which require different technical assistance and different types of skills than can be offered through NCCATT as it is currently configured. Employees in nonwoven textile companies, for example, may need to understand bonding processes and the responses of synthetic fibers and sheets to temperature or humidity changes. In addition, in some instances, the sectors are so new that their training needs have not been fully articulated.

One sector that does have a significant need for training and technical assistance is yarn production. Strong yarn manufacturers are absolutely critical if North Carolina is to maintain a textile industry, and more than 60 of these companies are located near NCCATT's location. If yarn manufacturers fail in the state, remaining textile companies further down the supply chain—both in mature industries like hosiery and in emerging industries such as medical and defense-related textiles—would be adversely affected. For traditional companies, failure of the yarn manufacturers would mean that they would have to turn to overseas suppliers, removing the one competitive advantage that remains—speed to market. Emerging textile sectors would also be affected, as fewer firms might relocate to North Carolina without the draw of a mature industry cluster that includes local yarn manufacturers.

Most of this analysis of industry trends and general technical assistance needs has focused on the needs of larger textile firms. While certainly the majority of employees in North Carolina do work at large textile companies, there are 865 textile companies in the state with fewer than 100 employees.* NCCATT has by and large not served these companies and learning more about

* Source: Dun & Bradstreet

the training and technical assistance needs of these firms and learning how to better serve these firms could be vital to improving the state of North Carolina's textile industry.

Needs of individual firms

For this study, the project team interviewed owners and operators of textile companies, as well as industry experts and economic developers, to determine the most pressing training and technical assistance needs of firms. Most employers in the traditional textile sectors today believe that the days of requiring a degree program in have passed. Industry experts, however, see a potential need in the future for higher-level textile technicians as the industry moves to more advanced levels. The Bureau of Labor Statistics, for example, projects a 13 percent increase in computer specialists and an 18 percent increase in extruding and forming machine setters, operators, and tenders for synthetic fibers, even as industry employment declines by more than 4 percent.[4] A new technician program would likely concentrate more on understanding textile materials and processes to allow individuals to work at different types of companies that all use fibers as a key input in their products.

But even while technical requirements increase, companies also still look to community colleges to help prepare the entering labor force. For example, companies expect the public sector to provide English as a Second Language (ESL) and basic math and English for those lacking basic competencies. Programs that integrate into their ESL programs the unique language of the industry where they are working have a better chance of reaching the students and at the same time better preparing them for the environment in which they will work.

The firms interviewed expressed real needs in the area of technical assistance, particularly research and development. Many companies, particularly those that are smaller, simply do not have the resources to invest in R&D. The Center or other technology providers can assist these firms in getting new products to market through rapid prototyping and by running small samples of new styles to show to potential customers. Start-up companies and small firms often do not have the staff capacity or machinery to do prototyping internally, making a resource like the equipment available at the Center extremely valuable. In certain cases, this prototyping can help larger companies as well. Often, it can be difficult for these large firms to interrupt their regular runs of product to do a small sample run of something new.

Technical assistance can also be helpful in testing the quality of product at the company. For small companies, they may lack the testing equipment that customers require. For larger companies, equipment such as that located at the Center can offer an independent assessment of a product's quality, something that is usually required before a product can be brought to market. The Hosiery Technology Center (HTC) at Catawba Valley Community College developed quality standards for hosiery products and does a significant amount of testing at its lab, a service that benefits producers and retail customers.

---

[4] U.S. Department of Labor, *The Past, Present and Future of Employment in the Textile and Apparel Industries: An Overview*, A Report to the Congress, May 2004, p. 48.

Firms interviewed were generally very positive about equipment from Wellman Industries and others that has recently been loaned to the Center. The equipment is seen both as a demonstration of that company's support for NCCATT and as a valuable resource for firms.

Industry experts see the technical assistance needs of textile firms as centering on issues of flexibility. According to individuals interviewed, textile firms do not have a history of being quick to change. Textile firms also need assistance in developing their ability to innovate. Firms need to stay on top of technology trends and emerging markets. Several experts pointed to the need for an information hub that could better disseminate this type of information. Firms could also benefit from assistance with taking better advantage of government procurement opportunities. A concrete service that provides procurement and bid requests from governmental agencies would greatly assist companies looking to expand their market opportunities. HTC's *Legsource.com* is a good model of such a service.

Other NC Resources for the Textile Industry

North Carolina—as befits a state with such a mature textile industry—has the largest textile research base in the country. A unique combination of academic, government and private industry groups provide significant amount of research and technical assistance to textile firms in the state. Below, brief descriptions of some of the most important providers show how they complement some of the activities of NCCATT.

North Carolina State University College of Textiles: NC State University hosts one of the nation's most respected schools of textiles. While much of the work of the university centers on teaching incumbent students, the college offers a significant amount of assistance to the industry. Several firms interviewed for this study, for instance, used NC State for technical assistance, stating that the distance between Gaston County and Raleigh was not a barrier to service. However, NC State's main focus is not on working with companies to meet their day-to-day needs and their services are not oriented toward helping firms bring new products to market. The advanced equipment located at the Raleigh campus is often tied up in conducting large-scale activity in support of faculty and student work. Indeed, the university tends not to pursue much activity that doesn't have at its core a research angle. This limitation means the small scale testing needed by small companies is not usually performed by NC State. The university also does not stress rapid response to all companies request for service. A backlog of research and limited faculty availability can mean that firms have to wait significant amounts of time before receiving assistance.

North Carolina Nonwovens Cooperative Research Center: NCRC was established as a State/University Cooperative Research Center in 1991 with a grant from the National Science Foundation and receives funding from the State of North Carolina and the industry. The Center serves the nonwovens industry through fundamental and applied research in nonwoven technologies and through an active technology transfer program. Core research programs—including the development of new materials, the modification of existing materials, and the development of instrumentation and test methods for nonwoven fabrics—are developed jointly by NCRC faculty and staff and member companies. NCRC also carries out research for individual companies. Membership is open to any company, worldwide, that is involved in

manufacturing nonwoven roll goods, converting roll goods into final products, or supplying machinery or raw materials to the nonwovens industry. Research activities are carried out in cooperation with many other universities. In addition, the Center provides high-level training and assistance in the implementation of technologies developed by NCRC, offers courses taught at plant sites, workshops, seminars, conferences, and one-on-one consulting. NCRC also operates pilot facilities at companies for manufacturing various types of nonwovens. NCRC's physical and mechanical testing lab offers analytical equipment to test critical properties of nonwovens.

Industrial Extension Service (MEP): The federally sponsored industrial extension service located at NC State does serve a significant number of textile clients. However, the MEP concentrates most of its work on assisting companies to pursue general quality improvements such as lean manufacturing and other business operations issues. Programs offered through MEP do not have a specific textile focus.

***TC²*: The Textile and Clothing Technology Center (TC²),** based in Cary, is a national research facility concentrating on sewn goods and apparel. The industry-sponsored center operates a production facility at its headquarters that serves as a demonstration center for advanced apparel technologies as well as conducting research that benefits the apparel and sewn products sector. TC² does provide some direct consulting to firms on both technology and general business practices, though it is not limited to North Carolina in its delivery of these services. One of the specialties of TC² is offering information to clients on improving their understanding of the supply chain and how relationships in that chain can be improved and perfected.

Institute of Textile Technology: ITT is a textile research and consulting group which recently moved to NC State's Centennial campus in Raleigh. ITT primarily focuses on advancing textile research, although it does offer some consulting services to firms through its for-profit subsidiary ITT Technologies, Inc. (ITT3), which is located in Greenville, South Carolina. ITT3's services, as advertised, include: "analysis and testing of chemicals and materials; in-plant studies to evaluate process improvements or to provide troubleshooting, proprietary research and product development; environmental and energy studies and audits, engineering services for textile processes and environmental systems."

Private industry groups: Cary is also home to two large industry initiatives: Cotton, Inc, which promotes the use of cotton by industry and consumers, and INDA, which is the Association of the Nonwoven Fabrics Industry. Both these entities promote research and training among textile firms.

X. Key Findings

As the project team acquired data, information, and insights through research and interviews for this project, several common themes emerged that were reinforced by information from multiple sources. This section pinpoints these themes to produce several conclusions that serve as keystones for the recommendations for the future of NCCATT.

Despite recent job losses, the textile industry is still very important to North Carolina.

Textiles still comprise the largest manufacturing industry in North Carolina, employing more than 86,000 workers across the state. While the industry has lost thousands of jobs in recent years, two factors mitigate this loss and indicate that textiles should not be counted out as an important source of jobs and growth for North Carolina. First, the textile industry is not homogeneous. Job loss has been concentrated largely in the traditional, labor-intensive, commodity-product textile operations. At the same time, new opportunities are being created in other segments of the textile industry, such as nonwoven and nanotextile products, which are finding new applications in markets such as defense and medical supplies. These technology-intensive, highly specialized fields hold the potential to create significant numbers of higher-paying, skill-intensive jobs.

Second, even the traditional segments of the textile industry have the potential, with targeted support and technical assistance, to compete successfully with foreign manufacturers. While labor-intensive cut-and-sew operations are not likely to return to this country, more capital- and technology-intensive firms such as fabric mills and knitted products have opportunities to develop advantages based on quality and speed to market. North Carolina has significant opportunities to develop in the textile industry, and should not write the industry off.

The textile industry needs a dedicated center for applied technology services and technical assistance.

The textile industry is highly specialized, making use of processes and inputs not shared with many other manufacturing industries. The expertise and knowledge required to diagnose the needs of textile companies, create targeted solutions, and implement training and technical assistance projects are highly specific to textile technologies. It takes higher levels of specialized expertise and experience than most community colleges can employ or afford. Only by focusing resources, can the state afford to meet the skill and technical needs of its most important employers and the career opportunities of its labor force. In addition to NCCATT, North Carolina does have several organizations that now offer high-level services and resources for the textile industry, but these organizations concentrate primarily on research and development, not on immediate applications of that research or training. If the opportunities offered by the textile industry are to be realized for North Carolina, the industry needs to be served by a dedicated center offering applied textile industry-specific programs, services and expertise.

The isolation and lack of accountability at the Textile Center have allowed it to drift away from its core mission.

It follows from the preceding conclusion that an industry center would require a certain degree of autonomy in order to focus completely on the needs of industry. As it currently operates, however, the Center's status has gone beyond autonomous to isolated. Though the Center is part of the North Carolina Community College system, it is not directly connected to the instruction, economic development or workforce development programs of the system because it is not part of a community college and does not operate under the same regulations or funding streams. The Center receives almost all of its financial support directly from the NC General Assembly, without specific guidelines or accountability for its use.

This lack of accountability and oversight has led to a situation in which the Center has seemed to lack direction and purpose. It drifted away from its core mission, spending its resources and efforts on clients outside the textile industry. It also established a structure that incurs very high administrative costs (about 40 percent of the staff are administrative), reducing the impact of the state dollars put into the Center. The Center does not appear to have tried to leverage state funding by seeking out and securing additional support from other sources (with the exception of some recent equipment loans from industry). Neither has it acted proactively to develop tight partnerships with other research and service providers for the textile industry, or to fulfill its statewide mission: it serves mainly a small core group of firms that are located close to the Center facilities. In fact, historically the Center has taken a reactive stance in serving industry needs, waiting to be asked to address specific problems rather than being a leader at the forefront of efforts to help the industry innovate and develop new markets.

All in all, it appears that the Center's autonomy has translated not into independence, but into lack of direction and accountability.

The Hosiery Technology Center provides an excellent model of compromise between autonomy and accountability.

The Hosiery Technology Center (HTC) demonstrates that an industry center can maintain a tight focus on its target industry while also being part of a community college. HTC, which has been part of CVCC since its inception and whose director reports directly to the president of the college, is widely recognized as being one of the most effective, efficient, innovative industry technology centers in the industry. It has been able to realize significant economies by being under the administrative and operational umbrella of the college, yet it has always had the autonomy it needed to focus directly on the needs of hosiery manufacturers, and has always been evaluated according to its economic impact on the industry, not according to education-based measures such as the number of students in its classes. Complete institutional independence, such as the Textile Center has had, does not appear to be necessary in order to achieve the level of autonomy needed to provide innovation-based, fast-turnaround technical services and assistance to a specialized industry.

This balance between autonomy and accountability is achieved largely through a positive working relationship between the director of HTC and the president of the college, as well as a

clear recognition on the part of the president and other college leadership of the importance of the hosiery industry and of a dedicated resource for that industry. Any replication of HTC's model would depend for its success on a strong understanding between and common commitment of the leadership involved.

XI. NCCATT Recommendations

NCCATT comprises a staff and facilities with a long history and identity of serving the textile industry. The purpose of this report is to suggest potential options for organizing, staffing, and funding a world class NCCATT that will meet the current and future needs of an industry that has been, and remains, a major part of the state's economic base, and to suggest information necessary to evaluate the options. Ultimately, the alternatives faced by the North Carolina Community College System and the North Carolina General Assembly must balance any future missions and utility of the Center, the financial resources available to support it, and policymakers' willingness to align resources to fulfill the future recommended mission. This report focuses on options within the realm of the state's community college system, of which NCCATT is part. Options considered here are (1) to keep the Center as an independent institution, (2) dissolve it, (3) integrate the programs and services into a community college, or (4) create a semi-autonomous Center but within the governance structure of a community college. Options that transfer responsibility to other units of North Carolina government or devolve NCCATT into a private Center were not considered.

We believe that the final option, described below, will best serve the interests of the entire state's current and anticipated textile industry and its workforce and help the industry not only survive its global challenges but to grow.

Option 1: Remain an Independent Institution

The Center is currently in the process of expanding its efforts to assist textile companies with more technical assistance and testing services. The project team believes this is a positive step that recognizes the current and projected needs of today's textile firms. Training programs alone are no longer enough. In the eyes of many of the Center staff and Board members, this recent change in focus will be sufficient to turn things around at the Center, and they believe that it should continue to operate autonomously much as it has. They are concerned that becoming part of another institution—particularly a community college—would dilute the Center's focus on the needs of the textile industry, particularly since the industry's recent job losses have led many to dismiss it as an unimportant economic development target.

While the project team agrees that the Center's focus on the textile industry is important, the status quo appears untenable. The Center's lack of formal connection to the programs of the North Carolina Community College System, and specifically to its regulations and oversight requirements, has allowed the Center to lose direction and purpose. Despite receiving almost all of its financial support directly from the NC General Assembly, the Center has not received specific guidelines for its use nor been accountable for the impact of the uses to which it puts these funds. Under these conditions, the Center has drifted away from its mission and has been slow to react to assessing and serving industry needs. In addition it has not adequately fulfilled its statewide mission, instead targeting most of its efforts at a relatively small number of companies in close proximity to the Center's location. Finally, there have been concerns about the activities of the Center's president, who was teaching courses at nearby colleges during the

Center's operating hours—significant enough concerns that the System conducted an audit into these activities.

All in all, it appears that the Center's autonomy has led to a lack of direction and sufficient accountability. It is the belief of the project team that the status quo of maintaining an independent Textile Center within the NC Community College System cannot be recommended.

Option 2: Dissolving NCCATT

The present shortcomings of the Center should not distract policy makers from considering whether there is still a mission for an institution like NCCATT within the economic development and workforce development activities in North Carolina. Despite large losses of employment and firm capacity, there are still large numbers of textile companies in existence that will continue to have needs both for technical support and human resource development. And, as pointed out earlier, the textile industry remains the largest manufacturing sector in the state, employing 86,000 people.

While the media focuses upon the plant closings, primarily in the apparel sector, there are other traditional textile sectors—hosiery, for example—that continue to be globally competitive. In addition, there are potential new products and innovations in the areas of medical textiles and defense textiles that could have a significant future for the development of new, more knowledge-based industries, as described earlier in this report.

One might argue that the textile industry's needs should be met by the state's community colleges the way most other industries' needs are met – through technical education and customized training resources available in the System's 58 colleges. However, having a dedicated facility to serve such a dominant industry cluster in the state actually fits well within the System's expressed plans to develop cluster expertise for important industries at community college-based "cluster hubs" located across the state. The first step toward this approach came with the System's $8.7 million investment in biotechnology centers awarded earlier this year through funding from the GoldenLEAF Foundation. And, in part because of NCCATT's long-standing existence, no community colleges in the System run any programs specifically for the textile industry.

Importantly, North Carolina has the most significant research assets related to textiles in the nation, mostly located in the Triangle. The RTP area is home to the College of Textiles at NCSU, the Institute of Textile Technology, TC2, Cotton, Inc., and INDA. These assets, combined with the mature supply chain associated with the state's long tradition of textiles, position the state to be at the forefront of new emerging opportunities in textiles. Interviews for this study, however, indicate that there appears to be a significant gap between the state's textile research resources and the ability of these resources to concretely help North Carolina firms develop new products and target new markets. One reason not to dissolve the Textile Center is that, under new direction, it could play an important role as the connecting linchpin, a sort of "retail storefront" between the high level technology and product advancement taking place in RTP and textile firms' immediate needs for new and innovate products and processes that will be

globally competitive. Closer cooperation with NC textile research assets will help ensure that more of their benefit accrues to the state, rather than leaving it.

Clearly it is in the state's interest to (1) support at a modest level the remaining traditional textile firms who employ huge numbers of North Carolinians and for whom losing their jobs would likely result in taking a lower-paying service industry job or leaving the workforce completely, and (2) put into place resources that will put North Carolina in the vanguard of new economic development opportunities in areas such as medical textiles, defense textiles, and nonwovens, as well as nanotextiles, a cross-cutting application that could affect all of these sectors.

There are no dedicated textile programs at any other institutions within the North Carolina Community College System. Given the tens of millions of dollars the state is spending to develop a stronger presence in the promising but still small biotechnology cluster, a continued investment of less than $1.5 million for the textile industry seems warranted.

Option 3: Integrate the NCCATT's programs and services into an existing Community College

A third option is to place NCCATT under the control of an individual community college, thus keeping it within the community college system but limiting its autonomy to function as an independent Center. Gaston College is the college that is located closest to the Center and the heart of the industry and is the likeliest candidate to both continue to meet the textile industry's needs and perhaps to use its facilities for other college needs such as additional classroom space.

While this option would have the advantage of making the Center part of a community college and the System thereby increasing its accountability, there is a real possibility that the Center's textile focus would ultimately be eliminated or markedly downgraded as it competes with other college needs and missions. The "Center" would be forced to compete for resources and leadership attention along with other worthy activities of the college. The Center would likely report to the College's Dean of Continuing Education since most of its programs are not for credit, losing its status as an autonomous entity. It might be difficult to continue to maintain a textile focus and justify continued state support, even at a reduced level, for the Center. This option does not acknowledge the continued importance of textiles to the state and does not position the state to have a community college-based center of focus for the industry. Moreover, the Center also could lose the particular industry relationships it currently enjoys both with the Board of Trustees and NCCATT's Foundation Directors.

RECOMMENDED:

Option 4: Create a Semi-Autonomous, Industry-Driven Textile Technology Center at Gaston College

The fourth and recommended option is to officially dissolve NCCATT but create, through legislative action, in its place the Textile Technology Center (TTC), a semi-autonomous, industry-driven center modeled after and tightly linked to Catawba Valley Community College's Hosiery Technology Center and consistent with the long range of the state to develop "cluster hubs" at community colleges to develop specialized expertise that can meet the needs of North Carolina's industry concentrations, or "clusters." This option would require dissolving the existing NCCATT Board of Trustees, though some of its members would be asked to take part in a new TTC Advisory Board, to be described later. The State would transfer ownership of NCCATT's land and buildings to Gaston County, which owns all of Gaston College's facilities.

As part of this structure, the General Assembly would statutorily establish the funding stream, authorize the Advisory Board, and establish the guidelines that govern the TTC and its relationship with Gaston College. It is also recommended that the Assembly take this opportunity to also include in this legislation recurring funding for the Hosiery Technology Center and that the legislation stipulate a close working relationship between the two centers. They could both be considered auxiliary enterprises within the budgets of their respective colleges. As specially distinguished units, they would have control over their budgets and be accountable to the Community College System and the Assembly for allocations.

Gaston College would manage administrative and fiscal matters of the Center, while NCCATT's programs and staff would be largely directed by the new Advisory Board and tightly linked with the HTC. This is a budget neutral recommendation for the state. It is recommended that the state combine current funding for NCCATT and HTC and redistribute them as deemed appropriate to support the two centers' missions and activities.

An advantage of transferring the facilities to Gaston College is that doing so will save administrative and overhead costs by the college's assuming business operations functions such as payroll and accounting. It would also bring the Center under the same regulations as the other institutions within the System, ensuring a higher level of accountability. In addition, by becoming part of a college and associated with the HTC, it will develop closer links with other community colleges and other higher education and research entities.

Establish TTC Advisory Board

The Textile Technology Center Advisory Board should primarily comprise department heads and CEOs of textile firms that can advocate for specific technical assistance and training needs. It is recommended that the Advisory Board comprise nine members. Initially, two existing NCCATT Board of Trustees members should be asked to serve on the new TTC Board. In addition:

- At least three members should represent entities outside of the Charlotte/Gastonia MSA
- At least two members should represent companies that produce nonwoven textile products
- At least two members should represent textile companies with fewer than 100 employees
- At least one member should represent a textile research organization such as the NCSU College of Textiles or TC2.
- Two industry representatives should also serve on the HTC Advisory Board
- One member from the NC Community College System Office
- One member from the Gaston College Board of Trustees

As described later, Gaston College must understand the important role of this Advisory Board in guiding the activities and direction of the TTC.

TTC's Purpose

The new Center should be directed at textile companies, especially small and medium-sized firms, and will play a major role in:

a) assisting traditional textile companies, particularly yarn manufacturers, which are a critical part of the textile supply chain in NC

b) as markets shift and the economy changes, aiding the development of the newly emerging parts of the industry

c) lowering costs to firms by supplying technical services and training programs

d) providing the North Carolina Community College system with good curricula and programs which could be used by other colleges, and

e) serving as an intermediary between the colleges and the industry.

Establish Tight Links to HTC and Annual Reports

In order to profit from the successes of the HTC and promote cross-fertilization between the two centers, the legislation that governs the TTC should stipulate that the directors of the TTC and the HTC meet in person quarterly to share information, expertise and strategies. The TTC should also submit an annual report with impact measures similar to that currently produced by the HTC every year.

Prerequisites for the New Textile Technology Center

Because this recommendation involves creating a semi-autonomous industry-focused Center at Gaston College that is somewhat atypical for a community college, the project team believes

that Gaston College should adhere to the following guiding principles in order for this model to be successful.

Willingness to house a Center that is dedicated to serving statewide the current and emerging technology and workforce development needs of one of North Carolina's most important clusters. The mission of serving the textile industry must be preserved by the local and state community college leadership. As described earlier, textile companies are found across the entire state, and the College must recognize that with state support for this industry cluster comes a mandate to meet the entire state's textile needs.

Willingness to allow a semi-autonomous private sector-dominated Advisory Board to direct the operations of the Center. One of the fears of some Center stakeholders is that loss of independence and assignment to a community college would eliminate the direct industry support that has been so essential to the functioning of the Center. The Center cannot simply become another arm of a college folded into other college missions and priorities. While control over the buildings and ownership of the property, and responsibility for maintaining the facilities and overseeing staff can rest with the community college, there needs to be a stated agreement that the Advisory Board will largely direct the programs and activities of the Center, make recommendations about staff hires, and provide leadership for its strategic direction.

Willingness to recognize that this Center will not generate significant numbers of FTE and therefore will use assessment measures that focus on industry impact. Economic-development oriented industry centers must be measured and evaluated differently than other parts of community colleges. Examining the number of students in seats is not an appropriate or effective way of determining the impact of an institution that exists to make industry more competitive. We therefore recommend a using the tool already developed by the Manufacturing Extension Partnership and currently used by the HTC to measure the Center's impacts.

XII. Suggested First Steps and Functions for the Textile Technology Center

The following is a description of some of the first actions that the new Center should undertake to be successful and some of the functions it should carry out. This list is not comprehensive and is not intended to be a detailed operations plan, which is beyond the scope of this report.

Develop a New Mission and Business/Operating Plan

The Advisory Board and key staff of the Textile Technology Center, along with Gaston College's leadership, should convene a very broad-based industry "summit" to define the technical services and workforce needs of the textile industry. This convening must include a range of textile firms, including nonwoven goods, and significant representation from small and medium-sized and new companies. While not all the needs that are put on the table will be able to be met given the relatively modest resources available, priorities will be determined and a mission and initial set of targeted activities developed. Emphasis should be on activities that will increase the bottom-line competitiveness of existing textile firms and those that will increase the state's capacity to support emerging textile sectors.

Based on this input, a formal business/operating plan should be developed for the new Center, including anticipated revenues, budget, staff, and resource requirements to meet the needs of the plan. In addition, a fee structure should be developed and agreed to by the industry. Ideally, the financial structure needs to not only recover some costs but add some revenues to grow programs, equipment and staff in the future.

As part of its business/operating plan there should be an annual report to the President of the NC Community College System Office and the State Board of Community Colleges, as mentioned earlier. In addition, each year a state system evaluation team should visit the new Center to review operations and ensure that the original goals of the plan are being fulfilled.

Become a True Statewide Resource

The new Center should establish strong and frequent partnerships and outreach strategies that will reach far beyond the Charlotte/Gastonia region. This should involve a combination of direct delivery of services by Center personnel as well as curricula and expertise sharing with other community colleges. Customized classes or some on-site classes maybe be delivered through another community college facility, but Center staff could be used.

Provide Industry-Driven Services and Technical Education and Training

The new Center should teach textile-related courses and provide various forms of technical assistance and services. There should be continuation and improvement of some of the technical assistance and testing services NCCATT has recently started.

While the new Board and industry should make final determinations on the appropriate mix of services and training, the following appear to be good candidates.

Services: Quality testing, rapid prototyping and product development, reverse engineering, marketing/procurement assistance, lean manufacturing (through IES), industry trends research, exporting assistance, central information hub to coordinate partnering opportunities among companies, and industry meeting coordination

Training: textile machinery and processes, ESL from textile perspective, textile industrial maintenance courses, and explore the need for an advanced textile technician degree program that could fulfill needs in both traditional and emerging textile companies such as nonwoven goods.

Be A Champion for Innovation and New Markets

Perhaps the most important function the Textile Technology Center can perform is to serve as a center for the emerging needs of the textile industry. As described above, this likely means more efforts at technology transfer—including applied research and product development—and diffusion. This also could mean serving as a place for industry meetings and conferences (as NCCATT currently does), or showcasing new equipment and procedures. Even the furnishings could be distinct from the rest of the campus so that industry continues to see the facility as its own. Consideration should be given to maintaining the present NCCATT Foundation, which could only support the activities of the Center.

A key factor in the success of the Hosiery Technology Center to date has been its dedication to proactively working with companies to inform them and even convince them of market changes and new opportunities. The leadership and staff of the TTC cannot wait for the phone to ring to carry out their work. The same vocal and persistent leadership exhibited by the Hosiery Center should be transferred to the TTC for it to have real impact, be embraced by industry as a valuable resource, and be worthy of state support.

Create Career Pathways

The new Center should chart out for some of the larger components of the textile industry the potential career pathways that individuals take to advance within the industry. This would include a discussion of potential skills necessary to advance along these pathways. The Center could become a resource to both community colleges and high schools on how to develop the expertise to implement part of these pathways for the textile employers. This would include some forms of competency-based assessments for students who would take textile cluster programs. This activity should be carried out in partnership with the technical education

departments on campus at Gaston College. The pathways ought to include helping people identify and embark on entrepreneurial opportunities that require special industry knowledge, which could be a niche producer or a small business operating somewhere along the cluster's value chain.

Develop Strong Partnerships

The new Center should be well connected to the state's many textile and manufacturing oriented organizations and industry associations. The goal should be to complement and enhance the research and training base already in place and to link tightly with industry groups, both to profit from their expertise and to market the TTC's capabilities. The new Center should have a clear, specified role that does not overlap with other service providers and industry groups.

- NC State University's College of Textiles, Nonwoven Cooperative Research Center, and the Industrial Extension Service (the state's Manufacturing Extension Partnership entity).
- INDA, Cotton, Inc., TC2 and other industry research groups
- Textile industry associations
- NSF's Advanced Technological Education Program: Only community colleges may apply for these grant funds that support technical education. There is the possibility the program would support a national textile center through this program.
- Homeland Security and Defense Department: Given the market of defense clothing and the applications of clothing to homeland security measures, there may be funding within each of these federal agencies. Civilian dual use programs exist with the DAPRA unit of the Department of Defense. Part of the strategy of the new Center will be to develop ties within these departments and to seek out additional programmatic funding.

XI. Conclusion

Many issues need to be resolved for a successful future of a new Textile Technology Center. Because the industry is in such transition and job losses have been great, it is tempting to move state policy and resources away from the Center. However, this view underemphasizes the remaining significance of the textile industry to North Carolina and its future possibilities to offer fewer but higher-paying jobs for North Carolinians. It is not wise state policy to walk away from this dominant and mature cluster that still can be an engine of growth.

A reinvigorated Textile Center can help traditional textile companies become more competitive, spur innovation in the industry, and help attract new nonwoven, medical and defense textile companies to the state. Indeed, by supporting the recommendations in this report, the state of North Carolina is recreating the Center to serve the original mission its founders intended over fifty years ago: to invest in an industry vital to North Carolina and its workers.

Appendix A: Interviews

During its research, RTS and its consultants conducted interviews with individuals from the following institutions. In several cases, more than one person from an organization or company was interviewed. Names have not been disclosed in the interest of confidentiality.

Educational Institutions

- North Carolina Center for Applied Textile Technology
- Catawba Valley Community College
- Gaston Community College
- Hosiery Technology Center
- NCSU - College of Textiles
- NCSU – Industrial Extension Service
- NCSU - Nonwovens Cooperative Research Center

Government

- Carolinas Partnership
- Gaston County Government
- Gaston County Schools
- NC Department of Commerce
- U.S. Department of Commerce

Industry/Industry Experts

- American & Efird Inc
- Beam Construction
- Carolina Hosiery Association
- Carolina Mills
- INDA
- The Massey Company
- Muratec
- National Textiles
- Parkdale Mills

- Pharr Yarns
- RL Stowe Mills
- Southern Textile Association
- TC^2
- Wellman

Appendix B: NCCATT Equipment

Most equipment at the NCCATT is on loan from the state, NCCATT's foundation, or local businesses. It is estimated that this machinery is worth over $5 million. NCCATT owns several pieces of equipment, however, most of it is obsolete according to staff. Information on the value and age of loaned equipment is not available.

State Owned

Equipment	Depreciated Value	Age
Roving Frame	$11,600	1969 – obsolete
Dye Machine	13,358	1998
Infrared Dying Machine	13,999	1998
Spectrophotometer	10,000	1999
Universal Testing Machine	10,890	1998

Foundation Owned

Equipment	Depreciated Value	Age
CSM Spinning Frame	$86,645	Unknown
Sohler Overhead Cleaner	8,255	Unknown

On Loan from Industry

Testing Equipment

Boiling Water Shrinkage Bath and Laser Board
Hunter Lab Colorimeter
EIB Hairness/Fabric Simulation
Instron-Fabric Ring Pull/Staple Pad Friction
Fafegraph (High Stretch Tensiles, Single Fil)
Favimat (Single Fil Tensiles)
Lawson Hoseleg Knitter
Kiesokki Filament and Silver Evenness
Laundrometer (Glycerine Heating Fluid)
Rotoring Cohesion
Shrinkage Forces/Free Shrinkage Tester
Staff Tester Knit and Weaving Quality
Statimat Yarn Tensiles
Uster Yarn Evenness
Zweigle Twist Tester

Classifault
Pilling (Image Analysis Development Project)
Static Dissipation
Shirley Silver Analyzer
Rothchild Cohesion Tester
Mullenburst Tester
Elmendorf Tear Tester
Moisture Evaporation Balance
Fabric Tilt Table
Tapeboard Winder
Card Winder
Microscope with Camera and Capture Card
Sewing Machines
Fiber Flex Tester
Extractor and Dryer
LASE Tester
Light Box Table
Fabric Sample Press (Cutter)
Uster Fabriscan
Vibromat by Textechno
Instron Model 4502
Fabric Streak Analyser by Atlas

Yarn Reels and Balance
ILE DC-65 Evenness Tester
UT4-CY Evenness Tester for Filament Yarn
UT4-SY Evenness Tester for Filament Yarn
Uster Hariness Tester
Uster Classimat Quantum
Uster-Tensorapid 4
Uster-Tensojet 4
Washer and Dryer
FAK Knitter
Randum Tumble Pill Tester
Scott Skein Break Tester

Process Equipment

Air Lay Machine
Card-Trutzschler 760
Card-Trutzschler 903
Blending & Openning System for Carding

Reiter RSB Draw Frame
Rotoring Quick Spin
One Shot Melt Spinner
Single Position Filament Melt Spinner
Murata Air Jet – Staple Spinning
Murata Vortex – Staple Spinning
Reiter R-1 Open End Staple Spinning
Schlafhorst SE-9 Open End Staple Spinning
Schlafhorst SE-11 Open End Staple Spinning
Murata Cone Winder with Quantum Clearers
Ring Spinning Frame (196 Spindles)
Rovematic
Scharer Schweiter Doubler
Monarch Model DXC Knitting Machine (22 inch)
Ahiba Polymat
4 Position Screen Print Machine
Screen Print Belt Dryer
Screen Print Flash Units
Macbeth Light Box