

COLLEGE OF TEXTILES ANNUAL REPORT 2006-2007

Changes in Service Environment

Over the past year and a half we have been engaged in a major rethinking of the role of the college and our leadership position. We will re-emphasize our world-leading programs, nonwovens and protection and comfort, and strengthen our ITT/NCSU materials and textiles research consortium. We will create a stronger focus on medical and biotextiles and add a fashion and textile design program. Our NC Department of Commerce funded study of the North Carolina textile and apparel industry has led to a new understanding of the critical importance of this industry to the state, region and country and how we can serve these 1472 companies and their 130,000 employees. The Department of Commerce has funded a new project to make the database public to support supply-chain management activities across the entire sector to increase the competitiveness of textile companies. We are building a performance and protection cluster. The State of South Carolina is funding us to do a similar study of their textile and apparel industry.

We are extremely pleased that many textile and apparel companies in the U.S. are becoming true world competitors. Many are partnering with the college for new product and process development and new management concepts and tools. The college faces increased competition from universities in Hong Kong, Japan and Europe who have received substantial new national and EU funding for university research in nanotechnology, smart memory fibers and fabrics, and medical textiles, as these areas seek to develop strong competitive industries. At the same time our federal government has drastically cut textile research funding.

Compact Plan: Major Initiatives from Our Compact

This February the new Nonwovens Institute was launched – our challenge is now to make this new institute an even greater contributor to the university, state, and nation. We will hire a new co-director, increase the number of graduate students supported, add academic programs, and add new initiatives in engineered fabrics (a new ERC has been proposed to the NSF jointly with the College of Engineering) and a new Industry-University Research Center in filtration.

We will expand the Textile Protection and Comfort Center by adding a co-director to meet the needs of federal agencies and industry research partners and provide new analysis and testing support to a wider range of partners. We will develop a Center of Excellence in Protective Materials and Systems, new laboratory capabilities for research in bio and chemical protective textiles funded through our \$2 million federal grant, and build an industry membership center for the protective and performance materials industry sector.

We will develop a fashion and textile design program preparing our students for rewarding lives as innovative and responsible leaders in fashion and textile design including apparel, home textiles, new protective materials, industrial and automotive textiles, and medical and architectural textiles. This program will add new elements of design capabilities to our strong textile technology base creating a unique and world-leading program.

We will expand our work in medical and biotextiles adding a suture research center to our ongoing work in tissue engineering, medical devices, protective scrubs and gowns, activated fibers, anti-viral and anti-bacterial coatings, and wound care. We will continue to partner closely with the Biomedical Engineering Department and College of Vet Med while adding new hospital and medical research center partners.

Diversity: Initiatives and Progress

The College of Textiles continues to be a leader in diversity and is recognized for its leadership in attracting minority students. Our undergraduate class is 9% African American, 5% Asian American, 3% Hispanic and 2% international. We plan to increase international undergraduate enrollment to 5% while continuing to improve our African American and Hispanic enrollment. Our graduate enrollment is 47% international. The African American Textile Society continues to grow. The AATS Fashion Show continues to be a smashing success with a large audience, renowned judges, and incredible originality in the creations. The College remains one of the most diverse on campus in faculty and in students. Our two faculty hires this year were both female. Our EPA and staff hires continue to demonstrate our commitment to diversity.

Instructional Program Advances

The success of our enhanced Polymer and Color Chemistry Program was demonstrated by a 36% growth in enrollment last year. With the creation of a new Forensic Science Center with CHASS and CALS, with education, research, and extension components and a possible new B.S. in Forensic Science, we see this program continuing to advance. Our faculty in Textile and Apparel Management have extensively revised the curriculum and added courses to boost students' abilities to design, prototype, and evaluate fashion products under a new Fashion Development and Product Management Concentration. The name of the degree has been changed to Fashion and Textile Management. We have started the planning for the fashion textile design program.

Research

The College moved above the \$8M mark in research funding, a 28% increase over last year (Table 1). This improvement is due largely to strong support for the *Textile Protection and Comfort Center* (TPACC) activities which received over \$2.5M in new funding. TPACC received an additional \$190K for new work on the first responder's ensemble, \$270K to develop a new method for assessing flame and thermal threats facing US Special Forces, and a second \$1M federal grant to complete its development of the Man In Simulant Test Laboratory for field-testing chemical protection of gear worn by emergency responders and military forces. We also received \$336K in NC Biotechnology Foundation and Robert Wood Johnson Foundation support for new research in the medical textiles arena.

Our *Nonwoven Cooperative Research Center* (NCRC) continues to enhance its reputation as a world-class facility for traditional and high-tech applications of nonwovens fabric. Its expertise led to \$2.1M in new funding for membership affiliations and fundamental research.

Table 1. Five-year summary of research funding activity in dollars.

	2002-03	2003-04	2004-05*	2005-06	2006-07
Proposals Awarded	4,319,768	4,049,266	5,380,662	6,653,758	8,487,360
Federal (non-NTC)	724,613	956,101	476,385	877,457	3,601,010
NTC	2,363,309	2,089,811	2,066,198	2,064,052	2,447,660
Industry	1,231,846	1,003,354	3,268,996	3,712,249	2,438,690
Foundation			12,500		336,110

After 14 years of uninterrupted support through grants from the US Commerce Department, The National Textile Center (NTC), a partnership of the eight leading textile schools, did not receive 2007-08 funding. This “pause” in NTC support is an outcome of the Continuing Resolution passed by Congress last winter. This Center continues to garner strong support from Congress and the textile and allied industries giving us good reason to anticipate resumption of funding for 2008-09 programs pertaining to fundamental textile science research.

Our partnership with the Institute of Textile Technology and the ITT/NCSU Research Consortium continues to bring significant new research opportunities to the College. To date, the Institute has supported thirty-four outstanding graduate students and will support seven additional graduate fellowships this fiscal year. In 2007-08, the Institute will provide \$1.5M in research funding to support graduate research projects. This is an increase of \$400M over FY 2006-07. The Institute added a new member, Highland Industries, and 8 new associate members: VF Corporation, American Dornier, American Truetzschler, ITEMA America, Murata Machinery Company, Staubli Corporation, Crypton Fabrics, and AATCC.

The Nonwovens Institute was formally launched with a stronger academic mission to supplement its outstanding research mission. Nonwovens now supports over 20 graduate students and the new institute will have strong formal relationships and joint appointments with the departments of Chemical Engineering and Wood and Paper Science. NCRC Membership stands at 74. The NCRC state-of-the-art melt-blown/spun-bond pilot facility has already shown its potential

for major levels of activity. The second phase of the installation of the staple nonwovens laboratory is complete. When all work is completed, this facility will be worth over 2 million dollars and will complete the missing elements of the Nonwovens infrastructure. NCRC has also established six graduate and undergraduate courses and a graduate Certificate has been approved. An option in nonwovens is now possible as part of the Textile Technology Masters degree program.

Extension

Table 2 shows the dramatic growth of the Six Sigma program with our partnership with the NC State Industrial Extension Service (IES). The number of course offerings has nearly doubled and the economic impact of \$6.8 million is due to the completion of projects completed from training in previous years as well as this year. Gross revenues increased by 70%.

Table 2. Six Sigma Program Highlights

	2005-2006	2006-2007
Number of workshops (total)	19	32
Number of new workshops	6	10
Number of training days	182	230
Number of participants (Total)	350	478
Number of Participants (NC)	288	425
Economic Impact (reported to date)	\$2,800,000	\$6,800,000
Gross Revenue to COT	\$340,000	\$650,000

Our Short Course Program has been in considerable transition this year as seen in Table 3.

Textile Fundamentals workshops continue to be in demand, but our U.S. customer base is shifting from textile manufacturing to retail and allied textile industries. Customers are requesting more “hands-on” and “how-to” courses for textiles fundamentals. We have introduced several laboratory-based courses where 80% of the training occurs in the lab. The response has been extremely positive.

Table 3. Short Course Program Highlights

	2005-2006	2006-2007
Number of short courses (total)	15	18
Number of new short courses	5	7
Number of training days	56	84
Number of participants (Total)	245	391
Gross Revenue (Total)	\$142,000	\$173,000

With the success of our TexED programs, our extension activities are now funding one Ph.D. student, three M.S. students, and seven undergraduates. We plan to increase this support in the coming year to two Ph.D. candidates and six M.S. candidates. The College has a number of multi-use labs. These include extension labs whose primary purpose is classroom teaching as well as providing service to industry. Most other labs are primarily used for research while some may offer services as well. In particular, TPACC and NCRC offer specialized services to industry in areas not covered by Extension. Both departments have numerous labs for specialized teaching and research. These labs are grouped together for each department and are reported below. This past year has seen a 61% growth in value of services offered, all of the growth due to the dramatic growth in NCRC and TexLab contracts.

Table 4. 2004-2007 ATA Contracts

	2004	2005	2006	2007
<i>TexLabs</i>	197,530	110,320	114,744	166,833
<i>NCRC</i>	653,788	473,067	747,879	1,300,000
<i>TPACC</i>	277,735	173,020	192,750	105,720
<i>TECS</i>	23,800	73,420	38,361	32,000
<i>TATM</i>	21,640	11,300	19,573	4,250
<i>TOTAL</i>	976,963	730,807	998,563	1,608,803

Faculty and Staff

Dr. Keith Beck received the Olney Medal for outstanding achievement in textile chemistry. The Olney Medal recognizes outstanding achievement in textile, polymer, or other fields of chemistry of major importance to textile science. The Outstanding Extension Service Awards were presented to Sandra Broome and Dr. Donald Shiffler. Dean A. Blanton Godfrey was appointed by Governor Michael F. Easley to serve as a member of the North Carolina Institute of Medicine. Dr. Russell Gorga was inducted into the NC State University Academy of Outstanding Teachers. The Centennial Campus Middle School Volunteer Partner Award recognizing individuals and groups that demonstrate outstanding service and cooperation with the Centennial Campus Middle School staff and students was presented to Kent Hester and Kappa Tau Beta. The College of Textile

awarded Kent Hester, Director of Student and Career Services the EPA Award for Excellence and Judy Elson, Textile Engineering Chemistry and Science Lab Manager, the SPA Award for Excellence. Dr. Marian McCord, a Biomedical Engineering core faculty member and Associate Professor of Textile Engineering, Chemistry and Science, was awarded the Rich Felder Award for Outstanding Service in Support of Teaching and Learning. Professor Alan Tonelli was cited as one of the top 40 most prolific authors in *Macromolecules*, a journal of the American Chemical Society.

Students

Moran Aframian received the Service Student of the Year award. MorLove, sponsored by the College of Textiles, received the Service Club of the Year. Moran started MorLove to use her love of textiles and creativity to help children living in poverty. Kyle Blakely, a senior in textile and apparel management, won first place in the undergraduate division at the 14th annual \$10K Business Plan Competition held by the Entrepreneurship Education Initiative at North Carolina State University's College of Management. Paul Carruth, a junior in Textile Engineering, received the Faculty Senior Scholarship Award presented by The College of Engineering at North Carolina State University. He was also the male recipient for the 2006 Leader of the Pack scholarship. Mark Clapp, a senior in Textile Engineering and Biomedical Engineering, was the recipient of the 2006-07 College of Engineering Faculty Senior Scholarship. Andy Coughlin, a Textile Engineering major, received the College of Engineering Leadership Award; Mark Clapp and Ian Jester, a Textile Engineering major, received awards for Citizenship and Service; Caitlin Daley, a Textile Engineering major, received the award for Leadership and Alan Kinlaw, a Textile Engineering major, received the award for Humanity.

Philip Bradford, an MS student in Textile Engineering, won the best paper award at the SAMPE Fall Technical Conference on November 8, 2006. Ravi Shankar who is pursuing dual Ph.D.s in Fiber and Polymer Science and Materials Science and Engineering won First Place for excellence in polymer science and engineering at American Chemical Society North Carolina Polymer Discussion Group. At the International Forum on Textile Science and Technology for

Doctoral Students held at Donghua University in Shanghai, China in November, three College of Textiles graduate students won awards for their written papers and oral presentations.

Fund Raising

The past year was a year of milestones for the partnership between the College of Textiles at NC State University and The North Carolina Textile Foundation, now celebrating the 65th anniversary of establishing the College as the premiere institution for textile education in the world. During the year, we focused on meeting the goals of the Achieve! Campaign, building endowments, securing the future of our flagship Centennial Scholarship program, and providing for the long-term growth of our endowment. We surpassed our Achieve! Campaign goal of \$50 million eighteen months ahead of schedule raising over \$52 million since the beginning of the campaign. Throughout the campaign, one of our top priorities has been undergraduate scholarships, and we have succeeded in raising nearly \$8 million for that purpose. These efforts, coupled with prudent investing and spending, have culminated in achieving record endowment assets of nearly \$31 million as well as the establishment of a consistent record of growth of those assets.

Administration

During 2007, Michael Walker assumed the responsibilities of the Assistant Dean for Finance and Administration within the College of Textiles. We have streamlined our financial structure under Michael with the Director of Research Administration now reporting directly to him.

Recommendations and Concerns for the Future

Our main concern continues to be the level of salaries for faculty and staff. The budget reductions over the past years continue to cause many problems in operating funds. We have serious challenges in staffing new classes and class sections due to our remarkable growth in undergraduate students. Our most important challenges are having the resources to support our program changes and expanding critical research funding sources. Many opportunities for new research directions require matching funds and serious investments. Attractive start-up packages for new faculty continue to be major challenges.

Appendix 1 Examples

Producing World Leaders

In May 2007 Mark Clapp graduated with degrees in Textile Engineering and Biomedical Engineering with a minor in Spanish. During his NC State career, Mark received a Caldwell Scholarship and was selected as “Leader of the Pack.” He volunteered as a dental assistant on a service assignment in the Dominican Republic and organized and led a team of students to New Orleans to rebuild homes destroyed in Hurricane Katrina. He spent a semester abroad in Peru completing courses for his minor in Spanish. He worked part-time as a clinical intern at WakeMed, spent a summer internship at Duke University Medical Center working on a textile-based spinal disk replacement, and spent another summer internship at Princess Alexandra Hospital in England as an administrative intern. He will enter UNC-CH medical school this summer.

Esther Chang is an undergraduate majoring in textile and apparel management. During her first three years she has spent a semester internship in Shanghai designing handbags for the world market, a semester abroad at Hong Kong Polytechnic University studying color trending, and a summer internship with Michael Kors in design in New York City. Esther is currently interning in New York City with Alexander Wang and Mocium.

Sara Yasin, a senior in Textile Apparel Management joined a student delegation accompanied by College of Textiles faculty to explore “Doing Business in Mexico”; emphasizing the global perspective in textiles today. They saw for themselves the culture and business environments in Mexico, had discussions with business and government personnel, toured manufacturing facilities, and attended the textile industry tradeshow Exintex. Sara was also featured in the July/August issue of *Muslim Girl*. The article is about her life as a Muslim and the wonderful program “Behind the Veil” she designed this year at NC State with the Women’s Center to help non-Muslim girls understand what it is like to wear a hijab

for a day. The program was a success and Sara hopes to have women at multiple universities go through this on the same day next year. Sara will be studying in Manchester, UK this fall.

Ilana Marks, a student in the Anni Albers joint program with the College of Design, was featured in our Fall 2006 WolfText , announcing that she tied for third place in the Disney's ImagiNations University Design Competition receiving a \$1000 scholarship. She then traveled to Italy for the summer to participate in the Rutgers Rome study abroad program, primarily taking courses in Art History, where Rome served as the classroom. While in Italy she took the opportunity to visit many textile museums and factories. Ilana is currently in San Diego attending SIGGRAPH, an international animation, computer graphics, interactives, and gaming conference.

Improving health and well-being

In 2007 the College of Textiles spun off a new company, LAAMScience, to produce a new anti-viral surface coatings proven to kill over 99% of known viruses. Professor Stephen Michelsen along with colleagues at Emory University School of Medicine have developed this technology and licensed it to LAAMScience. The focus this year will be on creating protective face masks with these coatings to protect wearers against avian flu, HIV, and SARS. The research team is also partnering with WakeMed to explore the value of these coatings applied to fabrics in hospitals in reducing hospital-acquired infections.

Creating educational innovation

The College of Textiles will begin a new joint program with ENSAIT in France and Hong Kong Polytechnic University in September 2007 for an M.S. in Textiles, Global Supply Chain Management. Students from each of the three universities will spend one semester together at each of these universities studying supply-chain management in Asia, Europe, and the United States. In each country the students will have both academic courses in supply-chain management

and industry practicums learning the details of the textile and apparel complex supply chains across the world.

In the past year the College of Textiles has significantly upgraded the teaching facilities in its Microscopy Lab by adding a polarizing teaching stereoscope, an LCD projector, DVD player, Symposium, and a PC enabling the instructor to effectively show students' images under a teaching microscope while all 18 students in the class work with their own instruments.

In partnership with the Danish Technological University, the College of Textiles created an Internet-enabled course bringing together twelve textile engineering and six textile management students together with Danish students and DTU faculty jointly working on fiber-based materials and products. The course used Webinar technology to communicate through Internet video and audio during interactive sessions.

The Colleges of Design, Management and Textiles have created a senior capstone course bringing together MS students in industrial design, MBA second-year students, and textile engineering seniors for design, innovation and new product development. Students work together in interdisciplinary teams on industry-funded research projects to develop product ideas, prototypes, and business plans. The course is taught by faculty from the three colleges with active industry participation.