



**January 26, 2009**

## **REQUEST FOR PROPOSALS**

Proposals are solicited from industrial research institutes, nonprofit organizations, and faculty members of senior colleges and universities for grants under the Institute of Textile Technology (Institute) / North Carolina State University (NCSU) Textile and Materials Research Consortium's Fiscal Year 2009-2010 Program. **The deadline for submitting COMPLETE proposals is February 27, 2009 at 5:00 pm** (proposals must be **delivered** by February 27, 2009). No exceptions will be made to this deadline. Use overnight delivery if needed. Proposals can also be delivered by e-mail (see below), but no confirmation of delivery will be made available. E-mail submissions must be followed up with a printed copy with 30 days.

Total available funds are approximately \$600,000. This includes funds for any Institute Fellows that may participate in MS Thesis Research at North Carolina State University. A complete application/instruction package for the grant program is available at the Institute website: <http://www.itt.edu/>. Please follow instructions closely. The maximum award is \$100,000 not including Institute Fellows, with average awards anticipated to be \$40,000. The anticipated starting date for projects is no earlier than April 1, 2009 for those projects that include an Institute Fellow and July 1, 2009 for all others. Projects funded must be completed by July 1, 2010, including the final researcher report. Investigators may apply for renewal during the next request for proposals, but such requests will be considered totally separate from this grant cycle. Applications for renewal grants will be evaluated in the same manner as a proposal for new projects.

Proposals for the ITT/NCSU program should be addressed to:

TAC Chairman  
ITT/NCSU Textile and Materials Research Consortium  
Box 8301  
2401 Research Drive  
NCSU College of Textiles  
Raleigh, NC 27695-8301

Or

By e-mail to:  
TAC Chairman  
ITT/NCSU Textile and Materials Research Consortium  
[henryb@itt.edu](mailto:henryb@itt.edu) and [patriceh@itt.edu](mailto:patriceh@itt.edu) (send to both e-mails to ensure delivery)

Inquiries or questions can be made to Dr. Henry Boyter Jr. at 919-513-7704 or [henryb@itt.edu](mailto:henryb@itt.edu). Applications may also be delivered to the Institute offices at 2418 College of Textiles, North Carolina State University campus prior to 5:00 pm on the closing date.

# INSTRUCTIONS TO APPLICANTS FOR RESEARCH GRANTS

## GENERAL REQUIREMENTS

Proposals are solicited from industrial research institutes, nonprofit organizations, and faculty members of senior colleges and universities for grants under the Technical Advisory Committee (TAC) of the ITT/NCSU Textile and Materials Research Consortium's (hereafter called the Consortium) Fiscal Year 2009-2010 Program. The deadline for submitting completed proposals is February 27, 2009 (proposals must be post-marked or delivered by February 27, 2009). No exceptions will be made to this deadline. The anticipated start date for projects is no earlier than April 1, 2009 for those projects that include an Institute Fellow and July 1, 2009 for all others.

The purpose of the Consortium's program is to encourage applied textile research that can be adopted by manufacturers with a goal that the results from the research be capable of implementation in textile facilities within a six-month period after the research has been reported. Research is encouraged in the field of emerging technologies where the research application is longer term, but even in this area, a timely goal of two years for textile application should be maintained. A list of priority research topics identified by the Consortium Technical Advisory Committee is given in [Exhibit 5](#). However, proposals on any of the applied textile topics or areas listed that falls within the Institute's mission will be considered. It is asked that, if you wish to submit a proposal outside the listed topic areas, you send a short paragraph to Dr. Henry Boyter Jr. to explain the topic area ([henryb@itt.edu](mailto:henryb@itt.edu)). Proposals in the area of "fashion" are not within the scope of projects that will be funded. If you have any questions, contact Dr. Boyter.

All Principle Investigators (PIs) submitting proposals must sign a statement of understanding before funding is awarded that the PI and the organization they indicate they are representing will abide by all requirements of the ITT/NCSU Textile and Materials Research Consortium. Under this agreement, ALL research will be held in the strictest confidence (unless/until a release in writing is granted) and ALL intellectual property will be the property of the Consortium. If you have any questions concerning this agreement contact Dr. Gilbert O'Neal at 919-513-7704. A copy of the ITT/NCSU Textile and Materials Research Consortium Agreement can be obtained by each organization by contacting Patrice Hill at 919-513-7583. If awarded funding, the PI(s) and/or their Institute will be required to sign a contractual agreement that will be specific to each project.

Criteria that will be used to judge proposals are:

- the scientific quality of the proposed work,
- the need for the research in the textile industry,
- the probability that useful results can be obtained in one grant cycle,
- the potential for continued support from other funding sources,
- the cost of the proposed work, and
- participation of Institute Student Fellows at NCSU to fulfill NCSU thesis requirements.

Special consideration will be given to proposals that satisfy the above criteria that include a priority topic (outlined in [Exhibit 5](#)). Attention will also be given to past performance on grants funded through the Consortium. Requests for funds should not exceed \$100,000 for proposals from NCSU faculty who include two Institute Fellows. Requests for funds should not exceed \$50,000 for proposals from NCSU faculty who include a single Institute Fellow and for those proposals from other parties. For all proposals from NCSU faculty, a line item for each Institute Student Fellow appears in the budget sheet at \$15000, but this is not be included in the total for the budget and will not be considered in the \$100000 maximum award. It is requested that NCSU faculty consider mentoring two Institute Fellows, but this is not required. If you select this option, indicate this on the budget sheet and describe the two distinct projects for the Institute Fellows in the body of the proposal.

In the area of Yarn and Fabric Formation (YF), some project areas are designated as short term, non-student areas (YFS) that do not have the presentation requirements of the full projects. These projects have a maximum award of \$20000 and a time period of six months from July1, 2009-March 1, 2010. These projects are not intended for Institute Fellow participation although other students can be used. It is expected that the PI(s) for this project present a written report and oral presentation at the Spring 2010 meeting. This is a new project type, so if you have any questions, contact Dr Henry Boyter Jr.

Major equipment (>\$3000) cannot generally be obtained through this grant process. Exceptions can be made, but must first be approved in writing prior to proposal submission and approved capital equipment can never exceed 50% of the proposal budget. Capital equipment (>\$500) requests are discouraged but will be evaluated on a case-by-case basis during proposal reviews. If any Major or Capital Equipment is purchased with Consortium Funds, that equipment will become the property of the Consortium at the end of the funding cycle and the Principle Investigator is responsible for delivering the equipment to the Consortium at North Carolina State University. If Consortium Funds are to be used for delivery, a specific line item must be included in the budget.

For all proposals funded, the PI must submit a minimum of four reports to the Technical Advisory Committee of the ITT/NCSU Textile and Materials Research Consortium. The Fall 2009 presentation is optional. If an Institute Fellow is involved, they will make the oral presentations at the TAC Meetings. Each meeting also requires a written update for inclusion in the meeting materials. It is also requested that NCSU Faculty Advisors attend all of the presentation that involve Institute Fellows they mentor. Detailed Presentations are normally thirty minutes, but can be made longer if there is time in the meeting program and the PI requests the time in advance. The final written report is separate from any student thesis. The Principal Investigator will determine the format for the final written report and are encouraged to use a recognized engineering or physical science style or journal guide. As part of the final report, the PI must provide a summary of the findings from the research in a “Why was this research important?” or “Industrial Summary of Findings” format. This summary will not exceed one page and should include the applicability of the results and the economics of the processes involved. The presentations required are:

| Milestone                         | Presenter     | Presentation Area                                       | Timeframe    |
|-----------------------------------|---------------|---|--------------|
| TAC Spring Meeting 2009           | PI or Student | Brief Summary of Proposed Research (10 minutes)         | April 2009   |
| TAC Fall Meeting 2009             | PI or Student | Written Update to the TAC Chairman                      | October 2009 |
| TAC Spring Meeting 2010           | PI or Student | Detailed Report of Results                              | May 2010     |
| Final Report                      | PI            | Final Written Report and Industrial Summary of Findings | July 1, 2010 |
| TAC Fall Meeting 2010 (if needed) | PI            | New Results and Final Conclusions                       | October 2010 |

Principal Investigators under this grant program agree that no results will be reported to anyone other than the Consortium until after the submission of the final report to the Consortium AND written approval of the President of the Institute. The PI will be encouraged to submit the research for publication in a refereed journal however, all results, not just proprietary or patentable research results will be governed as stated in the ITT/NCSU Textile and Materials Research Consortium Agreement and By-Laws. This requirement for prior approval extends to the PI, any technical staff, and any students. For those projects that include an Institute Fellow at NCSU, the PI is required to inform NCSU that the student's thesis will also be held in confidence for a period of one year from the acceptance of the thesis by NCSU.

## RESEARCH PROPOSALS

The first page of each proposal should be a fully executed research cover form. ([Exhibit 1](#)). Each proposal is to consist of four sections. The synopsis consists of 7 elements and is not to exceed one page. The project description consists of 8 elements and is not to exceed 4 single spaced-pages – typed in 12 point Times New Roman font. This page limit includes the list of references but does not include resumes. Other important information consists of 4 elements and is not to exceed 1 page. The Budget is to be placed at the end of the proposal. **DO NOT NUMBER ELEMENTS WITHIN SECTIONS.** A checklist is included at the end of these instructions for your convenience.

**Synopsis:** (Please use the standard format as seen in [Exhibit 2](#) —1-page limit)

1. Title. A concise, descriptive, textile-related title.
2. Research Area Number. A list of the research areas is attached. ([Exhibit 5](#)) If a proposal is being submitted that is not based on these research areas, use NA for the number.
3. Keywords. List descriptor words, separated by commas.
4. Name, title, organization, email address, facsimile number, and phone number of the principal investigator.

5. Name, title, organization, email address, facsimile number, and phone number of other important investigators.
6. Name, organization, email address, facsimile number, and phone number of Research Dean, University Point of Contact, or equivalent for the Principal Investigator.
7. Abstract. Provide a concise description of the problem, methods, and objectives.

**Project Description:** Start a new page. (3-page limit excluding resumes)

1. Title. Use the same title as in synopsis.
2. Statement of the Problem(s) to be addressed by the project, including explanation of the need for research (two paragraphs maximum).
3. Statement of Results, Benefits and/or Information expected to be gained during the performance period (two paragraphs maximum).
4. Nature, Scope, and Objectives of Research including a timeline of activities (See [Exhibit 3](#) for sample timeline).
5. Methods, Procedures, and Facilities. Provide sufficient information to determine if the technical approach will satisfy the objectives.
6. Related Research. Show by literature and communication citations the similarities and dissimilarities of this proposed project to completed or ongoing research on the same topic. This must include an in-depth search of the literature of pertinent references.
8. Investigator(s) Qualifications. Include resume of the principal investigator and other critical members of the research team. No resume is to exceed 2 pages or list more than 15 pertinent publications. Resumes are not included in the 3-page limit.
9. Other Important Information: Start a new page. (1-page limit)
10. Submittal of Proposal to Other Agencies. The application must disclose any other agencies to which this or a similar proposal has been or is anticipated being submitted for funding, including the anticipated date(s) of initiation. Consortium funds are not available for commingling with other funding sources.

**Budget:** Start a new page.

PLACE AT THE END OF THE PROPOSAL. Budget justification must be included as Attachment A. The proposed budget must include the amount proposed from each line item (Financial Plan form is available as an MS Excel file at [www.itt.edu](http://www.itt.edu) and shown in [\(Exhibit 6\)](#). All applicants must submit detailed budget justification to allow proper evaluation of the costs proposed. **PROPOSALS NOT CONTAINING BUDGET JUSTIFICATION WILL BE RETURNED TO PI WITHOUT CONSIDERATION FOR FUNDING.** If the proposal is for continuation of work funded in a previous grant cycle, include the budget for each grant cycle. The budget must be submitted as a Microsoft Excel spreadsheet in electronic and printed form. All yellow spaces must be completed. Use NA where text is not applicable and the number zero where a number is required. All non-yellow cells in the electronic version are locked.

- (a) Salaries and Wages. Include individuals or personnel categories of salary and wages, estimated hours or percent of time and rate of compensation proposed for each person or category. Overtime and/or premium pay are not allowed. If the rate of pay shown is higher than the current rate of pay include an explanation of amounts included for

projected increases. The maximum total amount that the PI(s) serving as an Institute Fellow committee chair(s) may budget for salary including ALL overhead (direct and indirect) on the project is \$14600 (indicated on budget sheet by Faculty/PI Salary Total). If two PIs (co-chairs) are involved, the maximum for each is \$7300. Proposals with more than two PIs will not be accepted. If the project requires additional effort from the PI(s), outline this in detail in the proposal and review with Dr. Henry Boyter before submission. Additional funding beyond the \$14600 cap for all PI(s) is not anticipated for this RFP, but will be reviewed on an individual basis.

For those projects that would involve two Institute Fellows, the maximum is \$14600 each for PIs on a project or \$21500 for a single PI. NEW FOR THIS 2009-2010 FUNDING CYCLE : The ITT/NCSU Textile and Materials Research Consortium will pay University PI(s) the designated funds either as salary/overhead or as release time under the rules of the PI's university. These funds can be divided as described by the PI(s) on the proposal budget sheet. Note: all funds paid to University PI(s) are subject to the rules and maximums of the University involved. No funds outside these rules will be made available.

- (b) Fringe Benefits/Labor Overhead. Proposed rates/amounts in conformance with applicant's institution accounting policy. Explain what costs are covered in this category and the basis of rate computations. Indicate whether rates are used for proposal purposes only or whether they are also fixed or provisional rates for billing purposes. Proposals from NCSU faculty and staff should a 16.5% indirect cost rate that is covered in a negotiated overhead rate for the consortium. If an organization has or is willing to accept lower indirect or fringe benefit rates than those given in the budget spreadsheet (highlighted in green), contact Dr. Henry Boyter at 919-513-7704 for a modified sheet. The budget spreadsheet provided has been set for submittals from NCSU PIs.
- (c) Supplies and Expendable Equipment. Indicate amounts estimated for laboratory, computing, and field supplies separately. Funding is allowable for office supplies directly related to the funded project. Provide detail on any specific item or other subcategory that represents a significant portion of the proposed amount (\$500 or more).
- (d) Equipment. Itemize any proposed permanent equipment acquisitions and show the estimated cost of each item. Include only items that are of a type not chargeable to an indirect cost pool. Computer purchases are not allowed. If fabrication of equipment is proposed, list parts and materials required for each and show costs separately from the other items. Major equipment (>\$3000) cannot generally be obtained through this grant process (see General Requirements above).
- (e) Subcontractors or Consultants. Identify the specific project tasks or problems for which such service would be used. List the contemplated subcontractors (including consultants), the estimated amount of time required, and the quoted rate per day or hour.
- (f) Travel. Briefly specify travel requirements for field work and for presenting project related information to the TAC committee at the three required meetings. Itemize

estimated travel costs to show the number of trips required, destinations and miles to be traveled, the number of people traveling and per diem rates, cost of transportation, and miscellaneous expenses for each trip. Calculations of other special transportation costs (such as charges for use of contractor-owned vehicles or vehicle rental costs) should also be shown. It can be assumed that required presentations will be made at the NCSU College of Textiles.

Travel by PI(s) or others for conferences of any kind is NOT allowed. The ITT/NCSU Textile and Materials Research Consortium encourages PI(s) to present the research completed (after approval) to a wide range of audiences, but will not fund anything beyond the two Consortium conferences required. No research funds can be used by anyone except ITT Fellows for attending any meeting, conference, education course, seminar, or related function or paying for registration, software, or other materials related to these functions. ITT Fellows are provided a separate Travel Grant during their two years in the ITT Fellows program to attend a meeting of their choosing. The PI may use research money and the separate ITT Fellow's Travel Grant for the ITT Fellow to attend a function related to and considered important for their thesis work. ITT Fellow travel MUST be approved by the President of ITT at least 30 days in advance of the first use of the ITT Fellow Travel Grant or any research funds. Travel Grant or research funds designated for travel in the original approved research budget may not be used for any other purpose without a written request to and approval of the ITT Director of Research. If, due to unusual situations, a PI feels that funds are needed for PI travel of any kind, this travel must be approved in advance by the Institute Director of Research. A PI may use the salary/release money provided to them for travel.

If an Institute Fellow is involved in a funded project, one REASONABLE conference trip for the Fellow will be funded by the Institute President at their discretion as part of the project funding. Request for such funds should be included in the budget. Because the details may not be known at the time of the proposal submission, simply indicate such travel in the body of the proposal. Institute Fellows and their Advisors must apply to the Institute President at least one month before the funds are needed for approval of the expenditure of funds.

- (g) Other Direct Costs. Itemize different types of costs not included elsewhere, such as shipping, equipment use charges, or outside testing lab costs. Where clarification is needed, provide breakdowns showing how the cost was estimated.
- (h) Publication Costs. Do not include reproduction/printing costs for the final written report or meeting presentations other than the copies supplied to the Consortium. If the report is published by the Consortium as part of its numbered report series, these costs will be covered from sources outside the project budget. Only electronic submissions are required with the exception of the printed final written report (1 unbound copy in color if applicable and one electronic copy). If an Institute Fellow is involved, an electronic copy of the student's thesis must also be provided. All Institute Fellow Research Notebooks should be made available by the PI upon request. If the PI anticipates leaving the principal organization where the research occurred, all research notebooks will be

forwarded immediately to the Consortium for duplication. Costs for publishing the research in scholarly journals is available at the discretion and with approval of the President of the Institute. PIs must request these funds separately and before any commitment to any publisher.

- (i) **PI Contracts.** All PIs will sign a Research Agreement before the awarding of funding. This agreement outlines the terms of this RFP and any changing conditions that occur before the final awarding of the funds. If you would like to see an example copy, contact Dr. Henry Boyter at 919-513-7704

**Number of copies:** One electronic copy of the proposal on CD or by e-mail is required (in MS Word format and budget in MS Excel format). In addition, one paper copies of the complete proposal are required. **DO NOT STAPLE THESE PROPOSALS.** You may use paper clips, rubber bands or binder clips. One copy must bear the original signatures of the investigator(s), applicable Department Head or College Dean/Assistant Dean, applicable Business Office reviewer, and all other officials of the submitting institution who are required to sign proposals submitted to off-campus agencies. ([Exhibit 1](#)) A checklist for submittals is given in [Exhibit 4](#). All submitted budgets **MUST** be approved by the PIs organization's Business Office, Officer, or equivalent.

**Special Conditions:** By submitting a proposal and budget for this RFP the submitter is confirming that the budget is in a format that both the submitting institution will approve with no further direct involvement of the ITT/NCSU Textile and Materials Research Consortium. It is the responsibility of the PI(s) to have budgets with their Institutions complete. It is **NOT** the task of the ITT/NCSU Textile and Materials Research Consortium. All PI(s) that receive funding will be asked to sign a contractual document outlining the requirements, milestones, and budgets associated with their project. Any delays in the budgeting process or the completion of the contractual agreement by the PI(s) and/or their institutions may delay or cause withdrawal of funding at the discretion of the ITT/NCSU Textile and Materials Research Consortium.

## **INTELLECTUAL PROPERTY (IP)**

All PIs submitting proposals must sign that statement of understanding included in the RFP package that the PI and the organization they indicate they are representing will abide by all requirements of the ITT/NCSU Textile and Materials Research Consortium. Under this agreement, ALL research will be held in the strictest confidence (unless a release in writing is granted) and ALL intellectual property will be the property of the Consortium. If you have any questions or would like a copy of this agreement contact Dr. Gilbert O'Neal at 919-513-7704. If awarded funding, the PI(s) and/or their Institute will be required to sign a contractual agreement that will be specific to each project.

**PAST PERFORMANCE**

While the Consortium recognizes that circumstances, such as graduate student schedules, beyond the PI's immediate control can adversely affect the schedule of research, nonetheless, the Consortium is constrained by administrative rules and funding requirements to adhere to project schedules, unless adjustments are mutually agreed to beforehand. Thus, timeliness of researcher performance on past projects funded through the Consortium must be a factor in proposal selection. As a consequence, any researcher who is late in an ongoing or past study funded through the Consortium without an approved no-cost extension may not be eligible to be a named participant in any proposal for this funding cycle. If you have any questions about eligibility for this funding cycle, please contact Dr. Henry Boyter Jr. at 919-513-7704.

## **AMENDMENTS AND WITHDRAWALS**

The ITT/NCSU Textile and Materials Research Consortium reserves the right to amend this RFP or withdraw any of its components at any time before final contractual agreements are approved by the Consortium and the PI and the PI's organization.

# EXHIBIT 1

A Proposal to the  
Technical Advisory Committee of the  
ITT/NCSU Textile and Materials Research Consortium

For Research entitled

(Title)

Covering the period from April 1, 2009 to July 1, 2010

Or

Covering the period from July 1, 2009 to July 1, 2010

Requested Support in the amount of \$\_\_\_\_\_

SUBMITTED BY

\_\_\_\_\_  
Name, Title and Department of Principal Investigator(s)

\_\_\_\_\_  
Name and Title of Department Official

\_\_\_\_\_  
Name and Title of Dean for Research (or equivalent)

\_\_\_\_\_  
Name and Title of Business Office Official (or equivalent)

Date Submitted\_\_\_\_\_

## EXHIBIT 2

### Sample Format for Synopsis Portion of Research Proposal

#### RESEARCH PROPOSAL

(1) Title \_\_\_\_\_

(2) Proposal Number \_\_\_\_\_

(3) Keyword \_\_\_\_\_

(4) Principal Investigator(s), academic rank, university, address, phone, facsimile, email: \_\_\_\_\_  
(indicate which PI is the main contact)

(5) Other Investigator(s), academic rank, university, address, phone, facsimile, email: \_\_\_\_\_

(6) Research Dean or University Point of Contact \_\_\_\_\_

(7) Abstract:

# EXHIBIT 3

## Schedule of Tasks (example)

| TASK | YEAR  |   |   |       |   |   |      |       |   |   |   |   |  |
|------|-------|---|---|-------|---|---|------|-------|---|---|---|---|--|
|      | 2009  |   |   |       |   |   | 2010 |       |   |   |   |   |  |
|      | J     | A | S | O     | N | D | J    | F     | M | A | M | J |  |
| A    | ----- |   |   |       |   |   |      |       |   |   |   |   |  |
| B    |       |   |   | ----- |   |   |      |       |   |   |   |   |  |
| C    |       |   |   |       |   |   |      | ----- |   |   |   |   |  |

## EXHIBIT 4

FISCAL PERIOD April 2009 – June 2010 (July 2009-June 2010)

### APPLICATION CHECK LIST

- Cover letter
- Signed Title Page ([Exhibit 1](#))
- Proposal package complete with all 4 sections included.
- Synopsis (1-page limit) ([Exhibit 2](#))
- Project Description (3-page limit excluding resumes)
- Other important information (1-page limit)
- Budget Plan included at end of proposal.
- Budget justification included as Attachment A (printed copy)
- One electronic copy submitted on CD of the proposal in MS Word format and budget pages in MS Excel format.
- Two paper copies prepared for submission and secured by binder clips or rubber bands (no staples).

**NOTE:** All text must be in 12 point Times New Roman font.

# EXHIBIT 5

## MASTER LIST OF TOPICS

### 2009-2010 Funding Cycle

#### FUNCTIONAL FABRICS

#### CESTAB

#### YARN AND FABRIC FORMATION

#### ECONOMIC COMPETITIVENESS

The Technical Advisory Committee (TAC) of the ITT/NCSU Textile and Materials Research Consortium has established a set of priorities for Consortium supported research for the Fiscal Year 2009-2010. The Committee selected these topics with aid from the Yarn and Fabric Formation, Functional Fabrics (including Dyeing and Finishing), CESTAB (Committee for Economically Sustainable Textile and Apparel Businesses), and Economic Competitiveness Research Subcommittees. In evaluating proposals, priority will be given to proposals that address these topics. Please note that proposals that do not reference one of the research topics / research areas by title and number will not be considered for review as part of this RFP, unless the responder provides a written paragraph for preapproval to Dr Henry Boyter ([henryb@itt.edu](mailto:henryb@itt.edu)). All priority research topics/ research areas are indicated by the letter (M) preceding the topic. Be sure to use the topic number to indicate where needed. It is not necessary to title proposals the same as the topic title. Some of the topics are not as detailed, so if you have any question, please contact Dr. Boyter.

**FUNCTIONAL FABRICS (FF) ([Return to Index](#))**

Functional Fabrics includes the traditional areas of dyeing and finishing, but also includes technical fabrics, nanotechnology, emerging technologies, and any other advanced application.

- FF1. (M) Slashing - Because of the costs of energy and the increase in the cost of chemical sizes, new methods and techniques need to be examined to reduce the costs of slashing operations. Examples include dry sizing, PVA alternatives,
- FF2. (M) New Durable Fabric Finish Technologies - Flame Retardants, Stain/Water Repellants, Antistats that are either an economical and functional, environmental, and/or energy consumption improvements over current technologies.
- FF3. (M) Repellant Finishes – It has been observed that when FR and Repellant finishes are both present, that some of the FR functionality is lost. New application methods or new repellant finishes to address this problem are needed.
- FF4. (M) Antimicrobial Finishes for Improved Wash/Dry/Autoclave Durability – Depending on chemistry could use either AATCC 100 or ASTM E2149 ideally > 3 log reduction. Original and 50 washes. Each cycle is wash/dry using AATCC 96.IV.A, then autoclave by vacuum steam at 134C for 4 min.
- FF5. (M) Waterless or Low Water Dyeing and Finishing Technologies – New techniques are needed as water becomes more important in the world economy. This request does not include previously researched technologies such as carbon dioxide dyeing, spray technologies, or low liquor ratio machines.
- FF6. (M) Durable Antistat Finishes meeting these specifications as “objective” and for “threshold” equal to or better than 100% cotton. The “objective” is performance at 50% RH instead of 20% RH.

|                       |                   |                                |
|-----------------------|-------------------|--------------------------------|
| Surface Resistivity   | original          | < 10 <sup>11</sup> ohms/square |
| Concentric Ring       | 50X <sup>2</sup>  | < 10 <sup>11</sup> ohms/square |
| At 20% R.H., 73 ± 2°F | 100X <sup>2</sup> | < 10 <sup>11</sup> ohms/square |
| AATCC 76 (NFPA-99)    |                   |                                |

|                       |                   |           |
|-----------------------|-------------------|-----------|
| Static Decay          | original          | < 0.5 sec |
| 5000-500 Volts        | 50X <sup>2</sup>  | < 0.5 sec |
| at 20% R.H., 73 ± 2°F | 100X <sup>2</sup> | < 0.5 sec |
| FTM 4046 (NFPA-99)    |                   |           |

- FF7. (M) New Acrylic Fabric Systems for Outdoor Fabrics – Properties of interest are FR, Self-Cleaning, and Superhydrophobicity.

Tweaking the current finishing system to take advantage of benign replacements for current functionalities (eliminating fluorocarbons for example);  
Adding features heretofore not possible nor practical on acrylic fibers; and  
Replacing the (acrylic + finishing) system with a new complex, with similar but more benign capabilities.

- FF8. Nanofiber Applications - The objective of the proposed work is to use a dual treatment process combining electrospinning and atmospheric plasma treatment to create durable water repellent nanofiber depositions on textile fabric surfaces. The proposed research will also enable process development that can be optimized for low cost industrial scale application.

**CESTAB (C) ([Return to Index](#))**

- C1. (M) Removal of antimony from wastewater due to polyester and flame retardants.
- C2. (M) Methods for identifying causes and elimination of aquatic toxicity specific to textile manufacturing.
- C3. (M) Practical methods of lifecycle analysis for textile producers. Perform and/or compare life cycle assessments of cotton and polyester.
- C4. (M) “Green” replacements for traditional organic coagulants and polymers used in textile wastewater and sludge applications.
- C5. (M) “Green” Polyester – This project is to take samples of virgin polyester, non-antimony based polyester, 100% Post Industrial Recycled Polyester and 100% Post Consumer Recycled Polyester. The samples will be analyzed for harmful substances that may be listed under California Prop 65 or the European REACH. Regardless of the environmental standard the true question would be, "do the post consumer or post industrial products pose a greater or lesser health risk to the consumer". Are these recycled products really "green"?

**ECONOMIC COMPETITIVENESS ([Return to Index](#))**

The textile industry as a whole is being impacted by economic conditions experienced over the last 10 years. These conditions are forcing individual companies and the Institute to examine themselves, and to develop and implement new business strategies. The subcommittee is looking for research that will answer the questions, not what are the problems, but what are the answers.

- EC1. (M) Product data management for staple yarns due to global purchasing.
- EC2. (M) The impact of complexity on profitability : when diminishing returns are reached.
- EC3. (M) Review of distribution channels of fabrics and the changes occurring in various markets.
- EC4. (M) Impact of trade advertising on markets. The proposed research aims to assess the impact of trade advertising on both the customer market (i.e. fabric manufacturers) and the final consumer market. The specific objectives are to:

- To identify and examine current trade advertising campaigns;
- To analyze the effectiveness of current advertising campaigns;
- To determine the impact and market potential of trade advertising through interviews with customers and the final consumers; and
- To develop a framework that will allow the US textile industry to better target the end market.

- EC5. (M) Market Demand for Environmentally Sustainable Textile Products - As U.S. producers seek new ways to compete in the global marketplace, they are looking beyond traditional mass production and marketing to meeting the needs of particular market segments. The specific objectives are:

- To define the term “environmentally sustainable” for each sector of the textile industry
- To conduct a market analysis of the environmental textile market
- To identify companies currently positioned in the environmental textile market
- To interview these companies in order to determine their textile needs
- To interview textile suppliers in order to determine the cost-to-benefit ratio of environmental production
- To interview consumers to determine market demand conditions of environmental textile products
- To develop a framework for US textile companies to use when implementing an environmentally focused marketing strategy.

- EC6. (M) Closed Loop Recycling - This project proposes to extend the current ITT work by further developing the operational decision making portion of the closed loop textile recycling framework and considering two different types of textiles products, an apparel

garment and a technical textile product. The anticipated result is a robust framework for making strategic and operational decisions in setting up a closed loop textile recycling network, as well as two detailed case studies. To develop the operational decision making portion of the framework, a detailed (stochastic, discrete-event) computer simulation program will be developed. This program will use the resulting network from the facility location procedure and will include simulation of collection, recycling (refurbishment), manufacturing, and transportation operations, as well as inventory levels of both virgin and recycled materials (refurbished and new product). Different inventory and transportation policies will be investigated, and sensitivity analysis will be performed, especially on estimates of the amount of product received at the collection facilities.

In order to build a framework to determine the number and location of collection sites and the processing plants, answer logistical/transportation questions, and drive a computer simulation model, an estimate of the anticipated amount of the various reverse demand streams needs to be determined. The estimated demand streams are very important in determining the feasibility and effectiveness of the reverse logistic network. By combining the amount of new products being created with the life cycle analysis and possible population densities, the return demand volume can be estimated. A key deliverable will be to determine effective return demand estimation processes.

From an environmental impact, recycling/reusing products in a reverse logistics system is an admirable goal. However, determining its impact on profit is critical. There are many indirect and direct economic reasons for companies to consider closed loop recycling that include decrease in cost of raw materials, production, after sales service, and disposal. As more legislation is enacted to force companies to recover, recycle, and reduce their carbon footprint and as the cost of oil and energy increases, reverse supply chains are becoming viable alternatives. The goal of the project will be to evaluate costs of closed loop recycling systems and not to develop new recycling technology (material breakdown processes). A cost benefit analysis for each product type will be performed to determine the difference between virgin and recycled materials production to determine a break even point. Closing the loop may lead to protection of market share as well as open potential new markets.

EC7. Market Analysis of Fabric Distribution Channels - The purpose of the proposed research is to conduct a review of the various distribution channels for fabrics and to analyze the changes occurring in the marketplace. The specific objectives are to:

To conduct an analysis of the fabric market;

To survey fabric manufactures in order to determine their distribution channels and current trends in these channels;

To conduct in-depth interviews with select fabric manufacturers about specific issues revealed in the survey;

To develop an analysis of current trends in the fabric market; and

To identify competitive opportunities for US textile firms in the fabric market.

- EC8. Global Competitive Analysis - Rigorous identification and analysis of competitive forces at industry, strategic group and firm levels will provide ITT members knowledge of competitive industry forces on both the supply and demand sides of the business, insight into the behavior of strategic groups in the industry and individual firm strategy and performance. Understanding competitive dynamics at industry, strategic group and firm levels will allow ITT members to evaluate their competitive positions and pursue long-term sources of competitive advantage to ultimately drive performance.
- EC9. Analyze and measure productivity of marketing and branding efforts in textile and/or apparel companies. Based on the ITT study “Productivity in Textiles: How to correctly measure the impact of mergers and outsourcing” (Mercedes Marshall) one of the key issues in corporate profitability is that manufacturing profitability and productivity are well understood, but the portion of manufacturing cost tends to decline while corporate overhead costs (including marketing costs) tend to incline. Overhead productivities and marketing productivity measures are far less researched, and no specific study for the textile industry is readily available. At the same time branding efforts are considered crucial to the success of companies.

**YARN AND FABRIC FORMATION (YF) ([Return to Index](#))**

The Yarn and Fabric Formation Subcommittee is seeking proposals that encompass various areas of greige manufacturing including product testing, comprehensive manufacturing analyses, product improvement development, and the development of new products.

- YF1. (M) Slashing – Because of the costs of energy and the increase in the cost of chemical sizes, new methods and techniques need to be examined to reduce the costs of slashing operations.
- YF2. (M) Application of 3 D knitting /weaving technologies to non apparel markets.
- YF3. (M) Quick and inexpensive tests for cotton maturity and honeydew-stickiness that can be done without advanced laboratory techniques.
- YF4. (M) Optimize card setting for cottons and blends with a focus on fiber length distribution and its impact on quality and mill performance.

**YARN AND FABRIC FORMATION (YFS) – Nonstudent Areas**

The following project areas are available for funding in the YF areas. These projects are considered short term and will not include the services of an Institute Fellow. Also, the maximum total budget amount for these areas is \$20,000 and they have a funding period of July 1, 2009 to March 1, 2010. These are very general topic areas where improvements or more economical techniques are needed in manufacturing, so if you have any questions, contact Dr. Henry Boyter before proceeding with a proposal.

- YFS1. Relate HVI properties to immature cotton neps as identified in yarn, in fabric, and in dyed fabric and investigate cotton property outlier/error results present in USDA green card bale data.
- YFS2. Types and Sources of Barre Problems. Economic impact.
- YFS3. Barre troubleshooting guidelines.
- YFS4. Spinning air balance and compressors – piercer settings.
- YFS5. Waste benchmarks for card/sliver/blow room/trash/AF across processes.
- YFS6. Troubleshooting guide for Barre and slubs.
- YFS7. Defects software – application.
- YFS8. Re-establish optimum weave room ambient conditions in terms of runnability looking at ionization levels, temperature, and humidity. Yarn static parameters?
- YFS9. Temperature and humidity for compressed air on air jet machines.
- YFS10. Lubricants in size – impact on PVA and starch.
- YFS11. Cleaning of yarn stock.
- YFS12. Dynamics of air jet reeds. Optimization.
- YFS13. Yarn contraction info for filament yarns versus width of fabric.
- YFS14. Heat setting without desizing.
- YFS15. Material Tracking with RFID (bale to sale).

## **EXHIBIT 6**

**Budget Sheet  
(provided separately)**

## **Amendments**

None at this time.