

**An NSF Industry/University Cooperative Research Program**

# **TRTC PROSPECTUS**

## **September 2010**

### **Tire Research and Test center**

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**EXECUTIVE SUMMARY**  
**Tire Research and Test Center (TRTC)**  
**NSF Industry/University Cooperative Research Program**  
**Virginia Tech and**  
**The University of Akron**

The Tire Research and Test Center (TRTC) is a multi-university cooperative research center among Virginia Tech (VT) and The University of Akron (Akron). It is part of the NSF Industry/University Cooperative Research Centers Program. If established, it will be jointly supported by industry and the National Science Foundation (NSF).

The TRTC combines the modeling, testing and material science expertise of the VT researchers and the expertise of the Akron researchers in the material and polymer sciences. It will function as a complete tire science and engineering center with extreme versatility in developing synthesis and processing systems for tire compounds. It has the capability and goal to develop leading edge polymer composite and nano materials and processes to improve the technical base that is needed by the tire companies to compete successfully in the global marketplace.

The mission of the Center is to create and transfer to Center Members the new technologies and relevant technical base to drive development of competitive technologies in polymer and nano materials for advanced, high performance tires.

The Center conducts a cooperative research program that features a highly leveraged, pooled, cooperative research program. The cooperative research program includes the research of approximately 10-15 graduate students, 16 faculty researchers and several research scientists. Large industrial firms provide a minimum of \$40,000 per year in research funding for membership in the cooperative program. Small, SBIR-size, firms pay a minimum of \$20,000 per year in research funding for membership. Member firms play a major role in recommending and selecting projects for the cooperative program. Members may designate the program/project areas in the cooperative program to be supported by their funds.

An Industrial Advisory Board (IAB) made up of one member from each voting member firm provides oversight. This committee provides feedback on the state of the research projects at each of the semiannual review meetings. It also recommends projects for the cooperative program, provides feedback on project proposals and makes recommendations to the Center Directors for research direction and Center policies.

The Center's VT research laboratories are primarily located in the Institute for Advanced Learning and Research in Danville, VA, at the Center for Vehicle Systems and Safety in Blacksburg, VA and at the Chemical Engineering Department in Blacksburg, VA. At Akron, the Center's research is primarily conducted in the Auburn Science and Engineering Building and at the College of Polymer Science and Engineering.

The Center also performs research on individual projects funded by separate research contracts or grants from industry and Government. Work with industry on individual contracts can take several different forms. These include:

- Proprietary, fundamental research projects conducted by the Center in areas of specific interest to a company
- Collaborative research projects between the Center and a company where each conducts a major part of the research,
- Joint projects for Government agencies
- Visiting scientists working in the Center
- Analysis of industrial problems
- Technical services such as Tire Mechanics, Vehicle Dynamics
- Answering technical inquiries.

The IAB meets semiannually. The meetings rotate among VT and Akron. Working in concert, the IAB and the TRTC faculty propose new research projects for the cooperative program. Proposed projects are presented at either the spring or fall meeting of the IAB. However most new project proposals will be made at the fall meetings so that graduate students can be recruited on a normal cycle for new projects scheduled to start the next fall semester. The IAB members then specify their level of interest in the current projects and the recommended new projects and provide suggestions for change. Based on the collective results of the IAB project evaluations and anticipated membership funding, the Directors select the new projects for the cooperative program.

Research in the cooperative program concentrates on new technologies that can provide a leading edge to the member companies. The principal research program areas are:

- Materials
- Modeling
- Testing
- Manufacturing

These program areas provide new opportunities for the development of innovative, low-cost, high performance materials and processes not currently available commercially.

A Program Coordinator leads each program area. The Program Coordinators have the responsibility to control the budget allocated to the area and to coordinate the research efforts in the individual projects. Generally, the Program Coordinators are either VT or Akron faculty. The research projects are directed by VT and Akron professors and carried out primarily by graduate students, assisted by undergraduate students and researchers from abroad who join the program as post docs or visiting scholars. Approximately 16 faculty members from VT Mechanical Engineering and Materials Science and Engineering and the Department of Chemical Engineering and Akron Mechanical Engineering and Polymer Science and Engineering Departments participate in the Center's research program.

Membership in the TRTC Cooperative Research Program provides many benefits to participating companies. These include:

- Opportunity to co-design, co-develop and co-manage the TRTC research program
- A voice in selection of the research projects through membership in the IAB and the direction of a major polymer science and engineering research program

- An opportunity to allocate their membership funding to support the research program area(s) most relevant to their company interests
- Interaction with the broad knowledge base of participating faculty
- Access to a broad range of tire research for a small percentage of the total cost
- An option for a royalty-free, non-exclusive license to patents and other intellectual property resulting from the Center's precompetitive research program
- An opportunity to send a visiting scientist to work at the Center
- Access to the Center for technical questions, occasional technical services and separately funded research projects
- Contact with graduate and undergraduate students for recruiting purposes.

Semiannual meetings are held to review projects, select new projects and conduct the policymaking business of the Center. An annual, comprehensive progress report on the Center's projects is sent to Member Companies prior to the spring IAB meeting. An abbreviated technical report is furnished prior to the fall IAB meeting. These reports are furnished in the form of CDs to facilitate the flow of information throughout the Center member organizations.

Oral project reviews and a poster session are presented at each semiannual meeting. The reports are also furnished as CDs containing a complete Audio/visual record of the technical review talks. IAB members provide written feedback to the project leaders on special evaluation forms. This provides an opportunity for individual companies to have direct input into each project.

Publication is encouraged, after review by the Center Members, but can be delayed for a maximum of six-months.

### **VISION, MISSION AND GOALS**

The Tire Research and Test Center vision is to provide the forum for industry/university cooperative research on the further development, validation, and industrial implementation of the emerging technologies of tire materials, manufacturing, modeling, and testing.

TRTC will provide first class technology development, research, and test solutions to tire, automotive, and road transportation companies through modeling, analysis, and demonstration of integrated solutions and systems.

- To advance, develop and promote research into the principles and technology of tire science and engineering through research, development, education, and technology exchange among academic, industry, and government entities;
- To increase the quantity and quality of the professionals prepared to work in the area;
- To involve the faculty of the University(s) in research in areas of common interest to Sponsors and the University(s);
- To perform research that will allow tire companies to be competitive in the world economy

The TRTC mission inherently recognizes the opportunity afforded by the formation of a multi-university science and engineering center that has both a strong mathematical modeling component and an equally strong material and polymer science capability. This combination provides the intellectual leadership to meet future tire science and technology needs of our Member Companies. The focus will be on developing a technology base that will lead to the development of competitive, reproducible tire materials and compounds that:

- Can be manufactured by robust, high-yield and environmentally friendly processes
- Are cost efficient to manufacture
- Can be tailored to specific applications
- Are based on the best innovative science, technology and engineering practices

The following goals were established to accomplish the Center's mission:

- Promote close interaction among VT and Akron researchers to develop an interdisciplinary research program in materials and processing with emphasis on developing new areas of tire technology such as nanostructured particles and surfaces
- Forge collaborative research alliances with outstanding researchers from other universities to bring in talent and expertise to compliment the Center's Research
- Develop new science, technology and novel concepts to help the tire industry leap into the future
- Serve as an in-depth, expert resource for tire science and technology
- Transfer and exchange knowledge/technology and inventions to the Center's industrial members and Federal Government supporters
- Contribute to tire science education, by training and educating students including providing them exposure to industrial technology and industrial research procedures
- Become a focal point for networking in tire and allied areas of science and technology for exchange of ideas and to identify global needs and opportunities.

The TRTC vision and mission statements and goals guide the future direction of the Center's research program.

## **ORGANIZATION**

The organization and management structure provides (1) strong interaction and collaboration among VT and Akron research components and (2) involves each of the Center's combined research faculties and participating members in as much of the decision making process as possible. The policy and research decisions are consistent with the policies of the two parent Universities and the spirit of cooperative research. Within these constraints, the faculty and participants, acting in-concert, determine the research activities, policies, and future directions of the Center.

### **Center Directors**

A Site Director, VT Associate Professor Saied Taheri, Department of Mechanical Engineering and a Site Director Akron Professor Celal Batur, Department of Mechanical Engineering will manage the Center. A Co-Director and an Associate Director will be selected once the center is

established. The Center Directors inform Center Member companies, the National Science Foundation and their respective universities on the conduct and achievements of the Center. The primary responsibilities of the Center Directors are to:

- Ensure that the precompetitive research program has intrinsic merit
- Assure communication and knowledge transfer to participating companies
- Ensure and maintain academic excellence and a research program that contributes to the education of students
- Make final decisions on Center policy and operations
- Help IAB on the selection of research proposals and projects
- Prepare Center budget
- Administer Center funds
- Issue reports on the Center's operation and research
- Recruit new industry participants

### **Industrial Advisory Board**

The Industrial Advisory Board (IAB) advises on matters of Center operation, policy and research. The Committee is the forum through which the ideas, goals and requirements of the industrial participants of the Center are expressed and coordinated. The Chair of the IAB is an IAB member, recommended by the two Directors and approved by vote of the IAB.

The IAB is made up of

- One member from each participating firm with voting rights
- One member from the National Science Foundation
- Additional, non-voting participants as invited by the IAB

The responsibilities of the IAB are to

- Recommend research project areas and projects
- Provide feedback to Center Directors on their interest in recommended projects
- Recommend Center policy including direction of research, member networking, patent and publication policies, etc., consistent with the policies of the participating universities
- Provide feedback on each project at each review meeting to the Center Directors, Program Coordinators and Project Leaders

### **Program Coordinators**

The TRTC technical program consists of four principal thrust areas. Each program thrust area is under the direction of a Program Coordinator(s). The Program Coordinators have the responsibility to administer the budget allocated to each Program Area to assure that the resources are used to the best advantage of the individual technical tasks or projects. The Program Coordinators report directly to the Center Directors and participate in determining the technical strategy of the Center. The Program Coordinators are faculty of VT and Akron.

### **Project Leaders**

The Project Leaders are generally university faculty researchers from VT and Akron or from other associated universities.

The responsibilities of the project leaders are to

- Coordinate their research progress with the appropriate Program Coordinator.
- Organize and conduct the research projects
- Direct the students, postdoctoral fellows, visiting scientists, and Center research staff in conducting the research projects
- Interact directly with appropriate research and other technical and business personnel of the industrial member companies particularly interested in their projects.
- Publish research results in accordance with Center policy
- Identify intellectual property and write Invention Disclosures as appropriate
- Advise their Program Coordinators of technical successes as well as problems and resource requirements needed to succeed

### **Communication**

The IAB meets semiannually, in the spring and in the fall. The meeting sites rotate among VT and Akron. They consist of a full day technical review and poster session followed by a half-day business meeting. The IAB meetings provide an open forum to discuss research progress, accomplishments, new project selection, technical direction and other Center policies and issues requiring attention.

Annual comprehensive technical progress reports are prepared for each completed calendar year and sent to all Center Members prior to the spring IAB meetings. An abbreviated technical report on all Center Program areas and projects is prepared and distributed to all Center Members prior to the fall meeting. The reports are furnished in the form of CDs to facilitate their dissemination within the member organizations.

The oral technical review talks, which are presented at the semi-annual IAB meetings, are recorded and furnished to the members as audio/visual PowerPoint presentations on a CD. Center newsletters are sent to all Center Members periodically to report the latest research results and other Center accomplishments and activities. Preprints of publications on completed work and graduate theses from Center projects are available to all members. The Center encourages and provides both formal and informal interactions between industry and faculty as well as student researchers. The Center's Cooperative Research Program relates both the interests and needs of industry with the interests and skills of the Center's faculty. Therefore, close faculty-industry communication concerning research ideas is a necessity. Such research related interactions, while very important, are not intended to supplant the normal faculty consulting services in areas not specifically related to Center projects.

### **Evaluation**

The NSF/IUCRC Program requires that Center activities including industry-university interaction and accomplishments be independently observed and evaluated. The TRTC Evaluator is Dr. Dee Hoffman. The Center Evaluator is sensitive and responsive to the needs of the NSF/IUCRC program office, the Center leadership and its constituencies and to the IUCRC Evaluator Guidelines that call for the following:

- Attend, observe and participate in IAB and semi-annual evaluator meetings



- Administer, analyze and present the findings of Industry/Faculty Outcomes Data to the Center leadership, and the IUCRC program, both as a split run for each site, and as a merged report when appropriate
- Assist in the administration, tabulation and presentation of on-line findings of LIFE forms for new research proposals, and continuing progress reports during IAB meetings
- Perform exit interviews to determine why members leave, and to determine the basis on which they would return
- Prepare annually and at least 90 days before the Center's anniversary an Evaluator Report presenting a history of the Center, including its activities, opportunities, challenges and responses for the previous year, and an indication of the general health, well-being and strategic and tactical direction for the future
- Provide NSF and the Center constituencies with information on Center accomplishments and challenges in a timely fashion, so that corrective action if appropriate can be taken on-line, and thus provide the Center with a basis for continuing improvement

**Level of Interest and Feedback Evaluation (LIFE)** — An important objective of the TRTC IAB meetings is to stimulate interaction among faculty, students and industrial members. The NSF LIFE questionnaire facilitates this interaction. The LIFE questionnaire for each Center Research Project is completed by voting members of the IAB based on the oral presentations, poster presentations and faculty discussions at both the spring and fall Technical Review meetings. The results are presented (in hard copy) and discussed by the IAB, NSF representative and Center faculty during the business meeting that follows the technical review. These open discussions enhance the collaborative spirit of the Center constituencies. They are very important in determining the future technical direction of the Center and fostering significant scientific interaction among researchers and sponsors.

**Study of Organizational Effectiveness** — The organizational effectiveness of the Center is reviewed on an annual basis, generally, just after the spring IAB meeting. The Center Evaluators conduct the review with Center Members and faculty using special forms designed for the I/UCRC program. These questionnaires are designed to assess the Center's performance against various effectiveness criteria. The responses to these questionnaires are summarized in report form by the Center Evaluators and presented to the Center Directors to help them identify Center strengths and weaknesses that respectively need to be exploited or corrected. A copy of the report is also submitted to the NSF.

### **Schedule of Activities**

The Center operates on a fiscal year beginning July 1. However, the membership year for individual members starts on the date they join the program. As already discussed, there are semiannual meetings of the IAB held each spring and fall. Both meetings review the Center's research programs, select new projects, present tutorial lectures, discuss strategic issues and evaluate both the short and long term Center objectives.

### **Project Selection**

The IAB, individual member companies and participating faculty recommend new research projects for the Center's Cooperative Research Program on a semiannual basis. New project proposals can be presented at either the spring or fall IAB meetings although the fall meeting is recommended to provide sufficient time to locate students and resources and assure that the projects start by the following fall semester. These proposals are presented orally during the technical presentation session. Whenever possible, white papers describing the new project proposals will be furnished to the IAB prior to the meeting. The same forms used to evaluate interest in the Center's ongoing research projects are used to evaluate the new project proposals. If a new project proposal is ranked favorably by the IAB compared to existing projects, the Center Directors, in close coordination with Center faculty, can elect to implement the new project. The number of new projects that can be initiated each year depends on the availability of funds and the number of students completing their graduate research.

**Project Selection and Termination** — A key requirement in initiating a new project is the availability of an appropriate student(s). Therefore, we provide a 10-month window from the decision to initiate a new project to allow for student recruitment and to get the project up and running. Conversely, when the decision is made to terminate a Center project, for whatever reason, the Center guarantees funding for at least an additional six-month period if required to enable the student researchers to either complete their graduate research or to enable their faculty advisor to find alternate funding. In a worst-case scenario, the Center provides the necessary funding to enable the students to complete the research requirement for their degrees.

### **Publication Policy**

Publication of research in scientific journals is a requirement of academic research and is encouraged. A disclosure-delay mechanism prevents untimely publication of patentable research. No such publication, which is defined as a presentation at symposia, national or regional professional meetings, submissions of abstracts or proposals, publication in journals or other public disclosure, shall occur before being reviewed by one of the Center Site Directors. Each proposed publication, in the form of the complete publication or an extended abstract, by either a Center Faculty Researcher or a member of a center company, will be submitted to one of the Center Site Directors to be screened for intellectual property content. If the Center Site Director determines that the proposed publication or presentation does not contain patentable material, the Director may authorize publication. If the Center Site Director determines that the proposed publication may contain patentable material, a copy of the proposed publication or an extended abstract of it shall be sent to each Center Member in good standing for review. Before the end of the 30 day review period, the beginning of which period shall start to run with submittal of a research paper or report to each fully paid member, if a Center Member determines that the proposed publication does contain Center Technology of interest, the member may request a three-month moratorium to allow it to decide if the proposed publication contains patentable Center Technology of interest. The reasons for the three-month moratorium on public disclosure, which may be granted at the discretion of the Center Director, must be clearly stated in the request. During and after the 30-day review period, the Center Member shall keep such

disclosures confidential, in accordance with the terms of the Membership Agreement, in order to allow the University or any Center Member to evaluate the research results for patent purposes. The Center will notify the Center Members when a graduate thesis or dissertation, which has been authored by a student supported entirely or in part on a Center project, has been submitted for approval to any faculty member of the participating universities. Center Members have the right to request and receive a copy of said thesis or dissertation prior to any public disclosure of the thesis or dissertation, in accordance with the provisions found in the Membership Agreement. The Center Members will have 30 days from receipt of such copy in which to review the thesis or dissertation to identify intellectual property of interest to the Center Member. In no event shall publication of the thesis or dissertation be delayed more than 60-days after the end of the 30-day thesis/dissertation review period for an appropriate intellectual property filing to be made by the University or any Center Member.

### **Operating Budget**

The operating budget for the TRTC comes from industrial funding, NSF and the cost sharing provided by the two universities. Research funds provided by participating companies are allocated to the costs of the research program. Additional leveraging and funding of individual projects or program areas is provided by Federal grants obtained by Center researchers. The Universities have established a mechanism for the transfer of membership funds to accommodate the project priorities as determined by the annual vote for fund allocation among research projects.

### **Patent Guidelines**

**General Basis** — The TRTC patent procedures follow the VT and Akron patent policies modified to accommodate the goals of cooperative research with industry. The patent policy procedure described herein is subject to the NSF Standard Patent Rights Clause (see NSF Grant Policy Manual 751.3 implementing the Bayh-Dole Act, 35 U.S.C.200 et seq.) including March-in rights.

**Invention Reporting and Ownership** — Inventions made on the Center's Cooperative Research Program shall be promptly reported to the inventing university (or universities in the case of a joint invention) and Center Members. Title to inventions made in the course of this research on the Center's Cooperative Research Program shall vest in the inventing university(s) or its (their) designee(s). Ownership of Center Inventions shall be determined using the following qualifiers:

1. Ownership shall vest in VT for Center inventions made solely by one or more Center researchers from VT.
2. Ownership shall vest in Akron for Center inventions made solely by one or more Center researchers from Akron.
3. For inventions made by researchers from the two universities, ownership shall vest jointly in the respective universities.

The same protocol holds for inventions involving Center researchers from other universities.

**License Rights** In the event that one university in the case of sole university inventions or multiple universities, in the case of a joint invention, first file for a patent on an invention from the Center’s Cooperative Research Program, the Center Members in good standing that are part of the Center’s Cooperative Research Program on the date of the Invention Disclosure shall be granted an option to obtain a royalty-free, non-exclusive license to practice such invention.

In the event that one university in the case of sole university inventions or multiple universities, in the case of a joint invention decide to pursue a patent on a Center invention, Center Members in good standing that are part of the Center’s Cooperative Research Program on the date of Invention Disclosure will receive an option to obtain a limited, royalty-free, non-exclusive, nontransferable license without the right to sublicense. The Center Members that elect to exercise their license option must agree to share the patent costs in exchange for a royalty-free, nonexclusive license to use such invention for the life of the patent protection that is obtained subject to the Center’s formal Patent Procedures.

**Royalties** — Royalties generated from licenses to Center patents and technology will be distributed in accordance with each University’s standard royalty distribution policies.

#### **Patent Procedure**

1. The University where the invention was made solely by its personnel and first disclosed (hereinafter Principal University) has first opportunity (at the sole discretion of the Principal University) to apply for and pay for the patent. In this case:

- a) The Principal University owns the patent.
- b) Non-inventing Universities retain the right to practice for research and educational purposes.
- c) Center Members retain an option to obtain royalty-free, non-exclusive rights, without the right to sublicense.

2. For joint university inventions, the participating Universities may agree (at the sole discretion of the Universities involved in the patent) to file and share the cost for a patent. In this case:

- a) The participating Universities jointly own the patent.
- b) Center Members retain an option to obtain royalty-free, non-exclusive rights without the right to sublicense.

3. If none of the Universities chooses to file for a U.S. Patent, each Center Member will have thirty (30) days after receipt of the Invention Disclosure from the Center to inform the Center in writing of its intent to exercise its option to have the Principal University or Universities file for a U.S. patent. In this case:

- a) Requesting Center Member(s) agrees to pay for the preparation, prosecution and maintenance of the patent (hereinafter “Participating Member(s)”)
- b) All Center Members will be informed of the request to file a patent and will have thirty days to inform the Center of their intent to participate in the patent action and share the patent costs on a pro-rated basis.
- c) Non-participating Members will have waived their rights.
- d) Principal University (or Universities) retains ownership.

- e) Non-inventing Universities retain the right to practice for research and educational purposes.
  - f) Participating Members have royalty-free, non-exclusive rights, without the right to sublicense, when they share in the patent costs.
  - g) Participating Members may negotiate at any time for an exclusive or field of use exclusive position.
  - h) Principal University or Universities may license to third parties but first must give Participating Members the option to negotiate an exclusive field of use license.
4. Participating Members may request in writing that a foreign patent(s) be filed with the understanding that they will have to pay for the preparation and prosecution of the patent(s) and its (their) maintenance. In this case:
- a) Participating Members, which request that a patent be filed, agree to pay for the preparation prosecution and maintenance of patent.
  - b) Principal University or Universities retains ownership.
  - c) Non-Participating Members have no rights.
  - d) Participating Members have royalty-free, non-exclusive rights, without the right to sublicense, when they share in the patent costs.
  - e) Participating Members may negotiate at any time for an exclusive or exclusive field of use position.
  - f) Principal University or Universities may license to third parties after first giving the Participating Members the option to negotiate for an exclusive or exclusive field of use position.
5. If no Center Member exercises the option to request that a patent be filed on a Center invention, all Center Members will have forfeited their rights and the Principal University or Universities may exercise its right to file for a patent.
6. If the Principal University or Universities chooses not to exercise its patent filing rights (in Article 5), the Inventors can request the rights to their invention. In this case, it is important to protect the rights of Center Members and the Universities that may already be practicing the technology base of the invention. Therefore, the inventor's request will be evaluated and if approved, will be granted with the understanding that the Center Members on the date of record of the Invention Disclosure and the Universities will retain royalty-free, non-exclusive rights.

### **Center Membership Policy**

The primary objective is the creation of a multi-tiered membership structure that meets the I/UCRC program objective to provide the greatest flexibility to recruit new Center Members from both large and small organizations.

**Eligibility** —Membership is limited to firms that have significant R&D, business or manufacturing operations in the U.S. The categories of membership in the TRTC are listed below:

#### **Tier 1 — Standard Voting Membership**

- a) Full rights to Center Technology

- b) Large Company-Full Member (>500 employees)—\$40K annual membership fee—1 vote
- c) Small Company (SBIR eligible size)—\$20K annual membership fee—1/2 vote

**Tier 2 — Affiliate Membership**

- a) Approval of Center Directors required
- b) Rights to technology only from specific program/project being supported
- c) Minimum annual program/project support of \$10K
- d) No voting rights

**Tier 3 — Associate Membership**

- a) No rights to Center Technology
- b) No voting rights
- c) Minimum annual membership of \$1K
- d) Access to Center/University facilities under provisions that are established by each university

The standard Large Company Membership Agreement is shown in Attachment 1. The Small Company (SBIR eligible) Membership Agreement is the same except for a smaller annual membership fee and 1/2 of a vote on the TRTC IAB.

**POTENTIAL BENEFITS TO INDUSTRIAL MEMBERS**

Benefits of membership in the Center’s Cooperative Research Program are listed below.

1. Each voting Center Member is entitled to one voting representative on the Center’s IAB. This entitlement provides the Center Members a formal opportunity to suggest new projects for the cooperative research program, select the projects to be funded, and to participate in determining the research direction of the Center.
2. A voting Center Member may allocate its funding to a specific research area(s).
3. A Center Member may send up to five representatives to the semiannual IAB and Technical Review meetings. The presentations by the Center faculty and a poster session provide opportunities for representatives to discuss those projects of particular interest with the involved faculty members and graduate students.
4. A Center Member receives at least one CD copy of the semiannual formal Research Reports. At least one CD copy of the oral technical presentations is provided to each member.
5. A Center Member receives an option for a non-exclusive, royalty-free license to inventions made on the Center’s cooperative program if they share patent costs or if one or more of the Universities pays for the cost of a patent.
6. A Center Member through participation in Center Technical Review meetings and progress reports can keep abreast of a wide range of polymer and materials research results and opportunities. The pooling of membership fees provides base funding for the research of approximately 15 graduate students. This provides a cost-effective mechanism for Member Companies to gain detailed access to a broad base research program for a small percentage of the cost of performing research in-house.

7. A Center Member can choose to send a visiting scientist to the Center. If this person works on one of the research projects in the cooperative program, there is no extra fee required from the Member Company. An extra fee is required in accordance with each university's access to facilities policy if the visiting scientist works on a research project other than a project in the cooperative program.
8. A Center Member has access to the Center and its faculty as a resource for technical questions, occasional technical services, and conducting individual research projects under separate contract.
9. A Center Member gains exposure to graduate students and undergraduate students at the semiannual review meetings to assist in the recruitment of new staff members.

### **RESEARCH PROGRAM**

The Center's cooperative program research projects are integrated into four (4) highly interdisciplinary research thrust areas that cover a broad spectrum of tire science and engineering. These will be discussed in more details during the Workshop.

## Tire Research and Test Center (TRTC)

### Industry/University Cooperative Research Center

#### Membership Agreement

This Membership Agreement (“Agreement”) is made this day of \_\_\_\_\_ by and between \_\_\_\_\_ Virginia Polytechnic Institute and State University (hereinafter called "UNIVERSITY") and \_\_\_\_\_ (hereinafter called "Company") for the purposes of participating in the Tire Research and Test Center (“TRTC”) which is defined as all TRTC Research Sites funded by the Industry/University Cooperative Research Center Program of the National Science Foundation.

WHEREAS, the parties to this Agreement intend to join together in a cooperative effort to support an Industry/University Cooperative Research Center for TRTC (hereinafter called "CENTER") at the UNIVERSITY to maintain a mechanism whereby the UNIVERSITY environment can be used to perform research in the area of tire material, modeling, energy, testing, manufacturing, the parties hereby agree to the following terms and conditions:

A. CENTER will be operated by certain faculty, staff and students at the UNIVERSITY. For the first five years, the CENTER will be supported jointly by participating organizations such as industrial firms, federal laboratories, the National Science Foundation (NSF), the State, and the UNIVERSITY. It is possible that the UNIVERSITY may receive support from NSF for an additional ten years.

B. Any COMPANY, Federal Research and Development organization, or any Government-owned Contractor Operated laboratory may become a sponsor of the CENTER, consistent with applicable state and federal laws and statutes.

C. COMPANY agrees to contribute the following annually in support of the CENTER and thereby becomes a member with the benefits as identified herein, for that membership group.

_____	Large Company-Full Member	\$40,000 annual member fee
_____	Small Company	\$20,000 annual member fee
_____	Affiliate Member	\$10,000 annual member fee
_____	Associate Member	\$1,000 annual member fee

An Affiliate Member is a partial member with rights to technology only from specific program/project being supported. An Associate Member is a partial member with none of the rights granted to Full Members under Sections G and H.

Payment of these membership fees shall be made to UNIVERSITY through which the COMPANY exercises its membership in the CENTER as a lump sum due January 1<sup>st</sup> of each year of membership, unless arrangements for installment payments are made between



COMPANY and UNIVERSITY. Checks from COMPANY should be made payable to the Virginia Tech Foundation, Inc. and mailed to:

Managing Director  
TRTC Center at Virginia Tech  
150 Slaton Avenue  
Danville, VA 24540-0261

In lieu of the cash membership fee, with the agreement of the Managing Director and the Industrial Advisory Board (IAB), COMPANY may elect to sponsor a research project at UNIVERSITY, the results of which will be shared with all TRTC members.

Because research of the type to be done by the CENTER takes time and research results may not be obvious immediately, COMPANY should join CENTER with the intention of remaining a fee paying member for at least two years. However, COMPANY may terminate this Agreement by giving UNIVERSITY ninety (90) days written notice prior to the termination date.

D. There will be an Industrial Advisory Board (IAB) composed of one representative from each Full Member. This board makes recommendations on (a) the research projects to be conducted by CENTER (b) the apportionment of resources to these research projects, and (c) changes in bylaws, which may be adopted by the IAB, but which will not change the contractual terms of this Agreement

E. UNIVERSITY reserves the right to publish in scientific or engineering journals the results of any research performed by CENTER. COMPANY, however, shall have the opportunity to review any paper or presentation containing results of the research program of CENTER prior to publication of the paper or presentation, and shall have the right to request a delay in publication for a period not to exceed ninety (90) day(s) from the date of submission to COMPANY, for proprietary reasons, provided that COMPANY makes a written request and justification for such delay within thirty (30) days from the date the proposed publication is submitted by certified mail to COMPANY. Requests for delays must be submitted to the Managing Director of the CENTER.

F. All patents derived from inventions conceived or first actually reduced to practice in the course of research conducted by the CENTER shall belong to UNIVERSITY whose personnel generated the invention. Such UNIVERSITY, pursuant to chapter 18 of title 35 of the United States Code, commonly called the Bayh-Dole Act, will have ownership of all patents developed from this work, subject to "march-in" rights as set forth in this Act.

G. UNIVERSITY agrees that all such CENTER Full Members are entitled to obtain a nonexclusive royalty-free license to inventions generated during their membership period, which will be written up in a separate license agreement by the UNIVERSITY who owns the intellectual property. A Full Member will have the right to sublicense its subsidiaries and affiliates. Full Members that wish to exercise rights to a royalty-free license agree to pay for the costs of patent filing, prosecution and maintenance fees, including attorney fees and normal University overhead costs related to patent expenses. If only one Full Member seeks a license,

that COMPANY may negotiate an exclusive fee-bearing license from UNIVERSITY, with the right to sublicense its subsidiaries and affiliates.

H. As determined by the IAB, copyright registration may be obtained for software developed by CENTER. Full Members shall be entitled to obtain a nonexclusive, royalty-free license to all software developed by CENTER. Full Members will have the right to enhance and to re-market enhanced or unenhanced software with royalties due to CENTER to be negotiated, based on the worth of the initial software.

I. Affiliate Members are entitled to obtain a royalty-free, paid up, nonexclusive license to Inventions and copyrighted software that are generated by TRTC research during their membership period for non-commercial, educational and research purposes.

J. Any royalties and fees received by UNIVERSITY under this Agreement, over and above expenses incurred, will be distributed according to UNIVERSITY'S policy.

K. Neither party is assuming any liability for the actions or omissions of the other party. Each party will indemnify and hold the other party harmless against all claims, liability, injury, damage or cost based upon injury or death to persons, or loss of, damage to, or loss of use of property that arises out of the performance of this agreement to the extent that such claims, liability, damage, cost or expense results from the negligence of a party's agents or employees. In no event shall any party to this agreement have any liability for incidental or consequential damages.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their duly authorized representatives, effective as of the date and year first above written.

**COMPANY**

**UNIVERSITY**

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\_\_\_\_\_

Name:

Name:

Title:

Title: TRTC Director

Date:

Date:

\_\_\_\_\_

Name:

Title: Dean or Dept. Head

Date: