Executive Summary: Testing Center

Background

This proposal describes a testing center that would support the primary technological companies/industries of a community. Many industries cannot be successful in the marketplace without a substantial foundation of test results. This is particularly important in the aerospace industry where testing is mandated by the Federal Aviation Administration and a company is not permitted to manufacture (or even make progress on its plan) until suitable test results on all aspects of their product are demonstrated by an outside agency. Other industries like automotive and textiles also require significant product/materials testing before they can enter the market.

Many other types of testing have become critical to manufacturers, as well as all levels of government. For example, quality control evaluation (most industries), environmental testing (government and industry) and genetic testing (Food industry, Law Enforcement) are testing examples where speed and accuracy are critical. Unfortunately, testing operations are considered "non-value-add" operations by most manufacturers. Also, some companies prefer that testing results be obtained from outside groups that operate "at arm's length" from the manufacturer or government agency in order to provide an objective result.

Although the ability to obtain objective test results is critical for a manufacturer's success and for a government's ability to protect and serve the public, it is necessary that several criteria are satisfied. Testing must be accomplished with high accuracy, low cost and in close proximity to the industrial or governmental requestor. The proximity requirement is because in many testing scenarios, significant information must be exchanged prior to testing and, in the case of a failed test, an iterative approach may be used where rapid feedback on process changes is needed in order to move a product to the next stage of qualification.

Although many large companies have extensive testing and analysis facilities, such facilities are unaffordable for small companies and internal testing facilities cannot provide the external certification needed in some industries. Therefore, we assert that cost-effective, local testing centers are critical for high tech economic growth. One of the best examples of a testing center that has had a huge impact on its local economy is The National Institute for Aviation Research (NIAR) at Wichita State University (WSU). NIAR is the leading aerospace testing service in the U.S. It employs approximately 300 people, has expanded to five locations in or around Wichita, Kansas and has 42 partners (customers) in Wichita alone not to mention over 60 others throughout the U.S. Not only has NIAR helped attract aerospace companies to Wichita, it has helped to make WSU one of the top three universities in the amount of aerospace research funding received.

This proposal is a "blueprint" for how to start a testing center. The authors are currently setting up a testing center at the Gateway University Research Park's South Campus and this proposal is informed by that experience. Also, several work products from the Gateway center are included as part of this package and an explanation of how costs can be controlled through a shared infrastructure model with a local university is described.

I. Greensboro Economic Development Status

Over the past 11 years, the Piedmont Triad has lost over 40,000 manufacturing jobs. Alamance, Randolph, and Rockingham counties suffered tremendous losses due to the closings and/or restructuring of numerous furniture and textiles companies. The average per capita income level of counties in the Piedmont Triad was more than $5,000 below the national average from 2000-2010 and the unemployment rate of Greensboro and surrounding areas has exceeded national averages for many years. In order to address this problem, the Greensboro Partnership Economic Development (GPED) and the Piedmont Triad Partnership (PTP) have identified Advanced Manufacturing & Materials, Aviation, Transportation & Logistics, Financial & Business Services, and the Life Sciences as targeted clusters for cultivating high-wage, high-growth jobs.

Also, the Greensboro community worked together with the colleges and businesses of the area to develop a media campaign emphasizing Greensboro as an attractive location for industry and education e.g. “XXX thrives here, so can you”. The community has worked particularly closely with North Carolina A & T State University (NC A&T SU) and The University of North Carolina at Greensboro (UNCG) to create the Joint School of Nanoscience and Nanoengineering (JSNN) in order to create a school that could educate a high technology workforce and attract new industry to Greensboro such as in the advanced manufacturing, aerospace and life science sectors identified by GPED. The construction and operation of JSNN has created jobs and is just beginning to have industrial impact as its Nanomanufacturing Innovation Consortium now has 27 members.

JSNN is located on the Gateway University Research Park’s (Gateway) South Campus in southeastern Greensboro. Gateway is a 501(c)3, not-for-profit joint venture corporation controlled by NC A&T SU and UNCG. Gateway's mission is to be a catalyst for university research, innovation, and economic development and as a “Millennial Campus” as defined by the North Carolina Legislature, it enables easier interaction with industry than the main campuses of the universities.

JSNN was created to promote collaboration, innovation and cooperative, technology-driven problem solving. Its new $56.3 Million, 105,000 square foot facility has twelve laboratories including a 7000 square foot combination nanoelectronic and bio cleanroom, Analytical laboratory, NMR facility (Agilent 400 MHz and 700 MHz systems), Microscopy suite, Nanoparticle & Nanofabrication facility, Visualization facility, Nanobiophysics lab, Nanochemistry lab, Nanobiology lab, BSL3 facility, Genomics lab and Biomass Energy Lab. The facility has also recently completed (August 2012) an expansion project for our new Siemens 3T MRI system. JSNN has over $15 Million in equipment and has created a unique environment that serves as a “reactor” for emerging technologies and fosters an atmosphere conducive to discovery. Research underway at JSNN focuses on real-world problems, e.g. JSNN's extensive research capabilities in nanocomposite technologies create lighter, stronger materials for the automotive, aircraft and energy sectors.

The combined skills and infrastructure of JSNN and Gateway provide assistance to industry through a variety of economic development programs that include the Nanomanufacturing Innovation Consortium (NIC), the Nanobio Launchpad and their outreach to enable companies to locate on the Gateway campuses. JSNN and Gateway also have an extensive mechanical testing and chemical analysis toolset that enables nanomaterials and nanochemistry research. The Piedmont Triad has several aerospace (e.g. Hondajet, Timco, VX aerospace), automotive (e.g. Volvo/Mack, Thomasbuilt) and textile (e.g. VF, ITG,

Glen Raven, AEC) firms that are expected to benefit from the instruments that JSNN uses for mechanical testing and chemical analysis associated with its research programs.

II. Economic Development Strategy Description

The strategy described in this proposal is a testing center that uses the "extra capacity" available on university-owned research equipment (during a start-up phase) and then acquires additional equipment and facilities as the testing center becomes successful. For the Greensboro area, materials testing would probably be the best fit since it would be expected to be useful for the aerospace, automotive and textile industries. As the testing entity grows, it is expected to create jobs directly (within the entity) and indirectly (in community and business organizations that work with the testing entity) as well as generate funds for the university. The goals of the proposed strategy also include attracting companies to the region and improving the cost-effectiveness of their materials testing.

Material testing is needed for quality control, certification and technology improvement and is often done through an outside group. This strategy is useful for large companies, providing an outside certification of materials e.g. the aircraft industry must test and certify their production materials in order to satisfy Federal Aviation Administration (FAA) requirements. It is also useful for medium size and small companies because it is less expensive to pay for a testing service than to hire the experts and purchase comprehensive equipment and infrastructure needed to self-perform the testing. A local testing service also produces more rapid feedback of results since engineering and production personnel must work closely with the testing service so that appropriate results are obtained.

Wichita, Kansas is an excellent example of how proximity to a testing facility has been an important factor in attracting companies to an area. The FAA requirement that all aerospace materials be tested has led to large queues at the three major testing facilities frequently used by the aerospace industry (The National Institute for Aviation Research (NIAR) at Wichita State University (WSU), and two commercial testing facilities, Intertek Corp. and Element Materials Technology). Although the large queues slow the qualification of materials used for aircraft manufacturing, 42 aircraft companies have established facilities in Wichita in order to be close to NIAR. The focus on aerospace testing has helped to increase the amount of aerospace research funding that comes to WSU and has enabled NIAR to employ approximately 300 people with five locations in and around Wichita. Also, NIAR’s annual operating budget has been in excess of $40 Million from 2008 through 2013. Creating a materials testing facility would not only help "hometown" entities such as HondaJet (HACI), Volvo and the many regional textile manufacturers, but it would attract entities to locate at least a portion of their corporations nearby in order to obtain more rapid feedback and qualification.

III. Proposed Project

The proposed project is to create a testing center utilizing the "extra capacity" available on university-owned research equipment. The proposal is intended to be a "how to" manual for creating a testing center that would meet the needs of most medium to large cities in the United States. The necessary components include a research university with a scientific/engineering toolset that has "extra capacity" i.e. its equipment is not used for large time periods during a 168 hour week such as during the night or on the weekends. In addition, the university must have a methodology to allow external users to access

the equipment/facilities. As the testing center becomes successful, it will acquire additional equipment and facilities, increasing the research capability for the university and the profitability for the testing center. The testing center personnel must develop a menu of tests that can be performed, establish a control system for samples to be tested, quality control procedures and establish relationships with the industries with which it will work. This testing center "blueprint" is expected to be useful for mechanical testing (aerospace, automotive and textiles), chemical testing (chemicals, materials, textiles, paper, general quality control), forensic testing (chemical, drug and DNA), environmental testing (effluent sampling, air quality and particulates) and medical testing.

For the Greensboro area, testing is needed by the aerospace, automotive and textile industries for their production materials. In order to demonstrate the utility of this proposal, JSNN and Gateway have established the Gateway Materials Test Center (GMTC) (www.gatewaymaterialstestcenter.com). GMTC is a program of JSNN administered by Gateway that will test aerospace, automotive and textile samples. Local testing is a critical component that is expected to help Greensboro's aerospace and advanced manufacturing clusters to grow. Also, GMTC works with the NC A&T SU and UNCG as well as the local community colleges to promote greater educational interest in advanced manufacturing in order to assist with the development of a sufficiently skilled workforce needed to attract other advanced manufacturing companies.

JSNN and Gateway already have the access model, facilities, equipment capability and knowledge base to carry out test operations. If this proposal is successful, the funding will be used to purchase additional equipment to expand the current capability of GMTC in order to get the business "off the ground". The project team has focused on operational details including control of customer samples, the development of a quality manual and creation of a projected budget.

As the testing entity grows, it is expected to create jobs directly (within the entity) and indirectly (in community and business organizations that work with the testing entity) as well as generate funds for the university. Direct job creation by GMTC is expected to be 300 by year five of operation with an indirect creation of approximately 750 jobs. Our job creation estimates are based on the results obtained by Wichita State University's NIAR. One of the reasons that JSNN and Gateway chose materials testing was the pent-up demand and therefore expectation for rapid growth. Other testing operations such as environmental or chemical analysis might grow more slowly. Also, by the third year of operation, GMTC is expected to expand with the construction of a testing center building on the Gateway South Campus. The projected number of construction jobs for two years is approximately 400. The GMTC is expected to create jobs and attract business to locate near the Gateway South Campus in Southeastern Greensboro.

IV. Measurement of Success

The most direct measurement of GMTC's success will be job growth in Greensboro. In addition to the job creation described above (300 jobs directly created by GMTC in the first 5 years of operation), longer term (beyond 5 years), it is expected to continue steady growth as GMTC branches out into other testing fields such as wind energy, battery technology, environmental and other industrial applications.

A second measure of success will be Greensboro's ability to attract and retain additional advanced manufacturing companies and for those companies to continue to expand their product lines. GMTC will play a small but essential part in this effort and will help build the skill level of Greensboro's workforce that will be is needed by manufacturers. GMTC will also work collaboratively with the city's economic developers as well as entities such as the airport to build readiness for an opportunity to attract high tech manufacturers

Also, a measure of GMTC's success for JSNN / Gateway will be the "profit" from the enterprise that will then be "ploughed back" into JSNN's education and research as well as Gateway's campus in Southeastern Greensboro. The goal is to have a sufficient revenue stream to begin a GMTC building in Year 3. Although GMTC's direct effects will be felt in Greensboro, if the efforts to attract large aerospace, automotive and other manufacturers are successful, the effects will be felt city-wide and state-wide. The successful attraction of a single company the size of HondaJet could generate in excess of 1500 jobs.

V. Summary

This proposal provides a "how to" manual to establish a testing center utilizing the assets of a research university as a method to assist local industry and stimulate a city's economy. In order to demonstrate this methodology and assist in Greensboro's economic development, JSNN and Gateway have established the Gateway Materials Test Center at Gateway's South Campus in Greensboro. A complete description of the process to form a testing center and the establishment details regarding GMTC are contained in Section 2 of this proposal.

The GMTC embodiment of the testing center proposal is expected to directly create 300 jobs and indirectly create 750 jobs in its first five years of operation as well as 400 construction jobs to build a new testing facility.