

## **AC 2007-1577: MARKETING MANUFACTURING USING THE NSF FUNDED REGIONAL CENTER FOR NEXT GENERATION MANUFACTURING**

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**MARKETING MANUFACTURING  
USING CONNECTICUT'S COMMUNITY COLLEGES'  
COLLEGE OF TECHNOLOGY'S  
REGIONAL CENTER FOR NEXT GENERATION  
MANUFACTURING:  
A National Science Foundation Funded Initiative**

## **Abstract**

The Connecticut Community College's College of Technology with support from the National Science Foundation's Advanced Technology Education Grants (ATE #0402494) established a Regional Center for Next Generation Manufacturing (RCNGM). The RCNGM's goals and objectives included implementing a marketing campaign for careers in manufacturing. This paper will identify specific activities that the RCNGM Center co-sponsored with its academic, business and government partners as well as professional associations that addressed the marketing of careers in manufacturing as well as recruitment and retention strategies for under represented populations.

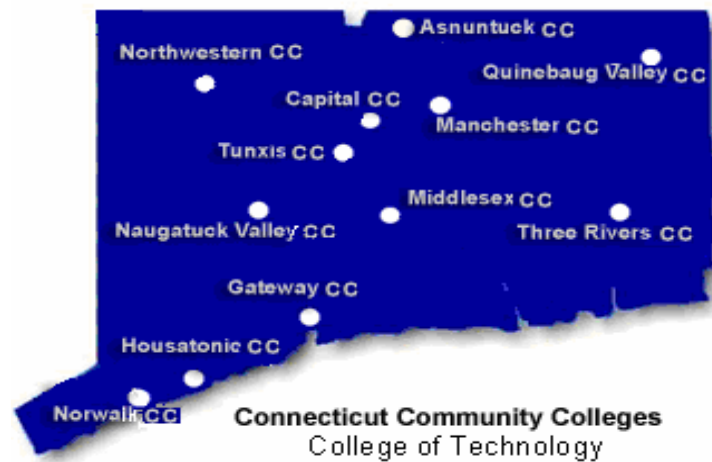
A highlight of this paper will be the state-wide Manufacture Your Future Symposium co-sponsored with the CT Business and Industry Association in May 16-17<sup>th</sup>, 2006. Over 3500 high school students attended the symposium that included school districts from throughout CT. The symposium featured a next generation manufacturing company with 10 pods demonstrating manufacturing processes beginning with the design of a manufactured key chain using CAD to the actual engraving of the part with a laser. Two additional breakout areas were part of the symposium and included a section on higher education that showcased 18 higher education organizations and several educational initiatives. A second section hosted 20 manufacturing company exhibits where students observed a variety of manufacturing products made in CT and also received numerous free samples. Finally, there was an exterior lobby entry where a number of engaging demonstrations were held including a moving robot; a submarine from Electric Boat; guitars from Kamatics and a space launch rocket. Cash donations from industry, government, educational and professional organizations totaled over \$175,000. In addition, in-kind donations surpassed \$250,000 and included time donated by a rigger company to transport the manufacturing equipment from the participating manufacturing companies to the CT Convention Center.

The symposium had an extensive pre and post evaluation plan that was completed by over 1800 students and their teachers. The results of these surveys will be presented and discussed as well as a suggested operational plan for adapting and implementing a similar event in another region or state.

**Introduction:** The **Connecticut College of Technology (COT)** is a virtual college that encompasses the entire state and includes the 12 community colleges that make up the public community college system, six private and public universities and secondary schools throughout Connecticut. (see Diagram 1) The COT was created by the State legislature, Public Law 95-04, with the objective of establishing a seamless pathway in engineering and technology between technical high schools, community colleges and Baccalaureate awarding colleges and universities. Although the COT always included all 12 public community colleges in Connecticut, only two (2) four-year colleges/universities, the School of Engineering at the University of CT and the School of Technology at Central Connecticut State University were

partners in the COT's initial design and implementation. The COT subsequently expanded to include four (4) for a total of six (6) receiving colleges/universities. These additional four partners include the Schools of Engineering at the University of Hartford, Fairfield University, the University of New Haven and Charter Oak State College.

**Diagram 1: Map of Connecticut's Community Colleges' College of Technology Locations**



The COT is now in its 10th year of operation and is administered by a state director who reports to the Chief Academic Officer of the Community College System. All of the partner institutions have Site Coordinators, which include the twelve community college campuses, who participate in a statewide COT site coordinators council. The council meets monthly to discuss/act upon such topics as student recruitment, retention, outreach and overall program/curriculum enhancement.

The COT has two pathways, one in engineering and a second one in technology including technology education for K-12 teachers. The students can complete credit certificates as well as two-year Associate Degrees that articulate seamlessly with the schools of engineering and technology in six universities and colleges. Our stakeholders, administrators, directors, technology faculty members, and site coordinators can quickly respond to the changing needs of local industry by creating, approving and implementing new, industry-driven curriculum within a matter of months.

The COT has received several National Science Foundation Advanced Technology Education (ATE) grants that have developed innovative curriculum, provided faculty development including industry externships and provided student scholarships through the NSF CSEMS scholarship initiative. In addition, COT stakeholders have fostered a close working relationship with government agencies such as the Office of Workforce Development, the Department of Economic Development; professional associations such as the Society of Manufacturing; military and defense organizations including the Connecticut Center for Advanced Technology and its' National Air Force Leadership Institute. In addition, the COT has partnered with the CT Business and Industry Association on several grants and most recently was successful in receiving a National Science Foundation grant to establish a Regional Center for Next Generation Manufacturing.

The **Connecticut Business and Industry Association (CBIA)**, the largest statewide business association in Connecticut and one of the largest in the country and its Education Foundation has been a partner of the College of Technology for over 10 years, participating in numerous initiatives including several NSF grant proposals. Together with the COT and the RCNGM, numerous outreach programs in collaboration with Connecticut's manufacturing industries have been implemented.

In 2004, the Connecticut's Community Colleges College of Technology (COT) was the recipient of a National Science Foundation funded Advanced Technology Education Regional Center, called the **Regional Center for Next Generation Manufacturing, (COT-RCNGM)**. CBIA serves as the statewide business and industry partner for the Regional Center on Next Generation Manufacturing under the College of Technology (COT) in Connecticut's community colleges. The goals and objectives of the COT-RCNGM include developing new programs and curriculum in next generation manufacturing; providing faculty professional development; recruiting and retaining a diverse population of students; developing online, hybrid delivery of technology and engineering education; and establishing longitudinal studies to evaluate work place needs and satisfaction with graduates from Connecticut's educational institutions. In addition, the COT-RCNGM in collaboration with CBIA, was responsible for developing and implementing an aggressive marketing campaign that targeted high school students and young adults with the objective of recruiting them for careers in manufacturing.

This paper will focus on the marketing campaign that has been successfully implemented. In particular, this paper will provide a detailed analysis of a statewide, three day, "Manufacture Your Future Symposium" that involved manufacturing associations, government agencies, higher education institutions including the COT partners; outreach initiatives; industry and over 3500 high school and middle school students and their teachers.

**Rationale and Background:** There is a significant need for highly skilled people to support Connecticut's growing manufacturing workforce which includes aerospace, biomedical and engineering based companies. New technologies and new products require very different skill sets than those expected of manufacturing employees in the past. Schools and colleges must address these changing skill requirements and work more collaboratively with local businesses in order to produce a new generation of manufacturing workers. The 2005 "Labor Day Report" of the National Association of Manufacturers (NAM) warns of a "looming skills shortage in manufacturing" as low skill jobs go overseas and high performing workplaces necessitate manufacturing employees who are competitive in the global economy<sup>1</sup>. Jobs requiring strong math, science and technical skills to support high end, precision products are the only manufacturing jobs that will continue to grow in Connecticut. There are currently 5,280 manufacturing businesses in the state, employing 14 percent of the private sector workforce. Connecticut ranks 20th in the nation in production and exported \$8.6 billion in manufactured goods in 2004<sup>2</sup>. In 2004 CBIA conducted a "Survey of Current and Future Manufacturing Jobs in Connecticut" for the NGM Center. Manufacturers identified tool and die makers, CNC programmers and technicians, engineers, and CAD/CAM workers as "extremely difficult" to fill positions. Forty-one percent of respondents cited entry-level production workers as "very" or "somewhat" difficult to fill. Only 9% of companies indicated that they intend to eliminate positions over the next five years<sup>3</sup>.

A 2005 survey of all Connecticut businesses conducted by CBIA similarly reported that the most difficult to fill positions in the entire state are skilled machinists and other manufacturing jobs.<sup>4</sup> Thus, despite a net loss of manufacturing jobs over the last decade, many high skill, high wage jobs continue to go unfilled, offering tremendous opportunities for those with the requisite academic and employability skills. Productivity has increased, due to the implementation of new technologies and lean manufacturing techniques, but the need for skilled workers remains as companies have re-tooled themselves for new business opportunities.

Manufacturers in Connecticut and throughout the country are expressing great concern that they will not have an adequate supply of young people interested and able to step into their advanced manufacturing workplaces. This is due largely to looming retirements of aging manufacturing workers, a decline in the number of manufacturing training programs and thus a smaller number of graduates<sup>5</sup>. An October, 2005 Connecticut Department of Labor report recently presented to the Connecticut Employment and Training Commission (CETC), states that there are 677 current openings for machine tool/technicians with only 107 enrolled students in high school and community college programs<sup>6</sup>. At the CETC meeting, the Director of the Aerospace Cluster indicated that the demand is actually much higher just in his industry alone. Although hiring patterns with their ups and downs are cyclical, there is clearly a growing shortage of highly trained young people able to meet industry requirements for entry-level jobs in manufacturing.

Meeting the need for a 21st Century manufacturing workforce will require new programs and strategies to attract young people, particularly underrepresented minorities and females into manufacturing programs. The economic imperative spelled out by Thomas Friedman in *The World is Flat*, citing the thousands of science and engineering graduates being produced annually in India and China must be addressed if America is to remain an economic powerhouse<sup>7</sup>. Educators, students and their parents must begin to understand what is at stake here and the opportunities open to young people if they can master the skills needed in advanced manufacturing. The burgeoning skills shortage and on-going mismatch of students to career opportunities must be addressed by educators in partnership with employers, to attract and prepare skilled graduates, who will be competitive in a global marketplace. Even among students who are well prepared, relatively few students choose manufacturing majors.

The Regional Center on Next Generation Manufacturing, in partnership with CBIA, has begun addressing the negative perceptions about manufacturing through a statewide careers campaign, that includes radio, TV and internet based ads and an annual career symposium. Manufacturers are ready to inform and recruit students, but must also convince parents, academic teachers and guidance counselors that high skill, high wage opportunities are available in their companies. CBIA, working with regional and local manufacturing associations, such as the New Haven Manufacturers Association (NHMA), can provide this interface with the schools, using local resources and those developed under CBIA's State Scholars Program and the marketing campaign for the COT-RCNGM Center. The project partners believe that the infrastructure and commitment is now in place to strengthen the performance of under-represented minority and female students and engage them in new manufacturing pathways, leading to technical programs in the community colleges.

Connecticut manufacturers have legitimate concerns about how they are going to meet the demands of a highly competitive global marketplace. Not only is their workforce aging, but they aren't getting enough young people entering manufacturing careers. Negative stereotypes of dead-ended careers in unclean, repetitive environments still remain. Exacerbating the problem is that today's manufacturers are working in a fast-paced, sophisticated technological environment, requiring workers to be not only adaptable but capable of mastering many different functions. In short, not only are many young adults entering the workforce unaware of opportunities in manufacturing, but many of them haven't developed the necessary analytical, technology, math and science skills needed to succeed in today's manufacturing.

The urgency of these concerns catalyzed the implementation of a careers in manufacturing campaign that was part of the COT-RCNGM and its major industry partner, CBIA. As part of this campaign, CBIA was subcontracted by the COT-RCNGM to assist in the creation of the Manufacture Your Future DVD. This DVD focused on the College of Technology; the seamless pathway between CT Community Colleges and partner 4-year colleges/universities; the COT RCNGM; and careers that are available in manufacturing within Connecticut. It also profiled 5 Connecticut individuals with careers in advanced manufacturing. These individuals were filmed at their places of employment which included TRUMPF, Inc; Becton Dickinson and Company (BD Medical-Medical Surgical Systems); Otis Elevator; Pratt and Whitney/ United Technologies; and Product and Moore Tool Company. The DVD also included interviews with industry CEOs; the Community College Chancellor; deans; faculty and students from the CT Community Colleges and COT 4-year partner institutions. The DVD was designed in 5 to 8 minute sections. This allowed educators the flexibility to view particular segment(s) without having to watch the entire DVD. The DVD was distributed statewide and nationally and was video streamed on the COT RCNGM website ([www.nextgenmfg.org](http://www.nextgenmfg.org))

Another statewide initiative was an ad that highlighted a Hispanic, female COT Engineering Technology alumna from Norwalk CC who completed her A.S. degree in Engineering Science, two B.S. degrees in Mechanical Engineering from the University of Hartford and is continuing her education in a PhD program at Rutgers University. The ad not only promoted the College of Technology and its pathway programs but was written in both English and Spanish. It was distributed statewide in newspapers and publications that specifically targeted Connecticut's underrepresented populations

Additional marketing campaign activities included an analysis of TV and radio stations that attracted a younger audience. These TV and radio stations were then used to air a Manufacturing ad that is also on the DVD and radio clips highlighting high-paying manufacturing careers. Representatives from CBIA and the COT-RCNGM also participated in TV and radio interviews. Newspaper articles highlighting CBIA and the COT-RCNGM activities on manufacturing careers were published throughout the State. In addition, an aggressive online marketing campaign was also implemented, including the establishment of the COT-RCNGM website, ([www.nextgenmfg.org](http://www.nextgenmfg.org)), as well as the production and implementation of pop-up ads on commercial websites including monster.com and careerbuilder.com.

CBIA and the COT-RCNGM were supporters of a very successful regional symposium on manufacturing that was held in Waterbury, CT in the Spring of 2005. This event was organized

by the Waterbury Chamber of Commerce, along with the Small Manufacturers' Association (SMA). The expo brought area middle-school and high school students to a simulated factory floor where they viewed manufacturing "pods". These series of pods provided the participants with an understanding of what manufacturers do to produce a product. The program was supported by local manufacturers and businesses throughout the Waterbury area. CBIA and the COT-RCNGM also provided financial support for this event.

Subsequently, the SMA approached CBIA and the NSF funded COT RCNGM, in the summer of 2005 and proposed that an expanded version of the Waterbury event be held statewide. Because of the enormity and complexity of this proposal, the key to the success would be the collaboration of other manufacturers and educational institutions. The partnership between CBIA with the RCNGM was a significant foundation to build a statewide outreach initiative with and had the capacity to spearhead the expansion of the Waterbury pilot from a regional focus to a statewide program. Therefore, the idea of a statewide careers expo would provide momentum to the existing campaign. With the support and leadership of several manufacturing associations, manufacturers and the COT-RCNGM, CBIA formed a Planning Steering Committee to determine the feasibility of putting on this statewide manufacturing careers event.

After several meetings, the Steering Committee decided that the most cost effective and efficient way to make the greatest impact would be to produce a statewide event in a central location. The "Manufacture Your Future: Careers Expo" was subsequently offered to 3,500 middle school and high school students May 17-18, 2006 at the Connecticut Convention Center in Hartford, CT. The students were scheduled in the morning, while the expo was open to college students and adults in the afternoon. Additional events included a Next Generation Manufacturing conference for industry leaders and COT-RCNGM faculty workshops highlighting next generation manufacturing practices.

**Expo Overview :** The challenges were how to produce an event of this magnitude that was fun and educational for young people, and how to logistically make the event run smoothly and successfully. To address these issues, the following subcommittees were formed: (1) Fundraising; (2) Pod Committee; (3) Exhibitors; (4) School Outreach; (5) Higher Education; (6) Outreach; (7) Marketing; (8) Convention Center Logistics; and (9) Faculty Workshops.

The expo was designed to highlight nine manufacturing pods representing the major processes of manufacturing. (A tenth pod would concentrate on careers.) Those pods were (consecutively): CAD/CAM Design; CNC Programming and Machining; Tooling; Metals & Coil Slitting; Stamping; Wire & Spring; Plastic Injection Molding; Finishing & Plating; Assembly & Lasers and Careers. Participating manufacturers volunteered their time and equipment in setting up and demonstrating the pods with logistical help from Industrial Riggers, who also volunteered their expertise and rigging equipment to move the equipment into the Convention Center. Powerstation, the events management group that successfully ran the Waterbury model, provided a "kid friendly" atmosphere along with disc jockeys stationed at each pod to explain what each process was all about. The company also provided overall logistical support at the Convention Center with assistance from CBIA's conference coordinator.

Before entering the exhibit hall, students viewed Connecticut products that they could relate to, such as a Hamilton-Sundstrand robot and space suit, a rocket model from the Connecticut Center for Advanced Technology (CCAT), a model of a submarine from Electric Boat, a guitar made by Palm Guitar and (once inside the exhibit hall) a genuine Hummer car. Groups of approximately 100 students at a time first enter a darkened tunnel with flashing lights and techno music, and then moved on to a waiting area to view a portion of the Manufacture Your Future DVD. They then proceeded to each pod, stopping no longer than 10 minutes at each pod, where a DJ gave them an overview of the manufacturing process and how it related to the making of a product.

Once students moved through the pods, they entered an area where college representatives, primarily from two-year community colleges and four-year engineering schools, gave them information on their manufacturing career programs. This area was followed by exhibitor booths with 20 different industries represented. These companies had booths where they demonstrated their products, gave out free samples of their products ( all of which were manufactured in Connecticut) and explained to the participants how their Connecticut-made products contributed to Connecticut’s economy. Students from the Connecticut Technical High Schools also had a booth as part of the exhibitor section and demonstrated to their peers the use of CAM to manufacture a product and modern machining. Throughout their journey through the pods, reference was made to a key and key chain and how particular manufacturing processes had a hand in producing them. Students exiting the exhibit hall each received a key and key chain made by the companies sponsoring the pods.

**Expo Logistics:** Before moving forward, commitments from manufacturers who would donate their equipment to the event had to be coordinated. The Pod Committee planned the sequence of the manufacturing pods so that the evolution of a product could be best understood.

Commitments from the following companies were obtained:

Pod Process	Company
Computer-aided Design	Schwerdtle Stamp Company
Tooling	Schwerdtle Stamp Company, Robert Morris
Stamping	G & R Manufacturing/Demsey Bead Industry
Metals	Atlantic Steel/Erikson Metals/Yarde/Ulbrich
Wire/ Spring	CT Spring & Stamping/Acme-Monoco
Plastics	Hawk Plastics/Westminster Plastics
Finishing	Quality Rolling & Deburring/Donham Craft
Lasers/Assembly	Trumpf/Hobson & Motzer

In addition to providing the necessary equipment, each company provided technicians and engineers from their respective companies who assisted with the presentations at their pod. In addition, the sponsoring company also solicited participation from other manufacturing companies, so that in as much one company was the champion of their “pod”, all of the pods have several manufacturing companies involved in the operation of the process it was demonstrating.

**Fundraising:** The initial step in moving the event forward was funding, as it was evident that in order to produce the event, financial sponsorship would be critical. Estimates of the total cost to successfully mount the expo were approximately \$150,000 - \$175,000. A fundraising campaign

ensued which gave manufacturers the opportunity to become a specific level sponsor with the COT-RCNGM providing the initial seed money. In addition, manufacturers and individuals had the opportunity to sponsor bus transportation for their local school with a \$300 donation. Two solicitation letters were sent – one requesting larger donations and one specifically requesting donations for bus transportation support. Through targeted solicitation letters and follow-up phone and in-person presentations, \$78,900 in private funds were raised from industry, private donors, and professional associations and an additional \$103,000 in state and grant funds for a total of \$181,900 (cash). This does not represent in-kind donations which included industry and stakeholder representatives' time as part of the planning committees and at the Expo; in-kind contributions from the COT-RCNGM educational institutions; and significant in-kind contributions from the staff and administration from CBIA who administered the Expo. It was conservatively estimated by CBIA that their in-kind contribution alone well exceeded \$40,000.

**Marketing and School Outreach:** While fundraising was taking place, marketing outreach began. A logo and letterhead branding the event was created, along with a promotional flyer and letters directed to schools which were sent February 1, 2006. The first letter, signed by Connecticut Department of Education's Commissioner, was sent to superintendents, followed by another letter to middle school and high school principals signed jointly by the CBIA's Vice President of the Education Foundation and the Executive Director of the CT College of Technology's Regional Center for Next Generation Manufacturing. Within a few days of the receipt of the letter to the school principals, the schools began responding enthusiastically and positively. The response was so overwhelming, that two weeks before the submission deadline of March 31<sup>st</sup>, the Expo's student quota of 3,500 had been filled. (Every effort was made to accommodate the overflow by allowing schools to attend the Expo after the scheduled hours in the morning.) A brochure and letter was also distributed to the community colleges and through the Capital Community Workforce Board targeting out-of-work and career-changing adults.

**Transportation:** Key to the success of the Expo was transporting the students to and from the Convention Center. DATTCO, a statewide bus company in CT, was contracted to provide transportation for Connecticut's public schools throughout the State for schools who were unable to provide their own transportation. Buses were scheduled to arrive at 10-minute increments in order to accommodate the large numbers of students attending the expo.

**Online Dissemination of the Event:** In order to provide up-to-date information on the Expo to students, educators and potential industry sponsors, the COT-RCNGM website dedicated specific web pages to the event on its website, [www.nextgenmfg.org](http://www.nextgenmfg.org). Sponsoring manufacturers also had the opportunity to have their logo displayed on these web pages. These same logos were displayed on banners at the entrance to the Exhibit Hall. The activity on the website was monitored and an analysis of the website hits is discussed later in this paper.

**Volunteer Coordination:** Because of the large number of students anticipated, keeping the flow of traffic steady and organized became a critical consideration. Volunteers played an important role in manning strategic areas of the Convention Center, including: the bus drop off and pick up areas, entrance to the pods, moving throughout the pods and displays, and announcing when it was time for a school to leave the hall. Volunteers were given an orientation the morning of the event, along with exhibition hall information, specific assignments and walkie talkies for key

volunteers. Some volunteers were assigned “floater” roles while one person remained in the volunteer center to circumvent problems as they arose. To help volunteers identify what schools were entering the hall, students were given color wrist bands for their specific schools along with an Expo “goodie” bag, which was handed to them as they got off the bus. Volunteers wore Manufacture Your Future t-shirts so that they could be identified as resources for anyone attending the expo.

**Appreciation Reception:** The collaboration among organizations and the volunteerism of the individuals involved in this event was so remarkable that the Steering Committee determined an appreciation reception was warranted. Invitations were sent to 400 for a reception held the last day of the Expo.

**Educational Exhibits:** The last pod was the Career/ Educational pod where the COT RCNGM was showcased with two (2), ten-foot booths that distributed career pathway information, DVDs and a prize wheel that allowed the participants to win prizes donated by community colleges and industry. Nine community colleges, five partner 4-yr colleges/universities and 4 additional educational institutions/organizations also had exhibits in the career/ educational pods. In addition, the COT RCNGM name and logo was prominently represented throughout the convention center as a major sponsor; tote bags, handouts, and engraved keys with our RCNGM logo and web address were also distributed to every student, educator, and guidance counselor that attended this event.

**Expo Assessment:** The careful planning and collaboration that took place prior to the event, in the long run, paid off. The Expo took place as designed, and by all accounts all events scheduled for both days ran smoothly and without any major setbacks.

Getting the equipment into the Convention Center took two full days before the event began. Working with Industrial Riggers and the Convention staff, the pod champions set up their equipment without major incidents other than some minor complications involving Convention Center regulations. But for the most part, there were no serious consequences. Students were actively engaged with what the DJ’s were saying. The students were particularly interested in the “eye candy,” such as the robot that greeted them before they entered the hall, and the Hummer in one of the pods, which was a big hit for many of the students. The college and manufacturing exhibitors also actively interacted with the students, many of whom were interested in finding out about college programs that offered manufacturing career paths.

A momentous moment for students was the visit by Governor Jodi Rell, who decided to view the exhibits prior to giving a keynote address at the Next Generation Manufacturing Conference. Having the governor endorse the Expo underlined the importance of the message that the Expo was trying to convey – that skilled manufacturers are needed in Connecticut, and that young people need to be made aware of the opportunities to be found in manufacturing.

**Expo Ancillary Activities: *Next Generation Manufacturing Conference:*** During the afternoon of the first day of the Expo, The Next Generation Manufacturing Conference sponsored by CBIA and the COT-RCNGM was attended by business leaders, legislators and educators at the Convention Center. Following on the success of last year’s conference, this year’s conference

was entitled “Sustaining Productivity Improvement.” In addition to the keynote speech from Governor Rell, other speakers included: Paul Fox, Director of Global External Relations at Gillette and Darryl Fournier from Ahlstrom FiberComposites. In addition to a panel on “How to sustain productivity improvement”, the Executive Director of the COT-RCNGM was a presenter on the panel that discussed the role of higher education in preparing the next generation workforce in Manufacturing.

**Faculty Workshops:** The second morning of the Expo offered high school and community college faculty the opportunity to hear panel experts talk about lean manufacturing and green technologies. Industry experts from UTC Power, BVH Integrated Services and Naugatuck Valley Community College discussed the advancement and influence of green technologies in industry, while experts from Wiremold, the Connecticut Center for Advanced Technology (CCAT), Davis Learning Resources and Central Connecticut State University talked about the value of lean manufacturing and how it is changing how workers work in the workplace.

In addition, the accomplishments of the COT-RCNGM by faculty, consultants and program managers from the partner institutions which included community colleges, universities and outreach initiatives were disseminated to the group. The participants also viewed segments of the new Manufacture Your Future DVD. Approximately 40 high school and community college educators attended the sessions.

**Expo Pre and Post Survey Evaluation:** As part of the required evaluation plan, the COT-RCNGM and CBIA mailed a package of pre-expo materials to the registered school coordinators which consisted of a manufacturing quiz, a single fact sheet on Connecticut manufacturing, and information on manufacturing careers and salaries. Also in the package were important pre and post data surveys. Students and teachers had the option of filling these surveys out and mailing them or completing them online. The surveys provided important data before and after the event used in analyzing the effect of the expo on students and educators.

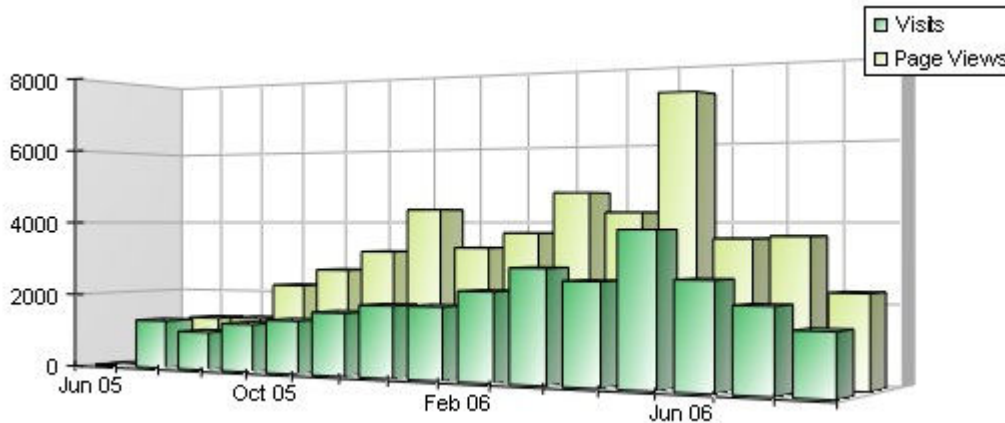
More than 1,831 pre-surveys and 1,118 post surveys were returned, representing approximately a 35-60% rate of return (the norm is 10%). Overall, the marks were very high across the board, and positive correlations could be made between pre and post data perceptions. For instance, among Manchester High School students, prior to the expo, only 10% strongly agreed that there were many career opportunities in manufacturing. Post survey data indicated that nearly 60% of the same students strongly agreed that there were, indeed, many opportunities in manufacturing.

COT-RCNGM has also been monitoring the website to determine the effect the symposium had on website visits. The website dedicated several sections to the promotion of the Manufacture Your Future: Career Expo.

The Graph below tracks the COT-RCNGM website activity from June '05 – August '06.  
**COLLEGE OF TECHNOLOGY REGIONAL CENTER FOR NEXT GENERATION  
 MANUFACTURING WEBSITE ACTIVITY**

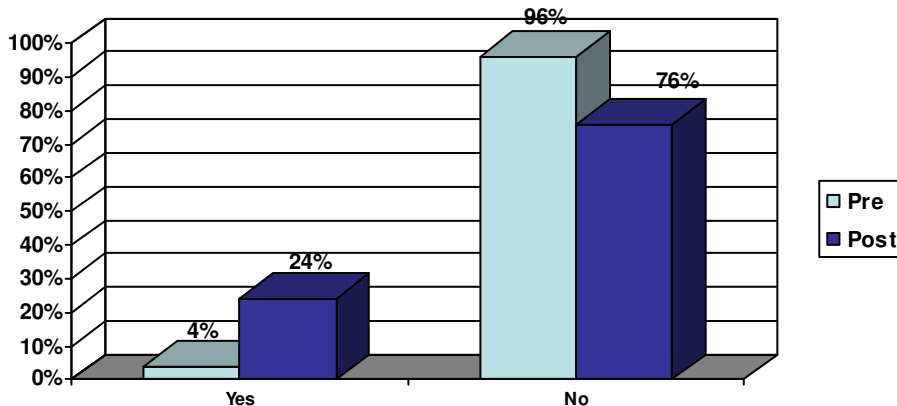
[www.nextgenmfg.org](http://www.nextgenmfg.org)

Page Views vs. Visits from Jun '05- Aug '06



There is a significant increase in the activity on the COT-RCNGM website during the month preceding (April) and the month of the Manufacture Your Future: Career Expo. In particular, the 57% increase in the number of website visits from April '06 to May '06 and the significant spike in visits and in page views in May '06, the same month as the Manufacture Your Future: Career Expo indicates a correlation between the Expo and the marketing of the event. This is further supported by the pre and post event surveys that were conducted as observed below:

**Student Responses: DID YOU VISIT THE REGIONAL CENTER FOR NEXT GENERATION MANUFACTURING WEB-SITE?**



As you can see, there is an increase from 4% to 24% of respondents that viewed the COT-RCNGM website after the expo. It can be concluded that an increase in visits is due to the Expo.

This further corroborates the conclusions that the activity on the website significantly increased due to the marketing campaign, in particular the marketing and participation in the Manufacture Your Future: Career Expo.

**Survey Data:** The Expo by all accounts was hugely successful for everyone who participated. However, the key to acknowledging the true success of an event such as this is assessing the impressions of those who participated before and after attending the event. The following questions were asked in both the pre and post surveys that were completed by teachers and their students:

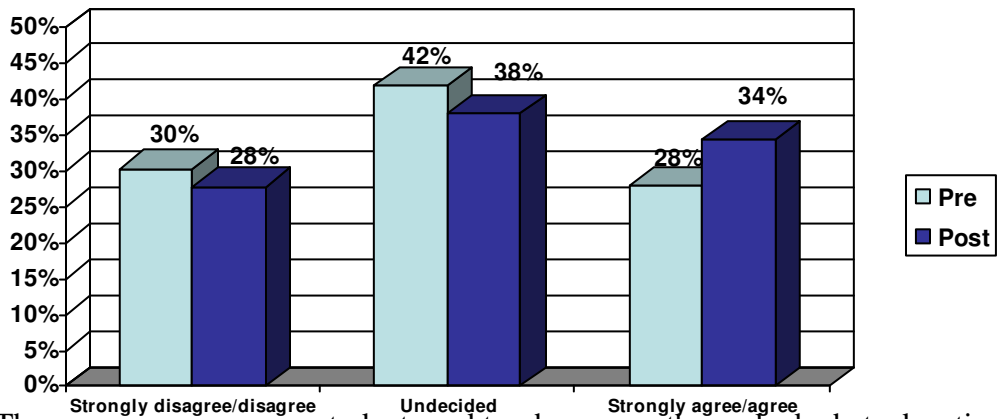
- I am aware of the different careers in manufacturing.
- I believe there are many career opportunities in manufacturing.
- I believe you can earn high wages in manufacturing.
- I believe that manufacturing work spaces are clean.
- I would like to work in manufacturing some day.
- I believe that in order to be successful in manufacturing, you need education after high school.

It can be concluded that one of the major objective’s of the Manufacture Your Future: Career Expo which was to *change* the perception that manufacturing is not alive in Connecticut and that there are no career paths for students was accomplished.

The students’ responses reported a significant increase from only 37% reporting in the pre-expo surveys that they believed that manufacturing work spaces are clean, to 59% reporting that they believed that manufacturing work spaces are clean, an increase of 29%. Although the teachers responses reported a smaller increase between the pre and post surveys, from 79% to 85%, there were only a small percentage who reported both in the pre and post survey that they did not think manufacturing work spaces were clean.

For the question, I WOULD LIKE TO WORK IN A MANUFACTURING CAREER SOME DAY., the following student responses were reported:

**Student Responses**



The students and teachers were then asked what educational level they felt was necessary to pursue a career in manufacturing. There is a 10% increase in students that felt

it was necessary to go to a community college from the pre to the post survey. It's positive to see a high percentage of students feel higher education is important, whether it's a 4-year degree or an associate degree. Of those teachers surveyed, many felt that community colleges and a 4-year education would be beneficial to students. Again this is positive, as these professionals are potentially the individuals guiding their students and offering career/ education advice.

It should be noted that in reviewing the data, the expectation that the technical high school marks would be higher than the comprehensive high school responses did not seem to correlate. Rather, many comprehensive high schools expressed a genuine interest in pursuing manufacturing careers, while some technical high school students were either undecided or clearly opposed to working in manufacturing. In moving forward, student outreach to all high schools, including those schools that may not be focusing on manufacturing learning, should be considered.

In the open ended comments, the students reported that what they liked the most about the Expo were the pod displays and the explanations of how products were made (52%). A fair number also liked the free giveaways (25%) while others cited the college booths (7%) as being their favorite events. What students disliked the most were the loud music and standing for too long (52%) and the crowds.

**Conclusions:** A debriefing of all the key stakeholders was held approximately one month after the Expo was concluded. Team members concluded at this meeting that the most outstanding accomplishment of this event was the collaboration among all those who supported it – whether indirectly through financial support, or whether directly through volunteered time and effort. The collaborating partners truly demonstrated what can be accomplished when everyone participated as part of the team and left agendas behind. Everyone concurred that the Expo accomplished its objectives of increasing the awareness of students and their teachers that Manufacturing in CT is alive and well and provides a career pathway for students that pays well, is in a clean environment and uses skills that often require higher education certificates and degrees. These conclusions were further substantiated by the quantitative data collected in the pre and post surveys.

Overall, the team felt the Expo had been successful and had more than met their expectations. However, it was determined that if the Expo was to be repeated, consideration needed to be given to the huge amount of time and resources required to put on this event. Timing of the event would also be an important consideration.

The numerous activities of the COT-RCNGM in partnership with CBIA are demonstrating an impact on the number of students enrolling in manufacturing and related engineering and technology programs. Preliminary data collected for the Fall 2006 enrollments report that the marketing efforts of the COT-RCNGM in collaboration with CBIA marketing campaign have been successful. For example, enrollments at one of the COT-RCNGM lead community colleges, reported an increase in enrollments in their Freshmen Engineering class from 40 in the Fall of 2001 to 142 in the Fall of 2006, an increase of 66%. Other sister community colleges have developed and implemented new courses and programs and are also reporting healthy enrollments. A new, Fall 2006, online course in plastics was full with 22 students. Similarly,

outreach programs to feeder high schools were oversubscribed for the Fall of 2006 and several high school programs were expanded.

During both the Fall and Winter of 2006-07, both CBIA and the COT-RCNGM have received numerous inquiries from students and their teachers regarding another Manufacture Your Future Expo. Due to the huge time commitment and resources necessary to make this event a success, the collaborating partners have agreed to organize the second, biennial Manufacture Your Future: Career Expo in the Spring of 2008. The COT-RCNGM and CBIA are confident that the successes of the marketing campaign are having a significant impact on manufacturing in both CT and the region. Without a doubt, the funding provided by the National Science Foundation to establish the Regional Center for Next Generation Manufacturing provided the catalyst necessary to create a model that includes educational, industry, government and other stakeholders who collaboratively are successfully addressing and meeting the needs of manufacturing not only in New England but throughout the U.S.

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