Contents

Foreward ................................................................................................................................. 3
Mission, Vision & Goals ........................................................................................................... 8
An Introduction to Weld-Ed ................................................................................................. 11
Partner Profiles ..................................................................................................................... 14
Outreach & Recruitment ....................................................................................................... 36
New Labs ............................................................................................................................... 42
Industry Partners ................................................................................................................ 46
Professional Development ................................................................................................... 54
Products & Dissemination .................................................................................................. 61
The Future of Weld-Ed ......................................................................................................... 64
Contacts ............................................................................................................................... 66
Foreword

Why Welding? Why Now?

BY ERNEST LEVERT
There is a myth and reality that we face every day in that welding is not considered a high technology industry. Well, I am here to say, this is a myth. The reality is welding is becoming increasingly more high tech, with more automation being infused in welding today. Welding automation processes and applications are being integrated frequently and there is no sign that it will slow down anytime soon. The welding industry is continuing to increase welding productivity and welding technicians are in demand.

Weld-Ed Mission strives to improve the quality of education and training services to address the hiring and professional development needs of the welding industry.

Lockheed Martin Missiles and Fire Control is one of the industry partners supporting the Weld-Ed Center. Weld-Ed is a national partnership of colleges, universities, professional societies, government, and private industry committed to increasing the number and quality of welding and materials joining technicians to meet industry demand. Lockheed Martin is a leader in the use of high technology welding and materials joining processes. We wanted young people to see their own futures in engineering and manufacturing, especially where math, science, and higher technical skills are concerned. I like to use the term we are all welding professionals from the welder, welding technician, welding engineer, welding business owner to the professors. All of us must take a part in preparing the next generation of welding professionals by discussing welding opportunities and challenges within our companies and industries. If we do not address these issues, there will remain a shortage of qualified welding personnel. The next generation really does depend upon each of us.

Welding professionals need to know more than just how to weld; they need to know about chemistry, metallurgy, materials science, physics, mathematics, codes and standards, and various inspection techniques. The knowledge in these areas can come from either training or through on-the-job experience. Depending on the amount of education and experience in the field, individuals have virtually an unlimited income potential. Careers in welding include the following: welder, welding technician, welding engineer, welding inspector (certified), welding educator (certified), welding sales representative, instructor, and college / university professor. The more education a person has (formal degree, continuing education, or certificate program) the more valuable they are to an employer. Employers need individuals who not only know how to weld but also those who have skills in areas such as mathematics, design, problem solving, troubleshooting, materials science, interpersonal relationships, business, etc. Individuals with these skills are very valuable to companies and tend to excel in the industry. In today’s world, an individual has the ability to control their own destiny. However, almost every welder wants to move into a position of higher responsibility. Given the right attitude, education, skills and ability, a person will have the opportunity to move up in the organization at some point in time. These positions bring more opportunities for recognition and financial reward.

Industry Expectations are follows: Knowledge of Equipment and Technologies, Knowledge of Tools to Improve Producibility (Lean & Sigma), Knowledge of Codes and Standards, Understand Welding Procedure Specifications (WPS), Ability to set up and Run
Automated Equipment, Technical Report Writing, Programming Capabilities, Computer Skills, Trouble Shooting Skills, Basic Metallurgy, and Exposure to Welding Processes. We also want individuals with Employability Skills: be on time, Meet Schedules, Complete Tasks, Management Skills, Communication Skills, Dress, and Hygiene.

However, the general public and industry as a whole are virtually unaware of the role welding plays in the world today. They do not know of the value it adds to products that make life easier, protect our nation, and explore outer space, or that it provides a wide range of well-paying career opportunities.

As we prepare for the new millennium, we must ask ourselves the question, “Where is the welding industry headed?” I believe the critical issues facing us in the 21st century are globalization and training. During these next years, we’ll certainly see increased use of international welding standards and more jobs going to welding fabricators from countries outside of the United States. Our world will continue to shrink as computer networks link us together. We can assume that in the 21st century continued widespread use of welding technology and ever-increasing global competition will create new challenges for employers and welding professionals. In the next century, welding professionals will need to be better educated to fill new job categories and be more flexible so they can respond to the changing knowledge and skill requirements of existing jobs. Meeting the challenge of employment and training will call not only for the best efforts of employers, educators and trainers, unions, welding professionals Weld-Ed, and the American Welding Society (AWS), but also for new forms of cooperation and collaboration between these groups.

First, we must prepare our youth of today for welding careers of tomorrow by participating in career day programs sponsored by local schools and AWS Sections. All of us must take a part in preparing the next generation of welding professionals by discussing welding opportunities and challenges within our companies and industries. If we do not address these issues, there will remain a shortage of qualified welding personnel. The next generation really does depend upon each of us.

For welding to maintain its stature in industry, we must all take a part in preparing the next generation of welding professionals. I ask you to accept the challenge and do your share.

**Ernest D. Levert**
Lockheed Martin, Senior Staff Manufacturing Engineer
Member - Production Technical Excellence Staff
AWS National President 2002-2003
Federation of Material Societies 2007-2008
International Institute of Welding-
Chairman - Commission IV Power Beam Processes 2007-Present
About Ernest Levert

Ernest D. Levert is the Senior Staff Manufacturing Engineer for Lockheed Martin Missiles and Fire Control in Dallas, Texas. He works in the Production Engineering Department where he functions as the subject matter expert for welding engineering and materials’ joining processes for the entire corporation. He is Member of the Production Technical Excellence Staff. The PTES program recognizes and encourages the highest level of accomplishment for the individual contributor within the technical fields of Production Operation. Some of the programs he supports include the International Space Station Thermal Control Units Program, Patriot Advanced Capability (PAC-3), Army Tactical Missile System (Army TACMS), Line-of-Sight Missile Program (LOSAT), Joint Strike Fighter Program (JSF-F35), Advanced Missile Programs, Terminal High Altitude Area Defense (THAAD) project, and the Multiple Launch Rocket System (MLRS). Previously, Mr. Levert worked for General Dynamics, Convair Division, in San Diego as a welding engineer where he supported the Atlas Space Vehicle program, Tomahawk Cruise Missile Program, Ground Launched Cruise Missile Program, and the Space Shuttle program. Mr. Levert has over forty years of welding experience in the aerospace and defense industries. He received his Bachelor of Science in Welding Engineering from The Ohio State University and currently enjoys a position as an Ohio State University College of Engineering Distinguished Alumni. He is a Registered Professional Engineer in the State of Texas.

Along with his heavy corporate load, Mr. Levert divides his time between various community (Scoutmaster), church, and family obligations. Away from work Mr Levert is proud to serve as President of the Federation of Materials Societies (FMS) 700,000 members, Chairman of the International Institute of Welding (IIW) Commission IV, Power Beam Processes (50 countries), and serves as the United States delegate at the IIW annual assemblies. Mr. Levert is the first African American to serve in each of these esteemed positions. He is a frequent speaker at inner city schools to lands across both oceans when government officials and Chief Executive Officers of companies in industrialized and developing countries host him.

Mr. Levert is an internationally recognized Welding Engineering Subject Matter Expert (SME) who specializes in Laser and Electron Beam Welding Technologies. He joined Lockheed Martin Missiles and Fire Control in Dallas, Texas in 1986 as a Welding Engineer in the Manufacturing Engineering department. For the past twenty years, he has singularly written procedures and developed policies and processes that provide essential structural integrity and allow verifiable and secure access to foreign markets for many Lockheed Martin products. Because of his innovative solutions, he has helped to put Lockheed Martin in the forefront of welding sciences.
Mr. Levert was not only the first African American to serve as President of the American Welding Society in 2002-2003 but also the first Ohio State University Welding Engineering graduate to achieve that position. The American Welding Society is the largest organization in the world dedicated to advancing the science, technology and application of materials joining. AWS serves over 50,000 members in the United States and around the world and has its headquartered in Miami, Florida. For his continuous efforts in support of AWS’s mission, he is now recognized as an AWS Distinguished Member.

**Mr. Levert has received the following Awards:**

- Lockheed Martin MFC Production Technical Excellence Staff: Welding Engineering and Materials Joining Subject Matter Expert
- Nominated for the National Black Engineer of the Year for Professional Achievements in Industry.
- The Ohio State University College of Engineering Distinguished Alumnus Award.
- Lockheed Martin NOVA Award for Outstanding Leadership by helping the company wins new business.
- NTA Technical Achiever Award for Outstanding Achievements in Engineering.
- AWS Counselor Award for his vision and outstanding leadership and perseverance in advancing the science and application of welding, supporting the welding industries, preparing the next generation of welding professional, and improving the image of welding in the U. S. and worldwide.
- The Ohio State University Minority Engineering Program Excellence Award
Chapter 1

Mission, Vision & Goals
The Founding of Weld-Ed

In 2007, the American Welding Society and several companies that rely heavily upon welding worked with representatives from Lorain County Community College, The Ohio State University and other community and technical colleges to seek funding for the creation of the National Center for Welding Education and Training from the National Science Foundation’s Advanced Technological Education funds. The four-year funding established the National Center for Welding Education and Training, headquartered in the Nord Advanced Technologies Center at Lorain County Community College in Elyria, Ohio. The Center began operations in July 2007. Weld-Ed brings together the American Welding Society (AWS), industry partners, such as Lockheed Martin and Lincoln Electric, and a collection of colleges and universities.

Weld-Ed Vision

Weld-Ed is a national partnership of colleges, universities, professional societies, government, and private industry committed to increasing the number and quality of welding and materials joining technicians to meet industry demand.
Weld-Ed Mission

Weld-Ed strives to improve the quality of education and training services to address the hiring and professional development needs of the welding industry.

Weld-Ed Center Goals

The Center’s Goals are to:

- Increase the number and quality of welding technicians to meet the on-going workforce needs
- Promote comprehensive reform of welding education and training
- Promote and enhance faculty professional development and continuing education for welding educators.

The National Center for Welding Education and Training is a dynamic partnership between business and industry, two-and-four-year educational institutions, the American Welding Society and government. The Center is doing business as Weld-Ed through funding support from the National Science Foundation under award number NSF 0703018. Weld-Ed, in collaboration with over 60 business, industry, and educational affiliates, improve the quality, quantity and availability of welding technicians through advancements in educational curricula and instructor professional development.

To accomplish its mission, the Center, along with its 10 Regional Center two- and-four-year member colleges, and industry partners, work collaboratively on the development of new and improved curricula in all areas of welding. As a result of these efforts, faculty and instructors are provided continuing education opportunities at Regional Centers throughout the country. These programs are specifically designed to train the next generation of workers for the materials joining industry and to upgrade the skills of existing workers.
Chapter 2

An Introduction to Weld-Ed

BY MONICA PFARR
WELD-ED PRINCIPAL INVESTIGATOR
Since its inception in 2007, the National Center for Welding Education and Training (Weld-Ed) has reshaped the way instructors teach and students learn in the welding and metals joining industry. Through new, innovative education strategies being implemented by partners across the country, Weld-Ed answers the demands of a changing industry and focuses on preparing the next generation of welding and material joining technicians to answer the call of 21st century employers.

Headquartered in the Nord Advanced Technologies Center on the campus of Lorain County Community College in Elyria, Ohio, Weld-Ed’s mission is to improve the quality of education and training services to address the hiring and professional development needs of the welding industry.

The Center, initially funded by a four-year grant from the National Science Foundation, brings together the American Welding Society (AWS) and other industry partners such as Lockheed Martin and Lincoln Electric, Chattanooga State Community and Technical College, Honolulu Community College, Illinois Central College, Lorain County Community College, North Dakota State College of Science, Texas State Technical College – Waco, Yuba Community College, Pennsylvania College of Technology, The Ohio State University and Weber State University to accomplish its mission.

Always looking towards the future, Weld-Ed utilizes market-driven research and innovative data to enhance education and training, as well as recruitment and other services for current and future welding professionals. By carefully analyzing information and tracking trends, Weld-Ed stays ahead of the curve with groundbreaking professional development workshops which ensure welding instructors remain on the cutting edge of the industry. Through an extensive database of industry partners, regional partner colleges are able to adapt curriculum to meet the demands of their local employers.

More than a person behind a mask, Weld-Ed drives innovation that enhances curriculum, aids instructors and produces quality welding technicians to meet the country’s projected demand for welding professionals. From creating a state-of-the-art wheelchair that allows a paralyzed welding technician to perform hard-to-reach tasks, to empowering girls to explore the art of materials joining, Weld-Ed is transforming education because we understand that when sparks fly, the possibilities are endless.

“Together we can address the industry’s workforce needs and upgrade the skills of existing employees - it’s a win-win situation.” Duncan Estep, Director, The National Weld-Ed Center
President Barack Obama was briefed on the merits of Weld-Ed during a visit to Lorain County Community College in January 2010. The president held a town hall meeting on the campus of LCCC in Elyria, Ohio. This was the second stop on his highly publicized “White House to Main Street” tour.
Chapter 3

Partner Profiles
Lorain County Community College (LCCC) first opened its doors in 1963. In 1964, the Lorain School of Technology was incorporated into LCCC, and the first classes were held in rented facilities. In its first fall of operation, 1,006 students registered for credit classes at LCCC. In 1966, LCCC moved to its current location, making LCCC the first community college in Ohio to have a permanent campus. In 1995, the University Partnership was established and LCCC became the only community college in the state to offer bachelor’s and master’s degrees from eight Ohio universities all at the LCCC campus. Enrollment at LCCC now tops 12,500 students.

LCCC’s Welding Technology program began in the fall of 2001. It is a stand alone, two-year, full-time associate degree program (66 credit hours) housed in the Nord Advanced Technologies Center. The program provides students with the knowledge, skills and professional behaviors necessary for competent performance as a welding technician, a position that serves as a liaison between the welding engineer and the welder. The welding technician adapts appropriate welding theory to practice and supervises shop floor welders on the job. This position requires skill in various processes such as gas, arc and inert gas welding.

**Participation**

LCCC was one of the original educational institutions to become involved with Weld-Ed as the college’s Welding Technology program goals reflect those of Weld-Ed: to increase the number of welding technicians to meet the on-going workforce needs, to promote enhancements in welding education and training, and to promote and enhance faculty professional development and continuing education for welding educators.
Specific LCCC accomplishments that meet the goal of increasing the number of welding technicians include:

- Annual meeting of our local welding industrial advisory committee
- Participation in an LCCC sponsored career fair each spring
- Several high school and junior high open houses and summer outreach events, including Rosie’s Girls welding camp that present welding hands-on activities
- Taking LCCC students to The Ohio State University’s spring career fair in welding
- Hosting the Cleveland AWS Chapter April 2010 meeting
- Active participation in Weld-Ed partner meetings and conference calls
- Participation in and support of annual AWS show and exposition

Specific LCCC accomplishments that meet the goal of enhancing welding education and training include:

- Contributing member of the Weld-Ed Curriculum Committee
- Development of interactive video distance learning (IVDL) courses in print reading and arc welding
- Articulation agreements are in place with several joint vocational schools, career and adult education centers, and proprietary welding schools
- Transfer agreements are in place with The Ohio State University, University of Toledo, The University of Akron, and Cleveland State University

Specific LCCC accomplishments that meet the goal of promoting and enhancing faculty professional development include:

- Hosted a three credit hour “Train the Trainer” course (WTEC 291) during the summers of 2008 and 2009
- Trainers participated in “Train the Trainer” courses in the summer of 2010
Results

Over the past three years, 333 seats have been taken in credit welding courses. During this time period, two students have graduated from the program. Of the 333 seats, 95% have been male, 6.3% African American, 1.8% Asian, 9.6% Hispanic, 1.8% Native American, and 8.1% have been special needs students. Over this same time period, 109 seats have been taken in non-credit training programs related to welding.

With assistance from Weld-Ed, LCCC built a new, state-of-the-industry welding lab and classroom facility. The classroom is equipped with interactive video distance learning (IVDL) capabilities, allowing for lecture and laboratory demonstrations to be broadcast to any of LCCC’s outreach and satellite facilities or partner institutions. This facility promotes Weld-Ed’s education and training goals through advanced modes of delivery of new welding processes and technologies. The lab was showcased during a January 2010 visit to campus by President Barack Obama during his “White House to Main Street” tour. For more information about the new welding facility at LCCC please turn to Page 42.

Future

In keeping with the goals of Weld-Ed, LCCC is developing new courses in submerged arc welding and CNC plasma arc cutting. The college is also exploring the development of one-year certificates in automation and non-destructive testing.
Chattanooga State Community College

CHATTANOOGA, TENNESSEE

Chattanooga State Community College is a comprehensive, regionally accredited community college with more than 10,000 students. Founded in 1965, Chattanooga State serves a six-county area of Southeast Tennessee and bordering counties of North Georgia and Alabama as an open-entry postsecondary institution offering more than 50 majors of study toward associate of arts, associate of science and associate of applied science degrees, as well as a wide array of certificate studies and university parallel (transfer) studies.

Chattanooga State operates one of the state’s twenty-seven Tennessee Technology Centers (TTC). The TTC is the region’s premier provider of workforce development, providing state-of-the-art technical training for workers to obtain the technical skills and training necessary for advancement in today’s job market.

Chattanooga State enjoys special partnerships with businesses, manufacturers and industries of all types and sizes. Notable partnerships include the Volkswagen Academy; the Building and Construction Institute of the Southeast; numerous fully accredited apprenticeship programs including: electrical, plumbing, carpentry, iron work and other programs; the Associate of Applied Science degree concentration program in radiation protection in association with the Tennessee Valley Authority.

**Participation**

Through its TTC and its Department of Continuing Education and Workforce Development, Chattanooga State has been the regional leader in welding education for over 40 years. Chattanooga State provides a wide array of classes, courses and instruction to meet the needs of students and business, industry and manufacturing partners. Classes range from introductory classes for novices and hobbyists to full welding curriculum (1,290 hours or more) for aspiring professional welders.

Welding classes are offered primarily at the Chattanooga campus and at the Kimball satellite site. Classes are offered throughout the year and at various times to accommodate the scheduling needs of both traditional and nontraditional students, including “third shift” classes between midnight and 5:30 a.m. Career opportunities for graduates include positions as combination welders, maintenance welders, MIG welders, pipe welders, structural steel welders, TIG welders and more.
Results

Chattanooga State is the leading provider of welding education in the region and the preferred educational resource of most regional businesses, industries and manufactures. The College works closely with employers to assure that graduate have the requisite welding skills, abilities and proficiencies to meet their needs. To this end, Chattanooga State works closely with larger employers (TVA for example) to assure that graduates meet specific job requirements for the industry. This is accomplished through designing curriculum that is tailored to industry and making classes available to meet specific scheduling demands. Designing advanced welding courses and delivering the same at convenient times is something that Chattanooga State proudly does for its partners.

Lessons Learned

Participation with Weld-Ed solidifies the bonds between national welding educators and enhances Chattanooga State’s reputation with local industry leaders.

Future

The demand for skilled welders will increase in the coming years. Volkswagen Group of America, Inc. will open its new North American assembly plant in Chattanooga in the immediate future; TVA is expanding existing nuclear power facilities and building new nuclear power facilities throughout the Southeast; other businesses and industries are moving to the area; and existing businesses and industries are beginning to expand with the thawing national economy. Chattanooga State fully expects that its welding education efforts will remain vital to the economic health and vitality of the region.
Pennsylvania College of Technology became an affiliate of The Pennsylvania State University in 1989, after establishing a national reputation for education supporting workforce development, first as a technical institute and later as a community college. Today, Penn College is a special mission affiliate of Penn State, committed to applied technology education and attracts the second-highest enrollment in the Penn State system; over 6,500 students are enrolled in associate and bachelor degree programs. Penn College’s enrollment includes students from Pennsylvania, New York, Maryland, New Jersey and Connecticut. The modern Penn College campus offers students hands-on instruction and access to the latest equipment, leading to excellent graduate placement.

**Participation**

Penn College was recruited to be a partner in the first year of the Weld-Ed project based on its reputation of producing high performing students in national competitions and through the College’s participation in the American Welding Society. As a statewide institution with strong and growing relationships with surrounding states, participation in a national center for welding technician education fits within the College’s goals of serving a broader audience of students and providing the highest quality instruction in welding at the certificate, associate and bachelor degree levels.

Two-year or four-year program options allow students to start in the Welding and Fabrication Engineering Technology bachelor’s degree or in one of the two-year programs in Welding (certificate) or Welding Technology (associate of applied science). Welding Technology associate degree students can later transfer into the bachelor’s degree. The graduate welders, welding technicians, and welding and fabrication engineering technologists are employed in a wide range of manufacturing environments and industries. No single industry dominates welding employment in Pennsylvania or the mid-Atlantic region.
Hence, Penn College provides a strong background in manufacturing across a wide range of industrial settings.

**Results**

Weld-Ed has helped the Penn College welding program strengthen the relationship with manufacturers that employ welding professionals. Weld-Ed participation has been leveraged with the Pennsylvania Statewide Workforce Investment Board to bring additional attention to the need for trained welding technicians in all industries in Pennsylvania. Additional opportunities to engage industry in discussions with Penn College about their needs for welding technicians have also been created.

Penn College has developed and maintains an online toolkit to support Pennsylvania’s career development and entrepreneurship academic standards www.pacareerstandards.com. The site links to career development materials specifically for welding while providing easy access to the Careers in Welding website, the Weld-Ed website, curriculum units, and recruitment videos including the “Degrees that Work-Welding” video. The site is designed for teachers, counselors, and students in Pennsylvania and receives more than 30,000 hits per year.

**Lessons Learned**

Annual Weld-Ed-funded Welding Summits have forged relationships among secondary welding educators, career and technical education programs of study, the Pennsylvania Association of Welding Educators (PAWE), and faculty from all the Pennsylvania postsecondary institutions offering certificates and associate degrees. These summits have invited lively discussion on several topics critical to the success of welding education in Pennsylvania including: ideas about how to engage middle school counselors and teachers in understanding the value of welding education and the important role relationship building plays between welding instructors and middle school counselors in this effort.

**Future Activities**

As Weld-Ed professional development becomes available, Penn College will encourage all mid-Atlantic welding technician postsecondary faculty to participate in these events. By holding these events in newly renovated welding laboratories at Penn College, which opened in fall 2010, the strength of Penn College programs will be clearer to associate degree colleagues. The resulting relationships will lead to strong articulations between Penn College’s Welding and Fabrication Engineering Technology bachelor’s degree and postsecondary welding technician programs in the mid-Atlantic region. This partner-
ship will increase the number of welding technicians and technologists available to help industry meet its needs for a skilled workforce. The professional development courses will ensure that faculty have strong backgrounds in pedagogy to teach core welding technician theory and application.

As the welding certificate and associate degree programs participate in the College’s program evaluation and curriculum revision, the Penn College Welding Technology curriculum will be benchmarked against the Weld-Ed national curriculum to ensure that minimum standards are met. Specialized areas of delivery will be adopted based on the needs of industry within the service area.

Penn College will participate in the 3rd Annual Weld-Ed Welding Summit co-sponsored with PAWE in October 2010. High school welding teachers will also be encouraged to participate in Weld-Ed developed and sponsored professional development.

Children enrolled in the Children's Learning Center at Pennsylvania College of Technology visited to the college's welding lab, arranged and led by Kerri Ann Zacker, shown holding her daughter. Zacker visited the children at the center to show her tools of the welding trade and talk about items that are welded. Then she led the group – including daughter Adeline – to the classroom where she is a student in the welding technology major. David R. Cotner, department head and instructor of welding, taught the children about the welding robot and the plasma metal cutter.

As part of the New Choices/New Options program at Pennsylvania College of Technology, a female student explores welding as a career option.
The Ohio State University was founded in 1870 and has become one of America’s largest and most comprehensive universities, serving more than 55,000 students annually. Located in Central Ohio, the institution offers more than 160 undergraduate majors and more than 240 master’s, doctoral and professional degree programs. The university has earned further distinction as a top-notch academic medical center and a cancer hospital and research center. The National Science Foundation (NSF) ranks OSU among the top seven public universities in terms of research and the 2009 research expenditures were more than $716 million.

OSU’s Welding Engineering curriculum offers tracks to a Bachelor of Science in Welding Engineering, a Master of Science in Welding Engineering or a Doctor of Philosophy in Welding Engineering. The welding engineering program provides students with basic liberal studies and the engineering training needed to gain employments in the manufacturing industries. Welding engineering courses combine work in several engineering fields. Four academic areas are treated: design, including work in engineering mechanics, stress analysis, structures and machine and production design; the materials used in manufacturing, with course work in physical metallurgy, metallography, and physical chemistry; manufacturing processes, including electrical equipment and control; and fitness for service including nondestructive testing.

Participation

OSU is a proud member of the Weld-Ed team and is committed to providing the next generation of welding professionals with an education that matches industry needs. To show this commitment, OSU established a local skill panel with representatives from
industry, education, organizations, and government. This Weld-Ed initiative provided valuable insight into the employment and educational needs of welding professionals. The findings of this skill panel initiative were disseminated through several reports on the welding industry including “The National State of the Welding Industry Report”.

The program has developed a unique partnership with the Edison Welding Institute that includes sharing a facility and the latest equipment in the welding industry. Committed to the goals of Weld-Ed, the OSU program proves to students that welding is an exciting and important field that can take students from the shipyard to outer space, and everywhere in between.

Results

As a result of the partnership between OSU and Lorain County Community College, which houses the Weld-Ed headquarters, the two higher education institutions were awarded a collaborative grant by the Division of Undergraduate education at the NSF to work on the preparation of 21stCentury Welding and Materials Joining Technicians (DUE-0302792 & DUE-0302803). The grant works on topics and issues associated with the education of welders, welding technicians and welding engineers. Industry input and support play an important role in the success of the grant. The grant is focused on the following areas:

• To develop a curriculum and curricular model that will prepare welding and material joining technicians for manufacturing jobs in the 21st century.

• Provide a core competency in the various areas of welding technology - processes, materials, design, and inspection, while allowing flexibility for training students to meet the needs of the local manufacturing community.

The initial project will develop a curricular model that can be emulated by other two-year colleges for the training of welding technicians.
Future

OSU continues to seek new and innovative ways to recruit and train a diverse group of students as the next generation of welding engineers. Additionally, the college continues to develop and strengthen industry partnerships. The program’s advisory board, for example, includes nearly 20 industry representatives to ensure the welding curriculum leads to employment and fulfilling careers.
For more than 40 years, Texas State Technical College (TSTC) Waco has been providing top-quality technical education. The college is nationally recognized for the number and quality of technology graduates.

Texas State Technical College offers two welding programs: a one-year Combination Welding program, and a two-year Welding Technology Associate Degree program.

The Combination Welding Program is designed to develop the skills needed to enter the job market ready to go to work as a welder. Intense training in the major welding processes of shielded metal arc, gas metal arc, flux core arc, gas tungsten arc and submerged arc welding is encountered. The one-year Combination Welding course is supplemented with support courses, such as job planning and layout, welding symbols and blueprint reading, and non-destructive testing methods. The students receive a Certificate of Completion in Combination Welding upon graduation.

The two-year Welding Technology Associate Degree program is designed to develop the skills required of the major welding processes, as well as the technical study of metals. In addition to the welding processes, students have courses in general psychology, algebra, composition, humanities, academic elective, job planning and layout, welding symbols and blueprint reading, introduction to metallurgy, welding metallurgy, nondestructive testing methods, and automated and robotic welding applications. Upon graduation, students receive an Associate of Applied Science Degree in Welding Technology. Following graduation, students have the opportunity to enroll in the Advanced Pipe Welding course. This is a 32-hour per week course designed to develop the skills needed to perform the demanding tasks of the pipe welder.

In both programs, as well as the Advanced Pipe Welding option, the student’s lab objectives are designed to meet the requirements of the AWS, ASME, and API welding codes.
Participation

Texas State Technical College became aware of Weld-Ed through the college’s affiliation with the American Welding Society. TSTC is a Sustaining Company Member of AWS.

TSTC’s welding program sparks interest in welding among young people by means of a mobile welding lab. The 20-foot, fully equipped trailer travels to high schools across the state of Texas and allows students to get a hands-on idea of welding.

TSTC Waco Welding Programs has approximately 25 industry advisory committee members; ensuring students always receive the latest available training. These industry partners help design curriculum, matching instruction to industry needs, helping ensure TSTC graduates will be work-ready from their first day on the job.

Results

As a regional partner of Weld-Ed, Texas State Technical College benefits from the vast networking opportunities of the organization. Not only do these contacts improve the quality of education that welding students and instructors receive, but it also increases the number of job opportunities available for graduates. Additionally, the high quality instruction at TSTC’s welding programs puts graduates at the top of the employer’s hiring lists.

Future

The program will soon offer summer training courses for high school welding instructors.
Yuba College is located in the agricultural community of Marysville, California, and serves about 7,500 students in Northern California. The college opened in its current location in 1962 and has continued to reach for excellence in both facilities and instruction. The college’s state-of-the art shops, laboratories, classrooms, athletic fields, theater and library are utilized by both students and community members. Course offerings have grown to more than 1,000 courses in 90 different departments. With nearly half of all Yuba College students in career and technical education courses, joining Weld-Ed in 2008 made perfect sense for both the organization and Yuba College.

**Participation**

Since becoming a Weld-Ed regional partner, Yuba College has become a pioneer in community outreach. The Yuba welding program has sponsored several welding camps for students and instructors and also participated in Train the Trainer by hosting training sessions in July 2009. The Hot Sparks Cool Welding camp brought materials joining technology to foster children and Yuba’s Welding Olympics for high school and community college students is a popular competition.
Yuba College has participated in the National Skills Panel for Welding and the NSF ATE PI conferences in Washington, D.C., and has been instrumental in the development and delivery of FABTECH Show Educator Conference programming in 2008, 2009 and 2010. Last but not least, college representatives are members of the Weld-Ed Curriculum Committee and the Recruitment Committee.

**Results**

Numerous community outreach efforts have brought increased respect to the welding program, both from within the college and from the community it serves.

Yuba College has been successful in strengthening ties to local businesses and organizations through its customized training program offerings. Going forward, these programs will be vital to the continued growth of the welding network in Northern California.

**Lessons Learned**

Teamwork among Weld-Ed Regional Partners has allowed the Yuba branch to strengthen the level of education students receive. Collaboration between partners has increased the scope of the college’s welding program, not only in the surrounding areas and businesses, but also with businesses from around the country. These increased networking opportunities equal more job potential for Weld-Ed graduates.

**Future Plans**

Yuba College plans to host summer instructor training. The college will also continue to develop technician level welding courses to benefit students.
The North Dakota State College of Science (NDSCS) is a two-year, comprehensive, residential college with its main campus located in Wahpeton, N.D., and a second site, referred to as the Skills and Technology Training Center, located in Fargo, N.D. NDSCS offers degrees, certificates, and diplomas in over 80 academic options in traditional career and technical studies as well as the liberal arts. The college also offers a variety of Distance Education courses. Approximately 94% of graduates are employed or pursuing additional college education.

**Participation**

NDSCS became a member of Weld-Ed in 2008 after Joel Johnson, welding program coordinator, attended the first Weld-Ed educator’s seminar in 2007. Since that initial seminar, Johnson has served as an educational partner of Weld-Ed and also participated on a number of sub-committees, including the curriculum development committee. He is working on developing a new instructor training course that will support the mission of training future welding technicians.

**Results**

The campus has participated in a variety of projects, including the development of an instructional welding video and developing welding assessment for educators. Through the help and dedication of faculty on campus, the program designed and oversaw the fabrication of a state-of-the-art wheelchair that will allow disabled welders to continue to work in the industry. The chair has gained national attention in the welding community and serves as a beacon of success for the program.
Lessons Learned

NDSCS has benefited from its membership in Weld-Ed by providing the campus and its welding program with national exposure. NDSCS has given presentations at the FABTECH show in Chicago, the ATE Conference in Washington, D.C., and Skills USA University in Kansas City. By being an educational partner of Weld-Ed, the campus benefits from networking with leading welding intuitions from across the country.

Future

A career awareness seminar will be offered to teachers, counselors and principals from across the region. The seminar will allow students to explore the options that exist in high-demand careers by educating their teachers and counselors on the boundless opportunities at the college.
For nine decades, Honolulu Community College has met the education and workforce needs of its community by providing a broad range of career and technical programs and a comprehensive liberal arts program designed to prepare students for transfer to baccalaureate institutions. The college began in 1920, when Territorial Trade School enrolled its first class of 42 students. Since then, the college has grown from the original course offerings of auto mechanics, machine shop and carpentry to include a diverse variety of subject areas. The campus has become home to many prestigious technology organizations, including housing the administrative headquarters of the Pacific Center for Advanced Technology Training. By fall 2009, enrollment was 4,585 credit students and 2,991 apprentice students.

Participation

The College became involved with Weld-Ed through participation in the AACC Workforce Development Institute in Newport Beach, California, in January 2009. At this conference, an invitation was extended for the College to join Weld-Ed.

Results

The College advanced the Weld-Ed mission in the following ways:

- Developed new curriculum that fills the identified gap
- Engages high school students through use of a portable trailer and visits to 17 area high schools
• A six-week Construction Academy summer bridge program offers welding exposure to high school juniors and seniors

• High School to HCC Fair attracts 1,000 high school students. The fair is held each year in February and special efforts are made to recruit minorities, women, non-traditional students and people with disabilities.

Additionally, local industry benefitted from the Weld-Ed partnership by taking advantage of an advanced training on virtual welder (VRTEX 360™) course conducted by Lincoln Electric representatives and hosted by the HCC Welding program, the Pacific Center of Advanced Technology and Weld-Ed affiliates in July 2010.

**Lessons Learned**

The College has discovered that passively waiting for high school students to develop interest in welding careers on their own does not work well. Going to the high schools to actively recruit with the department’s welding trailer and virtual welding simulator has proven to be a more effective recruitment tool.

**Future Activities**

HCC has many activities planned that are in line with the goals of Weld-Ed. Some upcoming projects include: a workforce needs survey to ensure students are being trained as accurately as possible; continuing education courses for educators; and expanding the Tools for the Trade scholarship program with the goal of increasing workforce diversity.
The state of Utah has been involved in higher education welding for more than 35 years. The program began at Utah State University and was transferred to Weber State University, located 40 miles north of Salt Lake City, in 2004. Weber State University was founded in 1889 and now serves more than 23,000 students on multiple campuses.

**Participation**

Weber State University joined Weld-Ed in 2009, as a regional partner representing the mountain west region. The availability of a bachelor’s degree in Welding Engineering Technology has added new students to Welding Technology programs in the region. Students who desire to obtain a bachelor’s degree in the welding field can earn an Associates of Science Degree or Associates of Applied Science Degree in Welding Technology at their local colleges and then transfer to Weber State University for a bachelor’s degree. WSU has been able to participate in conferences with other welding educational institutions, increasing the cohesiveness and recognition of welding education. Weld-Ed has assisted WSU in the recruitment of students into the field of welding and the retention of students in welding to increase their level of education.

**Results**

WSU has been very successful in recruiting students into welding through various initiatives. High schools, junior high schools, young women groups and at-risk students have come to WSU to learn about careers in welding and educational opportunities. WSU has an active student chapter of the American Welding Society and many of the students participate in recruiting activities by providing welding and cutting demonstrations to potential students.
WSU serves as a training facility for educators in the region, holding instructor training seminars and weld camps for welding instructors and their students.

**Lessons Learned**

Weld-Ed has helped WSU increase its visibility and recognition as an institution of higher education in welding education. Through participation in conferences, as well as the association with Weld-Ed partners and affiliates more interest has been shown in WSU’s program.

**Future**

WSU continues to increase ties with schools in the region through concurrent enrollment agreements with high schools and articulation agreements with career and technical schools and colleges that offer certificate programs, Associate of Applied Science, and Associate of Science programs in Welding Education. Many of these programs have reported full enrollment and many of the students plan to continue their education at WSU and obtain a Bachelors degree.
Chapter 4

Outreach & Recruitment
Young girls are often given very clear images of what they should be when they grow up. “Welder” has not traditionally been on that list, but Lorain County Community College’s Rosie’s Girls summer camp is hoping to change that.

The day camp exposes middle school girls to welding and other traditionally male fields, such as carpentry. The camp is named after the fictional World War II character “Rosie the Riveter” and operates with the goal of increasing the number of females who eventually pursue those career tracks. Funded by the National Science Foundation and Weld-Ed, the camp was first held the summer of 2009 and was also held in 2010. Plans continue for the annual event.

The camp, which is open to girls entering the fifth and sixth grades, is free of charge upon successful completion.

For most campers, the program provides them their first experiences in welding. While many approach the action with nervous energy, by the end of the camp the girls are well accustomed to stepping outside their comfort zone.

“My dad told me I would love welding, and he was right,” exclaimed one camper after successfully welding her name in a piece of sheet metal.

“I was scared at first,” admitted another girl. “But once I did the first letter, I got better.”

Not only do the girls build welding and construction skills, they also build self-esteem. Surveys of the girls before and after the camp showed increases in how they felt about themselves and how they feel they are perceived by others. Especially encouraging was an increase of nearly 15 percent in the number of girls who reported after the camp that they “felt confident that they can do things even when others think they can’t.”
Like all Weld-Ed partners, Honolulu Community College and Texas State Technical College are constantly seeking a fresh batch of welding students to enroll in their programs. However, rather than waiting for those students to sign up for a tour of their campuses or send an e-mail query, these colleges are getting creative and bringing welding to high school students.

Through the use of mobile welding trailers, institutions are able to bring a hands-on welding demonstration directly to high school students in their region. At TSTC, the 20-foot fully equipped trailer allows prospective welding students across the Texas region to try out a profession they may not have otherwise considered. In Hawaii, the HCC trailer travels yearly to 17 high schools—putting a career in welding in the minds of young people across the state.

“We’ve learned that passively waiting for students to develop an interest in welding doesn’t work,” explained Mark Silliman of Hawaii Community College. “Using our welding trailer and virtual welding simulator has proven to be a far more effective method of recruiting new students.”

The trailers not only represent the partners’ commitment to recruit young welders, but also illustrate the power of industry partnerships. The TSTC trailer is fully loaded with state-of-the-industry welding equipment, thanks to donations from Lincoln Electric.
Yuba College Instructor’s Weld Camp Fills Gap In Student and Instructor Outreach

Dan Turner had attended numerous events about welding instruction, but always came home feeling that the programs were missing the mark. To address the issue, Turner created his own program: Weld Camp, a two-day intensive welding training program for high school and college welding students and their instructors.

Housed at Yuba College, where Turner is a welding instructor, Weld Camp began in 2006 and continues as an annual event.

Weld Camp trains about 60 students annually, including 50 high school students and about 10 Yuba College students. To qualify, the students must be enrolled in welding classes at their high school or at the college. Additionally, instructors attend the camp with their high school and college students.

The campers are broken down into small groups, where they learn new skills and have the opportunity to practice what they are learning. For many students and instructors, the camp provides their first connection with some of the latest welding technology that may not available in their high school classroom. The camp also provides introduction to gas tungsten arc welding, a process which isn’t typically included in a high school curriculum.

Students are also given current information about welding careers. Industry partners share specifics about what employers are looking for in new hires and give tips on how students can make themselves more marketable in the welding workforce.

While students are in workshops, welding instructors participate in their own intense training sessions. The sessions allow instructors to brush up on the latest technology and work side-by-side with a factory representative of the equipment that is used. Additionally, instructors are able to tour local companies that are in the welding industry.
The camp has successfully developed as a strong collaboration between Yuba College, Miller Electric and Shasta Welding. Both industry partners provide training aids and camp instructors to ensure that each camper receives ample individual attention. At the culmination of the second day of the program, a graduation dinner is held which features prizes donated by the camp’s benefactors.

Weld Camp has received praises from officials at Yuba College, who said the program is one of the best recruitment and outreach initiatives for technical programs at the college. The camp also receives consistently high marks from instructors who bring their students to the camp.

Turner is continually on the lookout for opportunities to expand and enhance the Weld Camp and its list of sponsors. His commitment to the instruction of welding is helping a generation of welding students get hands-on experience that would not have been possible without the camp.
Honolulu Community College Builds Welding Interest through Summer Bridge Program

High school students are getting a jump on their welding education thanks to Honolulu Community College’s Construction Academy Summer Bridge Program. The six-week program allows students in grades 10-12 and recent graduates to participate in an intense learning course in the learning group of their choice, including Welding for Trades and Industry.

Welding for Trades and Industry is a course for non-majors but offers a wide range of applicability as it relates to Automotive Technicians, Diesel Technology, Auto Body and many other related trades. The welding course introduces students to various methods of welding, including electric, oxyacetylene and oxyacetylene cutting. Those who complete the welding section earn three college credits.

Students who choose to take the Exploring the Trades program track are also given an introduction to welding technology. Other learning courses offered include Carpentry Basics and Basic CAD Drafting. Students in all courses strengthen their math skills and work-readiness through a construction-based environment.

About two dozen students participate in the Summer Bridge program each year, of which about 10 percent are female and about 90 percent are minority and/or underserved populations. The Summer Bridge program is free and has a partnership with more than 15 Hawaii high schools.

“The Summer Bridge Program is indeed an awesome program,” said a recent student. “You learn a lot of skills in building and construction and in architectural design. This program will also help students in developing employability skills.”
Chapter 5

New Labs
State-of-the-Industry Lab Renovation Ensures LCCC Meets Technology Demand

Keeping up with the changing technology of the materials joining industry requires the constant attention of welding education programs. With assistance from Weld-Ed, Lorain County Community College renovated its welding lab to create a new, state-of-the-industry welding lab and classroom facility. The new space doubles what was previously available to students, bringing the total footage of the renovated lab facility to 4,000 square feet. Northeast Ohio is not defined by one dominant industry as related to welding occupations; therefore the welding lab at LCCC was equipped to support well rounded and varied welding curricula. Students enrolled in welding courses at the college are not the only ones to benefit from this new lab. Local industry partners also utilize this lab for employee training.

The renovation process began in early 2008 by evaluating the current equipment and space. Once construction was underway, the renovation took nine months to complete. The finished lab was unveiled in Spring 2010.

The classroom is equipped with IVDL (interactive video distance learning) capabilities so that lecture and laboratory demonstrations may be broadcast to any of LCCC’s outreach and satellite facilities or partner institutions. This facility promotes Weld-Ed’s education and training goals through advanced modes of delivery of new welding processes and technologies. The laboratory is equipped with 20 welding booths capable of delivering oxy-fuel, SMAW, GTAW and GMAW/FCAW instruction. Several booths are configured to allow wheelchair access to serve students with special needs.
Highlights of the Renovated Weld-Ed Lab on the LCCC campus

- The area of the lab is increased from 2,000 square feet to 4,000 square feet.
- Includes interactive video distance learning compatible classrooms with SMART boards.
- Includes a new CNC Plasma cutting table and Plasma cutter.
- Includes the capability of live feed welding from the lab.
- Includes four handicap accessible booths in the lab.
- Includes a new Robotic welding cell.
- Multiple welding processes available in the booths.
- Increased Gas Tungsten Arc Weld from 6 booths to 14 booths.

Other equipment obtained through the help of Weld-Ed include: a submerged arc welder and a CNC plasma arc cutting table.
Pennsylvania College of Technology recently renovated its lab space to further the Weld-Ed mission of providing the best possible welding education and training to students.
Chapter 6

Industry Partners
One of the objectives of Weld-Ed’s funding from the National Science Foundation was to establish a National Skills Panel (NSP) to explore and confirm the urgent needs for welding technicians along a welding career pathway.

The NSP was formed in 2008 and was comprised of welding industry leaders, association representatives from the American Welding Society and the National Association of Manufacturers, leaders from the community college movement at the national level, higher education leaders, and government representatives.

During the two-year tenure of the NSP, they explored a variety of different options for gathering definitive information regarding the needs of the welding industry as a whole, to determine and recommend strategies to address the projected shortage of welding professionals at all levels, especially welding technicians.

Their recommendations resulted in three publications that were produced by JBS International, Inc. under contract to Weld-Ed. The first was “The Welding Industry: A National Perspective on Workforce Trends and Challenges” (June 2008), the second report was “The Welding Industry: Trends and Challenges in Education and Training (2009)” and the third “The Welding Industry: A Regional Perspective on Workforce Trends and Challenges” (2008). All of these reports can be found on the Weld-Ed website www.weld-ed.org. These reports, coupled with additional information gathered throughout the Skill Panel process and further data collection through the use of Economic Modeling Specialists Inc. (EMSI) labor market information software, resulted in the publication “National State of the Welding Industry Report” that was completed in May 2010 and made available to the general public in September 2010.

The “National State of the Welding Industry Report” and its appendices represent the most comprehensive body of data that has ever been produced regarding the U.S. welding industry, its history, needs and what the future holds. While AWS has conducted a number of surveys over the past several decades about the industry, none was conducted that quantitatively looked at labor market data from traditional sources, from the industry itself and utilized economic modeling to gather a true picture of where the industry was in 2002, where it currently is in 2010 and where it is projected to be in 2019.

The report quantifies the urgent need for new welding technicians to be in the educational pipeline, and debunks the traditional perception of welding as a dark and dirty career. The report also proposes approaches to change the image of welding. The executive summary of the State of the Industry report is available as a PDF at www.weld-ed.org. The full report can be ordered by calling (866) 529-WELD or e-mailing weld-ed@lorainccc.edu.
Weld-Ed is deeply grateful for the commitment of the members of the National Skills Panel, who devoted countless hours to these important projects. Their work is critical to the advancement of the welding and materials joining industry.

**Members of the National Skill Panel included:**

- Gerald Uttrachi, chair, American Welding Society (SC)
- Gene Lawson, co-chair, American Welding Society and ESAB (CA)
- Robert Visdos, facilitator, Workforce Institute, Inc. (OR)
- Patricia Adams, ENTRON (SC)
- Bruce Albrecht, Miller Electric (IL)
- Charlie Albright, the Ohio State University (OH)
- Alan Badeaux, North Point High School and AWS District 3 (MD)
- Chris Bailey, Lincoln Electric (OH)
- David Beneteau, Centerline Welding Products (MI)
- Jeanette Carter, the Pennsylvania College of Technology (PA)
- Dave Dickinson, Dickinson Consulting (OH)
- Barbara Derwart, Brian Jones and Laura Putnam, JBS International Inc. assigned to U.S. DOL/ETA (DC)
- Sterling Dolese, Northrop Grumman
- Nick Evans, Northrop Grumman Shipbuilding (LA)
- Darren Haas, Northrop Grumman Shipbuilding Gulf Coast
- Lee Kvidahl, Northrop Grumman (MS) Shipbuilding Gulf Coast
- John Letki, ESAB (SC)
- Dr. James McKenney, the American Association of Community Colleges (DC)
- Jennifer McNelly, the Manufacturing Institute an affiliate of the National Association of Manufacturers (DC)
- Stephen Paquette, the Stark Development Board (OH)
- Monica Pfarr, the American Welding Society (MI)
- George Rollins, Fluor
- Kevin Roossinck, Northrop Grumman Ship Systems (MS)
- Dr. Audrey Smallwood, the Alabama Technology Network (representing the NIST MEP Program)
Kris Stadelman, the Seattle-King County Workforce Development Council (WA)

Mike Trupo, the U.S. Department of Labor/employment and Training Administration (DC)

Dr. Larry Warford, the League for Innovation in the Community College (AZ)

Frank Wilkins, Texas State Technical College – Waco (TX)

Dean Wilson, AWS and Wilson Industries (CA)
Curriculum Committee Develops Core Standards for Weld-Ed

For welding to continue to move forward, it’s important that the educators of Weld-Ed are teaching to the same standards, no matter what part of the country they call home. To meet that goal, the Weld-Ed Curriculum Committee created a core curriculum for welding technicians.

This intensive process began with collecting student outcomes from partner colleges and crosswalking the outcomes to learn which core courses are being taught by the majority of partner institutions. The core was then compared with the Department of Labor/Weld-Ed Welding Competency Model to identify any industry needs that were not represented on the core list from the colleges. Partners were then given the opportunity to recheck their curricula to investigate if their programs met any of the missing items from the Competency Model list.

From there, partner colleges used their industry connections by asking two local welding/materials joining industry partners to validate the need for the core courses and the items from the Competency Model list.

The list, as confirmed by the industry partners around the country, was presented to the American Welding Society’s curriculum committee and members provided feedback to the list.

The final core list of student outcomes that will become the Weld-Ed National Curriculum Model for Welding Technicians was approved. The final list includes hundreds of standards in 16 core areas: Assembly; Blueprint Reading; CNC Programming; Flux Cored and Sub-Arc; Gas Metal Arc; Gas Tungsten Arc; Metallurgy; Non-Destructive Testing; Occupational Health and Safety; Oxy-Fuel Welding and Cutting; Process and Equipment; Robotic Welding; Shielded Metal Arc; Shielded Metal Arc/Pipe Welding; Welding Design; and Welding Fundamentals.
Additional information regarding the competency modeling process and the elements that make up each of the steps and blocks of each competency model can be found at the Weld-Ed website www.weld-ed.org or on the U.S. Department of Labor’s Competency Model Clearinghouse website www.careeronestop.org/CompetencyModel.
The National Visiting Committee (NVC) is the formal review board for a National Science Foundation Advanced Technical Education project. The NVC meets with project staff and partner college representatives annually in person to review the accomplishments of the Center for the past year, to hear plans for the next year, and to make recommendations based upon what has been presented. An NVC committee is voluntary and consists of leaders from different disciplines within a particular industry or subject matter. The Weld-Ed NVC was formed in such a manner consisting of representatives from industry, two-and- four-year education institutions, secondary education, and a Principal Investigator from another NSF ATE Center.

Two-year Community College Faculty
Dr. Rick Polanin
Instructor
Illinois Central College

Roy Lanier
Welding Department Chair
Pitt Community College

Secondary School Educator
Scott Burdge
Welding Instructor
R. G. Drage Career Tech Center

Four-year College/University Faculty
Prof. George Cook
Professor of Electrical Eng.
Vanderbilt University
School of Engineering

Industry Representatives
Dr. Herschel Smartt
INL Fellow & Department Mgr
Idaho National Laboratory

Dennis Blunier
Caterpillar (retired)

John Mendoza
Training & Development Analyst
CPS Energy

Ms Nancy Cole (Chair)
President
NCC Engineering

Harvey Castner
Program Manager
Edison Welding Institute

NSF-ATE Principal Investigator / Director
Karen Wosczyna-Birch
CT Community Colleges
Executive Director - College of Technology/Regional Center for Next Generation Manufacturing
Weld-Ed’s Industry Relationships Build Better Welding Technicians

A key component of Weld-Ed is building relationships with businesses and individuals in the welding and materials joining sector. Each partner college and university is tasked with continually seeking new ways to engage their local manufacturing leaders in the welding education process. After all, for Weld-Ed to be successful, the current generation of welding technician students must graduate with the skill sets required to meet the needs of industry.

All of Weld-Ed’s regional partners enjoy numerous partnerships with their local industry and Chattanooga State Community College is just one example of how strong industry connections keep a welding program viable.

Chattanooga State’s advisory panel boasts more than 30 local individuals that represent a dynamic cross-section of materials joining, welding and labor businesses and organizations in the Tennessee, Georgia, and Alabama regions. Notable partnerships include the Volkswagen Academy and the Building and Construction Institute of the Southeast. Additionally, the college has a close relationship with Tennessee Valley Authority, a corporation owned by the U.S. government that provides electricity for 9 million people in seven southeastern states.

Not only do Weld-Ed partners benefit from the advice shared by their industry partners, often times students benefit through unique internship or apprenticeship programs that are born from Weld-Ed partnerships. At Chattanooga State, welding students have the opportunity to participate in apprenticeship program in plumbing, carpentry, iron work and other fields.

As Chattanooga State and the other regional partners have learned, fostering industry partnerships makes for a better educational experience for students and creates a next generation of welding technicians who are workforce ready.
Chapter 7

Professional Development
Weld-Ed understands that well trained educators and instructors are essential to producing skilled students, ready to dominate the workforce. To that end, Weld-Ed offers continuous training programs to ensure those at the front of the classroom are knowledgeable in the most current techniques and standards in the industry.

Intense, two-week Train the Trainer sessions were offered from 2007-2009 at five partner facilities. Locations for the training included Lorain County Community College (OH), The Ohio State University, Pennsylvania College of Technology, Yuba College (CA), and Texas State Technical College allowing for as many educators as possible to attend training. The conferences were aimed at high school, technical school, community college and technical college instructors.

Topics addressed include: arc welding, physics of welding, non-arc welding, metallurgy background, heat flow, safety, metallurgy in welding, design and testing. At the end of each session, attendees receive a complete set of training materials for use in the classroom.

John Gable, a welding instructor at Jefferson High School in El Paso, Texas, attended his first Train the Trainer session in 2009 in Waco, Texas by taking advantage of a grant that paid for his trip. He enjoyed the course so much that he paid to attend the 2010 conference out of his own pocket.

Gable has been teaching welding to high school students for nearly 20 years and understands the importance of staying up with the latest trends and technology in the field. He also understands the budget and space constraints of teaching at the high school level.
Through well adapted programming, Gable was able to take home several ideas to immediately implement in his classroom. Also an instructor at El Paso Community College in El Paso, Texas, Gable was able to lay the groundwork for the expansion of the welding program at his high school and also implement teaching upgrades to his classes at the college.

“The Train the Trainer sessions have motivated me go out on my own and implement the changes they suggest,” Gable said. “I hope Weld-Ed continues offer this great opportunity so that I can continue to get better at my profession.”
Chapter 8

Minority Recruitment
From her first taste of welding as a junior in high school, Carissa Love was hooked. The challenge of the work relaxed her and there was a side bonus – she was better than the boys in her class.

Love continued her passion for welding and enrolled in the Welding Technology program at Texas State Technical College, where she continued to be at the top of her class. Her skills won her a top honor and a place in history as the first woman to win the American Welding Society’s Professional Welders Competition in November 2009 in Chicago.

As champion, Love was awarded $2,500 which she used toward her education as TSTC, where she received an Associate of Applied Science in Welding Technology degree and continued on through the school’s innovative and intense Advance Pipe Welding course. The 32-hour a week pipe welding course prepares students for the demanding tasks of a professional pipe welder.

Love’s win sparked chatter in the welding world, affirming many people’s belief that women make better welders than their male counterparts.

To continue to recruit women and other young welders, TSTC uses a mobile welding trailer that travels to high schools in the region and allows the students a hands-on welding demonstration, right in their own backyard.

No matter her sex, Love’s win ignited pride in her alma mater. A banner still hangs outside the welding office at TSTC, congratulating Love in her AWS championship.

Following completion of the Advanced Pipe Welding course, Love planned to begin work in the field. She aspires to become a welding inspector.

For those thinking of a career in welding, Love offers advice: “Work hard and try your best.”
Wheelchair Project Creates Opportunity for NDCS Faculty, Student to Get Creative

Where the world sees challenges, welders see opportunity. For many students with disabilities, welding opens the door to a new world, one where they can get their hands dirty and make a tangible difference.

Accommodating students with unique abilities can present welding instructors with a plethora of opportunity to renovate their class. Such was the case when Jordan Kay enrolled at North Dakota State College of Science.

Determined to earn an associate’s degree in welding technology, Kay hit a stumbling block when he discovered he was unable to reach some classroom projects from his traditional wheelchair.

Rather than turn away from the problem and find a new career path, Kay and his instructors at NDSCS designed a wheelchair that lifts Kay to a standing position, allowing him to complete jobs that require a person to stand upright.

From the day Kay enrolled at the college, faculty began searching for solutions to day-to-day hang-ups that Kay faced in his seated position. An elevator was installed to get him to second-floor classes and tables with adjustable heights were utilized in classrooms. Still, instructors Joel Johnson and Jay Schimelfenig knew the NDSCS welding family would face a unique issue when Kay began courses in fabrication, which typically requires students to stand during projects.

Schimelfenig worked diligently to design a chair that elevates Kay to a standing position. After more than 200 hours of design time, Schimelfenig teamed with Johnson, and later with Kay, to begin constructing the new chair. Unable to use a battery-operated chair in a welding lab for safety reasons, the chair uses air pressure to power the lift mechanism. The chair can be connected by hoses to an air source, or fitted to a carbon monoxide tanks for increased mobility.
Kay controls the air pressure with a switch on the arm rest. When the chair is activated, the undercarriage first moves down to lift the front wheels off the ground. The seat then lifts to a 75-degree angle, propelling Kay to a standing position while keeping his weight pushing back on the main frame of the chair. With a belt holding his upper body in place and a leg brace securing his knees, Kay uses his legs to support the rest of his body weight.

With the advantages of the new chair, Kay earned his associate’s degree. Following graduation, he completed a summer work program as a welding technician with the city of Minot through the Job Service North Dakota Workforce Investment Act Youth Program. In the city job, he not only completed welding jobs, but helped the city shop become more wheelchair accessible.

The faculty at NDSCS gave Kay the opportunity to achieve his welding dream. Along the way, Kay not only became a trailblazer for disabled students with a passion for welding, but he taught those around him about the boundless opportunities that arise when traditional methods are challenged.
Chapter 9

Products & Dissemination
Weld-Ed and AWS Develop Marketing Materials to Attract Young Welders

The future of welding is dependent on recruiting a new batch of welders. In order to attract a more diverse sector of youth, a variety of print and online recruitment materials have been developed. These items include:

“Hot Bikes, Fast Cars and Cool Careers” is a DVD developed by AWS for use in promoting careers in welding. The video features Troy Trepanier, Jessi Combs and Bryan Fuller, who starred together in TLC’s “Overhaulin.” The three stars of the video have continued to collaborate on cool custom builds and to promote careers in welding. In this video, they share their personal stories about getting into welding bikes, cars and trucks, and why young people should consider building a career in welding. The video also includes a guest appearance by TV host Jay Leno, who is a motorsports enthusiast and car collector extraordinaire, who gives his own perspectives on why America needs more welders.

“In Demand Magazine – Careers in Welding,” is an AWS and Weld-Ed publication that guides students to career opportunities in welding. The magazine provides career information to youth and adults who are interested in exploring careers in welding. This magazine offers job profiles, interviews, salary information, educational information and more for interested individuals to consider before choosing a career in the welding field.

The “Careers in Welding” Web site was developed as part of the Weld-Ed NSF ATE contract and is the primary Internet attraction tool for prospective welding students. The site provides career information, industry news, company profiles, welding publications and other information, including welding videos. The site targets students, welding professionals who want to upgrade their skills or explore welding career pathways, and educators who are interested in promoting welding careers to students, parents and other interested parties.
“The Invincible Iron Man” comic was developed by AWS in cooperation with Marvel Comics to promote welding careers to youth. More than 100,000 copies of this comic book have been distributed to youth in the K-12 setting throughout the U.S. A second version of the comic was released in connection with the second Iron Man feature film in May 2010. This comic has been well received and has successfully promoted welding careers to youth who otherwise may have never considered welding as a vocation or a career opportunity.
Chapter 10

The Future of Weld-Ed

BY DUNCAN ESTEP
DIRECTOR, WELD-ED
As we think about where we will go from here, it’s important to reflect on all that has been accomplished over the course of Weld-Ed thus far. Weld-Ed has engaged in a number of initiatives that will continually increase the number and quality of welding technicians available to meet the needs of industry.

Throughout the Center’s brief existence, Weld-Ed has become a vital resource encompassing welding education and training across the United States. The Center has provided breakthroughs such as a national curriculum model for welding education, a modular national professional development program for secondary and postsecondary instructors, and an unprecedentedly in-depth look into the state of the welding industry, locally, regionally, and nationally. Most importantly, the Weld-Ed Center has united educators, industry, organizations, and government with the sole purpose of recruiting and training the future of the welding industry- an industry critical to the economic recovery and future prosperity of the United States. Moving forward, Weld-Ed will expand its set of offerings to include services to industry and education leaders. The National Weld-Ed Center and Regional Partners will help to identify welding technician training needs, marketing and recruitment strategies, and assist with updating curriculum to meet regional industry needs.
Chapter 11

Contacts
Chattanooga State Community College
4501 Amnicola Highway
Chattanooga, TN 37406-1097

Jack Sample
jack.sample@chattanoogastate.edu
(423) 697-2670

Illinois Central College
One College Drive East
Peoria, IL 61635

Rick Polanin
rpolanin@icc.edu
(309) 694-5404

Honolulu Community College
874 Dillingham Blvd.
Honolulu, HI 96817

Michael Barros
mbarros@hawaii.edu
(808) 845-9229

Lorain County Community College
1005 N. Abbe Road
Elyria, OH 44035

Tom Annable
tannable@lorainccc.edu
(440) 366-7015
North Dakota State College of Science
800 6th St. N.
Wahpeton, ND 58076

Joel Johnson
Joel.Johnson@ndscs.nodak.edu
(701) 671-2170

The Ohio State University
1250 Arthur E. Adams Drive
Columbus, OH 43221

Dave Farson
Farson.4@osu.edu
(614) 688-4046

Pennsylvania College of Technology
One college Ave., DIF 122
Williamsport, PA 17701

Jeannette Carter
jcarter2@pct.edu
(570) 320-8003

Texas State Technical College
3801 Campus Drive
Waco, TX 76705

Matt Siddens
matt.siddens@tstc.edu
(254) 867-3552
Weber State University
3848 Harrison Blvd.
Odgen, UT 84408

Mark Baugh
mbaugh@weber.edu
(801) 626-7540

Yuba College
2088 North Beale Road
Marysville, CA 95901

Dan Turner
dturner@yccd.edu
(530) 741-6932

Weld-Ed
National Center for Welding Education and Training

National Center for Welding Education and Training Contacts
1005 N. Abbe Road • Elyria, Ohio 44039
www.weld-ed.org
(866) 529-WELD

Monica Pfarr
Weld-Ed Principal Investigator
American Welding Society
mpfarr@aws.org
(800) 443-9353  x 461
Duncan Estep  
Center Director  
destep@lorainccc.edu  
(440) 366-7016

Ramona Anand  
Project Manager  
ranand@lorainccc.edu  
(440) 366-4930

Michael Fox  
Research Analyst  
mfox@lorainccc.edu  
(440) 366-4927

Weld-Ed Staff and Partners
Acknowledgements

Special thanks to the National Science Foundation, without which Weld-Ed would not have been possible.

Thanks to the Weld-Ed Center staff, regional partners, the American Welding Society and industry partners who collaborate daily to further Weld-Ed’s mission and goals. Thanks to writer Kim Carrasquillo, Weld-Ed Research Analyst Michael Fox and Rob Musser of Visual Rhyme Creative for compiling this summary booklet. Thanks to Ernest Levert, Monica Pfarr, and Duncan Estep for their knowledge and expertise.

This Weld-Ed publication was prepared with support from the National Science Foundation under grant number 0703018.