

Analysis of the Capabilities for Development of Employee Extrusion Technology

Training Programs within the El Paso, Texas Area

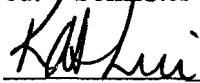
by

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**ABSTRACT**

The basis for this study is the Extrusion Technology Certificate developed by Northwire, Inc. in conjunction with the Wisconsin Indianhead Technical College-New Richmond in 2003. This joint initiative was viewed as the best option to provide Northwire with a recruitment base of employees skilled in both technical extrusion and personal development skills. The Certificate has replaced the previous system of eight to twelve weeks of one-on-one, on-the-job training followed by six to eight months of supervised training (Northwire, 2004). The two-semester Certificate is taught on-site at Northwire. The results: the 320 one-on-one training hours have been replaced by 160 hours of hands-on and classroom time. The skill level of new employees has risen significantly. Employees now earn technician skill level in one to one and a half years

versus the previous four to five years. Productivity and quality ratings for Extrusion Technology Certificate graduates have been twice as high as non-graduates. The El Paso Community College is a possible partner in starting such a Certificate if proven feasible. Research, analysis, and planning are required to determine if the El Paso area can sustain a Certificate in Extrusion Technology and whether or not the El Paso Community College can provide the equipment, faculty, and funding to support it.

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## *Chapter I: Introduction*

### *Background*

This study was prepared upon request of a wire and cable manufacturer in Wisconsin that had recently opened a satellite facility in Santa Teresa, New Mexico. The satellite's location immediately west of El Paso provided manufacturing facilities in close proximity to major current customers in Mexico and future growth opportunities within the southwest region.

Extrusion technology skills are paramount to manufacturing wire and cable. This process is the first and last step in production. It involves technical set-up of six components of equipment via computerized engineering drawings and instructions. Personal judgment is needed to determine correct color, temperature, and speed for custom products. Plastic and color pellets are melted onto various gauges of copper through extrusion to make a conductor. Conductors are twisted together to form a cable. Plastic is extruder over the cable to complete the finished product.

The plant experienced high turnover rates during the first two years of operation. Quality and production rates were below standard. Management identified several issues that they felt attributed to this:

1. Insufficient communication skills. English was a low-level second language.
2. Lack of computer skills. All production work instructions and documentation are computerized.
3. Lack of an in-house highly trained extrusion technician.
4. Work habits and behaviors that did not reflect company key values.

Northwire requested the researcher to analyze the possibility of creating a training program for Santa Teresa employees that provided the same level of education that the Wisconsin program provides.

#### *Statement of the Problem*

The problem addressed in this study is the need for technical extrusion and soft skill training programs for start-up and growth of a wire and cable manufacturing facility in Santa Teresa, New Mexico.

#### *Purpose of the Study*

The purpose of this study is to perform analysis of the possible development of an extrusion technology certificate with the El Paso Community College (ELCC) that mirrors the competencies taught through the Wisconsin Indianhead Technical College-New Richmond (WITC) Certificate.

#### *Assumptions of the Study*

1. A viable labor market exists in the El Paso area.
2. A sufficient pool of students will enroll in an Extrusion Technology Certificate if offered.
3. Northwire, Inc. will require all employees other than entry level functions to graduate with this Certificate.
4. El Paso Community College is the best educational option within this geographical area.
5. The core competencies identified in the American College Testing Program (ACT) WorkKeys program administered at the Wisconsin plant are consistent with extrusion jobs at the New Mexico facility.



6. The lacks of skills identified by management within the satellite facility are valid.

### *Definition of Terms*

*Certificate* - “Courses selected from an existing associate degree or diploma program that are combined to meet the special needs of people having related experience and/or who are working in the field. Selected continuing education courses (degree credit, diploma credit, and/or noncredit courses) combined into a curriculum that serves to update specialized career skills.” (*A Lifetime of Learning*, College Catalog, Wisconsin Indianhead Technical College-New Richmond, 2004-5, p. 17).

*Competency* – “An individual’s demonstrated knowledge, skills, or abilities performed to a specific standard.” “Competencies consist of a combination of knowledge, skills, and abilities that are necessary in order to perform a major task or function in the work setting.” (*Competency-based Training Tutorial*, JGN Consulting, 637 Jackson Street, Denver, CO 80206, p. 3).

*Core Competency* - “The knowledge, skills, and attitudes that are expressed through behavior and contribute to the success of an individual’s job performance and to the overall success of the organization” (*Core Competencies*, Dundon, Elaine, MBA, Presentation at American Society for Training and Development International Conference and Expo, May 18, 2003, 2:00pm-3:00pm).

*Extrusion* – The process of melting plastic pellets and covering copper wire and/or conductors (Northwire definition. Retrieved on September 9, 2005 from Northwire Host data base).

*Job Profiles* - A process utilized to identify key skills and skill levels an employee must have to adequately perform a specific job in a specific company.

*Limitations of the Study*

1. This study is limited by the physical distance between the researcher and the El Paso Community College.
2. Changes in staff at the Advanced Technology Center, El Paso Community College limited and delayed the progress of the study.
3. The El Paso Community College does not use the Worldwide Instructional Design System (WIDS) which clearly identifies competencies to be taught and performance outcomes to be achieved through each class.

*Methodology*

1. Compile current curriculum developed by Northwire, Inc for the Extrusion Technology Certificate created in 2003 in conjunction with the Wisconsin Indianhead Technical College-New Richmond campus and compare to El Paso Community College.
2. Research cultural, environmental, and economic differences that may impact the program in the Texas/New Mexico area.
3. Analyze requirements for development of a certificate for accreditation in the state of Texas.
4. Research requirements and availability of equipment and instructors.
5. Marketing/advertising of program.
6. Investigate possible state funding programs
7. Identify costs per employee for each location.

8. Locate facilities and equipment.
9. Study class schedules for both locations for convenient schedules for employees and company production schedules.
10. Research opportunities for development of new classes and current class re-design as required to include identified core competencies.

## Chapter II: Literature Review

### *Introduction*

This chapter will discuss the importance of technical colleges as partners with businesses in developing employee training. Background information on the WorkKeys program utilized by the employer to identify core competencies for extrusion is provided. The Worldwide Instructional Design System used in Wisconsin in application of competencies in lesson plans and classes is discussed. Funding sources to assist small businesses in costs incurred in developing programs are also discussed here.

### *Partnerships with Technical Colleges*

Partnerships with business have been the foundation of technical and community colleges since their founding. The United States faced global economic competition in the early twenty century. In order to maintain the country's economic strength, a higher skilled workforce was needed. According to Pamela Owens in her University of Wisconsin Stout thesis paper, the need for an increased college enrollment was identified by the American Association of Community Colleges (*An Assessment of Business and Industrial Training Trends in the Chippewa Valley Technical College District*, The Graduate School, University of Wisconsin Stout [electronic version]. Retrieved March 3, 2008 from 2008

<http://stolib.wisconsin.edu/cgi-bin/Pwebrecon.cgi?v1=2&SAB1=Technical%20Training&BOOL1=all%20ofthese&FLD1=Keyword%20Anywhere%20%>).

Businesses worked with local technical colleges to develop specific job function training. With the direct connections to jobs, student enrollment has continued to grow. The success of such programs is evident in the number of program and certificate offerings in the Wisconsin Technical College System (WTC on-line catalog, 2008). Examples of business partnership programs include:

- \*Cabling Technician
- \*Extrusion Technician
- \*Information Security Specialist
- \*Medical Coding Specialist
- \*Plastic Injection Molding Setup Technician
- \*Supervisory Management Systems

In researching program and certificates offered at the El Paso Community College, the same strong relationship to training for jobs is evident (ELCC website, *Programs and Certificates*. 2008). Examples of business partnership courses include:

- \*Industrial Manufacturing – Plastics
- \*Technology – Robotics & Automation
- \*Computer Aided Drafting Operator
- \*Industrial Patternmaker
- \*CNC Machinist
- \*Basic Firefighter

Wisconsin Indianhead Technical College publishes a very direct mission statement on page two of their website: “Learning is our passion. As Northwest Wisconsin’s leader in technical education, WITC creates dynamic opportunities for career preparation and personal effectiveness.” The site continues to describe the idea that for them, learning is first for all programs and certificates taught.

The El Paso Community College does not display a college-wide mission statement. The Instruction Programs section on page one of the school’s website repeats the following in several locations on their web site: “The mission of the Instructional area is to ensure high quality courses and outstanding programs in various deliver modes to all individuals who desire to pursue higher education. In addition, the Instructional area will provide a wide array of support services to foster student success.”

#### *Identifying Core Competencies*

Required key skills for extrusion were identified in the Wisconsin manufacturing plant through the use of the WorkKeys program developed by ACT. ACT is a not-for-profit international organization providing educational assessments, research, and workforce development service. ACT has identified key generic employability skills: skills crucial to effective job performance in many positions (ACT, Inc., WorkKeys,

*Frequently Asked Questions*. Retrieved on March 3, 2008 from

<http://act.org/workkeys/overview/faq.html#skills>). The WorkKeys System has a basis in these skills: Reading for information, Applied Mathematics, Listening, Writing, Teamwork, Applied Technology, Locating Information and Observation.

This System consists of:

- \*Job Profiling/Job Analysis to determine skill requirements,
- \*Skill Assessment to identify the current skill of employees, and
- \*Instructional Support to assist trainers/teachers in improving skills.

Job profiles or job analysis can be done for a specific job at a specific company.

The ACT WorkKeys program book states that a job profile can help a business answer the question: what does it take to be a customer service representative at this particular company? (*WorkKeys System*. (pp.1) ACT Education Services). Occupational profiles are more generic than a job profile and identify skills needed to perform the same type of job in many companies and industries. It can answer the question for example: In general, what does it take to be a customer service representative? The profiler begins by reviewing information such as job descriptions, company information, and the Dictionary of Occupational Titles (DOT) from the U.S. Department of Labor. A task list is drafted from this data. Interviews with employees actually performing the job follow the review of information. A final task list is developed by the employees and the profiler to identify WorkKey skills and skill levels. Each task is rated for the importance to the job. Time spent on each task is noted and rated. Once the job's critical tasks are identified through this rating system, each task is broken down to the WorkKeys skills needed to perform them successfully. The level of skill required for each of these skills is also agreed upon.

Eight assessments are utilized singly and in combination to measure workplace skills under the WorkKeys program (*WorkKeys Assessments*. Retrieved on March 3, 2008 from <http://www.act.org/workkeys/assess/>). These assessments have been developed with

the validity standards described in the Equal Employment Opportunity Commission's Uniform Guidelines. The following assessment areas are included:

1. Applied Mathematics
2. Applied Technology
3. Listening
4. Locating Information
5. Observation
6. Reading for Information
7. Teamwork
8. Writing

WorkKeys materials explain that testing has proven that workers having solid academic, problem-solving, and communications skills are most likely to be successful employees, therefore their assessments concentrate of these skills.

Utilization of WorkKeys provide valuable information to employers for development of training initiatives, defining skill requirements for jobs and applying them to the hiring process. The program helps employees understand what is expected of them in their job and how continuing training and education can impact their career.

#### *Worldwide Instructional Design System*

The Wisconsin Technical College system utilizes the Worldwide Instructional Design System (WIDS) as the tool for class development. WIDS is a part of the WTCS Foundation, Inc. which is a long-standing non-profit organization established for the advancement of education (WIDS, *History*, 1-2. Retrieved on March 28, 2008 from



[http://www.wids.org/index.php?option=com\\_content&task=Section&id=10&Itemid=96](http://www.wids.org/index.php?option=com_content&task=Section&id=10&Itemid=96)).

In 1993, the Foundation collaborated with 16 technical colleges to develop this performance-based instructional design system for use by both education and business. This system was developed in Wisconsin in response to the observed need to develop a shared data base of lesson plans within the State technical school system. This popularity led to expansion into a title change and applications for over 150 worldwide organizations. It is currently utilized by seven states. This database allows access to information regarding the core competencies taught in any class. Texas does not utilize this system and therefore does not publish competency and outcome information for public review to the same extent that Wisconsin does. Class offerings in Texas provided titles and brief class descriptions (ELCC on-line catalog, 2008). Classes identified with their matching competencies are listed in Table 1.

#### *Funding Sources*

Wisconsin's governor Jim Doyle developed the Workforce Training Grant program to provide financial support to businesses for training current employees enabling them to advance and earn more money. The grants reimbursed 75% of costs incurred for instructional design, equipment, instructors, and labor hours for training (S. Lockwood, personal communication, February 12, 2005). The Economic Development Department of New Mexico offers businesses financial help in training new employees. The Job Incentive Training Program in New Mexico provides up to 75% labor hour replacement for up to 6 months to provide training for newly hired employees.

### Chapter III: Research Methods

#### *Statement of the Problem*

The problem addressed in this study is the need for technical extrusion and soft skill training programs for the start-up and growth of a new wire and cable manufacturing facility in Santa Teresa, New Mexico

#### *Purpose of the Study*

Analyze the possible development of an extrusion technology certificate training program in coordination with the El Paso Community College that mirrors the competencies taught in the Wisconsin Indianhead Technical College-New Richmond Certificate.

#### *Subject Selection and Description*

Extrusion operations are the core process in manufacturing and therefore highly trained technicians are vital to a wire and cable manufacturing facility. The researcher chose the extrusion skill set for the study because of this (Lou Garriga III, personal conversation, April 8, 2003).

#### *Data Analysis*

A number of college catalogs, company records, and course outlines were reviewed and analyzed for this report. Comparisons were made between Wisconsin and Texas technical schools for related programs and classes (Appendix A, B, C, and D). The researcher verified that core competencies matched, learning style variances were considered, and class schedules were compatible with production schedules at the plant. College biographical information was studied for location, equipment, graduation rates, and faculty competency (Appendix E and F). The researcher and Director of the

Advanced Technology Center, El Paso Community College met to outline school objectives and capabilities. Department of Economic Development, State of New Mexico training incentive programs were analyzed by the researcher for possible financial reimbursement opportunities.

Support materials on course design using accelerated adult learning techniques, learning styles, and competency-based training were reviewed to assist the researcher in identifying these techniques within the class offerings at both campuses. The objective was to incorporate them in the program to be developed if not already included.

### *Limitations*

1. The physical distance between the researcher and the Texas campus limited the face-to-face planning sessions and meetings. Data collection therefore relied on email and web-based information and research which were at times slow to progress.
2. The major limitation was a lack of continuity with the staff at the Advanced Technology Center of El Paso Community College. The first extrusion instructor hired to develop course materials and teach technical classes, resigned following completion of the first three lesson plans. A second instructor was hired and began revising the lessons and adding his materials. He then resigned. The Director of the Center then resigned. Following 10 months, I was able to identify his replacement and had to begin planning and discussions with new staff.
3. The El Paso Community College does not utilize WIDS. (J. Consuales, meeting May 10, 2005). This system clearly identifies and documents

competencies and learning outcomes for each class. The ELCC class information did not provide clear competencies or learning outcomes.

### *Summary*

The purpose of the study was to analyze the possibility of developing a training program. Meeting this goal required unique techniques for methodology. A great deal of statistical data review and analysis or surveys were not needed. The study concentrated on information gathering and comparison reports (Appendix E and F).

## Chapter IV: Results

### *Background*

The purpose of this study was to analyze the possible development of an extrusion technology certificate with the El Paso Community College that mirrored the competencies taught in Wisconsin Indianhead Technical College-New Richmond Certificate. The Wisconsin program includes both technical extrusion skills and core soft skills that have proven to assist students in becoming successful employees. The start-up of a new facility in New Mexico, on the west border of El Paso, Texas highlighted the need for a similar training program at that location. A comparison study of the Wisconsin Certificate specifics with the capabilities of the Advanced Technology Center at El Paso Community College to develop a similar program was performed. The intent was to use the information to develop state-approved Certificates for employees working at the New Mexico facility.

### *Item Analysis*

Multiple components of the Wisconsin Indianhead Technical College (WITC) Extrusion Technology Certificate were compared to the Advanced Technology Center at El Paso Community College (Appendix F). Six main components were identified and studied: core competencies, class offerings, class development, equipment, instructors, and student pool.

#### 1. Core Competencies

WorkKeys analysis performed in Wisconsin identified the core competencies required to perform the extrusion job. These competencies were utilized for a basis for the Texas Certificate, with related classes becoming the core

requirements. Basic math skills and reading information were the highest rated skill requirements by employees performing extrusion work. Therefore, these two skill sets were needed in the class schedule for the Texas program. Hiring experiences at Northwire in Santa Teresa during 2004-6 illustrated the local culture required initial assessments to determine the level of English language reading skills and math skills and possible tutoring needs (M. Molner, personal conversation, May 11, 2005). El Paso Community College (ELCC) offers both the screenings for an associate degree level and tutoring to assist students to achieve that level. The Workforce Development Center at the college offers classes in bilingual computer and English for the workplace under their Center for Workforce Preparedness program. (ELCC, *on-line catalog*, 2008).

## 2. Class Offerings

The El Paso Community College catalog was used to identify classes that mirror those offered in the WITC Certificate (ELCC *on-line catalog*, 2006, 2008). Texas has offered a Certificate in Industrial Manufacturing-Plastics for over three years which in Fall 2008 included four classes directly related to extrusion. The four core areas covered in current classes are an introduction to plastics, college math, plastic composites, and quality standards. In Wisconsin, the Introduction to Plastics and Composites lesson plans are included in the Extrusion Controls & Operations I & II classes, however, both math and quality remain independent classes. Interpersonal communications and work practice competencies were not found in classes offered in Texas

other than in short workshops or continuing education offerings through the Workforce Development Center. These are important skill sets taught in Wisconsin through Workplace Reality and the Human Side of Quality classes (Appendix A, B, C, and D).

As illustrated by the on-line course catalog and verified in meetings with Center staff, El Paso Community College does not offer accelerated learning classes. This is a limitation for work places, since it requires longer semesters that include more class sessions. The goal is always to have students and/or employees learn and apply skills as quickly as possible. The three semester plastics program offered at ELCC would require too much time away from the job and loss of production time.

### 3. Class Development

In developing the Wisconsin certificate, it was found that current class offerings did not contain all of the required competencies identified by the company. This was also true in Texas. WITC cooperated with re-design of current classes and inclusion of new classes designed to include missing competencies. For example, the area of interpersonal communications and workforce readiness were essential to the Wisconsin program and not available in Texas. WITC incorporated classes being taught at other school locations and accepted re-designs completed by the company involved. (S. Lockwood, personal conversation, March 10, 2003). Curriculum re-designs for the Texas Certificate were discussed during a May 10, 2005 meeting with the Director of the Advanced Technology Center and three of the instructors.

It was agreed that the company could design courses utilizing the Worldwide Instructional Design System format for incorporation into the Texas Certificate (J. Consuales, personal conversation, May 10, 2005).

#### 4. Equipment and Facilities

The Wisconsin Certificate is taught on-site at the manufacturer's location. Classroom space, computer lab and an extruder designated for training are provided for students. In New Mexico, however, classroom space is limited to a conference room with three laptops. Extruders can be utilized only while in-production and Saturdays. The need for extrusion equipment twenty-four hours per day at the plant limits when classes can be scheduled there. ELCC has no equipment at the school.

#### 5. Instructors

A full time technical trainer specializing in extrusion was hired by the company in Wisconsin and sub-contracted to WITC to teach classes. ELCC had one plastics instructor on staff that specialized in injection molding. Based on initial meetings regarding the creation of an extrusion certificate, ELCC hired an experience extrusion instructor to assist in state-approved course design and as faculty.

#### 6. Student Pool

Enrollment statistics provided on WITC-NR's website state that one in nine residents sign up for some sort of class. ELCC's website figures show that 8,000 credit students and 10,000 continuing education students enroll each semester.



Additional issues illustrated in Appendix F, support the conclusion that development of a sister training program through El Paso Community College is not recommended at this time. The current ELCC plastics certificate is three semesters in length versus the one semester accelerated program in Wisconsin. Texas has a much more complex approval system for crediting of classes within technical education than Wisconsin (J. Consuales, personal conversation, September 11, 2005). Providing a state-approved Certificate may not be possible at that location. State funding sources have been available in Wisconsin, providing assistance to small employers and technical colleges for new program development, instructional design and training sessions. Similar funding sources could not be located in either Texas or New Mexico. New Mexico offers training incentive dollars for new hires for on-the-job programs only (C. Evans, personal conversation, October 12, 2005).

## Chapter V: Discussion

This study was generated by a company's need for technical and soft skill training programs in Santa Teresa, New Mexico. The Wisconsin location had addressed the same needs by developing a state-approved technical certificate with the Wisconsin Indianhead Technical College. The purpose of the study was to develop the same type of program with the El Paso Community College.

### *Limitations*

1. The study is limited by the physical location of the researcher and the El Paso Community College. Communications were limited to one meeting and multiple telephone calls and emails that delayed progress.
2. Changes in the staff at the Advanced Technology Center at El Paso Community College limited and delayed the progress of the study.
3. The El Paso Community College does not utilize WIDS for class design. This system clearly identifies competencies taught and learning outcomes for each class. The researcher was limited to class descriptions listed in on-line catalogs.

A new limitation arose during this study that resulted in the termination of the proposal tied to this study. A wire and cable competitor opened a facility on the east side of El Paso, within five miles of the El Paso Community College east campus. The researcher was notified that the company would not support a publicly offered program with ELCC that would possibly train competitor's employees (L. Duncanson, personal conversation, October 19, 2007).

## *Conclusions*

The lack of technical and soft skill training programs for extrusion required for a start-up facility and future growth in Santa Teresa, New Mexico cannot be addressed at this time by designing a certificate program with ELCC.

This statement is based on the following study findings:

\*Although a cooperative environment existed with the Advanced Technology Center at ELCC at the beginning of this study, the planning process disintegrated with staff changes.

\*A certificate program with the required competencies, both technical and soft skill oriented, taught in one semester, and requires new design. This process would require staffing, funding, and approximately one year to complete.

\*An experienced extrusion instructor is needed, preferably in-house at the company facility.

\*Extrusion equipment must be available at a minimum four hours per day.

\* The El Paso campus of ELCC is located within the home location of current employees and would therefore work well for classroom training. However, with the majority of new hires and future employees coming from the Las Cruces, New Mexico area, the distance is prohibitive for those employees.

\*Cost per employee would higher using an ELCC program. Factoring the cost of tuition, books, lost productivity, and travel time the average cost per employee would exceed \$13,200 per employee. Average cost in Osceola is \$10,000. See Appendix G for details.

*Recommendations for Providing Technical Skills Training*

1. The best option, particularly in light of new competitors moving into the area, is to develop a strong in-house on-the-job training program taught by the skilled technicians on staff.
  - a. Investing in a train-the-trainer program for these technicians. The first step is to identify one employee on each shift that illustrates strong teaching and technical skills. Instruments that assist in identifying personality, leadership, and interpersonal communication styles can be utilized for this task. If technical skills are lacking, support staff from the Wisconsin plant can travel to New Mexico to provide training. The Wisconsin in-house train-the-trainer certification class can be taught by Osceola personnel to provide learning and teaching techniques.
  - b. Written on-the-job training outlines. To provide consistency in training on all shifts, written training calendars should be prepared for trainers to follow. These calendars can serve as checklists for training and documentation of verification of learning obtained. Special standard operating procedures, safety topics, and specific company policies can be included.
  - c. Using human resources (HR) personnel to coordinate and track training, maintaining required records. Corporate HR

can assist in providing training needs analysis and instructional design as required for the program.

*Recommendations for Providing Soft Skills Training*

1. Interpersonal communications and workplace expectations skills taught in the Wisconsin classes of Workplace Reality and Human Side of Quality can be taught in workshops designed by WITC. Instructors from WITC are willing to travel to Santa Teresa to provide such training on weekends.
2. Problem-solving and Troubleshooting skills can be taught in-house by the Director of Southwest Operations in three scheduled sessions over an eight month period.
3. Basic math, computer, and language skills can be addressed through enrollment in classes such as Bilingual Computer and English for the Workplace at the Workforce Development Center, Center for Workforce Preparedness at El Paso Community College.

Following this study, the researcher feels that the best option for the company would be development and implementation of an in-house on-the-job training program supplemented with specific competency-based workshops.

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## Appendix A: *WITC Extrusion Technology Certificate Overview*

### Overview

The Extrusion Technology certificate gives learners practical theory and applications necessary to enter a career in plastic extrusion equipment setup and operation. The course work is largely hands-on in an actual manufacturing setting. Areas of emphasis include operation of plastic extruders in the wire and cable industry.

### Student Profile

As a student in this certificate, you should be able to:

- Apply mechanical principles
- Be very detail oriented
- Work with people and ideas in a team setting
- Assume responsibility for quality work

### Preparation for Admission

The following will help you prepare for this certificate:

- Basic math/algebra/geometry
- Print reading
- Basic computer skills

### Outcomes

Employers will expect you, after completing this certificate, to be able to:

- \*Use engineering specifications and drawings to set up extruder and auxiliary equipment.
- \*Run product to customer specifications.
- \*Set up production work cells.
- \*Document processes and procedures.
- \*Maintain accurate records.
- \*Troubleshoot extrusion operations.
- \*Perform preventative equipment maintenance and basic repairs.
- \*Maintain tools and equipment.
- \*Inspect materials and product for quality
- \*Work productively and cooperatively with others.

### Career Outlook

After completing this certificate, you will be ready for your career as an:

Extrusion Operator  
Extrusion Technician

### Curriculum

#### Number Course Title Credits

10196115 Human Side of Quality 3.0  
10196189 Team Building and Problem Solving 3.0  
10623120 Quality Assurance 1.0  
32804373 Math 373 2.0  
47623409 Extrusion Controls and Operations 1 .8  
47623419 Production Tracking Systems .8  
47623420 Extrusion Controls and Operations 2 .8  
47623421 Workplace Experience in Extrusion 3.2  
47623430 Quality Tasks for Production .3

CERTIFICATE REQUIREMENTS 14.9\_\_

## Appendix B: *WITC Extrusion Class Descriptions*

### **800.243.9482 witc.edu**

**10196115**

#### **Human Side of Quality - Credits: 3.0**

Participants will have the opportunity, through activities, to demonstrate personal, team, and organizational practices. The activities will foster interdependence among coworkers and continuous improvement related to human aspects of habits and behaviors. The course will include themes of self-knowledge, self-mastery, team development skills, interpersonal communication skills, and training skills.

**10196189**

#### **Team Building and Problem Solving - Credits: 3.0**

In Team Building and Problem Solving, the learner applies the skills and tools necessary to facilitate problem solving in a team environment. Each learner will demonstrate the application of the benefits and challenges of group work, necessary roles in a team, stages of team development, different approaches to problem solving, consensus, systematic process of problem definition, data acquisition, analysis, developing alternative solutions, solution implementation, evaluation, and documentation.

**10623120**

#### **Quality Assurance - Credits: 1.0**

Welcome to the Quality Assurance course. Companies in the United States are in the business of producing and delivering products and services to consumers like you. Quality has been a buzzword in the business world for a number of years. What is quality? How are companies in America and around the world attempting to improve quality? In this learning experience, you will explore the meaning of the term quality and some of the philosophies and strategies that American industry has been focusing on to improve the quality of their products and services.

**32804373**

#### **Math 373 - Credits: 2.0**

This course covers practical applications of whole numbers, fractions, decimals, percent, proportion, and formula evaluation. The course also includes measurement, U.S. and metric systems of measurement, and basic geometry.

**47623409**

#### **Extrusion Controls and Operations 1 - Credits: .8**

Learn the process and equipment involved in manufacturing wire and cable products to quality and customer specifications, and the set up and operation of wire and cable extruders. Students will physically setup extruder for production runs; interpret extruder controls and perform adjustments per schedule and/or guidelines; run product at 99.7 percent quality; perform operator-designed preventative maintenance; and set up and operate auxiliary equipment such as lasers, printers and band makers.

**47623419**

#### **Production Tracking Systems - Credits: .8**

Use of AXIOM software in scheduling, tracking and directing production. Competencies obtained in the course: Understand Axiom process and purpose; interpret work orders and instructions; produce accurate labels; locate and interpret special manufacturing instructions; read and interpret product drawings; accurately enter personal production data; and print reports.

**47623420**

#### **Extrusion Controls and Operations 2 - Credits: .8**

In this extension of Extrusion Controls and Operations 1, students learn the advanced process and equipment involved in manufacturing wire and cable products to quality and customer specifications, and the setup and operation of wire and cable extruders. Students will physically set up extruder for production runs; interpret extruder controls and perform adjustments per schedule and/or guidelines; run product at 99.7 percent quality; perform operator-designed preventative maintenance; and set up and operate auxiliary equipment such as lasers, printers and

band makers.

**47623421**

**Workplace Experience in Extrusion - Credits: 3.2**

This hands-on opportunity will allow students to utilize skills and knowledge gained in "Extrusion Controls and Operations" on the production floor, manufacturing actual product. Students will run product at 99.7 percent quality and set up and operate extruder.

**47623430**

**Quality Tasks for Production - Credits: .3**

In this course, students will learn use of precision measurement tools and testing. SPC charting and data analysis will be included. Hands-on lab work in performing everyday quality tasks in a manufacturing setting.

## Appendix C: *ELCC Plastics Certificate Plan*

EL PASO COMMUNITY COLLEGE  
COUNSELING DEGREE PLAN  
2008-2010

### ADVANCED TECHNOLOGY INDUSTRIAL MANUFACTURING Plastics

**Certificate of Completion**  
MAJOR CODE: 17382

Catalog Year

DATE:

Student Name Social Security #/ID# FA Student VA Student  
Student Signature Date  
Counselor Name Counselor Signature

EPCC  
COURSE

RUBRIC/TCC Number

REQUIRED COURSES  
TITLE

CREDIT  
HOURS

#### FIRST SEMESTER

<i>HYDR 1445</i>	Hydraulics and Pneumatics	4
MATH 1332	College Mathematics	3
PLTC 1301	Introduction to Plastics	3
PLTC 1303	Plastics Composites	3

#### SECOND SEMESTER

<i>DFTG 1413</i>	Drafting for specific Occupations	4
PLTC 1343	Mold Design and Maintenance	3
PLTC 1445	Plastic Processes I	4

#### SUMMER SESSION

PLTC 1306	Plastic Quality Control	3
PLTC 2446	Plastic Processes II	4

Total Credit Hours      *31*

**Students are advised to refer to the course descriptions for all courses identified in the degree plan to ensure they have completed the appropriate prerequisites**

## Appendix D: *ELCC Plastic Certificate Class Descriptions*

2007-2008

### ELCC TECHNICAL COURSE DESCRIPTIONS

# M

MATH 0300. COLLEGE PREP MATH.

Credits 3.

Introduces basic mathematical concepts and skills with emphasis on whole numbers, fractions, decimals, ratios, proportions, percents, and a brief introduction to negative integers. May not be counted toward graduation requirements. Prerequisite: Score at appropriate level on placement exam. (3:0). Mathematics Discipline.

MATH 0301. PREALGEBRA. Credits 3.

# P

PLTC 1301. INTRODUCTION TO PLASTICS. Credits 3.

Surveys a course designed to introduce the student to the field of plastics. Overviews thermoplastic and thermoset materials and the major processing methods utilized by industry. (2:3). Advanced Technology Industrial Manufacturing Discipline.

PLTC 1303. PLASTICS COMPOSITES. Credits 3.

Introduces techniques used to combine various types of reinforcing elements with a polymer resin to yield specific characteristics and properties not attainable by either constituent acting alone, in addition to additives and modifiers, covers blends, alloys and engineering plastics. (2:3). Advanced Technology Industrial Manufacturing Discipline.

PLTC 1306. PLASTIC QUALITY CONTROL. Credits 3.

Instructs in reading and interpreting blueprints for inspection purposes of plastic parts. Emphasizes geometric dimensioning and tolerance and hands on setup using modern inspection tools and gages. Covers first article check as per customer requirements. Introduces Statistical Process Control and Design of Experiment. (2:3). Advanced Technology Industrial Manufacturing Discipline.

PLTC 1343. MOLD DESIGN AND MAINTENANCE. Credits 3.

Introduces the basic design parameters of plastic injection molds including mold flow, nominal walls projection, depressions, and ejector systems, runners, gates, parting lines, and general mold configurations. Emphasizes maintenance techniques on in-house molds. Covers essential rules for designing molds for amorphous, crystalline and thermoset plastics. (2:3). Advanced Technology Industrial Manufacturing Discipline.

PLTC 1372. BLUEPRINT READING FOR PLASTICS. Credits 3.

Studies the different types of manufacturing blueprints and the application of each. Emphasizes blueprints germane to the plastics industry, including mold blueprints. (3:0). Advanced Technology Industrial Manufacturing Discipline.

PLTC 1445. PLASTIC PROCESSES I. Credits 4.

Identifies and examines thermoplastic processes. Emphasizes safety, selection, and preparation of raw materials, machine functions, mold setup, and the use of auxiliary equipment associated with injection molding. (3:4). Advanced Technology Industrial Manufacturing Discipline.

PLTC 2431. TROUBLESHOOTING PLASTIC PROCESSES. Credits 4.

Develops knowledge in process diagnosis and corrective action including minor repair procedures for plastics processing equipment and basic machine control settings. Includes creation of process sheets and transfer of control data. Introduces various machine control systems. Intense simulation of production environment. Prerequisite: PLTC 2446. (3:4). Advanced Technology Industrial Manufacturing Discipline.

PLTC 2446. PLASTIC PROCESSES II. Credits 4.

Continues Plastic Processes I with further emphasis on injection molding techniques. Examines thermoset molding utilizing both compression and transfer processes. Surveys vacuum forming, extrusion, and blow molding. Prerequisites: PLTC 1303, PLTC 1445. (3:4).

*Appendix E: Class Comparison*

WITC-New Richmond	El Paso Community College
1. Basic Math	College Math
2. Quality Standards	Plastics Quality
3. Industrial Safety	None Offered
4. Workplace Reality/Human Side...	None Offered
5. Problem-Solving & Trouble-Shooting	None Offered
6. Extrusion Controls & Operations I & II	None Offered
7. Production Tracking Systems	Bi-Lingual Computer as tutorial



Appendix F: *Certificate Component Comparison*

Program Component	WITC	ELCC
1. Core Competencies	Reading English Math	English Math
2. Class Offerings	*Basic Math *Quality Standards *Industrial Safety *Workplace Reality/Human Side *Problem-Solving/Trouble Shooting *Technical Extrusion *Production Tracking Systems	*College Math *Plastic Quality *None *None *None *None *None
3. Class Development	Full Cooperation/design services	Outside contracts
4. Equipment/Facilities	In-house 8 hrs/day On-site No production	None in-house Saturday at plant Campus Production
5. Instructors	FT technical trainer on-site	Contract instructor
6 Student Pool	1 in 9 residents enroll	8,000 credit/10,000 Continuing Ed.
7. Accelerated Programs	Yes-one semester	No- three semesters
8. State Accreditation	Yes	No
9. Funding Sources	grants: 75% of cost	Wage reimbursement New hires - 6 months
10. Class Schedules	1 <sup>st</sup> & 2 <sup>nd</sup> Shift hours	1 <sup>st</sup> shift only
11. Program Marketing	Website Catalogs Brochures	Same “ “
12. Screening Programs	Math Reading Writing Compute	Math Reading Writing

*Appendix G: Average Cost per Employee*

Item Charged	Wisconsin Cost	NM Cost
1. Tuition	\$2,000	\$3,972
2. Books	\$400	\$600
3. Labor	\$8,000*	\$8,812*
4. Mileage Reimbursement	-0-	\$134.40*
Total Costs	\$10,400	\$13,518.40

Notes:     \*Wisconsin average hourly rate = \$12.50; NM = \$13.77

          \*mileage of 25 miles one-way from plant; .48/mile; 80 trips or 1 semester.