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# Federal High Tech Cooperative Demonstration Grant

## FINAL REPORT

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# **Federal High Tech Cooperative Demonstration Grant**

**January 1990 - September 1991**

## **GOALS:**

The Federal High Tech Cooperative Demonstration Grant funded the creation of a model manufacturing training program for Oregon's precision metals industry. The program, a cooperative venture between private industry, education and government, focused on two main goals: (1) to train entry-level employees, and (2) to upgrade the skills of current employees in response to technological changes.

## **HISTORY:**

As much as 30% of the current workforce is expected to reach retirement age within the next five years creating the need for a pool of skilled labor from which to replace these retiring employees. With the precision metals industry placing increased emphasis on computerized manufacturing techniques and equipment, the need to provide training in the operation of 'state of the art' equipment also exists. Upgrade training, particularly in the areas of computer usage and numerical control equipment operation, is critical to continued industry growth. The Oregon Precision Metal Fabricators Association and the Northwest Screw Machine Products Association were formed to address these needs.

Prior to the acquisition of the Federal High Tech Cooperative Demonstration Grant, Clackamas Community College formed partnerships with Oregon's precision metal fabricators and screw machine products industries and leased a training site in Wilsonville, Oregon. The community college made this centrally-located space available for technical training during the grant period. In turn, the precision metals industries agreed to provide the equipment needed for instruction. Prior to the grant some curriculum planning had taken place and a few evening courses were being offered. The grant provided an opportunity to significantly expand the curriculum, add basic skills components, target special groups such as women and minorities, and solidify the educational missions and opportunities of the two newly-formed trade associations.

## **OBJECTIVES AND ACTIVITIES COMPLETED:**

### **1. Develop curricula for one-year certificate and two-year associate degree programs.**

With guidance from industry representatives, college staff developed competency-based curricula for nine-month certificate programs in the precision metal fabrication industry and the screw machine industry. All three instructors were recruited from industry and participated in the curricula development. One owns and operates his own manufacturing business and another helped write a textbook for the precision metal fabrication program entitled The Shear Edge.

Innovative arrangements with equipment manufacturers, suppliers, and association members provided both new and used equipment valued at more than \$750,000. Included were a new CNC laser cutting machine and CNC press brake loaned to the project by U.S. Amada Limited. The company loaned the machines to demonstrate the technology to prospective customers and to train the students in the precision metal fabrication program.

Additional CNC press brakes, shears, grainers, sanders, riveters, seven screw machines, tooling, and software were also donated or loaned for training purposes. Industry agreed to supply the training program with sheet metal, bar stock, and other supplies.

The college recruited students using a variety of methods (see objective #5). Recruitment for the training programs insured that unemployed and dislocated workers, injured workers, women, and other economically disadvantaged people were represented according to the grant's recruitment objectives. Each applicant was required to take a mathematics placement assessment to assure competency in the fundamentals of arithmetic. Applicants unable to demonstrate such competency were referred to "refresher" math courses prior to entering the program.

The certificate programs were designed to allow open enrollment at the beginning of each term, with a maximum enrollment of fifteen students in each program at any given time. The fifteen students in each class could be enrolled in the first, second or third term of the program with the three levels managed concurrently by one instructor. In addition to technical training, the certificate programs required students to complete courses in applied beginning algebra, technical mathematics, blueprint reading, flat pattern development, statistical process control, and geometric tolerancing and dimensioning. Although the overall focus of these programs was technical skills, students were trained in team building, interpersonal skills, work place problem solving, resume writing and interview skills.

### Precision Metal Fabrication Enrollment

	First Term Students	Second Term Students	Third Term Students	Term Total
Fall '90	7	0	0	7
Winter '91	2	7	0	9
Spring '91	7**	2*	7	16
Total No. Graduates in Prec. Metal Fab. 6/91		9		

\* Were given advanced course work to complete graduation by 6/91.

\*\* Students expected to continue studies in Fall 1991.

### Screw Machine Technology Enrollment

	First Term Students	Second Term Students	Third Term Students	Term Total
Fall '90	7	0	0	7
Winter '91	4	7	0	11
Spring '91	5**	4**	7	16
Summer '91	0	0	2 (spec arrg)	2
Total No. Graduates in Screw Machine Tech. Program 8/91		9		

\*\* Two students in the screw machine program completed the program by special arrangement during the summer 1991; other students expected to continue studies in Fall 1991.

To complement the certificate programs, Clackamas Community College developed additional support courses for the industry, including tool & cam design, MasterCam, CADKEY, and CNC laser cutting machine operation. These courses were offered in the evening and on weekends.

Much time and effort were spent on the development of 2+2 programs with area high schools. However, a number of intervening factors prevented the completion of this goal. Oregon schools were anticipating the economic consequences resulting from the passage of Oregon ballot measure #5, which limited property taxes currently used to fund public schools. Secondary school administrators agreed the 2+2 plans were viable, but were hesitant to commit additional funds and staff given the uncertain funding sources created by the tax limitation initiative.

In 1991 the Oregon Legislature passed major legislation requiring a comprehensive reorganization of both primary and secondary education. Under the legislation basic secondary education would be completed at the end of 10th grade. Students would then be given the opportunity to choose between college preparatory classes or professional/technical training. Statewide, primary and secondary schools and community colleges have begun planning for these changes. The 2+2 programs and associate degree programs required in the original grant will be a critical part of this new education system.

## **2. Design and implement a work-readiness assessment and training program.**

The six-week training program was designed to provide entry level trainees with the basic skills required for initial employment in the precision manufacturing industry. The pilot program, entitled "Introduction to Precision Manufacturing," began in April 1990, offering training in technical math, blueprint reading, use of precision measuring instruments, problem solving skills, machine shop safety, and hand and power tool usage. Industry tours provided opportunities for students to become acquainted with the workplace.

These programs were offered to students free of charge. The target audiences for these programs were the unemployed and underemployed. Applicants were assessed in two phases. First, the applicant was required to take the standard college placement examination in mathematics, reading and writing. Second, applicants met with the program instructor for a personal interview and performance tests involving spatial relationships. The philosophy of the assessment process was not to screen individuals but to recognize potential strengths and weaknesses prior to the beginning of the program. The instructor could then adapt the course content to better meet the needs of the immediate group.

Six work readiness programs were offered between April 1990 and April 1991. Seventy-nine students entered these programs; sixty-five students completed, of which over 80% were placed. Refinements were made to the initial curriculum with each successive program. The program was lengthened to eight weeks, allowing students sufficient time to better understand the course materials and acquire part-time employment. The unanticipated economic downturn in 1990-91 made fewer jobs available. To make graduates of the work-readiness programs more attractive and employable in industries outside the precision metals, additions were made to the curriculum. Optional courses in first aid/CPR and forklift driving were offered. Additional emphasis was also placed on team-building, work readiness, life and work problem solving, career and goal planning, resume writing and interviewing techniques. The program was originally taught by one staff member. However, near the end of the grant period several additional faculty members contributed teaching time, sharing individual talents and technical strengths.



**3. Provide staff development and training for instructors.**

Instructors for the six-week and nine-month programs attended a "Train-the-Trainer" program during the summer of 1990. At that time, all of the faculty had come directly from industry and had no teaching experience. The instructors attended a "Power Presentation Skills" seminar later in the year as a follow-up to this initial training. This training greatly contributed to their ability to work with adult and disadvantaged populations. Continuous support and guidance was provided to these instructors throughout the course of the grant.

In addition, faculty training was provided on state-of-the-art equipment loaned to the Center. One instructor attended a week-long seminar at the U.S. Amada School in California to learn the operation of the CNC laser cutting machine, and another support staff member, responsible for machine maintenance, attended the same seminar for a two-week period. Additional training was provided in Brooklyn, New York on the operation of the CNC plasma cutting machine. One instructor attended a course to learn about the coordinate measuring machine.

**4. Establish a replicable model that could be used by other groups interested in metals manufacturing.**

The curriculum for the certificate precision metal fabrication program is available for dissemination in a text entitled *The Shear Edge*. Curricula is also available for the screw machine certificate program, and a comprehensive, competency-based curricula is available for the six-week work readiness program.

Presentations were made by staff at the following conferences regarding the training programs and techniques used to create them:

- \* Regional Partnership Conference sponsored by NW Regional Education Lab, Winter 1990
- \* 1990 Work Now and In the Future Conference
- \* University of Missouri Training Institute, March 1991
- \* Oregon Vocational Career Counselors, April 1991
- \* National Coalition of Advanced Technology Centers, Spring 1991, Fall 1991

An article entitled "Forming the Future," written by staff member Nicole Skinner, has been published in the ERIC database. Articles concerning specific programs have been published in nationally-distributed periodicals such as *Automatic Machining* and *The Fabricator*. Local community colleges have received copies of the complete competency-based curriculum for the work readiness programs and certificate program outlines.

Two groups of high school manufacturing instructors and students have visited the Center to become familiar with the Center's programs and plan for the development of the 2+2 portion of the training program. In August 1990 the training center was represented by staff and students at the Oregon State Fair for ten days. Members of both industry associations represented the training facility and programs at the Portland World of Work Fair in the spring of 1991.

**5. Develop recruitment package designed to attract adults and high school students with special emphasis given to minority populations and women.**

The training center's recruitment plan targeted displaced workers, minority populations, women, career changers, unemployed and underemployed, immigrant populations, and injured workers. Program brochures, videos and application forms aided staff members during visits to public and private organizations, including high schools, alternative schools, employment offices, Adult and Family Service offices, community colleges, refugee centers, private industry councils, urban leagues, dislocated workers programs, and women's groups. Agency representatives were involved in the design of recruitment activities for each group. The close working relationship between the Center and state and private vocational rehabilitation and insurance groups seeking retraining for injured workers resulted in numerous student referrals.

Five students were employed by industry at the time they entered the certificate programs. Their employers made arrangements for them to attend classes and maintain their employment, and in many cases, paid for or reimbursed the students for the cost of instruction.

The training center staffed a public awareness booth at the Oregon State Fair in August 1990 for ten days. Feature stories appeared in such national trade magazines as The Fabricator and Automatic Machining. A local television station produced a feature story on the training center in relation to economic development in the state of Oregon.

Newspaper advertisements were used to solicit students for the six-week Introduction to Precision Manufacturing programs, and public service radio announcements and cable access were used to promote public awareness of all programs.

The programs and courses were printed in the Clackamas Community College term schedule of classes which is mailed quarterly to 100,000 residents and businesses. Specialized mailings were sent to individual industry association members and Society of Manufacturing Engineers members each term notifying them of current course offerings.

Center staff and industry personnel represented the training center at high school and community college career fairs and The World of Work Fair in Portland. High school metals/manufacturing instructors attended seminars at the training center, and two classes of high school students visited the training site. While all of these activities helped recruitment efforts, the most successful recruitment activity was personal contact with an organization, followed by a visit to the training center.

6. Offer 36 classes for 200 students by Summer 1991.

### Enrollment and Sections Data

1989 - 90 School Year	Sections	Head Count
Winter '90	15 Sections	174 Students
Spring '90	36 Sections	317 Students
School Year Totals	51 Sections	491 Students

1990 -91 School Year	Sections	Head Count
Summer '90	6 Sections	70 Students
Fall '90	21 Sections	200 Students
Winter '91	33 Sections	265 Students
Spring '91	45 Sections	318 Students
School Year Totals	105 Sections	853 Students
Two Year Totals (18 Months)	156 Sections	1,344 Students

7. Fill 100 job vacancies.

#### I. Work Readiness "Introduction to Precision Manufacturing" Programs

Of the 79 students enrolled in the six sessions of Introduction to Precision Manufacturing, 65 students graduated (82%). Twelve graduates chose not to seek immediate employment, seven entered the nine-month certificate programs at the training center, two enrolled in unrelated college programs, one student returned to high school, one entered the armed services, and one (a professional musician) chose not to seek employment in the metals industry.

Of the 53 graduates seeking employment, 43 had been employed as of May 1991 (81%).

### Areas of Employment for Intro to Precision Manufacturing Graduates

Precision Metal Fabrication	21 placements	48%
Screw Machine Industry	9 placements	20%
Related Industrial Areas	7 placements	16%
Unrelated Areas	7 placements	16%



Two additional Introduction to Precision Manufacturing programs were offered in the spring and summer of 1991 beyond the requirements of the federal grant. These programs were expanded to eight weeks and each student was required to pay a fee of \$1,195 to cover the costs of instruction. A total of 18 students attended these two sessions, most of them referred by private vocational rehabilitation agencies and the local Adult and Family Services division. All of the students completed the program, and five are currently employed in related industries.

## **II. Screw Machine Technology and Precision Metal Fabrication Certificate Programs**

In June 1991 there were seven graduates in the screw machine program. One graduate moved out of state and chose not to accept employment in the screw machine industry. The other six graduates are now employed with local screw machine companies (86%). Two additional students graduated from this program at the end of August 1991. One of these graduates started his own company.

Nine students graduated from the precision metal fabrication program in June. One of those students has not reached the legal age for employment in a manufacturing setting (18 years). However, the remaining eight graduates are now working in the precision metal fabrication industry (89%).

Seven students will be continuing their studies as second and third term students in the screw machine program in the fall of 1991. Seven students will be returning as third term students in the metal fabrication program. It is anticipated that these students will also be successfully placed following graduation.

## **III. Placement Procedures**

Students from all three programs were assisted in developing personal resumes to be kept on file at the training center. Student resumes, accompanied by a cover letter outlining the skills learned in the program, were mailed from the Center to area companies at the end of each program. In addition, members of the industrial communities volunteered time to conduct "mock interviews" to help students improve their interviewing skills.

A comprehensive job search and placement effort was initiated and maintained by project staff. Follow-up was done with companies where graduates had been placed to learn how the training programs could be improved in the future.

### **8. Evaluate the project.**

The project's goal was to develop a model center to train current and potential employees in the precision metals industries using the combined resources of the private sector, education and government. This has been done. From planning, to recruitment, to implementation, to job placement, industry and agencies have participated and assisted project staff in meeting these goals.

This project has been evaluated by the Northwest Regional Education Laboratory based in Portland, Oregon. The evaluation report, prepared by Mr. Tom Owens in June 1991, has already been submitted.

The success of the project, in part, can be measured by the industries' and public and private vocational rehabilitation agencies' continued demand for the training programs. Clackamas Community College has dedicated funds and space to continue the two certificate programs at a permanent college facility now

under construction in Wilsonville. The work readiness introduction to Precision Manufacturing program has already been continued beyond the requirements of the grant. Two additional programs, paid for by student fees, were offered this past spring and summer. Most students were referred by state or private agencies that often paid the fees.

Industry support, despite a recessed economy, is reflected in its continued involvement. As a direct result of the pilot screw machine training program and local industry support, Index GmbH plans to loan the training center a new CNC screw machine to provide an opportunity for advanced technical training for students and local companies. It is anticipated that the machine-loan program initiated by the Center with U.S. Amada will continue into the next year as well.

The curricula is competency-based and is suitable for replication. A textbook entitled The Shear Edge was written by project staff and is available through Clackamas Community College. Staff have participated in many appropriate activities to share project techniques and information. With little modification, the Oregon Metals Industry Council plans to use the work-readiness curricula developed at the training center for use in the primary metals industry during the next year.

There were, however, unanticipated difficulties in implementing the grant project. The uncertain economic marketplace made industry employers hesitant to employ new workers. There was no public transportation available to the training facility, causing frequent difficulties for a student population comprised of the unemployed and underemployed. The donated machinery was expensive to transport to the Center, in addition to creating unanticipated maintenance and tooling needs. Despite the loans and donations of machinery, there continues to be a need for additional CNC equipment, especially in the screw machine program.

Hundreds of students have benefitted from the training offered at the Center. Sixteen students have already graduated from certificate programs and many more will complete graduation requirements in the coming months. Sixty-five students completed the Introduction to Precision Manufacturing programs; over 80% of those students seeking work are now employed and many others have gone on to additional training.

However, individual success stories reflect the real success of the project:

Tanya, a twenty-two year old woman with one child, had numerous learning disabilities and was a high school drop-out. She was referred to the work-readiness program through the community college's Targeted Learning Center and Adult and Family Services. Tanya completed the six-week program successfully and was granted a scholarship through the college to attend the nine-month certificate program in metal fabrication. Tanya graduated in June and is now employed in a precision metal fabrication company earning \$7 per hour.

Robert was referred to the work-readiness program by his vocational rehabilitation counselor. While on a tour with his class to a local screw machine company, Robert was offered a job upon completion of the program at \$8 per hour. In addition the company volunteered to pay Robert's tuition while he attended the certificate screw machine program. He received a pay raise to \$10 per hour in June, and it is anticipated he will return to complete the program this fall.

Sunny, a forty-four year old Thai woman, attended the work-readiness program and found immediate employment at a precision metal fabrication company. She received a \$2 per hour pay raise after the first 60 days, was told she had broken all company production records, and has been asked to design an assembly department for the company. She will eventually have six other people working under her supervision.

The success attained by these individuals reflects the true strength of the training developed under this grant. Industry representatives and Center staff feel a sense of "pride in ownership" and seek to continually improve the programs through an open and candid evaluation and assessment process. The solid relationships forged between the training center and public and private agencies continue to aid in recruitment, retention and placement of students both now and in the future.

As a result of this training grant, many new individuals have entered the Oregon precision metals industry. Many more individuals already employed in the industry have upgraded their current skills. There is a genuine demand for the precision metals training programs by industry and human resource agencies, and these programs will continue beyond the grant period.

## **CONCLUSIONS**

While Ballot Measure #5 and the economic fluctuations of the targeted industries sometimes hindered the grant's objectives, we feel the overall project was an outstanding success.

The Federal High Tech Cooperative Demonstrative Grant has :

- Established an on-going series of industry specific training programs
- Established a model for similar projects that other industries in other regions can duplicate
- Increased the training and career options for the unemployed and underemployed in Oregon's Willamette Valley
- Attracted the interest, involvement and contributions of a variety of private corporations
- Addressed and eased the anticipated industry skill shortages and provided a long term solution to these problems
- Significantly contributed to the program graduates' future employment options
- Established a successful model of cooperation between industry, equipment suppliers and manufacturers, social service agencies, workers compensation insurance representatives, community colleges and the federal government.

As a compliment to the funding source and project staff, three recent events attest to the value of this effort.

- A. The loan of a 'state of the art' \$400,000.00 Multi-Turret CNC Screw Machine to the training effort by Index GmbH Incorporated of Germany and Leupold and Stevens of Beaverton, Oregon. These companies have agreed to replace this equipment on an annual basis with the latest technology.
- B. A request for technical assistance from an Adult and Family Services funded Inventory Control and Manufacturing training projects. These projects wish to replicate the human relations, problem solving and life & career planning component developed under this grant.
- C. The receipt of a State of Oregon Economic Development Grant to create a similar series of training programs for Oregon's Primary Metals Industry.