SHAW Consulting

Trade Adjustment Assistance Community College and Career Training (TAACCCT) II Grant
Third Party Review 2015

Institute:	New England Institute of Technology
Program:	**SAMI: Shipbuilding, Marine Trades and Advanced Manufacturing Institute**
Time Frame:	October 2012- September 2015
Reviewer:	Christine Shaw, Ph.D.
Date:	April 5, 2015

This report is a detailed accounting of the deliverables produced through the TAACCCT II grant received by New England Institute of Technology. The purpose of this report is to provide an assessment of the quality of the 'tangible' products identified by NEIT in their statement of work for the SAMI project. Specifically, the materials reviewed for this report include training manuals, curriculum documents, student assessments, academic developmental support materials and industry specific orientation content.

The SAMI project (page 11 of the grant application) established a four part work strategy for implementing the grant. The first category focused primarily on facilities, lab build out and staffing. These components establish the foundation on which the content delivery occurs and are part of the interim reports conducted by an outside evaluating agency.[1] The deliverables containing educational content and educational structures and processes relate to work strategies 2-3 are detailed in the report below. The grant consists of two additional work strategies, employment (4) and evaluation (5), both of which are part of the wider outcome measurements associated with this TAACCCT II grant.

Strategy 2: Recruitment and Assessment

Deliverables: Recruitment materials, student assessment tools and orientation process (technical and academic)

Recruitment materials: Though recruitment materials are not traditionally considered educational content, a number of the products produced by the SAMI project do in fact, have an educational aspect. New England Institute of Technology, in partnership with a Rhode Island manufacturing consortium, produced a video to promote the industry by introducing the opportunities and advantages of employment in the manufacturing field. The video is available to employment agencies, schools and community agencies to help inform people about the career options and job training in the

[1] Drexel University Center for Labor markets and Policy, Onsite Review NEIT/SAMI Grant. Preliminary Evaluation August 2014

field of manufacturing. Additionally, the recruitment activities included outreach to employers through presentations at chambers of commerce, business networks and government programs.

Specific content on the educational program components and engagement in the skill and knowledge standards taught as part of the program were presented. This feature in the recruitment process describes the continuum from entrance into SAMI and the exit into employment by the participants. Both employers, agencies that work with the under or unemployed and participants are informed and involved in the educational components starting at the recruitment phase. Evidence of this can be seen in the job postings for Electric Boat where they it is clearly stated that preference in hiring is given to SAMI graduates.

Student Assessment Tools: SAMI employs a continual cycle of assessment that starts before program admission (during recruitment) and continues through the employment placement phase to include after training (job evaluation). Specific products produced by SAMI related to assessment include:

- Pre-participant self-assessment: During orientation individuals interested in SAMI complete a self-assessment that asks them to consider
- Baseline Technical Skills Assessment (welding and machine) skills evaluation:
- Accuplacer (reading and mathematics)
- Interim Technical Skills Assessment
- Participant Performance Review (completed by instructor bi-weekly)
- Resume: The case workers from SAMI

Orientation Process: As part of the SAMI program the staff and partnering businesses developed a comprehensive orientation program. The orientation program has specific educational components including the self-assessment and baseline technical skills assessment as well as presentations and demonstrations by industry (grant deliverable). For example, during the orientation, potential participants are presented with the following prompts to assist them in critically thinking about their career goals and engagement in the program:

> *"Do I know and understand what employer's value in good employees in Rhode Island?"*
>
> *"Do I know what jobs in this industry pay at entry level?"*
>
> *"Am I ready, prepared, committed and able to fully participant in SAMI?"*

The orientation program then offers information and opportunities for individuals to answer these questions. Industry representatives participate in the orientation along with SAMI staff providing an overview of the industry, facts about employment opportunities, related occupations, what the jobs involve (21st Century Machinist, Welder), mission of SAMI ("To train and deliver a pipeline of workers to our employer partners who are skilled, reliable and productive") and a clear overview of the training and placement process.

Strategy 3: Training and Education

Deliverables: Courses, certificates, articulation agreements, job referrals

The SAMI project developed two distinct occupational skills training programs for welding and machine technology. Both of these programs directly serve the ship building, marine trades and advanced manufacturing industries in Rhode Island. The programs are competency based and training is delivered through an individual student driven model. There are two major components: first, the curriculum, developed in collaboration with industry partners (verified through independent focus groups with industry representatives) by instructors hired by SAMI with specific expertise within the industry areas. Second, student skills assessments that provide feedback to the students on what they have achieved and identifies areas of need for the instructor. The specific content is reviewed for each program separately below:

Welding: (8 week, 260 hours)

Delivery Method: The welding program is delivered through a blended model of theory and classroom instruction with lab based application. The physical space used for the program allows for transition between the classroom and the lab throughout the day. The instructors have extensive experience in the field as well as certifications directly associated with the ship building industry. In addition to classroom and lab instruction, participants have opportunities to visit companies and talk with employers about the job requirements, expectations and applications.

Content: The welding program includes a scaffolding of skill and knowledge development starting with a broad overview and introduction to arc welding, cutting, joining, and grooving. Throughout the program safety procedures are reviewed and specific time in the lab is given to practicing and ensuring safety protections are followed. Specific time allocation and topics for instruction can be viewed in

Appendix 1: Welding Curriculum

Machine Technology: (10 week, 300 hours)

Delivery Method: The machine technology program is delivered in segments of 30 hours for a total of 300 hours of instruction. However, the instructors utilize a competency assessment method which allows for participants to advance through the segments based on demonstration of mastery of specific skills and knowledge standards. The training space includes classroom, computer lab, mathematics lab and machine lab. The machine lab consists of two areas: one with manual machines for each area covered and another with computer controlled machinery. Each participant must pass skill evaluations on the manual machinery before moving to the computer controlled machinery.

Content: The classroom instruction focuses on safety, precision measurement, quality control, blueprint reading, AutoCAD, mathematics, materials and cutting tools. The machine specific skill development includes cut-off saw, drill press, lathe, milling and grinding (Appendix IV: Machine Technology Curriculum

With the machine technology program, industry partners played a specific role in selecting which machines to focus on. Though businesses hiring SAMI completers may use other machines specific to their trade (and materials such as plastics) the skills learned on the more common machines are transferable (based on feedback gathered during focus groups with employers and SAMI completers). Additionally, both employers and completers reported that the skills training with the manual machines was fundamental to successful operation of the computer controlled machinery (*See: Drexel University, Summative Analysis of Program Completers and Industry Partnership Engagement, November 2014).*

Quality Indicators (welding and machine technology):

Validity: SAMI used a number of methods to validate that the competencies incorporated into the training program are those needed for successful employment in the field of welding and machine technology. The full engagement of the industry partners in the creation of the curriculum provided a solid foundation when the program started. Additionally, instructors reported that components of the curriculum were adjusted and new skills added as a result of ongoing industry input into the skills training component. Throughout the year, employers are invited to visit or drop into the training program. This serves two purposes; to allow for input and industry advising as a continual process rather than a once or twice a year process often seen in the advisory board models and second, participants are able to engage with industry representatives while they are in the skills training program to expand their understanding of the work environment and what employers are looking for in an employee candidate. Industry representatives then certified the content of the training

programs. This is documented in letters of certification from each of the major industry partners for the project.

In addition, SAMI validates participants' occupational skills training content through follow up with employers and completers. SAMI developed an "In-training Participant Survey" which each participant completes while enrolled in the training (appendix II). SAMI responded to this feedback by increasing mathematics instruction needed for calculating tolerances on the job. Additionally, students who were able to engage in internships as part of their program, provided feedback to their instructors on the relevancy of their training regarding onsite application to different machines or manufacturing processes. Visits to businesses have also been incorporated into the SAMI program increasing the awareness of the job environment and expanding understanding of the application of the skills and knowledge presented during the training program.[2] Finally, each participant is surveyed during and at the completion of the program providing feedback regarding the training program (appendix III). This data is then processed with the instructors on a regular basis by the coordinators.

Articulation:

Articulation serves two purposes, one to provide opportunities for completers to continue their education in a certificate or degree program at New England Institute of Technology and second as a validation of the rigor and content alignment to technical academic program competencies. SAMI administration has secured articulation agreements for both the welding and the machine technology program in the following areas.

- 3 credits for MT114 Marine Welding. This is part of the Marine Technology Associate Degree program.
- 4 credits for MCT125 Machining Technology. This is part of the Mechanical Engineering Technology Associates Degree.

The curriculum content is developed in a way that the competencies are 'stackable' and the participants are able to continue on to more advanced training programs in areas such as pipefitting, sheet metal and robotics. During the industry partner focus groups, one partner, Electric Boat, reported that SAMI completers are able to by-pass one of their required training modules in welding and advance to the next training program.

Job Referral, Guidance and Advising Products:

The SAMI program utilizes a number of tools to help guide the participant through the program and assist with preparation for job placement and retention. One of the products created for this

[2] For more details on the feedback collected from employers and completers see the *Summative Analysis of Program Completers and Industry Partnership Engagement*, completed in November 2014 for the SAMI program.

component of the educational experience is the ***'Employment Action Plan'***. This document is used by the case manager and completed in partnership with the participant. Information regarding employment goals, assessment data, background information and work readiness and job seeking skills are included in this tool. Additionally, each participant completes a ***'Participant Agreement'*** which confirms their intent to complete the program, meet with their case manager and comply with program regulations. SAMI also developed a ***'Participant Handbook'*** which details the components of the program, expectation of participants and assistance with job placement and case management.

Prior to going out on a job interview, participants complete a resume with their case manager and participate in a workshop on the interviewing and application process. SAMI staff then provide a seminar to assist completers with preparing for the interviews including reviewing possible questions and developing strategies for presenting their abilities and skills in the best light.

As of April 1, 2015 the following companies have hired SAMI completers:

Aim Joraco
Aerotek Staffing Agency
American Tool
American Welding
Amtrol
Bank of America
Blount Boats
Cadence, Inc.
CMT Materials (MA)
Colonial Machine & Tool
Cranston Housing Authority
East Bay Manufacturing
Electric Boat
ETCO Manufacturing
Flagship Staffing Services
Greystone
Groov Pin
Guill Tool & Engineering
Little Rhody Machine & Repair
Maro Display
Matrix Power
Modene Applied Thermal Innovation
New Urban Arts
OAR Mold Works
Ocean State Technical Services
O-D Tool & Cutter, Inc. (MA)
Pilgrim Screw
Porter Machine
Primary Flow Signal
RI Carbide
Rice Machinery
Senesco Marine
Swissline Precision
Teknor Apex
Tiffany & Co.
TLR Security Services
Town of Scituate
Tradesmen International
Vibco Vibrators
Waddington Electric
Walco Electric
Xpress Sweeping

Summary:

On careful review of the orientation, instructional, job readiness and articulation components developed by New England Institute of Technology, it is evident that the coordinators in partnership with business and community agencies have developed and implemented a high quality, industry focused training program. The curriculum is highly competencies based (versus seat time) allowing

each participant the opportunity to develop the needed skills before moving forward. Though the welding program is a set number of days, participants are able to move on to advanced and additional skill development or stay for additional help if needed. The program developed specific tools to evaluate competency obtainment throughout and at the completion of the training program.

One reason this program is successful, in the eye of this reviewer, is the careful attention focused on the whole cycle, application through job placement. This cycle includes focused and purposeful activities during orientation (exploring the jobs, academic evaluation and skill assessment, program and industry expectations) continual monitoring of the training program delivery (staff evaluation, participant survey feedback, employer feedback) and job placement assistance (resumes, interview preparation, on-site interviews, employer satisfaction feedback, continued training). The program specifically links to associate degree options providing completers the option to continue their learning in structured academic programs as well as industry recognition to by-pass 'in-house' training. These options both result in financial savings or increased earnings for the completers.

Appendix 1: Welding Curriculum

N.E.I.T. / SAMI
WELDING TRAINING PROGRAM
COURSE SYLLABUS
(260 HOURS)

Classroom:
- Introduction to Welding program, Orientation and outline of training ..... l.0 hr.
- Welding basics. "What is Welding" Fundamentals and Theory..... .4.0 hrs.
- Welding and Cutting Safety. In accordance with AWS / ANSI Z- 49.1..... .4.0 hrs.
- Introduction to the SMAW (shielded metal arc welding) process ..... l.0 hr.
- Introduction to the GMAW (gas metal arc welding) process ..... l.0 hr.
- Introduction to the FCA W (flux core arc welding) process ..... l.0 hr.
- Introduction to the GTAW (gas tungsten arc welding) Process ..... l.0 hr.
- Introduction to the OFC (oxy fuel cutting) Process ..... l.0 hr.
- Safety in handling fuel gases and high pressure cylinders ..... l.0 hr.

Shop:
- Hands on demonstration ... SMAW, (basic carbon steel) ..... l.0 hr.
- Safety in the shop- hand tools .....1.0 hr.
- Welding machine basics..... 2.0 hrs.
- Passing out of PPE for welding (personal protective equipment)..... .30 min.
- Student welding practice ..... l.0 hr.
- Discussion and questions ..... 1.0 hr.
- Demonstration of OFC burning (cutting)..... 1.0 hr.
- Student practice with the OFC process ..... 3.0 hr.

Classroom and Shop:
- Weld joint configuration.....3.0 hrs.
- Welding positions (flat, horz. vert., O.H.) ..... 2.0 hrs.
- Demonstration of" out of position" welding ..... 2.0 hrs.
- Demonstration of welding lap and tee joints ..... 2.0 hrs.
- Student welding practice of lap and tee joints ..... l.0 hr.
- Discussion and questions..... 1.0 hr.
- Introduction to Groove welds..... 2.0 hrs.
- Demonstration welding of groove weld joint..... 2.0 hrs.
- Student welding practice of groove welds ..... l.0 hr.
- Discussion and Questions..... 1.0 hr.
- Student welding practice "out of position" welds ..... l.0 hr.
- Taking first written course quiz ..... 2.0 hrs.

Classroom:
- Introduction to Shipbuilding requirements ..... 2.0 hrs.
- Overview of Electric Boat, Quonset Point, R.I. ..... 1.0 hrs.
- Overview of Senesco Marine, N. Kingstown, R.I..... 1.0 hr.
- Overview of Blount Boats, Warren, R.I ..... 1.0 hr.
- Materials used in shipbuilding and their weldability..... 2.0 hrs.

Shop:

- Gas Metal Arc Welding- Standard CV and Pulse process.....4.0 hrs.
- Demonstration of GMA W (basic carbon steel) ..... l.0 hr.
- Student welding practice ..... l0.0 hr.
- Discussion and questions ..... 1.0 hr.
- Flux Cored Arc welding basics..... 2.0 hr.
- Demonstration of FCAW (basic carbon steel) ..... l.0 hr.
- Student welding practice..... 10.0 hrs.
- Welding of different joint types in shipbuilding (SMA W, GMA W, FCA W) 20. Hrs.
- Demonstration of welder qualification test..... 2.0 hrs.
- Student qualification test practice ..... 20.0 hrs.
- Discussion and questions ..... 1.0 hr.

Classroom and Shop:

- Taking second written course quiz ..... 3.0 hrs.
- Introduction to basic welding metallurgy ..... 3.0 hrs.
- Electrodes and their AWS classifications ..... 2.0 Ill's.
- Introduction to NDE (nondestructive examination)..... 2.0 hrs.
- Welding machine advanced set-up..... 3.0 hrs.
- Student welding practice ..... 1 0.0 hrs.
- Understanding dist01tion and effects of welding heat to base metals, Goules), And how to use preheat correctly (when and why) ..... 6.0 hrs.
- Introduction to pipe welding..... 2.0 hrs.
- Different metals used in pipe fabrication..... 1.51n·s.
- Gas Tungsten Arc Welding- pipe applications (demonstration) ..... 2.0 hrs.
- Student welding practice, GTAW (plate and pipe) ..... 8.0 hrs.
- Introduction to Blueprint Reading and Welding Symbols ..... 8.0 hrs.
- Student welding project ..... 15.0 hrs.
- Taking third written course quiz..... .4.0 hrs.
- Grading and inspection of student projects ..... 4.0 Ill's.
- Final welding practice session (preparation for employment) ..... 20.0 Ill's.
- Final overview, discussion, question and answer time and handing out of Certificates of completion ..... 5. 0 hrs.

Appendix II: Participant In-Training Survey

SAMI Participant Survey
In-Training Survey

Date:_____

1. **Please identify the SAMI Training Program you are participating in:**

☐ **Welding Training Program** ☐ **Machine Training Program**

2. **Please rate the following aspects of the training as of this point in the training program:**

A. The level of instruction in the "hands-on" Lab portion of the training is appropriate and easy to follow: ○ Agree ○ Disagree ○ Needs Improvement

B. The level of instruction in the classroom portion of the training is appropriate and easy to follow: ○ Agree ○ Disagree ○ Needs Improvement

C. The "hands-on" training on the machines/equipment is well coordinated with what I am learning in the classroom portion of the training: ○ Agree ○ Disagree ○ Needs Improvement

D. The Instructor(s) have a thorough grasp of the subject matter, teach at a level appropriate to my needs and demonstrate an interest in my progress: ○ Agree ○ Disagree ○ Needs Improvement

E. The training is an appropriate balance of classroom work and "hands-on" training: ○ Agree ○ Disagree ○ Needs Improvement

F. I have participated in Math Remediation: ○ YES ○ NO **If you checked "Yes" answer Question G below:**

G. Math remediation supports my progress in the training Lab and classroom: ○ Agree ○ Disagree ○ Needs Improvement

H. I have received assistance with the following: ○ Resume Preparation ○ Job Interview Preparation

If you checked either "Resume" or "Job Interview Preparation please answer Question I below:

I. I feel the SAMI Program has prepared me well for an an Interview with a resume that reflects my skills, accomplishments, education and the SAMI training: ○ Agree ○ Disagree ○ Needs Improvement

J. The staff in the SAMI Program are professional, knowledgeable friendly, and interested in my progress: ○ Agree ○ Disagree ○ Needs Improvement

I. I feel I am on track to successfully complete the SAMI Program: ○ Agree ○ Disagree ○ Needs Improvement

3. **Please identify any portion of the training with which you are having difficulty or feel needs improvement:**

4. Please identify any suggestions for program improvement (especially where you selected "needs improvement")

Appendix III: Program Completers Survey

SAMI Participant Survey
Date:_____
Program Completion
Participant Name:_____ Signature:

1. Did the SAMI Skills Evaluation Process, prior to training, help you decide which training track to choose?

☐ Yes ☐ No Please indicate "why" or "why not" in the space below:

2. **Please identify the SAMI Training Program you participated in?**

☐ Welding Training Program ☐ Machine Training Program

3. **Overall, how would you rate the SAMI Skills Training Program?**

○ Excellent ○ Good ○ Fair ○ Poor

4. **Please rate the following aspects of the training class:**

A. Training met my expectations:	○ Excellent	○ Good	○ Fair	○ Poor
B. The level of instruction was appropriate:	○ Excellent	○ Good	○ Fair	○ Poor
C. The length of the training was appropriate:	○ Excellent	○ Good	○ Fair	○ Poor
D. The Instructor(s) had a thorough grasp of the subject matter and interest in the students:	○ Excellent	○ Good	○ Fair	○ Poor
E. The training was an appropriate balance of classroom and "hands-on" training:	○ Excellent	○ Good	○ Fair	○ Poor
F. The training facility was well equipped, clean and safe:	○ Excellent	○ Good	○ Fair	○ Poor
G. The SAMI Program prepared me for employment:	○ Agree	○ Disagree	○ Not Sure	

4. **What was your favorite part of training?**

5. **Indicate your <u>least</u> favorite part of training and suggestions for improvement?**

5. **Did you get a Job after you completed the SAMI Program? ☐ Yes ☐ No**

If "yes": Is the Job training related? ☐ Yes ☐ No **Employer Name:**_____

Address:_____

Start Date: _ _/_ _/_ _ _ _ Rate of Pay: $_____ ☐ Hour ☐ Monthly ☐ Yearly ☐ Other

Appendix IV: Machine Technology Curriculum

MACHINE TOOL TECHNOLOGY

Certificate Program: 10 week segments
300 hours each segment

Work activities in machine shop involve applying knowledge of machine capabilities, the properties of materials, and shop practices to set-up and operate various machines. The skills needed to position work pieces, adjust machines, and verify the accuracy of machine functions and finished products are taught by classroom instructions, demonstration, and hands on experience. The machine training program will lead to employment.

Classroom Modules:

- Safety in the Work Environment
- Precision Measurement Tools & Quality Procedures
- Blueprint Reading / AutoCAD
- Technology Math
- Manufacturing Materials & Cutting Tool Geometry

Machine Modules:

- Cut-off Saw Operations
- Drill Press Operations
- Lathe Machining
- Milling Machining
- Grinding Machining
- Introduction to CNC Machining

MACHINE TOOL TECHNOLOGY
TEN WEEK SCHEDULE – 30 HOURS PER WEEK

1st PHASE - TWO WEEKS

COURSES	Hours per Week
Introduction to Manufacturing Employment	1
Safety in the Work Environment	3
Math in Machining	3
Introduction to Blueprint Reading	3
Basic Metrology	5
Manufacturing Materials & Cutting Tool Geometry	5
Bench work – Layout Principles / Hand Tools / Power Tools	10

2nd PHASE - TWO WEEKS

COURSES	Hours per Week
Safety in the Work Environment	2
Math for Manufacturing	3

Blueprint Reading / AutoCAD	5
Basic Machine Technology – Cut Off Saw & Drill Press Process	20

3rd PHASE – SIX WEEKS

COURSES	Hours per Week
Safety in the Work Environment	1
Math for Manufacturing	1
Advanced Metrology	3
Quality Procedures and Concepts	5
Machine Technology – Turning / Milling / Grinding	18
Introduction to CNC Machining	2

COURSE DISCRIPTIONS

BENCHWORK:

When you complete this lesson you will be able to identify the basic hand tools required and hand work methods used to manufacture replacement or repair parts used in various types of equipment.

- Describe tools and methods for work piece layout, bluing, measuring, scribing lines, and marking hole centers.
- Describe tools and methods for hand cutting material with a hacksaw, including hacksaw parts description, blade types, cutting edge alloys, and tooth pitch.
- Describe the different types of files and methods for filing and draw filing.
- Describe the types of hand reamers and methods for precision sizing of holes, including the use of hand reamers, hand chucks, and drivers.
- Describe the different types of deburring tools and techniques for the deburring of parts with hand tools.
- Describe the various types of taps and dies and the proper hand use of hand taps and dies.

METROLOGY:

When you complete this lesson:

You will be able to identify common micrometer types, identify their components, and correctly take readings using English, metric and Vernier micrometers.

- Identify common types of micrometers.
- List the major components of micrometers.
- Demonstrate how to take an accurate reading with an outside micrometer.
- Explain how to properly read the scale on an English scale micrometer, a metric scale micrometer, and a Vernier micrometer.
- Demonstrate how to take an accurate reading with an inside micrometer.
- Demonstrate how to take an accurate reading with a depth micrometer.

You will be able to describe the various types of fixed gauges commonly used by maintenance and machining technicians. You will also be able to explain the purpose of the various fixed gauges.

- Identify and describe the purpose of each of the following types of fixed gauges:

- Go No Go gauge
- Plug gauge
- Thickness gauge
- Screw Pitch gauge
- Radius gauge
- Small hole gauge

You will be able to list the major components of dial indicators and demonstrate how to use the instrument to take an accurate reading. You will also be able to describe how to use a dial indicator to measure the run out of a rotating part, and how to align two shafts using a dial indicator.

- List the main components of a dial indicator.
- Explain how to properly read a dial indicator.
- Describe how to measure run out.
- Demonstrate how to align rotating components.
- Describe various types of indicators.

CUT OFF SAW:

When you complete this lesson, you will be able to describe the design and operation of a band saw. In addition, you'll be able to explain how to use a bandsaw to produce various cuts.

- List the major components of a vertical band saw.
- Describe different types of available band saw cutting blades.
- Explain how to manufacture a band saw blade using the shearing, welding, grinding, and annealing attachments.

DRILL PRESS:

When you complete this lesson, you will be able to describe the design, function, and safe operation of a drill press and its major components and attachments.

- Explain safety precautions taken when operating a drill press.
- Describe various drill press components and attachments.
- List various types of drill presses and describe their operations.
- Describe how cutting speeds and feed rates affect drill press operations.

TURNING:

When you complete this lesson, you will be able to identify engine lathe control systems and machining methods, and explain the basic methods to manufacture replacement or repair parts for various types of equipment.

- Describe basic engine lathe parts and operational controls.
- Identify types of chucks and discuss procedures for installing and removing chucks and faceplates on cam lock spindles.
- Explain the operation and use of the four jaw chuck.
- Describe tail stock parts and operations.
- Describe the following types of cutting tools and discuss their uses:
    - Carbide and alloy turning tools and drills
    - Drill bits

    - Turning tools
    - Facing tools
    - Boring bars and tools
    - Threading and specialty tools
- Identify factors that determine suitable speeds and feeds for different cutting tools, operations, and work piece materials.
- Describe the basic methods used for:
    - Turning operations
    - Shaft work
    - Thread cutting
    - Boring bars and tools
    - Threading and specialty tools
    - Identify factors that determine suitable speeds and feeds for different cutting tools,

MILLING:
When you complete this lesson, you will be able to identify the basic control systems and machining methods used on a vertical milling machine and explain the basic operations necessary to manufacture replacement or repair parts used in various types of equipment.

- Identify the function of the vertical milling machine's operational controls.
- Explain how work pieces and cutting tools may be precision located through coordinate measuring.
- Explain how to square a work piece on a vertical milling machine.
- Describe the use of the holding and clamping tools.
    - Explain how to determine suitable speeds and feeds for various:
    - Cutting tools
    - Operations
    - Work piece materials
- Describe the use of each of the following cutting tools:
    - End mills
    - Woodruff cutters

GRINDING:
When you complete this lesson, you will be able to describe surface grinder control systems and explain basic machining methods used to manufacture replacement parts used to repair various types of equipment.

- Identify surface grinder components and identify their functions.
- Discuss techniques and components related to work piece clamping.
- Identify types of grinding wheels and compare their uses.
- Explain the basic steps for dressing a grinding wheel and profile-shaping a grinding wheel.
- Describe the two basic techniques for grinding a part.
- Identify safety equipment and best practices for safe grinder operation.
- Outline the technique for grinding a work piece parallel and to a specific size.

Appendix V: Sample Program Participant Performance Review

SAMI Machine
Skills TrainingProgram
Participant Performance Review

Review Period From:	**To:**
Date:	

Name of Participant:
Name of Training Program: ☐ SAMI Welding Program ☐ SAMI Machine Program
Location of Training:
Training Instructor:
Case Manager:

Instructors are to complete performance reviews on a bi-weekly basis and forward to Case Manager
RATING SCALE – Use ratings as defined below.

E – EXCEEDED EXPECTATIONS: A preponderance of the participant's work and performance exceeded expectations. The participant consistently did outstanding work, regularly going beyond what is expected of participants at this point in the training program.
M – MET EXPECTATIONS: Performance fully met the training/curriculum expectations, and may on occasion have exceeded expectations. The participant generally performs very well and requires little additional guidance.
I – IMPROVEMENT NEEDED: Performance met some of the training expectations but did not fully meet the remainder. The participant generally performs at a minimal level and improvement is needed to successfully complete the program. Performance deficiencies were due to the participant's lack of effort or ability to acquire skills.
F – FAILED TO MEET EXPECTATIONS: Performance generally failed to meet expectations. The participant did not perform at the level expected for participants at this point in the training program. Unacceptable performance was due to the employee's lack of effort or lack of demonstrated ability to acquire skills necessary to progress in this training program.
N/A – Not applicable at this point in the training program – will be relevant as training progresses

Performance Category	**Rating**	
Attendance/Punctuality: Dependable, present at training and on time. Absences are properly approved and reported. Indicate the number of days absent during this review period: _____.		
Cooperation/Teamwork: Projects a positive work attitude; follows instructions; relates and works effectively with Instructors, participants and others. Behaves and acts professionally.		
Communications: Listens carefully to Instructor and others involved in training; effectively expresses self in individual and group settings; respectful of others in all interactions		
Attention to Safety: Follows all safety procedures, works in a safe manner at all times, wears safety equipment as required and/or directed		
Knowledge of Work/Training Content: Understands training content and assignments; uses appropriate tools and equipment for assigned work		
Quantity of Work: Completes all assignments within specified time frames**;** demonstrates ability to adjust to unexpected changes in work demands		
Proficiency - "hands-on" skills: Demonstrates proficiency in developing "hands-on" skills to effectively utilize equipment, machines and tools of the trade		
Readiness for CNC Training: Based on the participant's performance in the manual machine training and math classes, he/she has demonstrated the readiness to progress to the CNC module(s) of SAMI Training	**YES**	**NO**
Proficiency – classroom instruction/participation: Demonstrates ability to understand instruction and apply lessons learned to work tasks, i.e, measurement, blue print reading, following instructions; takes notes during class, studies in preparation for classes		
Readiness for Employment/Internship: Based on the participant's performance in either the manual machine training, the CNC training OR both, the participant has demonstrated the competencies to be placed in either an internship or employment	**YES**	**NO**
Math Remediation: Understands math concepts at a level appropriate for this point in the skills training program. Demonstrates ability to apply math concepts to the machine skills training		

- ❑ **Participant is on track to complete training, but would benefit from one or more of the recommended services below** (please check)
- ❑ **Participant is NOT on track, at this point in the program, due to one or more of the following issues:**
  - □ **Attendance (Absence/ late for program)**
    Number of days absent during review period: _____

    Number of days tardy during review period: _____

    Make up required to meet curriculum hours to successfully complete program?

    __ Yes __No If Yes, please indicate what needs to be made up: _____

    Comment on reason for absence or tardiness:

    _____

    _____
  - □ **Program Performance/ Participation issue:** Describe participation issue (behavioral; work readiness – communication/listening/following instructions/attention to safety ;).

    _____

    _____

    _____
  - □ **Participant is having trouble demonstrating the skill level appropriate for this point in the program**
  - □ **Participant is having trouble keeping up and/or understanding program content**
  - □ **Participant is having trouble understanding and applying math to training**
  - □ **Participant is having personal issues which are impacting full program participation**
  - □ **Participant is failing or near failing tests, quizzes and/or practical exercises**
  - □ **Participant is having trouble with homework assignments**

INSTRUCTOR RECOMMENDATIONS

❑ Appointment with SAMI case manager to address personal or occupational barriers
❑ Math remediation
❑ Work readiness workshops (work behaviors/attitudes/resume/job interviewing)
❑ Other:_____

Comments (Please comment in regarding those performance categories where you have indicated the participant needs improvement OR is failing to meet expectations at this point in the program.)

SAMI Program
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