Program Name	Precision Machining
Program CIP Code	48.0500.30
Program Description and Coherent Sequence	The **Precision Machining** program is designed to introduce students to basic precision manufacturing and advanced machining principles and technical skills. Students will be prepared in the following instructional areas: manufacturing systems, production planning, information systems, quality control, documentation, technical problem solving, management, predictive/preventive maintenance and automated manufacturing. Students will have the opportunity to earn industry-recognized certifications such as NCCER Level 1 and MSSC Level 1, which can lead to the Certified Production Technician (CPT) certification, NIMS Level 1 certification or ASQ quality certification. The program is comprised of two core courses and a specific course in Computer Numeric Control (CNC) Precision Machining. The program uses a delivery system made up of four integral parts: formal/technical instruction, experiential learning, supervised occupational experience and the Career and Technical Student Organization SkillsUSA. **Fundamentals of Precision Manufacturing:** This course includes units of instruction in computer control and power systems used in manufacturing. Included are automated and control systems, materials and properties, mathematics, manufacturing processes, occupational safety, production systems and quality control. In each area, the topics emphasized are those fundamental to basic manufacturing processes and practices. Units include set-up and change-over techniques, using industrial instruments while utilizing technical skills applied to academic foundations of communication, geometric and algebra math applications. Students completing this program will develop advanced critical thinking, interpersonal relations and life and leadership management skills while building business relationships that are required for work-based learning utilizing workplace employability skills. **Applications of Manufacturing:** This course includes units of instruction in computer control and power systems used in manufacturing. Units also include set-up and change-over techniques, using industrial instruments and utilizing technical skills. Instruction also includes career opportunities in manufacturing, communications skills, work-based learning experiences, teamwork, safety, creative thinking and problem solving. **Precision Machining:** In this course students develop a clear understanding of mechanical systems including engines, pumps and medical devices as well as the need for highly accurate parts via modern CAD-CAM systems to produce 3-D developed components. Students will learn how tighter tolerances require

	ultrahigh precision machining to be competitive in the aerospace industry. Students will have the opportunity to earn an industry-recognized certificate verifying the student's practice of machine geometry, motion control and machining strategy. **Work-based Learning:** Students have the opportunity to participate in either a Precision Manufacturing Cooperative Education experience or an Internship.
Industry Validated Standards	http://www.azed.gov/career-technical-education/files/2016/06/technical-standards-precision-machining-48050030.pdf
Specialized Equipment	Lathe (Engine) of 14"X 30" (minimum capacity) Milling Machine Mill (CNC) with standard workbench with continuous path capability on 2½ axes. CNC lathe or turning center Computer workstation operator's manual Air Compressor (stationary or portable) C-clamps, parallel-closing clamps Clamps Diagonal Cutter (optional) Drills, portable power High Speed Drill Set Bench vise and arbor press. four-inch Deburring Machine Polishing Machine Surface Grinders Equipment for Drafting/Blueprint reading portions of MFG Equipment List can be accessed here: http://www.azed.gov/career-technical-education/files/2013/07/equipment-list-precision-machining-48050030.pdf
Industry Recognized Certifications	• HAAS o CNC Operator Certificate o Tool Setter Certificate • Manufacturing Skill Standards Council (MSSC) o Certified Production Tech (CPT) • Mastercam o Associate Certification - Mill Design and Toolpaths o Certified Programmer Mill Level 1 (CPgM1) • NIMS EDM o Plunge o Wire • NIMS Machining Level I • NIMS Machining Level II • Grinding Skills II • Manual Milling

	• NIMS Machining Level III o CNC Milling: Programming Setup & Operations o CNC Turning: Programming Setup & Operations o Turning Operations: Turning Between Centers • Machining Manufacturing Skill Standards Council (MSSC) level 1 • National Career Readiness Certificate (NCRC) Level 1 • NCCER o Industrial maintenance o Millwright
CTE End-Of- Program (EOP) Technical Skill Assessment (TSA) Y/N	Y
Current EOP TSA Pass Score	60%
Participation in JTED Program Qualifies Students for These Employment Opportunities	CNC Operator Tool Setter Certificate Production Technician Programmer Mill Level 1 Machinist

SB1525 JTED Course and Program Requirements

Requires students obtain passing score of 60% on assessment 15-391(3)(b) Page 1/20-24 & 15-391(5)(b) Page 2/1-6	Yes Precision Machining Technical Skill Assessment has a 60% pass score.
Not a Course Required under Minimum Course of Study including Honors 15-391(3)(d) Page 1/27-29	Courses in this program are not required for graduation.
Majority of Instructional Time in Lab / Field / Work Based Learning Environment 15-391 (3)(e) Page 1/30-32 and **Requires CTSO Participation** 15-391(5)(d) Page 2/10-13	Yes Yes, the majority of instructional time for each course is in a lab environment. SkillsUSA
Demonstrated Need for Extra Funding for a course 15-391 (3)(f) Page 1/33-34	Yes The Precision Machining program demonstrates the need for extra funding because of the equipment and cost of projects that emulate real-world applications. Both equipment and consumable supplies are cost prohibitive in the absence of extra funding.
Specialized Equipment Exceeds Cost of Standard Course 15-391(3)(g) Page 1/35-36 and 15-391(5)(c) Page 2/7-9	Yes Specialized equipment includes but is not limited to: • Lathe (Engine) of 14"X 30" (minimum capacity) • Milling Machine • Mill (CNC) with standard workbench with continuous path capability on 2½ axes. • CNC lathe or turning center • Computer workstation operator's manual • Air Compressor (stationary or portable) • C-clamps, parallel-closing clamps • Clamps • Diagonal Cutter (optional) • Drills, portable power High Speed Drill Set • Bench vise and arbor press. four-inch • Deburring Machine • Polishing Machine • Surface Grinders • Equipment for Drafting/Blueprint reading portions of MFG

Alignment through Curriculum, Instructional Model and Courses Sequence 15-391(5)(e) Page 2/15-18	Yes State-established course sequence for the Precision Machining program consists of a minimum of 3 Carnegie Units of Instruction.
Defined Pathway to Career and Postsecondary Ed in Specific Vocation or Industry 15-391(5)(f) Page 2/19-21	Community Colleges offer additional certifications and an Associate Degree in Precision Machining fields. Industry opportunities right out of high school or community college: • CNC Operator • Tool Setter Certificate • Production Technician • Programmer Mill Level 1 • Machinist
Fills High Need Vocation or Industry as Determined by CTE/ADE 15-391(5)(j) Page 2/30-31	Precision Machining is ranked 22nd on the 2016 CTE Program List based on Labor Market Data from the Office of Employment and Population Statistics ranking high skill, high demand and high wage occupations.
Requires a Single or Stackable Credential or a Skill that allows a student to obtain work 15-391(5)(k) Page 2/32-35	Yes • HAAS o CNC Operator Certificate o Tool Setter Certificate • Manufacturing Skill Standards Council (MSSC) o Certified Production Tech (CPT) • Mastercam o Associate Certification - Mill Design and Toolpaths o Certified Programmer Mill Level 1 (CPgM1) • NIMS EDM o Plunge o Wire • NIMS Machining Level I • NIMS Machining Level II • Grinding Skills II • Manual Milling • NIMS Machining Level III o CNC Milling: Programming Setup & Operations o CNC Turning: Programming Setup & Operations o Turning Operations: Turning Between Centers • Machining Manufacturing Skill Standards Council (MSSC) level 1 • National Career Readiness Certificate (NCRC) Level 1 • NCCER o Industrial maintenance o Millwright

Leads to certification or licensure verified by that vocation or industry that qualifies student for employment which the student would not otherwise qualify. 15-391(5)(l) Page 2/36-39	Yes Precision Machining programs must offer one of more of the following certificates: • HAAS o CNC Operator Certificate o Tool Setter Certificate • Manufacturing Skill Standards Council (MSSC) o Certified Production Tech (CPT) • Mastercam o Associate Certification - Mill Design and Toolpaths o Certified Programmer Mill Level 1 (CPgM1) • NIMS EDM o Plunge o Wire • NIMS Machining Level I • NIMS Machining Level II • Grinding Skills II • Manual Milling • NIMS Machining Level III o CNC Milling: Programming Setup & Operations o CNC Turning: Programming Setup & Operations o Turning Operations: Turning Between Centers • Machining Manufacturing Skill Standards Council (MSSC) level 1 • National Career Readiness Certificate (NCRC) Level 1 • NCCER o Industrial maintenance o Millwright
If no certification or licensure is accepted by vocation or industry, completion of program must qualify student for employment for which student would not otherwise qualify without completing JTED program. 15-391(5)(l) Page 2/39-43	N/A
Requires instruction and instructional materials substantially different from and exceed scope of standard instruction and include skills, competencies and knowledge to be successful in JTED program vocation or industry. 15-391(5)(m) Page 2/44-45 and 3/1-3	Instructional and instructional materials are specific to the industry certification sought. Both instruction and instructional materials are substantially different from and exceed the scope and cost of standard instruction.

Industry provided financial or technical support. 15-391(5)(n) Page 3/4-8	Yes, industry support includes but is not limited to the following: • Serves on industry standards development and validation committees • Serves on state and local advisory boards • Provides work-based learning experiences • Donates equipment and supplies • Serves as classroom speakers and resources
Demonstrated need for extra funding in order to provide JTED program 15-391(5)(o) Page 3/9-11	Yes, this program demonstrates the need for extra funding due to the cost of specialized equipment, instructional materials, lab setup and work-based learning.

Eligibility		**Yes**	**No**
JTED	The **Precision Machining** program meets the requirements for **JTED** compliance and eligibility	x	
CTE Federal Perkins and State Priority	The **Precision Machining** program meets the requirements for **Perkins** and is eligible to generate **CTE State Priority funding**.	x	