WORKFORCE INVESTMENT BOARD OF VENTURA COUNTY

MANUFACTURING COMMITTEE MEETING

Wednesday, December 10, 2014
8:00 a.m.-9:30 a.m.

Ventura County Community Foundation (VCCF) Nonprofit Center
4001 Mission Oaks Blvd. (Board Room), Camarillo

AGENDA

8:00 a.m.	**1.0 Call to Order and Agenda Review**	Bill Pratt
8:02 a.m.	**2.0 Public Comments** Procedure: The public is welcome to comment. All comments not related to items on the agenda may be made at the beginning of the meeting only.	Bill Pratt
8:05 a.m.	**3.0 Committee Chair Comments**	Bill Pratt
8:08 a.m.	**4.0 Approval of Minutes:** October 8, 2014	Bill Pratt
	5.0 Ventura County Regional Strategic Workforce Development Plan	
8:10 a.m.	• AMP SoCal Pillar Committees Update	Talia Barrera
8:15 a.m.	• AB 86 Update	Teresa Johnson
8:20 a.m.	• VC STEM Regional Network Grant	Cheryl Moore
8:25 a.m.	• Work Readiness Skills Curriculum Development	Scot Rabe
8:30 a.m.	• Manufacturing/Engineering Pathways Standards: Industry Advisory and Steering Committee Discussion – Engineering and Technology Pathway – Welding and Materials Joining Pathway – Machining and Forming Technologies Pathway	Cheryl Moore
9:20 a.m.	**6.0 Committee Member Comments**	Committee Members
9:30 a.m.	**7.0 Adjournment**	Bill Pratt

Next Meeting
February 11, 2015 (8:00 a.m.-9:30 a.m.)
Moorpark College, 7075 Campus Road, Moorpark
(Campus Center Conference Room A)

Individuals who require accommodations for their disabilities (including interpreters and alternate formats) are requested to contact the Workforce Investment Board of Ventura County staff at (805) 477-5306, at least five days prior to the meeting. TTY line: 1-800-735-2922.

WIB Manufacturing Committee Meeting
October 8, 2014

MINUTES

Meeting Attendees

Committee Members	WIB Staff	Guests
Bill Pratt (Chair)*	Talia Barrera	Brad Hudson (Congresswoman Julia Brownley)
Tavi Udrea (Vice Chair)*	Cheryl Moore	Celine Park (Ventura College)
Joe Klocko	Theresa Salazar Vital	Bill Cordeiro (California State University, Channel Islands)
Subhash Karkare		David Finn
Byron Lindros		Fred Garcia (Community Services Department/WIA)
Tiffany Morse		Allen Pike (Trans FX Inc.)
Alex Rivera*		Wendy Tafton (Ventura County Office of Education)
Marybeth Jacobsen		Mark Urban (CST Corp.)
Sharon Woolley		

**WIB Members*

1.0 Call to Order and Agenda Review

Chair Bill Pratt called the meeting to order at 8:20 a.m. No changes were made to the agenda.

2.0 Public Comments

No public comments

3.0 Committee Chair Comments

Bill Pratt announced that the WIB Manufacturing Committee will be working with both of the California Career Pathways Trust grant recipients (*Alliance for Linked Learning* and *VC Innovates*) to provide business input.

4.0 Approval of Minutes: August 13, 2014

Motion to approve: Alex Rivera
Second: Joe Klocko
Motion approved

5.0 Ventura County Regional Strategic Workforce Development Plan

- Biomedical Device Certificate of Achievement: Subhash Karkare announced the final approval and launch of the new Biomedical Device Manufacturing Certificate of Achievement. (See attached.) The first two-campus certificate program in the Ventura County Community College District–and in the California Community College system–the certificate is a tangible example of how working together can achieve results. The idea was launched in 2012 during a discussion between business leaders and educators at a meeting of the WIB Manufacturing Committee.

  Committee members expressed their appreciation to Mr. Karkare, Scot Rabe, Bill Pratt, and others involved for their vision, collaboration, and long-term commitment to making a business need for talent become a tangible program.

- MRVC: Manufacturing Day (October 3, 2014): Tavi Udrea and Bill Pratt highlighted the success of the Ventura County Manufacturing Day, sponsored by the Manufacturing Roundtable of Ventura County (MRVC) in partnership with local manufacturers, the WIB, and the Ventura County Office of Education (VCOE). This year were about 300 students, teachers, counselors, and school administrators who participated in this initiative from 10 different high schools in Ventura County and four other counties. (See attached.)

  The following manufacturers participated in showing how education applies to real-world settings: Alcoa Fastening Systems (Newbury Park), Amgen, Inc. (Thousand Oaks), Applied Powdercoat, Inc. (Oxnard), Dynamic Automation (Simi Valley), Haas Automation, Inc. (Oxnard), Kinamed, Inc. (Camarillo), and Milgard Manufacturing, Inc. (Simi Valley).

- Advanced Manufacturing Partnership of Southern California (AMP SoCal): Cheryl Moore provided an update on the recently formed regional consortium. The development of the new structure for the partnership brought together aerospace and defense manufacturing businesses, community colleges, universities and government in four counties (Los Angeles, Orange, San Diego, and Ventura). The role of the Pillar Committees will be to convene, examine the trends of their respective industrial ecosystem pillar and make recommendations to the Executive Board. Additionally, Pillar Committees will review the progress of AMP SoCal implementation Strategy Working Groups quarterly. Pillar Committee will begin meetings in October-December 2014.

  In addition to having a seat on the AMP SoCal Executive Board, each of the four counties is to have representation on the six Pillar Committees, providing report-outs to a coordinating group in each county. In Ventura County, the coordinating group will be the WIB Manufacturing Committee. WIB staff are working on volunteer recruitment for the Pillar Committees (Workforce and Training, Supplier Networks, Research and Innovation, Infrastructure and Site Development, Trade and International Development, and Operations Improvement and Capital Access).

- AB 86 Planning Grant: The Committee received information about a recent West Ed report. "The Ones that Got Away," regarding the results of interviews with faculty and administrators at eight different colleges. The report provides information on how workforce training programs yield some of the highest earnings for community college students, regardless of completion of a degree or a certificate. A copy of the report is available on the WIB website.

- California Career Pathways Trust Grants: Cheryl Moore announced that both projects are working together and that the three WIB sector committees, the Manufacturing, Clean/Green and Healthcare will provide a neutral platform for educators and businesses to come together on a quarterly basis for input on curriculum and program development. Tiffany Morse provided additional information on the VC Innovates grant.

- SCRC Deputy Sector Navigator Update: Joe Klocko provided an update on the STEM robotics RFA from SCCRC schools. Of the 15 responses, six were from Ventura County. All will receive $5,000 each. Mr. Klocko said that additional funds might be available for future incentives.

- Center of Excellence (COE) Unmanned Aircraft Systems Application: In response to a request from the County of Ventura Department of Airports a UC Berkley-led grant application, the WIB provided a letter of support. In Addition, Cheryl Moore contacted AMP SoCal resulting in approval by the Executive Board of a regional letter of support which helped to leverage the AMP SoCal preferential status for grant applications.

- SB 850: Community College Baccalaureate Ideas: Mark Urban with Kavlico Corporation, a brand of Custom Sensor & Technologies (CST), suggested priorities for creating local degrees or certifications in interdisciplinary specialties: mechatronics, industrial distribution, and predictive analytics. The Committee agreed, adding industrial engineering as a fourth priority. Other interdisciplinary examples identified by the Committee included automation, logistics, mechanics/software, finance/supply chain, security systems engineering, and water/automation/growth of varieties. Tiffany Morse noted that the Ventura County Office of Education was developing a Department of Education grant application related to mechatronics. The Committee decided to study the four top priorities to consider possible development of local career pathways.

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- Workforce Innovation and Opportunity Act: The federal guidelines were in development, with planned release of a draft document in mid-January 2015. WIB staff will let WIB and WIB committee members know when more specific information is available.

6.0 Committee Member Comments

Marybeth Jacobsen shared some information on the STEM-Equity Manufacturing Industry Tour, which was offered to female students in the Simi Valley Unified School District.

7.0 Adjournment

Bill Pratt adjourned the meeting at 9:30 a.m.

Next Meeting
December 10, 2014 (8:00 a.m.-9:30 a.m.)
VCCF Nonprofit Center (Board Room)
4001 Mission Oaks Blvd., Camarillo

PROGRAM OF STUDY

Biomedical Device Manufacturing Certificate of Achievement

Biomedical Device Manufacturing Certificate provides skills for the manufacturing of medical devices including basic quality control, government regulations as well as applied skills such as machining and working in an ultra-clean environment. This certificate will prepare students to obtain employment in the field of medical device manufacturing. Students complete 13 specified units.

This Certificate of Achievement is a joint program between Moorpark College and Ventura College. Once the required courses are completed, students can apply to obtain the Certificate of Achievement at either college. To submit an application for the Certificate of Achievement, see a counselor.

Required Courses: **Moorpark College - Complete 3 courses (6 units) from the following:**		**Units**
BIOT M02A	Environmental Control and Process Support	2
	or	
BIOL M12A	Environmental Control and Process Support	2
BIOT M02B	Manufacturing: Quality Control and Validation Quality	2
	or	
BIOL M12B	Manufacturing: Quality Control and Validation	2
BIOT M02E	Business Practices and Governmental Regulation	2
	or	
BIOL M12E	Business Practices and Governmental Regulation	2

Required Courses: **Ventura College - Complete 3 courses (7 units) from the following:**	**Units**
MT V02 Applied Machining I	2
MT V05 CNC Machining I	2
MT V15 Manufacturing Processes	3

Total Units	**13**

Media Advisory

NATIONAL MANUFACTURING DAY IN VENTURA COUNTY

Spotlight on Careers in Manufacturing

Date

October 3, 2014

Time

Morning and afternoon (times vary by site and participant group)

Purpose

- Ventura County participation in National Manufacturing Day
- Highlight the high-tech sophistication and impact of manufacturing
- Introduce students and educators to rewarding careers in manufacturing
- Demonstrate how education and skills apply to real-world settings

Sponsors

- Sponsored by: Manufacturing Roundtable of Ventura County (MRVC)
  - MRVC Chair: Byron Lindros, Amgen, Inc. (Thousand Oaks)
  - MRVC Immediate Past Chair: Ali Motamedi, Alcoa Fastening Systems (Newbury Park)
  - MRVC Manufacturing Day Chair: Tavi Udrea, Haas Automation, Inc. (Oxnard)
- In partnership with:
  - Ventura County Office of Education
  - Workforce Investment Board of Ventura County

Business and Education Group
7:00 a.m.-
8:30 a.m.

- Guests: high school counselors, teachers, principals, and other administrators
- Welcomed by: MRVC and representatives from Ventura County manufacturers
- Breakfast hosted by: Haas Automation, Inc. in Oxnard

Program Description

- Discussion of manufacturing workforce needs, career opportunities, and skill requirements
- Tour of high-tech manufacturing facility (Haas Automation, Inc.)

Student Groups
9:00 a.m.-
2:00 p.m.

- Guests: students and teachers/advisors from Ventura County, Orange County, San Luis Obispo County, Monterey County, and Fresno County
- More than 300 visitors to manufacturing sites in Ventura County

Program Description

- **Large group** introductions to manufacturing, tour of facility, opportunities for questions, and snacks at one of two sites:
  - Amgen, Inc.: 10:00 a.m. and 12:30 a.m. (maximum 35 per group)
  - Haas Automation, Inc.: 9:00 a.m., 10:00 a.m., 11:00 a.m., 12:00 p.m., and 1:00 p.m. (maximum 50 per group)
- **Small group** visits to other manufacturing sites for a company overview, tour of the facility, and opportunities to ask questions (15-25 participants per group, depending on site capacity)

Participating Ventura County Manufacturers

- ✓ Alcoa Fastening Systems
  1300 Rancho Conejo Blvd., Newbury Park
  Contact Ali Motamedi: (805) 262-4209; ali.motamedi@alcoa.com
  or Maria Calderas: (805) 603-9667; maria.calderas@alcoa.com
- ✓ Amgen, Inc.
  One Amgen Center Drive, Thousand Oaks
  Contact Byron Lindros: (805) 447-2294; blindros@amgen.com
- ✓ Applied Powdercoat, Inc.
  3101 Camino del Sol, Oxnard
  Contact Vic Anselmo: (805) 981-1991); vic@appliedpowdercoat.com
- ✓ Dynamic Automation
  4525 Runway Street, Simi Valley
  Contact Marc Freedman: (805) 584-8476; mfreedman@dynamicautomation.com
- ✓ Haas Automation, Inc.
  2800 Sturgis Road, Oxnard
  Contact Tavi Udrea: (805-573-0714); tudrea@haascnc.com
- ✓ Kinamed, Inc.
  820 Flynn Road, Camarillo
  Contact Bill Pratt: (805) 384-2748; wpratt@kinamed.com
- ✓ Milgard Manufacturing, Inc.
  355 E. Easy Street, Simi Valley
  Contact Alex Rivera: (805) 579-5188; alexrivera@milgard.com

MRVC Manufacturing Day Visitors

- ACE Charter High School, Camarillo
- Fillmore High School, Fillmore
- Newbury Park High School, Newbury Park
- Rio Mesa High School, Oxnard
- Thousand Oaks High School, Thousand Oaks
- Ventura High School, Ventura
- Westlake High School, Westlake Village
- Esperanza High School, Anaheim
- Fresno City College, Fresno
- King City High School, King City
- San Luis Obispo High School, San Luis Obispo

Contacts

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Workforce Investment Board of Ventura County (WIB)
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Talia Barrera, WIB Manager
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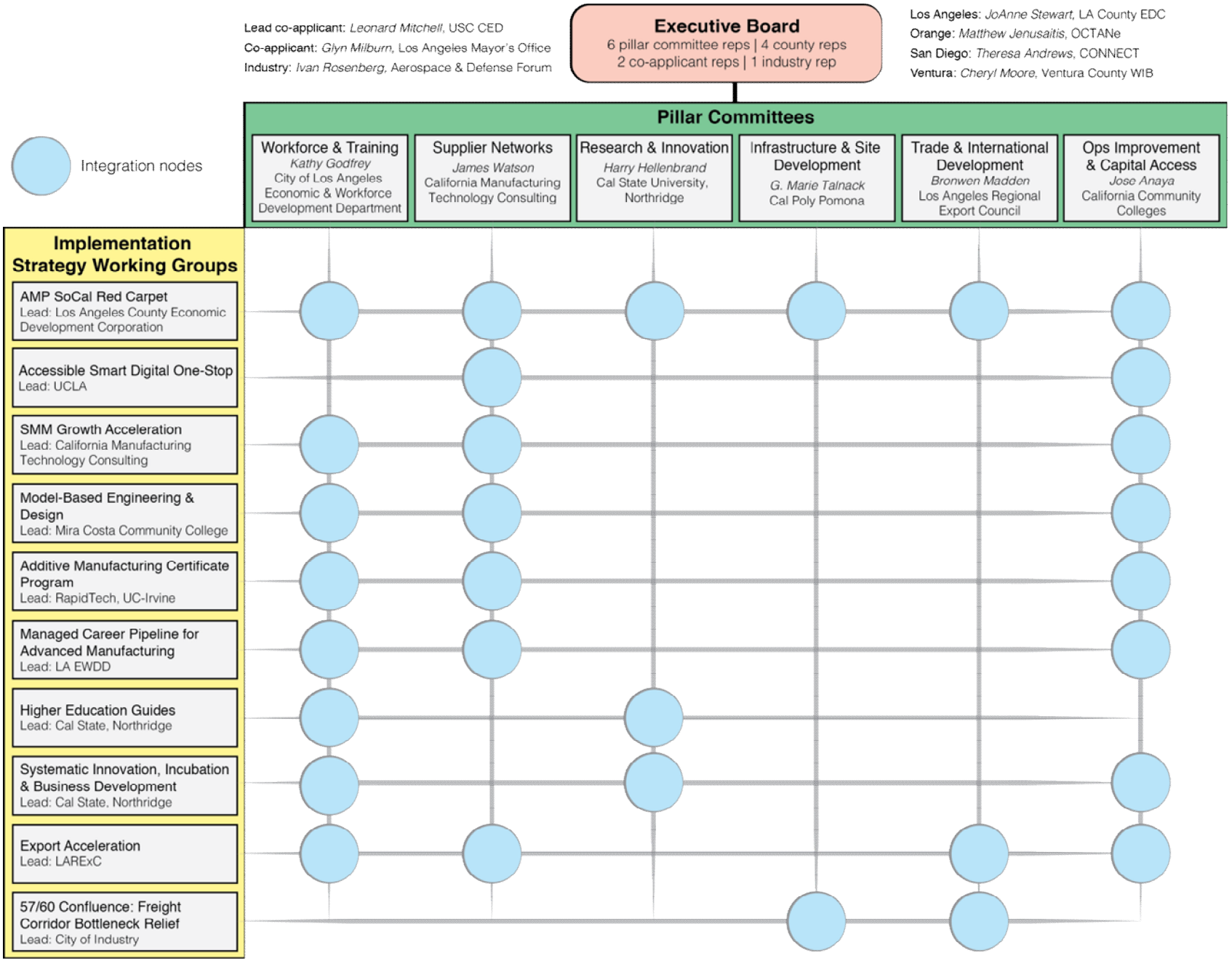
AMP SoCal Structure



California STEM Learning Network

SCIENCE | TECHNOLOGY | ENGINEERING | MATHEMATICS

Overview of CSLNet

Why is STEM So Important to California?

Many of the world's most innovative and valuable companies started and are located in California: Apple, Amgen, Genentech, Hewlett-Packard, Walt Disney, Google, Facebook and Twitter, to name a few. At their core, these companies are world leaders due to their ability to harness science, technology, engineering and math to drive innovation.

While California has nearly 900,000 STEM jobs, accounting for more than 13% of the nation's overall STEM-related workforce, the state has a crisis when it comes to preparing students in science, technology, engineering and mathematics (STEM), as evidenced by California's rankings on the Nation's Report Card (the National Assessment of Education Progress) that place it among the lowest five performing states in math and science proficiency. Simply put, our students are not graduating from public schools equipped and prepared to continue on to higher education STEM programs or to enter the STEM workforce.

Currently, despite an almost 11 percent unemployment rate, there are more job openings in STEM fields than qualified STEM job seekers.

> The number of STEM jobs is projected to grow by 19 percent over the next decade, nearly twice the rate of non-STEM jobs.

This gap must be closed if California is to retain its position as a world leader in STEM innovation, particularly in light of estimates that project the number of STEM jobs to grow by 19 percent over the next decade, nearly twice the rate of non-STEM jobs.

What is CSLNet's Vision?

CSLNet's vision is that all students in California have the knowledge and skills needed for success in education, work, and their daily lives. In particular, CSLNet is focused on those students who have historically been underserved, including women and students from groups underrepresented in STEM fields.

Established as a non-profit in July 2010, CSLNet addresses California's need for a statewide network to connect and build upon the state's many and diverse STEM assets. By aligning and focusing STEM efforts in the state around a common agenda, CSLNet aims to have statewide and national impact.

What are CSLNet's Mission and Goals?

CSLNet's mission is to help California prepare the nation's most STEM-capable graduates. In order to accomplish this, CSLNet has the following long-term goals:

I. Increase STEM interest, capabilities and engagement of all PK-14 students

II. Strengthen and expand access to STEM teaching and learning in schools, colleges and communities

III. Increase the number of students pursuing STEM-related credentials, degrees and careers

www.cslnet.org

One Embarcadero Center, Suite 500
San Francisco, CA 94111
Tel: 415-315-1725

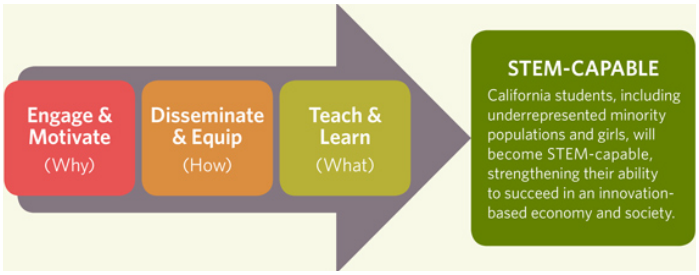
701 E. Santa Clara St. #50
Ventura, CA 93001
Tel: 805-665-6317

Overview of CSLNet

These goals are addressed through the following strategies and corresponding areas of work:

- **Strategy 1: Build public understanding and support** for STEM education through policy and advocacy, communications and outreach
- **Strategy 2: Build the field** through network development, statewide initiatives and meetings and convenings

Each strategy is a thread woven into CSLNet's **Theory of Change**, anchored by the introduction of Common Core State Standards and Next Generation Science Standards. This theory is designed to foster the development of STEM-capable students:



How is CSLNet improving STEM outcomes in California?

CSLNet brings together leaders and stakeholders from K-12, higher education, business and industry, governmental agencies, science and technology, research, community-based organizations, science centers, and philanthropies. Through this cross-sector collaboration, CSLNet fosters innovation, and helps to scale and sustain effective STEM teaching and learning in and out of school time for all students.

CSLNet is also partnering with other state and national STEM networks to ensure all students have access to quality STEM learning.

Supporting Regional Networks
CSLNet is supporting the development, capacity building and collaboration among Regional Networks that engage students, teachers, business and industry partners and community partners to address regional needs in STEM education, mobilize local communities, and implement innovative and effective strategies.

CSLNet's Statewide Initiatives
Statewide Initiatives focus on addressing key barriers to STEM learning.

STEM Teacher Pathways. CSLNet is working with state and regional partners to strengthen post-secondary pathways and professional development opportunities to produce a highly skilled K-12 STEM

teaching workforce in California. CSLNet is also a partner in the nationwide 100Kin10 movement to address the need for STEM-trained teachers.

CSLNet's STEM Teacher Pathways initiative works hand-in-hand with The Power of Discovery: STEM² initiative by focusing on out-of-school time (OST) programs as a dynamic environment for teacher pathway programs and recognizes the potential of informal educators as a recruiting pool for future teachers of STEM.

The **Power of Discovery: STEM²** initiative is an important new effort to build the power of schools and community-based organizations to expand learning opportunities in STEM for young people in California. By building collaborative and effective partnerships between schools and after school organizations, and by mobilizing a broad coalition of community partners with STEM expertise and resources, the initiative will enhance school-based STEM instruction and expand out-of-school STEM learning opportunities. The California Afterschool Network (CAN), working in close alignment with CSLNet, will coordinate the work.

Advancing STEM Policy
CSLNet supports the development and implementation of policies that strengthen STEM education in California. A key area of focus for this work is educating key stakeholders in the state on the importance of STEM education and its positive impact for all students.

Your Part:

CSLNet encourages you to become a partner in this important work. Check out our website www.cslnet.org for resources and information about how you can become a STEM champion.

Follow CSLNet On

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MANUFACTURING READINESS SKILL CATEGORIES

Workforce Investment Board of Ventura County

SAFETY	MATH CONCEPTS	MEASUREMENTS	HAND AND POWER TOOLS
• Lock-out, Tag-out, Try-out • Bio mechanics • MSDS • Potential energy sources (gravity, pneumatic, hydraulic, chemical , steam/gas pressure)	• Combined operations of fractions and mixed number • Table of decimal equivalents and combined operations of decimals • Degree of precision, tolerance and clearances • Steel rules and gage blocks • Algebraic operations of additions, subtraction and multiplication • Ratios and proportions • Mathematical conversions from standard to metric • RPM, and implication of gearbox reduction to RPM and torque	• Standards • Units of measurement • Mass and weight measurement • Metric measurement • Measuring motion • Measuring fluids • Indicators • Micrometers • Gauging tools • Calipers • Diameter tape	• Electric drills • Pneumatic drills and hammers • Screwdrivers, nut-runners and wrenches • Air supply for pneumatic tools • Wrenches • Hacksaws • Taps and dies • Hammers • Squares • Levels • Pipe threading machines

BASICS OF QUALITY CONTROL	BLUEPRINT CONCEPTS	EMPLOYABILITY SKILLS	COMPUTER SKILLS
• Process • Basic quality methodology and inspection techniques • Importance of individual – do it right first time • Manufacturing theory and quality • Lean manufacturing and quality	• Introduction to schematics and symbols • Pneumatics and hydraulic schematics • Piping schematics • Piping symbols • Differences in schematics • Views • Electrical symbols • Hydraulic and pneumatic symbols • Hydraulic and pneumatic diagrams • Assembly instructions	• Basics of interviewing • Work ethic • Communication skills • Continuous Improvement skills • Basic company policy understanding • Time management • Task prioritization • Worker, supervisor, manager etiquette and protocol basics	• Excel • Word • OS basics • Computer navigation • Computer security • Computer etiquette • ERP basics • Viewer basics, PDF, CAD, jpg, png, bmp, TIFF, Solid Works, etc • File extension basics

C. Engineering Design Pathway

The Engineering Design pathway provides learning opportunities for students interested in preparing for careers in the design and production of visual communications.

Sample occupations associated with this pathway:

- Mechanical/Electrical Drafter
- Design Engineer
- Manufacturing Design Engineer
- Project Architect

C1.0 Understand historical and current events related to engineering design and their effects on society.

- C1.1 Know historical and current events that have relevance to engineering design.
- C1.2 Interpret the development of graphic language in relation to engineering design.

C2.0 Understand the effective use of engineering design equipment.

- C2.1 Employ engineering design equipment using the appropriate methods and techniques.
- C2.2 Apply conventional engineering design equipment procedures accurately, appropriately, and safely.
- C2.3 Apply the concepts of engineering design to the tools, equipment, projects, and procedures of the Engineering Design Pathway.

C3.0 Understand the sketching process used in concept development.

- C3.1 Apply sketching techniques to a variety of architectural models.
- C3.2 Produce proportional two- and three-dimensional sketches and designs.
- C3.3 Present conceptual ideas, analysis, and design concepts using freehand, graphic, communication techniques.

C4.0 Understand measurement systems as they apply to engineering design.

- C4.1 Know how the various measurement systems are used in engineering drawings.
- C4.2 Understand the degree of accuracy necessary for engineering design.

C5.0 Use proper projection techniques to develop orthographic drawings.

- C5.1 Understand the concepts and procedures necessary for producing drawings.
- C5.2 Develop multiview drawings using the orthographic projection process.
- C5.3 Understand the various techniques for viewing objects.
- C5.4 Use the concepts of geometric construction in the development of design drawings.
- C5.5 Apply pictorial drawings derived from orthographic multiview drawings and sketches.

C6.0 Understand the applications and functions of sectional views.

- C6.1 Understand the function of sectional views.
- C6.2 Clarify hidden features of an object using a sectional view and appropriate cutting planes.

C7.0 Understand the applications and functions of auxiliary views.

- C7.1 Understand the function of auxiliary views.
- C7.2 Use auxiliary views to clarify the true shape and size of an object.

C8.0 Understand and apply proper dimensioning standards to drawings.

- C8.1 Know a variety of drafting applications and understand the proper dimensioning standards for each.
- C8.2 Apply dimension to various objects and features.

C9.0 Understand the tolerance relationships between mating parts.

- C9.1 Understand what constitutes mating parts in engineering design.
- C9.2 Interpret geometric tolerancing symbols in a drawing.
- C9.3 Use tolerancing in an engineering drawing.

C10.0 Understand the methods of applying text to a drawing.

- C10.1 Describe the processes of lettering and/or text editing.
- C10.2 Implement standard methods of title block creation and use.
- C10.3 Develop drawings using notes and specifications.
- C10.4 Plan, prepare, and interpret drawings and models through traditional drafting or computer-aided design (CAD) techniques.

C11.0 Understand the methods of creating both written and digital portfolios.

- C11.1 Develop a binder or digital portfolio representative of completed work for presentation.
- C11.2 Give an effective oral presentation of a portfolio.

B. Engineering Technology Pathway

The Engineering Technology pathway provides learning opportunities for students interested in preparing for careers in the design, production, or maintenance of mechanical, electrical, electronics, or electromechanical products and systems.

Please rate the following standards.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B1.0 Communicate and interpret information clearly in industry-standard visual and written formats.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B2.0 Demonstrate the sketching process used in concept development.

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**B3.0** Identify the fundamentals of the theory, measurement, control, and applications of electrical energy, including alternating and direct currents.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**B4.0** Understand the concepts of physics that are fundamental to engineering technology.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**B5.0** Understand how the principles of force, work, rate, power, energy, and resistance relate to mechanical, electrical, fluid, and thermal engineering systems.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**B6.0** Employ the design process to solve analysis and design problems
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B7.0 Understand industrial engineering processes, including the use of tools and equipment, methods of measurement, and quality assurance.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B8.0 Understand fundamental control system design and develop systems that complete preprogrammed tasks.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B9.0 Understand the fundamentals of systems and market influences on products as they are developed and released to production.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B10.0 Design and construct a culminating project effectively using engineering technology.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B11.0 Understand the methods of creating both written and digital portfolios.

C. Welding and Materials Joining Pathway

The Welding and Materials Joining pathway provides students with an understanding of manufacturing processes and systems common to careers in welding and related industries. The following pathway standards are based on, but not limited to, well established American Welding Society (AWS) EG2.0 Guidelines for the Entry Level Welder. Representative topics include the interpretation and layout of welded and assembled-part prints, cutting, mechanical bonding, joining, cohesive bonding, adhesive bonding, and mechanical fastening.

Sample occupations associated with this pathway:

- Metal Fabricator
- Sales
- Welders, Cutters, and Fitters
- Welding Inspector
- Welding Engineer

C1.0 Interpret and demonstrate the planning and layout operations used in the welding processes.

- C1.1 Use current information technology ideation and design process systems in the manufacturing of welded parts and products.
- C1.2 Interpret scaled welding blueprints; gather design and materials information; perform calculations; and use the detail to plan, lay out, and produce parts or finished products.
- C1.3 Analyze welding symbols on drawings, specifications, and welding procedure specifications.
- C1.4 Critique the design parameters across welding processes to produce a welded part or product.

C2.0 Understand and demonstrate how materials can be processed through the use of welding tools and equipment.

- C2.1 Introduce joint preparation methods and explain how to identify joint specifications.
- C2.2 Use standard and new emerging welding tools and equipment, such as oxygen fuel cutting (OFC), plasma arc cutting (PAC), and carbon arc cutting (CAC) to cut materials for the purpose of completing a finished product that meets the standards of the AWS or a similar industry standard.
- C2.3 Use welding tools and equipment such as oxy fuel welding (OFW), shielded metal arc welding (SMAW), gas metal arc welding (GMAW), flux-cored arc welding (FCAW), gas tungsten arc welding (GTAW), forge, and furnace to combine or join manufactured parts and products resulting in a finished product that meets the standards of the AWS or a similar industry standard.
- C2.4 Compare and contrast the physical qualities of various industrial materials and how these qualities affect the ability of the materials to be processed to produce useful welded parts and products.

C3.0 Differentiate and apply various types of welding assembly processes.

- C3.1 Use welding tools such as OFW, SMAW, GMAW, FCAW, GTAW, forge, and furnace and the equipment and assembly processes appropriate to the design criteria of a specific product to result in a finished part or product that meets the standards of the AWS or similar industry welding standards.
- C3.2 Produce bonded industrial materials by using adhesive such as flow, pressure, and fusion welding.
- C3.3 Compare and contrast existing material bonding methods with future innovative bonding processes.

C4.0 Understand finishing processes and the differences between various types of finishing materials used in the manufacture of welded parts and products.

- C4.1 Employ and explain the steps to be taken, and the choices to be made, in finishing welded materials.
- C4.2 Apply the processes used for finishing welded materials.
- C4.3 Assess how to select an appropriate finishing process to meet the design criteria of a specific welded product.

C5.0 Understand and defend the purposes and processes of inspection and quality control in welding manufacturing processes.

- C5.1 Identify and explain weld imperfections and their causes.
- C5.2 Identify and explain destructive and nondestructive examination practices.
- C5.3 Describe the reasons for inspection and quality control in the manufacturing of welded parts.
- C5.4 Analyze and identify the steps to check for distortion, joint misalignment, and poor fit-up before and after welding.
- C5.5 Perform continuous online quality control inspections of welded parts.
- C5.6 Evaluate and know how to troubleshoot performance problems of welding systems.

C6.0 Explore and understand various welding systems that require standard hand and machine tools.

- C6.1 Select and use appropriate welding tools, equipment, and inspection devices to manufacture parts or products.
- C6.2 Compare and contrast the various welding systems used in conventional manufacturing industries in order to select and use appropriate tools, equipment, and inspection devices.
- C6.3 Research new and emerging welding systems and their effects on the standard hand and machine manufacturing industry.

C7.0 Understand various automated welding systems, welding design for manufacturing, flexible manufacturing systems, and materials resource planning.

- C7.1 Recognize materials and processes in relation to welding systems.
- C7.2 Understand the importance of maintaining documentation for welding systems.
- C7.3 Distinguish between welding processes involved in the following manufacturing systems: "just in time," design for manufacturing, flexible manufacturing systems, and materials resource planning.
- C7.4 Use computers to design and produce welded products, write numerical control programs, and control robots.
- C7.5 Compare and contrast the ways in which emerging welding systems may be integrated into current manufacturing processes.

C8.0 Understand various joining or combining processes, including welding processes used in manufacturing, maintenance, and repair.

- C8.1 Recognize the importance of base metal preparation and joint fit-up and alignment.
- C8.2 Analyze and be able to defend various welding processes used to complete a fabrication, an assembly, or a repair.
- C8.3 Produce a completed fabrication, an assembly, or a repair by using appropriate joining and mechanical fastening techniques and processes.

C9.0 Understand how a manufacturing company is organized and the elements of welding production management.

- C9.1 Know how scheduling, quality control, accident prevention, and inventory control are used efficiently and appropriately in a welding production management system.
- C9.2 Understand that a welding production management system includes planning, engineering, organizing, and controlling resources and manufacturing processes.
- C9.3 Diagram corporate structures that affect welding production.

C. Welding and Materials Joining Pathway

The Welding and Materials Joining pathway provides students with an understanding of manufacturing processes and systems common to careers in welding and related industries. The following pathway standards are based on, but not limited to, well established American Welding Society (AWS) EG2.0 Guidelines for the Entry Level Welder. Representative topics include the interpretation and layout of welded and assembled-part prints, cutting, mechanical bonding, joining, cohesive bonding, adhesive bonding, and mechanical fastening.

Please rate the following standards.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

C1.0 Interpret and demonstrate the planning and layout operations used in the welding processes.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

C2.0 Understand and demonstrate how materials can be processed through the use of welding tools and equipment.

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**C3.0** Differentiate and apply various types of welding assembly processes.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**C4.0** Understand finishing processes and the differences between various types of finishing materials used in the manufacture of welded parts and products.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**C5.0** Understand and defend the purposes and processes of inspection and quality control in welding manufacturing processes.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**C6.0** Explore and understand various welding systems that require standard hand and machine tools.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

C7.0 Understand various automated welding systems, welding design for manufacturing, flexible manufacturing systems, and materials resource planning.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

C8.0 Understand various joining or combining processes, including welding processes used in manufacturing, maintenance, and repair.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

C9.0 Understand how a manufacturing company is organized and the elements of welding production management.

B. Machining and Forming Technologies Pathway

The Machine and Forming Technologies pathway provides students with an understanding of manufacturing processes and systems common to careers in machine tool and materials forming industries. Representative topics include trade vocabulary; shop math; basic material identification; proper use of hand and machine tools; reading precision measuring tools within .001" and the interpretation of machined and formed-part prints; the cutting, shaping, fastening, and finishing of machined parts; fixtures: forging, molding (casting), cold forming, and shearing processes.

Sample occupations associated with this pathway:

- CAD/CAM Specialist
- CNC Machinist
- Manufacturing Engineer
- Materials/Supply Management Specialist
- Quality Assurance Technician

B1.0 Validate that a provided part meets specifications from its engineering drawing by comparing specifications (geometric dimensioning and tolerancing) and by demonstrating proper technique using appropriate precision measuring tools.

- B1.1 Identify and describe how the isometric and the orthographic views and the tolerance, scale, and material from an engineering drawing are used with an actual part.
- B1.2 Demonstrate the correct use of precision measuring tools such as vernier and dial calipers, height gages, and micrometers utilizing both English and Metric systems.
- B1.3 Demonstrate the correct use of a gage block (set) to check a part or to calibrate the accuracy of other precision measuring tools.
- B1.4 Explain calibration, tolerancing, and conditions that cause parts to fall out of tolerance.

B2.0 Describe and layout a project according to specifications or engineering drawings. Demonstrate proper technique with layout tools and work-holding devices such as three- and four-jaw chucks, collet chucks, angle plates, sine bars, parallels, and v-blocks to machine a real part.

- B2.1 Describe and then contrast when to use work-holding fixtures, such as v-block, angle plate, toe clamp, vises, chucks, or custom fixtures.
- B2.2 Describe and demonstrate how to indicate a vice on a milling machine to "square up" a block on a mill using a micrometer and a precision square measure to confirm that the block is square.
- B2.3 Use a dividing head or turn table to demonstrate the proper procedure for indexing a part requiring flats, hex, or equally spaced geometry per print specifications.
- B2.4 Use a surface plate, surface gage, height gage, prick and center punches, scriber, layout dye, and other appropriate tools to locate hole centers, radii, and locations matching the specifications provided.

B2.5 Describe and demonstrate the engine lathe by grinding a high speed tool bit focusing on the tool cutting geometry and tip radius, speeds and feeds for the materials being cut and using their tool bit and precision measuring tool, machine a part within specifications.

B3.0 Research and compare the properties of two metals using two different material specifications and a process specification.

B3.1 Classify the difference between ferrous and nonferrous metals and contrast low-, medium-, and high-carbon steels by their common uses in industry.

B3.2 Describe both the alloys from their classification systems utilizing Unified Numbering System (UNS) or American Iron and Steel Institute-Society of Automotive Engineers (AISI-SAE) and explain how characteristics such as the Rockwell Hardness Test affect machining operations.

B3.3 Demonstrate how to calculate, then revise the calculations, for spindle speed and feed rate, for both alloy examples, for either a vertical mill or a lathe.

B4.0 Demonstrate a cutoff saw operation(s) to produce a length of bar stock to specification.

B4.1 Using a length of bar stock and a process specification or drawing, cut a length of bar stock matching the cut list and demonstrate no sharp edges.

B4.2 Cut one steel bar and one aluminum plate determining the correct or optimal blade material (carbon steel, high speed, or bimetal), the proper sawtooth set to use for each, and explain why.

B5.0 Demonstrate bending, shaping, other metal forming, and fabrication techniques, including processes such as basic hand filing, knurling on a lathe, forging metal shapes or objects, green sand casting, sheet metal machines, spot welding equipment or rivets, cold form bending with cold forming machinery or homemade devices, and shapes (tooling) to achieve a specific design specification.

B5.1 Discuss and demonstrate the wide variety of metal cutting hand files: materials, sizes, shapes, cuts, and tooth configurations.

B5.2 Describe and demonstrate the care and use of the common file which can be used to form radii on a variety of commercially available metals or those that have been casted or forged.

B5.3 Describe and demonstrate cold forming (i.e. knurling on a lathe).

B5.4 Describe and demonstrate the safe use of the open forge, anvil, and tooling to custom shape hot metal.

B5.5 Describe and demonstrate the process of making a pattern, mulling and chemistry of the green sand, the use of parting powder, and ramming the casting flasks.

B5.6 Describe and demonstrate the safety procedures of heating and pouring the metal (aluminum, brass, or bronze) from a crucible furnace.

B5.7 Produce a cast part and finish to specifications.

B5.8 Describe and demonstrate the safe use of sheet metal shears, box and pan breaks, bar folders, spot welders, and riveting tools.

B5.9 Complete a layout project using a detailed set of sequential instructions to manufacture the project to plan specifications.

B6.0 Identify and select the right grinding wheel; perform wheel dressing; and grind the provided part/material to the size and surface finish specifications provided.

B6.1 Set up and safely operate pedestal and surface grinders.

B6.2 Recommend a choice of grinding wheels for a variety of conditions determining which ones are serviceable for use and selecting the right size, mounting, and dressing for grinding.

B6.3 Complete a part in semi-finished (oversize) state; square-up and finish the block to the tolerance for size, surface finish, and squareness specified by the plan or drawing.

B7.0 Perform a series of routine boring operations from a set of specifications or a drawing and explain the selection of proper tools (drill, reamer, countersink, spot facer, counter bore, tap, and center drill) for each step of the process.

B7.1 Set up and safely operate a drill press.

B7.2 Square-up and lay out a block according to provided drawing and/or specifications.

B7.3 Drill, tap, or ream holes according to specifications.

B7.4 Research the proper material machinability and tooling recommendations from trade resources such as 'Machinery's Handbook'; choose the correct tool and holder; and calculate the spindle rpm and the feed rate for holes.

B7.5 Perform secondary operations on each hole to specification including: reaming, countersinking, counter boring, tapping, and deburring.

B7.6 Use a pin gage or thread gage to validate each hole or that a tapped thread meets specifications.

B8.0 Describe and demonstrate the machining of an external and internal taper, knurled part, and threaded and bored part on an engine lathe to plan specification or drawing to produce a part and measure each end diameter within tolerance.

B8.1 Demonstrate proper cutting tool selection and speeds for an engine lathe.

B8.2 Set up and safely operate an engine lathe taper attachment or turning center.

B8.3 Produce a shoulder-bushing to the specification of the drawing provided.

B9.0 Produce parts to specification using a boring head or angular cutting with a sine bar, a keyway, and pockets with a typical vertical mill.

B9.1 Set up and safely operate a vertical milling machine.

B9.2 Demonstrate proper cutting tool selection and speeds and demonstrate an efficient setup to minimize work-holding setups.

B9.3 Produce a part with keyway to specification demonstrating proper end mill selection, proper tool-path, and proper speeds.

B9.4 Mill an angular surface on a square block using a vice, sine bar, and gage blocks; measure angle to ensure it meets the specification.

B10.0 Produce parts to specifications or drawings provided on a computer numerical controlled (CNC) mill or lathe. Demonstrate common functions or controls through manual input and through programmed (stored) input. Introduce basic G and M Code Programming focusing on the use of the Cartesian coordinate system and machine axis.

B10.1 Discuss and demonstrate the setup and safe operation of a CNC turning or milling center: the setup of tools in tool holders; referencing the vice or chuck to the machine's control; and referencing the cutting tool to the machine's control.

B10.2 Demonstrate control panel commands to perform basic milling or turning commands for motion of the tool path along the coordinate axis.

B10.3 Convert a provided three-dimensional (3-D) or computer-aided design (CAD) data set to a set of machine instructions (G code) and then run the program producing the part to specifications provided.

B10.4 Demonstrate a tooling change and tool selection to complete a multistep process on a CNC milling or turning center.

B10.5 Produce a part with tight-radius pocket features by demonstrating proper cutting tool selection, proper tool-path, and proper speeds on a CNC milling machine.

B11.0 Understand and defend the purposes and processes of inspection and quality control in machining and forming processes.

B11.1 Identify and explain machining and forming imperfections and their causes.

B11.2 Identify and explain destructive and nondestructive examination practices.

B11.3 Describe the reasons for inspection and quality control in the manufacturing of machined and formed parts.

B11.4 Analyze and identify the steps to check for distortion, misalignment, and poor fit before and after and machining or forming a part.

B11.5 Perform continuous online quality control inspections of machined and formed parts.

B11.6 Evaluate and know how to troubleshoot performance problems of machined and formed parts.

B. Machining and Forming Technologies Pathway

The Machine and Forming Technologies pathway provides students with an understanding of manufacturing processes and systems common to careers in machine tool and materials forming industries. Representative topics include trade vocabulary; shop math; basic material identification; proper use of hand and machine tools; reading precision measuring tools within .001" and the interpretation of machined and formed-part prints; the cutting, shaping, fastening, and finishing of machined parts; fixtures: forging, molding (casting), cold forming, and shearing processes.

Please rate the following standards.

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**B1.0** Validate that a provided part meets specifications from its engineering drawing by comparing specifications (geometric dimensioning and tolerancing) and by demonstrating proper technique using appropriate precision measuring tools.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College	
Beginning	☐	☐	☐	**B2.0** Describe and layout a project according to specifications or engineering drawings. Demonstrate proper technique with layout tools and work-holding devices such as three- and four-jaw chucks, collet chucks, angle plates, sine bars, parallels, and v-blocks to machine a real part.
Intermediate	☐	☐	☐	
Advanced	☐	☐	☐	

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B3.0 Research and compare the properties of two metals using two different material specifications and a process specification.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B4.0 Demonstrate a cutoff saw operation(s) to produce a length of bar stock to specification.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B5.0 Demonstrate bending, shaping, other metal forming, and fabrication techniques, including processes such as basic hand filing, knurling on a lathe, forging metal shapes or objects, green sand casting, sheet metal machines, spot welding equipment or rivets, cold form bending with cold forming machinery or homemade devices, and shapes (tooling) to achieve a specific design specification.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B6.0 Identify and select the right grinding wheel; perform wheel dressing; and grind the provided part/material to the size and surface finish specifications provided.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B7.0 Perform a series of routine boring operations from a set of specifications or a drawing and explain the selection of proper tools (drill, reamer, countersink, spot facer, counter bore, tap, and center drill) for each step of the process.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B8.0 Describe and demonstrate the machining of an external and internal taper, knurled part, and threaded and bored part on an engine lathe to plan specification or drawing to produce a part and measure each end diameter within tolerance.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B9.0 Produce parts to specification using a boring head or angular cutting with a sine bar, a keyway, and pockets with a typical vertical mill.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B10.0 Produce parts to specifications or drawings provided on a computer numerical controlled (CNC) mill or lathe. Demonstrate common functions or controls through manual input and through programmed (stored) input. Introduce basic G and M Code Programming focusing on the use of the Cartesian coordinate system and machine axis.

	K-12	Adult Education	Community College
Beginning	☐	☐	☐
Intermediate	☐	☐	☐
Advanced	☐	☐	☐

B11.0 Understand and defend the purposes and processes of inspection and quality control in machining and forming processes.

6.0 COMMITTEE MEMBER COMMENTS

During the WIB Manufacturing Committee meeting on December 10, 2014, Scot Rabe made a public comment and distributed a sample letter of support for the Ventura College Bachelor of Applied (BAS) application.

Address of Business/Individual

Ventura College
Attn: Dr. Greg Gillespie, President
4667 Telegraph Road
Ventura College, 93003

Dear Dr. Gillespie,

This letter is to inform you of our (my) support for the Ventura College Bachelor of Applied Science (BAS) application.

We (I) are (am) very excited to support this application. The degree will be a BAS in Technical Supervision and Management. Our community has a need for individuals trained and skilled in a technical or vocational area to have the opportunity to move into supervisor and management positions in these technical areas. In addition, this program will support individuals who may wish to start their own business by providing applied training.

This innovative degree will incorporate the credits students obtain in current Associate of Applied Science degrees. The specific additional two years of course work will upgrade skills of current employees as well as train new students for job openings.

Ventura College works with the high schools to provide pathways from high school to community college to careers. This new degree will provide an additional step in the pathway to include a baccalaureate degree specific for students with careers and interest in technical/vocational fields.

We (I) look forward to the opportunities that this degree will provide for our community members. This project supports the economic development of our region by training local individuals for local jobs and starting new business.

We (I) fully support the college in moving forward with the development of the Bachelor of Applied Science program.

Sincerely,

Name and Title