



Strategic Workforce Investment Proposal

Partnership—Weber State University (WSU), through the College of Engineering, Applied Science & Technology (EAST) and the Department of Engineering Technology, is applying for Strategic Workforce Investment funding for a new cooperative project in aerospace and manufacturing automation industry needs between the following partners:

- Weber State University—Dean David Ferro, College of Engineering, Applied Science and Technology; Rick Orr, Department Chair, Engineering Technology
- Bridgerland Applied Technology College (BATC), John Davidson, Vice President for Instruction, Contracts, and Grants; Ed Ball, Advanced Manufacturing and Robotics Electronics Department Head
- Davis Applied Technology College (DATC), Ginger Chinn, Vice President of External Engagement & Economic Development
- Ogden-Weber Applied Technology College (OWATC), Monica Schwenk, Development Director; Curtis Nielsen, Director of Trades and Apprenticeships

Stackable Sequence of Credentials—The career pathway consists of a stackable sequence of credentials (See Figure 1) starting with applied technology college high school and adult students. Specifically designed to streamline and expedite student progress toward a practical STEM-oriented career goal, multiple exit and entry points culminate in an associate degree or higher in engineering technology. The certificates/degrees directly support economic growth in the high-need industry cluster of manufacturing. Finding skilled automation employees is a critical need for the manufacturing industry. Students with basic skills are highly sought after by employers and will frequently work in this career pathway while continuing education. As shown in the following stackable sequence, students enter at an Applied Technology College (ATC) and can exit to employment or continued education:

1. Applied Technology Colleges Industrial Automation Certifications
 - a. BATC – Automated Manufacturing Basic Technician (1050 ATC hours)
 - b. DATC – Industrial Technician (900 ATC hours)
 - c. OWATC – Industrial Automation Maintenance Technician (IAMT) (1240 hours)
2. Weber State University Associate of Applied Science in Controls Technology
3. Weber State University Bachelor of Science in Electronics Engineering Technology

WSU's partnership with BATC, DATC, and OWATC in providing these stackable degrees offers a number of entry and exit points. Each successive step provides students access to an advanced degree and associated higher wages, achieving a primary Strategic Workforce Investment. Students taking advantage of the stackable credential track from an ATC to WSU will possess the technical skills necessary to be employed with a northern Utah manufacturer.

STRATEGIC WORKFORCE

ON-RAMPS



Figure 1: Strategic Workforce On-Ramps and Off-Ramps

The detailed courses for the Controls Stackable Credentials are shown below:

Controls Stackable Credentials			
Step 1: Complete appropriate certificates at DATC, OWATC, or BATC			
Davis Applied Technology College		Ogden-Weber Applied Technology College	
Step 1: Industrial Technician (900 hours)	Hours	Step 1: Industrial Automation Maintenance (1240 hours)	Hours
IAMT 0000 Automation Technology Orientation	0	Math 1000 Math 1	60
IAMT 1100 Industrial Safety and Workplace Relations	30	Math 1015 Essential Math for Technicians	90
IAMT 1200 Automation Maintenance Basics	60	IAMT 1000 Industrial Safety	30
IAMT 1000 Electronic Fundamentals for Industrial Automation	120	IAMT 1200 Automation Maintenance Basics	60
IAMT 1300 Industrial Mechanics	90	IAMT 1300 Industrial Mechanics	90
IAMT 1250 Fluid Power Hydraulics	60	IAMT 1260 Fluid Power	120
IAMT 1450 Fluid Power Pneumatics	60	IAMT 1021 Electrical Systems for IAMT	160
IAMT 1600 Electrical Motor Controls	120	IAMT 1602 Electric Motor Control	150
IAMT 2000 Programmable Logic Controllers I	90	IAMT 2000 Programmable Logic Controllers I	90
BTEC 1030 Operating Systems and Email Applications	30	BTEC 1107 Introduction to Computers	30
BTEC 1032 Spreadsheet Fundamentals	30	BTEC 1450 Critical Workplace Skills	60
WKSK 1500 Job Seeking Skills	30	<i>IAMT Electives (300 hours required)</i>	300
Emphasis (180 Hours)		IAMT 2910 Automation Final Project	90
<i>Programmable Logic Control (PLC) Programmer</i>		IAMT 2930 Automation Technician OJT/Instructor Aid A	15
IAMT 2050 Programmable Logic Controllers II	90	IAMT 2930B Automation Technician OJT/Instructor Aid B	15
IAMT 2010 Human Machine Interface (HMI) Programming	90	IAMT 2930C Automation Technician OJT/Instructor Aid C	15
<i>Facilities Maintenance Technician</i>		IAMT 2930D Automation Technician OJT/Instructor Aid D	15
Plumbing for Automation Technology	30	IAMT 2930E Automation Technician OJT/Instructor Aid E	15
Electrical Equipment Basics	30	IAMT 2930F Automation Technician OJT/Instructor Aid F	15
HVAC Refrigeration	90	IAMT 2930G Automation Technician OJT/Instructor Aid G	15
Blueprint Reading	30	IAMT 2930H Automation Technician OJT/Instructor Aid H	15
<i>Soldering Technician</i>		ELTT 1700 Electrical Equipment Basics	30
IAMT 2400 Electronics Assembly and Soldering	60	SOLD 1000 Electronic Assembly and Soldering	60
IAMT 2030 Semiconductor Devices	120	MACH 1740 Machining I	90
<i>Electronics Technician</i>		IAMT 2050 Programmable Logic Controllers II	90
IAMT 2035 Digital Fundamentals	120	Welding 1050 Welding Overview	10
IAMT 2040 AC/DC Circuits	60	COMP 1006 Fundamentals of Composites	60
<i>Robotics Technician</i>		IAMT 1005 Introduction to Electronics	200
IAMT 2035 Microcontroller/Microprocessor Programming	60	Bridgerland Applied Technology College	
IAMT 2025 Industrial Robotics	90	Step 1: Automated Manufacturing Basic Technician (1050 hours)	
IAMT UAV/Drone Technology	30	ELEC 1001 Computer Tools for Technology	60
<i>Electric Motor Drives Technician</i>		IAMT 1011 Basic Electrical Theory and Wiring	60
IAMT 1500 Electric Motors/Drives	90	IAMT 1021 Troubleshooting Electrical Circuits	15
IAMT 1750 Automatic Controls Troubleshooting	60	IAMT 1102 Technical Communication Fundamentals	30
IAMT 2901 Automation Technology Externship	30	IAMT 1103 Basic Workplace Safety	15
<i>Communications Technician</i>		IAMT 1104 Industrial Safety	15
ITEC 1125 Industrial Networking	120	IAMT 1151 3D Modeling	60
IAMT 2015 Fiber Optic Technician Certification Preparation	60	IAMT 1200 Automated Manufacturing Basics	60
<i>Process Control Technician</i>		IAMT 1250 Fluid Power Hydraulics	60
IAMT 2200 Instrumentation - Process Control	90	IAMT 1252 Fluid Power Pneumatics	60
IAMT 2250 Process Technology Equipment and System Operators	90	IAMT 1300 Industrial Mechanics	90
<i>Energy Technician</i>		IAMT 1500 Electrical Motors/Drives	90
IAMT 1005 Renewable Energy	60	IAMT 1600 Electrical Motor Controls	120
IAMT 1105 Building Automation	60	IAMT 1611 Troubleshooting Control Circuits	15
IAMT 2915 Final Project	30	IAMT 1621 Troubleshooting Motor Circuits	15
IAMT 2901 Automation Technology Externship	30	IAMT 2000 Programmable Logic Controllers 1	90
		IAMT 2002 Troubleshooting PLC Circuits	15
		IAMT 2012 Sensors and Instrumentation	120
		IAMT 2020 Introduction to Industrial Robotics	60

Weber State University

Step 2: Associate of Applied Science Degree in Controls Technology

IAMT Certification (at least 900 hours) from DATC, OWATC, or BATC (25 credits)/WSU (44 credits)

Required Engineering Technology Courses (23 credit hours)	Credits	Required General Education Courses (21 credit hours)	Credits
EET 1130 Digital Circuits	4	Comm 2110 HU Interpersonal and Small Group Communication	3
EET 1140 DC Circuits	3	ECON 1010 SS Economics as a Social Science	3
EET 2010 AC Circuits	3	ENGL 1010 EN Introductory College Writing	3
EET 2120 Power and Motors	4	MATH 1010 Intermediate Algebra	4
EET 2170 Industrial Controls	3	MATH 1060 Trigonometry	3
MFET 2410 Quality Concepts and Statistical Applications	3	PHYS 1010 PS Elementary Physics	3
MFET 4580 Process Automation	1	WEB 1701 TA Document Creation	1
MFET 4580L Process Automation Lab	2	WEB 1703 TC Data Manipulation, Visualization, and Presentation	1

Step 3: Bachelor of Science in Electronics Engineering Technology

Required Lower-Division EET Courses (12 credit hours)	Credits	Required Support and General Education Courses (40 credit hours)	Credits
EET 2110 Semiconductor Circuits	4	MATH 1050	4
EET 2140 Communications Systems	4	MATH 1210 Calculus 1	4
EET 2150 Embedded Controllers	4	PS 3203 Customer Service Techniques or BSAD 3000 Small Business Management or MFET 3550 Manufacturing Supervision	3
<i>Required Upper-Division EET Courses (28 credits)</i>		PHYS 2210 PS Physics for Scientists and Engineers I	5
EET 3010 Circuit Analysis	4	ENGL 2010 EN Intermediate College Writing	3
EET 3030 FPGA and ASIC Design	4	ENGL 3100 Professional and Technical Writing or NET 3250 Business Communication	3
EET 3040 Instrumentation and Measurement	4	General Education Life Science	4
EET 3090 Project Management	2	General Education Social Science (Diversity)	6
EET 4010 Senior Project I	2	General Education Creative Arts/Humanity	6
EET 4020 Senior Project II	2	Computer Literacy	1
EET 4030 Controls and Systems	4		
EET 4040 Signals and Systems	4		
EET 4890 Cooperative Work Experience	2		
<i>Elective Upper-Division EET Courses (2 credits)</i>			
EET 3100 Renewable Energy	3		
EET 3180 Advanced Solar PV Systems	4		
EET 4060 Advanced Communications	4		
EET 4090 Systems Design and Integration	3		
MFET 4850 Integration of Automated Systems	3		
EET 4900 Special Topics	1-4		

Figure 2: Controls Stackable Credentials

Industry Clusters—Manufacturing is the high-need industry cluster supported by this proposal.

Evidence of Support from Industry

The following companies or entities have indicated a critical need for employees in this career path and have affirmed support for this proposal by providing part-time employment early in a student’s educational path. These firms represent a broad cross-section of Utah’s manufacturing base including representation from automotive, consumer products, aerospace, materials production, and pet food industries. Support of the project is wide ranging, from relatively small, privately held organizations, to large international firms. Mike Rasmussen, Autoliv, stated that this program is perfect and sorely needed. Although no company can say exactly how much they will hire unless extremely confident what is going to happen, right now Autoliv has new business every week and could use people at every level of this stackable credential. The companies listed below have made similar comments.

Autoliv, employing over 2,000 in Utah, is the world's largest automotive safety supplier with sales to all the leading car manufacturers in the world. Autoliv is considered a leader in manufacturing and is investing heavily in automation. They have been recruiting Automation and Controls Engineering Technology students from Indiana State University after realizing that no university or ATC in Utah can meet the changing needs in manufacturing related to automation. Autoliv also supports their employees by offering tuition reimbursement and flexible schedules to attend school.

Mike Quayle, Human Resource Manager Autoliv Brigham City, stated "Autoliv, the world leader in Automotive Safety Products is appreciative of Weber State University and their support of providing a Control Degree Program. To successfully compete in a global market, we will continue to automate our equipment and processes. Having Weber State and the local ATC's provide the training and background to develop talent for our current and future needs is key to our survival and keeping jobs in Utah. We currently hire 7-10 Controls people a year and anticipate this number to grow."

Autoliv plans to hire between 5-10 entry-level Industrial Automation Maintenance technicians in the upcoming year. The entry-level employment requirement for Autoliv IAMT occupations is enrollment in the IAMT program (or greater). Autoliv cited their biggest concern was ensuring skill retention before advancement and encouraging skill upgrade training for employees.

Lifetime Products is an industry-leading, Utah-based manufacturer of tables, chairs, sporting goods, outdoor furniture, play systems, and storage systems. The company employs over 1,500 people and operates over 2,000 automated or semi-automated pieces of equipment in the Clearfield, Utah, manufacturing facility. Over 50 of those pieces are automated robotic cells.

Denise Wandling, Executive VP Human Resources/Risk Management states, "While we are always striving to improve and grow our manufacturing technologies, there is a deficit in the amount of qualified personnel available to help us achieve those goals. In conjunction with that, a growing economy and lucrative job market have left many companies such as ours in a position of having to compete over the few limited resources that are available in the region. These resources provide us with a flexibility that is invaluable to our operation. That is why we would like to express our support for the establishment of a Controls Engineering Technology Degree through Weber State University and the Utah College of Applied Technology. We believe a program such as this would provide current and prospective Lifetime employees with an education in the concepts that will help streamline our manufacturing automation goals from design to implementation."

Nucor (including Vulcraft) is a Fortune 500 company that has become the nation's largest steel producer, employing about 800 people in Utah. Nucor is also North America's largest recycler. Seeing the growing need for automation skills, Nucor recently invested \$225,000 to help Michigan Tech establish an industrial control and automation lab.

Terry Larson, Roll Mill Electrical Supervisor, states, “We strongly support the automated manufacturing programs at our local Applied Technology Colleges, and would like to see curriculum that builds upon the certificates that the ATCs are offering.”

American Nutrition, Inc. manufactures, packages, and distributes pet foods for dogs and cats. Founded in Ogden, Utah, in 1972, this private firm employs over 200 in Utah and has locations in Washington and Pennsylvania. Michael Naeger, Corporate Engineering Manager states, “American Nutrition supports a coordinated program between DATC & OWATC and Weber State for a Controls Engineering Program.”

Williams International is the world leader in the development, manufacture and support of small gas turbine engines. The privately owned company’s Ogden facility is the most modern and efficient gas turbine design-to-production facility in the world. Its competitive production capabilities will increasingly depend on automation in the future. Williams hires graduates of the ATCs and WSU.

Fresenius Medical Care is a division of Fresenius Medical Care North America (FMCNA). Their global parent company, Fresenius Medical Care AG & Co. KGaA, is the world’s leading innovator in kidney care and the world’s largest provider of dialysis products and services. Approximately 360 people of over 67,000 FMCNA employees work in the Ogden Manufacturing plant making various dialysis products. Dave Harris, Director of Ogden Molding Manufacturing supports WSU’s efforts and stated, “Finding a Controls or Automation Engineering is often a struggle, which is exacerbated by a continual push to reduce labor and improve quality through automation. Having a path for students to pursue an Automation Technician Associate’s degree, and if desired an Automation/Controls Engineering degree, will benefit industry and certainly a need that will not diminish. Technicians who can track down a physical problem and repair/replace components of an automation system are certainly a critical need; however, the need for a skilled automation technician to diagnose an issue that may not be ‘visible’ is a completely different skill set and from my exposure there are few techs in that group. A tech that can get into a controller’s code and trace the control logic to test, diagnose, and isolate an issue is a need that cannot always be filled with a mechanical or even an electrical tech nor is it a cost effective use of an automation engineer. An Automation Engineer designs/integrates, builds, and installs; and the Automation Tech services makes improvements to the system or the functionality. I see it as a progressive path—those that do not wish to pursue an engineering degree can step off ‘the train’ at the tech level and unquestionable add value, and I believe industry can commensurately compensate.”

Envirotech’s President and CEO, Dave Ferrell, mentioned that he can find program managers, but not a skilled technician to fix his robots. He currently needs two controls technicians.

Setpoint Systems is a local Ogden firm with significant international impact. As a premier provider of custom automation solutions, they develop systems to assemble, test, and inspect products. They also help firms integrate robotics into their existing systems and are internationally known for project management, on-time and on-budget project delivery. WSU

considers them a leading-edge manufacturer and has enlisted their assistance and support in this effort. Mark Coy, President/CEO, Setpoint Systems stated that he supported WSU in this effort.

HollyFrontier, Senior Training Specialist Clay Holbrook, “believes the IAMT Certification will address our need for Maintenance Technicians, and we typically have 5-8 positions open in any given year. Within the last 2 years, we have experienced growth and hired approximately 20 Automation Technicians—which isn’t typical. We anticipate hiring an additional 5-8 Automation Technicians in the next year.”

Kroger Layton Dairy, Engineering Resource Leader Todd Larson, stated “This last year, we have had some growth, and now, we are looking for approximately 6 new technicians for our department. We have had great success in hiring certified Automation Technology students.”

Control System Integrators and Champion Technology Services plans to hire between 1-5 entry-level IAMT technicians.

Campbell Scientific strongly supports the automated manufacturing programs at the local ATCs and is interested in continuing education that builds upon the ATC certificates.

Program of Study Workforce Needs—According to the Utah Employment Forecast Survey, December 15, 2015, Process Planning & Automation jobs are expected to rise from 8 percent to 21 percent within the next 5 years. This same survey indicated the intent of employers to hire in areas related to automation as shown in Table 1.

Table 1 Utah Employment Forecast Survey for Advanced Manufacturing and Aerospace and Defense

Advanced Manufacturing: Intend to Hire by 2020	
Position	Maximum Intend to Hire
Maintenance Technicians	550
Maintenance and Repair Workers, General	390
First-Line Supervisors of Production and Operating Workers	340
Electrical Engineers	500
Industrial Engineers	125
Maintenance Workers, Machinery	85
Aerospace and Defense: Intend to Hire by 2020	
Other Installation, Maintenance, and Repair Occupations	113
Installation, Maintenance, and Repair Occupations	68
Electrical and Electronic Equipment Mechanics, Installers, and Repairers	32
Drafters, Engineering Technicians, and Mapping Technicians	18

Table 2 illustrates the number of Utah job openings according to the Division of Workforce Services and wages for job titles at the various levels of education.

Table 2 Employment Information (Source: DWS unless otherwise indicated)

Employment Information				
Stackable Educational Level	Job Title	Projected Annual Statewide Job Openings (2012-2022)		Median Wage
		Growth	Replacement	
IAMT Technician	Electrical and Electronics Repairers, Commercial and Industrial Equipment	10	20	\$26.90
	Industrial Machinery Mechanics	140	110	\$16.80
	Maintenance Workers, Machinery	30	10	\$20.80
	Maintenance and Repair Workers, General	220	190	\$16.20
	Installation, Maintenance, and Repair Workers, All Other	10	10	\$21.70
Associate of Science in Controls Technology	Electrical and Electronic Engineering Technician	20	40	\$27.30
	Engineering Technicians	0	10	\$31.30
Bachelor of Science in Electronics Engineering Technology <i>(needed for promotions and job transferability)</i>	Local Engineering Technology Majors	\$55,000-\$65,000 \$75,000 with experience		
		<i>Source: WSU Faculty</i>		

DATC—The Automation Technology program works with local employers in Davis and Salt Lake Counties to provide employment in manufacturing, process control, entertainment, transportation, and commercial environments.

Students find employment in the areas of Maintenance Technicians, Programmable Logic Controllers (PLC) Programmers, Process Control Operators, Instrumentation Technicians, Robotic Technicians, and Service and Sales Technicians.

Students have been placed with Smith’s, Kroger Dairy and Bakery, Futura Industries, Albertsons Distribution Center, BD Medical, Select Comfort, Frito Lay, Cubiscan, Lagoon, Sun Products,

Holly Refinery, Orbital ATK, Firefly, Orbit Irrigation, Pro-Mold, Conductive Composites, TD Williamson, Airgas, North Davis Sewer District, and Intermountain Wind and Solar.

OWATC—The Industrial Automation Maintenance program serves Weber County employers. In FY16, 34 students completed the IAMT certificate and 23 students upgraded their IAMT skills. Student completers were hired by Autoliv Module, CSM Bakery Products, Fresenius Medical Care, Riverside Electric Inc., and Wayfair.

Representatives from the employer advisory teams annually evaluate each tech college program, and three employers evaluated the IAMT program in FY16. The three employers rated the OWATC IAMT program's program length, learning activities, competency testing, methods of evaluation, and skill proficiency as 4.3 out of 5.

BATC—The Automated Manufacturing and Robotics program serves the Bear River Region in Northern Utah, which includes Rich, Cache, and Box Elder Counties. A robust pathway exists for high school students to enter the automation, robotics, controls, and electronics field with early morning daily broadcasts into every high school in the Bear River Region, currently at 150 students in 7 high schools. A 900-hour Robotics STEM Academy certificate is possible for these students shortly after graduation as they complete 630 hours in high school. More advanced technical-level certificates are available at industry request in the areas of automated manufacturing, robotics programming, controls engineering technician, mechatronics, electronics, autonomous robotics, etc. Companies who hire from this program include Presto Products, Pepperidge Farm, Schreiber Foods, Malt-O-Meal, West Liberty Foods, Gossner Foods, Lower Foods, Autoliv Tremonton and Brigham City, Campbell Scientific, Juniper Systems, SAE Industrial Automation Specialist, Automation Product Group, Proctor and Gamble, RR Donnelley, ATK, Inovar, Schlumberger, Nucor Steel, JBS, and more.

Pathway Student Data—Table 3 illustrates the 2015-16 student enrollment, attainment, and job placement rates at the various educational levels. An educational pathway with stackable credentials from the ATCs to WSU will provide northern Utah manufacturers with a technically skilled workforce.

Table 3 Controls Engineering Technology Educational Pathway Student Data

Controls Engineering Technology Stackable Educational Pathway Student Data			
	Student Enrollment	Attainment Rates (2015-16 graduates)	Job Placement Rates
IAMT Technician	BATC-200 DATC- 216 OWATC-200	BATC-9* DATC-8 ** OWATC-25***	BATC-100 DATC-98 OWATC-98
Associate of Science in Controls Technology	WSU-60 (potential)	New Program No data yet****	New Program No data yet
Bachelor of Science in Electronics Engineering Technology	WSU-10-15 potential added to Electronics Engineering Technology Degree		

* Many of the BATC Electronics Engineering Technology and Automated Manufacturing and Robotics students are part-time and cannot complete within a one-year time frame. Often students complete enough courses and industry certifications to gain employment before completing a one-year certificate. With about an 80 percent completion rate overall. BATC also broadcasts to 150 high school students (juniors and seniors) in the early morning Automated Manufacturing 900-hour AM STEM program. Approximately 50 percent of these students could complete the 900-hour certificate soon after graduating from high school. BATC already has 9 completers within the first year of this 2-year high school program.

**Of the 216 DATC students enrolled during FY 2016, only 41 students were seeking IAMT Certification. Because students may enroll at any time, students are in varying training phases during the year, currently 19/41 are still enrolled. DATC has a significant number of students (80) enrolled through the Hill Air Force Base Pathways Program; 79 of these students graduated with an occupational skills certificate but did not receive an IAMT certificate. The students in the HAFB Pathways Program would be excellent potential candidates for the B.S. Degree. Forty-four percent of our enrolled students are participating in Employer and Continuing Education or Occupational Upgrades and are not seeking certificates which impacts our graduation rates.

***OWATC IAMT program maintains a program completion rate of 89 percent. The program is not lockstep, and students may enroll at any time. During a one-year snapshot, all 200 students were in varying training phases of the 1,225-hour program. Of those, 25 completed within the one-year timeframe; and 98 percent were placed into training-related employment.

**** The Associate of Science in Controls Engineering was approved Summer 2016. Approximately 13 students are ready to enter the WSU portion of the program. Graduates are expected to earn above average pay (\$27) and enjoy high placement rates due to the growing shortage of skilled labor in this field.

Board of Regents Support—The Board of Regents sent separate message of support.

UCAT Support—Utah Colleges of Applied Technology sent a separate message of support.

Funding Request Items—The budget requested to support this proposal is listed in Table 4 below:

Table 4 Budget

Funding Need	Budget
Total Annual Budget	\$285,000
<p><i>NOTE:</i> The proposed total budget of \$285,000 can be reduced at the expense of student capacity. For example, a lab can be built for a total budget of \$240,000 per year with WSU at \$150,000 per year instead of \$195,000 per year, but the initial capacity for the PLC portion would be limited to 6-9 students per year in year one (40% fewer students in year one at the maximum load per station), building to a maximum of 16-24 after six years (47% fewer students.) The mechatronics portion of the lab would start at 6-9 students per year one and build to a maximum capacity of 14-21 after year 6 (a 14% reduction in capacity and two years longer to reach maximum capacity.)</p>	
Weber State University	
<i>One-time Funding WSU</i>	\$25,000
<p>Mechatronic CNC Mill Training System (87-MS8M60) with Denford Micromill \$20,000 (upgraded Denford mill) Required computer \$2,000 Mechatronics 90-Start 4 (installation) 3,000 This equipment will be used with the robot to train students in automated load and unload. The product is a small valve body that the robot loads into the mill and unloads. Students must also program the small mill to machine the valve.</p>	
<i>Total WSU Budget</i>	\$195,000
<p>A faculty position (\$110,000) at WSU to teach, enroll, and track the progress of all students in the Controls Technology pathway and equipment for an automation lab to support Stackable Credentials Level 2 and 3 (Associate of Science Degree and Bachelor of Science Degree) would begin in year 2.</p>	
<p>The following detailed budget for equipment will enable WSU to gradually build a world class automation and mechatronics lab. This budget plan is in priority order anticipating ongoing funding.</p> <p>The SWI automation lab consists of two basic elements, a programmable logic controller (PLC) element and a mechatronics element. The PLC portion of the lab, which would be a prerequisite to the mechatronics, consists of 16 Portable PLC Combined Troubleshooting Learning System Stations supported with an Allen Bradley PLC, software and a WSU supplied computer. Each station can accommodate two to three students. Capacity builds from 10-15 students per year in year 1 to 30-45 students per year after year 4. The</p>	

mechatronics portion of the lab consists of 8 mechatronics stations designed for 2-3 students each. Each station includes an Allen Bradley PLC, software, and a PC (WSU supplied). Capacity for mechatronics would start at 6-9 students per year in year 1 and build to a maximum of 16-24 in year 5. The stations are designed for students to explore the stations individually and then integrate all of the stations into an automated production line that represents leading manufacturers.

1st priority \$197,067 (Equipment only year one):

- a. Mechatronics Learning System (3) @ \$5,975 (\$17,925 tot)
- b. Studio 5000 Lite PLC Programming Software–single seat (8) @ \$1,329 (\$10,632 tot)
- c. Pick and Place Feeding Station; (1) @ \$13,150
- d. Gauging Station; (1) @ 13,385
- e. Fanuc 200iD/4S Robot Integration to Amatrol Mechatronics (1) @ \$4,540 ea
- f. Servo Robot Assembly Station; (1) @ \$21,660 (using existing WSU Fanuc robot)
- g. Portable PLC Combined Troubleshooting Learning System (5) @ \$20,545 (\$102,725 tot)
- h. FactoryTalk View ME Programming Software (5) @ \$1,290 ea (\$6,450 tot)
- i. Required AB installation for robot & freight \$6,600

2nd priority \$201,946 (\$110,000 salary and \$91,946 equipment in year 2):

- a. AB Mechatronics Learning System; (1) @ \$5,975
- b. Studio 5000 Lite PLC Programming Software-Single Seat (4) @\$1,329 (\$5,316 tot)
- c. Orientation Processing Station (1) @ \$13,150
- d. Portable PLC Combined Troubleshooting Learning System (3) @ \$20,545 (\$61,635 tot)
- e. FactoryTalk View ME Programming Software (3) @ \$1,290 (\$3,870 tot)
- f. Freight \$2000 (est)

3rd priority \$199,491 (\$110,000 salary and \$89,491 equipment in year 3):

- a. AB Mechatronics Learning Sys; (1) @ \$5,975
- b. Studio 5000 Lite PLC Programming Software-Single Seat (4) @\$1,329 (\$5,316 tot)
- c. Sorting-Buffering Station (1) @ 10,695
- d. Portable PLC Combined Troubleshooting Learning System (3) @\$20,545 (\$61,635 tot)
- e. FactoryTalk View ME Programming Software (3) @ \$1,290 (\$3,870 tot)
- f. Freight \$2000 (est)

4th priority \$204,656 (\$110,000 salary and \$94,656 equipment in year 4):

- a. Portable PLC Combined Troubleshooting Learning System (4) @ \$20,545 (\$82,180 tot)
- b. Studio 5000 Lite PLC Programming Software-Single Seat (4) @\$1,329 (\$5,316 tot)
- c. FactoryTalk View ME Programming Software (4) @ \$1,290 (\$5,160 tot)
- d. Freight \$2000 (est)

<p>5th priority \$206,982 (\$110,000 salary and \$96,982 equipment in year 5)</p> <ol style="list-style-type: none"> a. Mechatronics Learning System (3) @ \$5,975 (\$17,925 tot) b. Studio 5000 Lite PLC Programming Software-Single Seat (3) @\$1,329 (\$3,987 tot) c. Mechatronics Torque Assembly Station (1) \$13,150 d. Mechatronics Inventory Storage Station (1) \$13,150 e. Mechatronics Electro-Hydraulic Testing Station (1) \$13,150 f. Level / Flow Process Control Learning System with PID controller Module and Hand Tool Package 1 set @ \$23,380 g. Basic Pneumatics Learning System; (1) @ \$5,580 h. Intermediate Pneumatics Learning system; (1) @ \$2,755 i. Pneumatics System Tool Package; (1) at \$725 j. Advanced Pneumatics Learning System; (1) @ \$1,680 k. Freight \$1,500 (est.) <p>Funding for Priorities 1-5 includes one-time funding for equipment. After year 5, recurring expenses will occur to keep the lab current with industry. Ongoing requirements would include the costs of replacing outdated programmable logic controllers (PLCs), software, learning station components, the purchase of additional robots, and possibly the addition of an additional part-time faculty to support the expected increase in student load.</p>	
<p>Applied Technology Colleges</p>	
<p><i>Total ATC Budget (split equally among 3 ATCs)</i></p>	<p>\$90,000</p>
<p>ATC equipment and training; total annual needs to support first stackable level: Industrial Automation Maintenance Technician (IAMT) Certification. This money will be split equally among the ATCs. ATC monies will be used for equipment and part-time faculty. The current equipment needs for each ATC is listed below. Once these needs are met, the money will be used for replacement/new equipment and part-time faculty to meet increasing demand.</p> <p>BATC</p> <p>Priority 1 - Two Lab Volt Mechanical Training Systems - \$40,000 One for Logan West Campus and one for Brigham City Campus</p> <ul style="list-style-type: none"> • Mechanical training simulator helps students learn effective and efficient methods of maintenance to reduce downtime and increase company profits. Provides hands-on training with mechanical systems including learning to identify, troubleshoot and repair machine parts and components; identify the different types of lubrication and the property quality and duration of use; explain viscosity index theory and code; identify, install, troubleshoot, and repair types of bearings, drive belts, brakes and clutches, gear reducers, and pumps. <p>Priority 2 - Two Hydraulic Fluid Power trainers - \$40,000 One for Logan West Campus and one for Brigham City Campus</p>	

Priority 3 - Electrical Motor Controls updates and Motors/Drives trainers - \$40,000
One set for Logan West Campus and one for Brigham City Campus

Priority 4 – PLC trainer updates with new PLCs, variable frequency drives - \$40,000
Would include HMI panels, industrial network equipment, servo drives

Priority 5 – Sensors and Instrumentation lab equipment for process control - \$40,000
Would include all sensors, valves, controls, and instruments used in industry.

DATC

Priority 1 - 1 FANUC Education Training Cart- \$25,000 (can purchase multiple stations as funding is available)

1 ABB Education Training Cart - \$25,000 (can purchase multiple stations as funding is available)

- The FANUC and ABB Robotics Education Training Carts incorporate the robot housed in a self-contained mobile enclosure. This allows instructors to teach in a laboratory or at a remote site. The robot is housed in a safe, controlled environment enhancing lab safety.

Priority 2 - FANUC Robotics Instructor Training & Software - \$4,000
FANUC Robotics Trainer - \$50,000

Priority 3 - ABB Robot with Controller - \$25,000

OWATC

Priority 1 - FANUC Robotics Instructor Training - \$9,000

- Providing 3 instructors 1 week of advanced robotics and automation training—\$3,000 per person

Priority 2 - Upgrade Existing Motor Control Trainers - \$7,500

- Upgrade existing motor control trainers to provide students with actual hands-on wiring of system versus a soft simulation. Students will transfer electrical schematics to wire circuits, control circuits, power circuits, DC motor controls, AC motor and frequency drive controls. Electric motor control simulators provide a safe environment for students to learn how three-phase alternating current (AC) is used in Delta and Wye circuits for industrial settings. System integration between motors solenoids, motor control devices included instrumentation devices used in controls.

Priority 3 - Lab Volt Mechanical Training System - \$20,000

- Mechanical training simulator helps students learn effective and efficient methods of maintenance to reduce downtime and increase company profits. Provides hands-on training with mechanical systems including learning to identify, troubleshoot and repair machine parts and components; identify the different types of lubrication and the

property quality and duration of use; explain viscosity index theory and code; identify, install, troubleshoot, and repair types of bearings, drive belts, brakes and clutches, gear reducers, and pumps.

Priority 4- 1 Fanuc Robotics Trainer - \$60,000

- Basic robotics training prepares students for Weber State University's advanced automation and integration training. Students learn basic robotics, identify components, troubleshoot, and repair. One training accommodates only 2 students. An additional robotics trainer will expand lab capacity for increased enrollments.

Priority 5 - 1 FANUC Education Training Cart- \$25,000

1 ABB Education Training Cart - \$25,000

- The FANUC and ABB Robotics Education Training Carts incorporate the robot housed in a self-contained mobile enclosure. This allows instructors to teach in a laboratory or at a remote site. The robot is housed in a safe, controlled environment enhancing lab safety.