

Apprenticeships That Work The RAMTEC Model

Ritch Ramey
RAMTEC Coordinator
Tri-Rivers RAMTEC

Success Bound Conference
May 9th, 2018

RAMTEC



Building a Robotic & Automation Technician Pipeline

K-5

6-8

9-12

High Education

Career



Ritch Ramey

RAMTEC Coordinator

Tri-Rivers Career Center

Marion, Ohio

RAMTEC

Robotics and our Manufacturing Crisis



“Over the next decade, nearly three and a half million manufacturing jobs will be needed to be filled and the skills gap is expected to result in 2 million of those jobs going unfilled”

Source; The manufacturing Institute



Current Manufacturing Gap



- “800 New Hires Needed in Our Honda Plant to Replace Retirees”
- “300 Robotic Technicians Needed in Next 3 years”
- “200 Robotic & Automation Technicians needed in next 2 Years”
- “100 Skilled Workers Needed in next 6 Months”
- “50 Skilled Workers in Next 6 months”
- “We need 15 Entry Level Robotic Technicians Immediately”
- “We Will Hire Your Whole Graduating Class as Robotics Techs ”
- We will Graduate 21 Engineering Technologies students this year

Our Answer to the Manufacturing Gap





RAMTEC Ohio Growth

- September 2013 RAMTEC Ohio at Tri-Rivers in Marion opened
- June 2014 RAMTEC Ohio \$14,995,000 Straight A Grant to create 8 additional RAMTEC sites funded
- November 2015 additional \$ 8,000,000 funding for 14 more RAMTEC Ohio sites
- Provided Training for 96 Instructors
- Hosted Summer Camps for more than 500 Participants





Why is the RAMTEC Program Needed?

*Exposure of our our next generation to Highly Rewarding
STEM & Manufacturing Careers*





Prepared for Apprenticeships



"RAMTEC Engineering Technology graduates have been a great addition to our Maintenance Apprenticeship program. They have a solid foundation in electrical, PLC, hydraulics, and robotics, all which are key components of our multi-craft workforce. RAMTEC is in tune with developing technology, and preparing students with the needed skills, to succeed in industry today."



Cam Lee
Predictive Engineer
Whirlpool Corporation

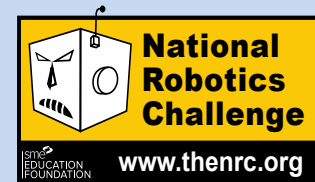


RAMTEC is the first training center in the United States to offer “newly” developed industry certifications for Robotics, CNC Machining, Mechatronics, Industrial Maintenance, and Robotics Welding all under one roof.

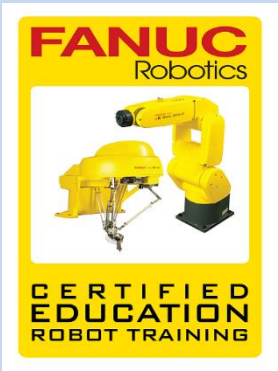
RAMTEC

RAMTEC

Educational Collaborators



Industry Equipment Leaders and Strategic Partners





RAMTEC Engineering Outreach



Fairs



Schools



(perfect for
upper elementary
and
middle school
aged students)



Libraries



Contests



Camps



Camps



Student Training



Machining



Hydraulics



Welding

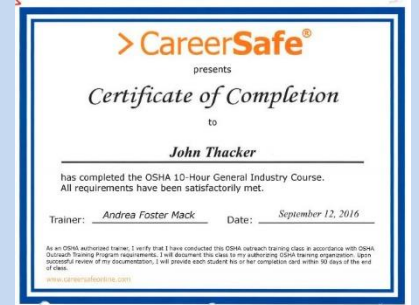


Robotics



Programmable Logic Controllers

Graduates Earn Certifications Worth \$8,700



World's Top Recognized Robotics Certifications

- 23 Seniors Certified in FANUC iRVision
- 37 RAMTEC students are FANUC Industrial Robotic Certified
- 37 Students are Yaskawa Motoman Certified
- 23 Students Certified in Collaborative Universal Robots

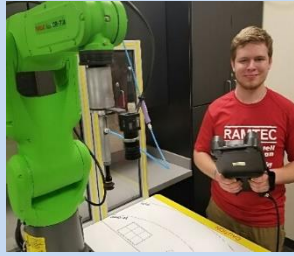


RAMTEC



Great Career Opportunities

- College Credit and Certifications Lead to Great Careers



12 Seniors are already working in the field



RAMTEC Why is this important to our students?

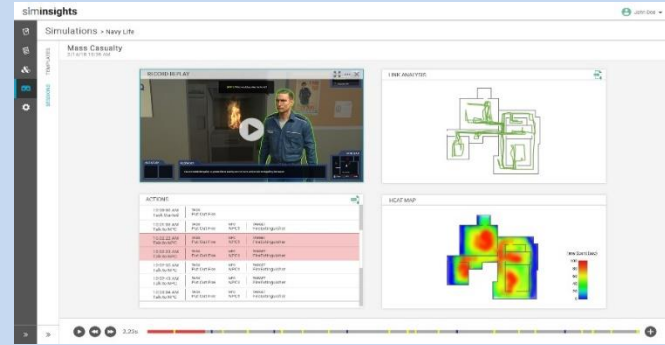
- Positive exposure for Ohio
- Publicity is good for manufacturing





Future Career Demands

- Cognex Vision
- Artificial Intelligence
- JIT VR Based Training
- JIT AR Based Training
- Robotic Palletizing
- Mobile Robotics
- Drones



For Further Information
ramtecohio.com



Whirlpool Apprenticeship Program

- 4 Year, 8000 hour program
- 144 Min Hours Classroom / Lab Training Per Year
- 37 Associates in Maintenance Technician Track
- 13 in Tool & Die Track
- Multiple Cohorts



Whirlpool Apprenticeship Program

- What Makes A Successful Program
 - Instructors with Industry Experience
 - Hands on Lab Experience
 - Constant Feedback with Plant Personnel
 - Evals and Adjustments



Industrial Maintenance Program

- 650 hours – multi-skilled craft instruction
 - Instructors with Industry Experience
 - Hands on Lab Experience



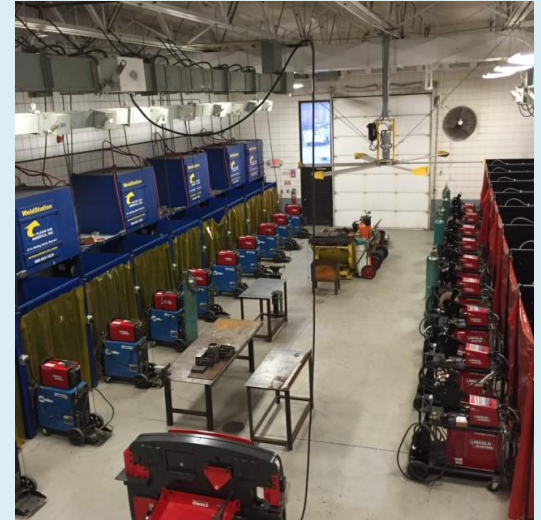
Industrial Maintenance Program

- NCCER Core Curriculum
- Applied Math
- Machine Trades,
- NCCER Electrical Level 1
- Electrical Controls for Machines
- Hydraulics/Pneumatics
- Electrical /Mechanical Troubleshooting
- Intro to Programmable Logic Controllers PLCs
- Intro to Robotics
- Basic Welding
- Advanced Welding
- Intro to HVAC
- ESCO EPA 608 & R410-A
- Soft Skills and Resume



Welding, Fabrication and Allied Processes

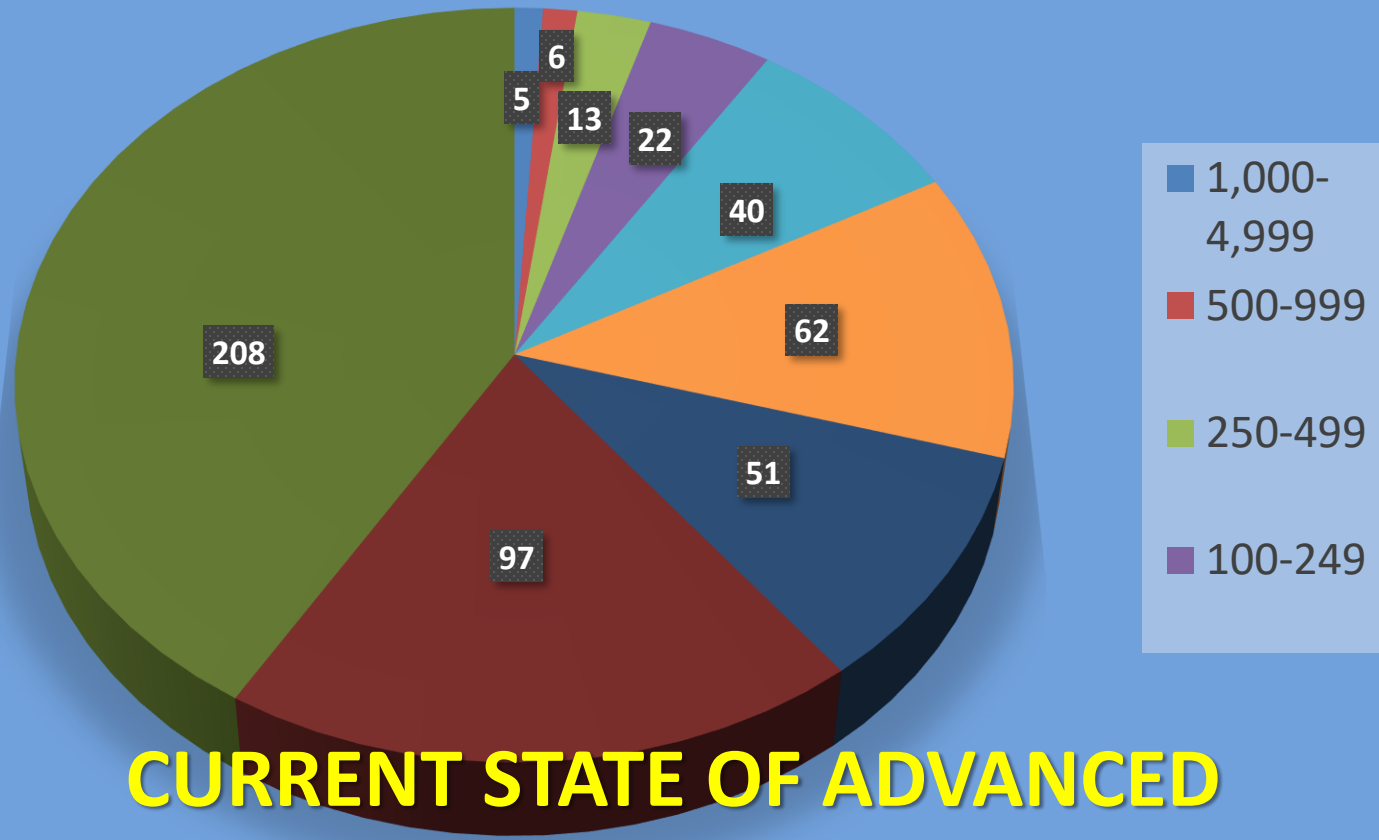
- Math for Welders
- Lab Safety
- Oxy-Fuel Cutting
- Weld Print Reading
- OSHA 10 Safety Certification
- Shielded Metal Arc Welding (SMAW)
- Flux Cored Arc Welding (FCAW)
- Structural Fabrication
- Carbon Arc Cutting and Gouging
- MIG Gas Metal Arc Welding (GMAW)
- TIG Gas Tungsten Arc Welding (GTAW)
- Intro to Pipe Welding
- Intro to Lincoln /FANUC Robotic Welding
- Employability / Soft Skills Training





RAMTEC ROBOTICS TECHNICIAN TRAINING (RRTT)

TRI-RIVERS RAMTEC, JOBS OHIO, OHIO MEANS JOBS, AEROTEK, HONDA, ROBOTWORX AND CARDINGTON YUTAKA TECHNOLOGIES



**CURRENT STATE OF ADVANCED
MANUFACTURING SKILLS GAP IN 50
MILE RADIUS MARION**

CURRENT STATE OF ADVANCED MANUFACTURING SKILLS GAP IN MARION & SURROUNDING COUNTIES

**FOR
EMPLOYE
RS**

Inability to find skilled workers to compete and grow

**FOR
INDIVIDUALS**

Inability to secure good jobs, provide financial stability

**FOR THE
REGION**

Inability to attract/retain companies, grow economy
= Higher poverty &

LABOR POOL

Current Associates, Students, Unemployed, Underemployed, Associates Elsewhere,
Military, Temp Agencies, Recruiters, General/Other

Skilled Trades Jobs, Job Descriptions, Skill Sets, Competencies Required, Job Profile,
DACUM, Job Task Analysis, Document Work Instructions, KSAO's, Written Expectations

Collect Data

Previous Education, Training, Experience

Collect Data

*Examine
Hiring Process*

Assessments, Testing (Written/Hands-On)

Collect Data

Gaps Identified

DEVELOP PORTFOLIO

Education

Training

OJT

Job Shadow

Mentor

Coach

Apprentice

Co-op

Intern

Work Study

Reassess
Gaps

Curriculum

Job Aids

Lab/Mock Up

Formal or Informal

Serve on Advisory Board

Teach/Instruct

Speak/Present

Job Fairs

Career Expo

Other

Tuition Assistance

Scholarship

Other Incentives

UPGRADE PORTFOLIO

Retention
Culture

TALENT POOL

Wage & Benefit Pkg.
Performance Reviews



THE OHIO STATE
UNIVERSITY

Identify businesses that need robotic technicians

- Aerotek, Honda, RobotWorx and Cardington Yutaka Technologies



Identify sponsors

- Tri-Rivers RAMTEC will partner with Jobs Ohio & Ohio Means Jobs



Market/recruit participants for training

- Create coordinated marketing plan and implement



Screen candidates

- Ohio Means Jobs, Tri-Rivers and business partners



Education Training

- Tri-Rivers RAMTEC 120 hour prototype



Evaluate project/adjust

ACTION PLAN FOR 1ST PROTOTYPE

Social Cost of Opportunity Youth

Individual impact on local and national economies



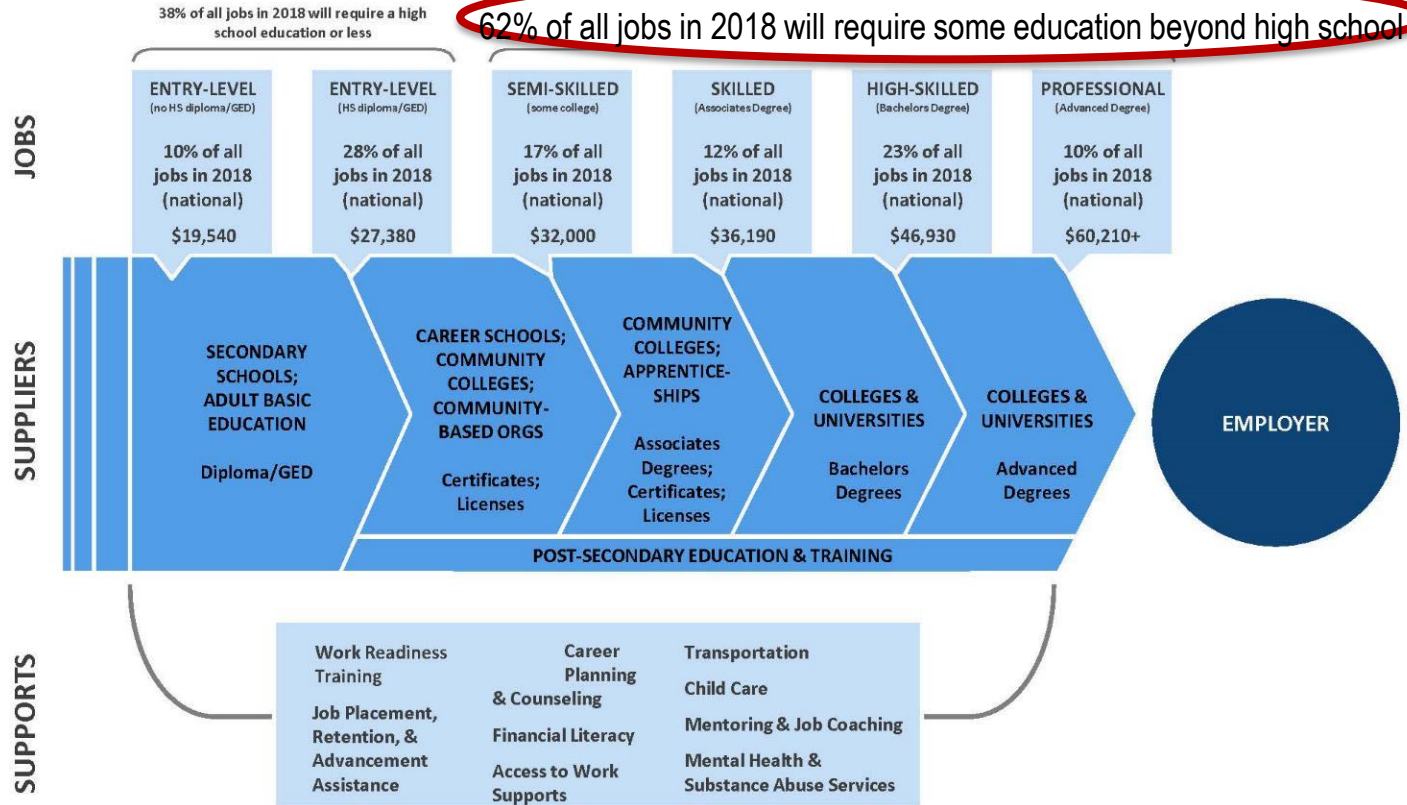
Annual cost to society per opportunity youth



Lifetime taxpayer burden from lower wages, health costs, etc.

Source: Academic study funded by the U.S. Corporation for National and Community Service. Dollar estimates corrected for 2012-2016 inflation

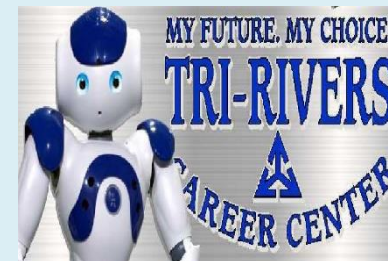
Talent Supply Chain Model



Source: Georgetown University Center on Education and the Workforce. "Help Wanted: Projections of Jobs and Education Requirements Through 2018." June 2010



Apprenticeships and Adult Training



Mark Edington – Robotics Coordinator

May 9, 2018

RAMTEC

Training Secondary, College and Incumbent Workers



FANUC

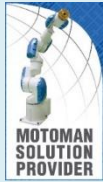
RAMTEC

Marion, OH

Area “Industry” Partnering with RAMTEC

- Whirlpool Corporation
- Honda of America
- Marion Industries
- US Yachiyo
- Cardington Yutaka Technologies
- Bridgestone - Upper Sandusky
- FT Precision - Fredericktown
- Guardian Industries - Upper Sandusky
- MTD Products Inc. - Willard
- SilverLine / Anderson
- UTLX – Union Tank Car Co.
- American Showa – Sunbury
- Sparkfun – Denver, Colorado
- Acoust-A-Fiber – Delaware Ohio

Industry Participating in Training



- Whirlpool – Largest MFG for Dryers in the world
- Honda of America - 
- Marion Industries – Tier 1
- US Yachio – Tier 1
- Cardington Yutaka Technologies – Tier 1
- Bridgestone – Tier 1
- FT Precision – Tier 1
- Custom Glass Solutions – (Guardian Ind.)
- MTD Products Inc. – Lawn / Snow blower / 4 Wheelers
- SilverLine / Anderson – Windows & Doors
- UTLX – Union Tank Car Co.
- CoorsTek – Medical implant devices



RAMTEC

State of the art Training Facility – All hands on Training – 38 Robots



Whirlpool Robotics Class



Whirlpool Students FANUC Certifications



RAMTEC



FT Precision, Inc.
Fredericktown, Ohio

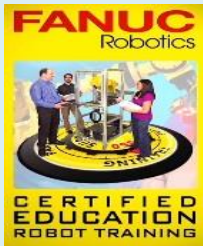


FANUC

RAMTEC
Marion, OH

Available Certifications

- CNC Machining - Robo drill / Mazak / Hass / Dosan
- Hydraulics Parker
- Welding Conventional Mig, Stick
- Robotic Welding FANUC / Yaskawa
- Robotics FANUC / Yaskawa / Universal
- Robotics Collaborative Robotic Systems
- IR Vision For FANUC Robots
- PLC Allen Bradley, Mitsubishi
- OSHA 10 Safety



RAMTEC Robotic Training Summary

Certified Students

- **290 Industry Adult Students**
- **143 TRCC Secondary Students**
- **47 Instructors**

Total: 480 Students

28,384 Total Training Hours



Robot and Automation Advantages

- Safety – Robots Can do the More Dangerous Tasks
“Exploit technology not people”
- Robots are Highly Accurate and Can do Repetitive Tasks
- Require Higher Skill Training and Higher Wages for Technicians
- Maintain America’s Technological Edge vs Foreign Competition
- New Collaborative Robots Enable Humans to work with Robots
- Reshoring of “Estimated 250,000 Manufacturing Jobs”
- Overcome the Manufacturing Workforce Gap

Whirlpool Strategic Partner with RAMTEC

Project Start February 2, 2018 Through May 4, 2018

Whirlpool Vent Tube Automation Project



Whirlpool Project Equipment Video



This work cell picks up gravity-fed vent tubes and loads them into dryers.

Whirlpool Equipment Unloading Conveyor Unloading



Setting Up Conveyor



Whirlpool Equipment Arriving



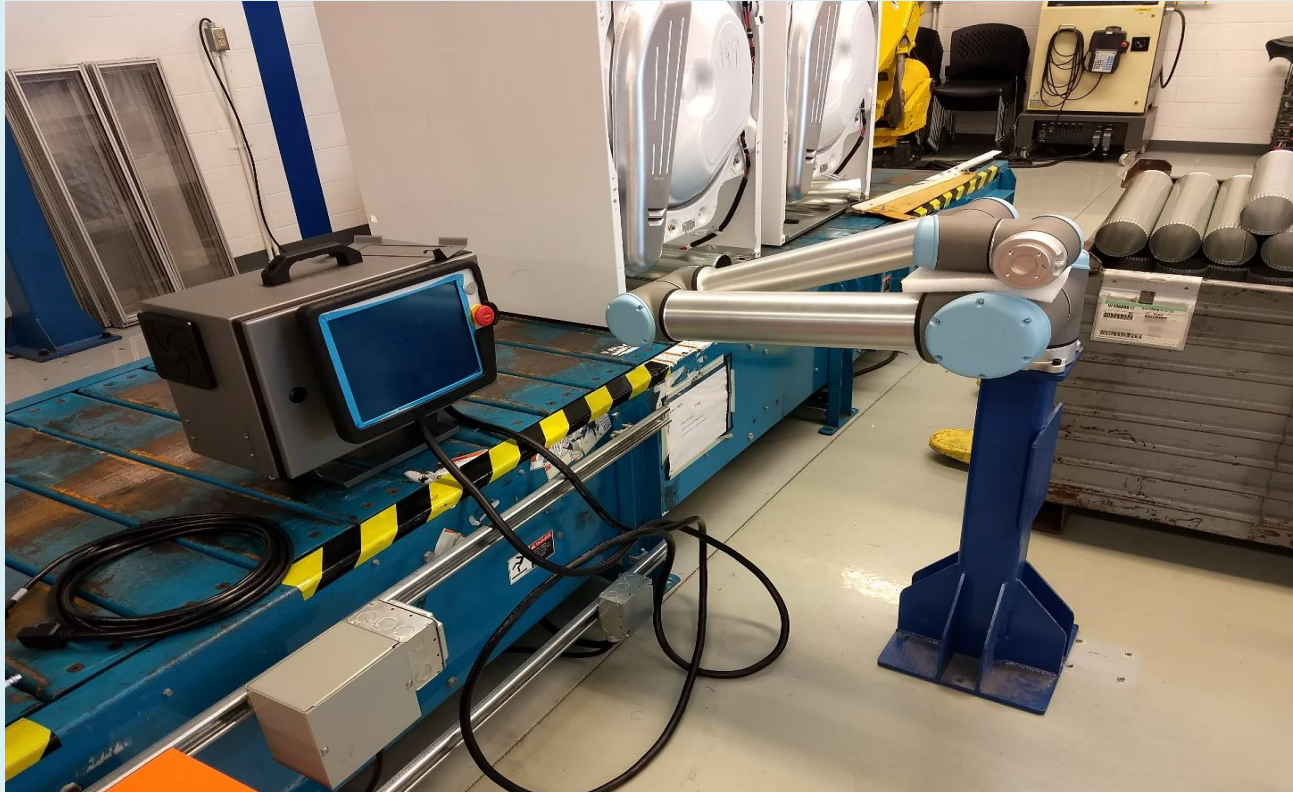
Unpacking The UR Robot



Strategic Laying out of Misc. Components



Mounting Robot and Base



Automation / Integration

Task Analysis:

1. Conveyor / VFD 40HZ, spacing of dryers on conv.
2. Encoder – Absolute Type, where and how to mount
3. Balluff Ethernet Connection block Mount and config.
4. Prox. And laser sensors How to mount, wire, config.
5. Pneumatic port block assemble (Mount) for Robot EOAT
6. Universal Robot (UR10) Program, Line Tracking, mount
7. Robot EOAT- Grippers & sensor ... proto-type & 3Dprint parts
8. Robot EOAT Adaptor plate proto-type / Machine part
9. Allen Bradley PLC wiring and programming
10. Warning Beacon (Light) Green – Red

“Projection” Cost Summary

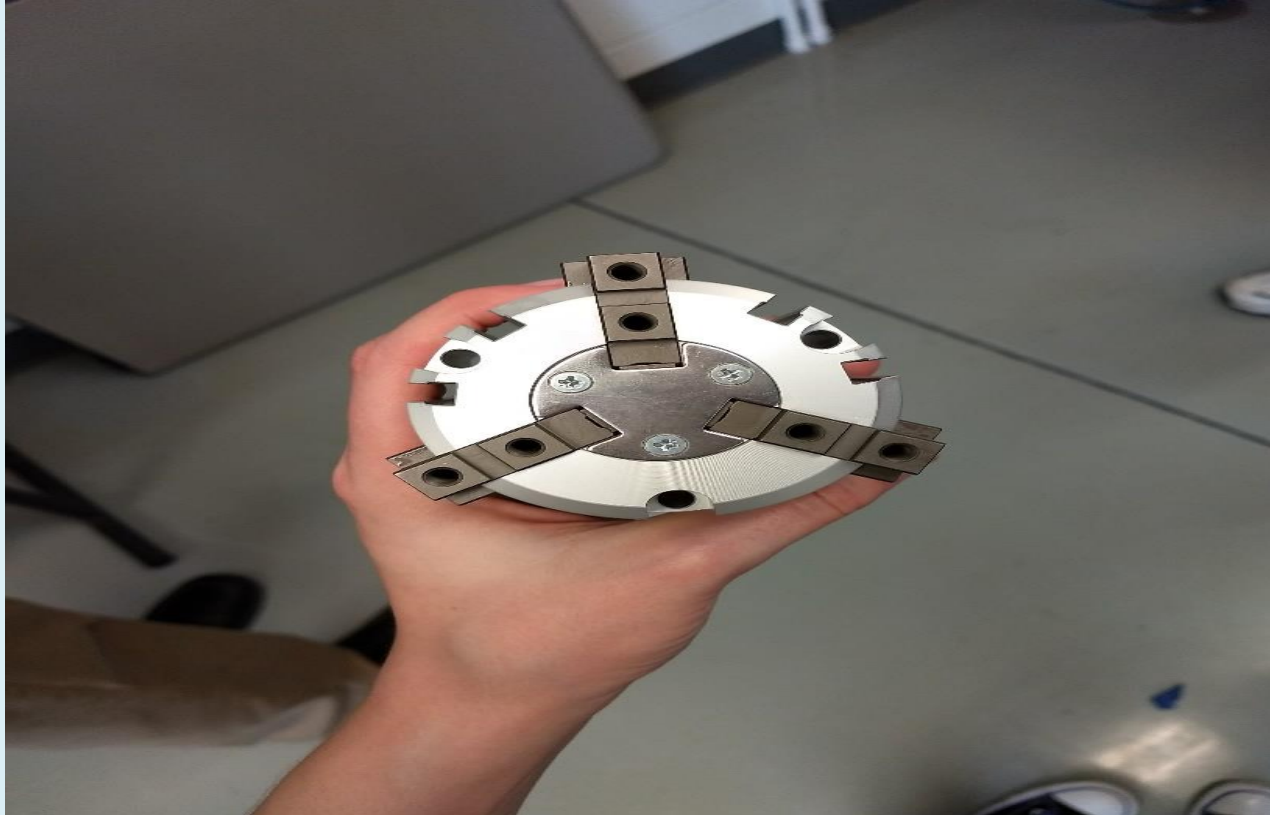
Industry

- Project Man Hours = 300hr.
- Man hours (4 Engineers) = 75hr. Per-Engineer
- $300 \times \$150.00$ per hr. = \$45,000.00
- Equipment Costs = \$65,000.00
- Misc. Project cost = \$10,000.00
- Utilities, Machining, 3D-Printing materials
design / engineering prototypes.
- Approx. Summary of project ... \$120,000.00

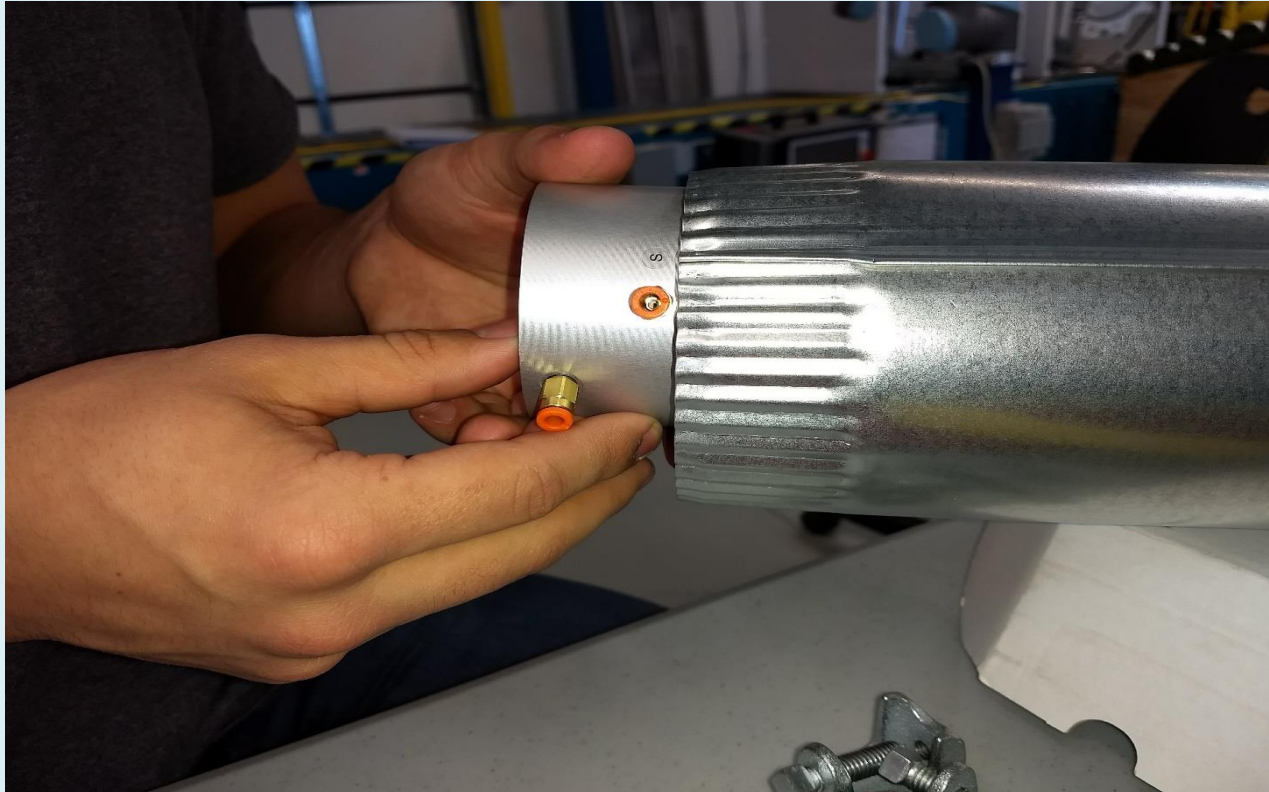
Project Cost Summary

- Project Man Hours = 300hr.
- Man hours per student (4 students) = 75hr. Per-Student
- $300 \times \$35.00$ per hr. = \$10,500.00
- Equipment Costs = \$65,000.00
- Misc. Project cost = \$4,000.00
- Utilities, Machining, 3D-Printing materials
design / engineering prototypes.
- Summary of project ... \$79,500.00
- Savings of \$40,500.00 on project

End Of Arm Tooling Gripper Cylinder



EOAT Cylinder Prep

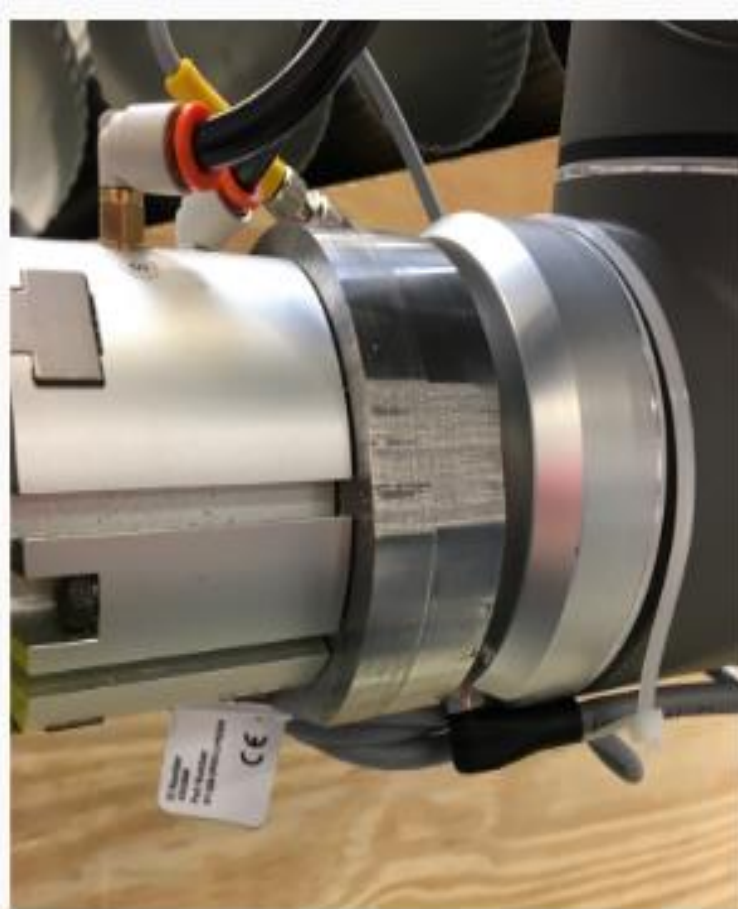


Proto-type EOAT Adaptor





Prototype



Machined Part

End of Arm Tooling - Gripper Fingers

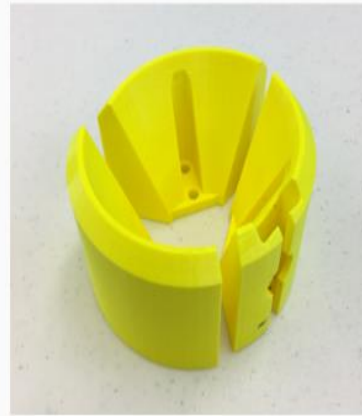
Our design for the gripper fingers went through 3 main innovations.



Version 1



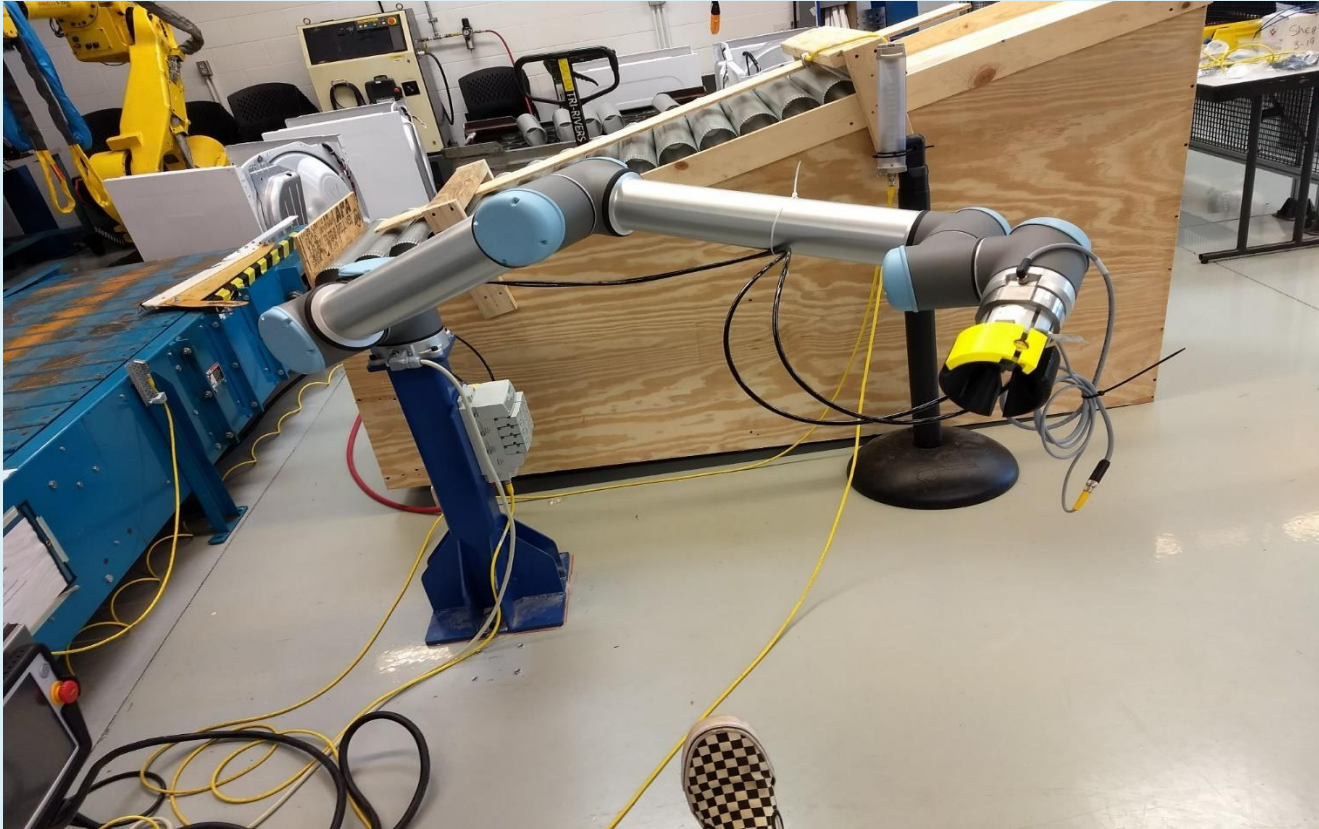
Version 2



Version 3
(Final)



EOAT 3D Printed Grippers



Dryers for Testing Equipment



Machining Components



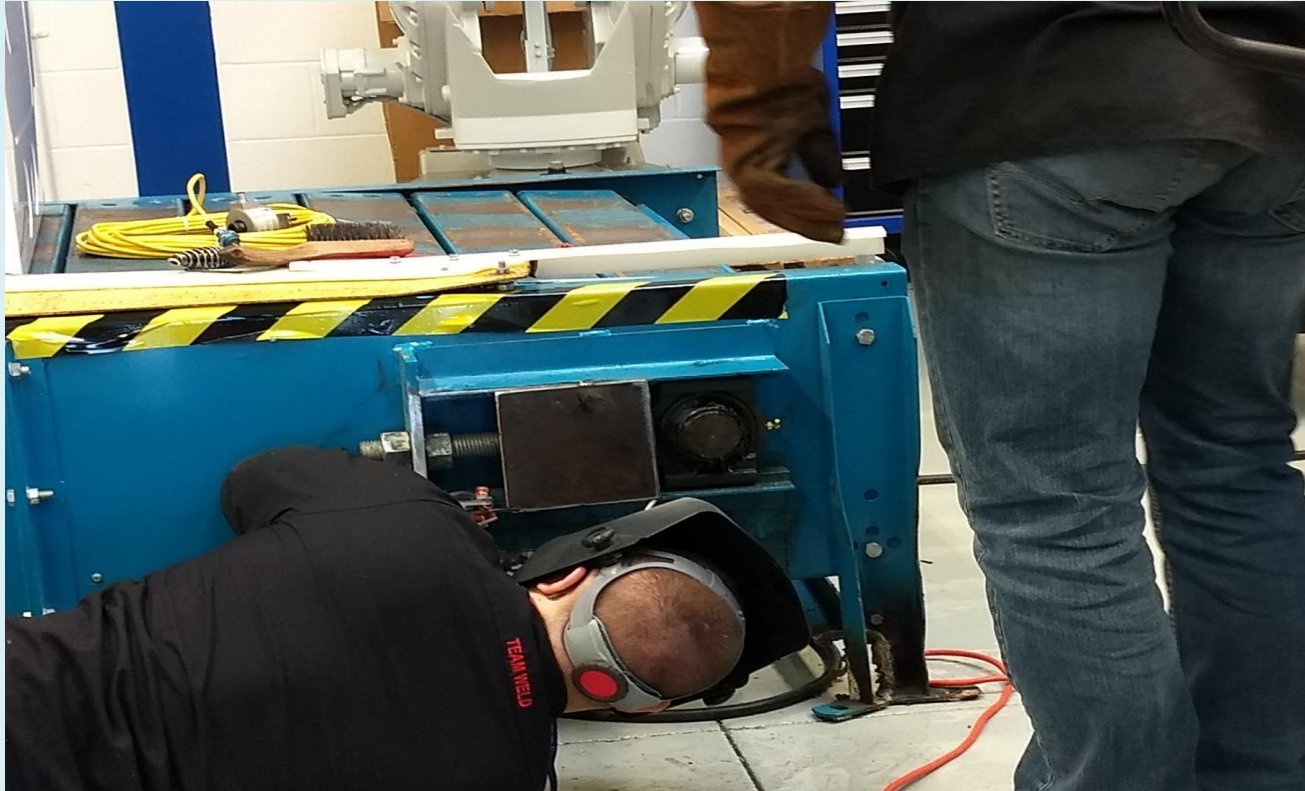
Fabing Mounting Plate



Fabing Mountings



Welding Plate to Conveyor



Drill Conveyor Shaft / Prep for Encoder



Encoder Mounted



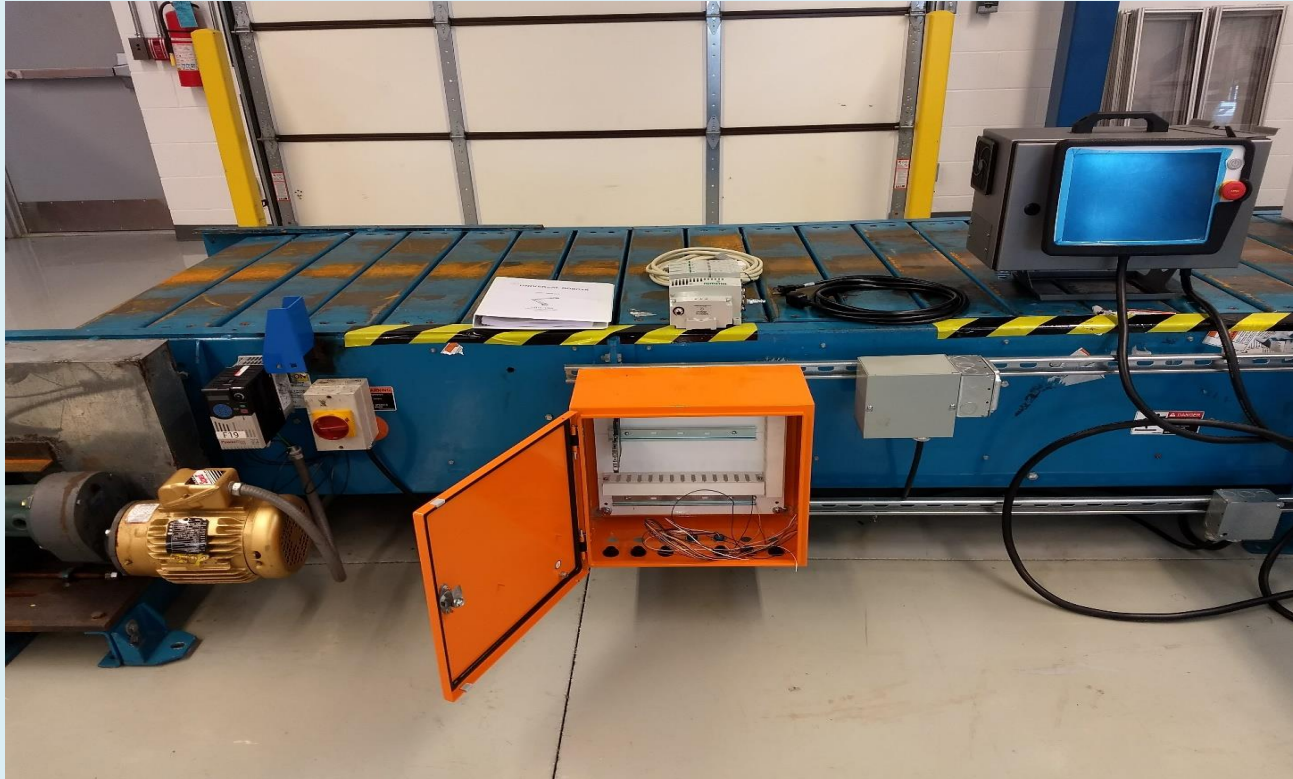
Pneumatics Valves Installed



Mauk Conveyor for Vent Tubes



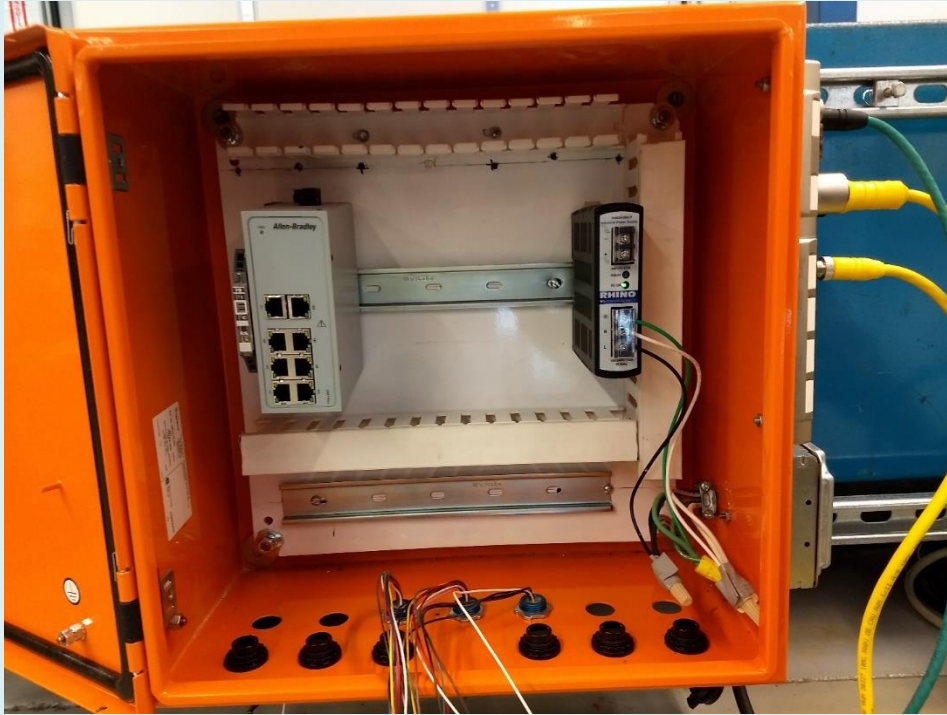
Starting to Mount Electrical Cabinets



Wiring the PLC



Installing Power Supply and A&B Ethernet Block



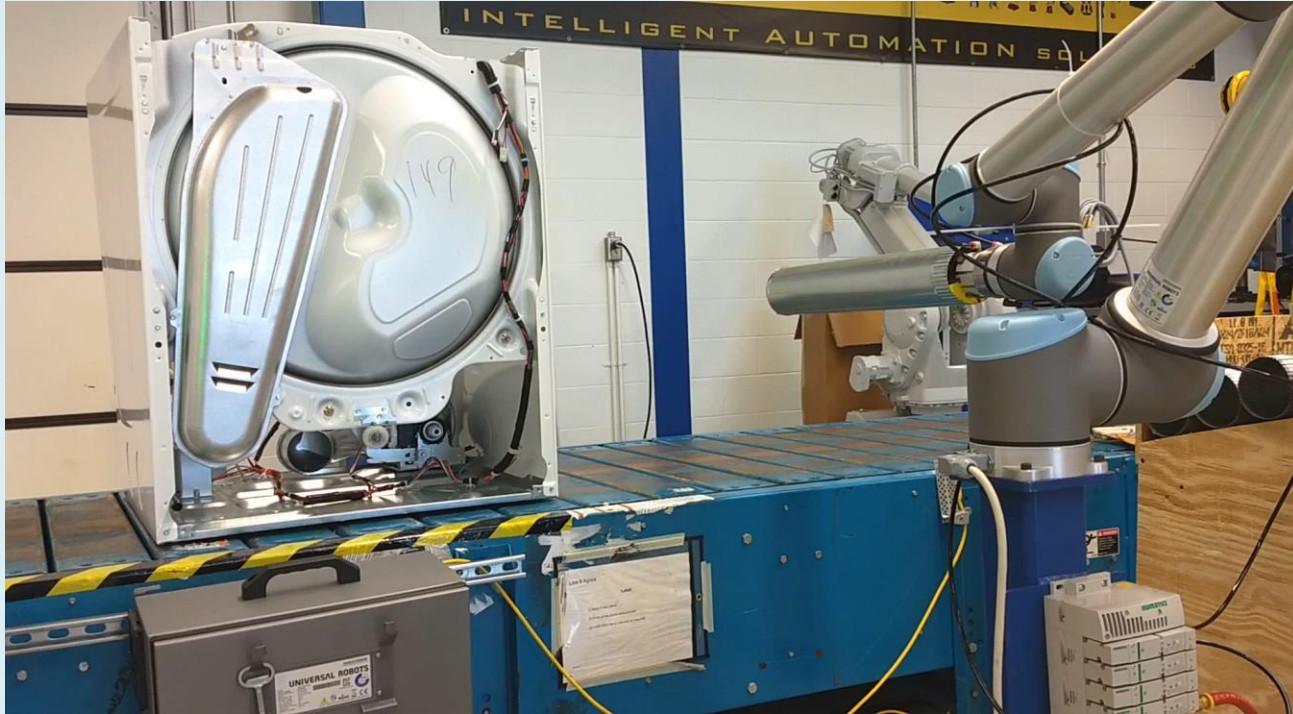
Install PLC and Terminal Strip



Wiring and Programming



Setting Up Line Tracking



Programming The Robot



Project Team Members

