



# SEMICONDUCTOR LINE PROPOSAL

(Mirroring Main Campus)

Presented to:  
Temple College  
Taylor Campus  
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# ABOUT OUR COMPANY



At ROOTS Education Co. (REC), we provide kits so students can build systems, outfitting students, organizations, and educational institutions with valuable Career and Technical Education (CTE) services.

Through assessments, curriculum, simulation, and our (patented) adaptable hands-on lab training technology, ROOTS fully prepares students to step confidently into further education and high-earning advanced manufacturing and technology careers.

Program blueprints show that students emerge from ROOTS learning programs with full competencies beyond those offered by major competing bodies. ROOTS develops students' capabilities in a wide array of fields, such as advanced CTE programs in automation, advanced manufacturing, and the rapidly expanding field of collaborative robotics (Cobots). Through the diversified education and credentialing ecosystem REC offers, ROOTS students learn a complimentary variety of essential life and career skills, improving student education and employability outcomes.

## Why ROOTS?

- Our concept is to collaborate with schools with a blank slate, identifying components and needs so students can be heavily involved with assembly, validation, programming & operation of a robotic work cell. This allows you to teach from a system that addresses local workforce needs. We provide the tools to guide students through theory, complimented by experiential learning with hands-on engagement during/ after the theory. In our more advanced levels, the students install, wire, program, fabricate, calibrate, teach, strategize, and develop their process all while competing and creating their own manufacturing cell.
- Each level educates students and instructors about science, technology, and engineering within the world of robotics to better understand Industry 4.0, and to create Employee 4.0.
- Our system is an engineered, customized approach that freely allows build and teardown, imagination, and integration.
- Working in advanced manufacturing requires a broad understanding of the factory's processes. Strategic training utilizing hardware and software creates a diverse base of innovators and problem-solvers.
- Industry 4.0 is a rapid evolution in how modern manufacturing operates. Student 4.0 requires access to equipment which enhances the educator's ability to keep pace with the ever-changing industry.
- Backed by our 70+ years in manufacturing.
- Backed by 100+ robotic installations on multiple continents.
- Training industry workers since 2004 in robotics best practices.
- Strategic partnerships in multiple states to improve cost and timing to you.
- ROOTS stays current as industry experts in manufacturing consulting.

# PRODUCT DIFFERENTIATORS

## KEY INPUTS:

1. Industrial Grade Robots
2. Open sourced, so students can contribute to real world problems by becoming developers, not just followers
3. Safety Oriented
4. Designed for core integration with OEM equipment
5. Project (Lab) Based Curriculum
6. Designed to be installed by students with ROOTS oversight.
7. Simulator tools so all students can contribute at the same time
8. Independent interactive learning modules
9. Flexible to accommodate reconfiguration, repurposing and processing
10. Flexible to add and remove accessories
11. Flexible to enable creativity and imagination
12. Retained value to be sold back into Industry for new equipment
13. Onsite, Certificate based Train-the-Trainer offerings.

## WHAT MAKES US DIFFERENT - "STUDENTS PUT THEIR PHONES DOWN":

1. Co-collaboration to meet specific needs
2. Private and customized training website

3. Designed for your region, for your employers
4. Minds-on, Hands-on approach
5. Designed to enable creativity, imagination and applied engineering
6. We focus on integration (most challenging part of manufacturing)
7. We create excitement, engagement, leaders and team skills - separating our programs from others
8. We range from a mix of Science and Art to create Technicians and Application Engineering prospects
9. Air tight curriculum (instructors don't require prior knowledge of robotics)
10. Expandable, can be networked and integrated with other equipment
11. Creative design allows students to make reconfigure, repurpose
12. Designed with Safety Training devices
13. Designed with Troubleshooting devices
14. Provides project based tasks so students can solve problems in a team environment
15. Introduction to engineering skills are created with application based tools
16. Industry 4.0 compatible

# ABOUT OUR ADVANCED LEARNING FACTORIES

We are honored to enhance your Training Center with the Wafer Processing Learning Factory which is a continuation of the Advanced Robotic Applications, focused within the realm of Semi-Conductor technology.

We understand your needs very well and that is why our system is unique and truly one-of-a-kind WITH: *Project Based Learning, simulating manufacturing processes in the real world, problem solving with building 21st. century skills. Open interfaces which conform to industrial standards, Plug & produce methods, Motivating, practical project exercises, Fast conversion for various training scenarios, Flexible robot cells to industry standard, Solid and reliable machine networking. The wafer processing trainer can be upgraded and expanded as learning objectives and budget morph and grow with technology and the needs of external stakeholders drive the learning outcomes.*

## A **WAFER PROCESSING LEARNING FACTORY:**

The Wafer Processing Learning Factory will be housed in a skeleton style clean-room, creating the conception of a clean-room without the cost of major construction or facility changes. Inside the clean-room, multiple robots will be manipulating semiconductor wafers from process station to process station. Each station will perform operations typical within the wafer production process and as expected, students will be able to identify if processes meet expectations at stage. The process cells allow students to create, align, adjust and maintain the process that a wafer would typically be exposed to.

## **Pathway to Proficiency:**

The ROOTS program is designed to create an automation pathway for students. Having an Automation Strategy is critical for long-term goal achievement, and we can help with that. We create a manageable approach to keeping

up with industry by continuously evolving your ROOTS kits without replacing and starting over. Over time, you can add extra tooling, accessories, and software improvements to your kit, allowing students to create new scenarios and lab exercises. In addition, you can add additional systems to your kit for added learning complexity and enabling competitions amongst classes or groups.

The ROOTS Semiconductor Training system is designed and deployed in a modular format that allows each station to be isolated and trained on individually. This approach gives opportunities for more advanced students to experience more in-depth training experiences while more challenged students can remediate and gain extra training hours focusing on the areas that need the most attention. The LMS is structured to allow for this type of advanced manufacturing process dissection as well as dovetailing seamlessly into the training regimen for the highest level of student learning experience. Each LMS subscription renewal also includes Hours for Train The Trainer, year over year.



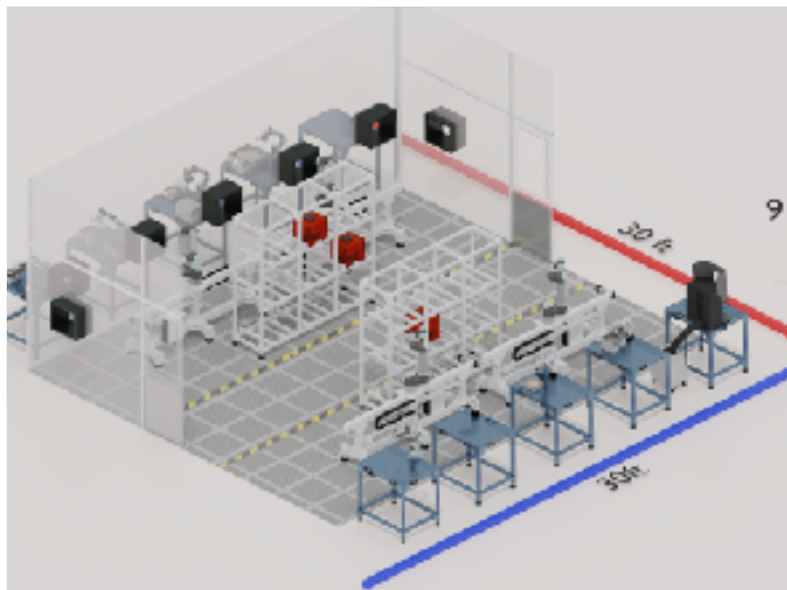


# ABOUT YOUR KIT

For students and incumbent workers, benefits include advanced skills education in a leading institution, often with no out-of-pocket costs. They learn new skills that provide the perfect combination of automation and challenges to eliminate the gap between education and industry, advancing their careers in an exciting and growing profession. The ROOTS Learning Factories provide more than just robotics; industrial-grade equipment supports learning the complex principles of robots, including classification, operation, troubleshooting, processing, logic, and applications in the automation industry. Students learn critical thinking through teamwork and innovation, electro-mechanical design, and programming in an intensive hands-on learning environment that propels them into excellent Industry 4.0 careers.

1. This program will provide students with an overview of the semiconductor industry, including Helium Leak Detection and Clean Room Protocols.
2. This program will provide students the basic concepts behind processing steps. These include processes like FOUP/SMIF handling, Scrubbing, Etch, Wafer Transfer, and more...
3. This program will guide future technicians in automated processing, maintenance, programming and integration techniques with use of robotic applications and industry 4.0 devices.

Within the Wafer Processing Line Students will obtain the: A) Knowledge, Skills and Abilities to automate a Vacuum Technology Process B) Knowledge, Skills and Abilities to automate a Plasma Etching Process C) Knowledge, Skills and Abilities to automate a Wafer Transfer Process D) Knowledge, Skills and Abilities to automate a Wafer Transfer Process E) Knowledge, Skills and Abilities to understand a Scrubber/Gas Abatement process. F) Knowledge, Skills and Abilities to understand a EFEM Vacuum Tool Process. G) Knowledge, Skills and Abilities to understand a Helium Leak detection Process.



Example Image for reference only.

ROOTSEducation.CO

# OUR PRODUCT PRICING STRUCTURE

Stations Included:

Qty

HAND TOOL TRAINING PACKAGE - A selection of foundational tools that provide critical tactual use of clamping, cutting, leveling, basic measurement, precision measurement and transferable measurement exercises. Fastener installation, proper torque setting, thread type identification and proper fastener selection are part of the training scenarios as well.

5

CLEAN ROOM PROTOCOLS PACKAGE - The gowning/de-gowning protocols; associated PPE donning and doffing, including TYVEK suits, booties, gloves, tack mats, de-ionizer bar, HEPA filter system

1

CLEAN ROOM STRUCTURE/DEVICE PACKAGE - Complete 24' x 20' clean room skeleton (roofless) with PPE gowning vestibule, Dual entry Door System, Cleanable walls, Clean room Lighting Package

1

HELIUM LEAK DETECTION PACKAGE - Industry specific, Mass Spectrometer-based leak detection Tool. Enhances Vacuum learning Module. Indispensable skill needed for modern Wafer Fabs. Supported with a full curriculum module(s)

1

INTEGRATED PLASMA ETCH PACKAGE - Includes a Plasma Etch toolbar teaching concepts of Plasma Etching, and Basics of Vacuum. Creates RF-Based reactive plasmas for precise Thin Film etching processes

1

ROBOTIC WAFER TRANSFER LEARNING PACKAGE - Contains an Atmospheric Robot, Transfer Software, Silicon Wafer Cassette Stands, fully supported Curriculum Modules for students to practice and understand how robots are utilized in a true Wafer Fab.

1

SCRUBBER /GAS ABATEMENT TRAINING PACKAGE - Allows Gas Neutralization before disposal. Non-Toxic gasses are used with this trainer, however, the process of gas abatement is a critical skill. The full Curriculum instructs the Use and Fundamentals of Scrubbing, Repair and Maintenance.

1

EQUIPMENT FRONT END MODULE (EFEM) PACKAGE - Large, Industry-Standard Transfer Module that allows students to program Wafer Transports from a standard FOUP-Style Cassette to a Vacuum Handler and onward to 4 simulated process stations. Learning Module Curriculum reinforces Vacuum Basics and Robotic Transfer Processes encompassing Low Vacuum Pumps, High Vacuum Pumps, Valve Pneumatics, Gauges, and Machine Software.

1

INSTALLATION/ENGINEERING/TRAINING - Delivery, ROOTS Installation and startup, onsite, 100 additional hours for onsite training, all costs associated with travel included

1

CURRICULUM/LMS- Air tight, Turn key Module-based Curriculum Suite. 1 year Learning Management System (LMS) subscription included

1

SHIPPING - All shipping costs to school location included.

1

**Equalis Contract - #EQ-052920-01G**

**Total Project Price: \$1,908,479**

[ROOTSEducation.CO](http://ROOTSEducation.CO)



EDUCATION CO.

# EXCLUSIONS

- *Costs nor labor for facility changes*
- *Costs nor labor for demo work*
- *Costs nor labor for utilities (all utilities within 6' of equipment i.e. air drops, electrical drops, water drops, drains, exhaust)*
- *Costs nor labor for required permits*
- *Payment to vendors (unless specifically hired by Roots Education Co.)*
- *Costs nor labor for rigging/unloading from trucks*
- *Costs nor labor to secure storage of materials*
- *Costs nor labor for waste management*
- *Costs nor labor for safety equipment / PPE*
- *Equipment for potential (simple) fabrication during assembly*

## TERMS AND CONDITIONS OF SALE

1. In consideration of the services to be performed by the Company, **Customer agrees to pay 50% downpayment of total, upon invoice, Net 15 days.**
2. Remaining payment due upon materials delivered or services rendered, Net 30 Days.
3. For all Labor, hardware, additional expenses, or Change Orders, terms are Net 30 Days.
4. Terms may not be changed without written consent of ROOTS Education Co., LLC.

## 5. THIS PROPOSAL IS VALID FOR 30 DAYS FROM DATE POSTED ON COVER PAGE.

### ACCEPTANCE

Unless a contrary provision is found on the face hereof, quotations may be withdrawn without notice at any time before receipt by the Company of an acceptance in writing. In addition, purchase orders received more than 30 days after date of quotation shall be subject to acceptance by the Company.

### QUOTATIONS

All quotations are limited to the items and quotations of items herein specified. The company assumes no responsibility for the furnishing of any other equipment or material. Delivery lead times are currently TBD. Once announced, all lead times are subject to production capacities and build times, and may extend past predicted delivery timeframes listed here. Delivery lead times do NOT include assembly or operation.

### PRICES

Unless otherwise specified all prices are f.o.b. our office and are subject to change without notice unless a firm order is placed with the Company within thirty (30) days from the date of quotation.

### TAXES

The amount of any applicable tax or other government charge upon the sale, shipment and/or use of goods covered by this quotation shall be added to the price and shall be paid by the Purchaser.

### CANCELLATION

In the event of any cancellation of the order by either party, Buyer shall pay to Seller the costs and expenses (including all expenses and all commitments to its suppliers and subcontractors) incurred by Seller prior to receipt of notice of such cancellation from Buyer plus Sellers usual rate of profit for the same or similar work

### PAYMENTS

The customer will be invoiced per the payment schedule noted above.

### LIMITED WARRANTY

(a.) Without limiting any other provision set forth herein, any and all product warranties will be limited to those available to Customer from the OEM (original equipment manufacturer) only. OEM warranties are contingent upon proper use of the products in the applications for which they were intended and shall not apply to products that are materially modified or subjected to unusual physical or electrical stress, misuse, abuse, or unauthorized repair. Customer is solely responsible for its machine's compliance with applicable regulations for machine guarding and safe operating practices. Unless otherwise noted, regulatory compliance of the system is the responsibility of the Customer. All software products are fully warranted for content, but operationally are provided "as is" and "with all faults", and the Company makes no warranty that the operation of software products will be uninterrupted or error-free.

(b.) Without limiting any other provision in this Agreement, and subject to the above Limitation of Liability paragraph, the Company warrants that it will perform the services specified in the section entitled "Scope of Work" in a quality and workmanlike manner; provided, however, that the foregoing sentence is not intended to, and does not, (i) warrant the performance of the system or other assembled products in a manner other than as specifically set forth in the performance specifications stated in the section entitled "Scope of Work" or (ii) warrant any product other than as expressly set forth in the preceding paragraph.

### SOLICITATION OF PERSONNEL OR EMPLOYEES:

Customer agrees that during the term of this Agreement and for a period of 12 months after the expiration or termination date of this Agreement, it will not, without prior written consent of the Company solicit, hire, contract with, nor engage the services of, any employee of the Company with whom Customer has worked directly in conjunction with performance of services.

### DELIVERY

The Company shall not be liable for delays or non-performance caused, directly or indirectly, by invasion, insurrection, riot, war, military or usurped power or by order of any civil or military authority, or by fire, flood, strike or labor difficulty, or by any other cause, whether of the same or different nature.

Unless otherwise specified, deliveries quoted are figured from the date of receipt of complete technical data and approved drawings. Unless otherwise specified equipment will be boxed or crated at our discretion for its protection against normal handling. Provisions for preservation, water-proofing, etc., are special and extra.

### GENERAL

# OUR COMPANY FOCUS

ROOTS' MISSION is To be a premier technical education provider, expanding the technical boundaries and developing an agile workforce with our custom learning solutions.

Implementing this concept in your school system bridges the gaps between local industry, further education, and the competencies of your future workforce by ensuring that skills evolution is addressed.

## **The ROOTS Education Company meets the demand with:**

1. Project-based 5E learning, simulating Industry 4.0 manufacturing processes and developing real-world problem-solving skills
2. Open interfaces which conform to industrial standards
3. Plug & produce methods
4. Motivating, practical, hands-on project exercises
5. Flexible and upgradeable robot cells configured to industry standards

## **The ROOTS Education Company differentiates itself with:**

1. Flexibility to integrate multiple robots and instruments to create a customized manufacturing cell with HMI's & PLC's
2. Designed for future maintenance & operational training
3. Lab exercises that require project management & teamwork
4. Designed for advanced troubleshooting disciplines
5. Designed to utilize industry best practices & tools to measure and validate installation requirements
6. Designed to provide project-based learning
7. Roots can perform maintenance, inventory of components, tear it down and do it again for the next class!

"The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn."

ALVIN TOFFLER

Author of Future  
Shock

"What is in the market today does not meet the needs of industry. Tech education is not adaptable, agile, or creative, and most robotic systems sold into schools do not come with curriculum. Schools are stuck with proprietary, expensive and inflexible offerings that aren't maintainable and do not hold their value. Students are not learning the deep skills required, and many programs are not flexible to changing industry needs – nothing is filling the gap." - Sara Hand - SparkGrowth





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