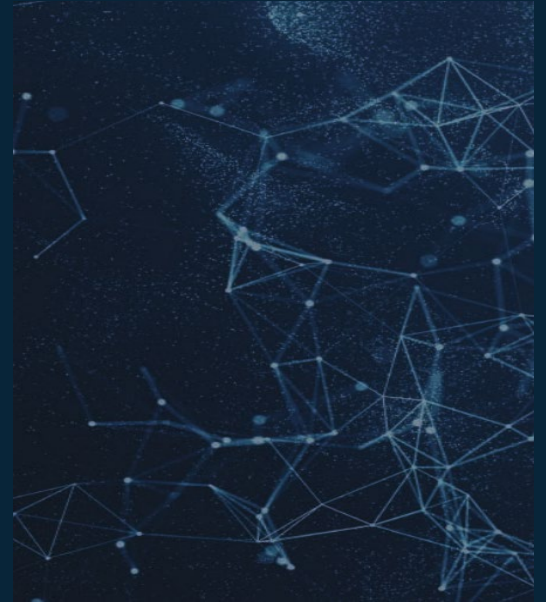




Beyond the Classroom

How EMAC and BYU-Idaho Built an Industry-Connected Electronics Manufacturing Course

A Case Study in Workforce Development Through Industry-Academic Collaboration



USE CASE

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Executive Summary

Brigham Young University-Idaho (BYU-Idaho) partnered with the Electronics Manufacturing and Assembly Collaborative (EMAC) to build an industry-connected *Special Topics in Electronics Manufacturing* course within its [Mechanical Engineering](#) and [Manufacturing Engineering Technology](#) programs. EMAC worked alongside Mechanical and Manufacturing Engineering faculty member Aaron Schellenberg to develop lecture materials, assignments and labs within their Learning Management System (LMS), and connect students directly with engineers and manufacturers during their industry field trip to Arizona, including Isola Group, MJS Designs, Verigon, and Latham Industries.

By the end of the inaugural cohort, BYU-Idaho reported stronger student understanding of PCB manufacturing concepts and the first employment conversations between students and manufacturers across the country. This use case outlines how the partnership was built and offers a model other institutions can adapt with EMAC's support.

The Workforce Challenge

Electronics manufacturing underpins nearly every modern industry: aerospace and defense, medical devices, telecommunications, industrial automation, and consumer electronics all depend on printed circuit boards. Employers across these sectors report a consistent gap: graduates often arrive with strong engineering fundamentals but limited exposure to the tools, workflows, and manufacturing environments they will work in from day one.

That gap extends beyond in-class lectures. Understanding how a PCB moves from design through manufacturability, assembly, testing, and production requires exposure that most engineering technology programs struggle to build into a standard curriculum: access to industry insight, working manufacturing floors, and practicing engineers willing to invest time in students.

Closing this gap requires more than updated course content. It requires colleges and industry to treat workforce development as a shared responsibility, embedding real engineering practice into instruction rather than layering it on afterward. BYU-Idaho set out to build exactly that kind of program.

Building the Partnership

Professor Aaron Schellenberg, faculty member at BYU-Idaho's Mechanical Engineering and Manufacturing Engineering Technology programs, recognized the growing demand for PCB manufacturing talent within Idaho's expanding electronics manufacturing ecosystem. He envisioned a course that would connect engineering fundamentals with practical industry experience and partnered with EMAC to build it.

EMAC's mission is to strengthen the electronics manufacturing workforce by connecting education, industry, and workforce organizations. Rather than serving as an outside advisor, EMAC became an active collaborator throughout the course's development, working alongside Professor Schellenberg to shape both the curriculum and the industry experiences built around it.

EMAC INSIGHT

Effective workforce development begins long before students enter the job market. The strongest programs combine classroom instruction with direct exposure to the professionals, technologies, and manufacturing environments students will encounter in their careers.

What EMAC Helped Build

The *Special Topics in Electronics Manufacturing* course ran as a fourteen-week progression through the full PCB fabrication and assembly lifecycle—from material selection through fabrication, component assembly, inspection, testing, and quality assurance. Students explored the processes and technologies involved in turning a PCB design into a finished, functional product, including PCB fabrication, solder paste printing, component placement, reflow soldering, inspection, testing, and quality control. Each topic built on the last, helping students understand not only how PCBs are manufactured, but also how decisions made at each stage can impact downstream processes, product quality, reliability, and manufacturability.

EMAC worked alongside Professor Schellenberg to develop the lecture materials used throughout the course, grounding instruction in current industry practice rather than textbook examples alone.

EMAC provided students with hands-on learning opportunities that reinforced classroom concepts and gave them direct exposure to real-world electronics manufacturing. EMAC hosted a PCB Defect Inspection workshop where students worked in teams to identify defects on PCBs, determine their root causes, and recommend appropriate corrective actions. EMAC also organized an industry field trip to Arizona, where students toured electronics manufacturing facilities and gained firsthand exposure to PCB assembly operations, as well as supporting functions such as warehousing and shipping/receiving. The trip also gave students the opportunity to engage directly with engineers and industry staff through Q&A sessions, providing insight into manufacturing careers, processes, and the skills needed to succeed in the industry.

CASE STUDY HIGHLIGHT — Industry-Informed Curriculum

Rather than teaching PCB Fabrication and Assembly as a lecture course, BYU-Idaho and EMAC built instruction around the complete product lifecycle, connecting manufacturing processes to quality, inspection, testing, documentation, and long-term reliability.

Industry Engagement in Action

Industry engagement was built into the curriculum throughout the fourteen weeks rather than concentrated in a single guest lecture or tour. As students progressed through manufacturing processes, each classroom concept was reinforced through direct contact with people working in the field.

EMAC introduced students to practical engineering problem-solving through a PCB Defect Inspection Workshop held midway through the program. Working in teams, students inspected PCB assemblies to identify common defects that can occur throughout the assembly process, determine the most likely root cause of each defect, and recommend corrective actions to prevent the issue from recurring. The workshop gave students hands-on experience applying root-cause analysis, quality inspection, and continuous improvement techniques to real-world PCB manufacturing challenges.



Students then took what they'd learned into different manufacturing environments during their industry field trip in Arizona. At [Isola Group](#) in Chandler, Arizona, students toured the facility and gained firsthand exposure to the PCB materials manufacturing process. They observed production operations, material handling, quality control, and the various processes involved in manufacturing materials used in PCB fabrication and assembly. Students also learned how material properties and manufacturing controls can impact PCB performance, reliability, and downstream fabrication and assembly processes. The tour provided a real-world perspective on the connection between PCB materials, manufacturing quality, and the overall electronics manufacturing lifecycle.



At [MJS Designs](#) in Phoenix, Arizona, students were introduced to the product development and engineering processes that support the transition from concept to production. The tour highlighted how engineers approach PCB design, electronics integration, prototyping, testing, and design validation while considering the requirements of the final product. Students observed how engineering teams collaborate across disciplines to troubleshoot technical challenges, refine designs, and prepare products for reliable manufacturing. The visit helped students understand how PCB fabrication and assembly fit into the broader electronics product development process.



At [Verizon](#) in Tempe, Arizona, students gained exposure to the practical side of electronics manufacturing and PCB assembly in a production environment. The tour allowed students to observe how electronic assemblies move through different stages of production, including component preparation, assembly, inspection, testing, and quality control. Students also learned how manufacturing teams use processes, equipment, and quality standards to ensure assemblies meet customer and performance requirements. The visit gave students a better understanding of the coordination between engineering, manufacturing, and quality teams required to produce reliable electronic products.



At [Latham Industries](#) in Phoenix, Arizona, students were able to see how PCB assemblies and electronic products are supported through the later stages of the manufacturing process. The visit gave students insight into production workflow, assembly processes, inspection, material handling, and the importance of maintaining consistency and traceability throughout manufacturing. Students also had the opportunity to learn from industry personnel about the day-to-day challenges of producing quality electronic assemblies and the collaboration required between production, engineering, and quality teams to keep manufacturing operations running efficiently.



EMAC INSIGHT

The program focused on industry engagement through facility tours and hands-on learning experiences. Students saw real-world manufacturing processes, interacted with engineers and industry professionals, and learned how teams solve challenges related to quality, production, and reliability. These experiences helped students apply classroom concepts to real-world problems and develop the problem-solving skills needed to think and work like engineers

Outcomes

According to BYU-Idaho's Faculty feedback, the program helped students understand PCB manufacturing concepts while developing the problem-solving skills used by engineers. Through hands-on activities and industry experiences, students learned how PCB fabrication, assembly, inspection, testing, and quality processes work together to produce reliable electronic products. These experiences helped students see how engineers identify problems, determine root causes, and develop practical solutions, while also giving them a greater appreciation for the complexity and importance of the electronics manufacturing industry.

The partnership also strengthened BYU-Idaho's industry network across the country. Through EMAC, Isola Group, MJS Designs, Verigon, and Latham Industries all became active participants in the course. By its conclusion, these companies had begun working with BYU-Idaho to explore employment opportunities for students from the inaugural cohort — an early, concrete signal that the model can create direct pathways from classroom to career.

The Model: How EMAC Can Help You Build This

The BYU-Idaho collaboration offers a model that other institutions can adapt to strengthen hands-on electronics manufacturing education. A few principles were especially important:

- **Make learning hands-on:** Give students opportunities to work directly with PCBs, manufacturing processes, inspection, and troubleshooting rather than relying only on lectures or demonstrations.
- **Develop engineering problem-solving skills:** Challenge students to identify real-world manufacturing issues, determine root causes, and develop practical solutions.
- **Connect students with industry:** Use facility tours, industry workshops, and direct interaction with engineers and manufacturing professionals to show students how classroom concepts are applied in the workplace.
- **Connect classroom learning to real-world applications:** Tie projects, workshops, and industry experiences directly to the PCB fabrication and assembly concepts students are learning.
- **Build lasting industry partnerships:** Treat industry relationships as long-term collaborations that can support curriculum development, hands-on learning, facility visits, career awareness, internships, and future employment opportunities.

For EMAC, the BYU-Idaho collaboration demonstrates a practical and repeatable approach to workforce development by combining hands-on learning with meaningful industry engagement. EMAC worked with faculty to connect classroom instruction to real-world PCB manufacturing and assembly, provided industry-informed learning materials, and brought manufacturers and engineers into the learning experience through workshops, facility tours, and problem-solving activities. This approach gives students opportunities to apply what they

learn, interact directly with industry professionals, and better understand the skills and challenges they will encounter in the electronics manufacturing workforce.

Next Steps

If your institution is exploring how to build stronger connections between classroom instruction and industry practice, EMAC can help facilitate that partnership, from curriculum development, to industry engagement, to access to professional tools.

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