

# intelitek

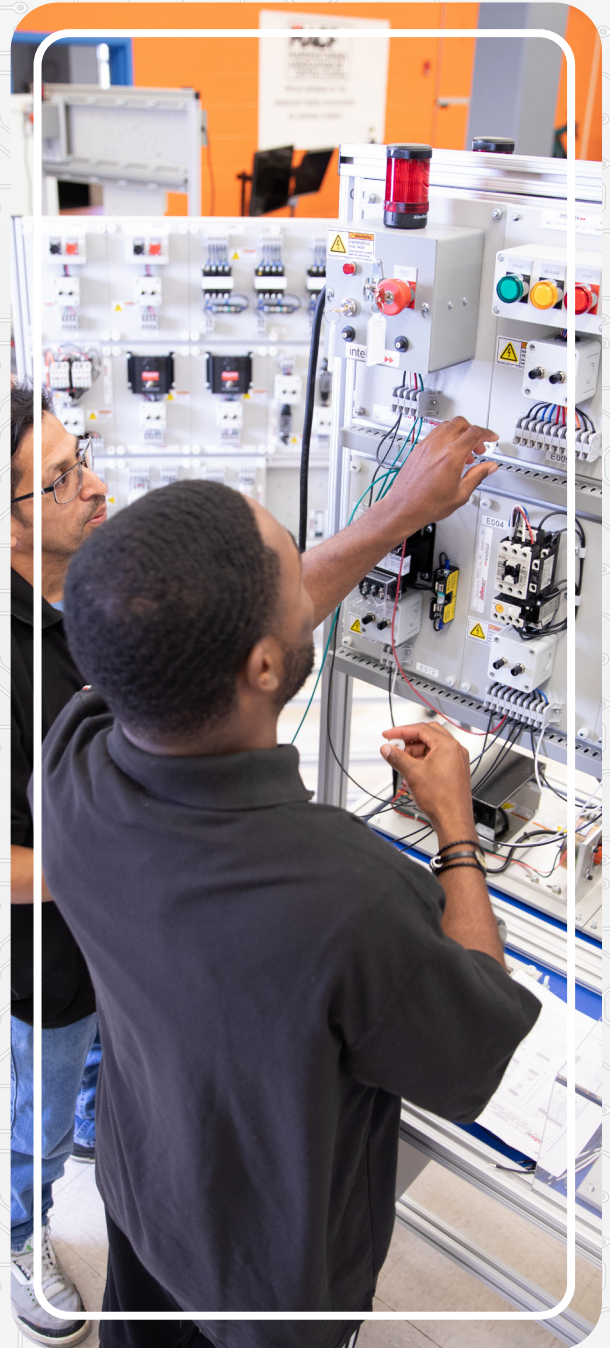
## **JOB MASTER**

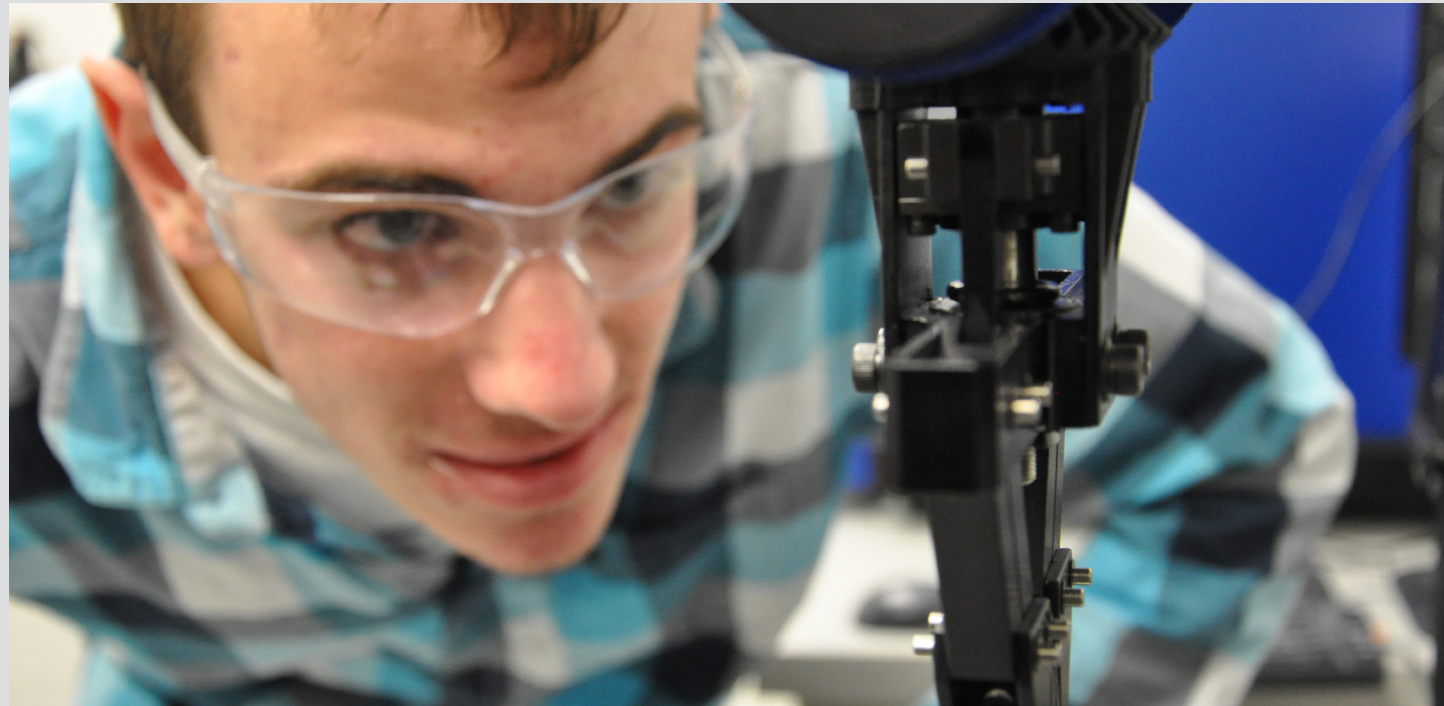
## Foundation of Manufacturing

Success in today's workforce requires more than just technical skills. Intelitek's series of manufacturing curriculum is the ideal solution for middle-school, high-school and post-secondary institutions looking to provide job ready skills and life-skills for in-demand careers in production and manufacturing. The series of courses enable any learner to acquire the core technical abilities necessary for lifelong success in industry.

In addition, the program focuses heavily on employability traits like critical thinking, problem solving, teamwork, and leadership.

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# Essential Career Skills for Tomorrow's Workforce

The foundations of manufacturing series of curriculum is primarily virtual instruction delivered on-line accessible anywhere, anytime. Using online simulations, assessments, and skills-based activities, students obtain validated skills essential to their careers.

In addition to technical skills, these introductory manufacturing programs address the industry requirement for entry level employees to have appropriate employability skills on day one. Courses include OSHA safety principles, portions of the SkillsUSA Career Skills Education Program (CSEP), and offer learners essential job skills, like communications, personal and professional growth, and career focus that make for successful work experiences. Attention is devoted to subjects like computer ethics in the workforce, resume writing and interview skills, teamwork, problem solving, retirement planning and the like.

Other courseware includes an introduction to advanced manufacturing, with an overview of the field and potential career paths. Skills needed for entry and advancement into the manufacturing workforce are part of the programs, including quality control, basic and applied math skills, blueprint reading, hand and power tool principles and applications.

With these courses under their belts, learners are workforce-ready: with the foundation for success in the field of advanced manufacturing.

## Educating for the Future

### The Challenge

Career Tech Education needs to prepare students with skills that will ensure they can be relevant in the labor market until retirement in about 40 years.

This is not a simple challenge because it is impossible to predict what the labor market will look like in a few decades. How can educators predict what new professions will be required, what existing professions will disappear from the job market, and what changes will occur that will affect students' careers? While this is a challenge, the answer is not complex. As educators we need to deliver skills that are transferable and more importantly, the skill to teach oneself new technology, techniques, processes and industries. In other words, in between teaching students their short-term career, we need also to teach them to adapt and self-educate so they can keep up with change.

### The Solution

As educators, we want to educate graduates who adapt themselves to changes in the job market and technology over the course of their careers. We need to inspire individuals that will be able to successfully cope with change, lead processes to adapt to change and thereby create increased value for society, employers and for themselves.

Together with industry employers, educators, and students, Intelitek continues to develop education programs that equip students with the tools to be relevant in the market when they graduate and throughout their working careers.

### Pathway to Employability

The program is a bundle of courses in manufacturing skills that will enable a school to prepare students for industry with the core fundamental technology and work knowledge to prepare them for jobs in manufacturing and production.

The curriculum is designed with both technical and soft skills for maximum student benefit.

The program is designed for middle or high school students as well as for students in post- secondary schools preparing them for jobs.

### Pathway to Certification

The program is a comprehensive set of relevant topics that include up to 16 courses and provides prep training and practice tests for production technician certification and industrial technology maintenance

The series of courses is the most comprehensive virtual training for industry available and can be enhanced with hardware kits to deliver concentrations specific to the type of industry careers relevant to the region of the school.

**Certification  
framework  
aligned with:**

**NIMS  
ITM & Industry 4.0  
Smart Standards**





# Foundations of Manufacturing

## Building Fundamental Skills

This is a training program for high schools and post-secondary institutions to introduce job readiness skills for tomorrow's essential careers. Delivered online or face to face, the courses provide learners with the foundational knowledge necessary for lifelong success in the field of Advanced Manufacturing. Through these courses students understand the basics of manufacturing concepts and components, building their confidence in their foundational understanding and skills. The outcome is a core knowledge of tools, safety, mathematics, blueprint comprehension, introductory understanding of Industry 4.0, and more.

### Intro to Advanced Manufacturing for Industry 4.0

Introduction to Advanced Manufacturing introduces the student to the manufacturing industry and its associated career paths. Students learn about careers offered in manufacturing and about how to prepare for and then pursue those careers.

Students learn how manufacturing companies operate. A number of common manufacturing technologies are described.

**Learning Topics** En Es 15 hrs

- Definition of Manufacturing
- The History of Manufacturing
- Careers in Manufacturing
- Types of Manufacturing Companies
- Manufacturing in the Design Process
- Big Data Analytics and Industry 4.0
- Planning and Staffing a Manufacturing Company
- Manufacturing Processes
- Computers in Manufacturing
- Statistical Process Control
- Computer Simulation Modeling
- Automation in Manufacturing
- Cyber-Physical Systems
- Datafication
- Flexible Manufacturing Systems
- Computer Integrated Manufacturing

### Safety Fundamentals

Safety is one of the most important aspects of an industrial training program. This dedicated module explores all aspects of manufacturing and workplace safety with the objective of educating students about safety norms, procedures and laws.

**Learning Topics** En Es 15 hrs

- Introduction to OSHA and Safety Responsibilities
- Safety in the Workplace
- Personal Protective Equipment (PPE)
- Safety Procedures
- Production Team Training & Responsibilities
- Product Development
- Customer Service

### Safety: Lockout/Tagout

Lockout/Tagout procedures are critical in creating a safe work environment. Lockout Tagout delivers skills-based curriculum through virtual and hands-on activities. Through interactive activities, students learn about lockout devices, conducting energy control analysis, performing lockout/tagout and more.

**Learning Topics** En Es 9 hrs

- Acquiring Lockout/Tagout Basics
- Attaching Lockout Devices
- Completing and Attaching Tagout Devices
- Conduct Energy Control Analysis
- Perform Lockout/Tagout Procedure
- Perform Lockout/Tagout Release

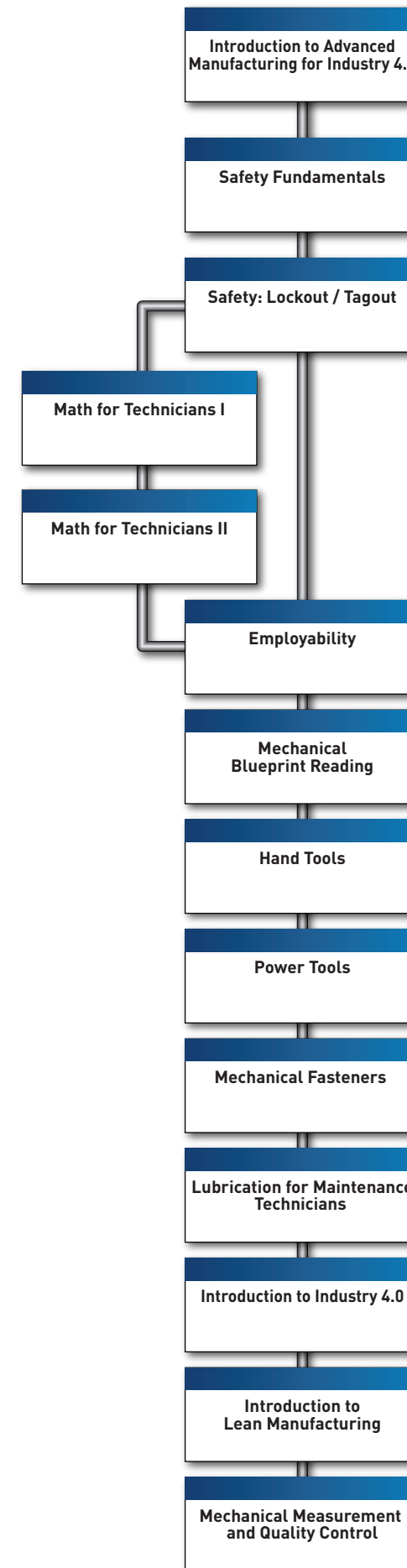
### Mathematics for Technicians 1

The course equips technicians with math skills they are likely to need. Topics include arithmetic and algebra, types of numbers (whole, fractions, and decimals), percentages, ratios and proportions, systems of measurement, geometry, and trigonometry

The curriculum conveys skills-based math through nine virtual activities, providing students with fundamentals in a variety of career and industrial environments.

**Learning Topics** En Es 14 hrs

- Working with Arithmetic and Algebra
- Working with Whole Numbers
- Working with Fractions
- Working with Decimals
- Working with Percentages
- Working with Ratios and Proportions
- Working with Systems of Measurement
- Working with Geometry
- Working with Trigonometry



### Mathematics for Technicians 2

Math for Technicians II applies advanced mathematics concepts to everyday tasks. Through interactive activities students learn about drive ratios, Ohm's Law, mechanical principles, and how these concepts apply in the engineering and industrial environments.

**Learning Topics** En Es 14 hrs

- Working with Conversion Formulas
- Applying Mechanical Principles
- Calculating Drive Ratios
- Calculating Speed Reducer Service Factor
- Using Ohm's Law in Series and Parallel Circuits
- Converting Binary, Binary Coded Decimal (BCD)
- Hexadecimal and Decimal Numbers
- Calculating Pressure, Force, Head and Flow
- Calculating Shim Requirements
- Selecting Pipe Size

### Hand Tools

Hand Tools play a key role in the everyday tasks of technicians. Hand Tools features skills-based curriculum delivered through seventeen activities in which students learn about using hand tools.


Hand Tools may be taught as a virtual module, delivered entirely online with interactive activities, or as a blended module with both virtual and hardware-based activities. A hardware package available with all the tools covered in the activities.

**Learning Topics** En Es 26 hrs

- Shop Safety
- Rulers and Tape Measures
- Calipers and Feeler Gauges
- Squares and Levels
- Knives, Scribes and Punches
- Work Holding Devices
- Hammers, Chisels, Saws, Pliers, Cutters, Files & Deburring Tools
- Drivers, Hex Keys, Wrenches
- Socket and Torque Wrenches
- (Optional) Hand Tools Hardware Package

## Mechanical Blueprint Reading

Blueprint Reading delivers skills-based curriculum through virtual activities. Students learn all aspects of reading and interpreting blueprints in engineering and industrial environments, including views, tolerances, cutting planes, thread dimensions, and welding symbols.


**Learning Topics**  **En Es** 18 hrs

- Identifying Lines and their Functions
- Single, Multiple and Auxiliary View
- Reading and Locating Blueprint Dimensions
- Determining Tolerances
- Identifying Thread Dimensions
- Identifying Tapers and Machine Surfaces
- Cutting Plane and Sections
- Geometric Dimensioning, Wear Limits, and Assembly Drawings
- Identifying Welding Symbols
- Reading Plot Plans
- Reading Footing, Foundation, and Floor Plans
- Reading Reinforced Concrete and Structural Steel Prints

## Power Tools

Power Tools play a key role in the everyday tasks of technicians. Power Tools delivers twelve skills-based activities, in which students learn all aspects of using power tools.

Power Tools may be taught as a virtual module, delivered entirely online with interactive activities, or as a blended module with both virtual and hardware-based activities. A separate hardware package is available with all the tools covered in the activities.

**Learning Topics**  **En Es** 9 hrs

- Shop Safety
- Power Drills
- Drill Presses
- Rotary Tools
- Jigsaws
- Reciprocating Saws
- Circular Saws
- Table Saws
- Bandsaws
- Sanders
- (Optional) Power Tools Hardware Package

## Lubrication for Maintenance Techs

Lubrication for Technicians conveys skills-based curriculum through virtual and hands-on activities.

Students learn about lubrication equipment, application methods, lubrication schedules, special purpose greases, synthetic lubricants, packing bearings and more.


**Learning Topics**  **En Es** 23 hrs

- Lubrication Fundamentals, Terms
- Identifying Lubricating Oils
- General Purpose Greases
- Special Purpose Greases
- Applying Lubricating Oils
- Applying Lubricating Greases
- Bearing Lubrication
- Setting Up a Lubrication Schedule
- Selecting Synthetic Lubricants
- Grease Guns, Bearing Packers
- Grease Lubricators, Drop Feed Oilers, Electric Chain Oilers

## Mechanical Fasteners

Mechanical Fasteners may be taught as a virtual module, delivered entirely online with interactive activities, or as a blended module with both virtual and hardware-based activities.

Through twelve activities, students identify and work with the many types of fasteners used in engineering and industrial environments. For blended lab applications, a separate hardware package is available with all the tools covered in the activities.

**Learning Topics**  **En Es** 18 hrs

- Screws and Bolts
- Threaded Fastener Selection, Thread Standards, Creating and Repairing Threads
- Nuts, Torque Wrenches, Bolt Extractor, Washers
- Rivets
- Adhesives
- Hook and Loop Fasteners
- Cable Ties
- (Optional) Fasteners Hardware Package



## Introduction to Lean Manufacturing


Lean Manufacturing explores the principles and techniques involved in lean manufacturing including minimizing waste in production, and improving workflow in industrial processes.

**Learning Topics**  **En Es** 14 hrs

- Defining Lean Manufacturing
- Understanding & Identifying Waste in a Workplace
- Designing the Mfg Workplace
- Redesigning a Workstation
- Mistake Proofing
- Fundamental Concepts in Lean
- Designing Lean Processes
- Task Analysis and Design
- Lean Production Scheduling
- Problem Solving Tools

## Mechanical Measurement and Quality Control


MMQC enables students to build a foundation of knowledge and skill in performing measurements and calculations. Students use precision measurement tools, such as steel rule, tape measure, protractor, micrometer, height gauge, various calipers and dial indicators. Students gain proficiency in reading mechanical drawings, in selecting the proper tools for inspecting parts and in preparing quality control/inspection reports. A separate hardware package is available with all the tools covered in the activities.

**Learning Topics**  **En Es** 15 hrs

- Accuracy, Precision and Measurement Tools
- Units of Measurement and Conversion
- Fractions, Decimals, and Rounding
- Scaled Measurement Tools
- Vernier, Dial, and Digital Calipers
- Micrometers, Height Gauges, and Dial Indicators, Fixed Gauges
- Transfer Measurement Tools
- Statistical Analysis
- Statistical Process Control
- Nominal Dimensions and Tolerance
- Parts Inspection and Inspection Reports
- (Optional) MMQC Hardware Package

## Employability


Employability offers Industry and Career Skills in a module that prepares high school and college students for career success. Developed with employability experts at SkillsUSA, the module covers job application topics such as setting career goals, résumé preparation and interview skills. It provides training in core employee skills such as time management, teamwork, communication, conflict resolution, work ethics and more.

**Learning Topics**  **En Es** 15 hrs

- Time-Management Techniques
- Personal Qualities for the Workplace
- Interpersonal Communication, Conflict Resolution, Teamwork
- Problem-Solving Techniques
- Decision-Making Skills
- Business and Personal Ethics
- Business Etiquette, Employer- Employee Relationships
- Proper Communication with Diverse Populations
- Career Goals
- Resumes and Cover Letters, Job Applications, Employer Interviews, Interviewing Skills

## Introduction to Industry 4.0

Introduction to Industry 4.0 offers a window into the impact of the Fourth Industrial Revolution and its accompanying technologies on the modern manufacturing industry. Using examples and analogies from real-world enterprises, the course explores Industry 4.0 concepts, processes, and technologies, and testifies to how these components interconnect together in order to grow the manufacturing industry of the future.

**Learning Topics**  **En Es** 15 hrs

- What is Industry 4.0?
- Technologies that Drive Industry 4.0
- Challenges for Industry 4.0
- Quality 4.0
- Supply Chain 4.0
- Data Standardization
- Internet and Ethernet
- The Internet of Things
- Industrial Control Systems and IIoT
- Big Data
- Automation & S/W Technologies
- VR, AR, and AI
- Maintenance 4.0
- Flexible Production
- Maturity Models for Industry 4.0



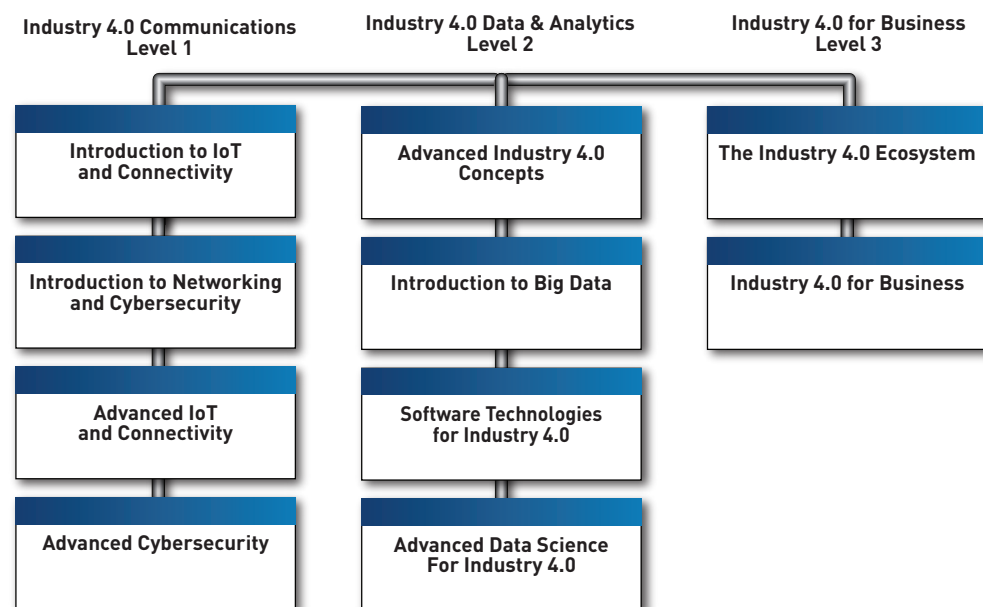
"In addition to the manufacturing, the students can also use the course and or the certification to get credit hours towards an engineering technology degree"

Laurie Newkirk  
Instructor, Automation and Product Technology  
Whithlacoche Technical College  
Florida

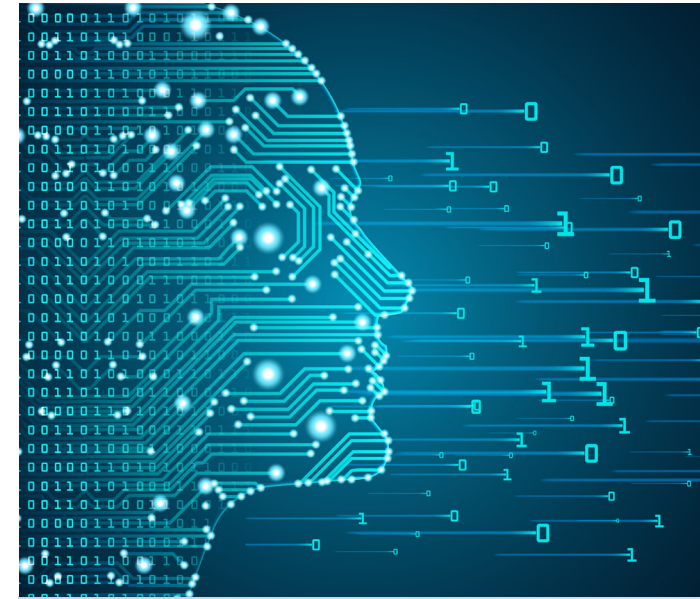
## Industry 4.0 Curriculum Series

Industry 4.0 is a concept where industrial processes and manufacturing plants take advantage of the most advanced technologies and use data collected in real time from the factory floor to monitor, maintain, and optimize in real-time.

The Intelitek training programs for Industry 4.0 focus on three aspects of training: First, the core technology skills so students can understand the technologies and how they work. Second, the interdependence of systems, the communications, automation, and interaction of systems within an industry 4.0 environment. And thirdly, the benefits of integrated industry 4.0 systems and the personal employability skills required to work in this new, collaborative world of industry.



## Industry 4.0 for Manufacturing



### Building Advanced Manufacturing Skills

As Industry 4.0 becomes more widely adopted, new jobs and new career options are being created and replacing less skilled roles. To help students and workers learn the skills necessary to compete in this new employment landscape Intelitek has created an Industry 4.0 training pathway.

The Industry 4.0 training series enables technical high schools, 2 and 4 year college programs, as well as industry training programs and apprenticeships, to offer an education to their students that leads to in-demand jobs and career advancement

### Intelitek Industry 4.0 Curriculum

- Introductory and in-depth curriculum covering Industry 4.0 concepts and technology
- Training provides students detailed knowledge of how Industry 4.0 will affect their role and work environment
- Students will understand and learn the benefits of smart maintenance, operational efficiency, remote monitoring and flexible mass production.

## Industry 4.0 Communications Curriculum

### Introduction to IIoT & Connectivity

Introduction to IIoT & Connectivity focuses on the vast network of smart sensors and devices and their impact on manufacturing. This course also explores topics related to the interconnection of IoT and industrial devices, such as SCADA systems, cloud computing, edge computing, and machine vision systems.

#### Learning Topics



En Es

15 hrs

- Introduction to Sensors, Smart Sensors, Actuators, & PLCs
- IIoT and IIoT
- IIoT Opportunities, Risks, Challenges, & Potential
- How a Sensor Connects to the Cloud
- Introduction to Edge Computing
- SCADA and Vision Systems
- Architecture of Smart Manufacturing Systems
- Introduction to Communication Protocols
- Tracking Methods

### Introduction to Networking & Cybersecurity

Introduction to Networking and Cybersecurity is an in-depth look at communication exchange in modern industry, from the Internet to the Industrial Internet of Things (IIoT) and Cloud technologies. The course covers key networking principles and concentrates on the structure and importance of industry-focused cybersecurity exploring threats that manufacturing entities have to contend with and combat.

#### Learning Topics



En Es

15 hrs

- IP Networking Basics
- Communication Protocols
- Cloud Computing
- Components of the Manufacturing Network
- Securing Digital Manufacturing Operations
- Cyber Threats & Basic Cybersecurity Practices
- Essential Cyber System Technologies
- Malware & Malware Protection
- Identifying Cyber Attacks & Cyber Breach Response
- IIoT and Cloud Cybersecurity Basics
- Cybersecurity Resources



## Advanced IIoT & Connectivity

Advanced IIoT and Connectivity focuses on the network of smart sensors and devices that is the Internet of Things (IIoT) and how systems are integrated and deployed in industrial environments.

Prerequisite: Intro to IIoT/ Connectivity

Learning Topics
En Es 15 hrs

- Smart Sensors
- PLC Functions and Applications
- Machine to Machine (M2M)
- Cloud Connectivity
- SCADA Systems
- Implementing IIoT
- Design Modularity
- Industrial IIoT Reference Architecture (IIRA)
- IIoT Protocols and Standards
- Material Identification
- Driving Manufacturing with IIoT

## Advanced Cybersecurity for Industry 4.0

The course explores cybersecurity concepts and investigates the ways that cyber-attacks can occur and be prevented in industrial control systems and IIoT networks.

Prerequisite: Intro to Cybersecurity

Learning Topics
En Es 15 hrs

- Cybermonitoring Tools
- Firewalls
- Switch Protection
- Antivirus Installation and Config
- Managing Ports and Services
- Cryptography
- IIoT Vulnerabilities, Attacks, and Countermeasures
- Secure Design of IIoT Devices
- Operational Security Lifecycle
- Identity and Access Management Solutions for the IIoT & Mitigating IIoT Privacy Concerns
- IIoT Compliance Monitoring
- Cloud Security for IIoT
- Incident Response and Forensic Analysis
- Establishing Persistence in a Compromised network or Device

## Industry 4.0 Data & Analytics Curriculum

### Advanced Industry 4.0 Concepts

This course explores how technologies interact with each other and with industrial components to create efficient, productive, and profitable enterprises. Emphasizing use cases, the course investigates digital threads, flexible manufacturing, and asset tracking.

Prerequisite: Intro to Industry 4.0

Learning Topics
En Es 15 hrs

- Digital Factory Tour
- The Digital Thread
- VR and AR in Manufacturing
- Smart Sensors in Manufacturing
- Cyberphysical Systems
- Flexible Manufacturing Systems
- Additive Manufacturing
- Maintenance 4.0
- Inventory and Asset Management

### Software Technologies for Industry 4.0

This course explores the different types of software that are essential for a production company's success in the automated commercial and industrial landscape.

Learning Topics
En Es 15 hrs

- Software Technology Overview
  - ▶ APS - Advanced supply chain & planning systems
  - ▶ MES - Manufacturing Execution Systems
  - ▶ ERP - Enterprise Resource Planning systems
- Scheduling Software
- Cryptography
- System Visualization Tools for VR, AR and Digital Twinning
- Quality Control Software
- Artificial Intelligence Software
- Business Intelligence Tools
- Data Modeling Software

### Intro to Big Data for Industry 4.0

The curriculum explores the world of data, including its collection, processing, management, visualization, and its uses. The course delves into big data in cutting-edge manufacturing, and machine learning, predictive analytics, modeling, simulation, improvement of processes and progress indicators.

Learning Topics
En Es 15 hrs

- Introduction to Big Data
- Characteristics of Big Data and Dimensions of Scalability
- Intelligent Decision Making and Getting Value Out of Big Data
- Data Collection and Management
- Algorithms, Computing, and Descriptive Statistics
- Data Analysis & Visualization of Data
- Predictive Analytics and Modeling
- Machine Learning
- Introduction to KPIs & Improving KPIs with Big Data
- Database Fundamentals
- Cloud Computing for Big Data
- Data-Driven Innovation

### Advanced Data Science for Industry 4.0

Data collection, storage, and analytics play a massive role in the manufacturing industry. Advanced Data Science for Industry 4.0 explores how the proper use of data can help manufacturing enterprises improve their bottom line.

Learning Topics
En Es 15 hrs

- Data Warehousing
- Data Mining
- KPIs of Big Data
- One Metric That Matters
- Data Driven Innovation
- AI, Machine Learning, and Deep Learning

### The Smart Manufacturing Ecosystem

Industry 4.0 technologies can improve a company's supply chain operations as it enables the supply chain to continually adapt to technological innovations that:

- Optimize operations
- Improve efficiency
- Respond to rapid changes in customer demands and customized solutions
- Maintain competitiveness
- Enhance profitability
- Generate more value to customers

These adaptations require from the **Original Equipment Manufacturer (OEM)**, that makes the systems or components that are used in another company's end product, to also adapt accordingly.



## Industry 4.0 for Business Curriculum

### Industry 4.0 - The Ecosystem

High level look at the Industry 4.0 Smart manufacturing in industry and the trends and use cases for technology

Learning Topics
En Es 15 hrs

- Industry 4.0 - The super infrastructure for the future of manufacturing (market trends)
- Requirements to be Industry 4.0 (technology trends)
- Business Processes (Flexible Mass Production)
- Real time Business Processes
- Enhanced Customer Experience
- Competitive Industrial Production
- Customized Mass Production
- Maintaining Production (improved reliability/quality)

### Industry 4.0 for Business

A look at industry 4.0 from the business perspective. The course will look at the benefits and justifications for manufacturing.

Learning Topics
En Es 15 hrs


- Outcomes of Industry 4.0
- Customer Satisfaction
- Information Transparency
  - ▶ Customized Mass Production
  - ▶ Intelligent Decision Making
  - ▶ Asset Management
- Business with industry 4.0
  - ▶ Business 4.0 (Business Efficiency)
  - ▶ Supply Chain 4.0
  - ▶ Quality 4.0
  - ▶ Maintenance 4.0

Skill 2: Threaded Fastener Selection

### Materials

**Non-Metallic Materials**  
Fasteners composed of plastics, fiberglass, and ceramics are utilized in situations where extreme corrosion resistance or electrical insulation is required or the fastener must possess the same thermal properties as the workpiece components.

**Plastic** fasteners are often chosen for their ductility (flexibility) and low electrical conductivity. Each type of plastic has its own unique characteristics.



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# Industry Certification

Intelitek's curriculum is designed to go beyond theory and uses hands on, skill-based training to educate students how jobs in industry are actually done. Intelitek and our partners have worked to align our content and lab exercises to prepare students for Industry Standard Certifications that will give them a competitive edge in the job market.

<b>Micro-Certifications</b> <ul style="list-style-type: none"><li>Yaskawa Robot Operator</li><li>Yaskawa Robot Programmer</li><li>Cognex Machine Vision Administrator</li><li>Siemens RobotExpert PLM Operator</li></ul>	<b>Curriculum aligned to Certifications</b> <b>Hands-on evaluation with Intelitek lab kits</b> <b>Fundamentals of Robotics</b> <b>Advanced Robotics</b> <b>Machine Vision &amp; Quality Control</b> <b>Manufacturing Processes</b>
<b>NIMS Industrial Technology Maintenance</b> <ul style="list-style-type: none"><li>Role: Maintenance Operations Specialist</li><li>Role: Mechanical Systems Specialist</li><li>Role: Hydraulic Systems Specialist</li><li>Role: Pneumatic Systems Specialist</li><li>Role: Electrical Systems Specialist</li><li>Role: Electronic Control Systems Specialist</li></ul>	<b>Curriculum aligned to NIMS ITM</b> <b>NIMS Performance Measures on Intelitek Lab</b> <b>Foundation Skills</b> <b>Electrical</b> <b>Mechanical</b> <b>Hydraulics</b> <b>Pneumatics</b> <b>PLCs</b>
<b>NIMS Industry 4.0</b> <ul style="list-style-type: none"><li>Role: Industry 4.0 Production Specialist</li></ul>	<b>Curriculum aligned to NIMS Industry 4.0</b> <b>NIMS Performance Measures on Intelitek Lab</b> <b>Advanced Manufacturing</b> <b>Computer Integrated Manufacturing</b> <b>Industry 4.0</b>



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