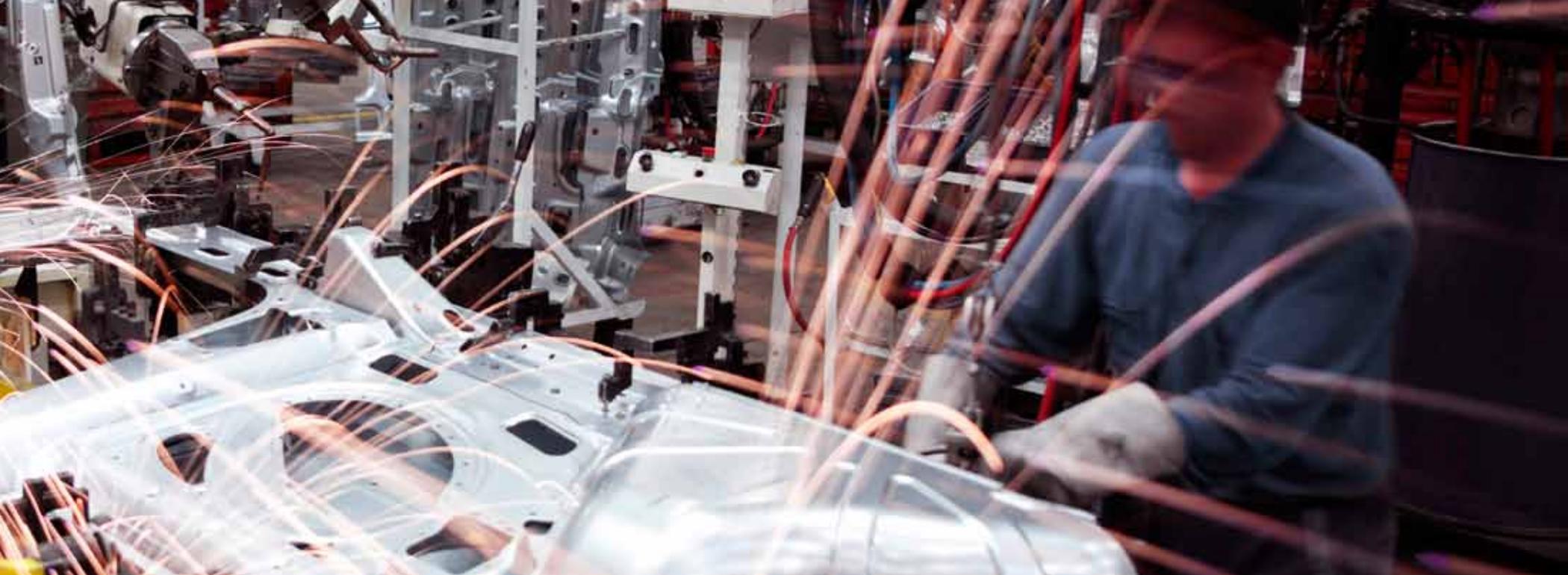


# BE A PART OF | Manufacturing





## MAKE THE WORLD RUN: Manufacturing in the US and South Carolina

In the United States, manufacturing accounts for approximately one in six private sector domestic jobs, making our country the world's leading technological innovator. According to the US Department of Commerce, manufacturing has a higher multiplier effect on the economy than any other sector. For every \$1 in manufacturing value added, \$1.4 in additional value is created in other industry sectors, including retail trade, transportation, information, agriculture, government and business services.\*

In South Carolina, manufacturing produces \$24 billion per year in economic activity, providing a wide array of dynamic and emerging career opportunities including nanotechnology, aerospace manufacturing, industrial design, metalworking, pharmaceuticals and many more.

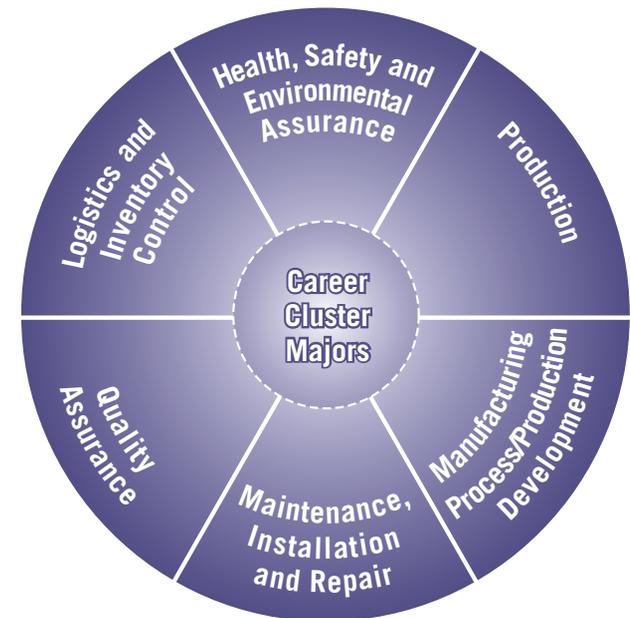
## THE MANUFACTURING CAREER CLUSTER

The Manufacturing Career Cluster is divided into six majors. They are as follows:

- Production
- Manufacturing Process/Production Development
- Maintenance, Installation and Repair
- Quality Assurance
- Logistics and Inventory Control
- Health, Safety and Environmental Assurance

Each of these majors is unique in educational, developmental and experience requirements and is aligned to industry careers as defined by national and international standards groups.

These six majors require knowledge and skills that can be acquired in post-secondary institutions, which range from private career and company-sponsored schools to two-year institutions, such as Midlands Technical College, and four-year colleges, such as the University of South Carolina.





**PRODUCTION:** The production major involves the construction and/or assembly of mechanical parts for various products, ranging from air conditioners to airplanes and from automobiles to smartphones.

**IF YOU CHOOSE PRODUCTION AS YOUR CAREER MAJOR, YOU MAY BE A PART OF:**

- Assembling parts or units, and positioning, aligning and fastening units to frames for proper fit using hand tools and power tools
- Inspecting, testing and adjusting completed units to ensure that units meet specifications and customer order requirements
- Operating automated assembling equipment, such as robotics, fixed automation equipment and small cranes to transport or position large parts
- Reading blueprints and specifications to determine component parts and assembly sequences of electromechanical units

**SAMPLE CAREERS**

**Associate's Degree or Less**  
**Annual Salary Range**  
**\$20,000-\$50,000**

- Production, Planning or Expediting Clerk
- Electromechanical Equipment Operator
- Painting and Coating Worker
- Computer Controlled Machine Operator

**Bachelor's Degree**  
**Annual Salary Range**  
**\$50,000-\$100,000**

- Manufacturing Engineer or Technologist
- First-Line Supervisor of Production and Operating Workers
- Power Plant Operator

*NOTE: Salary may differ according to industry, county, region and state.*

Career	Entry-Level Education	Annual Median Salary & Hourly Pay (2010)	Job Outlook (2010-20)	Responsibilities	Skills
<b>Machinists and Tool &amp; Die Makers</b>	High School Diploma or Equivalent	<b>\$39,910/year</b> <b>\$19.19/hour</b>	<b>7%</b> (Slower than average)	<ul style="list-style-type: none"> <li>• Work from blueprints, sketches or computer-aided design (CAD) or computer-aided manufacturing (CAM) files</li> <li>• Calculate dimensions using measuring instruments</li> <li>• Install, align, secure and adjust cutting tools and workpieces</li> <li>• Test completed tools or dies to ensure that they meet specifications</li> <li>• Inspect for proper dimensions and defects</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical</li> <li>• Math and computer</li> <li>• Mechanical</li> <li>• Stamina</li> <li>• Technical</li> </ul>
<b>Manufacturing Production Technicians</b>	Associate's Degree	<b>\$59,440/year</b> <b>\$28.58/hour</b>	<b>9%</b> (Slower than average)	<ul style="list-style-type: none"> <li>• Set up, test and adjust manufacturing machinery or equipment using any combination of electrical, electronic, mechanical, hydraulic, pneumatic or computer technologies</li> <li>• Inspect finished products for quality and adherence to customer specifications</li> <li>• Adhere to all applicable regulations, policies and procedures for health, safety and environmental compliance</li> <li>• Plan and lay out work to meet production and schedule requirements</li> <li>• Start up and shut down processing equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical</li> <li>• Critical thinking</li> <li>• Listening</li> <li>• Mechanical</li> <li>• Problem solving</li> <li>• Reading comprehension</li> </ul>
<b>Industrial Maintenance/Reliability Technicians</b>	High School Diploma or Associate's Degree plus On-the-Job Training	<b>\$65,000/year</b> <b>\$31.25/hour</b>	<b>28%</b> (Faster than average)	<ul style="list-style-type: none"> <li>• Perform precision maintenance, troubleshooting and repair of electrical and mechanical systems, such as process controls, instrumentation, switching systems, power supplies and generators</li> <li>• Interpret complex mechanical, hydraulic or pneumatic prints</li> <li>• Repair, replace or reassemble defective equipment parts using hand tools and power tools</li> <li>• Record type and cost of maintenance or repair work</li> </ul>	<ul style="list-style-type: none"> <li>• Critical thinking</li> <li>• Mechanical</li> <li>• Problem solving</li> <li>• Reading comprehension</li> <li>• Troubleshooting</li> </ul>
<b>Industrial Production Managers</b>	Bachelor's Degree	<b>\$87,160/year</b> <b>\$41.91/hour</b>	<b>9%</b> (Slower than average)	<ul style="list-style-type: none"> <li>• Decide how best to use a plant's workers and equipment to meet production goals</li> <li>• Ensure that production stays on schedule and within budget</li> <li>• Hire, train and evaluate workers</li> <li>• Analyze production data</li> <li>• Write routine production reports</li> <li>• Fix any production problems that may arise</li> </ul>	<ul style="list-style-type: none"> <li>• Interpersonal</li> <li>• Leadership</li> <li>• Problem solving</li> <li>• Time management</li> </ul>



**MANUFACTURING PROCESS/PRODUCTION DEVELOPMENT:** People who work in this major merge their creativity with their technical know-how, as they are responsible for designing machinery and tooling as well as monitoring the production and materials used in the manufacturing process.

**IF YOU CHOOSE MANUFACTURING PROCESS/  
PRODUCTION DEVELOPMENT AS YOUR  
CAREER MAJOR, YOU MAY BE A PART OF:**

- Analyzing technology and resource needs to plan and assess the feasibility of projects
- Coordinating and directing projects via detailed plans to accomplish goals
- Directing, reviewing and approving product design and changes
- Analyzing complex systems to determine potential for further development
- Designing and building tooling such as fixtures, dies and mechanisms required to support the manufacturing operation

**SAMPLE CAREERS**

**Associate's Degree or Less**  
**Annual Salary Range**  
**\$35,000-\$75,000**

- Drafter
- Precision Inspector, Tester or Grader
- Computer Numerical Control Setup Operator
- Engineering Technician
- Precision Machining Technician

**Bachelor's Degree**  
**Annual Salary Range**  
**\$75,000-\$150,000+**

- Electrical or Electronics Engineer
- Industrial Production Manager
- Labor Relations Manager
- Architectural or Engineering Manager
- Mathematician
- Training or Development Manager

*NOTE: Salary may differ according to industry, county, region and state.*

Career	Entry-Level Education	Annual Median Salary & Hourly Pay (2010)	Job Outlook (2010-20)	Responsibilities	Skills
<b>Industrial Engineering Technicians</b>	Associate's Degree	<b>\$48,210/year</b> <b>\$23.18/hour</b>	<b>4%</b> (Slower than average)	<ul style="list-style-type: none"> <li>Suggest revisions for methods of operation, material handling or equipment layout</li> <li>Interpret engineering drawings, schematic diagrams and formulas</li> <li>Work with management or engineering staff to determine quality and reliability standards</li> <li>Prepare charts, graphs and diagrams to illustrate workflow, routing, floor layouts, how materials are handled and how machines are used</li> </ul>	<ul style="list-style-type: none"> <li>Analytical</li> <li>Communication</li> <li>Critical thinking</li> <li>Math</li> <li>Observation</li> </ul>
<b>Industrial Engineers</b>	Bachelor's Degree	<b>\$76,100/year</b> <b>\$36.59/hour</b>	<b>6%</b> (Slower than average)	<ul style="list-style-type: none"> <li>Review production schedules, engineering specifications, process flows and other information to understand manufacturing and service methods</li> <li>Figure out how to manufacture parts or products or deliver services with maximum efficiency</li> <li>Develop management control systems to make financial planning and cost analysis more efficient</li> <li>Work with customers and management to develop standards for design and production</li> </ul>	<ul style="list-style-type: none"> <li>Critical thinking</li> <li>Listening</li> <li>Math</li> <li>Problem solving</li> <li>Speaking</li> <li>Teamwork</li> <li>Writing</li> </ul>
<b>Mechanical Engineers</b>	Bachelor's Degree	<b>\$78,160/year</b> <b>\$37.58/hour</b>	<b>9%</b> (Slower than average)	<ul style="list-style-type: none"> <li>Design or redesign mechanical devices, creating blueprints so the device can be built</li> <li>Develop a prototype of the device and test the prototype</li> <li>Use computers extensively to produce and analyze designs, simulate and test how a machine is likely to work and generate specifications for parts</li> <li>Analyze the test results and change the design as needed</li> <li>Oversee the manufacturing process for a device</li> </ul>	<ul style="list-style-type: none"> <li>Creative</li> <li>Listening</li> <li>Math</li> <li>Mechanical</li> <li>Problem solving</li> </ul>
<b>Materials Engineers</b>	Bachelor's Degree	<b>\$83,120/year</b> <b>\$39.96/hour</b>	<b>9%</b> (Slower than average)	<ul style="list-style-type: none"> <li>Develop, process and test materials used to create a range of products, from computer chips and aircraft wings to golf clubs and snow skis</li> <li>Select materials and develop new ways to use materials in manufacturing</li> <li>Monitor how materials perform and evaluate how they deteriorate</li> <li>Determine causes of product failure and develop solutions</li> <li>Evaluate technical specifications and economic factors relating to the design objectives of processes or products</li> </ul>	<ul style="list-style-type: none"> <li>Analytical</li> <li>Communication</li> <li>Math</li> <li>Problem solving</li> <li>Teamwork</li> <li>Writing</li> </ul>



**MAINTENANCE, INSTALLATION AND REPAIR:** Employees in this line of work perform preventative maintenance and troubleshooting procedures on machines, tools and other equipment, as well as repair electrical and mechanical systems, identify mechanical problems and record repair tasks through a computer database.

**IF YOU CHOOSE MAINTENANCE, INSTALLATION AND REPAIR AS YOUR CAREER MAJOR, YOU MAY BE A PART OF:**

- Assembling, installing or repairing mechanical and electrical parts
- Dismantling devices to access and remove defective parts, using hoists, cranes, hand tools and power tools
- Performing routine preventive maintenance and troubleshooting to ensure mechanical systems continue to run smoothly
- Identifying mechanical problems and determining how to correct them using drawings, blueprints, maintenance manuals and schematic diagrams

**SAMPLE CAREERS**

**Associate's Degree or Less**  
**Annual Salary Range**  
**\$20,000-\$45,000**

- Industrial Troubleshooter
- Reliability Technician
- Maintenance Technician
- Electric Motor, Power Tool or Related Repairer
- Welder, Cutter, Solderer or Brazer

**Bachelor's Degree**  
**Annual Salary Range**  
**\$45,000-\$75,000+**

- Electrician
- Electrical or Electronics Repairer

*NOTE: Salary may differ according to industry, county, region and state.*

Career	Entry-Level Education	Annual Median Salary & Hourly Pay (2010)	Job Outlook (2010-20)	Responsibilities	Skills
<b>Industrial Machinery Mechanics and Maintenance Workers</b>	High School Diploma or Equivalent	<b>\$44,160/year</b> <b>\$21.23/hour</b>	<b>19%</b> (Average)	<ul style="list-style-type: none"> <li>• Maintain and repair complex machines, such as an automobile assembly line's conveyor belts, robotic welding arms and hydraulic lifts</li> <li>• Read technical manuals to understand equipment and controls</li> <li>• Disassemble machinery and equipment when there is a problem</li> <li>• Perform diagnostic tests on machinery</li> <li>• Adjust equipment and reset or calibrate sensors and controls</li> </ul>	<ul style="list-style-type: none"> <li>• Manual dexterity</li> <li>• Mechanical</li> <li>• Problem solving</li> <li>• Reading comprehension</li> <li>• Technical</li> </ul>
<b>Millwrights</b>	High School Diploma or Equivalent	<b>\$48,360/year</b> <b>\$23.25/hour</b>	<b>-5%</b> (Moderate decline)	<ul style="list-style-type: none"> <li>• Install or repair machinery and equipment</li> <li>• Read highly technical instructions and blueprints on machinery</li> <li>• Replace defective parts of machinery as needed</li> <li>• Move machinery and equipment</li> <li>• Take apart existing machinery to clear floor space for new machinery</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical aptitude</li> <li>• Physical strength</li> <li>• Reading comprehension</li> <li>• Technical</li> <li>• Troubleshooting</li> </ul>
<b>Stationary Engineers</b>	High School Diploma or Equivalent	<b>\$52,140/year</b> <b>\$25.07/hour</b>	<b>6%</b> (Slower than average)	<ul style="list-style-type: none"> <li>• Manage industrial equipment such as stationary engines and generators</li> <li>• Inspect equipment to ensure that it is operating efficiently</li> <li>• Check safety devices routinely</li> <li>• Record data and keep logs of operation, maintenance and safety activity</li> <li>• Repair malfunctioning equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Detail oriented</li> <li>• Manual dexterity</li> <li>• Mechanical</li> <li>• Problem solving</li> <li>• Technical</li> </ul>
<b>First-Line Supervisors of Mechanics, Installers and Repairers</b>	Associate's Degree	<b>\$60,250/year</b> <b>\$28.97/hour</b>	<b>19%</b> (Average)	<ul style="list-style-type: none"> <li>• Directly supervise and coordinate the activities of mechanics, installers and repairers</li> <li>• Determine schedules, sequences and assignments for work activities based on work priority, quantity of equipment and skill of personnel</li> <li>• Examine objects, systems or facilities and analyze information to determine needed installations, services or repairs</li> <li>• Monitor tool and part inventories and the condition and maintenance of shops to ensure adequate working conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical</li> <li>• Coordination</li> <li>• Critical thinking</li> <li>• Judgment</li> <li>• Listening</li> <li>• Speaking</li> <li>• Time management</li> </ul>



**QUALITY ASSURANCE:** People who work in this major monitor and maintain mechanical and electrical parts during the manufacturing process. In addition, they ensure that industry standards and procedures are followed and that products and services meet specific performance measures.

**IF YOU CHOOSE QUALITY ASSURANCE AS YOUR CAREER MAJOR, YOU MAY BE A PART OF:**

- Analyzing and reviewing data to find specific types of quality problems
- Collecting and presenting necessary information needed for quality analysis
- Making recommendations to management to improve the production process based on findings from a quality assurance analysis
- Monitoring and documenting results of new procedures after implementation to show quality improvements

**SAMPLE CAREERS**

**Associate’s Degree or Less**  
**Annual Salary Range**  
**\$30,000-\$45,000**

- Calibration Technician
- Inspector, Tester, Sorter, Sampler or Weigher
- Quality Control Technician
- Quality Process Technician

**Bachelor’s Degree**  
**Annual Salary Range**  
**\$45,000-\$100,000**

- Quality Assurance Engineer
- Lab Technician
- Statistical Process Control (SPC) Coordinator

**Bachelor’s Degree + Graduate Degrees and/or Certifications**  
**Annual Salary Range**  
**\$75,000-\$150,000+**

- Quality Assurance Manager
- Quality Assurance Director

Career	Entry-Level Education	Annual Median Salary & Hourly Pay (2010)	Job Outlook (2010-20)	Responsibilities	Skills
<b>Quality Control Inspectors</b>	High School Diploma or Equivalent	<b>\$33,030/year</b> <b>\$15.88/hour</b>	<b>8%</b> (Slower than average)	<ul style="list-style-type: none"> <li>• Monitor or observe operations to ensure they meet production standards</li> <li>• Inspect, test or measure materials or products being produced</li> <li>• Accept or reject finished items</li> <li>• Report inspection and test data</li> <li>• Recommend adjustments to the process or assembly</li> </ul>	<ul style="list-style-type: none"> <li>• Dexterity</li> <li>• Math</li> <li>• Mechanical</li> <li>• Physical strength</li> <li>• Stamina</li> <li>• Technical</li> </ul>
<b>Quality Control Analysts</b>	Bachelor's Degree	<b>\$43,130/year</b> <b>\$20.74/hour</b>	<b>19%</b> (Average)	<ul style="list-style-type: none"> <li>• Conduct routine and non-routine analyses of in-process materials, raw materials and finished goods</li> <li>• Interpret test results, compare them to established specifications and control limits and make recommendations on appropriateness of data for release</li> <li>• Investigate or report questionable test results</li> <li>• Calibrate, validate or maintain laboratory equipment</li> <li>• Complete documentation needed to support testing procedures including data capture forms, equipment logbooks or inventory</li> </ul>	<ul style="list-style-type: none"> <li>• Decision making</li> <li>• Judgment</li> <li>• Listening</li> <li>• Reading comprehension</li> <li>• Speaking</li> <li>• Writing</li> </ul>
<b>Software Quality Assurance Engineers and Testers</b>	Bachelor's Degree	<b>\$81,140/year</b> <b>\$39.10/hour</b>	<b>9%</b> (Slower than average)	<ul style="list-style-type: none"> <li>• Design test plans, scenarios or manufacturing procedures</li> <li>• Document software defects and report defects to software developers</li> <li>• Identify, analyze and document problems with program function, output, online screen or content</li> <li>• Participate in product design reviews to provide input on functional requirements, product designs, schedules or potential problems</li> <li>• Review software documentation to ensure technical accuracy, compliance or to mitigate risks</li> </ul>	<ul style="list-style-type: none"> <li>• Computer programming</li> <li>• Critical thinking</li> <li>• Listening</li> <li>• Problem solving</li> <li>• Speaking</li> <li>• Writing</li> </ul>
<b>Quality Control Systems Managers</b>	Bachelor's Degree	<b>\$89,190/year</b> <b>\$42.88/hour</b>	<b>9%</b> (Slower than average)	<ul style="list-style-type: none"> <li>• Collect and analyze production samples to evaluate quality</li> <li>• Stop production if serious product defects are present</li> <li>• Monitor performance of quality control systems to ensure effectiveness and efficiency</li> <li>• Instruct staff in quality control and analytical procedures</li> <li>• Identify critical points in the manufacturing process and specify sampling procedures to be used at these points</li> </ul>	<ul style="list-style-type: none"> <li>• Critical thinking</li> <li>• Decision making</li> <li>• Judgment</li> <li>• Listening</li> <li>• Problem solving</li> <li>• Speaking</li> <li>• Writing</li> </ul>



**LOGISTICS AND INVENTORY CONTROL:** Individuals in this major are responsible for making sure other employees have the materials they need to complete a task efficiently, which often includes transporting raw materials to the production line, estimating the cost of materials and preparing finished products for shipment.

**IF YOU CHOOSE LOGISTICS AND INVENTORY CONTROL AS YOUR CAREER MAJOR, YOU MAY BE A PART OF:**

- Assessing appropriate equipment and staff needed for handling, storing and unloading materials
- Supplying plans that ensure availability of materials and products
- Loading and unloading trucks
- Coordinating supply chain management with other areas in the company, such as sales, marketing, finance, production and quality assurance
- Managing activities related to strategic or tactical purchasing, material requirements planning, inventory control, warehousing or receiving

**SAMPLE CAREERS**

**Associate’s Degree or Less**  
**Annual Salary Range**  
**\$20,000-\$35,000**

- Industrial Truck and Tractor Operator
- Shipping, Receiving or Traffic Clerk
- Dispatcher
- Production, Planning or Expediting Clerk

**Bachelor’s Degree**  
**Annual Salary Range**  
**\$35,000-\$50,000**

- Production Controller
- Inventory Controller

**Bachelor’s Degree + Graduate Degrees and/or Certifications**

**Annual Salary Range**  
**\$50,000-\$75,000+**

- Cost Estimator
- Operations Research Analyst

*NOTE: Salary may differ according to industry, county, region and state.*

Career	Entry-Level Education	Annual Median Salary & Hourly Pay (2010)	Job Outlook (2010-20)	Responsibilities	Skills
<b>Material Recording Clerks</b>	High School Diploma or Equivalent	<b>\$24,100/year</b> <b>\$11.59/hour</b>	<b>2%</b> (Little or no change)	<ul style="list-style-type: none"> <li>• Keep track of and record all outgoing and incoming shipments and ensure they have been filled correctly</li> <li>• Scan barcodes with hand-held devices or use radiofrequency identification (RFID) scanners to keep track of inventory</li> <li>• Compute freight costs and prepare invoices for other parts of the organization</li> <li>• Move goods from the warehouse to the loading dock</li> <li>• Compile reports on various aspects of changes in production or inventory</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical</li> <li>• Clerical</li> <li>• Communication</li> <li>• Customer service</li> <li>• Organizational</li> </ul>
<b>Cargo and Freight Agents</b>	High School Diploma or Equivalent	<b>\$37,150/year</b> <b>\$17.86/hour</b>	<b>29%</b> (Much faster than average)	<ul style="list-style-type: none"> <li>• Determine shipping methods and routes from pick-up location to final destination</li> <li>• Coordinate transportation and logistics details with shipping and freight companies</li> <li>• Record information such as cargo amount, weight, dimensions and time of shipment</li> <li>• Prepare bills of lading, invoices and other required shipping documents</li> <li>• Estimate, negotiate and determine shipment costs and other related charges</li> </ul>	<ul style="list-style-type: none"> <li>• Bookkeeping</li> <li>• Computer</li> <li>• Customer service</li> <li>• Organizational</li> </ul>
<b>Purchasing Managers, Buyers and Purchasing Agents</b>	Bachelor's Degree	<b>\$58,360/year</b> <b>\$28.06/hour</b>	<b>7%</b> (Slower than average)	<ul style="list-style-type: none"> <li>• Evaluate suppliers based on price, quality and delivery speed</li> <li>• Negotiate contracts on behalf of the company</li> <li>• Analyze price proposals, financial reports and other information to determine reasonable prices</li> <li>• Maintain and review records of items bought, costs, deliveries, product performance and inventories</li> <li>• Meet with vendors to discuss defective or unacceptable goods or services and determine corrective action</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical</li> <li>• Decision making</li> <li>• Math</li> <li>• Negotiating</li> </ul>
<b>Logisticians</b>	Bachelor's Degree	<b>\$70,800/year</b> <b>\$34.04/hour</b>	<b>26%</b> (Faster than average)	<ul style="list-style-type: none"> <li>• Develop business relationships with suppliers and customers</li> <li>• Direct the allocation of materials, supplies and finished products</li> <li>• Design strategies to minimize the cost or time required to move goods</li> <li>• Review the success of logistical functions and identify areas for improvement</li> <li>• Stay current on advances in logistics technology and incorporate new technologies into procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Communication</li> <li>• Critical thinking</li> <li>• Organizational</li> <li>• Problem solving</li> </ul>



**HEALTH, SAFETY AND ENVIRONMENTAL ASSURANCE:** To ensure the safety and wellbeing of all employees, people who work in this major implement specific health and safety programs, policies and procedures; plan and implement safety issues in new production processes; and, conduct investigations into environmental and safety issues.

**IF YOU CHOOSE HEALTH, SAFETY AND ENVIRONMENTAL ASSURANCE AS YOUR CAREER MAJOR, YOU MAY BE A PART OF:**

- Compiling, analyzing and interpreting statistical data related to occupational illnesses and accidents
- Conducting or coordinating worker training in areas such as safety laws and regulations, hazardous condition monitoring and use of safety equipment
- Inspecting facilities, machinery and safety equipment to correct potential hazards and ensure safety regulation compliance
- Reporting or reviewing findings from accident investigations, facilities inspections or environmental testing

**SAMPLE CAREERS**

**Associate's Degree or Less**  
**Annual Salary Range**  
**\$35,000-\$45,000**

- Safety Technician
- Health Physics Technician
- Hazardous Material Removal Worker
- Environmental Science Technician

**Bachelor's Degree**  
**Annual Salary Range**  
**\$45,000-\$100,000+**

- Health and Safety Representative
- Safety Team Leader
- Environmental Scientist
- Environmental Specialist

*NOTE: Salary may differ according to industry, county, region and state.*

Career	Entry-Level Education	Annual Median Salary & Hourly Pay (2010)	Job Outlook (2010-20)	Responsibilities	Skills
<b>Environmental Engineering Technicians</b>	High School Diploma or Equivalent plus Certifications	<b>\$43,390/year</b> <b>\$20.86/hour</b>	<b>24%</b> (Faster than average)	<ul style="list-style-type: none"> <li>• Set up, test, operate and modify equipment for preventing or cleaning up environmental pollution</li> <li>• Collect, analyze and test samples for pollution</li> <li>• Work to mitigate sources of environmental pollution</li> <li>• Review technical documents to ensure completeness and conformance to requirements</li> <li>• Arrange for the disposal of lead, asbestos and other hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>• Listening</li> <li>• Monitoring</li> <li>• Problem solving</li> <li>• Reading comprehension</li> <li>• Teamwork</li> </ul>
<b>Health and Safety Engineers</b>	Associate's Degree	<b>\$45,330/year</b> <b>\$21.79/hour</b>	<b>13%</b> (Average)	<ul style="list-style-type: none"> <li>• Inspect, test and evaluate workplace environments, equipment and practices to ensure they follow safety standards and government regulations</li> <li>• Collect samples of potentially toxic materials for analysis by occupational health and safety specialists</li> <li>• Demonstrate the correct use of safety equipment</li> <li>• Investigate accidents to identify why they happened and how they might be prevented in the future</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical</li> <li>• Communication</li> <li>• Problem solving</li> <li>• Stamina</li> <li>• Technical</li> </ul>
<b>Environmental Scientists and Specialists</b>	Bachelor's Degree	<b>\$75,430/year</b> <b>\$36.26/hour</b>	<b>13%</b> (Average)	<ul style="list-style-type: none"> <li>• Review plans and specifications for new machinery or equipment to make sure it meets safety requirements</li> <li>• Inspect facilities, machinery and safety equipment to identify and correct potential hazards</li> <li>• Ensure that a building or product complies with health and safety regulations</li> <li>• Review employee safety programs and recommend improvements</li> <li>• Install safety devices on machinery or direct installation of these devices</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical</li> <li>• Creative</li> <li>• Deductive reasoning</li> <li>• Problem solving</li> </ul>
<b>Environmental Engineers</b>	Bachelor's Degree	<b>\$78,740/year</b> <b>\$37.86/hour</b>	<b>22%</b> (Faster than average)	<ul style="list-style-type: none"> <li>• Design projects leading to environmental protection, such as air pollution control systems and operations that convert waste to energy</li> <li>• Obtain, update and maintain plans, permits and standard operating procedures</li> <li>• Analyze scientific data and conduct quality-control checks</li> <li>• Inspect industrial facilities to ensure compliance with environmental regulations</li> <li>• Monitor progress of environmental improvement programs</li> </ul>	<ul style="list-style-type: none"> <li>• Communication</li> <li>• Problem solving</li> <li>• Reading comprehension</li> <li>• Teamwork</li> </ul>



# Online Resources

## COLLEGES AND UNIVERSITIES

Allen University  
[www.allenuniversity.edu](http://www.allenuniversity.edu)

Benedict College  
[www.benedict.edu](http://www.benedict.edu)

Clemson University  
[www.clemson.edu](http://www.clemson.edu)

Columbia College  
[www.columbiasc.edu](http://www.columbiasc.edu)

Columbia International University  
[www.ciu.edu](http://www.ciu.edu)

Limestone College-Extended Campus  
[www.limestone.edu/extended-campus](http://www.limestone.edu/extended-campus)

Midlands Technical College  
[www.midlandstech.edu](http://www.midlandstech.edu)

SC State University  
[www.scsu.edu](http://www.scsu.edu)

South University  
[www.southuniversity.edu/columbia](http://www.southuniversity.edu/columbia)

Southern Wesleyan University  
[www.swu.edu](http://www.swu.edu)

University of South Carolina  
[www.sc.edu](http://www.sc.edu)

Webster University  
[www.webster.edu](http://www.webster.edu)

## EDUCATION DEPARTMENTS, ALLIANCES AND RESOURCES

CTE: Career Technical Education  
[www.careertech.org](http://www.careertech.org)

Mapping Your Future  
[www.mappingyourfuture.org](http://www.mappingyourfuture.org)

Midlands Education and Business Alliance (MEBA)  
[www.mebasc.com](http://www.mebasc.com)

Midlands Regional Education Center (MREC)  
<http://recs.sc.gov>

SC State Department of Education  
[www.ed.sc.gov](http://www.ed.sc.gov)

SC Independent Colleges & Universities  
[www.scicu.org](http://www.scicu.org)

SC Career Information System  
[sccis.intocareers.org](http://sccis.intocareers.org)

SC Technical College System  
[www.sctechsystem.com](http://www.sctechsystem.com)

## MANUFACTURING RESOURCES

Career ME:  
Your Career in Advanced Manufacturing  
[www.careerme.org](http://www.careerme.org)

Dream It! Do It! – Manufacturing Institute  
[www.dreamitdoit.com](http://www.dreamitdoit.com)

EngenuitySC  
[www.engenuitysc.com](http://www.engenuitysc.com)

Greatest Engineering Achievements of the 20th Century  
[www.greatachievements.org](http://www.greatachievements.org)

How Stuff Works  
[www.howstuffworks.com](http://www.howstuffworks.com)

Manufacturing Career Guides  
[www.khake.com/page40.html](http://www.khake.com/page40.html)

Manufacturing is Cool  
[www.manufacturingiscool.com](http://www.manufacturingiscool.com)

Manufacturing.gov  
[www.manufacturing.gov](http://www.manufacturing.gov)

NAM-National Association of Manufacturers  
[www.nam.org](http://www.nam.org)

Society of Manufacturing Engineers  
[www.sme.org](http://www.sme.org)

Society of Manufacturing Engineers Education Foundation  
[www.smeef.org](http://www.smeef.org)

SC Manufacturing Extension Partnership  
[www.scmep.org](http://www.scmep.org)

## MILITARY

Army Ed Space  
[www.armyedspace.com](http://www.armyedspace.com)

Peace Corps  
[www.peacecorps.gov](http://www.peacecorps.gov)

SC National Guard  
[www.facebook.com/scguard](http://www.facebook.com/scguard)

Today's Military  
[www.todaysmilitary.com](http://www.todaysmilitary.com)

US Air Force  
[www.airforce.com](http://www.airforce.com)

US Air Force Reserve  
[www.afreserve.com](http://www.afreserve.com)

US Army  
[www.goarmy.com](http://www.goarmy.com)

US Army National Guard  
[www.nationalguard.com](http://www.nationalguard.com)

US Army Reserve  
[www.goarmy.com/reserve](http://www.goarmy.com/reserve)

US Coast Guard  
[www.uscg.mil](http://www.uscg.mil)

US Coast Guard Reserve  
[www.uscg.mil/reserve](http://www.uscg.mil/reserve)

US Marines Corps Reserve  
[www.marines.com/eligibility/service-options/reserve](http://www.marines.com/eligibility/service-options/reserve)

US Marines Corps  
[www.marines.com](http://www.marines.com)

US Navy  
[www.navy.com](http://www.navy.com)

US Navy Reserve  
[www.navyreserve.com](http://www.navyreserve.com)



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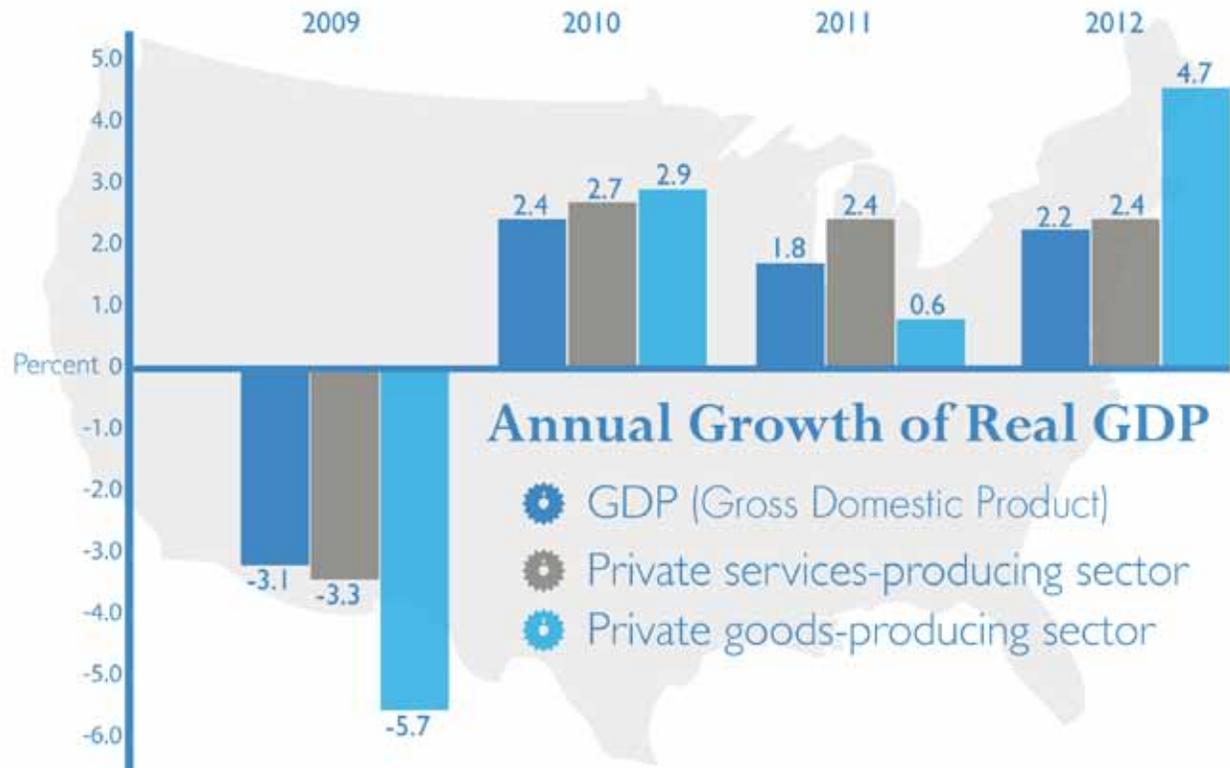
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# Growth of Manufacturing in the U.S.

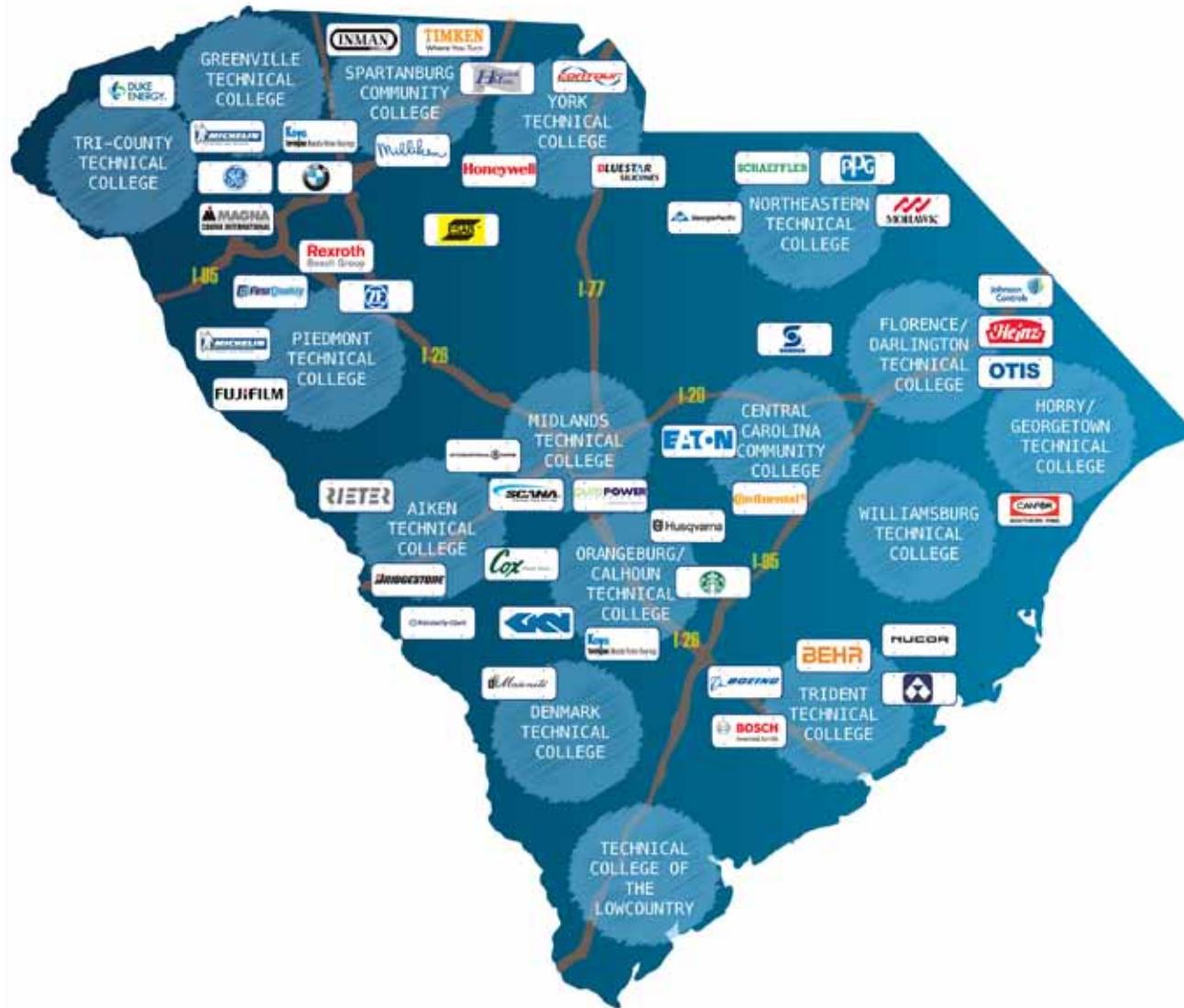


## THE ABOVE GRAPH SHOWS THAT MANUFACTURING HAS EXPERIENCED THREE CONSECUTIVE YEARS OF GROWTH NATIONALLY.

- Manufacturing contributed more to economic growth than any sector.<sup>1</sup>
- Manufacturing real value added—a measure of an industry’s contribution to GDP—rose 6.2 percent in 2012, after increasing 2.5 percent in 2011. Durable-goods manufacturing, the largest contributor to overall growth in the economy for the third consecutive year, increased 9.1 percent, after increasing 6.8 percent in 2011 and 13.3 percent in 2010.
- Wholesale trade increased 4.8 percent, after increasing 3.0 percent in 2011. With this recent growth, manufacturers that are adding new machinery and are hiring continue to be plagued by the difficulty of finding a skilled and qualified workforce that can adequately meet their needs. Today’s manufacturers are more automated and productive than ever. Yet, finding talent that is highly skilled threatens momentum the industry is experiencing.

<sup>1</sup> US Bureau of Economic Analysis

# Technical Colleges & Major Manufacturers Across South Carolina



# Make your move into **mechatronics**

*Where electronic, mechanical and computer skills  
connect*



## About the Career

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The days of labor-intensive manufacturing have passed. Modern manufacturing environments are highly automated and employ sophisticated systems to increase production, lower costs and improve quality. In these environments, production line down-time can cost thousands of dollars per hour in lost productivity and missed production deadlines. For the manufacturer to remain viable, it is imperative that their lines remain operating at peak efficiency. Mechatronics technicians keep the production lines functioning at the highest capacity.

Modern manufacturing lines have taken full advantage of automation technologies to lower costs, increase production and improve quality control. They employ extensive use of robotics, Programmable Logic Controllers (PLCs), hydraulic/pneumatic systems, and sophisticated electrical systems. Mechatronics technicians have a good grasp of these complex systems, allowing them to perform critical maintenance and repairs.

## About the Program

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MTC's Mechatronics Technology Certificate program prepares students to work in the highly automated manufacturing environment of the 21st century. The program is a good fit for students who desire a hands-on career and are technically inclined.

The Mechatronics Technology Certificate, a 34-credit-hour program, is designed to be completed in two semesters if the student follows the program layout. Course sequencing is structured but allows students to graduate in a fairly short time frame. Course topics include: AC/DC electricity, principles of manufacturing processes and production, print reading/CAD, industrial safety, hydraulics and pneumatics, programmable controllers, motors, basic principles of mechanics, sensors, and machine tool basics.



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-  [www.pinterest.com/mebasc](http://www.pinterest.com/mebasc)
-  [www.youtube.com/mebaconnects](http://www.youtube.com/mebaconnects)
-  [www.linkedin.com/company/mebasc](http://www.linkedin.com/company/mebasc)

