

GRCC Manufacturing Technology

Plastics Manufacturing
Quality Science
Tooling and Manufacturing
Welding



GRCC *works*

www.grcc.edu

GRCC Manufacturing Technology

The manufacturing segment of our economy offers many rewarding career opportunities in a variety of settings. The manufacturing of products creates thousands of secure technician-level jobs each year, most of which do not require a four-year degree.

The Advantages of GRCC's Manufacturing Programs

The Manufacturing programs at Grand Rapids Community College offer you:

- The background to work effectively in modern industry.
- The latest in the application of technology.
- Hands-on experience on state-of-the-art equipment.
- A wide choice of manufacturing courses.
- A degree for career advancement.

With GRCC's Manufacturing programs, you can:

- Earn an associate degree or a certificate.
- Expand and update your skills for today's changing technology.
- Choose courses to meet your long-term career goals.
- Prepare to transfer to earn a bachelor's degree.

Graduates of high schools and technical centers that are members of the Kent Metropolitan Articulation Project (KMAP) may receive credit for select classes.

Program Options

You can earn an Associate in Arts and Sciences in:

- Plastics Manufacturing Technology
- Quality Science
- Tooling and Manufacturing Technology
- Welding Technology

You can earn a certificate in:

- Industrial Technology
- Plastics Manufacturing Technology
- Quality Science
- Tooling and Manufacturing Technology
- Welding Technology

All credits earned in the certificate programs can be applied toward an associate degree.

In the Plastics, Tooling and Manufacturing, Quality Science, and Welding Technology programs, you can follow a program that allows you to transfer to Ferris State University to earn a bachelor's degree in several different areas of study.



Plastics Manufacturing Technology

Plastics Manufacturing Technology is a field of study that prepares people to produce many of today's consumer goods. A wide variety of parts and products such as automobile and machinery parts, household goods, sports equipment, furniture, and toys are formed from plastic.

Plastic workers set up, operate, and tend different types of machines to mold, form, or cast plastic materials. They often work with complex computer-controlled machines. Operators may load and troubleshoot programs; mix materials; setup molds; fill, monitor and adjust machines; unload and inspect finished products.

Career Opportunities

Plastics jobs can be found in many different industries since plastics materials are often used to manufacture items that were formerly made of wood, metal, glass, and ceramics. Positions available to a plastics manufacturing technology graduate, depending on the selected program, include:

- Engineer
- Laboratory Technician
- Material Handler
- Mold Designer
- Mold Setter
- Molding Technician
- Plastics Machinery Maintenance Technician
- Production Supervisor
- Operator
- Salesperson

Employment Projections

Growth in the plastics-forming industry is expected to continue in Michigan, as well as nationally. Over 150 plastic processing plants are located in Western Michigan. These manufacturers and the Western Michigan Section of the Society of Plastics Engineers have indicated that trained workers are in short supply and that excellent employment opportunities exist in plastics manufacturing.

Courses

GRCC offers the following field-related courses. Specific program requirements and course descriptions can be found in the GRCC catalog or at www.grcc.edu.

- MN 100 Manufacturing Principles
- MN 119 Introductory Machine Operations
- MN 165 Plastics Testing
- MN 217 Hydraulics
- MN 219 Survey of Polymer Technology
- MN 220 Basic Plastics Processing
- MN 223 Injection Molding Theory
- MN 242 Applied Injection Molding
- MN 244 Advanced Plastics Processing
- MN 249 Statistical Process Control

Areas of Study

You will learn about different processes including injection molding, blow molding, extrusion, thermoforming, and many secondary processes. The injection process is emphasized since it is the most prevalent in industry.

You will gain knowledge and skills in the following areas:

- Operation of equipment
- Process control capabilities
- Mold design
- Polymer chemistry
- Maintenance of molding equipment
- Testing of plastic material
- Advanced processing capabilities
- Modern molding practice
- Medical device manufacturing



Quality Science

Industry has increasingly emphasized improving productivity and the quality of materials and products. Quality science is a field in which people monitor and assure the quality of raw materials and finished products in industry. They develop quality assurance plans and procedures, conduct appropriate tests, perform calculations, and prepare detailed reports about the products and processes.

Areas of Study

Through classroom and hands-on laboratory work, you will gain knowledge and skills in the following areas:

- Quality assurance principles
- Statistical Process Control
- Experimental design
- Gages and measurement
- Use of coordinate measuring machine
- Geometric tolerancing and print reading
- Process capability analysis
- Mechanics of control charts
- Building quality/productivity teams
- Continuing improvement strategies
- Employee involvement
- Problem-solving techniques
- ISO 9000
- QA 9000

Employment Projections

According to the Michigan Department of Labor and Economic Growth, the need for qualified inspectors and technicians should increase by 5 percent by the year 2014.

The American Society for Quality (ASQ) indicates that quality technicians and mechanical inspectors who are ASQ certified earn higher salaries than those who are not certified.

Career Opportunities

Employees generally work in quality assurance departments. Quality-science technicians may specialize in design, incoming material, process control, production evaluation, inventory control, product reliability, research and development, and administrative application.

Positions available to Quality Science graduates include:

- Quality Auditor
- Quality Engineer
- Quality-Control Technician
- Quality-Control Supervisor
- Industrial Engineering Technician
- Production Technician
- Manufacturing Inspector
- Mechanical Inspector

Courses

The following quality science courses are available. Both required and elective courses are listed. Specific program requirements and course descriptions can be found in the GRCC catalog or at www.grcc.edu.

Graduates of the associate degree program will be prepared to take the Certified Quality Technician Examination given by the American Society for Quality.

- MN 248 Quality Assurance
- MN 249 Basic Statistical Process Control
- MN 251 Gauges for Measurement
- MN 252 Geometric Tolerancing
- MN 253 Applied Quality Techniques 1
- MN 254 Experimental Design
- MN 255 Applied Quality Techniques 2

Other specialty classes required or suggested include:

- MN 114 Blueprint Reading
- BA 183 Supervision
- BA 254 Business Statistics
- EG 110 Industrial Graphics with CAD



Tooling and Manufacturing Technology

The automation of equipment and processes continues to change the manufacturing environment. Tooling and Manufacturing Technology is a field of study in which people are prepared to work in the modern tooling and manufacturing industry. Technicians setup, operate, and maintain machines used to produce a wide variety of products.

The Advantages of GRCC's Tooling and Manufacturing Technology Program

Manufacturing technicians need high-tech skills to be successful in the changing workplace. GRCC's Tooling and Manufacturing Technology program offers the following advantages:

- Work experience through Co-op
- Challenge exams for some courses
- Advanced standing credits for high school students
- Different career tracks

Employment Projections

According to the Michigan Department of Labor and Economic Growth, machinists and CNC machinists' employment is expected to grow more than 22 percent by the year 2014.

Areas of Study

Through classroom and hands-on laboratory work, you'll learn the technical skills as well as the "soft skills" necessary to be a successful manufacturing technician. Technical skills are based on National Skills Standards. Depending on the program, track, and courses you select, you'll gain knowledge and skill in the following areas:

- Metallurgy
- Welding
- Hydraulics
- Materials handling
- Quality assurance
- Machine shop
- Manufacturing principles
- Machine tool operations on lathes, mills, grinders, drilling machines
- Computer Numeric Control (CNC) programming
- Computer Aided Design/Computer Aided Manufacturing (CAD/CAM)
- Production control
- Precision and non-precision measuring tools
- Basic heat treatment operations on steel
- Electrical discharge machines
- Print reading
- Teamwork
- Problem solving
- Quality principles
- Communication
- Applied math

Tooling and Manufacturing Technology

(continued)

Courses

The following courses are available. Technical core, general topic courses, and career track are listed. Career track areas include tool and die, mold making, CNC machining, CAD/CAM programming, and manufacturing production.

Special program requirements and course descriptions can be found in the GRCC catalog or at www.grcc.edu.

Technical Core Courses

- EG 110 Industrial Graphics with CAD
- MN 100 Manufacturing Principles
- MN 119 Introductory Machine Operations
- MN 234 Metallurgy
- MN 249 Basic Statistical Process Control
- TE 103 Intermediate Technical Mathematics
- TE 104 Advanced Technical Mathematics
- MN 116 Basic Welding
- MN 200 Intermediate Machine Operations
- MN 235 CNC and NC Machine Programming

General Topic Courses

- MN 213 Machinery's Handbook
- BA 103 Introduction to Business
- BA 183 Supervision
- TE 282 Cooperative Education

Career Track Courses

- DR 150 Introduction to Solidworks
- DR 190 Intermediate Solidworks
- DR 212 Tool Design
- DR 224 Die Design
- DR 225 Advanced Die Design
- DR 260 Introduction to Catia
- DR 241 Mold Design
- DR 258 Introduction to Pro-Engineering
- EL 144 Basic Electricity & Electronics
- MN 200 Intermediate Machine Operations
- MN 217 Hydraulics
- MN 218 Pneumatics
- MN 220 Basic Plastics Processing
- MN 230 Fundamentals of TIG & MIG Welding
- MN 236 CAM Machine Programming
- MN 238 Advanced CNC Programming
- MN 249 Basic Statistical Process Control

Career Opportunities

Positions available to Tooling and Manufacturing Technology graduates include:

- CNC Programmer or Operator
- Department Supervisor
- EDM Operator
- Layout and Inspection Technician
- Machinist (Maintenance, Experimental, Production and Tool room)
- Machine Operator or Set-Up Worker
- Mold Maker
- Pattern Maker and Model Maker
- Robot Technician
- Tool and Die Maker

These positions often lead to careers in manufacturing management, engineering technology, industrial sales, or technical training or to owning and operating a company.



Welding Technology

Welding technology is a large and diverse field in which skilled people use a variety of tools and equipment to permanently join metal parts into components and finished products. This process is the most efficient method to construct and repair buildings, bridges, automobiles, aircraft, ships, and most other manufactured products.

Welders are skilled metal workers with many related talents. They have the ability to determine correct welding processes and the skill to manually weld or use automated welding equipment.

Employment Projections

According to the Michigan Department of Labor and Economic Growth, the need for welders is expected to grow more than 20 percent by the year 2014.

Changes in technology such as advances in robotics and computer-aided manufacturing affect the demand for welders. Welders with a variety of skills will be needed for sophisticated fabrication, repair, and construction work which are more difficult to automate. Employment opportunities are best for certified welders.

Career Opportunities

Welders are often employed in manufacturing, services, construction, and repair. They may work alone or as part of a project team. Positions available to Welding Technology graduates include:

- Welding Machine Operator
- Utility Welder
- SMAW Welder
- GMAW (MIG) Welder
- GTAW (TIG) Welder
- Brazing Operator
- CNC Oxy-Fuel Cutter
- Fitter Welder
- Welding Technician
- Welding Supervisor
- Welding Inspector
- Tack Welder
- Resistance Welder
- Oxy-Fuel Welder
- Production Line Welder
- CNC Plasma Cutter
- Assembler Welder
- General Supervisor
- Pipe Fitter
- Millwright
- Maintenance Welder

Graduates are also prepared for welding-related careers in areas such as welding design, engineering, sales, and service.

Welding Technology (continued)

The Advantages of GRCC's Welding Technology Program

In GRCC's Welding Technology program, you'll learn modern welding practices and gain experience in different types of arc and gas welding, brazing, and flame cutting.

After completing the associate degree program, you'll be eligible for testing and certification to the American Welding Society (AWS) Welding Code. You'll also be eligible for testing to become a certified associate welding inspector in the AWS code.

Courses

The following list includes the specialty courses for the Welding Technology program. Specific program requirements and course descriptions can be found in the GRCC catalog and at www.grcc.edu.

MN 100 Manufacturing Principles
MN 119 Introductory Machine Operations
MN 134 Oxyacetylene Welding
MN 136 Basic Arc Welding
MN 230 Fundamentals of TIG & MIG Welding
MN 231 Welding Fabrication, Design & Testing
MN 232 Pipe Welding
MN 234 Metallurgy
EL 144 Basic Electricity and Electronics
EL 164 Introduction to Programmable Logic Controllers
TE 114 Material Science
EG 110 Industrial Graphics with CAD

Areas of Study

This program combines the development of welding skills with a background in general manufacturing. You'll gain knowledge and develop skills in the following areas:

- Oxy-fuel welding
- Shielded metal arc welding
- Gas tungsten arc welding
- Gas metal arc welding
- Pipe welding
- Welding fabrication
- Welding design and testing
- Brazing
- Heat treating and the strength of materials
- Blueprint reading
- Welding and mechanical drawing
- Metallurgy
- Basic electricity and electronics
- Manufacturing principles
- Machine operations
- Computer-controlled welding machines
- Safety practices
- Care and use of tools

Benefits of Attending GRCC

The benefits of attending GRCC include:

- Low-cost tuition
- Convenient location
- Day and evening classes
- Small class sizes
- Experienced and dedicated faculty
- Personal attention
- Job placement services
- Financial aid and scholarships available
- Opportunities for real-world experience
- Access to lifelong learning opportunities

For More Information

To receive the GRCC catalog or to get more information about course descriptions, degree requirements, financial aid, or admissions, call the Technology Department at (616) 234-3670 or the Enrollment Center at (616) 234-4000.

Visit GRCC's website (www.grcc.edu).



143 Bostwick Avenue, NE
Grand Rapids, Michigan 49503-3295
www.grcc.edu

These materials were developed under a grant awarded by the Michigan State Board of Education and the Michigan Department of Career Development.

Grand Rapids Community College is an equal opportunity institution. GRCC is a tobacco-free campus.