

## BACKGROUND

In Michigan manufacturing is essential to the state's economy. Manufacturing careers and the supporting businesses provide the living expenses for millions of people around the world. Nearly one in every five working adults in Michigan is employed in manufacturing.

### And there's more:

- Michigan's manufacturing workforce is the 5th largest in the country. In 2018 over 14% of the total workforce in Michigan worked in manufacturing.
- Manufacturers in Michigan account for 19.38% of the total output in the state. Total output from manufacturing was \$102.35 billion in 2018.
- Over the next decade, 4.6 million manufacturing jobs will need to be filled nationwide to keep up with the world's demand for goods and services...and to replace workers who are retiring.
- There are nearly 15,000 manufacturing companies in Michigan.

It is easy, with so much money and the large number of companies involved, to understand why our state needs so many skilled and committed individuals working in the manufacturing industry.

### Now about plastics!

- Plastics play an essential role in all of our lives.
- Annually, approximately 500 billion plastic bags are used worldwide. More than one million bags are used every minute.
- Michigan ranks third in the country in plastics industry employment. 1.4 million people are employed in the plastics industry in Michigan.

## Lesson: Vantage Plastics Talent Tour Video

### The lesson has three parts:

1. **Setting the stage** is accessing pre-knowledge and their current brainpower on the subject of manufacturing and how we use products in our daily life.
2. **A Talent Tour video** featuring Vantage Plastics to build their knowledge.
3. **Extensions** to enrich the learning experience.

The production and use of plastics have resulted in environmental issues over the years. These issues cannot be ignored by manufacturers or the users of plastics

**Innovation** is critical in the production of plastics. Michiganders will use plastics to maintain the high quality of life available in the Great Lakes Bay Region. But we also need to deal with the problem plastics cause. Plastic manufacturers in our region have the challenge of using innovation to design, create, collaborate, and motivate the world to problem solve while enjoying the essential use of plastics in our everyday lives!

[Central Asphalt Constructs First Public Recycled Plastic Roads in U.S.](#)

**Good sources for information on the need for and the issues with plastics:**

[Real World STEM? Try Plastics Pollution.](#)  
[Recycling in the U.S. Is Broken. How Do We Fix It?](#)

### Notes on timing:

Manufacturing and plastics are each topics rich with opportunity for students! The essential elements of this lesson are included in the "You are now ready to take a Talent Tour!" section of the lesson. Using the "Setting the Stage with Students" and "Extensions" adds more time but enriches the learning experience and might be the inspiration for a student to act in the search for a career pathway.



**1. Set the stage with students: 15 minutes**, more if sharing recommended videos and/ or an overview of the engineering design process.

**“With your partner(s) brainstorm a list of plastics you have made use of today.”**

Take a moment to go around the room and tally a count of the different items students have on their lists. You might mention some that they probably won't think of; their toothbrush, chewing gum (not just the wrapper either!), a drink in a metal can (to keep the metal from corroding, beverage manufacturers line the inside of cans with a plastic resin), your clothing (Check the label! If you see the words, acrylic, microfiber, polyester, or nylon), make-up, shampoo!

**“Plastics and plastic products are produced by manufacturing. What is manufacturing?”**

Manufacturing is the production of goods through the use of labor, machines, tools, and chemical or biological processing or formulation.

**“Who are manufacturers in our area and what do they produce?”**

Option-Share a local manufacturer tour video:

1. Share the first **20 minutes** of the Great Lakes Manufacturing Association video, [Manufacturing Day 2020](#)
2. [Fullerton Tool, Saginaw](#); **2 minutes**

## Note!

Understanding the Engineering Design Process is part of the NGSS (Next Generation Science Standards) for middle and high school students. If students do not already know the Engineering Design Process it would be very helpful to their understanding to provide an overview. Manufacturers closely follow this process and it provides students with a better understanding of the holistic nature of manufacturing.

[Engineering Design Process](#)

## 2. The Talent Tour

“What kind of careers are available in manufacturing?” Discussion eliciting student pre-knowledge

“Let’s get a closer look at a local plastics manufacturer and the career opportunities in manufacturing.”

“You are now ready to take a Talent Tour!”

[Share the Vantage Plastics Talent Tour Video](#)

- After the video, help students understand one of the manufacturing processes that produces plastic products – thermoforming.

Share a video to learn about the process:

[This is thermoforming 1 minute](#)

[Adam Savage's Vacuum Forming Machine 6 minutes](#)

- Do the Vantage Plastics Capabilities interaction page with students to better understand the application of the engineering design process and learn more about the highlighted careers from the video. **15-20 minutes**
- Design a product.  
Several local manufacturers stepped up at the beginning of the Covid-19 crisis to produce Personal Protective Equipment. Share the following websites:

[Vantage Plastics Starts Production of Face Shields in the fight against Covid-19](#)

[Providing protection from liquid splashes and droplets](#)

### Present students with the following scenario:

As the **Design Engineer** for the Plastics for Every Purpose company, Dr. Anthony Fauci has contacted you about the need for new personal protective equipment (PPE). A new virus has been detected in the country of Hindercastleland that enters the body only through the ears! He wants the United States to act quickly to come up with PPE that will protect Americans from this virus. Can something be made from plastic?

Follow the engineering design process to develop plastic protection from this virus. Project Planning page attached. **1 class period.**



### 3. Extensions:

- Ask students to produce a mini poster to share their project ideas. **1 class period.**  
Form students into teams of 2 or 3 to act as **Quality Control Managers**. They will evaluate each design and provide feedback. Feedback should use the questions from the Project Planning Sheet to assign point value to the final designs.
- Innovation. “**Innovation** is the creation, development and implementation of a new product, process or service, with the aim of improving efficiency, effectiveness or competitive advantage.”

Look more closely at Great Lakes Bay Region plastic manufacturers regarding their response to environmental concerns as they use INNOVATION to reuse, recycle, and redesign with plastics.

[Central Asphalt Constructs First Public Recycled Plastic Roads in U.S.](#)

[Flexible Services Tailored to Your Requirements](#)

[The Responsible Choice for Horticultural Containers](#)

[Robinson Industries: Why Plastic?](#)

[Robinson Industries: Returnable Packaging](#)

[Huhtamaki](#)

### Learn More:

Would students like to learn more about high school CTE and college manufacturing programs?

#### High School CTE

- Bay/Arenac
  - [Electronics & Robotics](#)
  - [Engineering & Drafting](#)
  - [Precision Machining](#)
- Clare/Gladwin
- Crawford/Oscoda/Ogemaw/Roscommon
- Gratiot/Isabella
  - [Mechatronics](#)
  - [Technical Education Center](#)
- Midland
- Saginaw (pg 4)

#### College Programs

- Alpena Community College
- Delta College
  - [Mechatronics Program Overview](#)
  - [Manufacturing and Industrial Technology Program Overview](#)
- Kirtland College
  - [CNC Machinist Degrees](#)
  - [Welding and Fabricating Degrees](#)
- Mid Michigan College
  - [Advanced Integrated Manufacturing \(AIM\)](#)
  - [Computer Aided Drafting & Design \(CADD\)](#)

#### Additional resources for further exploration:

##### Great Lakes Bay Manufacturers Association resources:

- **Video:** recommended use through 20 minutes
  - Shorter sections of high interest: minutes 9:30 – 12:30 features robotics/cobots
  - 12:30 – 16:00 features Avalon and Tahoe of Alma
- Manufacturing Career Cards available for purchase- **recommended lesson**
- **Student Scholarship and Teacher Grant Programs**

##### Central Michigan Manufacturers Association resources:

- **Career opportunities, student scholarship program events**