

Dear Teachers and School Contacts,

On behalf of the Dayton Region Manufacturers Association and Junior Achievement, welcome to the 2020 Manufacturing Month in the Dayton, Ohio region. Congratulations for recognizing the importance of career exploration experiences for your students! Experiential learning events such as Manufacturing Month represent very powerful learning opportunities for students. Below you will find information that will connect you with resources to help prepare your students for the events this month. Also included in this information is a quick guide for teachers to use when preparing their students for an optimal experience.

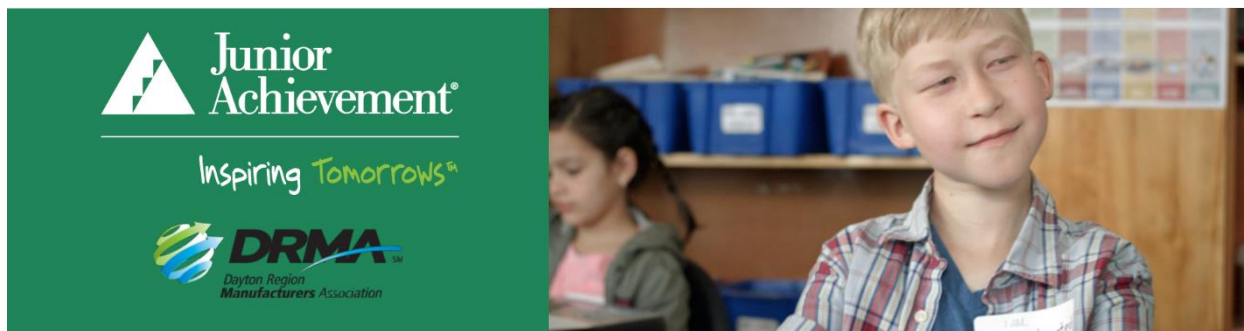
By the time that you receive this information, your classroom and school will have been matched with a manufacturing company partner which will be hosting your students. At the conclusion of the event, your hosting company will ask students to complete a quick survey before leaving the site that will help inform the company ways to continue strengthening the program the following year. Please ask your students to give the survey their full attention to ensure productive responses. We greatly appreciate your cooperation.

Enclosed you will find the following:

1. Making a Case for Participating in Manufacturing Month. This includes elements of the Ohio Department of Education Guiding Principles and Goals which support your participation in Manufacturing Month.
2. Career assessment tools for students
3. A teacher tip sheet for preparing students for their virtual site visit
4. Tips for preparing students on the day of the event
5. A guide for students to develop their questions prior to the event
6. Student activities and resources

On behalf of all those associated with Manufacturing Month in the Dayton Region, we wish you and your students an exciting and informative Manufacturing Month!





MAKING A CASE FOR MANUFACTURING MONTH IN OHIO

OHIO LAW

By participating in Manufacturing Month, you are helping your school district fulfill the requirements of the State of Ohio and the Ohio Revised Code. School districts are required to prepare plans to expose students to career opportunities, establish success plans for students at risk of drop out, and to implement state curricula with embedded career connection learning strategies (ORC 3313.6020 and ORC 3301.079). You can let your Principal and Superintendent know that by participating in Manufacturing Month, you are helping the obligation the State of Ohio places on your school district to create opportunities for students to explore careers and make connections with curriculum.

OHIO LEARNING STANDARDS GUIDING PRINCIPLES

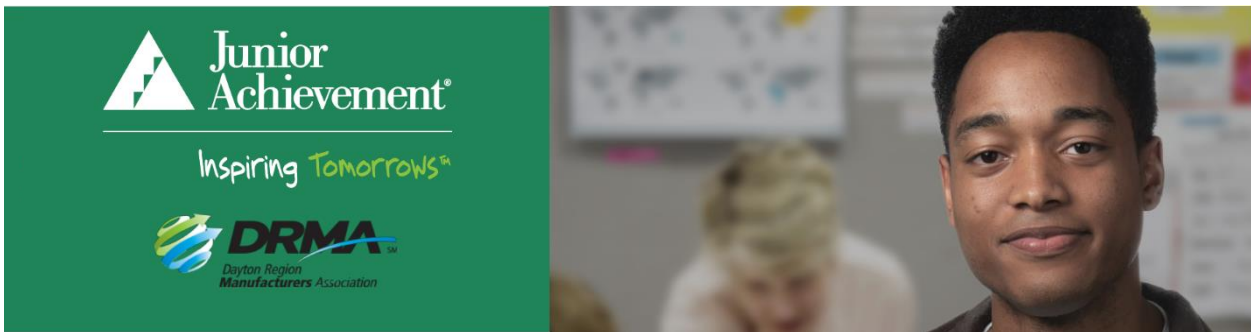
21st century skills are integral to the science standards and curriculum development revision documents. They are an essential part of the model curriculum component through the incorporation and integration of scientific inquiry, science skills and process and technological and engineering design. As enumerated by ORC 3301.079, these skills include: creativity and innovation; critical thinking, problem solving and communication; information, media and technological literacy; personal management, productivity, accountability, leadership and responsibility; and interdisciplinary, project-based, real-world learning opportunities.

OHIO LEARNING STANDARDS STUDENT-CENTERED GOALS

Ohio's student-centered goals (Duschl et. al., 2007; Bell et. al. 2009) for science education include helping students in the following ways: experience excitement, interest and motivation to learn about phenomena in the natural and physical world; come to generate, understand, remember and use concepts, explanations, arguments, models and facts related to science; manipulate, test, explore, predict, question, observe and make sense of the natural and physical world; reflect on science as a way of knowing, on processes, concepts and institutions of science and on their own process of learning about phenomena; participate in scientific activities and learning practices with others, using scientific language and tools; think about themselves as science learners and develop an identity as someone who knows about, uses and sometimes contributes to science. These goals are consistent with the expectations of Ohio law.

Ohio's Cognitive Demands for Science

DESIGNING TECHNOLOGICAL/ENGINEERING SOLUTIONS USING SCIENCE CONCEPTS (T) Requires student to solve science-based engineering or technological problems through application of scientific inquiry. Within given scientific constraints, propose or critique solutions, analyze and interpret technological and engineering problems, use science principles to anticipate effects of technological or engineering design, find solutions using science and engineering or technology, consider consequences and alternatives, and/or integrate and synthesize scientific information.



CAREER ASSESSMENT FOR STUDENTS

Teachers may wish to have their students participate in a career assessment before or after their Manufacturing Month site visit. Your students are invited to participate in one of two career assessments. You will find the instructions for students below.

Under **Career Exploration Tools**, two career exploration tools are available to help you learn more about your skills, abilities, and career options that may interest you! Work with your teacher and/or volunteer to decide which one is right for you.

- If you're over 14 years old, check out the JA Career Profiler Assessment by Truity, a fun, informative way to separate what you like from what you dislike. The personal analysis takes about 20 minutes to help you find a career that best suits your interests, skills, and values. Enjoy discovering your passions and your purpose!

Go to <http://japrofile.org>

- O*NET Interest Explorer, an online tool developed by the U.S. Department of Labor, Employment, and Training is available to all users and takes about five minutes to complete. O*NET career exploration provides useful information you can use to identify your strengths, the kind of work you like to do, and what you deem important. Use the assessment to identify the education and training needed for careers that interest you and their salaries, and find jobs that are in high demand.

Go to <https://www.mynextmove.org/explore/ip>





Tips for Preparing Students Prior to Manufacturing Month

- Have student utilize the career exploration tools for Manufacturing Month provided on the previous page.
- Locate the company's web site and review the information with your student.
- Help students prepare questions about the company that are comprehensive.
- In the event that students will be having live remote interaction with company representatives, prepare students for expectations regarding common courtesies including using "please" and "thank you" when appropriate.
- If there is real time virtual exchange with a company representative, remind students that their time engaging the representative may be the only time that the host has an experience with your school. The company's impression of your school based on the students' behaviors will be a lasting one.
- Reinforce how English, mathematics, social studies, science, and work-readiness skills are used every day at work.
- Focus on the role of teamwork at school and on the job. Showcase how teamwork can contribute to success in the workplace.
- Demonstrate that lifelong learning is important to continued success in the workplace.





Tips for Students

- Remember to have supplies ready to take notes during the presentation (lap top, iPad, pencil, pen, notebook)
- Be prepared to discuss your thoughts about manufacturing before and after the presentation. After the presentation, be prepared to answer the questions, “Has your view of manufacturing or the specific company changed as a result of the presentation? If so, in what way(s)?”
- Listen intently to the views of your classmates. You will likely find that there are varying impressions regarding careers in manufacturing that may help shape your opinion.
- If there is real-time interaction with a work site host, be attentive to these basic courtesies:
 - always identify yourself by name at the outset of a question
 - if there is a video feed, have students stand in the classroom or auditorium when asking a question so the work site sit can identify the student asking the question
 - thank the work site host for his/her responses.
 - remember that any interaction you have will leave a lasting impression on the work site host
 - do not have side conversations in the room or auditorium while the work site host is presenting
 - silence their cell phones during the presentation
- Be certain to complete the survey provided by your teacher



Manufacturing Month Question Guide

Students, as you view the presentations provided by manufacturers, please consider the following example questions. Below each category, please write a question that appeals to you the most. You may select one from the list or create one of your own. Be certain that by the completion of Manufacturing Month, through the various presentations and your own investigations, you have answered these questions.

ABOUT THE COMPANY

- What type of person is successful in the company?
- How many hours does an employee work each week?
- Are there opportunities for raises and promotions in the company?
- Do most people work alone or in teams?

YOUR QUESTION: _____

ABOUT THE JOB

- What education or skills are required for the job?
- What can I do today to begin preparing for a job like the one presented?
- How do you use time-management skills in this job?

YOUR QUESTION: _____

ABOUT THE HOST PRESENTER (If there is real time engagement with the presenter)

- Why did you choose this career? How did you get started?
- What is the coolest thing you have ever done at work?
- What do you like most about your job?
- What daily tasks do you perform at your job?

YOUR QUESTION: _____

ABOUT THE CAREER CLUSTER

- What are some of the entry-level jobs in this career area?
- What is a typical starting salary for an entry-level position?
- What type of on-the-job training do most companies offer?

YOUR QUESTION: _____



National Association of Manufacturers and Manufacturing Institute

Manufacturing Month is produced by the National Association of Manufacturers and the Manufacturing Institute and brought to you locally by Dayton Region Manufacturers Association. There is a comprehensive website that provides background information regarding Manufacturer's Month as well as resources for students, parents and educators. The address for the site is <https://www.mfgday.com/>. For your convenience, you will find sample activities taken from this material provided in the following pages below.

To get started, ask students to copy the URL above into their web browser. At the top of the page, click on "Stories". These are 30 second testimonials that describe real people and their work as manufacturers. Can you see yourself in one of these occupations?



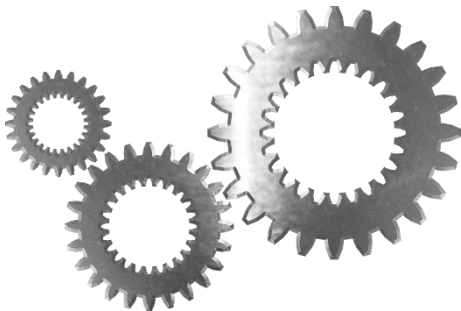
ACTIVITY 1:

MANUFACTURING TERMS & DEFINITIONS

Student Name: _____

DIRECTIONS: Match each term with its definition on the other column by letter. Students may use electronic resources to check your answers.

- | | |
|------------------------------|--|
| 1. ____ Market Research | a. Taking a concept through the process of making a configuration, drawing, model, or plan that serves as the basis for the actual product and making sure the products meets specific needs or wants. |
| 2. ____ Prototype | b. An original model on which something is patterned and used to develop a product. |
| 3. ____ Raw Material | c. Being creative |
| 4. ____ Hang Tag | d. A company that provides another company with goods and services, also called a vendor. |
| 5. ____ Warehouse | e. Amount of energy, work, products, or services produced in a given period by a company, individual or machine. |
| 6. ____ Production | f. Process of assessing a new product or service through research (like surveys, focus groups, or product testing) to test reactions to a product or service before making it available to the general public. |
| 7. ____ Design & Development | g. Make the actual product: usually includes technology, advanced machines, robotics and assembly lines. |
| 8. ____ Innovation | h. Something attached to a product (like a piece of clothing) that shares information about the manufacturer & the product. |
| 9. ____ Supplier | i. A material or substance used to make something. |
| 10. ____ Outputs | j. Taking an item after it has been manufactured and getting into the hands of a consumer. |
| 11. ____ Distribution | k. The expense materials, labor, and other components of the manufacturing process to create an end product. |
| 12. ____ Manufacturing Costs | l. Where products can be stored before distribution. |



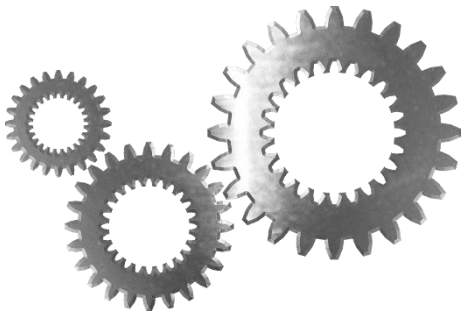
ACTIVITY 1:

TEACHER KEY

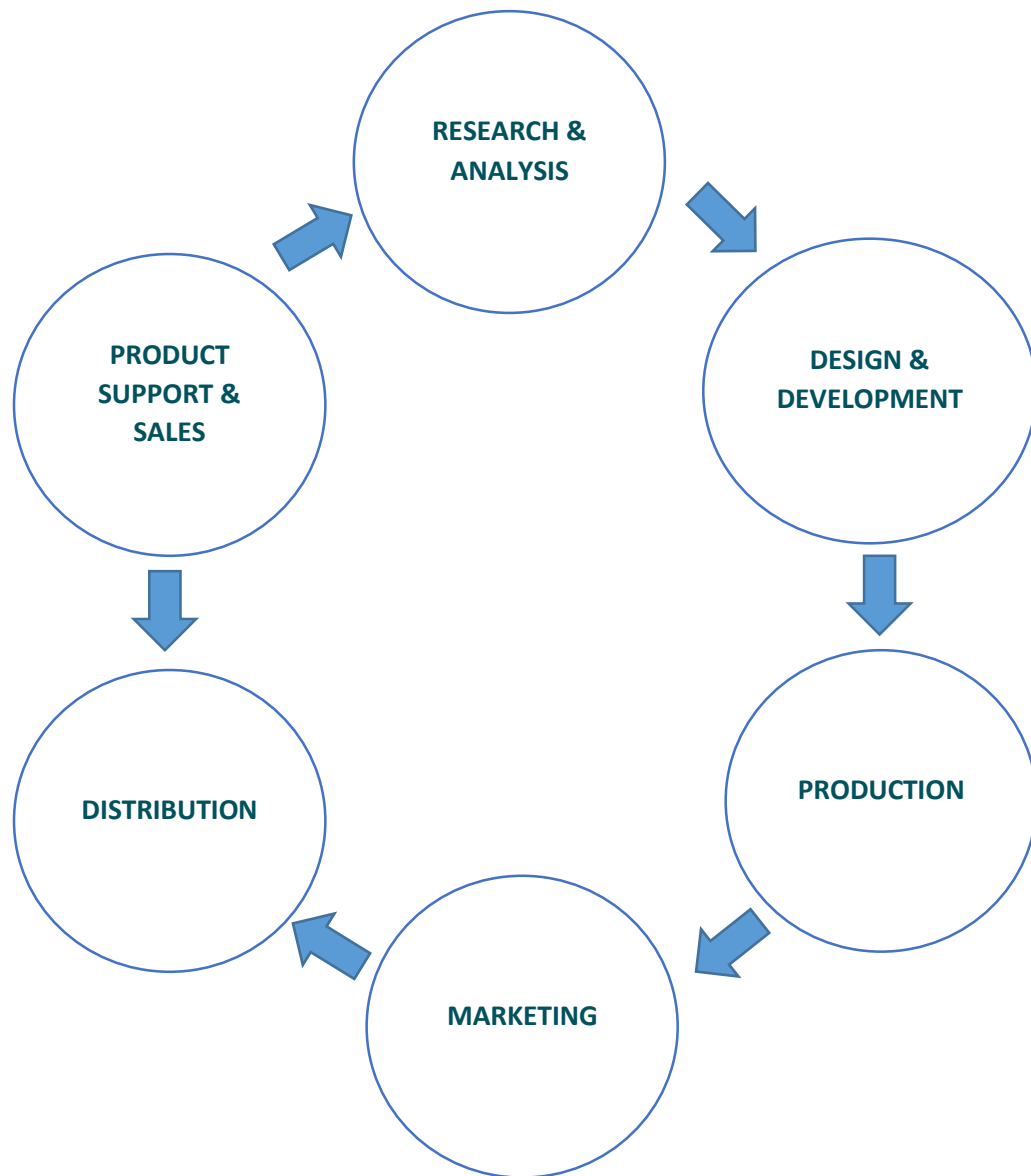
Student Name: _____

DIRECTIONS: Match each term with its definition on the other column by letter. Students may use electronic resources to check your answers.

1. f Market Research
 2. b Prototype
 3. i Raw Material
 4. h Hang Tag
 5. l Warehouse
 6. g Production
 7. a Design & Development
 8. c Innovation
 9. d Supplier
 10. e Outputs
 11. j Distribution
 12. k Manufacturing Costs
- a. Taking a concept through the process of making a configuration, drawing, model, or plan that serves as the basis for the actual product and making sure the products meets specific needs or wants.
 - b. An original model on which something is patterned and used to develop a product.
 - c. Being creative
 - d. A company that provides another company with goods and services, also called a vendor.
 - e. Amount of energy, work, products, or services produced in a given period by a company, individual or machine.
 - f. Process of assessing a new product or service through research (like surveys, focus groups, or product testing) to test reactions to a product or service before making it available to the general public.
 - g. Make the actual product: usually includes technology, advanced machines, robotics and assembly lines.
 - h. Something attached to a product (like a piece of clothing) that shares information about the manufacturer & the product.
 - i. A material or substance used to make something.
 - j. Taking an item after it has been manufactured and getting into the hands of a consumer.
 - k. The expense materials, labor, and other components of the manufacturing process to create an end product.
 - l. Where products can be stored before distribution.



THE MANUFACTURING CYCLE



RESEARCH & ANALYSIS: Research and analyze product as well as other products that are out there

DESIGN & DEVELOPMENT: Prototype

PRODUCTION: Includes testing, production costs

MARKETING: Includes marketing analysis and product marketing

DISTRIBUTION: Includes delivery methods

PRODUCTS SUPPORTS & SALES: Return policies, equipment failure

ACTIVITY 2:

APPLYING THE MANUFACTURING CYCLE

Student Name: _____

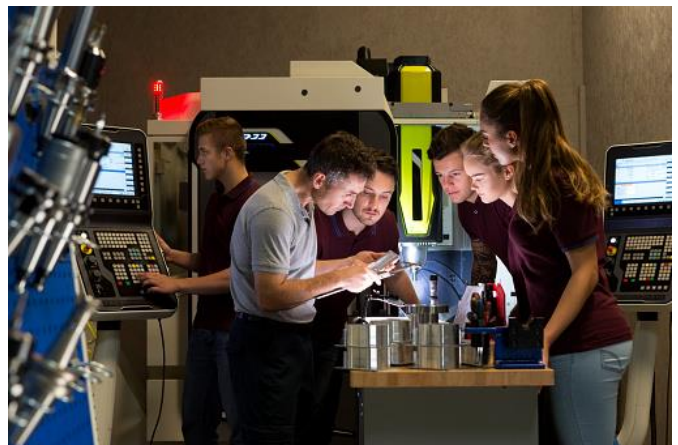
DIRECTIONS: *Create and present a PowerPoint, brochure, or poster, or write a paper on one of the machines listed below.*

1. Choose one of the following tools or machines:

CNC Lathe	MIG Welder	Band Saw
Water Jet	SMAW Welder (Stick Welding)	Vertical Mill
CNC Milling Machine	3D Printing	Hydraulic Power Press
Robotics	Grinder	Faro Arm
Wire Feed EDM Machine	Laser Texturing	Ironworker Machine
Compression Mold	Steel Stamping Press	Swiss Turning Machine
Sinker EDM Machine	Multiple Pallet CNC	Roll Bending & Forming Machine
Horizontal Mill	Hydraulic Shear	Pyramid Rolling Machine
Laser Cutters (Sheet Metal Fabrication)	Plastic Injection Mold	Screw Machine
Tube Laser	Press Brake (Brake Press)	Other: Teacher approval
TIG Welder	Belt Sander	
Die Manufacturing	Manual Lathe	

2. Include the following in your presentation:

- Image (photo) of the machine.
- Explain an industry where the machine is used.
- Describe a product made by this machine in your state.
- Where is the product made in your state?
- Explain which portion of the manufacturing cycle this machine is used for (could be more than one focus).



ACTIVITY 3:

APPLYING THE MANUFACTURING CYCLE

Student Name: _____

SUPPLIES NEEDED:

- 1 square piece (5½ inches) of corrugated (tubes inside) cardboard
- 2 CDs
- 1 wooden skewer (kabob skewer)
- 1 or 2 rubber band(s)
- Duct tape – 2 feet
- Scissors
- Ruler

DIRECTIONS: *Divide students into groups of 2 – 4 people.*

DESIGN & DEVELOPMENT/PRODUCTION:

1. **Design & develop** a vehicle (use the materials to build a vehicle that can travel 3 ft).
2. Draw a sketch of the vehicle before you develop the **prototype**.
3. **Test** the vehicle (students can videotape this portion).
4. Modify the **prototype**.

ANSWER THE FOLLOWING QUESTIONS:

1. **Research & Market Analysis:** Who would you market this vehicle to? (age group, gender, etc.)
2. **Marketing:** Would you sell this product as a kit or fully assembled? Why? How will you promote the product?
3. **Distribution & Packaging:** How would you distribute your product? How would you package your product?
4. **Distribution:** In what stores or venue would you sell this product?



ACTIVITY 4:

TRUE/FALSE

Student Name: _____

1. _____ Manufacturing careers can offer opportunities to do work that saves lives, puts men on Mars, and creates our quality of life.
2. _____ For every \$1.00 spent in manufacturing, another \$1.37 is added to the economy.
3. _____ All manufacturing companies have thousands of employees working in large factories.
4. _____ There are less than 1 million manufacturing workers in the United States.
5. _____ Manufacturing careers require a four-year college degree to be qualified.
6. _____ Over the next decade, nearly 3.5 million manufacturing jobs will likely be needed to be filled.
7. _____ Manufacturing helps to support partnership with other countries across the world.
8. _____ It is impossible to earn more than \$60,000 a year in a manufacturing job.
9. _____ Manufacturing jobs require teamwork, problems solving, and technical skills.
10. _____ Manufacturing jobs don't exist in large cities.



ACTIVITY 4:

TEACHER KEY

Student Name: _____

11. T Manufacturing careers can offer opportunities to do work that saves lives, puts men on Mars, and creates our quality of life.
12. T For every \$1.00 spent in manufacturing, another \$1.37 is added to the economy.
13. F All manufacturing companies have thousands of employees working in large factories.
14. F There are less than 1 million manufacturing workers in the United States.
15. F Manufacturing careers require a four-year college degree to be qualified.
16. T Over the next decade, nearly 3.5 million manufacturing jobs will likely be needed to be filled.
17. T Manufacturing helps to support partnership with other countries across the world.
18. F It is impossible to earn more than \$60,000 a year in a manufacturing job.
19. T Manufacturing jobs require teamwork, problems solving, and technical skills.
20. F Manufacturing jobs don't exist in large cities.

ACTIVITY 5:

DISCOVER AMERICAN MANUFACTURING

DIRECTIONS:

1. Read the short article entitled, "6 Types of Manufacturing Processes and Where We're Headed with Them" by Ruth Seeley (<https://partprocurer.com/6-types-of-manufacturing-processes-and-where-were-headed-with-them/>).
2. Go to the company websites listed below and find the company you will be researching.
3. Identify at least one product the company makes/produces.
4. Determine which of the 6 manufacturing processes may be used by this company.
5. Do the same for the other companies listed.

Student Name: _____

AFC Tool

<https://www.afctool.com/>

BasTech

<http://www.bastech.com/>

Detailed Machining

<https://www.detailedmachining.com/>

French Oil Mill Machinery Co.

<https://frenchoil.com/>

Hartzell Industries

<https://www.hartzellairmovement.com/>

Henny Penny

<https://www.hennypenny.com/>

idX Dayton

<https://www.idxcorporation.com/>

Libra Industries

<https://www.libraindustries.com/>

McGregor Metalworking

<http://www.mcgregormetal.com/>

Noble Tool

<http://www.nobletool.com/>

NOV

<https://www.nov.com/>

Nuvasive

<https://www.nuvasive.com/>

Select

<http://www.select.org/>

Staco Energy Products

<http://www.stacoenergy.com/>

VIP Supply Chain Solutions

<http://vip-scs.com/>