

# ***Educator*** in the **OH-PENN** ***Manufacturing*** Workplace



**OH-PENN**  
MANUFACTURING COLLABORATIVE



**2013**  
**Lesson Plans**

## TABLE OF CONTENTS

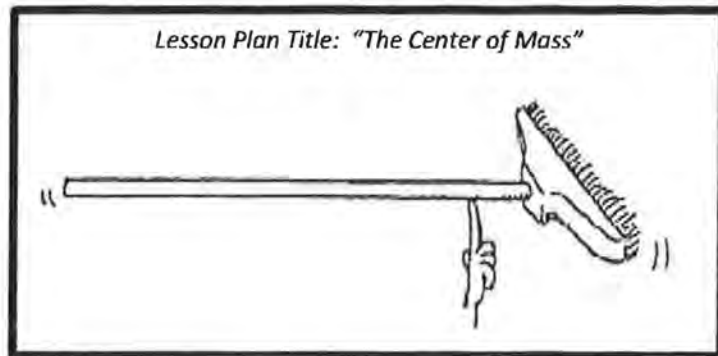
<b>EDUCATOR'S NAME</b>	<b>SCHOOL DISTRICT</b>	<b>SUBJECTS</b>	<b>COMPANY</b>
Joseph Barickman	Howland	Algebra/Calc/Programming	Starr Manufacturing, Inc.
Richard Black	Poland	World History	Clearview Architectural
Jaclyn Burke	Boardman	Physical Sciences	Gasser Chair
Rachael Camuso	Canfield	Inclusion Teacher	VEC, Inc.
Dean Conley	Canfield	World History/Global Policy	Specialty Fab, Inc.
Carrie Davis	Boardman	Algebra/Geometry/Calc	KTSDI, Inc.
Heidi Domhoff	Boardman	Algebra II/Geometry	Glunt Industries, Inc
Terri Fleming	TCTC	Pre-Engineering	BOC Water Hydraulics
Andrew Herman	Howland	Physical Science/Anatomy	Starr Manufacturing, Inc
Norene Kenyhercz	Youngstown	All Math	Specialty Fab, Inc.
Anthony Marafiotte	Campbell	Technology	Brilix Industries, Inc.
Jill Marconi	Poland	Math & Science	Specialty Fab, Inc.
Kathleen Masterson	Niles	Science	Taylor Winfield
Richard Minter	MIU4	Special Ed.	VEKA, Inc
Robert Morrell	Choffin CTC	Precision Machining	BOC Water Hydraulics
Mary Therese Olesky	Warren	Computer Tech/Careers	Ajax TOCCO
Janis Pentz	Youngstown	Integrated Social Studies	CMT, Inc
Megan Rodgers	Bloomfield Mespo	Science/Math/Computer	Taylor Winfield
Cami Schaubroeck	Christian Academy	Kindergarten	Heraeus
Marianne Sherwood	Commodore Perry	Integrated Math III/Calc	Joy Cone Co.
Steven Shurtleff	Boardman	English/Lit/Composition	Glunt
Sean Sich	Lordstown	Economics/US History	Butech Bliss
Todd Van Orman	TCTC	Engineering/Manufacturing	Butech Bliss
Tim Wensel	Canfield	Math/Algebra/Geometry	Specialty Metal

# Joseph Barickman

Howland High School  
Algebra II, Calculus, Programming  
Grades 10 - 12

Sponsored by

**STARR Manufacturing, Inc.**  
Dale Foerster - Vice President



*"I asked everyone, What could your math teacher have done to help you better prepare for what you're doing now?" The top two answers were:*

- *More hands on activities because that is when math makes sense*
- *More trigonometry*

*"For my computer programming classes I will try to include a lesson on CNC programming and CAD for my students who have an interest and aptitude for computers but do not want to be computer science majors. Also I feel an obligation to my students to try to educate them on what manufacturing opportunities are out there so that they can make a better informed choice about what they want to do with their futures."*

Joseph Barickman – Educator

*"We believe that we have been blessed with outstanding teachers who have gone beyond the requirements and made this pilot program a success we know will happen through their enthusiasm and expressed desire to share their experiences and new knowledge with their students and fellow students, administrators and counselors."*

Dale Foerster - STARR Manufacturing, Inc.



**STARR**

Manufacturing, Inc.



4175 Warren Sharon Rd.,  
Vienna, Ohio 44473-9524  
Ph: 330-394-9891, Fax: 330-394-9890

Email: Sales@Starrmfg.com,  
Web: www.Starrmfg.com

July 18, 2013

**Sponsor Name & Title:** Dale Foerster, VP

**Company Profile:**


Starr Manufacturing is a manufacturing, fabrication, assembly and machining company which produces custom industrial equipment and machinery for a diverse range of industries, with a core competence in medium to heavy industrial applications in markets related to energy (including coal, shale and oil), material handling, waste management and machine and equipment manufacturers. Starr currently employees approximately 70 team members.

**Business Sponsor's reflections on the Educator in the Manufacturing Workplace experience:**

We as a team and without exception have looked forward to the opportunity to have teachers intensively learning about what we do, skills we need, and enjoying hands-on experience in operations and in helping us to actually produce some of our product while they learn. We believe that the teachers are the key to bringing relevancy of the real world into the classroom and into helping to translate required curricula into real-world, applicable experiences with meaning for the students – and with an understanding of the new kinds of careers available in manufacturing, and the kinds of skills needed.

Our outstanding Howland High School teachers Joe Barickman (Algebra 2, Calculus, Programming), and Andrew Herman (Anatomy & Physiology, Physical Science) have surpassed our expectations! They have tackled each aspect of our business with gusto, numerous questions, and hands-on. They've talked with and gotten to know many employees personally, and have had open conversations with whatever is important to employees and to our educators' understanding of the manufacturing workplace. They have helped made parts, have assisted some of our most experienced employees on complicated assignments; and have, in just four too-short days for us (and probably too long for them), become one of 'us' – members of our All-Starr Team! We believe that we have been blessed with outstanding teachers who have gone beyond requirements and made this pilot program a success we know will happen through their enthusiasm and expressed desire to share their experiences and new knowledge with their students and fellow students, administrators and counselors. We hope that they will spread the word to other teachers, and that we can again have the privilege of hosting two more teachers next year. We believe that this program, borne out of thousands of unselfish volunteer hours by numerous persons in the education, manufacturing, workforce, service and other entities during the past two years, will help us reach our goal in matching education and training to great jobs, success for our citizens, and enviable quality of life for our Valley. We thank Andrew and Joe for taking time out of the 'free-time' summer. We thank everyone involved in this program for our privilege of being a part of this fabulous program – and we look forward to next year and to great results from our educators' experiences across our region! On behalf of everyone at Starr -

Sincerely,

  
Dale Foerster, VP



**Joseph Barickman**  
**Howland High School**  
**Algebra II, Calculus, Computer Programming**  
**grades 10 - 12**

**Starr Manufacturing Inc.**

My experience at Starr manufacturing was all encompassing. I was able to get an overall view of the manufacturing process and its dynamic. I was able to see the details involved in the work of individuals in almost every different task of the business. I was able to get involved in the manufacturing process myself. I was even able to be present for a presentation of an award to the company by the American Made Movie producers which included a speech by Congressman Tim Ryan.

There were several things that stood out from the experience. The most important skills that students need to learn to be successful in the manufacturing workplace are soft skills. If a person has a strong work ethic, is able to maintain good attendance, able to work and communicate with others, and have a willingness to continually learn, they can be successful in manufacturing. Without those skills they will fail. As far as hard skills in my area of mathematics and computers, trigonometry and reading manufacturing blueprints were always mentioned. Other essential math skills such as measuring with a ruler, converting from fractions to decimals, converting from decimals to fractions, converting from Metric to English measurements (and vice versa), area, volume, center of mass, and coordinate geometry were all used daily. Computer skills such as CAD (Computer Aided Drafting) and CNC (Computer Numerical Control) programming are in constant use. Being able to problem solve is a daily occurrence in the manufacturing workplace.

There were many things that I took away from the experience that I can use with my students. First of all, anything that can help teach a student work ethic, the importance of good attendance, how drug use can affect employability, the ability to communicate and work with others, and the importance of life long learning is more important than any hard skill. I asked everyone that I came in contact with "what could your math teacher have done to help you better prepare for what your doing now". The two top answers were "more hands on activities because this is when the math made sense for me" and more trigonometry. For my computer programming classes I will try to include a lesson on CNC programming and CAD for my students who have an interest and aptitude for computers but do not want to be computer science majors. Also I feel an obligation to my students to try to educate them on what manufacturing opportunities are out there so that they can make a better informed choice about what they want to do with there futures.

**Joseph Barickman**  
**Howland High School**  
**Algebra II, Calculus, Computer Programming**  
**Grades 10 -12**

**Starr Manufacturing Inc.**  
**4175 Warren Sharon Road**  
**Vienna, Ohio 44473-9524**  
**Dale Foerster, VP**

**Title of lesson plan:** Center of mass (Make it and balance it)

**Objective of the lesson:** To utilize a hands on activity to practice several concepts that the students should already be familiar with by the time they reach Algebra II, but may need to solidify (measurement with a ruler, angular measure with a protractor, Metric to English conversion, decimal to fraction conversion, fraction to decimal conversions), basic trigonometry as well as to use problem solving skills and teamwork to learn about a new concept (center of mass). It also gives them practice in reading a simple blueprint.

**Skills being utilized:** Metric to English conversion, decimal to fraction conversion (and vice versa), measurement skills(distance and angular measure), center of mass, problem solving skills, teamwork, and simple blueprint reading, Trigonometry also by using a more complex blueprint.

**Recommended teaching time:** 50 minutes

**Materials:** The students will need pre-made blueprint drawings containing 2 dimensional shapes with metric dimensions, light cardboard, scissors, rulers with English units only(accurate to  $1/16^{\text{th}}$  of an inch), pencils, compasses, and protractors. The teacher will need at least one, but preferably several markers and pens of various diameters which (when the caps are on) are flat on the bottom and the top.

**Body/Lesson/Activity:** Students are to break into groups of two. Each group is given a pre-made blueprint with a drawing of a 2 dimensional shape, a piece of cardboard, scissors, a ruler with English only increments, a protractor, and a compass. The students are to take the metric measurements from the drawing and convert them to English units so they can use their English only rulers. The blueprint will contain decimal measurements so that the students will not only have

to convert from Metric to English units, but must also account for the fact that the rulers will be in increments of 1/16th of an inch, so there will be decimal to fraction conversions (or vice versa) as well. They are then to take the cardboard and accurately create the shape using their English unit only ruler, protractor, and compass. Accuracy is important as this is what the students will be primarily graded on. After creating the shape the students are to problem solve and use whatever math they have learned in the past to try to accurately calculate the center of mass of the shape. The teacher will define what center of mass is before the lesson, however not explain how to find it. The students are then to put a mark on the cardboard shape at the point at which they calculated the center of mass to be at. The students will then compete to see who is closest to the true center of mass. This will be judged by the teacher who will use markers that have a flat top and bottom. The marker is placed on a flat surface and the students' mark on the shape for the center of mass is placed on the top of the marker to see if it balances. The smaller the diameter of the marker or pen that the cardboard shape balances, the closer the students are to the true center of mass. The students are to write a short explanation on how they calculated the center of mass. This will help provide practice for OGT style open response questions as well as help insure that the students had a method and did not just guess on the center of mass.

notes:

1. The teacher also has to watch that the students do not try to find the center of mass by balancing the shape on an object that they have with them like a pencil or by using their finger.

2. The teacher may need to give the students preliminary data that the students would not remember (such as 1 inch = 2.54 centimeter) or if preferred make the students look it up on their own.

**Conclusion:** This lesson should demonstrate to the students that workers in manufacturing need to know well a variety of math skills that they will use everyday (conversion, blueprint reading, measurement, and trigonometry). Also that they need to use problem solving and teamwork skills to tackle the unique problems that arise each day. (center of mass for example)

**Student Evaluation:** Students are to be evaluated on how accurate their cardboard models are in shape and size. They are also evaluated on their explanations of how they obtained their center of mass, however since this is a new concept, they are not expected to be exactly correct, only that they used sound reasoning. Optionally the students who have the closest point to the actual center of mass would get a small extra credit or reward.





# Richard Black

Poland Seminary High School  
World History  
Grade 9

Sponsored By

## Clearview Architectural

Michael Albright – National Sales/Project Coordinator

Lesson Plan Title: "The role of the US in the global economy and how it has changed."



*"My experience at Clearview was very interesting. Not only did I gain some useful insight and knowledge that I can use in my classroom, but also some life experiences I could share with students. I also gained insight on how global economics effects even small manufacturers here in the valley. Talking one day to the owner, he explained how labor unrest in Brazil resulted in a limited supply of a certain type of wood used to make fiber board from being exported to our country. The end result, Clearview could not prepare as much of this product for a while."*

Richard Black – Educator

*"Richard took part in hands on shop work and observed aerial window placement. It was a pleasure having him at our job site and facility. **Seeing him go from minor manufacturing knowledge to a full understanding of what we do was rewarding for everyone involved.**"*

Michael Albright – Clearview Architectural

# Clearview

ARCHITECTURAL



Michael A Albright

National Sales / Project coordinator

## Company Profile

Clearview is the industry leader in specialized window and trim architectural products. Founded in 1984, Clearview Designs Inc. produced custom windows and doors for private customer, builders, contractors, and eventually for the entire window and door industry. This success came with national recognition, including international media coverage in *The Wall Street Journal*.

In 1995, Clearview Designs became Clearview Window & Door Accessories. Envisioning a need for high quality custom muntin bars as well as curved and lineal trim for the architectural industry, Clearview and its founder, Richard Albright, began to concentrate in these fundamental areas. The name "Clearview", which was famous for its windows and doors, would soon become the industry standard in premium architectural products. The achievements of Clearview can be attributed to a clear vision of success, strong leadership, hard work, and patience. Clearview continually looks for new and innovative ways to provide its customers premium architectural accessories. It is with these qualities that Clearview will continue to achieve lasting success in the future.

## Reflections

Richard Black completed his educational 32 hours at clearview's manufacturing headquarters. He was able to experience in shop processes and off site final installation of the products manufactured here in Youngstown. Richard was able to witness first hand how architectural replication takes place. A current rehabilitation project in Youngstown located at 201 W. Federal St. Wells building allowed him to observe windows with historical significance removed, restored, and reinstalled . Richard took part in hands on shop work and observed aerial window placement. It was a pleasure having him at our job site and facility. Seeing him go from minor manufacturing knowledge to a full understanding of what we do was rewarding for everyone involved.

Michael A. Albright



7/2/2013



## **Richard Black**

Poland Seminary High School

World History

Grade 9

### **Clearview Architectural Products**

My experience at Clearview was very interesting. Not only did I gain some useful insight and knowledge that I can use in my classroom, but also some life experiences I could share with students. I say this because, unknown to me at first, the person I shadowed on my experience was a former student of mine. When I had him as a student he did not really take school very seriously. Now to see him as a leader and Project Coordinator at this small manufacturing business was very enlightening. Having him admit to me, "I wish I would have paid more attention in school", was refreshing. This is something I can use in the future. I also gained insight on how global economics effects even small manufacturers here in the valley. Talking one day to the owner of the company, he explained how labor unrest in Brazil resulted in the limited supply of a certain type of wood used to make fiber board from being exported to our country. The end result, Clearview could not prepare as much of this product for a while.

Seeing the overall process of what goes on day to day at Clearview, I can use this knowledge when discussing not only global economics in my class, but also the Industrial Revolution and problems faced by workers and employers then, and relate it to today's world. Students can now have a better understanding of the past and how it is still relevant to today's society.

## **Richard Black**

Poland Seminary High School

World History

Grade 9

### **Clearview Architectural Products**

730 Mahoning Ave., Youngstown, Oh 44502

Sponsor: Michael Albright: National Sales/Project Coordinator

**Title of Lesson Plan:** The role of the U.S. in the global economy and how it has changed.

**Objective of the lesson:** The students will be able to compare how the role of the U.S. has changed in the global economy.

**Skills being utilized:** Critical thinking skills

**Recommended teaching time:** One class period

**Materials:** Whiteboard/chalkboard, textbook, lecture notes

**Lesson:** The start of this lesson the students will be asked to recall how the Industrial Revolution in the U.S. impacted our role in the global economy. The students will then discuss how World War I helped the United States' role in the global economy. The students will then be asked to discuss how the Great depression affected global trade and how the United States played a role in this.

We will then fast forward to today. We will discuss what global trade means today and economic interdependence. We will discuss how Latin America, Africa, Asia, Europe, and the United States work together and depend on each other to make global trade succeed or fail.

From my experience in the Educator in the Manufacturing Workplace, I will discuss my interview with the owner of Clearview. From this interview, I will discuss with the class the current conditions in Brazil, and how the workers are demanding change. I will discuss how working conditions and wages are much different in Brazil than the U.S. I will then pose a question to the students:

**“How did European Colonialism and Imperialism in Latin America, during the Industrial Revolution play a role in what is going on in Brazil today?”**

**The students will have to draw upon prior knowledge of how Europeans used their militaries to keep Latin-Americans under control and how, they in turn, were not allowed to participate in their own governing during this time. Thus when Latin-Americans did get independence, the only way they knew how to keep control was to install military dictatorships. Today in order to get changes, workers and the people use violence to do this. Much like American and European workers did during the late 1800s and early 1900s. Furthermore we can discuss how labor unions helped American and European workers, and this example will illustrate how the lack of labor unions affects Latin-Americans.**

**The example I will use from my interview will be there is now a worldwide shortage of medium density fiberboard used in new building. Why, because the workers of a factory in Brazil demanded changes and when they didn't get them, they burned down thousands of acres of the trees used to make this fiberboard.**

**Conclusion:** The United States does not always have the dominant role in what happens in Global economics, like it once did.

**Student Evaluation:** The students' engagement in class discussions will be one way they will be evaluated. Later, the students can be evaluated in the form of an essay question on the test following the conclusion of the chapter.





# Jaclyn Burke

Boardman High School  
Physical Sciences  
Grade 9

Sponsored By

## Gasser Chair

James Elenz – Director of Operations



Lesson Plan Title: "Balloon-Powered Race Cars"

***What were the 3 most impactful things Jaclyn learned from this experience?***

- #1. There are so many people and jobs required to make a manufacturing company successful.*
- #2. Attendance and time management are critical soft skills needed to ensure that each day runs smoothly and that jobs get done.*
- #3. There are several levels of educational backgrounds and abilities, but all are needed and all are important for company growth.*

*I loved my experience. It gave me a new experience and above all ...THE MOST PRACTICAL CLASS I have ever taken. I will never look at sitting in a chair the same as I witnessed all of the parts, teamwork, time and assembly skills it required to make just one!"*

Jaclyn Burke – Educator

*"We were very happy to participate in the Educator in the Manufacturing Workplace Program and would be willing to participate in the future. We had a wonderful first experience with our educator Ms Jaclyn Burke. I hope she enjoyed the experience with our organization as much as we enjoyed having her with us."*

James Elenz – Gasser Chair

4136 Logan Way  
Youngstown, Ohio  
44505  
800.323.2234 toll free  
330.759.2227 fax

**gasser**

Gasser Chair Company, founded in 1946 by three Gasser brother in Youngstown, Ohio, is family owned business currently managed by second generation brothers. Gasser has been a manufacturer of high quality seating for the international hospitality and gaming markets for more than 67 years. We currently employ over 120 employees between our two manufacturing facilities and corporate office.

*Mission Statement - Delivering the ultimate customer satisfaction through quality at the source.*

It is encouraging to know that there are programs in the valley to better prepare the young adults by providing practical experience in the classrooms. We were happy to participate in the Educator in the Manufacturing Workplace program and would be willing to participate in the future. We had a wonderful first experience with our educator Ms. Jaclyn Burke. I hope she enjoyed the experience with our organization as much as we enjoyed having her with us.



James Elenz  
Director of Operations  
Gasser Chair

JACLYN BURKE

BOARDMAN HIGH SCHOOL

PHYSICAL SCIENCE: GRADE 9

<b>GASSER CHAIR COMPANY, INC.</b>		
<b><u>ADDRESS:</u></b> 4136 Logan Way Youngstown, Ohio 44505	<b><u>PHONE:</u></b> 800.323.2234 (toll free) 330.759.2227 (fax)	<b><u>BUSINESS CONTACT:</u></b> Jim Elenz <i>Director of Operations</i>

**SUMMARY:**

I had the pleasure of working for Gasser Chair Company, Inc. Gasser Chair is a family managed, international business that creates hospitality and gaming chairs for casinos, restaurants, offices, and homes worldwide.

As for my experience, I met with Gasser Chair employees July 29-August 2, 2013. My shift at Gasser started at 7:00a.m. and ended at 3:30p.m. Each day was different, yet every morning had the same structure. Starting the day, we would check on all the factory workers and production of chairs followed by manager and group leader meetings. At each meeting, needs of managerial and group leader staff members (from personal to supply needs) were discussed. Following meetings, I shadowed, assisted, and even supervised some jobs held by Director of Operations, Engineering Manager, Supply Chain Manager, Supply Purchaser, Stock Room and Fork Lift Specialist, Billing, Sales and Operations Supervisor, Dock and Transportation Coordinator, and Receiving Manager to name a few. All required essential soft skills such as communication, attendance, and time management as well as some hard skills in mathematics, measuring, and computers. This Gasser Chair plant employs close to 80 employees, and I was able to meet close to half of them from the CEO down.

I loved my experience. I will never look at sitting in a chair the same as I witnessed all of the parts, teamwork, time, and assembly skills it required to make just one! Even more surprising to me was all the different abilities and expertise required for each job along the assembly line - from welding, woods, and machine work to CNC programmers and upholstery. Go Gasser!

## TITLE: BALLOON-POWERED RACE CARS

### OBJECTIVES OF THE LESSON:

- Given an introductory activity, students will build cooperation skills to assist each other during car construction
- Given a group car project, students will create a balloon-powered car...
  - To promote kinesthetic learning by applying hands-on skills
  - To identify opposing forces and explain how Newton's Laws apply to classroom activities and everyday situations
  - To demonstrate their understanding of Newton's Laws, speed, measurements, and conversions in the construction and execution of their car.
  - To execute excel and emailing skills through write up of project

### SKILLS BEING UTILIZED/ELIGIBLE CONTENT:

- Inquiry, problem solving, development, pace and time management
- Prior knowledge of speed, conversions, Newton's Three Laws of Motion, and momentum

### RECOMMENDED TEACHING TIME:

- First Day: 50 Minutes
- Whole Project: 1 Week

### MATERIALS

#### • For the Teacher:

- Bulls-eye sheet
- Paper airplane paper
- Polling Everywhere Computer Questions
- Balloon-Powered Car Rules and Procedures Sheet, Rubric, and Report
- 9-inch Balloon
- Straws

#### • For the Student:

- Email account
- Excel Access
- Cell Phone
- Various other materials for car construction

### BODY/LESSON/ACTIVITY:

#### DAILY WARM-UP

#### QUESTION

- 3 Minutes

#### 1. Daily Warm-up

*Question: Using "Polling Everywhere," have students put in their codes to the tape measure question (Gasser Pre-Hiring Skills Assessment Test)*

#### OPENING

- 2 Minutes

2. **State the Day's Goal:** To demonstrate your understanding of class concepts by constructing a successful car model through use of hands-on, cooperative, and problem-solving skills.

#### EXPLORATION/

#### EXPLANATION

- 12 Minutes

3. Have students choose car partners and introduce project prior to today's lesson to allow students time to determine additional car materials.

4. **Bulls-Eye Activity:** Have students sit with their car partners side by side  
 a. **Purpose:** To promote cooperation, discuss the nature of science, assist each other's weaknesses, and learn the definitions of accuracy and precision and how they are used on the car project and in various jobs once leave high school - from manufacturing and construction to business and medical professions.

5. Discuss "Polling Everywhere" daily warm-up question and do some more questions pertaining to tape measures using additional questions from Gasser Chair "Basic Tape" Assessment to make sure all students know how to use and read a tape measure. Dependent on the assessment's result, further explanation and practice may be needed.



<p><b>ACTIVITY</b></p> <ul style="list-style-type: none"> <li>• 28 Minutes (today)</li> </ul>	<ol style="list-style-type: none"> <li>Students should already have materials present for today's construction.</li> <li>Begin car construction.</li> <li>Following car construction, students will develop and email me an excel attachment. Excel spreadsheet will include:             <ol style="list-style-type: none"> <li>Length and mass measurements of all parts</li> <li>Quantity of all parts</li> <li>Distance, Time, and Speed Columns (write formula for Speed Column using Distance and Time Columns).                 <ol style="list-style-type: none"> <li>Students will do three trials</li> </ol> </li> <li>Average Speed</li> <li>Conversion of average meters to miles</li> <li>Momentum of Car (use formula)</li> <li>Construct excel speed graph, labeling axes and determining slope (speed).</li> <li>Time for car assembly</li> <li>Rate of production if created 150 cars (volume/time)                 <ol style="list-style-type: none"> <li>Discussion elements based off rate:                     <ol style="list-style-type: none"> <li>Economies of Scale: Costs less when do more - meaning it will take longer to construct first car compared to fourth car (become more familiar with directions and part assembly when do more)</li> <li>Assembly lines are more effective - assembly is step by step specialization</li> </ol> </li> </ol> </li> </ol> </li> </ol>
<p><b>CONCLUSION</b></p> <ul style="list-style-type: none"> <li>• 5 Minutes</li> </ul>	<ol style="list-style-type: none"> <li>Begin clean-up of car construction.</li> <li>Ask students if they have any questions pertaining to the day's activity.</li> <li>Ask students to answer the exit questions, "What did we do today?" and "Why did we do it today?"</li> <li>Discuss tomorrow's class topic [car construction continued...] and remind them of announcements made in the opening pertaining to today's or the rest of the week's schedule.</li> </ol>
<p><b>SAFETY:</b></p> <p>Ensure that all students are displaying proper classroom etiquette. Watch out particularly for sharp objects (scissors, etc.) and hot objects (glue guns) used for car construction.</p>	
<p><b>ASSESSMENT:</b></p> <p><i>Informally:</i></p> <ul style="list-style-type: none"> <li>• I plan to circulate during group work so that I may listen to my students' discussions about the material during the lab. Additionally, I will ask them questions to either help clear up their misunderstandings or push them beyond their current levels of understanding if they seem to have a solid grasp of the material.</li> <li>• A majority of students will be able to explain their problems and potential solutions to the problems they've encountered during construction.</li> <li>• A majority of students (once have a working model) will be able to explain classroom concepts of Newton's laws and speed.</li> </ul> <p><i>Formatively:</i></p> <ul style="list-style-type: none"> <li>• Students will hand in their lab write-ups, which will be graded on accuracy.</li> <li>• Dependent on their mastery of Newton's Laws and Speed, all pairs of students must properly construct their cars to maximize the distance and speed traveled by their car.</li> <li>• A majority of the class must achieve an 80% or higher score on their test at the end of the week, which covers motion and forces.</li> </ul>	
<p><b>**Email me @ <a href="mailto:Jaclyn.burke@boardmanschools.org">Jaclyn.burke@boardmanschools.org</a> if you would like the attachments to this lesson**</b></p>	



# Rachael Camuso

Canfield Middle School  
Inclusion math  
Grade 6

Sponsored By

**VEC, Inc.**

Gina Pastella – Director of Strategic Engagement

*Lesson Plan Title: "A Welder's Week – Following Formulas & Patterns"*



*"Coming from public education throughout my career, I have not had a chance to experience how diverse a day's work can be within a company. I will also relay to my students that communication skills are very important—you have to be able to talk clearly and effectively throughout the day to a variety of different people, some face-to-face and some across the country. Lastly, I will focus more attention on incorporating more computer skills into my lessons so that my students are familiar with how technology can be an asset to their learning and eventually in their work day."*

*Rachael Camuso – Educator*

***"It is important for educators to be well-informed of the emerging career paths and the knowledge and skill-sets that students will need in business and industry. Rachael Camuso was very engaged in learning as much as she could during her time with us." Gina M. Pastella - VEC***



Rachel Camuso  
Canfield Village Middle School  
Inclusion Math  
6<sup>th</sup> Grade

VEC, Inc.  
977 Tibbetts Wick Rd., Girard, OH 44420

As I walked into the Tibbetts Wick Office at 7:00 A.M. on July 15, 2013, the first thing that I noticed was the company's mission statement and values that were posted on the wall. Almost every company has a mission statement, but most companies do not have their core values and behavioral values posted on their business's walls. "Faith, Family, and Community" as well as "Safety, Honesty, Integrity, Caring, Respect, Passion, Humility, and Gratitude" were not only stated on the walls, but impressively also a part of each of the employees. Every person I came into contact with was friendly, knowledgeable, and eager to assist me in any way that they could. Gina Pastella, Director of Strategic Engagement for VEC, Inc., was the first person that I met with. She provided me with a schedule for each day and introduced me to the Human Resources Department, where I spoke with Tricia Ferry, who showed me how she interviews perspective candidates. I was also introduced to Derek, the Safety Director, and he provided me with a shortened version of a safety orientation for new employees. Gina then took me to the Hubbard Office, where a subsidiary of VEC, Inc. is located. Evets Oil and Gas Construction Services is where I spent most of my job shadowing experience. I met with a variety of employees who showed me as much as they possibly could about the process of welding and what their jobs entailed. Every person that I spoke with showed me how they use math and computer skills on a daily basis. They also spoke very highly of the company that they work for—many workers stated that they cannot think of a better company to work for and that they were fond of the fact that VEC, Inc. was family and faith based.

On Tuesday, I was able to watch the welders weld together steel pipes at a 90 degree angle, while looking at take-offs from blue prints. I met the company's Corporate Chaplain, who comes to every office once a week to form relationships with the employees in hopes that they will come to him if they are struggling with a difficult situation in their personal lives. I visited the Hubbard Office's Tool Room, where I met with Brian Barnes, who tracks all of the company's tools by utilizing Microsoft Excel and a few employees. They must keep track of almost 10,000 tools that travel all over the United States to each of their job sites so that the company doesn't have to unnecessarily purchase tools that they already have or lose tools from one job site to the next. I was able to eat lunch and speak with the welders on that second day. They all stated that they wished they would have paid more attention in school, especially in their math classes. They also stated that they never realized before becoming a welder that they would use math skills, computer skills, problem solving skills, and communication skills on a daily basis.

On Wednesday, I participated in a variety of meetings and met with so many different people in order to learn about the different aspects of VEC, Inc. I was able to meet with Chad Less, who is one of the Construction Managers for Evets Oil and Gas Construction Services in the Hubbard Office. He spoke of the computer skills and math skills that employees needed, but also added that estimating is a skill that is definitely needed, but is difficult to find in employees. He told me about how welders who have a few years experience and are willing to travel can earn up to \$250,000 per year. Dominic Spelich, who is the Client Relations and Corporate Development Manager, was another employee that I was able to speak with. As he shared the many benefits and advantages of his job and the company, I could see the passion in his eyes about his role in the success of VEC, Inc. It was refreshing to meet so many people who love to go to work and enjoy the accomplishments of the company as a whole.

On Thursday, I was able to visit a job site in Kensington, Ohio, where welders and construction workers were working to finish a Gas Compressor Station. During the drive out to the job site, I saw miles of pipelines in Scio County and many other Gas Compressor Stations being built. During the last part of my day, I met with Gina Pastella for our debriefing meeting. I had so much to say about my experience and told her about how impressed I was with everyone and everything that I saw during my four days in the manufacturing workplace. It was an unforgettable and educational experience for me. This school year, I hope that my students gain knowledge and perspective through my job shadowing experience. VEC, Inc. is expanding so quickly that many of the employees are new to the company, but not new to the industry. However, it was an amazingly well-run company with knowledgeable and friendly employees, who are working towards the overall success of their company—VEC, Inc.



**Rachel E. Camuso**  
**Canfield Village Middle School**  
**Inclusion Math**  
**6<sup>th</sup> Grade**

**VEC, Inc.**  
**977 Tibbetts Wick, Girard, OH 44420**  
**Gina Pastella, Director of Strategic Engagement**

TITLE OF LESSON PLAN: **A Welder's Week—Following Formulas & Patterns**

OBJECTIVE OF THE LESSON: After learning and practicing math vocabulary terms, participating in a class discussion, and practicing following formulas, patterns, and calculations, students will calculate the weld inches that a team of welders completed in one week and then brainstorm why an oil and gas company (VEC, Inc.) needs to figure out weld inches per week for each job.

SKILLS BEING UTILIZED: Critical Thinking, Problem Solving, Vocabulary Acquisition, Math Calculations, Equations, Following Formulas, Math Reasoning

RECOMMENDED TEACHING TIME: two 45 min. periods or one 90 min. block

MATERIALS: ½ inch steel pipe (if available), rulers, paper/pencil, white board/markers, calculators, Class set of "Team of Welders and Number of Welds" Worksheets, Class set of "Formulas" Worksheets, Smart Board or Computer for pictures and video clips of welders welding pipes; Assessment Worksheet for next school day

BODY/LESSON/ACTIVITY:

1. With White Boards and Markers, students will review math vocabulary words and definitions that they already have been learning: diameter, pi, Psi (Pound-force per square inch), productivity, average, mean, Maop (Maximum Allowable Operating Pressure).
2. Practice with the students the formula for Psi and Maop. Show the students some pictures of pipe lines for oil and gas companies ([www.vecohio.com](http://www.vecohio.com)). Give them a few example numbers and the formulas and have them solve, using their calculators, on their white boards. Assist students as needed and review the correct answers on the teacher's white board.
3. Have the students analyze the numbers that they solve for during each example. Why would an oil and gas company, like VEC, Inc., have to have a lower maximum allowable operating pressure (Maop) when the pipe can actually withstand so much more pressure? Record the students' responses on Smart Board/White Board.

4. Pass out "Team of Welders and Number of Welds" Worksheet and "Formulas" Worksheet. Show students some pictures or short video clip of a welder welding a pipe together. Show the students the steel pipe that was welded by a welder at Evets Oil and Gas Company VEC, Inc. Allow students to share their stories and connections about welding (if they have any).
5. As a whole class, measure the pipe's wall thickness ( $\frac{1}{2}$  inch pipe) and the diameter of the pipe. Have the students record the pipe's wall thickness and diameter on their Worksheet. They will have to use these measurements in the formulas.
6. Have the students work in groups of two or three and figure out the weld inches that the Weld Team completed in one week. Use Calculators, Worksheet, and Paper/Pencil. (The students will first have to figure out total welds per person and then as a team. Make sure they are using the correct formula.)
7. When the students are finished with the calculations, have them list and discuss some reasons why VEC, Inc. needs to figure out weld inches and inches per welder for a job. Students will list their ideas on the back of their Worksheet.
8. Differentiation
  - a. Extension—Give students "Team of Welders and Number of Welds" Worksheet with some of the numbers blocked out so that they have to figure out the missing numbers. The total must be given and calculators can be used. Ask students to research on their devices how these formulas came to be. What are the formulas called? When were they created? How do they help welders and oil and gas companies?
  - b. Intervention—Give students "Team of Welders and Number of Welds" Worksheet with some of the totals per welder already figured out. Have the students find just the total of the entire Team of Welders. Make sure students are using the "Formulas" Worksheet that was given to the entire class.

**CONCLUSION:** Discuss the students' ideas for figuring out weld inches as a whole group. Record ideas on Smart Board/White Board. Have the students add to their lists as the discussion is going on.

**STUDENT EVALUATION:** Students will turn in their "Team of Welders and Number of Welds" Worksheet with calculations on the front and ideas listed on the back. The next school day, students will be given the corrected Worksheets back and asked to figure out and mathematically prove, "Which day is the most productive day for the Team of Welders?" They will also be asked to write a paragraph with this prompt: "Why do you think a job superintendent would want to have teams of welders who work well together and are the most productive?" They may use their corrected Worksheets and calculators to assist them in completing this assessment.



# Dean Conley

Canfield High School  
World History  
Grade 10

Sponsored By

## Specialty Fab, Inc.

David Hughes – Founder, Owner, President



*Lesson Plan Title: "Understanding Perspectives"*

*"As I sat in the weekly production meeting, it was easy to see that every member of the team was considered valuable and part of the decision making process. My experience allowed me to see all that is positive about a local American company. From supplying steel for Heinz Field in Pittsburgh, to helping create part of the new Oakland-San Francisco Bay Bridge, this company has a national reach. Specialty Fab, Inc. is also an integral part of fueling the Natural Gas boom by building the framework for local compression drills."*

*Dean Conley – Educator*

*What were Dean's most impactful take-aways from this experience?*

- *The pride within the company*
- *Everyone's willingness to work with me*
- *The wonderful opportunities that our local students will have in the future.*

**Dean Conley**  
Canfield High School  
([Dconley@canfieldschools.net](mailto:Dconley@canfieldschools.net))  
World History / Grade 10



**Specialty Fab Inc.**  
11950 South Avenue  
North Lima, Ohio 44452  
Dave Hughes, Owner

It would be obvious to anyone who has visited Specialty Fab Inc. that it is a family environment fostered by the owner, Dave Hughes. As I sat in the weekly production meeting, it was easy to see that every member of the team was considered valuable and part of the decision making process. My experience allowed me to see all that is positive about a local American company. This formula, although obvious to most, would be successful in any organization in any country in the world! And guess what? They're hiring.

During my time in North Lima, I was amazed at the exciting work that is being done by local American companies. From supplying steel for Heinz Field in Pittsburgh, to helping to create part of the new Oakland-San Francisco Bay Bridge, this company has a national reach. Specialty Fab Inc. is also an integral part of fueling the Natural Gas boom by building the framework for local compression drills.

Another critical lesson I am excited about sharing is that the experts of the steel industry still lie in the Ohio-West Virginia-Pennsylvania region. The institutional memory in our area is quite impressive, and even though we don't produce massive amounts of steel locally, people all over the world come to our valley for solutions in the steel fabrication industry.



## EDUCATOR IN THE MANUFACTURING WORKPLACE-2013

### Educator:

Dean Conley  
Canfield High School  
([Dconley@canfieldschools.net](mailto:Dconley@canfieldschools.net))  
World History / Grade 10

### Business:

Dave Hughes, Owner  
Specialty Fab Inc.  
11950 South Avenue  
North Lima, Ohio 44452  
<http://www.specialtyfab.com/>

EIMW LESSON PLAN: Understanding Perspectives

OBJECTIVE: Students need to demonstrate the ways that external forces (family, friends, electronic and print media, movies, textbooks, and teaching) can influence the way they perceive reality. Once understood, students need to research multiple sources to determine the actual reality, and confirm or question the status quo.

This lesson applies to all facets of life, however, it will be critical in understanding the current opportunities in the manufacturing industry. Most high school students don't see manufacturing as a viable profession in our area. It is true that we have seen significant demographic shifts since the 1970's, however, this lesson intends to disprove some of the local misconceptions.

STUDENT SKILLS: Critical-thinking was rated the most important skill employers were looking for in a December 2012 *Forbes* article. (Source: Casserly, Meghan. "The 10 Skills That Will Get You Hired In 2013". *www.Forbes.com*. 12/10/2012.  
<<http://www.forbes.com/sites/meghancasserly/2012/12/10/the-10-skills-that-will-get-you-a-job-in-2013/>>

Critical-thinking is defined as using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

RECOMMENDED TEACHING TIME: This lesson can range from 30-90 minutes. However, it could be stretched and/or revisited throughout the course, depending upon the importance placed on multiple perspectives and content limitations placed on the educator. I intend on introducing a similar lesson on the second day of class and then using this theme throughout my courses in order to get students to practice critical-thinking skills. I will use the local manufacturing industry as one of my case studies.

MATERIALS: The materials will depend on the amount of time allocated. I would think that this lesson can easily be completed with any range of primary source documents about a specific event or topic. Another option could be having students research credible sources in the computer lab (or dare I say phones) and discuss their findings. I've attached a simple diagram to help with defining and analyzing perspectives.

EVALUATION: This also depends on the time allocated for the lesson. I will use the reoccurring theme in my course—understanding perspectives. I will have students write perspective essays on preconceived notions followed by essays at the conclusion of the lesson. Finally, we will have discussions comparing what we have learned throughout the writing process.



# Carrie Davis

Boardman High School  
Mathematics  
Grades 9 – 12

Sponsored By

**KTSDI LLC.**

Vickie Soroka, Project Manager

Lesson Plan Title: "Estimation and Conversions Using the Metric System"

*"There was one common theme that came up in every conversation – use of and conversions involving the metric system and foreign currencies. Instead of just teaching basic conversions, I can give real life examples of when conversions will be used."*

*Carrie Davis – Educator*



*"Carrie Davis, our Educator in the Manufacturing Workplace, was very receptive to our input. She was enthusiastic and used her time wisely. Carrie was able to spend time with each department and observe our basic processes. In closing this has been a positive experience and we would welcome the opportunity to participate in the future programs."*

*Vickie Soroka, Project Manager*



801 E. Middletown Rd  
YOUNGSTOWN, OHIO  
44452 USA  
PH: 330-783-2000  
Sales@KTSDI.com  
www.KTSDI.com

Vickle Soroka, Project Manager

July 15, 2013

KTSDI LLC, established in 2007, started in a 12x13 spare bedroom with 2 employees specializing in heavy duty vehicle design. Today KTSDI LLC has 11 employees and occupies a 12,000 square foot facility on 6 acres. Our vehicle design efforts opened the door for KTSDI LLC to become the representative of 4 German companies in the North American market. They are Kessler (heavy duty axles), Mobil Elektronik (steer by wire and electronic sensors), Heyd (suspension components), and Neumeister (hydraulic cylinders). As representatives KTSDI's staff works with the Original Equipment Manufacturers (OEMs) in developing engineering criteria for custom components, as well as providing parts, service repair and warranty, and technical support for OEM's and end users.

Our mission is to provide quality service and products to our customers at a fair price and in a timely manner.

As a company that is experiencing rapid growth we welcome the opportunity to participate in the Educator in the Manufacturing Workplace program. We have found that today's employment applicants are poorly prepared for even entry level opportunities in our company. The deficiencies we see are Metric/Imperial conversion, basic concept of the relationship between a centimeter and an inch, reading a tape measure (also Metric/Imperial), and computer skills-like writing coherent e-mails.

Carrie Davis, our Educator in the Manufacturing Workplace, was very receptive to our input. She was enthusiastic and used her time with us wisely. Carrie was able to spend time with each department and observe our basic processes.

In closing this has been a positive experience and we would welcome the opportunity to participate in future programs.

Sincerely,

Vickle Soroka, Project Manager



**Carrie Davis**  
**Boardman High School**  
**Mathematics**  
**Grades 9 – 12**

**Business: KTSDI**

My experiences at KTSDI gave me the opportunity to observe many different types of workers. I spent time with the manager, an accountant, an engineer, the parts/service coordinator, sales representatives, IT specialists, mechanics, and even students from Germany and China in the midst of completing internships. Since the company is pretty small, with only eleven employees, I had a chance to spend one-on-one time observing and talking with each person.

There was one common theme that came up in every conversation – use of and conversions involving the metric system and foreign currencies. KTSDI works very closely with a few different European countries, the main one being Kessler Axles in Germany. They essentially handle all of the orders and service needs in North America for Kessler. While they do not actually manufacture the products, they do keep a lot of them in stock, and they also do repairs. Since the products that they are working with are manufactured in Europe, all of the measurements are in metric and prices are in Euros. The North American companies that they work with always give the necessary measurements in imperial, and KTSDI is responsible for making the necessary conversions to determine what parts are actually needed. The metric/imperial conversions are also necessary when servicing axels and other equipment since all of the parts are in metric, and the tools they use are based in the imperial system. In addition, when billing companies, they have to account for the fact that what they order from Kessler and other companies will be priced in Euros, and the conversion rate changes daily.

Overall, my time at KTSDI helped open my eyes to practical applications for the material that I teach each year. Instead of just teaching basic conversions, I can give real life examples of when the conversions will be used. In addition, I can help students truly understand the relationships between measurement systems and currencies so that they will have the ability to make accurate estimations, and really see the big picture.



**Carrie Davis**  
**Boardman High School**  
**Mathematics : Grades 9 – 12**  
*KTSDI*  
*801 E. Middletown Rd.*  
*Youngstown, OH 44452*  
*Ken Timmings, Manager*

**Estimation and Conversions Using the Metric System**

*Objective*

Students will learn to accurately estimate measurements and convert between metric and imperial measurement systems. These are necessary skills when working with equipment, parts, and tools that have been manufactured in other countries.

*Learning Targets*

**N.Q.1** : Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

**N.Q.2** : Define appropriate quantities for the purpose of descriptive modeling.

*Recommended Teaching Time*

Two class periods – approximately one hour and forty minutes

*Materials*

- Sets of household items and tools of various sizes
- Measurement list based on estimated lengths of household items and tools
- Interwrite Pad/Computer/Projector
- Ruler that has both centimeters and inches on the same side (digital version available with Interwrite software)
- “Classroom Scavenger Hunt” handout
- Chart of common conversion factors
- Example of completed Application Questionnaire for Axles (measurements in imperial)
- Blank Application Questionnaire for Axles (measurements in metric)

*Lesson*

**Day 1**

1. Break students into groups of three. Each group of three should have the same set of several household items and tools on their desks. Based on the items that you use, students should have a list of measurements they can choose from to estimate the length of each item. The measurements they have to choose from should be a mix of metric and imperial measurements. (10 minutes)
2. Engage the class in a discussion about their estimated measurements and the logic they used to make those estimations. (5 minutes)
3. Use a ruler that has both centimeters and inches on the same side (digital version with Interwrite software) to discuss the relationship between inches and centimeters. (5 minutes)

4. Take time to review both the metric and imperial measurement systems individually. Discuss how they are organized, how many centimeters are in a meter, feet in a yard, etc. (10 minutes)
5. Allow students to return to their groups of three and make any changes necessary to their original estimations. While students are working, walk around the classroom to make sure that each group has the correct estimations. (5 minutes)
6. Discuss example from manufacturing workplace with students: There are shelves and shelves of parts and tools in the shop. The boss is in the middle of fixing something and needs you to quickly get a 10mm piping piece for him. How can you use estimation skills to narrow down what you are looking for? (5 minutes)
7. Students will then work individually to complete the Classroom Scavenger Hunt. This will ask them to find objects in the classroom that are approximately a given measurement. Example – “Find something in the classroom that is approximately 10 cm long.” Collect these at the end of class. (10 minutes)

## **Day 2**

1. Review results from the Classroom Scavenger Hunt. Have rulers, meter sticks and yard sticks available for students to check estimations as a class. (10 minutes)
2. Remind students of the discussion the previous day about the relationship between inches and centimeters. Move from this into a lesson involving conversion factors and using proportions to convert measurements from metric to imperial and vice versa. (10 minutes)
3. Provide students with a chart of basic imperial to metric conversions. Then give them a brief introduction to the following scenario: A manufacturing company receives a request to build an axle, and all of the given measurements are in the imperial system. However, all of their parts are in metric – so they need to make the conversions before they can start building. Students can work in partners to complete the Application Questionnaire for Axles. Each pair should be given the Application filled out using imperial measurements. The blank copy of the Application asks for all measurements in metric. They need to convert each measurement required to fill in the blank metric Application. As they are working, walk around the classroom and observe strategies that students are using. (20 minutes)
4. Engage the class in a discussion of how they calculated the conversions necessary to complete the metric version of the Application Questionnaire for Axles. Collect the Applications before the end of class. (5 minute)

### *Conclusion*

The last five minutes of day two should be used to discuss the importance of metric/imperial conversions and estimations from a global perspective. Review the many applications, particularly in the manufacturing workplace, and the necessity of being able to compete with other companies in the world market.

### *Evaluation*

Formative assessment will be used when observing strategies and discussions while students are working in groups/pairs. The Classroom Scavenger Hunt and Application Questionnaire for Axles will also be used for evaluation.



# Heidi Domhoff

Boardman High School  
Geometry and Algebra 2  
Grades 10 – 12

Sponsored by

**Glunt Industries Inc.**  
Gary Shells – Corporate Manager



Lesson Plan Title: "Creating, Interpreting and Analyzing Scale Drawings of Two and Three Dimensional Objects"



*The pursuit of a career in skilled trades has declined over the years. I do not believe there is exactly one element that was the catalyst for this decline, nor can I identify all of these elements. **However, I do believe that by encouraging and enlightening our students about all of the opportunities available to them, we as teachers can dramatically impact this decline and consequently help strengthen our economy.***

*Heidi Domhoff - Educator*

# GLUNT INDUSTRIES, INC.

---

**Gary Shells**  
Corporate Manager

**MILL EQUIPMENT REPAIR SPECIALISTS**

7/10/13

Glunt Industries, Inc. I a large industrial repair facility specializing in refurbishment of steel and aluminum rolling mills. Our services include large machining, welding, assembly, and inspection.

Glunt was founded in 1971 by Harold Glunt. The company was taken over by his son Dennis Glunt in the mid 90's. In the early 2000's we employed approximately 70 employees doing approximately 10 million in yearly sales. We now employ 170 and do approximately 40 million in yearly sales.

Our mission statement is this:

We must deliver high quality, high value products and services to achieve unsurpassed customer satisfaction.

Our employees are the ultimate of competitive advantage. We must seek and develop the highest quality employees.

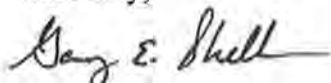
We must create an environment where our people are free to participate and develop to their full potential.

We must support open and honest communication at all levels.

We must aggressively improve and follow developed processes to be a high value, low cost producer.

My thoughts on the teacher sponsorship program are this. I believe it was a very healthy idea as more of the future graduates that may not be college material need to know that there are great jobs out there that may not require a college education. However these jobs will require training and they must strive to be the best in their field. If they are the best in their field they will always have employment. I believe these types of programs should be implemented more often and in more types of industries.

Sincerely,

  
Gary Shells



**Heidi Dombhoff**  
**Boardman High School**  
**Geometry and Algebra 2**  
**10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>**

**Glunt Industries**

The opportunity to submerge myself into a field where my prior knowledge was limited provided me with an enlightening and rewarding experience considering the fact that this may be the future career of one of my students. The thirty two hours spent at Glunt Industries was highly informative and provided me with an abundance of knowledge in regards to manufacturing, rebuilding and upgrading steel mill equipment. Glunt Industries was established in 1971 and currently operates three plants in Warren, Ohio. Through years of experience, the industry has learned how to remain marketable in a fluctuating economy. The machines that Glunt operates and the jobs that are successfully completed provide examples as to the uniqueness and value of the industry. I observed the operation of lathes and mills which accounts for most of the machines present at the plant, along with a large welding area. The item that consumes most of the machines time and makes Glunt Industries a significant sum of money is the repairing, upgrading and refurbishing of mandrels. A mandrel is a device that is used to coil and uncoil steel. The machines and employees at Glunt Industries spend an abundance time repairing mandrels for steel mills all over North America.

After interviewing and shadowing employees, plant and project managers, floor supervisors, inspectors, accountants, estimators and various other positions at Glunt Industries, I have manifested a solid foundation of respect for individuals who pursue a career in manufacturing. The pursuit of a career in skilled trades has declined over the years. I do not believe there is exactly one element that was the catalyst for this decline, nor can I identify all of these elements. However, I do believe that by encouraging and enlightening our students about all of the opportunities available to them, we as teachers can dramatically impact this decline and consequently help strengthen our economy.

After experiencing the field of manufacturing at Glunt Industries, the content in which I teach can be made more applicable to real world careers and skills that my students may pursue.

**Heidi Domhoff**  
**Boardman High School**  
**Geometry and Algebra 2**  
**10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>**

**Glunt Industries: 319 North River Rd. Warren Ohio, 44483; 330-399-7585**  
**Gary Shells, plant manager**

**Title of Lesson:** Creating, Interpreting and Analyzing Scale Drawings of Two and Three Dimensional Objects

**Objective:** (1) The students will be able to create a detailed scale drawing of two and three dimensional objects. (2) The students will be able to interpret the information presented to them through a scale drawing and create the represented object. (3) The students will be able to use the information presented to them through a scale drawing and manipulate the dimensions using their knowledge of ratios and scale factors. (4) The students will understand the real world applications of these skills and know the careers in which they are utilized.

**Skills/Eligible Content:** Common Core State Standards G-MG1 and G-MG3  
Modeling with Geometry G-MG

**Apply geometric concepts in modeling situations**

1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). □
3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). □

**Recommended Teaching Time:** To maximize the effectiveness of the lesson, plan to allocate two days covering this material.

**Materials:** Graph paper, isometric dot paper, rulers, compasses, 2-D objects, 3-D objects (wooden blocks, cylinders, triangular and rectangular prisms, pyramids, etc.), scale drawings, chalk/white board, overhead projector, writing utensil.

**Lesson: DAY ONE** The teacher will have materials organized and ready to distribute prior to greeting each student at the door. Once the students report to their seats in a timely fashion and daily attendance is recorded by the teacher, the students will be organized into groups of two. The teacher will determine the partnerships prior to the class period and make any adjustments due to absences. The students will be asked to rearrange their desks once they are told who their partner will be. They must sit next to their partner facing the front of the class. The teacher will distribute a single copy of a scale drawing to each group. Each group of students will be presented with a different scale drawing ranging from home blue prints to machining plans. The students will be given ten minutes to discuss with their partner what they can interpret from the scale drawing they were given. They will be asked what their drawing represents, how it can be used, who might use the drawing, and what details they notice. They can write their responses on a separate sheet of paper that will be verbally shared with their class. The teacher will display each individual scale drawing on the overhead projector so all students can

see the drawing. The group of students that were given the displayed drawing will be asked to answer the previous questions from their seats. The teacher will comment on each of the responses and add any pertinent observation if necessary. Once each scale drawing has been displayed and each group has shared their observations, the teacher will inform the students of the skills they will acquire through the completion of this lesson. The students will know exactly what ability they will have once the lesson has been delivered. The teacher will then discuss jobs, careers, trades and professions that may utilize the skills they are about to manifest. The teacher will explain to the students how the creation and interpretation of scale drawings can be used in various fields including that of machining and manufacturing providing specific examples from experiences at Glunt Industries. The teacher will display a scale drawing on the overhead projector and provide a detailed analysis of the drawing to the students. The teacher will explain exactly what information can be gathered from the drawing and how it is used. It will be explained that in many cases scale drawings are used to create objects. Also, it may be necessary for workers to use reverse engineering skills to create the scale drawing for an object that is in their possession. Finally, the teacher will explain to the students scale factors and how scale factors can be used to manipulate scale drawings. The teacher will present several example problems to the students simply manipulating scale factors of 2 and 3 dimensional objects. The students will be given homework problems to practice analyzing scale drawings and manipulating scale factors. **DAY TWO.** The students will be greeted at the door and report to their seats with their completed homework assignment. The teacher will review the homework assignment to be sure the students understood the information presented to them the previous day. The teacher will reiterate the material discussed the previous day. The teacher will demonstrate the tasks the students will complete in class at the front of the class using blocks and the chalk board. The teacher will demonstrate how to create scale drawings when looking at a 3-dimensional figure using rulers and compasses. The teacher will also demonstrate how to create a 3-dimensional object using blocks when looking at a scale drawing. Each student will be given 10 wooden blocks and a worksheet. The worksheet will require the students to work individually with teacher assistance to create 3-dimensional figures using the blocks based on scale drawings presented to them and devise scale drawings for 3-dimensional objects that are distributed to each student. The teacher will circulate the classroom monitoring student progress and work. The students will turn their worksheet in at the end of class. The students will be encouraged to ask questions at any point in time through the lesson.

**Conclusion:** Once all students have completed the assignment creating and interpreting scale drawings, the teacher will review once more the real world application of scale drawings emphasizing the areas in which these skills are utilized.

**Evaluation:** The students will complete a homework assignment on DAY ONE, followed by an in-class assignment on DAY TWO. The students will be assessed through hands-on demonstrations in regard to this material. The students will be asked to complete similar tasks as to what they completed in class as a formal assessment. Each student will work individually creating 3-dimensional figures based on a scale drawing and making scale drawings to represent objects presented to them.



# Terri Fleming

Trumbull Career and Technical Center  
Engineering Tech Prep Teacher  
Grades 11 & 12

Sponsored By

**BOC Water Hydraulics, Inc.**  
Todd Olson

Lesson Plan Title: "Valves and Fluid Flow"



*What were the 3 most impactful things Terri learned from this experience?*

- *The practical skills that are necessary in manufacturing*
- *The amount of math that is used on a daily basis*
- *The need for precision work – ok is not good enough*

*"I observed a collaborative workplace where management of the company values the opinions of ALL workers in the company.*

*While an understanding of math and science and their inner connectivity is crucial, more important are the soft skills of problem solving, communication, dependability and teamwork.*

***BOC is an outstanding example of an American Manufacturing Workplace."***

Terri Fleming - Educator





Water Hydraulics, Inc.

BOC Water Hydraulics is an OEM of water hydraulic systems for raw material and refineries industries. BOC is based in Salem Ohio with facilities in Chicago IL and Houston TX. Beginning in 1993 the company has seen continued growth to the multi-million dollar, 50 + Employee Company it is today.

As an MVMC founder, BOC continues to support the mission of re-building manufacturing in this area and this Country. We support the Educator in the Workplace initiative and hope it was successful in re-educating the teachers to what today's manufacturing looks like.

It was a pleasure to work with our two participants Bob Morrell and Terri Fleming. They were genuinely interested in bettering their perspective and were very diligent in the process. I believe they gained valuable insight and will be able to apply it.

Bob, being a Precision Machining instructor was able to see how CNC is used in our shop almost predominantly but not completely. Terry, as an engineering instructor was able to see the way in which we use 3D modeling and associated programs to better design our products and processes.

Thank You for this opportunity to contribute to the continuing education of our local educators and we hope to be able to participate in the future.

Best regards,

A handwritten signature in black ink, appearing to read "JDB", written in a cursive style.

jdb

**Terri Fleming**

**Engineering Tech Prep Teacher**

**Trumbull Career and Technical Center**

**Warren, Ohio**

**Manufacturing Site: BOC Water Hydraulics, Salem Ohio**

As a teacher, my experience is somewhat unique, as is my position. I am currently teaching the Engineering Tech Prep program at the Trumbull Career and Technical Center in Warren, Ohio. My undergraduate degree is a Bachelor of Science in Chemical Engineering degree from the University of Cincinnati and I have 15+ years experience in various fields of engineering, including manufacturing, construction, management, capital improvement, and environmental compliance. I have received my teaching license in Ohio under the alternative licensing process in Integrated Mathematics and Physics. Furthermore, I am a certified teacher for the Project Lead the Way Pathway to Engineering curriculum and have been accepted as a Master Teacher in this program. I am three classes from receiving my master's degree in interdisciplinary studies from the Rochester Institute of Technology.

I came into the program of Educator in the Manufacturing Workplace with somewhat of an attitude. While I appreciated the opportunity to meet new people – both educators and manufacturing personnel (networking is SO important) – I felt that I understood many of the skills currently being required in the workplace. I was basing this ASSUMPTION on the fact that I had been in the workplace from 1979 to 1996. While I teach my students not to assume but assemble facts, I failed to do this myself.

While I may have been in numerous manufacturing workplaces during the last 35 years, I have NOT viewed those workplaces through the lens of a teacher preparing students for the 21<sup>st</sup> century workplace. Nothing prepared me for what I was to learn at BOC. I observed a collaborative workplace where the management of the company values the opinions of ALL workers in the company.

BOC was founded by an engineer who believed in the stability of his design and left a lucrative position to follow that belief. His son joined the pursuit and has provided an additional dimension to the company that has allowed it to expand and become profitable. While an understanding of math and science and their inner connectivity is crucial, more important are the soft skills of problem solving, communication, dependability, and team work. BOC is an outstanding example of an American Manufacturing Workplace!

**Terri Fleming**  
**Trumbull Career and Technical Center**  
**Engineering Tech Prep**  
**Grades 11, 12**

**BOC Water Hydraulics**  
**12024 Salem-Warren Rd.**  
**Salem, Ohio 44460**  
**Todd Olson, President**

TITLE OF LESSON PLAN: Valves and Fluid Flow

OBJECTIVE OF THE LESSON: Examine the practical application of a simple machine (lever) to the application of valves and fluid flow.

**COMPETENCIES TARGETED IN THE LESSON:**

**Competency 89.1: Explain the basic principles of fluid mechanics.**

**Descriptors:**

- 89.1.1 Discuss the behavior of fluids, either at rest or in motion.
- 89.1.2 Identify fluids as being either liquid or gas.
- 89.1.3 Recognize common liquids and characterize them in terms of their physical properties (e.g., density, specific weight, specific gravity, viscosity).
- 89.1.4 Analyze the behavior of fluids as they flow through circular pipes, tubes and conduits with various shapes.
- 89.1.5 Explain the energy contained by the fluid based on pressure, velocity and position.
- 89.1.6 Account for energy losses and additions that occur as the fluid flows through many types of systems.

**Competency 87.1: Describe the importance of integrating individual machine elements into a more comprehensive mechanical system.**

**Descriptors:**

- 87.1.1 Define and explain the mechanical design process.
- 87.1.2 Explain the criteria for selecting components (e.g., gears, shafts, bearings, keys) that will be integrated into the final mechanical system.

**Competency 88.1: Explain the various manufacturing processes.**

**Descriptors:**

- 88.1.1 Describe the interrelationships between material properties and manufacturing processes.
- 88.1.2 Describe the manufacturing processes used to form materials into useful products (e.g., forging, extrusion, casting, forming, finishing).

**Competency 88.2: Demonstrate technical skills for manufacturing engineering technology.**

**Descriptors:**

- 88.2.1 Demonstrate machining skills (e.g., lathe, mill, drill press, surface grinder).

RECOMMENDED TEACHING TIME: 2 - 45 MINUTE PERIODS

#### MATERIALS:

This lesson can be presented in a stand-alone power point lecture. This would utilize only one forty five minute period. Hands on demonstration of the principles presented would take an additional forty five minutes.

#### BODY/LESSON/ACTIVITY:

Students often question the application of principles taught in science and math class. While nearly every science teacher has taught simple machines in their basic science classes, few can take the principle of the lever past the obvious "seesaw example". And while most students have seen or can understand the basics of a valve, few will connect the valve with the concept of simple lever. This lesson provides a bridge between these two primary concepts.

This lesson begins with a power point presentation discussing the fundamentals of the lever, a simple machine. This concept is extrapolated to fluid power and valve systems. Finally a simple "valve system" is constructed using different capacity syringes and tubing.

#### CONCLUSION:

Real world application of scientific and mathematical principles is presented and demonstrated.

#### STUDENT EVALUATION:

All pertinent materials will be provided upon request at [terri.fleming@neomin.org](mailto:terri.fleming@neomin.org).





# Andrew Herman

Howland High School  
Science  
Grades 9 – 12

Sponsored by

**Starr Manufacturing, Inc.**  
Dale Foerster, Vice President

Lesson Plan Title: "Manufacturing: When dreams and reality Collide!"

Lesson Objective: Student teams will understand and better appreciate the need for strong communication, teamwork, math, visual interpretation, measuring, estimating analytical troubleshooting, and problem-solving skills when manufacturing real items from other team's ideas.



*"STARR's unique project list is such that few jobs are ever duplicated. Therefore, every day every STARR worker is facing a brand new project and therefore must stay adaptable and ready to learn something new. **Every worker who thrives on the floor or in the office at STARR has to have one hard-soft hybrid skill in common: be a troubleshooting problem-solver.**"*

*Andrew Herman - Educator*

*"Our outstanding Howland High School teacher Joe Barickman and Andrew Herman have surpassed our expectations! They have tackled each aspect of our business with gusto, numerous questions and hands-on. We thank everyone involved in this program for our privilege of being a part of this fabulous program – and we look forward to next year and to great results from our educators' experiences across the region!"*

*Dale Foerster – STARR Manufacturing, Inc.*



**STARR**

Email: [Sales@Starrmfg.com](mailto:Sales@Starrmfg.com),  
Web: [www.Starrmfg.com](http://www.Starrmfg.com)

4175 Warren Sharon Rd.,  
Vienna, Ohio 44473-9524  
Ph: 330-394-9891, Fax: 330-394-9890

July 18, 2013

**Sponsor Name & Title:** Dale Foerster, VP

**Company Profile:**

Starr Manufacturing is a manufacturing, fabrication, assembly and machining company which produces custom industrial equipment and machinery for a diverse range of industries, with a core competence in medium to heavy industrial applications in markets related to energy (including coal, shale and oil), material handling, waste management and machine and equipment manufacturers. Starr currently employees approximately 70 team members.

**Business Sponsor's reflections on the Educator in the Manufacturing Workplace experience:**

We as a team and without exception have looked forward to the opportunity to have teachers intensively learning about what we do, skills we need, and enjoying hands-on experience in operations and in helping us to actually produce some of our product while they learn. We believe that the teachers are the key to bringing relevancy of the real world into the classroom and into helping to translate required curricula into real-world, applicable experiences with meaning for the students – and with an understanding of the new kinds of careers available in manufacturing, and the kinds of skills needed.

Our outstanding Howland High School teachers Joe Barickman (Algebra 2, Calculus, Programming), and Andrew Herman (Anatomy & Physiology, Physical Science) have surpassed our expectations! They have tackled each aspect of our business with gusto, numerous questions, and hands-on. They've talked with and gotten to know many employees personally, and have had open conversations with whatever is important to employees and to our educators' understanding of the manufacturing workplace. They have helped made parts, have assisted some of our most experienced employees on complicated assignments; and have, in just four too-short days for us (and probably too long for them), become one of 'us' – members of our All-Starr Team! We believe that we have been blessed with outstanding teachers who have gone beyond requirements and made this pilot program a success we know will happen through their enthusiasm and expressed desire to share their experiences and new knowledge with their students and fellow students, administrators and counselors. We hope that they will spread the word to other teachers, and that we can again have the privilege of hosting two more teachers next year. We believe that this program, borne out of thousands of unselfish volunteer hours by numerous persons in the education, manufacturing, workforce, service and other entities during the past two years, will help us reach our goal in matching education and training to great jobs, success for our citizens, and enviable quality of life for our Valley. We thank Andrew and Joe for taking time out of the 'free-time' summer. We thank everyone involved in this program for our privilege of being a part of this fabulous program – and we look forward to next year and to great results from our educators' experiences across our region! On behalf of everyone at Starr -

Sincerely,



Dale Foerster, VP

**Andrew Herman  
Howland High School  
Science 9-12**

First of all, the Foerstlers were incredibly generous and mindful of our presence and purpose. Joe and I were warmly accepted by everyone at STARR. I went into STARR without expectations, so that I could objectively appreciate what skills are required to thrive in a manufacturing workplace. However, after our orientation day, I became curious about the interplay between soft and hard skills to see which was more important in manufacturing jobs.

Overall, my experience at STARR left me with the pleasant impression that the workers with excellent soft skills were happiest in their roles and that the Foerstlers genuinely love most of their workers and take good care of them. I was pleasantly surprised to find a great amount of camaraderie and teamwork among the workers. "Without teamwork," it was pointed out to me by Marty, the quality control supervisor, "it would be impossible for STARR to maintain competitive high industry standards (ISO 9001:2008) as required by the petroleum industry. The workers seemed to be aware that their strong work ethics determine whether or not their jobs would exist in the near future.

In addition I came to a few other conclusions regarding the soft skills required to thrive and climb up the manufacturing job ladder. Approximately half of the workers in the air-conditioned office ("the good jobs") were occupied by workers who had proven themselves out on the plant floor. These men were no more or less qualified/certified than the rest of the workers but through hard work and determination caught the eye of STARR's leadership.

One man who currently works in the machine shop said he was approached after 1.5 years as a common laborer and asked if he was interested in further training paid for by STARR. It turned out his excellent attendance record and work ethic had been highly appreciated by his bosses. Clearly, soft skills made a huge difference in this man's manufacturing career. Nonetheless, I could sense that the Foerstlers are not enthusiastic to have to train and certify every good worker they find. They would much prefer to have the public schools use their tax dollars to send as many good workers as possible to trade and vocational career schools in the first place.

Most hard skills at STARR are technical and require extensive job-training and certification such as interpreting blueprints, programming PC software with blueprint data, fitting, measuring, cutting, drilling, bending, grinding, welding and machining metal. These skills are mastered through years of practice and a strong willingness to learn. Also, I noticed that most of the highest paid workers in the office had displayed excellent math skills either by attaining an engineering or accounting degree or by working their way up to the office from the floor. Still, every worker who thrives on the floor or in the office at STARR has to have one hard-soft hybrid skill in common: be a trouble-shooting problem-solver. Or as an experienced "fitter" Scotty Barbutes puts it, "My job is to put a square peg in a round hole all day long."

STARR's unique project list is such that few jobs are ever duplicated. Therefore, every day every STARR worker is facing a brand new project and therefore must stay adaptable and ready to learn something new.

**Andrew Herman**  
**Howland High School**  
**Physical Science 9<sup>th</sup> grade**  
**STARR Mfg Inc.**  
**4175 Warren-Sharon Road**  
**Vienna, Ohio 44473**  
**(330) 394-9891**  
**Dale Foerster – Vice President**

**Lesson Plan title: Manufacturing: When dreams and reality collide!**

**Lesson Objective (historical reasoning):** Science and applied science have always had to deal with the conflict between “theory and practice”. This lesson demonstrates why science has always been grounded by reality and the need for scientists to be pro-active problem-solvers.

**Lesson Objective (students’ skill utilized):** Students will understand and better appreciate the need for strong communication, teamwork, math, visual interpretation, measuring, estimating, analytical troubleshooting, and problem-solving skills when manufacturing real items from other people’s ideas.

**Recommended Teaching Time:** Two 50 minute class periods.

### **Materials needed:**

- 5 sheets of computer paper (sheet metal) per student
- 2 feet of yarn (steel rods/cables) per student
- 1 glue-on snap button (steel latch) per student
- 2 feet of scotch tape (bead of steel weld) per pair of students
- 1 ruler per pair of students
- 1 pencil with eraser per student

### **Procedure:**

**Part 1** Have students pair up with a partner and create a drawing of a sheet metal steel structure they would want to manufacture and sell. (NOTE: because each group will eventually swap drawings with another group it is important to have an even number of groups). The drawing should be as clear as possible including as many details as possible and all dimensions to the nearest 1/8". The drawing may include written instructions and notes for the manufacturers. (NOTE: students will not be making their own structures).

At the bottom right side of the drawing, each pair will place an estimation in minutes for how long it should take for the manufacturer to make a quality paper model of their drawing (creation).

**Part 2** Students will swap drawings with another group, procure needed materials, and begin to render the other group's drawing into reality as a paper model. Each group may consult with the originators of the drawing only three times after the swap is made.

**Part 3** After the model is completed; the model is returned to the originators for inspection of quality and measured for dimensional analysis. All dimensions of the structure must fit within an 1/8<sup>th</sup> inch tolerance or else it fails industry standards. However, each group is required to provide an assessment of overall model quality, essentially grading the manufacturer with a 1-10 number (10 being of the highest quality). In the end, negotiations between the two parties are recorded and summarized to discuss whether or not a business contract can be made. Discussions may include the amount of time (labor) required to make the model and therefore the estimated labor cost to manufacture the structure.

**Part 4** Have students write a one page essay reflecting on what skills they used during the manufacturing lesson and how it will effect how they approach school from here on out.

**Evaluation/Assessment:** Grades will be based 1/3 on student participation or effort, 1/3 on the quality rating given by peers and 1/3 on the reflection essay.





# Norene Kenyhercz

Youngstown City Schools – Juvenile Justice Center  
Mathematics  
Grades 7 – 12

Sponsored By

## Specialty Fab, Inc.

David Hughes – Founder, Owner, President

Lesson Plan: “Trigonometry and a Circular Base Plate”



*“From the president of the company to the student interns on the shop floor, everyone is treated with respect and their contribution is valued. There was a wealth of information pertinent to my subject area as each worker agreed that mathematics was in constant use. I came away with several ideas for real life lessons that I can bring to my students, putting to rest that well-worn question – “when will I ever use this?”*

Norene Kenyhercz – Educator

*“It was a pleasure having Norene Kenyhercz visit us. I believe she intends to expose the children to options other than college and explain the need for skilled workers not only to the children but also the parents.”*

David Hughes - Owner



# SPECIALTY FAB INC

11950 SOUTH AVENUE  
NORTH LIMA, OH 44452  
PH(330)549-1004 Fax(330)549-2004



**David Hughes**


**Founder, Owner, and President**

## **Company Profile:**

Specialty Fab, Inc. opened for operation in 1994. We are a welding and fabrication job shop that works with customer-supplied drawings to meet their exact specifications. We strive for a safe and clean work environment, continual improvement of customer satisfaction, and product quality with a commitment to our employees. We currently have 32 employees.

## **Business Sponsor's Reflection:**

It was a pleasure having Norene Kenyhercz visit us. She was very professional and I think that she has a firm grasp on the idea that there are great opportunities available for the children who choose a career in manufacturing. I believe she intends to expose the children to options other than college and explain the need for skilled workers not only to the children but also the parents. We are grateful for the opportunity to work with Norene and believe this project will be a great success.



Business Sponsor's Signature

7-11-13

Norene Kenyhercz

Youngstown City Schools – Juvenile Justice Center

Mathematics

Grades 7 - 12

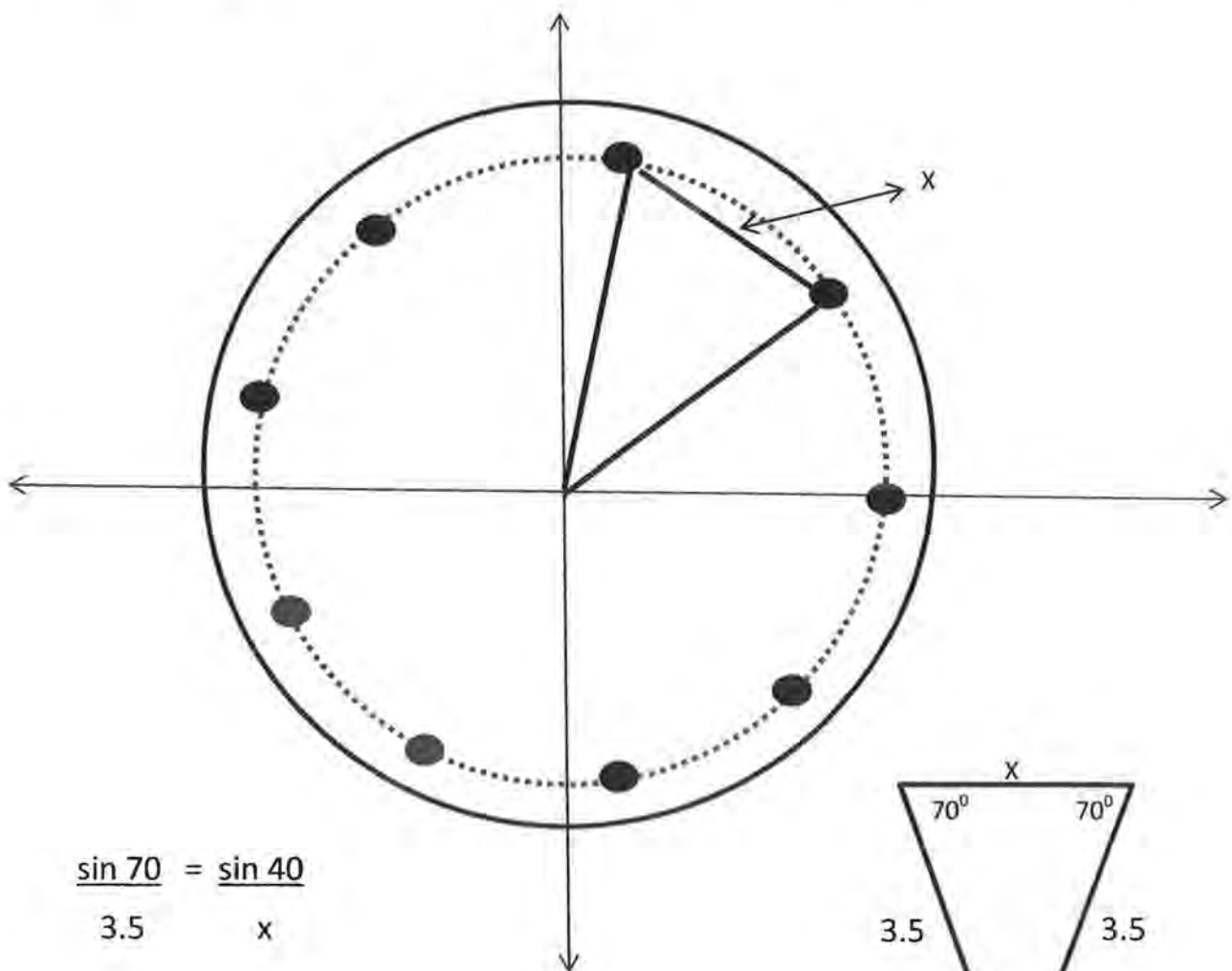
**Specialty Fab:**

Family. This is the prevailing feeling I had from the moment I walked in the door. This is a family. From the president of the company to the student interns on the shop floor, everyone is treated with respect and their contribution is *valued*. No workplace is perfect but this place comes very close. The requirements to begin working here are minimal. Students coming right out of high school are welcome to begin at the bottom as laborers and work their way up. Many of the employees I spoke with said they did just that. They have progressed to become welders, fitters, foremen and project managers with training provided on the job or paid for by Dave Hughes, the owner and president. Their walls are positively filled with awards, certifications, and honors. It is a relatively small shop of currently 29 employees and each one expressed gratitude for their job. Mr. Hughes is generous almost to a fault, active and supportive in his community and concerned personally for each employee. He also enjoys being on the floor, mentoring and teaching his new hires. Advancement is available but not required. There was a wealth of information pertinent to my subject area as each worker agreed that mathematics was in constant use. I came away with several ideas for real life lessons that I can bring to my students, putting to rest that well-worn question - “when will I *ever* use this?”

## Lesson Plan

Norene Kenyhercz Youngstown City Schools Business Name: Specialty Fab

This lesson plan came directly from the shop floor. I made a few modifications so that it could be done in a classroom. I adjusted the dimensions so that it would fit on a sheet of computer paper. I also changed the number of holes being punched just because I felt 12 holes were too many. I have the original blueprint from the shop for the project and I also have an original chart with chord length values that was given to me by the shop foreman. If anyone would like copies of these extra items you may contact me at [nknyhrz@gmail.com](mailto:nknyhrz@gmail.com). The lesson plan is on the next page, but the figure below is a representation of what a student's rough draft might look like. I estimated 90 minutes for this project but honestly have no idea. Obviously this time will be adjusted with experience! Also, students should be proficient with Law of Sines prior to beginning this project.



$$\frac{\sin 70}{3.5} = \frac{\sin 40}{x}$$

$$x = (3.5 \sin 40) / \sin 70 = 2.4 \text{ inches}$$



<b>Title:</b>	Trigonometry and a Circular Base Plate
<b>Objective:</b>	Use trigonometry to calculate chord lengths for a real life application
<b>Standards Addressed: (Common Core)</b>	<b>G.SRT.11</b> Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles. <b>G.CO.12</b> Make formal geometric constructions with a variety of tools.
<b>Recommended Time:</b>	90 min.
<b>Materials:</b>	Compass, ruler, computer paper, hole punch, scientific calculator, scissors (Hole punches and scissors can be shared)
<b>Prior Knowledge</b>	Writing and solving proportions using the Law of Sines
<b>Lesson</b>  Notes:	<b>TTW:</b> Pose the following scenario: The student is a fitter in a metal fabricating shop and has been given a project that requires punching 9 evenly spaced holes in a circular base plate. The base plate has a diameter of 8 inches and the holes must be punched 0.5 inches from the rim. This base plate will be used in the construction of freeway signage and must align perfectly with a corresponding bolt pattern. The first task is to create a template. <b>TSW:</b> Draw a rough sketch on notebook paper including the calculations for finding the proper chord length. The following requirements must be satisfied for approval: 1) Original circle is marked properly as 8 inch diameter 2) Inner concentric circle is marked properly as 7 inch diameter* (Student should be able to deduce this diameter from project instructions) 3) At least 2 points are place on the inner circle and triangle is shown using the two points and the center of the circle. The two sides of the triangle that are radii should be marked properly as 3.5 inches. The central angle should be marked properly as 40 degrees (Student should deduce this from project instructions). The chord length between the two points is the unknown. 5) The proportion using the Law of Sines and the correct solution must be shown. <b>TTW:</b> Approve the rough draft. The student will then receive the materials needed to complete the finished template. <b>TSW:</b> Complete the following 1) Proper construction with compass of circle with diameter 8 inches 2) Proper construction of concentric circle with diameter 6 inches. 3) Mark off the 9 points on the circle using the chord length from the rough draft. 4) Cut out original circle (8 inch diamter) 5) Punch a hole at each point.
<b>Conclusion:</b>	<b>TSW:</b> The student will test his/her template by laying it over the teacher's master master template. The holes and circles should align perfectly. <b>TTW:</b> Initiate discussion of tolerance and precision in manufacturing this base plate. Topics might include time involved in planning (time on the clock is money), what if a mistake is made, and does the customer require a particular precision. Show students an original blueprint of this project and chord length chart.
<b>Evaluation:</b>	This is a pass/fail activity. Passing credit is 10 points and requires that all steps are correct and student's template matches teacher's with a precision of within one-eighth of an inch. Student's who fail the first attempt will be given option of re-do (with different criteria) after school in my room. A successful second attempt will be given full credit. Failure on the second attempt will be given partial credit. *There is no "partial credit" on the manufacturing shop floor!!



# Anthony Marafiote

Campbell Memorial High School  
Technology/Business

Sponsored By

**Brilex Industries**  
Brian & Alex Benyo



Lesson Plan: "Sharp and to the Point"

Students will be assigned individual groups and will take turns at various workstations. Workstations will consist of the various aspects of manufacturing: such as estimating, sales, production, quality control, advertising etc.

*"My overall experience was outstanding. I now am able to integrate what I've learned into my lessons. Doing so, will allow my students the opportunity to experience what manufacturing is, has to offer, and the potential for their success in the field of manufacturing."*

Anthony Marafiote - Educator

TONY MARAFIOTE

Campbell Memorial High School

Technology/Business

8 – 12

BRILEX INDUSTRIES, INC:

My overall experience was outstanding. Brian Benyo, company president, had well thought out the 4 days to insure that I would be able to gain a meaningful understanding of what is involved in a manufacturing workplace.

Though my prior experience had prepared me for the experience, working with the estimators, seeing the computerized equipment, understanding the difficulties that arise, and speaking with the various employees gave me a greater understanding. I now am able to integrate what I've learned into my lessons. Doing so, will allow my students the opportunity to experience what manufacturing is, has to offer, and the potential for their success in the field of manufacturing.

I am very impressed with Brian and his brother Alex. These two gentlemen saw an opportunity to fill a void and seized it. They began, as many others do, taking baby steps into the arena. Many years later, they now have customers and potential customers coming to them because of their expertise, their quality, and their commitment to the industry.

While talking with their employees, I learned that Brian and Alex are not simply looking for a fat bottom-line. Rather, their employees have a genuine respect for how they are treated, the abilities of Brian and Alex, and the commitment the company has to them. To me, it speaks volumes to the type of individuals Brian and Alex are. I am glad to have had the opportunity to meet them and to get to witness the companies they are building.

**TONY MARAFIOTE**  
Memorial High School  
Technology/Business  
8-12

**BRILEX INDUSTRIES, INC**  
1201 Crescent Street – Youngstown, Ohio 44501  
BRIAN BENYO - PRESIDENT

**TITLE OF LESSON PLAN: SHARP AND TO THE POINT**

**OBJECTIVE OF THE LESSON:**

Students will be able to demonstrate proficiency in working collaboratively, applying math, language arts, and technology in producing a widget

**SKILLS BEING UTILIZED:**

Communication - both written and oral, Mathematical, Collaboration, Technological

**RECOMMENDED TEACHING TIME:**

5 – 50 minute class periods

**MATERIALS:**

12 dz - No. 2 Pencils; Student portable pencil sharpener; Electric pencil Sharpener; Computers with Internet access, student email accounts; word-processing, spreadsheet, and desktop publishing software; printer (preferably color); rulers;

**BODY/LESSON/ACTIVITY:**

Students will be assigned individual groups and will then take turns at various workstations. Workstations will consist of the various aspects of manufacturing such as: estimating, sales, production, quality control, advertising, accounting, supervising, computer IT, planning, quality control, and shipping.

Working in groups, students will be given scenarios as they work to acquire and fill orders for No. 2 pencils. Using computer resources, students will be required to market the company and its products and services to potential clients. This will



involve desktop publishing skills, written communication skills, and can include multimedia skills in producing TV and radio commercials and newsprint ads. Using spreadsheet software, students will track orders, invoicing customers, estimating orders for potential customers, production costs, track profit and loss, order capacities and time to completion. Using word-processing software and email, students will communicate with each other on various teams, with customers and potential customers, and with disgruntled customers. Using hand tools such as calculators, rulers, micrometers (optional), handheld pencil sharpeners, and electric sharpeners students will experience the mathematics involved in the production, inspection, and quality control of producing No. 2 pencils.

The success of this lesson is dependent upon the creativity of the instructor as each workstation needs to be designed to allow the student to fully experience all that is involved. This means, prior to teaching this lesson, each workstation needs have a written set of instructions, a clear set of objectives, a twist or two to create real life situations, and a clear set of outcomes – what are students supposed to remember, understand, accomplish, analyze, evaluate, and create.

Once students are assigned groups, it is important that the instructor works individually with each group to ensure students are successful.

#### CONCLUSION:

The overall goal of this lesson is to provide students with an opportunity to apply learned skills to real-life situations. Allowing for twists, turns, and competition will force students to all of Bloom's revised Taxonomy Domains.

#### STUDENT EVALUATION:

Evaluations for students will consist of rubrics to objectively evaluate subjective workstations such as desktop publishing, producing commercial, or newsprint ads. Rubrics will also be used to objectively evaluate written and oral communication skills. Spreadsheet printouts will be used to evaluate students at those workstations. A takeaway essay at the end of the lesson will be used to determine the overall success each student realized.



# Jill Marconi

Poland Middle School  
Math & Science  
Grades 7 & 8

Sponsored by

## Specialty Fab, Inc

David Hughes – Founder, Owner, President

Lesson Plan: "Safety in the Workplace and in the Science Lab"



*"My time at Specialty Fab was hot, dirty, loud and one of the best experiences of my teaching career. As a result of my involvement, I can identify two benefits. First, I have found ways to make real-world connections between manufacturing and my classroom. The second benefit of my participation in this experience is identifying well paying, high-demand jobs in our area that do not require a college degree."*

Jill Marconi – Educator

*"It was so nice having Jill Marconi here. She was very eager to learn everything she could that would help educate her students. Her enthusiasm was encouraging to say the least."*

David Hughes – Specialty Fab



# SPECIALTY FAB INC

11950 SOUTH AVENUE  
NORTH LIMA, OH 44452  
PH(330)549-1004 Fax(330)549-2004



**David Hughes**

**Founder, Owner, and President**

## **Company Profile:**

Specialty Fab, Inc. opened for operation in 1994. We are a welding and fabrication job shop that works with customer-supplied drawings to meet their exact specifications. We strive for a safe and clean work environment, continual improvement of customer satisfaction, and product quality with a commitment to our employees. We currently have 32 employees.

## **Business Sponsor's Reflection:**

It was so nice having Jill Marconi here. She was very eager to learn everything she could that would help her educate her students. Her enthusiasm was encouraging to say the least. We have been having trouble finding skilled employees. The number of applicants with the skills needed for fabricating has been declining for years. Jill intends to expose her students to options other than college and explain that there are good jobs out there for skilled applicants.

Business Sponsor's Signature

*David M. Hughes*

Jill Marconi  
Poland Middle School  
Science  
Grade 8

Specialty Fab

Participating in Educator in the Manufacturing Workplace has been a very rewarding experience. As a result of my involvement, I can identify two benefits. First, I have found ways to make real-world connections between manufacturing and my classroom. Next, I got the opportunity to learn about possible career options for my students. The following is a description of these benefits.

My time at Specialty Fab was hot, dirty, loud, and one of the best experiences of my teaching career. The entire workforce warmly welcomed me. Dave Hughes, the owner, gave me free reign to tour the building, take photos, and ask questions. The employees were very willing to answer my inquiries. They even gave me the chance to try my hand at welding and cutting steel with a torch. As a result of my experience, I have developed two lesson plans that will help my students make connections between the manufacturing workplace and the classroom. One lesson is about safety in the workplace vs. safety in the school science lab. The other lesson is about identifying different types of potential energy. I am looking forward to presenting these lessons to my students.

The second benefit of my participation in this experience is identifying well paying, high-demand jobs in our area that do not require a college degree. Although many of my students express interest in attending college, some want a different career path. The employees at Specialty have agreed to come talk to my students about career possibilities in the manufacturing workplace. I know my students will be interested in learning about these opportunities.

When participating in professional development, I hope to gain something that will benefit my students. This opportunity will provide my students with several benefits. I am looking forward to sharing what I have learned by them.

**Jill Marconi**  
**Poland Middle School**  
**8<sup>th</sup> Grade Science**  
**Specialty Fab, Inc.**  
**11950 South Avenue**  
**North Lima, OH 44452**  
**330 549-1004**

**David Hughes, Founder, Owner, and President**

**Title:** Safety in the Workplace and in the Science lab

**Lesson Objective:** Students will identify safety needs in the workplace and compare them to safety needs in the science lab. This will help students realize that safety is not only a consideration in the classroom.

**Skills Utilized:** Students will use critical thinking skills to identify the importance of safety in the workplace and the classroom. Students will collaborate to come up with classroom safety rules and a safety mission.

**Recommended Teaching Time:** 30-40 minutes

**Materials:** Prezi, science journals (for notetaking)

**Lesson:**

Lead students in a discussion about the importance of safety. Students will write a paragraph in their science journals about the importance of safety in the workplace and the classroom.



Students will get the opportunity to view several pictures taken at Specialty Fab. Students will identify safety concerns shown in each picture.

Students will work in groups to identify safety rules that are necessary in the science lab. Required rules will be revealed to the students.

As a result, the class will develop a set of safety rules to be enforced for the school year.

**Conclusion:**

Students will discuss how safety in the workplace and classroom are related. They will come up with a safety mission statement based on their learning.

**Evaluation:**

Students will write a reflection in their science journals to summarize their learning. Several days after the lesson, students will play safety bingo to help students self-assess their learning of the concepts in this lesson. Students will have a performance evaluation during the labs throughout the school year.



# **Kathleen Masterson**

Niles McKinley High School  
Special Education: English, Math, Science, Transition  
Grades 9 – 12

Sponsored By

**Taylor Winfield Technologies**  
Frank Deley – Vice President of Operations



Lesson Plan: "A Welding Brochure"

*"Educational needs for an employee at Taylor Winfield go well beyond the basic educational skills taught in the classroom. A complete understanding of scientific principles is vital. In addition, measurement skills are important. There is a need to convert metric and standard measurement because they deal with foreign companies. This opportunity was valuable and inspiring because it reminded me that the skills learned in school are necessary."*

Kate Masterson – Educator

*"It was an enjoyable 4 days educating the educators. We emphasized the need for mathematics and sciences at many different levels. I truly believe it was an eye opener for the educators and that manufacturing is very strong in our valley and provide very good jobs today."*

Frank Deley – Vice President Operations



TAYLOR-WINFIELD TECHNOLOGIES, INC.  
3200 Innovation Place  
Youngstown, Ohio, USA 44509  
330/259-8500 330/259-8538 Fax  
e-mail:

Frank Deley

Vice President Operations

**Company Profile:** Established in 1882 Taylor Winfield Technologies has been a world leader in design and manufacturing of material joining equipment and systems. We provide as an original equipment manufacturer all the engineering, assembly, wiring, testing and field service that a customer would require. In 2010 the company became part of the Brilex Group of companies even bringing greater strength and support to our company.

Our mission statement is "Our Customer's Success is our Success"

We presently have 90 employees under Taylor Winfield Technologies.

Our Offices are approximately 25,600 square feet and our Manufacturing facility is approximately 90,000 square feet.

It was an enjoyable 4 days educating the educators. (In my opinion 3 days would accomplish what is required) There was a lot of questions which I believe completely showed the interest they had in what we do. Our main goal was to explain how our company works from beginning to end. Also what type of individuals we are looking for to join our company. Explaining to the educators all the soft and hard attributes these individuals need to work here. We emphasized the need for mathematics and sciences at many different levels. I truly believe it was an eye opener for the educators and that manufacturing is very strong in our valley and provide very good jobs today. They realize our need for high level skills for our employees to keep us competitive moving forward.

Business Sponsor's Signature

A handwritten signature in cursive script, appearing to read 'Frank Deley', is written over a horizontal line.

Kate Masterson  
Niles McKinley High School  
Special Education: English, Math, Science & Transition  
Grades 9 – 12

Taylor Winfield Technologies:

Taylor Winfield is an outstanding company. Every employee went out of his or her way to make us feel welcome, especially Frank Deley, the Vice President of Operations. He set aside most of his week to personally introduce us to employees, explain their jobs, and discuss how each department fits into the organization.

The company uses an extremely large and complex flow chart to ensure the customer receives excellent service. It really shows how each department is dependent on the others to accomplish their goals. Attitude and cooperation are imperative qualities to have as well as good communication skills. Practically all of the employees have an engineering background which makes sense because Taylor Winfield is based on making machines to solve a problem for another company. The different departments need to be able to understand the big picture to collaborate. In most sales jobs, a salesperson would only have to know the product he or she is selling, but to work here sales needs a complete understanding of science and technology.

Educational needs for an employee at Taylor Winfield go well beyond the basic educational skills taught in the classroom. The company looks for people who know how to fix machinery, work hard, and take pride in their work. Many employees are farmers because they have those types of characteristics. A complete understanding of scientific principles is vital. Everyone there could rattle off intense theory as if it was nothing. In addition, measurement skills are important. There is a need to convert metric and standard measurement because they deal with foreign companies. The amount of knowledge need to work in this field is huge. It was a real eye-opener for me to learn that the science taught in school has practical use for people other than scientists and inventors.

This opportunity was valuable and inspiring because it reminded me that the skills learned in school are necessary. Hopefully, I can convince my students of this when they are learning scientific theories.

Kate Masterson  
Niles McKinley High School  
Special Education: Transitions I (grades 9-10)

Taylor-Winfield Technologies, Inc.  
P.O. Box 779  
Youngstown, Ohio 44501  
Phone: (330) 259-8556  
Frank Deley, V.P. of Operations

Lesson Plan Title: **Welding Brochure**

Objective: The goal of the Transitions I class is to help students prepare for life after high school. Employment options play a big role in postsecondary transition. The aim of this lesson is to build interest in skilled trades through an introduction to a career in welding. After viewing a video about welding and researching the field, students will produce a brochure presenting the benefits of this career.

Skills/Content Used: Students will understand and appreciate the importance of the welding industry by focusing on key points for a brochure. The lesson will use the following standards:

**Common Core Writing Standards OH.CC.W.9-10.**

*Text Types and Purposes*

W.9-10.2 *Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.*

W.9-10.2(a) *Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.*

*Production and Distribution of Writing*

W.9-10.4 *Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.*

W.9-10.5 *Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.*

**Ohio Content Standards Subject: Language Arts Grade: 9**

6.A. – *Formulate writing ideas and identify a topic appropriate to the purpose and audience.*

6.C. – *Use revision strategies to improve the style, variety of sentence structure, clarity of the controlling idea, logic, effectiveness of word choice and transitions between paragraphs, passages or ideas.*

9.C. – *Organize information from various resources and select appropriate sources to support central ideas, concepts and themes.*

9.E. – *Communicate findings, reporting on the substance and processes orally, visually and in writing or through multimedia.*

Teaching Time: 5 class periods



Materials:

- Mimeo or Smart Board
- computers
- *ASSIGNMENT* handout
- *EVALUATIVE READING* handout

Activity:

1. Show PBS video on welding

<http://www.pbslearningmedia.org/resource/ate10.sci.engin.systems.welding/welding/>

Source: Pennsylvania College of Technology/WVIA. Adapted from "degrees that work: Welding". Permitted use: Stream, Download and Share  
© 2009 WGBH Educational Foundation

2. Guide discussion of key points from the video and take notes on the board. Topics should include the following: *important uses, types of welding, process of welding, job outlook, wages, and training/skills needed.*
3. As a group, brainstorm questions people would have about a career in welding. Chart answers in a KWL diagram.
4. Explore the welding career overview at <https://ocis.org/>. Ohio Career Information System explains key points that can be used in the brochures.
5. In small groups, show students published brochures; direct their attention to layout design. Have them draw conclusions about the use of font style and size as well as placement of graphics, titles, and white space.
6. After students draw some conclusions about design, discuss their findings and make sure they consider purpose and audience. Point out how topic sections allow a reader to quickly find information.
7. Pass out the *ASSIGNMENT* handout, which describes the brochure and how it will be graded.
8. Demonstrate how to use the Read Write Think online interactive tool to create their brochures [http://www.readwritethink.org/files/resources/interactives/Printing\\_Press](http://www.readwritethink.org/files/resources/interactives/Printing_Press).
9. Ask students to produce a first draft of their brochures paying attention to length, coherence and design.
10. Arrange students in pairs, using the *EVALUATIVE READING* handout, have students give and receive feedback on their brochures.

Conclusion: After receiving feedback from at least one peer evaluator, have students review the criteria for assessment given in the *ASSIGNMENT* handout and create a final draft.

Evaluation: Based on the criteria from the *ASSIGNMENT* handout student may score up to 100 points in addition to 20 possible points for a thoughtful, complete peer evaluation.



# Richard Minter

Laurel High School Substitute  
New Castle School District Homebound Instructor

Sponsored By

**VEKA, Inc.**

Mindy Wilson – Corporate Benefits Coordinator



Lesson Plan Title: "Safety in the Workplace"

*"VEKA went to a lot of trouble to make my experience a good one and to make sure that I saw many parts of the business."*

Rich Minter - Educator

*"VEKA was happy to take part in the Educator in the Manufacturing Workplace Program and the employees who took part in the experience all had very positive things to say about the program as well as the educator assigned to our company. Rich engaged discussions with several managers regarding the types of skills they felt students needed to have in order to be successful in a manufacturing setting."*

Mindy Wilson – VEKA



VEKA, Inc. manufactures various PVC/vinyl extrusions for windows, doors, fences, and decks. The company's products include window and door profiles, color solutions, PVC profile systems, vinyl fence profiles, commercial window and door products, pro/cellular PVC decking products, railings, wood/vinyl windows, entry door systems, sliding door systems, and PVC construction technology solutions. It also provides research and development, marketing support, engineering, PVC extrusion, tool and die, training center, and customer call center services. The North American division was established in 1983 and its headquarters is based in Fombell, Pennsylvania. VEKA, Inc. currently has 538 North American employees and is experiencing continued growth. VEKA believes in thinking globally while acting locally and conducts a number of events throughout the year aimed at helping various community based charitable organizations.

VEKA was happy to take part in the Educator in the Manufacturing Workplace program and the employees who took part in the experience all had very positive things to say about the program as well as the educator assigned to our company, Rich Minter, from the Laurel School District. Rich seemed very interested in VEKA's processes and was amazed at how technical everything within the plant was. He really seemed to appreciate the amount of knowledge and skill required to run the various departments within VEKA. Rich engaged in discussions with several managers regarding the types of skills they felt students needed to have in order to be successful in a manufacturing setting.

Overall, everyone involved seemed to view the experience as very positive and would recommend the Educator in the Workplace program to other companies who may be considering it.

A handwritten signature in cursive script that reads "Mindy Wilson".

Mindy Wilson  
Corporate Benefits Coordinator

Richard Minter  
Laurel High School  
Substitute  
New Castle School District  
Homebound Instructor

Veka Inc

Veka is a major employer in Beaver County and I was able in my experience to find that they are very much interested in education. They went to a lot of trouble to make my experience a good one and to make sure that I saw many parts of the business. I did not think that I would be introduced to new things each day. The company employs around five hundred employees at this time and they are planning a six million dollar addition. This is all in preparation for a new company that they plan to start doing business with in the near future.

Mindy Wilson was my contact person and set up this experience. She was always available to take my calls and answer questions. Each morning she seen that I got to the person I was assigned to for the day. On day one I spent with Burton Grimes and learned about the extrusion machines. He took me on a tour and explained that he is in charge of the employees on the lines. He can move people around as he needs from one plant to the next at the Fombell location. On day two I spent with the plant manager Jim Weido and seen how he has a meeting each morning and they work out what machines are going to run what product. Each afternoon they meet again to determine what orders are complete and what ones will be finished by the morning. He informed me that this is a busy time of year for them and that they need to get more lines up and running. From these meeting he determines how they are going to work to complete the orders. He is in charge of the daily operations of the plant. Next came Ron Salkeld and he is in charge of Quality. You would not believe the number of checks these products go through to make sure it is a quality product. They are proud to have a major role in providing these services to big companies. He keeps track of all return and where they come from and the reason for the return. My last day was spent in the tool and dye department with Jim Berk and it was every bit as full as the other days. He also has the programmers in his area. He is in charge of seeing that any problems with the dye are taken care of immediately and he is on the ball when it comes to doing this in the most reasonable manner.

This company is very big in green as they regrind bad product and use it as the interior of fencing. They also have a 300,000- gallon storage area that they treat and reuse water. They have bins in different parts of the plant that are color coded so employees know what goes in what bin. This makes for a quick and easy method of reusing materials.

I would recommend this company for anyone looking for work. They make sure that the employees are trained before they ever make it to the line. It seems that good workers are promoted and have the opportunity to advance in the company.

Richard Minter  
Laurel High School  
Safety Education Grades 11 & 12  
Veka Inc.  
100 Veka Drive  
Fombell, PA 16123  
724-452-1000  
Contact: Mindy Wilson

### **Safety in the Workplace**

#### **Objectives:**

Students will be introduced to OSHA and NIOSH  
Students will be introduced to several business safety plans.  
Students will research two local companies' safety plans.  
Students will learn about company safety plan training.  
Students will create a safety plan.

#### **Skills Being Utilized**

Writing  
Organization  
Listening  
Computer  
Research

#### **Recommended Teaching Time**

Six 40 minute periods

#### **Materials**

Computers  
Smartboard  
Internet  
Local Companies  
Paper  
Pencils  
Chalkboard



### **Day 1**

The students will compare some local manufacturing safety training plans for employees. From the internet, the students will see and discuss local company safety plans. The individual will be given three days to find two local company plans and turn them in.

### **Day 2**

The students will try ear plugs, safety glasses, masks and other company safety gear. They will complete a list of any other required gear for the job. They will also talk about why a company would require these ideas.

### **Day 3**

We will use the internet and smartboard to look at government agencies that protect the worker. Examples of these agencies would be OSHA, the National Institute for Occupational Safety and Health, and the Family Medical and Leave Act.

### **Day 4**

The students will be divided up into groups of four and complete a safety kit for an imaginary company and they will complete a safety plan for this company. The kit must include if any medication is allowed, a checklist of all items that the company deals with, what training you will give your employees and how will you know that it meets all of the state and federal regulations.

### **Day 5**

Create a vocabulary list of all safety terms dealing with manufacturing.

### **Day 6**

Quiz

### **Conclusion**

We will have a quick review of the safety lesson.

### **Evaluation**

Evaluate the safety kits, evaluate the plans that they created from the two companies, and their classroom participation.



# Robert Morrell

Choffin Career and Technical Center  
Precision Machining 1 & 2  
Grades 11 & 12

Sponsored by

**BOC Water Hydraulics**

Todd Olson



Lesson Plan Title: "Conversational Programming"



*"The leadership was very knowledgeable and supportive towards their fellow workers. It was great to be part of this program and will help support added lessons in the classroom."*

Robert Morrell – Educator

*"Thank you for this opportunity to contribute to the continuing education of our local educators and we hope to be able to participate in the future."*

Todd Olson - BOC Water Hydraulics



Water Hydraulics, Inc.

BOC Water Hydraulics is an OEM of water hydraulic systems for raw material and refineries industries. BOC is based in Salem Ohio with facilities in Chicago IL and Houston TX. Beginning in 1993 the company has seen continued growth to the multi-million dollar, 50 + Employee Company it is today.

As an MVMC founder, BOC continues to support the mission of re-building manufacturing in this area and this Country. We support the Educator in the Workplace initiative and hope it was successful in re-educating the teachers to what today's manufacturing looks like.

It was a pleasure to work with our two participants Bob Morrell and Terri Fleming. They were genuinely interested in bettering their perspective and were very diligent in the process. I believe they gained valuable insight and will be able to apply it.

Bob, being a Precision Machining instructor was able to see how CNC is used in our shop almost predominantly but not completely. Terry, as an engineering instructor was able to see the way in which we use 3D modeling and associated programs to better design our products and processes.

Thank You for this opportunity to contribute to the continuing education of our local educators and we hope to be able to participate in the future.

Best regards,

A handwritten signature in black ink, appearing to read "JDB", written in a cursive style.

jdb

***Bob Morrell***

***Choffin Career and Technical Center***

***Precision Machining Instructor, 1 & 2, Grade 11 & 12***

***BOC Water Hydraulics Inc.***

***12024 Salem-Warren Rd.***

***Salem, OH 44460***

***330-332-4444***

***Contact Persons: Todd Olsen/John Burr***

*Summary of my Experience:*

To start with, my experience was not as breathtaking as many would be under the given circumstances due to the fact that I teach Precision Machining to junior and senior students at Choffin Career and Technical Center in Youngstown, Ohio.

Prior to teaching, I was employed at a variety of machining companies. I did experience the smoothness and knowledge that BOC employees displayed each day. Everyone had specific duties that resulted in success. I discovered that the CNC department chose to utilize conversational programming opposed to g and m coding. Also, they used all the same controls so that they could rotate from machine to machine.

The leadership was very knowledgeable and supportive towards their fellow workers. It was great to be part of this program and will help support added lessons in the classroom.



## **Lesson Plan Title: Conversational Programming**

### ***Objective:***

To introduce to second year Precision Machining students an additional popular method utilized in CNC programming, besides the traditional G coding, to support additional requirements in today's manufacturing , called Conversational.

### ***Skills Utilized:***

1. Knowledge of traditional G coding for comparison
2. Understanding of Blueprint Reading
3. Prior use of shop math skills and precision measuring tools
4. Use of the P.C.

### ***Recommended Teaching Time:***

Three days

Three sessions in related class room (120 min. total)

Three sessions in the lab (240 min. total)

### ***Materials:***

1. Note Book
2. Work Sheets
3. Scientific Calculator and charts
4. White Board/Smart Board
5. Sample work piece and solid block
6. CNC Machine
7. Required Cutters
8. Micrometers and Dial Calipers

### ***Activities:***

1. Discuss why Conversational programming is selected over traditional G coding
2. Research on the P.C. how Conversational is utilized
3. View selected sites on line and complete given worksheets
4. Based on the given drawing, calculate all cutter rpms and feed rates
5. Write a program based on the project blue print specs using the G coding method, then apply the Conversational method
6. Insert the program into the CNC control
7. Set the tool offsets and fill in all the required info
8. Dry run and verify program
9. Run the program

### ***Assignment:***

1. Design a basic part and manufacture using the Conversational method
2. Write at least a half page explaining the benefits of using Conversational

### ***Conclusion:***

After engaging with the Conversational method of CNC programming in the classroom,



# Mary Therese Olesky

Warren – Lincoln K8  
Technology & Careers  
Grade 8

Sponsored By

**Ajax TOCCO Magnothemic**  
Gregg Richley – Plant Engineer

Lesson Plan Title: "Careers in Manufacturing"



*"Math, reading and having a logical thought process to problem solve, was the resounding thing that everyone I spoke to said that students needed to be able to work the jobs that they were doing."*

Mary Therese Olesky – Educator

*"I found the Educator in the Manufacturing Workplace Program to be worthwhile and interesting. I would gladly participate in a program like this in the future."*

Gregg Richley – AJAX



Warren, OH  
Cleveland, OH  
North Canton, OH  
Albertville, AL  
Madison Heights, MI  
Longview, TX  
Ajax, Canada  
Shanghai, China  
Birmingham, England  
Hemer, Germany  
Tokyo, Japan  
Queretaro, Mexico  
Poznan, Poland

**Gregg Richley**  
**EHS Manager**

### **COMPANY PROFILE**

Ajax TOCCO provides the latest in induction heating, melting and forging technologies. Our proven applications include brazing, annealing, hardening, tempering, seam annealing, shrink fitting, curing, forging and melting.

Ajax TOCCO's promise is delivering high quality, technically advanced induction equipment that works right the first time. Our technical superiority is reflected in our highly skilled personnel, international reputation, modern facilities, technically advanced products, and a tradition of product innovation.

Ajax TOCCO's advanced technology is dedicated to the specialized needs of our customers. Serving the needs of a changing world, Ajax TOCCO has, since its founding, worked to teach the world how to put induction to work.

Ajax TOCCO currently operates 10 locations in North America as well as 6 international sites, employing over 1200 persons.

### **MISSION STATEMENT**

Ajax TOCCO Magnethermic Corporation, a world leader in induction heating and melting technologies, is in the business of helping our clients achieve their business objectives by delivering on time, quality, innovative designs, services, and equipment. Management of Ajax TOCCO Magnethermic is committed to meeting its business objectives by investing in talented, dedicated employees and always remembering the priority list: God, Family, and Work.

### **BUSINESS SPONSOR'S REFLECTION:**

I found the Educator in the Workplace program to be worthwhile and interesting. It was nice to see that school administrations are interested in the skills their students need to possess and that they included manufacturing in the discussion of this important idea. I would gladly participate in a program like this in the future.

BUSINESS SPONSOR'S SIGNATURE

A handwritten signature in cursive script that reads "Gregg Richley". The signature is written over a horizontal line.

1745 Overland Avenue N.E. • Warren, OH 44483 • 330-372-8511  
1506 Industrial Boulevard • Boaz, AL 35957 • 256-593-7770

Mary T. Olesky  
Lincoln K8  
Technology/ Careers  
8<sup>th</sup> grade

### Ajax TOCCO Magnothermic

My experience at Ajax was very memorable to say the least. The scope of things that they do at this manufacturing company was truly incredible and overwhelming to me, as a person who did not know what I was getting into. Gregg Richley, the Plant Engineer and EHS Manager, arranged for me to speak with and observe many individuals. He was so pleasant and accommodating. He gave me a tour of the plant and taught me all about Induction Heating, a very cool process, no pun intended. He talked with me about how they hire people and said that one of the problems with new hires is that “they don’t show up for work!” Getting skilled labor and having them able to pass a drug test is also a problem. Gregg is in charge of making sure all of the employees have safety training, so before I was able to go out into the plant I had to first, put on steel toed shoes. Then, I was given safety glasses, to be worn at all times. I was very disappointed that hard hats were not required as I was looking forward to wearing one. We did a safety training class, with some other workers that needed it, and then I was off to begin to understand what people in the field of manufacturing do.

The Warren Plant, the one I was at, has mostly skilled workers so I was just an observer. There were machinists, welders, pipe fitters, panel makers, engineers, bussers (one of my favorites), metallurgists, people who run lathes and drill presses, just to name a few that I was able to observe and talk to. Dave, a buss department group leader, was sand blasting when I first encountered him. He told me all about his job creating the bus fittings that go onto things that they build, like induction heaters. He works 10 hours a day, 6 days a week. He really likes his job and has been there “20 years or so”. He showed me the prints that he works from and how to read them. It looked like a foreign language to me, I kept saying “a ha” and nodding my head as he went into the technical aspects of how each job is different and everything has to be so precise otherwise it will cause problems where the machine that they are building would not work. I asked him “What do students need, to have a career in one of these skilled trades at Ajax?” He said “Math and comprehension skills and also, they need to problem solve.” Math, reading and having a logical thought process to problem solve, was the resounding thing that everyone I spoke to said that students needed to be able to work the jobs that they were doing.

What impressed me the most, in talking with all the workers that from the engineers to the cabinet makers, to the machinists and welders, to the person who creates the crate to ship the machines in, each person has a very skilled job that requires technical training or college degrees. I did not see a lot of young people, a few at best. Most of the workers have been there 20 years or more. Many that I talked with say they have kids, but that they didn’t want to weld or be a machinist, they like sports!

I was fortunate to see a special testing of a finished Heat-Treat Machine the second day I was there. How excited everyone was. There was a bunch of workers gathered around as well as engineers in suits and of course, the customer. There was a lot of picture taking and videoing going on. But what resounded out to me was the pride that was on each face as they looked at it, running just the way it was supposed to, each knowing they had worked together to make that happen.

**Mary Therese Olesky**

Lincoln K8

Technology/ Careers

8<sup>th</sup> Grade

**Ajax TOCCO Magnothemic**

1745 Overland Ave NE Warren, OH 44483

Gregg Richley, Plant Engineer

**TITLE OF LESSON PLAN:** Careers in Manufacturing

**OBJECTIVE OF THE LESSON:**

-The students will research/explore a career in manufacturing and write a summary paragraph/report including :

-A general overview of what the job entails

-The aspects they found interesting

-The students will understand the process needed to create a graph in MS Excel using data from the OCIS website ([www.OCIS.org](http://www.OCIS.org))

**(Applicable state standards)**

**Standard 4 Technology and Communication Applications**

**Benchmark B:** Develop, publish and present information in a format that is appropriate for content and audience.

1. Construct and publish information in printed and electronic form (e.g., printed reports)

**Standard 5 Technology and Information Literacy**

**Benchmark D:** Select, access and use appropriate electronic resources for a defined information need.

1. Select research databases that align with identified information need

**SKILLS BEING UTILIZED:**

-Computer skills: MS Excel, MS Word

-Research skills: Internet

-Language Arts: Reading Comprehension, Writing

**RECOMMENDED TEACHING TIME:**

-One week

**MATERIALS:**

Power Point on Manufacturing

Poster Materials: construction paper, colored pencils, glue sticks, magazines, scissors

Handouts: Grading Rubrics, Creating a Graph Directions

**BODY/LESSON/ACTIVITY:**

- I. Opening Bell activity every day: Log onto computers go to Time magazine website <http://nation.time.com/2013/06/27/the-4-am-army/> and read the introduction of the article The 4 A.M. Army by Michael Grabell. Write down any vocabulary they don't understand.
- II. Have a class discussion on the what they read and its relevance to their career paths



-go over vocabulary they didn't understand.

III. Introduce the unit "Careers in Manufacturing."

-show power point and video of induction heating

-talk about the assignment (create a poster which includes: title, paragraph, pictures, and graph) Go over the grading rubrics.

#### Day 2

I. Opening bell reading: The next section of The 4 A.M. Army by Michael Grabell...The Rise of "Temp Towns." Write down any vocabulary they don't understand.

II. Have a class discussion on what they read and go over vocabulary.

III. Log onto OCIS website and explore the careers in manufacturing and choose one to write a paragraph on.

IV. Open MS Word and begin paragraph. Save document on their server share.

#### Day 3

I. Opening bell reading: The next section of The 4 A.M. Army by Michael Grabell... "You Are Not Driving Goats." Write down any vocabulary they don't understand.

II. Have a class discussion on what they read and go over vocabulary.

III. Students will open MS Excel and the OCIS website. I will model how to create a graph using the wage data, from the website, of 6 major cities in Ohio. The students will then create a graph using the handout as a guide and they will also be able to work in pairs with the students next to them.

#### Day 4

I. Opening bell reading: The next section of The 4 A.M. Army by Michael Grabell... "A New Temp Ecosystem." Write down any vocabulary they don't understand.

II. Have a class discussion on what they read and go over vocabulary.

III. Have the students get the construction paper for the poster they will be creating and glue.

IV. The students will finish their paragraph and graph. When they are done they will print each document and glue it to the construction paper.

#### Day 5

I. Opening bell reading: The next section of The 4 A.M. Army by Michael Grabell... "A Temp Workers Bill of Rights." Write down any vocabulary they don't understand.

II. Have a class discussion on what they read and go over vocabulary.

III. The students will get magazines and search through them for pictures representing the career in manufacturing they chose.

IV. Create and print the title of the career they chose in MS Word. Paste it onto their poster.

**CONCLUSION:** In this unit the students will explore career options in the area of manufacturing. In creating a graph the students gain knowledge on how to organize data in a meaningful way.

Through differentiating my approach to include reading, visual presentations, students having the option of working in groups, class discussion, and handouts with graphic visuals, I believe all of my students can achieve the learning goals I have set for them. Creating a poster with the documents they have made will culminate the experience. I will laminate their work and display it in the hall showing the students that I value their hard work.

**ASSESSMENT:** There are three attached rubrics indicating the point value and standard of excellence that are required.



# Janis Pentz

Youngstown City School – Juvenile Justice Center  
Social Studies  
Grades 9 – 12

Sponsored By

**City MachineTechnologies**  
Claudia Kovach – Corporate Secretary



Lesson Plan Title: "Skills Shortage in the Manufacturing Industry"

***"I was very interested in getting a picture of a successful manufacturing worker in this 21<sup>st</sup> century environment. What I found was the necessity for basic math and reading skills. The ability to maintain a drug-free life, and a willingness to take direction, learn new things, and problem-solve."***

*Janis Pentz – Educator*

***"We think the program will produce good results. Oftentimes, students and even teachers have no idea of the great work opportunities kids have without going on to college."***

*Claudia Kovach – Corporate Secretary*



## CITY MACHINE TECHNOLOGIES, INC.



10005472 QM08  
ISO 9001

Corporate Offices  
773 West Rayen Avenue, PO Box  
1466  
Youngstown, Ohio 44501-1466

Electric Machinery Division  
825 M.L. King  
Boulevard  
Youngstown, Ohio 44502

Industrial Machine Division  
773 West Rayen Avenue  
Youngstown, Ohio  
44502

Lifting Magnet Division  
448 Andrews Avenue  
Youngstown, Ohio 44505

Office: 330-747-2639

FAX: 330-747-3205

[www.CMTcompanies.com](http://www.CMTcompanies.com)

E-mail: [mail@CMTcompanies.com](mailto:mail@CMTcompanies.com)

July 19, 2013

Jan Pentz, a high school social studies teacher from Youngstown City Schools, was invited to observe CMT the week of July 15.

Jan explained the inner workings of a school system, so we have a better idea of how students are taught. We believe this will be beneficial to the Mahoning Valley Manufacturing Coalition's efforts to increase the skilled trades workforce. Most of the students in Youngstown don't go on to college, so we need to start educating students early on about the opportunities they have even if they don't go to college.

We think the program will produce good results. Oftentimes, students and even teachers have no idea of the great work opportunities kids have without going to college. Skilled trades jobs in the Valley offer full-time careers with healthcare benefits, 401k plans and vacations.

It was nice that Jan had some manufacturing background prior to her teaching years. I think she appreciated the program more because she understood manufacturing and working in a factory-type setting.

**Janis Pentz**  
**Youngstown City School**  
**Mahoning County Juvenile Justice Center**  
**Social Studies 9-12**

**City Machine Technologies:**

City Machine Technologies is a city-based manufacturing company that produces huge electro magnets for industry and also rebuilds industrial motors for other companies.

My contact person was Claudia Kovach, the assistant manager and daughter of the owner. Ms. Kovach gave me a quick walking tour of the primary facility and introduced me to others in the office and to workers on the floor. Each worker that I met gave a detailed explanation of what their job duties entailed.

I then spent the remainder of the 4 days observing various workmen perform their duties. I spent 2 hours with each workman and asked questions about their backgrounds as well as asked questions about their duties. I was very interested in getting a picture of a successful manufacturing worker in this 21<sup>st</sup> century environment.

What I found was the necessity for basic math and reading skills. The ability to maintain a drug-free life, and a willingness to take direction, learn new things, and problem-solve.

I can now take this knowledge back to my classes and help my students prepare for the real world of earning a living in the 21<sup>st</sup> century. No longer can my students tell me I don't know what I'm talking about, I haven't been out of a classroom, etc.

I am extremely pleased with this experience and I feel this is one of the most useful professional development programs I have been involved in. I would like to thank CMT, Claudia Kovach, and the Educator In the Manufacturing Workplace program.

Janis Pentz

**Educator in the Manufacturing Workplace**  
**Manufacturing In Ohio Is the Future Lesson**  
***Skills Shortage in the Manufacturing Industry***

Preview time is 10 minutes + 10-15 minutes for discussion 30 minutes for Skype planned interaction.

**Lesson Objectives:**

1. To understand the skills required to work in a manufacturing environment.
2. To understand the earning potential for individuals working in manufacturing.
3. To understand there is a shortage of reliable manufacturing employees and the impact this shortage will have on the future of manufacturing in the Mahoning Valley, specifically in Youngstown..

**Key Points:**

1. Thirty percent (30%) of the manufacturing companies in Northeast Ohio will have difficulty finding skilled employees to replace employees who will be retiring in the next 10 years.
2. There remains a very high earning potential for highly skilled employees in the manufacturing industry.
3. Twenty-four (24%) percent of the jobs in Northeast Ohio are in manufacturing.
4. Manufacturing is the 8<sup>th</sup> largest industry in the world.

**Vocabulary:** (List of words with definitions to share with students prior to viewing this segment.)

1. Highly skilled - Individuals that are either formally trained (4 year college or technical college degree) and/or have many years of experience.
2. Earning potential- The amount of money someone should earn in their job.
3. Skill shortage- Employers cannot find job seekers with the expertise and ability level needed to be able to perform the job duties needed for their business. There is a mismatch with the workforce that there is high unemployment, however there are also many job openings. The problem is the people looking for work are unable to be hired because their skills do not match the basic requirements of the employer.



**Follow-up for students (and parents):**

1. The Business Journal (direct students to the Business Journal's website [www.dailybuzz.org](http://www.dailybuzz.org) for future reference) and/or bookmark
2. Career Cruising
4. School counselor
5. PIE/Chamber Industry Tours
6. Boys & Girls Club
7. After School Programs
8. Job Shadow
9. Youth Apprenticeship
10. Technical college in your area

I have already obtained a tentative date for a Skype call between my class and Claudia Kovach, assistant manager of City Machine Technologies.



# Megan Rodgers

Bloomfield Mespo  
Math, Computers, Science  
Grades 4 - 8

Sponsored By

**Taylor Winfield Technologies, Inc.**  
Frank Deley - Vice President Operations



*"Our main goal was to explain how our company works from beginning to end. Also what type of individuals we are looking for to join our company. Explaining to the educators all the soft and hard attributes these individuals need to work here."*

Frank Deley

Lesson Plan Title: "Discovering Sochi"

***"Manufacturing is not at all how I pictured it, nor is engineering. The engineers at Taylor-Winfield showed me what "real" electrical and computer engineers do and I think I would have liked it. This experience was very eye-opening and I'm excited to go back and share what I've learned with my students."***

*Megan Rodgers – Educator*



TAYLOR-WINFIELD TECHNOLOGIES, INC.  
3200 Innovation Place  
Youngstown, Ohio, USA 44509  
330/259-8500 330/259-8538 Fax  
e-mail:

Frank Deley

Vice President Operations

**Company Profile:** Established in 1882 Taylor Winfield Technologies has been a world leader in design and manufacturing of material joining equipment and systems. We provide as an original equipment manufacturer all the engineering, assembly, wiring, testing and field service that a customer would require. In 2010 the company became part of the Brilex Group of companies even bringing greater strength and support to our company.

Our mission statement is "Our Customer's Success is our Success"

We presently have 90 employees under Taylor Winfield Technologies.

Our Offices are approximately 25,600 square feet and our Manufacturing facility is approximately 90,000 square feet.

It was an enjoyable 4 days educating the educators. (In my opinion 3 days would accomplish what is required) There was a lot of questions which I believe completely showed the interest they had in what we do. Our main goal was to explain how our company works from beginning to end. Also what type of individuals we are looking for to join our company. Explaining to the educators all the soft and hard attributes these individuals need to work here. We emphasized the need for mathematics and sciences at many different levels. I truly believe it was an eye opener for the educators and that manufacturing is very strong in our valley and provide very good jobs today. They realize our need for high level skills for our employees to keep us competitive moving forward.

Business Sponsor's Signature

A handwritten signature in cursive script, appearing to read 'Frank Deley', is written over a horizontal line.

## Megan Rodgers

Bloomfield Mespo  
Math/Computers/Science  
K-5, 7/8

### **Name of Business:** Taylor-Winfield Industries

I had an absolutely fantastic week at Taylor-Winfield. The entire staff was very welcoming and friendly. As we went through each section of the business different experts discussed their areas with us. Each person we encountered took time to explain their job thoroughly – and it was clear they all loved what they do - and answered every one of our seemingly unending list of questions.

Manufacturing is not at all how I pictured it, nor is engineering. I was an engineering major for a short time in college but changed because I thought it was going to be all building circuit boards. The engineers at Taylor-Winfield showed me what “real” electrical and computer engineers do, and I think I would have liked it. It’s nice to see so many jobs in the area that are available for high skill levels. I think a lot of students feel they need to move to the big city to get good, high paying jobs.

After this experience, and another workshop I took this summer, I am determined to make my Science class more real-world based - A classroom where students don’t just “learn” science but that they actually “do” science. It seemed that a lot of the people we talked to learned their trade because somebody showed it to them, or they learned by doing. I was surprised to discover that there were even jobs at Taylor-Winfield that might even be considered “artistic”. Bending copper into the various shapes they need is indeed an art. These items must be handcrafted in much the way we would imagine a blacksmith of the olden days.

This experience was very eye-opening and I’m excited to go back and share what I’ve learned with my students.

**Megan Rodgers**  
Bloomfield Mespo  
Mathematics/Computers  
4<sup>th</sup>- 8<sup>th</sup> grade

**Taylor-Winfield**  
3200 Innovation Place  
Youngstown, OH 44509  
Frank Deley, Vice President of Operations

**TITLE OF LESSON PLAN:** Discovering Sochi

**OBJECTIVE OF THE LESSON:** Computer and Electrical engineers use “finite state automata” to tell a computer what to do. An example would be the touchtone menu you get when calling a customer service number. This activity will enable students to get a better idea of how these work by exploring the Olympic Village of Sochi Russia using a map.

**SKILLS BEING UTILIZED:**

Common Core Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
8. Look for and express regularity in repeated reasoning.

Computer Science/Computational Thinking

Simple Map Reading

Recognizing Patterns

Logic

Following Instructions

**RECOMMENDED TEACHING TIME:**

Approximately 1 period (45 mins)

**MATERIALS:**

The Sochi Olympics materials (and other resources) can be found on my page:

[www.bhsrogers.weebly.com/teach-sochi](http://www.bhsrogers.weebly.com/teach-sochi)

One Set of Venue Cards for Sochi & Demo set for Vancouver

Print out cards, fold in half, and glue so that the front has the venue and the back has the instructions.

Each Student will need:

Pen or Pencil

Sochi Olympic Map

You may want to do the main activity outside or in the gym for more space.

This activity can be done completely online as well using the above link.



#### INTRODUCTION:

You've won tickets to the Olympics! You know you don't want to miss the closing ceremonies. Before the Olympics start you want to find the best route to the Olympic Stadium so that you get there in time. There are shuttles at each of the venues that will take you to other places. Each venue has two departing shuttles – A and B, which you can choose to travel on. At each venue you may ask for either Shuttle A or Shuttle B (NOT BOTH). The volunteer at the venue will tell you where your shuttle will take you. Use your map to keep track of where you are going and which shuttle you have travelled on.

#### DEMONSTRATION:

Display the Vancouver Demo Map on the board. Have 3 students volunteer to hold each of the Demo Venue Cards. Starting at the Richmond Olympic Oval ask for (or click if using the online version) Shuttle A, you should be directed to Cypress Mountain. This time ask for Shuttle B, this will return you to Richmond Olympic Oval. Mark your routes on the map as you go. Try Shuttle B from Richmond, then choose Shuttle B again from Whistler. You should have a completed map at this point.

#### ACTIVITY:

Choose 7 students to be the Venues. These students will hold the venue cards and give instructions to the visiting students based on their shuttle requests. (Send students 1 by 1 so they can't overhear the answers)

Alternatively if you are in a 1:1 situation or computer lab, you can go to <http://bhsrodgers.weebly.com/discovering-sochi.html> and students can individually click through the various shuttle routes.

*Fast Finishers:* Challenge them to find the quickest route that allows them to visit all the venues. Or have them replace "volunteers" so that they also get a turn.

#### DISCUSSION:

What is the quickest route? What would be a very slow route? Some routes involve loops, can you find an example of this? Can you ever be in two places at once? Is it possible to get to the Jumping Center directly from the Skating Palace?

#### STUDENT EVALUATION:

Students will participate in the class discussion and turn in completed map with routes explained. They will also be able to apply what they have discovered to additional activities (posted on webpage). Students can also be asked to reflect in a journal or blog.

If you have questions or problems with the links please feel free to email me:  
bhsrodgers@gmail.com



# Cami Schaubroeck

New Castle Christian Academy  
Kindergarten

Sponsored By

**Heraeus Electro Nite Company**  
Brenda Scholl – Human Resource Manager

Lesson Plan Title: "Teamwork"

Students will be involved in team building activities and lessons to help them understand the importance of flexibility, reliability and accountability in daily life and eventually in the workforce.

*"I had the opportunity to meet people at all skill levels, ask questions and attend company meetings. Job skills that are lacking and should be taught in the classroom include: problem solving, respect, multi-tasking, attention to detail, pride in one's work and the understanding that what I do directly affects others. I had a truly great experience during my job shadowing."*

Cami Schaubroeck - Educator



*"Having Ms Cami Schaubroeck participate in the Educator in the Manufacturing Workplace Program was a great experience for us at Heraeus Electro-Nite. I believe both parties gained valuable insight into continuing to promote work in the field of manufacturing."*

Brenda Scholl – Heraeus

# Heraeus

Heraeus Electro-Nite Co.  
3 Fountain Avenue  
Ellwood City, PA  
Phone: (724) 758-4541  
Fax: (724) 758-4832

July 30, 2013,

Heraeus Electro-Nite has been at the forefront of sensor development, constantly expanding and improving the range of measurements available, resulting in today's sophisticated, reliable and easy to use disposable and non-disposable probes and associated instrumentation

Having Ms. Cami Schaubroeck participate in the Educators in the Workplace program was a great experience for us at Heraeus Electro-Nite. I believe both parties gained valuable insight into continuing to promote work in the field of manufacturing.

Should you have any further questions, please do not hesitate to contact me at (724) 758-4107.  
Thank you.

Sincerely,



Brenda J. Scholl  
Human Resources Manager



# Cami Schaubroeck

## New Castle Christian Academy: kindergarten

### Heraeus Electro Nite Company

I had a truly great experience during my job shadowing. I had never been inside a manufacturing plant before, so job shadowing in every area of the plant was both enlightening and interesting. I had the opportunity to meet people of all skill levels, ask questions, and attend company meetings. When my hours were completed, I felt as though I had learned more than I had even expected. I had a much better understanding of how a plant works and had a great appreciation for the many people who use their various talents to make this business such a success. The following is a list of the many things I “took away” from my experience. I was thrilled as to how many lessons and conversations I had that directly tied into my day to day classroom teaching.

- Change may be difficult, but is eminent for a growing company. There was a profound Chinese proverb in many of their company handbooks that said. This company has been busy acquiring new companies and change has been time consuming and grueling. Flexibility and growth are necessary for any of us who wish to succeed.
- Safety isn't just for kindergartners. Every aspect of a manufacturing job has safety at the forefront. Proper gear, training and inspection insure that no short cuts are made and that everyone is safe at all times.
- Heraeus is a global company. Employees have to have a global mindset. They have to accept diversity, be ready to travel, and adapt to the foreign standards. (ie: metric system)
- Ideal employees were described as: Learners, self-motivated, problem solvers, on time, respectful, communicators, possess positive attitude, excellent attendance records, flexible, and team players.
- Academic skills that I noted were: written and verbal communication (done professionally), spelling, legible handwriting, reading of graphs and charts, problem solving and inventing, measuring, converting, fractions, counting, multiplying, estimating, sequencing, logic and story problems. I noted these skills at nearly every skill level.
- Challenges are inevitable in a growing company. Employees who are not skilled socially have personnel problems that disrupt the work day. Poor work ethic and attendance is plaguing the workforce and causing dismissal of many young employees.
- Teaching, as observed by the men and women I spoke to, has become a task of “teaching for the test”. Job skills that are lacking and should be taught in the classroom include: problem solving, respect, multi-tasking, attention to details, pride in ones work and the understanding that what I do directly affects others.

Cami Schaubroeck  
New Castle Christian Academy  
Kindergarten  
Heraeus Electro-Nite Company  
3 Fountain Ave. Ellwood City, Pa. 16117 (724) 758-4107  
Brenda Scholl: Human Resource Manager

**Lesson Plan:** Teamwork

**Objective:** Students will be involved in team building activities and lessons to help them understand the importance of flexibility, reliability and accountability in daily life and eventually in the workforce. They will demonstrate how each person is important and how their actions affect the other team members.

**Skills:** Students will use the following skills: communication, cooperation, leadership, self-initiative, observation and problems solving.

**Recommended Teaching Time:** Approximately 45 min.

**Materials:** dominoes (several sets), puzzles (one for each team), story time book, large writing tablet/marker, glue sticks, colored paper strips

**Lesson/Activities:**

1. Teacher begins discussion with the class about teamwork. (What is it? Why do we need it.? When do we see it? Is it for adults, children, or both?)
2. Demonstrate how what we do on a team, greatly affects others/ both positively and negatively..... (use dominoes to make a trail; tapping one to cause the "domino effect") Discuss how when one fell, it tapped the next, clear down to the last one.



3. What if I moved a few of the dominoes? (remove 1 or 2) Students predict what will happen. Try domino effect again, noting what happened and why the line stopped. How does this apply to people?
4. Break students into small groups. Explain what it means to be a good team player. Make a list of "rules" for team involvement. Allow class to give most of the input.
5. Give each team a set of dominoes to try for themselves. Observe while they interact. After a few minutes or attempts, discuss how what you observed. (Did one person on the team do all of the work? Did someone get angry and knock the dominoes down?)
6. Give each team a second task. Provide a puzzle for each team. Hand out pieces to each member, but purposely leave a piece or 2 in the box.
7. Instruct students, as a team, to work together to put the puzzle together in so many minutes.
8. Observe as they discover there is a piece missing. What did they do? (Ignore it, look back in the box, or ask for help?) (There may be complaints of someone "hogging" all of the pieces or one person who has pieces but doesn't do his part.)

**Conclusion:**

Go back to the large tablet where the rules were written, and make a new chart of observations. Without using names, allow student to comment on what it's like being on a team and how they noticed it affecting the team as a whole. Also discuss what happened when a problem came up. How did they as a team solve it?

**Evaluation:**

Give students one more "task" and ask them to show that they have learned how to be a good team player. Put them in an "assembly line" with a craft to make to decorate the room. Each team will be assigned their own color. Each person will add a link to a paper chain. The last person finishes their team's chain and proudly displays it in the room.



# Marianne Sherwood

Commodore Perry High School

Math

Grades 8 – 12

Sponsored By

**Joy Cone Co.**

Colleen Chamberlain- Director of Human Resources

Lesson Plan Title: "Packing Problem"



What were the 3 most impactful things Marianne learned from this experience?

- Add Excel activities to my curriculum
- Encourage students who are not interested in college to pursue machine shop or fabricating careers
- Continue to require students to develop basic math skills and expand problem-solving skills

*"This program now gives our educators the experience to draw on that will assist them in helping students reach their potential through the use of real-world examples. Educators need to have a familiarity with the skills, both technical and soft, that students will need to be successful as they enter the working world. This program allows them the chance to learn what they teach is translated into the workplace."*

Colleen Chamberlain – Joy Cone



**Colleen Chamberlain**

**Director of Human Resources**

### **Company Profile:**

Joy Cone Company is the largest ice cream cone company in the world, baking the highest quality ice cream cones since 1918. We are a family and employee owned business with two North American facilities – Hermitage, PA and Flagstaff, AZ - employing over 550 between the two plants. Consumers in the United States, Canada, Mexico, Puerto Rico and the Caribbean enjoy ice cream in Joy Cone cake cones, sugar cones, waffle cones and waffle bowls.

Joy Cone Company is dedicated to its employees. The employees of Joy Cone Co. are integral to its continued success. The Company, in turn, pledges that all employees will be treated fairly, with respect and dignity. We pledge to provide all employees with a safe, clean and accommodating working environment. Joy Cone is dedicated to promoting from within in order to provide our employees career advancement opportunities. Last, but certainly not least, Joy Cone Company is dedicated to expansion and growth of the Company. This will provide opportunity and security for everyone involved with Joy Cone.

### **Business Sponsor's reflections on the Educator in the Manufacturing Workplace experience.**

Having the educator in our facility this week has been beneficial both to her and to our employees. Although most of our employees weren't sure what to expect, Marianne asked excellent questions that made the process go smoothly. Our employees learned more about themselves and their jobs, as well as what is necessary to be successful in their own positions, as I believe Marianne did. This has been an excellent opportunity for Joy Cone to "give back" to our community through education. This program now gives our educators the experience to draw on that will assist them in helping students reach their potential through the use of real-world examples. Educators need to have a familiarity with the skills, both technical and soft, that students will need to be successful as they enter the working world. This program allows them the chance to learn how what they teach is translated into the workplace.

*Colleen Chamberlain*

## **Marianne Sherwood**

Commodore Perry High School

Math

Grades 8-12

### **Joy Cone Company**

- Skills needed for office positions, machine and fabrication department, floor managers
  - Communication – verbal and written
  - Research and reading
  - Problem-solving
  - Basic math skills – computations with whole numbers, decimals, fractions, percents
  - Algebra skills – setting up formulas for Excel
  - Geometry skills – volume, area, angle measures
  - Trigonometry skills – right triangle and angles
  - Analyzing data to make decisions and predictions
  - Ability to use Excel
  - Initiative
  - Ability to work with others, ask questions, cooperate to solve problems
  - Willingness to learn
  - Good work ethic
- Time-management skills
- Management values workers who have a good work record
- Management is willing to advance workers who have college degrees
- Management is willing to advance workers who show initiative in their current jobs
- A student's attendance record and transcript are evaluated in the hiring process
- Workers who lack skills for a job but who show a willingness to learn can advance
- Philosophy is that anyone with intelligence and a good work ethic can be taught
- The first impression is important when applying:
  - Confidence
  - Eye contact
  - Solid handshake
  - Thoughtful answers
- The employees were very welcoming and willing to take the time to discuss their jobs and the skills that help them be successful.

Marianne Sherwood  
Commodore Perry High School  
Pre-Algebra – Grade 8  
Joy Cone Company, 3435 Lamor Road, Hermitage, PA 16148, 724-962-3422  
Colleen Chamberlain, Director of Human Resources

**Title: Problem Solving Activity: Packing Problem**

**Objectives:** Students will use problem solving skills and spatial reasoning to determine the number of pallets that can be packed in a rectangular prism.

Students will compare different approaches to a problem and explain why one of the approaches does not always produce the correct answer.

Students will write algebraic formulas to determine answers and apply the formulas to solve the problem.

**Skills/eligible content: Current PA standards:** M8.A.2.2.1 Solve problems involving percents.

M8.A.3.1.1 Identify, use and/or explain when it is appropriate to round up or round down.

M8.B.2.2.2 Calculate the volume of rectangular prisms.

M8.D.1.1.3 Determine the rule of a function.

M8.D.2.1.3 Determine the value of an algebraic expression.

M8.D.2.2.2 Write and/or solve an equation for a given problem situation (one variable only).

**PA Common Core Eligible Content** (Lesson will need to be used in a 7<sup>th</sup> grade class when new standards are approved.)

M07.B-E.2.3.1 Determine the reasonableness of answers in the context of the problem.

M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of right prisms.

**Teaching time:** 2 40-minute class periods (3 periods if students use Excel.)

**Materials:** Grid paper, regular paper, calculators (optional), Computer with Excel

**Background knowledge:** Students will need to know how to find the area of a rectangle, the volume of a rectangular prism, write ratios, determine percents, and write formulas.

**Body/lesson/activity:**

Introductory activity: Ask students how many 4x4 squares will fit into a 12x20 space. They cannot cut the squares or use fractions of squares. Allow students to work in groups to determine the answer. Calculators are optional. *(15 squares)* (2 ways to determine answers:  $Area = 12(20) = 240$  sq units;  $area\ of\ square = 16$  square units;  $240/16 = 15$  squares or  $12/4 = 3$  rows of squares and  $20/4 = 5$  rows of squares and  $3(5) = 15$  squares

After students determine the answer, have them draw the solution on graph paper. (trace a 12x20 rectangle and block of the 3x 4 rectangles.)

Discuss the 2 ways to find answers (Area/area or length/length x width/width and advantages of each technique.

Repeat with 4 x 4 squares and a 32 x 24 space. *(768 square units/16 square units = 48 squares or  $32/4 \times 24/4 = 8(6) = 48$  squares )*



- Repeat with 4" x 4" squares and a 15" x 23" space ( $345 \text{ in}^2 / 16 \text{ in}^2 = 21.5625$  which rounds to 22 squares based on rounding rules or 21 squares and some empty space or  $15/4 \times 23/4 = 3.75 \text{ squares} \times 5.75 \text{ squares} = 4 \times 6 = 24 \text{ squares}$  or  $15/4 \times 23/4 = 3.75 \text{ squares} \times 5.75 \text{ squares} = 3 \times 5 = 15 \text{ squares}$ )
- Have students discuss why there are multiple answers for the last problem. They should determine which answer is correct (15 squares). If necessary, they should draw a diagram using grid paper to illustrate the correct answer.
- Have students determine a formula for the number of 4" by 4" squares in a space that is L" x W".
- $(L/4) \times (W/4) = \# \text{ of squares}$  where L/4 and W/4 are rounded to the lower integer or "truncated".
- (Introduce the term "truncate" if students do not know it or use the Greatest Integer Function if students are capable of handling it.)

- Assignment:**
1. a. Find the number of 3" by 3" squares that can fit into a 27" by 15" space.  
b. How much space will not be filled?
  2. a. Find the number of 5" by 5" squares that can fit into a 27" by 15" space.  
b. How much space will not be filled?  
c. What is the ratio of the space that will not be filled to the total area ( $36 \text{ in}^2$ )?  
d. What percent of the space is empty?
  3. a. Find the number of 6" by 6" squares that can fit into a 27" by 15" space.  
b. How much space will not be filled?  
c. What is the ratio of the space that will not be filled to the total area ( $36 \text{ in}^2$ )?  
d. What percent of the space is empty?

### Assessment: Day 2: Problem Solving Activity

Discuss homework answers.

Assign task given below. Students should work in pairs or trios. The assignment can be extended another day to show students how to use Excel to solve the problem. This demonstrates the advantage of writing formulas and shows students how to "truncate" in Excel. (Use Truncate command or Integer command or Flooring function.)

**Task:** The inside of a delivery truck is 640 inches by 102 inches by 110 inches (LxWxH). You have to decide between packing your shipment in cases that are 40 inches by 40 inches by 30 inches or 50 inches by 50 inches by 40 inches.

- a. For each size shipping case, determine how many can fit into the truck.
- b. Determine the percent of wasted space for each size.
- c. Write a paragraph to your employer explaining which size shipping case you would recommend and why it is the best choice. In the paragraph, briefly explain how you determined your answer.

**Extension:** Suppose there has to be at least a 2 inch gap between the top of the truck and the top of the cases. The cases have to have a square base between 30 and 50 inches. The height of the cases has to be between 30 and 50 inches. What size case would give the lowest amount of wasted space in the 640"x102"x110 truck? Explain how you determined your answer.

**Day 3 – optional** – Show students how to enter information and formulas and create an Excel spreadsheet.



# Steven Shurtleff

Boardman High School  
English  
Grade 9

Sponsored By

**Glunt Industries, Inc.**  
Gary Shells - Corporate Manager

Lesson Plan Title: "Reverse Engineering of a Paragraph"



*"We spoke with lathe operators and machinists where we found out those operators who show the initiative and skill can operate a second or even third machine simultaneously. We noticed that many of the employees in a managerial or supervisory role had worked their way up from entry positions."*

*Steven Shurtleff – Educator*

*Gary Shells – Corporate Manager*

*"My thoughts on the teacher sponsorship program are this. I believe it was a very healthy idea as more of the future graduates that may not be college material need to know that there are great jobs out there that may not require a college education."*

# GLUNT INDUSTRIES, INC.

---

**Gary Shells**  
Corporate Manager

**MILL EQUIPMENT REPAIR SPECIALISTS**

7/10/13

Glunt Industries, Inc. I a large industrial repair facility specializing in refurbishment of steel and aluminum rolling mills. Our services include large machining, welding, assembly, and inspection.

Glunt was founded in 1971 by Harold Glunt. The company was taken over by his son Dennis Glunt in the mid 90's. In the early 2000's we employed approximately 70 employees doing approximately 10 million in yearly sales. We now employ 170 and do approximately 40 million in yearly sales.

Our mission statement is this:

We must deliver high quality, high value products and services to achieve unsurpassed customer satisfaction.

Our employees are the ultimate of competitive advantage. We must seek and develop the highest quality employees.

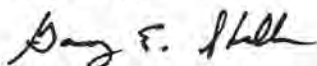
We must create an environment where our people are free to participate and develop to their full potential.

We must support open and honest communication at all levels.

We must aggressively improve and follow developed processes to be a high value, low cost producer.

My thoughts on the teacher sponsorship program are this. I believe it was a very healthy idea as more of the future graduates that may not be college material need to know that there are great jobs out there that may not require a college education. However these jobs will require training and they must strive to be the best in their field. If they are the best in their field they will always have employment. I believe these types of programs should be implemented more often and in more types of industries.

Sincerely,



Gary Shells

The first day at Glunt Industries began by meeting Gary Shells, the Corporate Manager. He walked us around the plant, one of three currently in operation. The North River Road plant that we visited worked primarily on mandrels and industrial repair for the Steel Industry. Depending on size and complexity, any given job may take from three weeks to three years to complete. There are usually 38 million dollars in jobs in the plant at any one time. We then met with Jim Heasley a Project Manager who follows jobs from the moment they enter the plant to the moment they leave. We followed him for a time as he checked in on jobs with machinists, the inspector, the welder and the detailer. We then transferred to Lee Nichols, the Shop Supervisor who walked us around giving us the opportunity to speak with individual workers on the floor.

Our second day began with Lee Nichols again. He explained that the company has its own repair department that services all of their equipment. We learned the difference between a Horizontal and Vertical Mill and how a Right Angle Head can allow them to perform even more efficiently. We spoke with lathe operators and machinists where we found out that operators who show the initiative and skill can operate a second or even third machine simultaneously. We then met Teresa, who sells cutters and tools to the plant. We then spoke with two estimators, both of whom were originally machinists themselves. We noticed that many of the employees in a managerial or supervisory role had worked their way up from entry positions.

Day three began by meeting the most interesting person we spoke with: Bill Heater, moralist, philosopher and Welding Foreman. He explained the different grades of steel and which specific gas was used with which metal. We then met with Pat Glunt, their I.T. engineer who advised employees to make themselves useful to their company so they will always have a job. This seemed to be the case with most of the workers we encountered during our time there. Most employees sought additional training, learned on the job or improved tools and means of manufacture.



Steven J. Shurtleff  
Boardman High School  
English: Freshman  
Glunt Industries Inc. 319 North River Road N.W. 330.399.7585  
Gary Shells: Corporate Manager

### Reverse Engineering

**Objective:** For students to be able to identify the component parts of a paragraph as well how those parts function. To learn how to engage in close reading of a nonfiction text. Determining an author's explicit meaning, as well as inferences drawn from the text. Determine the central idea of the text and analyze how it is shaped and refined by specific details.

**Skills Utilized:** Close Reading of Nonfiction Texts, Participating in Whole Class Discussions

**Recommended Teaching Time:** 30-60 minutes

**Materials:** News Article or Short Essay

**Lesson:** Several times throughout my visit at Glunt Industries, I heard the term reverse engineering. Often times they receive a part to be repaired with all of the original schematics to enable the inspector to determine what repairs are needed. Some customers also include pictures and explanations as to how the part works. However, more often than they would like, the part arrives with either archaic and indecipherable schematics, out of focus pictures or simply no explanation at all. The employees at Glunt must then reverse engineer the part, figuring out for themselves how the part works and what repairs are needed to fix the piece or if needed, how to manufacture the part from scratch. Another statement that I heard throughout the shop that is of vital importance was that the workers should get to know the function of the part on which they were working. They can then best figure out how to repair and even improve the part. It struck me that this idea of reverse engineering could be of use to me and my students in the English classroom. One of the most important things I believe I can do for my students is to teach them how to communicate; in writing and in speech. Therefore, if I expect my students to be able to construct a good essay, I need to break it down into its component parts and see how those parts themselves are constructed, much like the parts that Glunt Industries receives with the expectation that they be repaired to their original specifications without any idea what those specifications were.

This can work on essays, paragraphs, or even individual sentences. However, for the sake of time and usefulness I will discuss how a paragraph is built using reverse engineering. There are many layers of a paragraph, however, I feel the effect words have on an audience is as equally important as how it was constructed grammatically. First, I will give my students a sample paragraph, roughly 8-10 sentences in length. I will then instruct them to determine the Audience, Purpose, Tone, Subject, Speaker, and Occasion of the paragraph. By analyzing the diction and subject of the paragraph they can determine the tone of the piece. They can then determine the intended audience, purpose and speaker and occasion by examining further details of the paragraph.

For example, the following paragraph was taken out of the article "The Pay Is Too Damn Low" by James Surowiecki, published in the August 12 edition of the *New Yorker*, a magazine I subscribe to with my senior AP students, but often use specific articles from it with my freshman as well. Depending on the complexity of the article, this type of close reading exercise could be used at varying grade levels.

"This complicates things, in part because of the nature of these businesses. They make plenty of money, but most have slim profit margins: Walmart and Target earn between three and four cents on the dollar; a typical McDonald's franchise restaurant earns around six cents on the dollar before taxes, according to an analysis from Janney Capital



Markets. In fact, the combined profits of all the major retailers, restaurant chains, and supermarkets in the Fortune 500 are smaller than the profits of Apple alone. Yet Apple employs just seventy-six thousand people, while the retailers, supermarkets, and restaurant chains employ 5.6 million. The grim truth of those numbers is that low wages are a big part of why these companies are able to stay profitable while offering low prices. Congress is currently considering a bill increasing the minimum wage to \$10.10 over the next three years. That's an increase that the companies can easily tolerate, and it would make a significant difference in the lives of low-wage workers. But that's still a long way from turning these jobs into the kind of employment that can support a middle-class family. If you want to accomplish that, you have to change the entire way these companies do business. Above all, you have to get consumers to accept significantly higher, and steadily rising, prices. After decades in which we've grown used to cheap stuff, that won't be easy."

As the following activities are being conducted, I will be circulating amongst my students addressing questions and then recording student responses on the board.

**Guided Practice:** We will start by examining the piece for diction. What type of words are being used? What level? Are they specific to any certain topic? (ex: grim, franchise, combined profits, major retailers, profitable, tolerate)

What is the subject of this piece? How much can you glean from the paragraph in isolation from the rest of the article/essay? (economics, wages, profits, capitalism)

Next determine the tone. How is the author treating this topic? Is it whimsical, solemn, bland?  
(straight forward, there are no rhetorical flourishes)

Based upon the diction, tone and subject matter, who could be the target audience for this piece?  
(Economists, the general public, retail workers, CEOs)

What do you know of the speaker of this piece? Who are they likely to be? What is their opinion of the subject matter? (they might be an economist or a business student)

Given the previous information, what could the speaker's purpose be? What occasion instigated the composition of this piece? (to inform workers of the issues they face, to inform the general public of the issue of a living wage)

I then ask them to look at each sentence separately to determine the function of each sentence. A basic paragraph has an introductory sentence, supporting sentences that provide details and concluding sentences. I then ask them what else the introductory and concluding sentences do. (sample responses: transition to and from the surrounding paragraphs.)

**Conclusion/Independent Practice:** Now students will be given the entire article/essay to see if some of their assumptions were correct. Do the other paragraphs have a similar tone, speaker, audience, purpose, occasion and subject? Students will be asked to determine what this paragraph brings to the entire article? What would be missing if it was removed?

**Assessment/Evaluation:** They will then be given another paragraph from a totally unrelated article/essay to go through the same process on their own. This will be repeated with different articles of increasing complexity throughout the semester until close reading has been mastered.



# Sean Sich

Lordstown High School  
Social Studies / Economics  
Grades 8 – 12

Sponsored by

## Butech Bliss

Ashley Snyder - Executive Secretary



Lesson Plan Title: "Where are my tools?"



*"I have to say that I didn't know anything about Butech Bliss when I got there, but I will say that the experience was one of the most rewarding experiences I have ever had with a company. In the four days I was there, I learned so much from the staff. I also saw an industry that struggled to find the right workers for the job. This is why this program is so important. **We as educators need to relay the message that American manufacturing is alive and well.**"*

Sean Sich – Educator

*"Each of the participants were very eager and interested not just to learn the manufacturing process and what makes our company unique but to find out all the behind the scene jobs that make our company successful. We would welcome the opportunity to participate in the program again and welcome local educators the chance to learn hands on how manufacturing companies can provide high quality jobs throughout the manufacturing process."*

Ashley Snyder – Butech Bliss

# **BUTECH BLISS**

We Build Things. Better.

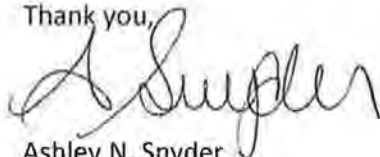
August 5, 2013

**550 South Ellsworth Avenue  
Salem, OH USA 44460  
Phone +1 (330) 337-0000  
Fax +1 (330) 337-0800  
[www.ButechBliss.com](http://www.ButechBliss.com)**

Butech Bliss was established in 1985 by John R. Buta, our current president. Throughout the past 28 years we have grown from 3 employees to over 260. We are a leading manufacturer in the metals processing industry and completely engineer, manufacture, assemble and test every machine in our Salem, Ohio facility. We are proud to be able to manufacturer equipment not just for United States metal producing companies but for companies all over the world.

We were extremely happy to be able to participate in the Educator in the Workforce program and be able to tailor the schedules for each of the participants to their background. We hope that the experience will be beneficial to each of the participants and they can use what they learned throughout the process in their curriculum. Each of the participants were very eager and interested not just to learn the manufacturing process and what makes our company unique but to find out all the behind the scenes jobs that make our company successful. We would welcome the opportunity to participate in the program again and welcome local educators the chance to learn hands on how manufacturing companies can provide high quality jobs throughout the manufacturing process.

Thank you,



Ashley N. Snyder  
Executive Assistant

**Sean Sich**  
Lordstown High School  
Social Studies (Economics)  
8-12

**Butech Bliss**  
550 S Ellsworth Ave Salem, OH 44460

I have to say that I didn't know anything about Butech Bliss when I got there, but I will say that the experience was one of the more rewarding experiences I have ever had with a company. In the four days I was there, I learned so much from the staff. While observing and interviewing the staff, they welcomed my inquiries and were always ready to answer questions when I asked them. I saw first-hand the process that Butech Bliss used to create, tear down, and rebuild their machinery. I also learned that the company keeps its competitive edge by creating products that are built to exact specifications customers want. This type of innovation allows them to set themselves apart in the manufacturing of steel stampers and stretchers. I also found that the company was an industry leader in Scrap metal collection.

As a teacher of Economics, I was glad I was able to speak to all of the personnel involved with every aspect of the plant. Whether it was sales or benefits management, I saw that anyone could work for them. It didn't matter if they had degrees or not. They need people to work for their company that can be dependable and willing to take on new challenges.

I also saw an industry that struggled to find the right workers for the job. This is why this program is so important. We as educators need to relay the message that American manufacturing is alive and well.

**Sean Sich**  
Lordstown High School  
Social Studies (Economics)  
8-12

**Butech Bliss**  
550 S Ellsworth Ave Salem, OH 44460  
Ashley Snyder: Executive Assistant

**TITLE OF LESSON PLAN:** Where are my tools?

**OBJECTIVE OF THE LESSON:** TSW use the concepts of cost/benefit analysis, opportunity cost, research, and technology to present a proposal to create a tool management system at Butech Bliss

**SKILLS BEING UTILIZED:**

Critical Thinking, persuasion, cost/benefit analysis, research

**RECOMMENDED TEACHING TIME:**

One day to present the problem, two days in a lab to research, should be due in 10 days.

**MATERIALS:**

Computer, Smartboard, and discussion of ideas with students

**BODY/LESSON/ACTIVITY:**

I will explain the activity as follows:

Congratulations! You were just hired as Butech Bliss as their tool manager for the tool shop. Upon entering the tool facility, you notice something strange. Very strange. None of the tools are marked with any kind of inventory control. When you ask your new boss about how tools are inventoried, she remarks that they go certain places on the shelf. Upon further questioning, you find out that even though tools are separated by



type (drill bits, taps and dies, lathe bits), when someone takes them, they just take them. Then, as the tool manager, you have to go get them from whoever takes them. Realizing that this costs the company lots of money, you proceed to talk to the Chief Financial Officer about implementing the new inventory system. She gives you the okay and you are off.

You will create or research two different methods of collecting and keeping track of the tools in the shop. You can use whatever premade system (i.e. if a company sells a solution, you can use it), but you have to keep costs low. After you find these two systems, you will give two benefits and drawbacks to the system. This includes actual costs and barriers (or lack thereof) into implementing the system. You will also have to choose your final option and defend your choice to the CFO.

#### CONCLUSION:

I feel this assignment works the best for using aspects of real decision making along with the idea that students have to weigh decisions involving costs while working in the business field.

#### STUDENT EVALUATION:

I will grade their projects based on how they evaluate the inventory systems using a rubric. I will grade them for the data they collect, the fairness that they give to evaluating the systems (i.e. do they explain benefits or drawbacks without using any biases toward one system or the other), how inventive they are with their choices (did they make one up for the company with their own software or tools), and how well they argue their position.



# Todd Vann Orman

Trumbull Career & Technical Center  
Manufacturing Technology  
Grade 11

Sponsored By

## Butech Bliss

Ashley Snyder - Executive Assistant

Lesson Plan Title: "Manufacturing Final Project"



*"I have an undergraduate degree in industrial Technology and spent the first nine years of my adult life working in manufacturing. **My experience at Butech was very informative and helpful as I prepare to start a Manufacturing Program this year.** It has been close to twenty years since I did any hands on machining and I was able to really discuss this with Journeyman Machinists and pick their brains about where I should start and how far I should expect to go."*

Todd Van Orman - Educator

*"We were extremely happy to be able to participate in the Educator in Manufacturing Workplace Program and be able to tailor the schedules for each of the participants to their background."*

Ashley Snyder – Butech bliss





**550 South Ellsworth Avenue  
Salem, OH USA 44460  
Phone +1 (330) 337-0000  
Fax +1 (330) 337-0800  
[www.ButechBliss.com](http://www.ButechBliss.com)**

August 14, 2013

Butech Bliss was established in 1985 by John R. Buta, our current president. Throughout the past 28 years we have grown from 3 employees to over 260. We are a leading manufacturer in the metals processing industry and completely engineer, manufacture, assemble and test every machine in our Salem, Ohio facility. We are proud to be able to manufacturer equipment not just for United States metal producing companies but for companies all over the world.

We were extremely happy to be able to participate in the Educator in the Workforce program and be able to tailor the schedules for each of the participants to their background. We hope that the experience will be beneficial to each of the participants and they can use what they learned throughout the process in their curriculum. Each of the participants were very eager and interested not just to learn the manufacturing process and what makes our company unique but to find out all the behind the scenes jobs that make our company successful. We would welcome the opportunity to participate in the program again and welcome local educators the chance to learn hands on how a manufacturing company can provide high quality jobs throughout the manufacturing process.

Thank you,

A handwritten signature in black ink that reads "Ashley N. Snyder". The signature is written in a cursive style.

Ashley N. Snyder  
Executive Assistant

**Todd Van Orman**  
Tumbull Career & Technical Center  
Manufacturing Technology  
Junior Program

**Name of Business: Butech Bliss**

I am in a little different position than most of the other participants in this class. I have an undergrad degree in Industrial Technology and spent the first nine years of my adult life working in Manufacturing. Prior to signing up for this class I had spoken to the Plant Manager of Butech about coming in to do some observation in their machine shop. So I probably took a little different approach than the rest of the participants in this program.

My experience at Butech was very informative and helpful as I prepare to start a Manufacturing Program this year. It has been close to twenty years since I did any hands on machining and I was able to really discuss this with Journeyman Machinists and pick their brains about where I should start and how far I should expect to go.

If I were to break my experience down by day, the first day would really be a "refresher course" so to speak. I talked to the head of nearly every department in the company including: safety, HR, purchasing, engineering, sales and toured the facility. This really allowed me to see what has changed and what has stayed the same in the ten years since I was in Manufacturing. Day two and three were spent on the machine shop floor. I was able to watch a part be programmed to run on the CNC mill, then I was able to watch that part run on the CNC mill and later watch that part go through inspection. This time spent on the floor was valuable as it allowed me to discuss machining techniques, different career paths, get different opinions on Manufacturing today and really get current feed back that will help me tell students today the pluses and minuses of Manufacturing.

The last day started with a tour of their second facility, more of a production shop. I came back to the main plant and spent time in welding, assembly and inspection. Some of the facts that I plan to share with my students is that Welders had the highest average salary at Butech, Machinists and Assemblers were not far behind, however, all the advancement positions such as Service Techs and even some engineers came through the Machinists pathway.

Butech allowing me to go a little different direction than originally planned made this experience much more valuable to me. If this opportunity would have just showed me the world of Manufacturing, I'm not sure it would have been beneficial to me with my employment background.

**Todd Van Orman**  
Trumbull Career & Technical Center  
Manufacturing Technology  
Junior Program

**Butech Bliss**  
550 S. Ellsworth Ave. Salem, Ohio  
Ashley Snyder Executive Assistant

**TITLE OF LESSON PLAN:**

Manufacturing Final Project                      \*Introduction

**OBJECTIVE OF THE LESSON:**

Students will demonstrate an understanding of the Manufacturing process.

**SKILLS BEING UTILIZED:**

Machining, Welding, Woodworking, AutoCAD/Inventor, Marketing, and material finishing

**RECOMMENDED TEACHING TIME:**

Three weeks from introduction to final product

**MATERIALS:**

Students will have access to steel, wood, plastics and the equipment in the machine shop lab.

**BODY/LESSON/ACTIVITY:**

Phase I – Students will choose a product that they wish to make. It will need to be manufactured in our lab. They will then design the product utilizing AutoCAD or Inventor software and create a set of blueprints. They will also need to create a materials list, a manufacturing flow chart and they will need to price this project using both time and materials. They will be checking their quotation vs. the actual product. Estimated 3 days (7.5 hours)

Phase II – At this point students would need to build their prototype. Following the flow chart they created they would need to build this prototype in the same fashion as they would build a production run. Estimated 9 days (20 hours)



Phase III – They will be required to check their prototype for the following:

Accuracy – does it match their drawings?

Time – did they quote the correct build time?

Flow – were they able to build it as they wanted, did it flow through the shop as they predicted?

Pricing – Would they be able to sell it for a profit based on the costs they calculated.

Estimated 3 days (7.5 hours)

#### CONCLUSION:

This project will show an understanding of the manufacturing process, by taking an idea and transforming it into a production part. This will require students to utilize nearly all the equipment we have learned in the first year of the program. It will require a great amount of inquiry, visualizing how the part will look, how long it will take to perform different operations, and putting costs with all the operations involved.

#### STUDENT EVALUATION:

This evaluation would be in many different levels.

Self-evaluation – how the student believes they did.

Physical evaluation – how did the part turn out (the results of Phase III)

A reflection report – This would tell what was actually learned throughout this project and if they have a deep understanding of it.

\* My entire school year will consist of Manufacturing lessons, I wanted to give and example of a larger Manufacturing project that would ultimately consist of numerous mini-lessons throughout the course of the three weeks.



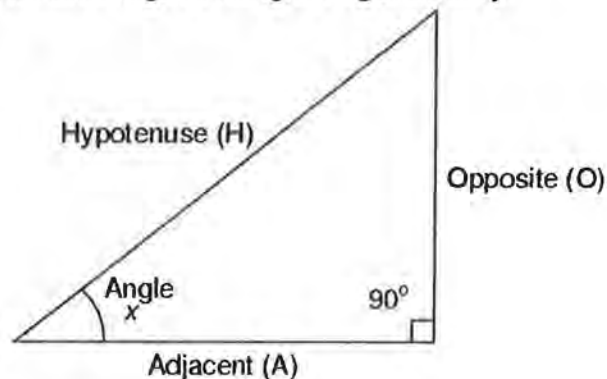
# Tim Wensel

Canfield High School  
Algebra I, Geometry, Algebra 2  
Grades 9, 10, 11

Sponsored by

**Specialty Metal Products Company, Inc.**  
Tanya McClafferty - Vice President

Lesson Plan Title: "CNC and Right Triangle Trigonometry"



*"There is so much more to manufacturing nameplates than I ever imagined! I've learned so much about the process in four days. More importantly, I was able to experience many, many examples of mathematics being utilized in everyday work. There were also several great examples for science. **As an educator, I have the responsibility to inform my students of the opportunities that exist in the world of manufacturing.**"*

Tim Wensel – Educator

*"I think it is very respectable for the educators who participate, to take an active interest in such a program. To understand how valuable and critical manufacturing is to our community, our county and our economy. Further for them to understand the need to open up direction for kids who sit on both sides of the college decision spectrum."*

Tanya McClafferty – Specialty Metal Products



Tanya McClafferty

Vice President

Company Profile:

Specialty Metal Products is a small nameplate manufacturer located in West Middlesex, Pa. We have been in business for over 35 years, specializing in chemical etching and fabrication of stainless steel nameplates for the OEM market. Our business has been growing over the last 5 years, now employing 21 full time positions.

Reflections:

Prior to Mr. Wensel arriving at our facility, I only had an idea as to what the program was intended for. My assumptions were the reason I volunteered Specialty Metals to host an educator. Those assumptions were accurate, however, it was very interesting to learn of the true end result in direct lesson planning in the classroom, based off of experience in the manufacturing environment. I think it is very respectable for the educators who participate, to take an active interest in such a program. To understand how valuable and critical manufacturing is to our community, our county, and our economy. Further, for them to understand the need to open up direction for kids who sit on both sides of the college decision spectrum.

At first thought, it was hard to see for myself, the value in hosting in our particular environment, as we all get stuck in day to day operations that seem so monotonous and simple. However, it was great to see what Tim was able to take from it; from the technical to the social, and everything in between. I feel very confident, that these 32 hours were well worth his time in the program, and that he has had a great opportunity to collect what is important for the classroom. It is vital that our young generations are given the tools to succeed in a manufacturing environment, and the tools which allow manufacturing to prosper. Without it, our future as a nation is in jeopardy.

Business Sponsor Signature

A handwritten signature in black ink, appearing to read "Tanya McClafferty", is written over a horizontal line.

# Tim Wensel

Canfield High School

Mathematics (Algebra 1, Geometry, Algebra 2)

9<sup>th</sup>, 10<sup>th</sup>, and 11<sup>th</sup> grade

Name of Business: Specialty Metal Products Company INC

There is so much more to manufacturing nameplates than I ever imagined! I've learned so much about the process in four days. More importantly, I was able to experience many, many examples of mathematics being utilized in everyday work. At each step in the manufacturing process, math skills were needed and utilized. Some of the more fundamental skills used by every worker included: reading a blueprint, measuring with precision (to nearest  $1/32^{\text{nd}}$  of an inch), converting between fractions and decimals (decimals to the nearest thousandth were the most popular mode of measurement), spatial reasoning, and reading a micrometer.

The CNC (computer number code) – Turret offered the most mathematical application. Consider the coordinate plane in algebra; the CNC operates in the first quadrant, expressing all locations as ordered pairs (x, y). Their machine is referenced home at (1.875, 2.00) leaving almost a 2" lip for the clamps to hold on to during the stamping process. All holes or pieces to be punched are loaded into the computer. A punching sequence is then programmed. The operator uses calipers to get an exact measurement from edge of steel to the reference line. Sheets to be punched are shimmed so punching is accurate; this is done by using a set of feeler gauges. A trial run using a piece of scrap metal offers a way to check the precision of the punches, before punching the actual parts.

To locate the punch holes on some circular nameplates the operator must employ the Pythagorean Theorem and/or Right Triangle Trigonometry. The CNC Machine will be the basis for my lesson plan. What a great example of the coordinate plane in action.

There were also several great examples for science: Burning images onto developing films using vacuum seal and 9 lumens, using resist to protect the areas of the metal that are not to be etched, using Ferric Chloride for etching the metal, and finally removing paint on the un-etched surface while not removing the paint from the etched steel.

I also had the opportunity to sit down and talk with Tanya, the owner/ Vice President of the company. We are both intrigued by the potential of this program. I got to see real-world applications of what I teach; so now I would have another relevant, meaningful real-world example to answer that "When are we ever going to use this stuff?" Tanya hoped this program would produce reliable, responsible, prepared graduates that were prepared to meet the challenges of the manufacturing world. As an educator, I have the responsibility to inform my students of the opportunities that exist in the world of manufacturing. Thank you!

Tim Wensel  
Canfield High School  
Mathematics (Geometry)  
10<sup>th</sup> grade

Specialty Metal Products Company INC  
85 Garfield Street  
West Middlesex, PA 16159  
Tanya McClafferty – Vice President

Title of Lesson: CNC and Right Triangle Trigonometry

Objective of the Lesson:

1. Each student will use trigonometric ratios to solve right triangles (G-SRT 7, 8; G-MG 3)
2. Each student will find needed ordered pairs to program a CNC Machine

Skills Being Utilized:

1. Trigonometric Ratios (sine, cosine, tangent)
2. Pythagorean Theorem
3. Special Right Triangles
4. Coordinate Plane

Recommended Teaching Time: We are on block scheduling: 88 minutes

Materials:

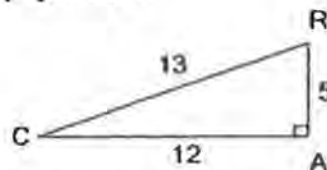
CNC Example 1, graph paper, straightedge, compass, protractor, scientific calculator, and nightly assignment

Body/Lesson/Activity:

Lesson starts with CNC Example #1 (See Attached). Students are to work in pairs. Students are familiar with the coordinate plane; they may need help interpreting the blueprint and understanding the notion of reference lines. I plan to share this experience with them, while they are working to find all 16 ordered pairs. Go over correct ordered pairs. Look for patterns, shortcuts, and answer any questions.

A. Right Triangle Trigonometric Ratios

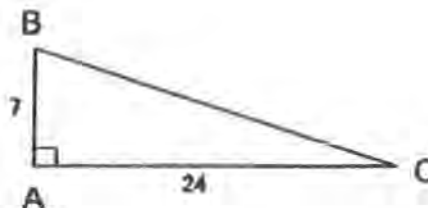
1. Definitions
2. SOH – CAH – TOA
3. Examples (See slides)
4. Special Right Triangles (45-45-90 and 30-60-90 in simplest radical form)





## B. Inverse Trig Ratios

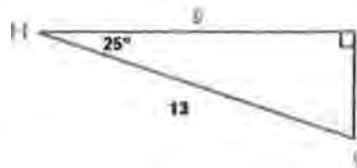
1. To Find Angle Measures
2. Calculator Examples (See slides)



## C. Solving Right Triangles (Applications)

1. Students are to construct a 3 – 4 – 5 triangle and find (not measure) each angle measure to the nearest hundredth degree.

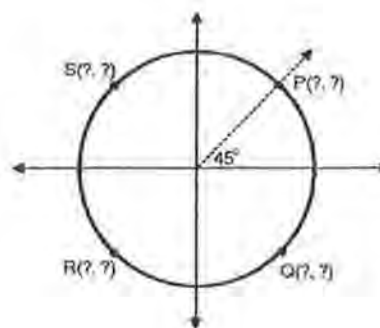
2.  $\triangle GHJ$



3. Area of regular pentagon with radius 40"

### 4. CNC Example #2

Need to program the CNC to punch 4 holes.  
Find the ordered pairs that name P, Q, R, and S. Note all points are on the circle 45° from the x-axis.



### 5. CNC Example #3

Similar to CNC #2

Need to program the CNC to punch 6 holes evenly spaced on a circle with a radius of 3in. Draw a picture.

**Conclusion:** On a note card to be turned in at the end of the block:

1. Have the students summarize the three trig ratios
2. Describe the process needed to solve a right triangle given that one leg measures 10" and the other leg measures 16".

## Student Evaluation:

1. Direct Observation in classroom
  - a. Performance on examples
  - b. Higher level questioning
2. Nightly assignment
  - a. Examples
  - b. Research CNC Machines.
    - i. Write one paragraph (in your own words) on how they operate.
    - ii. Design your own CNC problem. It must incorporate today's material. Include a diagram of your part.

Thank you!!

Educator in the  
Manufacturing Workplace



**OH-PENN**  
MANUFACTURING COLLABORATIVE

2013

***Special Recognition to the Extraordinary Educators!***



**Special Thanks to the Participating Manufacturers**

AND

**To our Program Partners**

Lawrence County School-to-Work, Inc.

Mahoning County Career and Technical Center

Mahoning Valley Manufacturers Coalition

West Central Job Partnership

Youngstown State University