Tech Challenge
Challenge Descriptions

Test your skills and compete for college scholarships!

2017
TECH CHALLENGE

FRIDAY, APRIL 7, 2017
8:30 A.M.–2:00 P.M.

Support your students in the largest academic and technical competition in Wisconsin offering:

- LIVE competitions
- DISPLAY competitions

$500 or $1,000 Scholarships awarded to STAR FIRST winners
# Challenges

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Anatomy & Physiology Knowledge Bowl

**Questions?** Please contact Pennie Tilkens at:
Email: pennie.tilkens@nwtc.edu
Phone: 920-498-6842

### SCIENCE

Student capacity: 12 teams of 3

College Knowledge Bowls have been a popular and long-standing competition. From 1953-59 they were broadcast on the radio, and then on TV. College (and also high school) Knowledge Bowls take place all over the U.S. and around the world. They are very popular in Central America.

The purposes of creating an A&P Knowledge Bowl at NWTC are two-fold. One is to strengthen the relationships with the high schools that teach A&P for transcribed credit, and the other is to foster a love of the content, an increased knowledge base and team-building skills among our transcribe students in a fun, friendly environment.

The competition will have two rounds.

- The first is oral testing using open-ended questions and a buzzer system. All teams would compete in this round.

- Through elimination the top two scoring teams would move on to the second round which would be a written, hands-on laboratory competition involving identifying the anatomical structures and their functions using models, specimens and the Anatomage table.
Auto Collision Repair

Questions? Please contact James Zuege at:
Email: james.zuege@nwtc.edu
Phone: 920-498-6860

TRADES & ENGINEERING TECHNOLOGIES
Student capacity: 12

The goal of the competition is for students to demonstrate their skill at repairing damage to vehicle. They will be required to repair damage to a supplied parts to set industry standards. We will supply all needed tools and materials required to complete the repair. Each competency of the repair will be assigned a point value and students of the collision repair program will judge to an established rubric. The competing students will be given 3 hours to complete the task.

Auto Body Repair
- NWTC supplied fender with three areas of damage to be repaired.
- Two of the areas to be repaired using filler material and finished to primer readiness.
- One area to be metal finished (no filler) and ready for primer.
- Judging criteria is based off accepted repair industry standards.
- Three hours to complete the task.

Scoring Rubric
1. Proper cleaning and prep of fender to be repaired.
2. Proper use of safety equipment.
3. Proper use of tools and equipment.
4. Proper choice of filler material.
5. Proper use and application of filler material.
6. Proper choice of sanding tools and choice of grits.
7. Repair areas straight and match fender contours.
8. Repairs finished and acceptable for primer.

The eight areas are scored from one point being unacceptable, to five points being excellent.

<table>
<thead>
<tr>
<th>1 Point</th>
<th>2 Points</th>
<th>3 Points</th>
<th>4 Points</th>
<th>5 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unacceptable</td>
<td>Needs more work</td>
<td>Average, some areas of concern</td>
<td>Very good, minor areas of concern</td>
<td>Excellent, no areas of concern</td>
</tr>
</tbody>
</table>

The total for the challenge is forty points.

Grade scale:
40 - 36 = A
35 - 32 = B
31 - 28 = C
27 - 24 = D
Auto Technology

Green Bay Campus

Questions? Please contact Todd Brandenburg at:
Email: todd.brandenburg@nwtc.edu
Phone: 920-498-5684

Marinette Campus

Questions? Please contact Wally Remic at:
Email: walter.remic@nwtc.edu
Phone: 920-498-5630

TRADES & ENGINEERING TECHNOLOGIES

Green Bay Campus student capacity: 48
Marinette Campus student capacity: 24

This event is organized into three separate sections.

Section One will consist of the actual testing of typical automotive electrical/electronic components using common electrical testing equipment.

Section Two of the event will consist of the identification and evaluation of typical automotive mechanical components. Common evaluation tools will be used for this section.

Section Three of this event is a written exam consisting of questions relating to typical automotive systems operation, diagnosis and service.

TOOLS WILL NOT BE REQUIRED FOR THIS EVENT.
Students will need to supply their own safety glasses. This event is limited to 2 groups of 20 students or a total of 40 registrants.
LIVE Challenges

Catapult Catastrophe!

**Questions?** Please contact Shannon Brunette at:
Email: shannon.brunette@nwtc.edu
Phone: 920-498-5692

**SCIENCE**

Student capacity: 21 teams of 3

Use the design, build, testing, and competition to demonstrate principles of physics with your students. Meet state and national standards in 2-dimensional vector analysis, measurement, experiment design and more. Hit soft skills such as teamwork, professionalism, and meeting deadlines. Win scholarships for your students!

**The Challenges:**

1. Be the most accurate team hitting a target at a range of 6-8 meters
2. Be the fastest team to destroy a two meter tall target with only a single placement of your catapult.
3. Shoot the highest and the Farthest in competition given only two shots!

**The rules:**

1. All teams should consist of 3 students between the ages of 14-18 and one advisor. An advisor cannot be responsible for more than two teams at the competition. Due to safety concerns, an adult must be present with all teams during the challenge.
2. Catapults must not exceed one meter in any dimension, excluding the arm which may be longer. The catapult must be moveable without machines through a standard door. The arm must be under 2 meters in length to allow for clearance indoors. Students on the team must be able to easily maneuver their machine between testing locations, so be aware of total mass or have a plan.
3. Catapults must be powered by human energy input. No motors of any kind.
4. All measurements should happen in the SI System of Measurement (metric).
5. All projectiles will be provided at the event for competition. After your team registers, you will receive practice projectiles that represent what will be utilized in both size and shape. (i.e. a sand bag which will be chalked for the highest, farthest, and target contests, a tennis ball for demolition contest.
6. A video must be presented at a date two weeks prior to the competition displaying your catapult design and specifications that includes a sample launch. These may be used for team introductions as well as for a safety review by the college prior to the contest to allow for modifications if required.
7. No more than $200 should be spent on your catapult. A cost analysis should be provided with your analysis materials. NWTC strongly encourages the reuse and upcycling of materials so long as doing so does not create an unsafe or unstable catapult.
Diesel Technology

Questions? Please contact Jon Sowl at:
Email: jonathan.sowl@nwtc.edu
Phone: (920) 746-4917

TRADES & ENGINEERING TECHNOLOGIES
Student capacity: 12
Limit 2 (Graduating Seniors) Students per High School may compete.

Contest Rules:
1. Must be a graduating senior to enter.
2. Students must be enrolling in the Diesel Program at NWTC-Sturgeon Bay Campus.
3. Students are required to supply their own safety glasses.
4. No tools are required.
5. This contest will take most of the day.

THE EVENT WILL CONSIST OF 3 PARTS:

Part 1: Written Test
A. This test will cover the basics of the following areas:
   1. Differences between gas and diesel engines
   2. Basic diesel engine theory and operation
   3. Diesel engine construction
   4. Diesel engine application
   This will be a 40 question test consisting of short answer, true/false, and multiple choice questions (50 minutes allowed).

Part 2: Parts Identification
A. The contestant will have 15 minutes to correctly identify basic engine and related systems components.

Part 3: Basic Diesel Engine Troubleshooting
This portion of the contest will involve working with a “live,” running 2-cylinder diesel engine.
A. The contestants will be required to follow a pre-start checklist (i.e. check oil, locate controls, etc.)
B. Trouble-shoot a “no start” condition on the engine described above. (Engine cranks but will not start).
C. The contestant will have 15 minutes to complete this portion of the contest.
Live Radio Announcement

Questions? Please contact Chris Kuborn at:
Email: christopher.kuborn@nwtc.edu
Phone: 920-498-5636

BUSINESS & INFORMATION TECHNOLOGIES
Student capacity: 20

Students will read a Public Service Announcement (PSA) on NWTC's Internet Radio Station - TC Campus Connection. The student will have 5 minutes to preview the 30 second radio ad before announcing it on the air. The student will decide the mood and feeling that the announcement should convey. Is it humorous, serious, playful or instructional. They will need to complete the reading of the ad in 30 seconds or be cut off mid message. How fast or slow do you speak? What do you sound like? The best announcement wins!
Parametric Modeling

Computer Drafting (Mechanical Design)

Questions? Contact Justin Lemke at:
Email: justin.lemke@nwtc.edu
Phone: 920-498-5645

Questions? Contact Bryan Guns at:
Email: bryan.guns@nwtc.edu
Phone: 920-498-5642

TRADES & ENGINEERING TECHNOLOGIES
Student capacity: 18

Part Modeling & Assembly Creation Challenge:
- Utilize either SolidWorks or Inventor Software
- Individual Challenge
- Students will be provided with part models of a mechanism (not necessarily similar the above)
- In addition to the parts provided, students will have to create one part model from a given drawing
- Students will take the provided parts and the part they created to form an assembly
- Components of the assembly will need to be set to a provided angle/orientation. The final answer will be to provide a dimension between parts in this orientation
- The students will be placed depending on the right answer and the time to complete
Revit Proficiency

Questions? Please contact Tom Felton at:
Email: tom.felton@nwtc.edu
Phone: 920-498-5623

TRADES & ENGINEERING TECHNOLOGIES

Student capacity: 18

Description
Have experience and skills with Revit building information modeling software? In this challenge, you’ll use basic to intermediate skills to model a simple building design that matches given specifications.

Goal
Employ parametric design software to manage building information used to prepare construction documents.

Tasks
1. Create a basic building information model.
   - Building information model to contain all modeled items that match given design.
     o Walls
     o Doors
     o Windows
     o Components
     o Floor
     o Roof
2. Manage annotation within a building information model.
   - Building information model to contain all annotation items that match given design.
     o Notes
     o Dimensions
     o Symbols
3. Generate graphic output from a building information model.
   - Printed sheet to match given design.
     o Completed titleblock
     o Specified views
     o Printed to scale

Judging Criteria
- Completeness
- Accuracy
- Speed
Video Production

Questions? Please contact Pat Saxe at:
Email: patrick.saxe@nwtc.edu
Phone: 920-491-2615

Questions? Please contact Brandon Mueller at:
Email: brandon.mueller@nwtc.edu
Phone: 920-498-6382

BUSINESS & INFORMATION TECHNOLOGIES

Group sizes: 20

Submission details: submit the script, proposal, production and post production details, schedule, and finished video file as a link to YouTube, all via an email to brandon.mueller@nwtc.edu. At least one week prior to the competition. The winning videos will be previewed at the competition.

<table>
<thead>
<tr>
<th>Video Production Judging Criteria:</th>
<th>Good</th>
<th>Better</th>
<th>Stellar</th>
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<tr>
<td>A proposal with a description of the organization or service being highlighted, how the video will help the organization</td>
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<td>A script and schedule used for production.</td>
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<td>A detailed description of the production process including tools used, personnel involved</td>
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<td>Quality of Video: lighting, exposure, composition</td>
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<tr>
<td>Quality of Audio: Proper volume, microphone used for production.</td>
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Welding Skills

**Questions?** Please contact Scott Massey at:
Email: scott.massey@nwtc.edu
Phone: 920-498-5638

TRADES & ENGINEERING TECHNOLOGIES
Student capacity: 40

THE EVENT WILL CONSIST OF THREE PARTS:

**Part 1: Oxy-Fuel Cutting**
1. Perform Oxy-acetylene cutting on 3/8” plate from supplied print
   a. Straight line cut
   b. Bevel cut
   c. Pierce hole and cut circle

**Part 2: Shielded Metal Arc Welding**
1. 3/8” plate A-36 (1G) Flat position V-groove with backing
2. 1/8” E7018 electrode, 120-140 Amps, D.C.R.P.
3. Evaluation: Visual exam to AWS D1.1

**Part 3: Gas Metal Arc Welding**
1. 3/8” plate A-36 (2G) horizontal position V-groove without backing
2. .035” ER705-6 electrode, 110-135 Amps, 17-19 Arc
3. Volts, C25 Shielding Gas
4. 1/16-1/8 root opening, 1/16-3/32 root face and 70_included groove angle
5. Evaluation: Visual exam to AWS D1.1

- This event will take 2-2 ½ hours.
- Students are required to supply their own safety glasses, welding gloves and wear appropriate clothing.
- This event is limited to the first 40 participants.
Architectural Drawing

Questions? Please contact Tom Felton at:
Email: tom.felton@nwtc.edu
Phone: 920-498-5623

TRADES & ENGINEERING TECHNOLOGIES - DISPLAY Challenges
Student capacity: No limit

Description
Let’s see your best architectural drawings! For this challenge, you’ll submit building drawings you have completed at school.

Goal
Prepare construction documents that demonstrate your experience and interest in building design.
Two drawing options:
• Option 1 – Single Family (Residential)
• Option 2 – Multifamily (Duplex, Condo, Apartments)

Option 1 – Single Family (Residential)
Must be an original design.
• Home to be a Ranch Style, 2 Story, or Freestyle.
  o All architectural styles allowed.
  o Home may be no larger than 3,000 square feet.
  o Square footage does not include the garage.
  o Garage can include a 2 or 3 stall design. (attached or detached)
• Recommended Living Spaces
  o Great Room or Living Room
  o Kitchen
  o Dining Room or Dinette
  o Master Bedroom
  o Master Bathroom
  o Two (2) Secondary Bedrooms
  o Full Bath
  o Half Bath
  o Laundry
• Design Options
  o Lower level can be designed as additional finished living space.
  o May or may not include exposed exterior walls, look-out or walk-out configuration.
  o This area does not count against square footage requirement.
• Recommended Drawings
  o Floor Plan(s) 1/4" scale
  o Lower Level Plan and Foundation Plan 1/4” scale
  o Front, back and sides exterior elevations must be shown (3-D perspective optional)
  o Building Section 1/4” scale
Option 2 – Multifamily (Duplex, Condo, Apartments)
Must be an original design.
- Wood, Structural Steel, Concrete or Masonry Building.
  - New or refurbished property.
  - All architectural styles allowed.
  - Two (2) units minimum.
  - Size minimum: 750 sq. ft. per unit.
- Recommended Living Spaces
  - Great Room or Living Room
  - Kitchen
  - Dining Room
  - Bedroom
  - Full Bath
- Design Options
  - Additional Bedroom(s)
  - Additional Bathroom(s)
  - Laundry: In-unit or Shared
  - Garage
- Recommended Drawings
  - Site Plan 1”=20'-0”
  - Floor Plan(s) 1/4” scale
  - Front, back and sides exterior elevations must be shown (3-D perspective optional)
  - Building Section 1/4” scale (Must include structure from footing to roof and show all pertinent construction and material information.)

Judging Criteria
- Creativity
- Functionality
- Completeness
Design & Graphic Technology

Questions? Please contact John Reinders at:
Email john.reinders@nwtc.edu
Phone: 920-498-5715

BUSINESS & INFORMATION TECHNOLOGIES

Student capacity: 40

Students will create and display an 11x17 (landscape or portrait) poster with a theme focused on a public service announcement (PSA). The poster can be created using any raster or vector image program(s).

Each poster must contain the following components: text, high resolution images, original or copyright free images.

Each submission must include a detailed creative brief describing the reasons for the design and how it helps spread the message of the PSA the student selected.

A detailed step-by-step process on how the poster was created must be supplied.

Judging will be based on the quality of the overall design, creative brief and design reasoning, required components, and display of the poster.
Machine Shop Project
(Computer Numeric Control)

Questions? Please contact Frank Parker at:
Email: franklin.parker@nwtc.edu
Phone: 920-498-6384

TRADES & ENGINEERING TECHNOLOGIES

Student capacity: No limit

Any metal, plastic, wood work piece or part which is drawn with any CAM (Computer Aided Manufacturing) software and then created (milling, turning, routing) on a CNC machine.

Displays will be evaluated on fit (Attached table), surface finish, and workmanship, in addition to a display of the CAM drawing and a print out of the machine code (G&M code) used to CNC machine the part.

Tolerances:
- Fractional Dimensions = +/- 1/64
- (Two place decimals) .XX = +/- .01
- (Three place decimals) .XXX = +/- .005
- Angles = +/- 1/2 degree
Printed Production Piece

Questions? Please contact William Mikolanz at:
Email: william.mikolanz@nwtc.edu
Phone: 920-498-5570

BUSINESS & INFORMATION TECHNOLOGIES
Student capacity: 40

Students will present/display a production style printed piece in either one or multi-color schemes. Acceptable substrates can include paper, synthetic or fabric.

Print method used must consist of one of the 5 major publishing methods; offset, gravure, flexographic, screen or digital*.

*If a digital printed piece is submitted, documentation of the device must also accompany the printed piece to provide evidence of a digital press as opposed to a simple laser output.
Digital prints can also include inkjet technology as long as the device meets industry standards for print production and has the ability to run a size 24” or larger.

Each project submitted must contain a detailed explanation of the piece, and the process used to create it as well as the intended purpose of the piece itself.

The written component should be one to two paragraphs long and serve as a way for students to ”sell” their work to the judges.

Judging will be based on quality, difficulty level, creativity, and the student’s written presentation explaining the piece and the process followed.
Sustainable Solar Building Design

Questions? Please contact Jenny Brinker:
Email: jenny.brinker@nwtc.edu
Phone: 920-498-7100

TRADES & ENGINEERING TECHNOLOGIES
Student capacity: 24 students; can work alone, or in groups up to four students

Design and model home with the goal of maximizing the model home’s energy efficiency and solar energy production. Students will use Energy 3D tool to design a 1,000 square foot, one-bedroom home. The Energy 3D tool provides options for optimizing building characteristics such as infiltration, insulation, window location, awning and tree shading, day lighting, appliance types, and accommodates the use of solar photovoltaic (electric) and a solar water heating systems. The competition will be organized so that students will have plenty of time to learn about the ENERGY 3D software and create a building design. Models will be judged based on annual energy use, CO2 production, and realistic, livable design. Here is a summary of the judging criteria. A more descriptive set of instructions is provided before the competition.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Poor</th>
<th>Satisfactory</th>
<th>Commendable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design components</td>
<td>Missing one or more of the home design requirements</td>
<td>All home design requirements are present</td>
<td>All home design requirements are present in a well-organized design</td>
</tr>
<tr>
<td>Annual energy use</td>
<td>Energy use is more than 8000 kWh annually</td>
<td>Energy use is lower than 8000 kWh annually</td>
<td>Design is near net-zero or generates more energy than it uses</td>
</tr>
<tr>
<td>CO2 footprint</td>
<td>Annual pounds of CO2 are not provided</td>
<td>Annual pounds of CO2 data is clearly presented.</td>
<td>Annual pounds of CO2 data is clearly presented, and annual CO2 is relatively low compared to competitor’s designs</td>
</tr>
<tr>
<td>Solar component</td>
<td>Missing solar installation</td>
<td>Solar contribution to the home’s energy production is minimal. Solar panels could have better placement for solar production and/or aesthetics.</td>
<td>Solar provides most or all of the home’s energy needs. Solar panels are placed in an area that receives maximum sunlight and look aesthetically pleasing.</td>
</tr>
<tr>
<td>Realistic, livable and affordable design</td>
<td>The home does not appear livable. Added cost is &gt;$45,001</td>
<td>The home is livable and has minimal Hours When Indoor Temperature is Uncomfortable. Added cost is &gt;$35,001 but &lt;$45,000</td>
<td>The home is livable, aesthetically pleasing, and has no Hours When Indoor Temperature is Uncomfortable Added cost is &lt;$35,000</td>
</tr>
<tr>
<td>Judging Interview</td>
<td>Missing one or more Judging Interview reports</td>
<td>All Judging Interview reports are provided, but unable to answer questions about the reports and design.</td>
<td>All Judging Interview reports are provided, and judges’ questions about the reports and design are answered in a way that demonstrates understanding of home energy efficient design.</td>
</tr>
</tbody>
</table>
Creative Metal Fabrication

Questions? Please contact Lee Weisnict at:
Email: lee.weisnicht@nwtc.edu
Phone: 920-498-7114

TRADES & ENGINEERING TECHNOLOGIES
Student capacity: No limit

Competition is metal fabrications that are designed and built for decoration or aesthetic.

Example: an end table, decorative art, a metal sculpture, etc. Let your mind run wild!
Students will be judged on creativity, quality of fabrication, looks, and workmanship involved
(i.e. a pre-drawn water jetted figure welded to a stand versus something that took planning and skill to make).

A sketch of the item is required. The sketch will not be judged on its own, but will be included in the overall judging of fabrications. A bill of materials (breakdown of materials/parts) with receipt, periodic documentation (pictures), and a quick summary on how you came up with the idea are also required.

Functional Metal Fabrication

Questions? Please contact Lee Weisnict at:
Email: lee.weisnicht@nwtc.edu
Phone: 920-498-7114

TRADES & ENGINEERING TECHNOLOGIES
Student capacity: No limit

Competition is metal fabrications that are designed and built to produce a function.

Example: can crusher, snowmobile trailer, grill, wood splitter, etc.

Students will be judged on practically of the item, creativity, quality of fabrication, and workmanship put into the fabrication. Functional metal fabrications will also be required to have a blueprint with orthographic projection (front, top, side views) and a sketch (isometric or oblique). Blueprint will not be judged on its own, but will be included in the overall judging of the fabrications.

A bill of materials (breakdown of materials/parts) with receipt, periodic documentation (pictures), and a quick summary on how you came up with the idea are also required.