The Advanced Manufacturing & Engineering for a Sustainable Future program at Burlington Technical Center (BTC) teaches students the fundamentals aspects of manufacturing, engineering, and design processes through both academic and hands-on work.
Sabrina is a Blacksmith and Studio Owner at Stevens Branch Studios.

Sabrina’s pathway to her current career began with what she refers to as “the best biggest mistake ever,” in which she wound up enrolled in a blacksmithing class when the glassblowing class she attempted to enroll in filled up. Sabrina studied at Rhode Island School of Design and the College of Fine Arts in Montpelier, but credits the many other opportunities in between for building her significant repertoire of artistic skills and specialties.

The headquarters of Sabrina’s work is Stevens Branch Studios, which she has developed from the ground up and is located next to her house. This is where a typical day in her life is centered – it has all of the tools she would need, including a forge, anvil, welder, and more, an array of materials for metal work and other forms of creativity, and plenty of space for spreading out and sculpture making. Sabrina also hosts artists at her studio, which she refers to as a “creative incubation space.” Sabrina said some of her current and past projects include decorative, architectural iron work such as railings and chandeliers (which she will also do the electrical wiring for), and huge metal sculptures of blossoms and other forms.

As you watch Sabrina’s video, here are a few questions to think about:

- What does Sabrina love about her job?
- What is a challenge that Sabrina faces in her job?
- Could you see yourself as a blacksmith and/or a studio owner in the future? Why or why not?
- Are you interested in learning more about Welding?
Hear from an Engineering Professional!

View Renee’s interview here: [https://www.youtube.com/watch?v=isbGo6bm3Kc](https://www.youtube.com/watch?v=isbGo6bm3Kc)

Renee is currently a Senior Principal Quality Engineer at General Dynamics Ordnance and Tactical Systems. Previously, she worked at General Dynamics as a Quality Engineer for the Hydra-70 Rocket Program and also as a Systems Engineer on the development of the F-35 Joint Strike Fighter Gun System.

Renee said that she was “mechanically-oriented growing up.” She liked to build things, and she took a shop class in middle school to explore building and creating objects. She enjoyed math and science in high school, and she ultimately decided to pursue engineering in college. Renee received a degree in Mechanical Engineering from Rensselaer Polytechnic Institute in New York. She explained that – although the school had a good engineering program – she also appreciated that it supported her other interests: tennis and ice hockey.

Now, Renee works with a team of 8-10 people to coordinate with payload supplies of General Dynamics’ rockets. On a day-to-day basis, she checks in with suppliers to see how production is going, communicates with her client (the Department of the Army), reviews and approves test plans and reports, and runs failure analyses, among other tasks. She says that what she loves most about her job is the people: “I love working with my teammates. That’s one of the best things – usually it’s the people.”

As you watch Renee’s video, here are a few questions to think about:

- What does Renee love about her job?
- What is a challenge that Renee faces in her job?
- Could you see yourself as an engineer in the future? Why or why not?
- Are you interested in learning more about Engineering?
All you need is a printout of the rocket kit sheet - a sheet of paper containing all paper parts for both the rocket and the launching platform.

Building the rocket is rated "tricky". Folding the bellow requires some endurance. The most important thing to observe is that all bellow parts must be air tight! The more precise you work, the higher the rocket will fly.

The most difficult part is the bellow's side wall. Cut it out and carefully scribe the bending lines! Then strictly follow the bending lines:

- - - - - - : Outside bend line
- - - - - - : Inside bend line

The bends must not break! If they do, close the slits with adhesive tape, applied to the back side of the paper. The folded bellow is then glued to the base plate. Remember: The connection ought to be air tight!
Fold up the flaps at the front of the base plate and glue them to the top side of the folded bellow. Build the starting tube by coiling the part around a pen or a stick. Slide it up through the top plate as shown on the left and glue it on the back (bottom) side of the top plate. After the glue of the first connections has dried, mount the top plate on top of the bellow.

Check whether everything is air tight: Close the end of the starting tube with your finger and carefully press the bellow. If you find any escapes for the air, stop them up!

Now build the rocket itself. Once again, the tubular part should be prepared by winding the paper around a stick or a pen. The finished tube must fit over the starting tube and slide easily along it.

Form a cone as the rocket tip and glue it on top of the tube - once again: Air tight, please ...
Build the fins and glue them to the sides of the rocket. Wait some minutes to allow the glue to dry.

Now you're ready for the first take off:
- Slide the rocket over the starting tube.
- Carefully bash onto the top of the bellow with your flat hand.
Watch the rocket race into the sky - or most likely into your room's ceiling ... If you did a good work with the bellow, five meters of height should be no problem.

IMPORTANT: Put launch pad onto an unbreakable surface. Remove all sharp or pointed objects around the pad. Keep airspace about the pad free from all faces!
Build your own paper rocket

Glue to top side of base plate

Glue below side wall here

Base Plate (top side)

Glue below side wall here

Fins

Rocket tube

Rocket tip

Glue to bottom side of bellow top plate

Bellow side wall

Glue to top side of base plate

Bellow top plate

Caution!
Keep airspace above launch pad clear of faces!

Starting tube

DANGER!
Do not hold your face above the launching platform!

Inside bend

Outside bend

More information, building instructions and more paper puzzles have a look at:
http://www.groeg.de/puzzles

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Tyler is currently the Design and Technology instructor at Burlington Technical Center. He will be transitioning over to teach the new Advanced Manufacturing & Engineering for a Sustainable Future course in the fall of 2020.

Tyler holds bachelor’s and master’s degrees in Mechanical Engineering, both from Rensselaer Polytechnic Institute, and a PhD in Environmental Engineering from the University of Vermont. Tyler has a diverse background in building and making, working as a carpenter, auto mechanic, race car designer and fabricator, composite part designer and fabricator, a design engineer for an international automotive manufacturer, and as a design engineer for an aftermarket all-terrain vehicle suspension manufacturer. He has in-depth knowledge of computer-aided design, manual and CNC machining, and hand fabrication, making him a valuable resource for students who want to explore the design and fabrication process.

For more information about the Advanced Manufacturing & Engineering for a Sustainable Future program, visit https://btcbsdvt.org/programs/new-advanced-manufacturing-engineering/.