

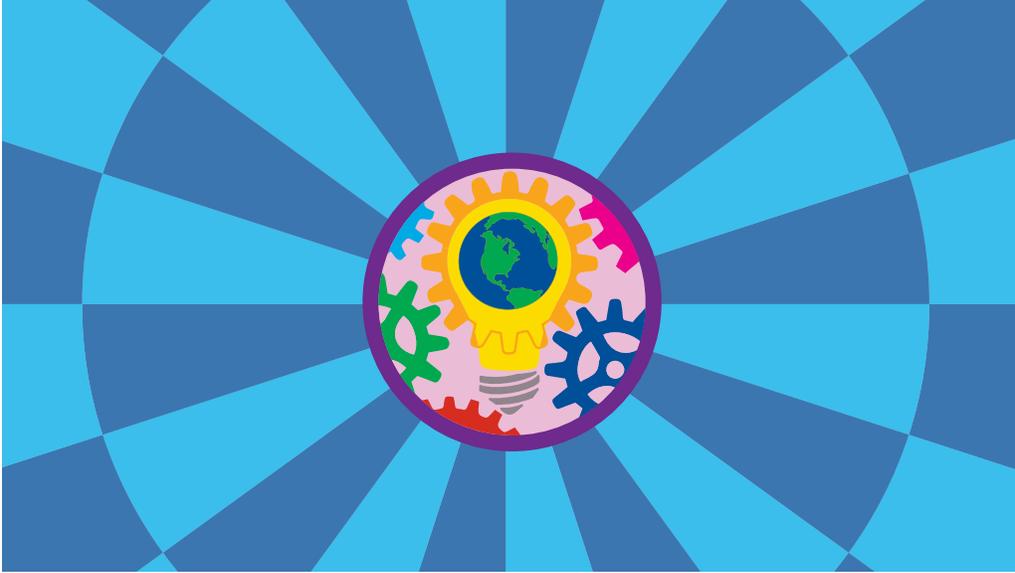


*Dream!  
Design!  
Create!*

*Explore the  
World of  
Mechanical  
Engineering!*

**Girl Scouts of  
Greater Atlanta  
Council's Own  
Badge**

**Developed in  
partnership with  
ASME Design  
Engineering Division**



# Mechanical Engineering

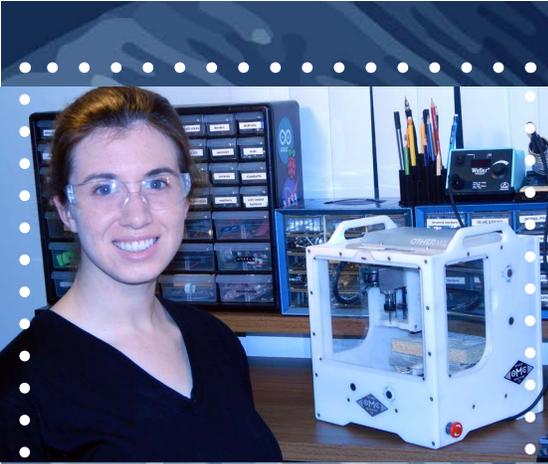
**D**iscover mechanical engineering through these activities. Engineering is everywhere - see how YOU can make an impact in today's world.

## *Steps*

1. Explore Engineering
2. Let's Get Energized
3. Go Green
4. Dream it! Sketch it! Model it!
5. Building for Tomorrow

## *Purpose*

When I've earned this badge, I will know more about mechanical engineering and how engineers make the world a better place.



Every step has three choices. Do ONE choice to complete each step. Inspired? Do more!

# STEP 1 Explore Engineering

**First thing's first! What does it mean to be a mechanical engineer? Learn about who mechanical engineers are and what they do. Discover what is exciting and why you might be interested in being an engineer.**

## CHOICES - DO ONE:

**Meet a Mechanical Engineer.** Chances are, you already know a mechanical engineer! Find out who, or meet someone new, and talk to them about what they do. You might ask them about: what their favorite part about engineering is, what it's like to study engineering in college, or advice they might give to someone like you who might want to be an engineer one day.

**OR** .....

**Discover the World of Engineering.** Are there other kinds of engineering besides mechanical? YES! there are many different kinds of engineering. Do some research either through the internet, through talking with an engineer you know, or by reading a book, to find out about all the different engineering career options. Pick which one is your favorite, and tell your troop leader why.

**OR** .....

**Nature and Engineering.** Observing the world around you can lead to new designs or help solve engineering problems. Engineers can use nature as a foundation for their designs by mimicking what things found in nature do. After walking through the woods you might notice that prickly seeds (cockleburs) stick to your clothing. Looking closely at the prickly seed to see how it does that resulted in the creation of hook and loop fasteners (Velcro), like the ones found on shoes. What are some things that you see in nature that are mimicked in what we use everyday?

Hi! I'm Morgan, and I'm a mechanical engineer and a Girl Scout!

I love mechanical engineering because I get to be creative every day, use cool tools and work with computers and my hands, and I'm empowered to create products that help people.

Girl Scouts taught me leadership skills that I use when working with my team

Check out the **GSGATL STEM Patch** for more cool science, technology, engineering and math activities.



# What types of Engineering are there?

Circle each of the different types of engineering.

- Aerospace
- Architectural
- Biomedical
- Chemical
- Civil
- Computer
- Electrical
- Environmental
- Industrial
- Materials
- Mechanical
- Nuclear
- Software
- Structural
- Manufacturing

P E M A K E T H E W O R L D L M C A  
 R V J R A B E T T E R P L A C E O S  
 O E L C O M P U T E R F A I R L U M  
 M R M H P E N G I N E E R E B E R E  
 I Y S I A M H S M E C H A N I C A L  
 S O F T W A R E A H H O R O O T G A  
 E K F E M T J T N E E N E T M R E U  
 J N U C L E A R U L M E S H E I O T  
 N G I T D R B T F P I S P E D C U H  
 S A W U O I E O A F C T E R I A S O  
 I E I R M A S B C U A R C S C L A R  
 N R L A Y L T E T L L A T L A N T I  
 D O L L K S T R U J M Y S E L F G T  
 U S E R E S O U R C E S W I S E L Y  
 S P C D V G F R I E N D L Y K J A H  
 T A E N V I R O N M E N T A L A W E  
 R C I V I L M A G I R L S C O U T K  
 I E S I S T E R S T R U C T U R A L  
 A R E S P O N S I B L E C A R I N G  
 L C O N S I D E R A T E S T R O N G



## Where can you see Engineering in your community?

Explore your town! Participate in a scavenger hunt looking for things made by engineers.



Share a picture of what you found here!



### Examples

- Science, train or airplane museums
- Bridges
- Roller coasters, playgrounds, buildings



STEP

# 3 Go Green

Explore alternative energy sources such as wind, water and solar power. Dream of ways that you can make a positive impact on the world by using these green energy sources.

**CHOICES - DO ONE:**

**Use Resources Wisely.** Identify some renewable resources that can be used to produce energy. Brainstorm and sketch ways you could redesign common household items to be more energy efficient or even make their own energy.

**OR** .....

**Keep it Cozy.** One way to conserve energy in a building is to use adequate insulation. Insulation helps keep the hot or cool air inside or outside of a building. This applies to people as well, we wear more clothes when it gets cold. Act as an engineer and determine which materials help keep you the warmest in different weather conditions. Have a clothes relay with your troop and see which team can layer up the fastest.

**OR** .....

**Cook with the Sun.** Make a solar oven out of foil and cardboard and try cooking a snack in it. Discuss how this could help families without access to electricity. Plan a menu as though you were a family living without electricity. How does it look different than your family's meals? How is it similar?

*More to Explore*

Make a windmill out of paper and a straw. Learn ways the wind can be harnessed to help power our world. Sketch, cut, and pin the paper to the straw



Earn the GSGATL LEED patch to learn more about renewable energy.

[STEM.GirlScoutsATL.org](http://STEM.GirlScoutsATL.org)



STEP

# 4 Dream it! Sketch it! Model it!

**Mechanical design engineers dream and design solutions for our world. They brainstorm and sketch their ideas before they start modeling or building.**

## Ship a Butterfly



Sample Supplies



Protect your "butterfly" with the supplies.



Test it! Will your shipped butterfly break?



### CHOICES - DO ONE:

**Ship a Butterfly.** Engineers love to solve problems. Your task is to protect a potato chip butterfly with items found around your house so that when your leader drops a light book on it, the butterfly does not break. Sketch your ideas before building and see what worked best.

OR .....

**Model a Cardboard Castle.** Create a castle, play house or doll house out of cardboard or other recycled materials. Building a prototype of your idea helps you to visualize it and it's a cheap way to get ideas to improve your design. Show someone your design, and tell them what you can do to make it better.

OR .....

**Tall Towers.** Challenge your team to sketch a design for a tall tower, and then model it using common parts such as Tinker Toys or Legos. Who can make the tallest tower that stays standing? What can you do to make it stronger?

**For More FUN**

Use what you learned about momentum in Step 2 and the ship a butterfly activity to create an Egg Drop device that will keep an egg from breaking when you drop it.

# STEP 5 Building for Tomorrow

Engineers look for better ways to use resources wisely and make the world a better place. Manufacturing is the key step in creating products - it's where ideas become reality.

## CHOICES - DO ONE:

- Explore! Visit a Factory.** Tour a local factory to see and learn how their product is made. Atlanta area Girl Scouts can tour the Lockheed Martin factory during Engineers Week to learn about how C-130 airplanes are manufactured.



OR .....

- Learn about 3D Printing.** Explore the world of 3D printing. Make a small toy or decoration with a 3D printer using your own design or a design from a digital library. Check to see if your local library has a 3D printer!

OR .....

- Reuse it.** Find something in your house that needs repair, and think of a solution to the problem only using materials you can find at your home. Share with others what you learned about reusing materials to fix problems. You could write a post about your sustainable solution on the GSGATL's Facebook page.



3D printed coin created by badge design team.



3D Modeled Yo-Yo Toy

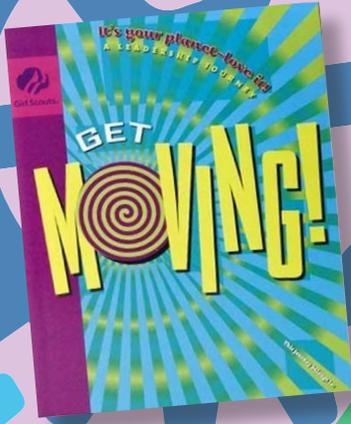
3D Printed Yo-Yo Toy

### More to Explore

#### Virtual Visions, Digital Designer

Engineers use 3D modeling and Computer Aided Design (CAD) tools to visualize their designs.

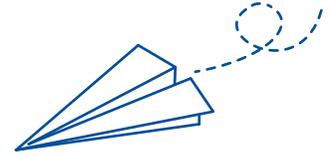
Use an online App or program to create a design of your choice.



***Add the Badge to Your Journey***  
Using what you learned in Step 3, complete the “Get Moving” Journey Energy Pledge on Page 20 of the Journey book.

**Now that I’ve earned this badge, I can give service by:**

- Showing a younger sibling or Girl Scout how to make and fly a paper airplane
- Designing and building a toy for a child
- Teaching a friend or Girl Scout about engineering careers



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*I’m inspired to:*