

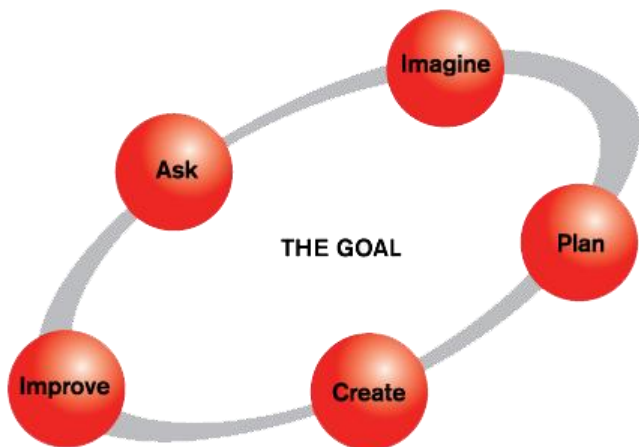
## ***Introduction to Engineering and the Design Process***

### **Introduction**

This week, we'd like to introduce you to the field of engineering, wherein people (engineers) use the engineering design process to solve problems! Engineering is the process of designing, building, and improvising structures, devices, and systems using math and science.

There are many types of engineers, such as biomedical, chemical, civil, electrical, industrial, and mechanical engineering. In the upcoming weeks, we will talk in more depth about these various fields, introducing you to professors at Northeastern working in these fields, as well as providing activities for you to try out and additional resources to learn more.

The simplest definition of “engineering” is that engineers solve problems. These problems range from small (how can I wake up in the morning, how can I prevent potholes) to global (how can we solve global warming, how can we create fresh water out of saltwater). To solve these problems, engineers use their understanding of math and science, the engineering design process, and a variety of tools, such as computer programs, calculators, or measuring devices (like an anemometer). Please view our presentation on engineering and the design process to learn more: <https://prezi.com/eco3azukx7c2/>



## Northeastern Connection

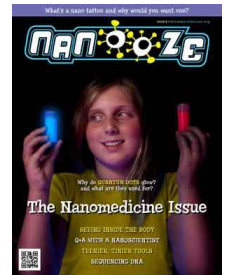


Each week we will introduce you to one of our Engineers. This week, meet our **Interim Dean: [Dr. Jackie Isaacs](#)**. Dr. Isaacs solves manufacturing problems. She also likes to teach children about engineering and nanotechnology. She and her colleagues developed a video game about nanotechnology that you can play for free: [Geckoman](#).



Nanotechnology is the understanding and control of matter at the nanoscale, at dimensions between approximately 1 and 100 nanometers where unique phenomena enable novel applications. This is TINY! The thickness of human hair is 0.08 mm or 80,000 nanometers. Nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale.

<https://www.nano.gov/nanotech-101/what>. Although a little dated, some great resources can be found @ <https://www.nanooze.org/articles/downloads/>



## Do Now

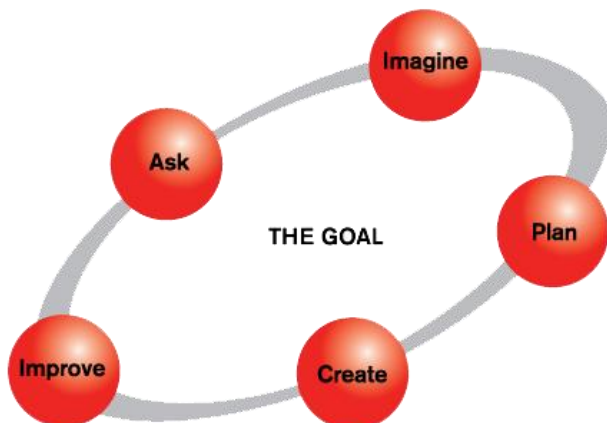
Engineers solve problems, but what are some real-world problems that an engineer might be trying to solve? In our presentation, you saw a list of the Grand Challenges (<http://www.engineeringchallenges.org/>), which are some major problems engineers in the USA are tackling. However, engineers are not limited to these challenges and can attempt to tackle any problem, which is often related to a product their company is trying to sell. In this

Do Now, you will be completing the “What Is this Thing” challenge. There are three handouts: a set of pictures, the student handout, and an answer key, all of which, including instructions and extensions can be found here:

<https://stem.northeastern.edu/materials/whatis/>.

## Activity

Now that you’ve had a chance to think about what



kinds of problems engineers may tackle, let's solve our own problem! We will be designing **paper towers** for our favorite stuffed animal, using only paper.

The design parameters/constrictions are as follows: you must build a tower that is at least one foot tall, uses only paper (no tape!), and can support the weight of the stuffed animal (which must rest on top of the tower) for at least 30 seconds.

We want to use the engineering design process for this activity (see handout below). Before diving in and solving this problem, think about the problem and brainstorm ideas. What shape(s) should the paper form? What orientation (i.e. direction) should the paper face? What is the best way to support the weight?

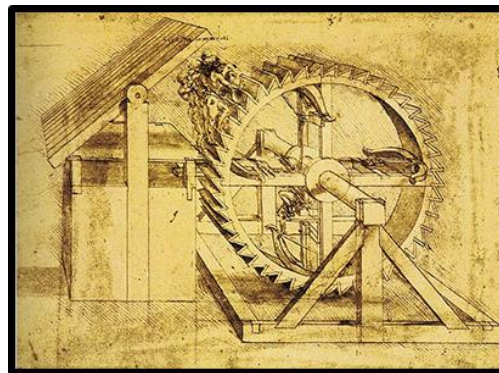
During the activity, remember: an engineer does not give up! If one solution does not work (and this happens often), we improve the design and/or try another solution.

## **Share Your Results**

We'd love to know how this activity turned out! What worked, what didn't work? Please share pictures of your final design or the process getting there! Email us @[stem@northeastern.edu](mailto:stem@northeastern.edu)

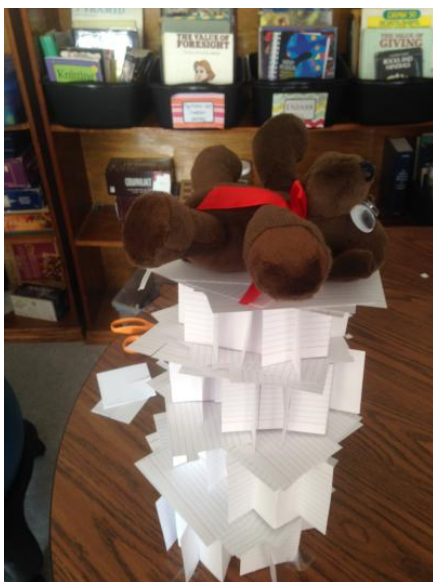
## Supplies Needed

Do Now: Handouts + Pencil | Handouts: <https://stem.northeastern.edu/materials/whatis/>



**Activity:** Small stuffed animal, scissors, index cards or playing cards or paper

Handout: <https://stem.northeastern.edu/wp-content/uploads/EDP-Handout.docx>



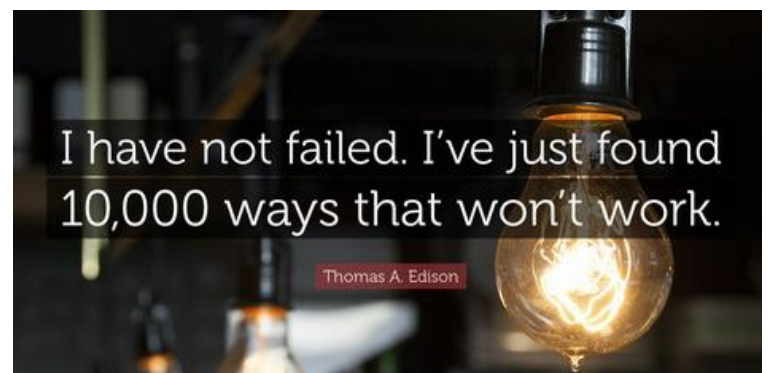
## Related Links/Extensions

What better way to learn more about engineering than to play some engineering games? Explore these sites for some online games to play:

- Try Engineering:

<https://tryengineering.org/students/games/>

- PBS Kids:



<https://pbskids.org/games/engineering/>

• New Engineer: <https://newengineer.com/insight/the-12-best-games-for-engineers-1027990>

## Engineering Word Search

E	E	E	M	E	L	B	O	R	P	E	N	N	N
O	C	G	M	E	T	A	E	R	C	M	B	A	S
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O	K	S	A	H	N	C	I	M	R	E	M	O	R
H	N	Y	R	G	G	I	N	E	T	L	S	T	E
E	I	R	E	N	S	E	M	I	N	O	A	E	A
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H	I	P	G	E	L	I	N	M	I	R	N	O	I
P	E	O	N	C	O	A	E	E	G	O	L	L	T
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I	S	M	I	I	I	E	O	A	I	Y	R	Y	O

SCIENCE  
IMPROVE  
NANOTECHNOLOGY  
PLAN  
PROBLEM  
SOLUTION  
ENGINEER  
MATH  
IMAGINE  
CREATIVITY  
ASK  
CREATE

Play this puzzle online at : <https://thewordsearch.com/puzzle/972432/>