



## The Engineering Design Process

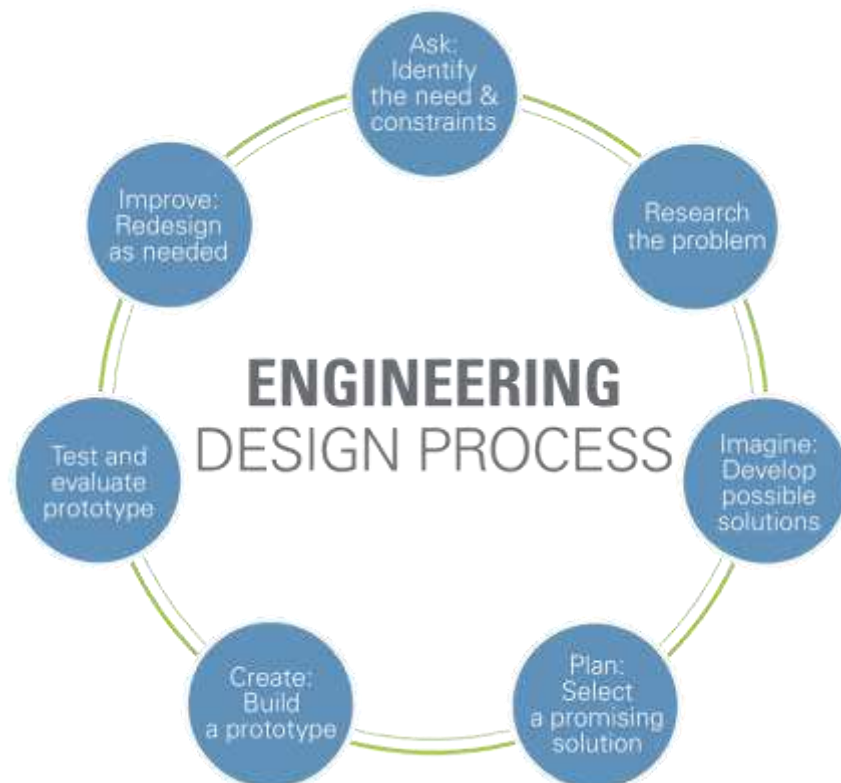
What are the benefits for student learning in using the Engineering Design Process?

EDP teaches collaboration and promotes critical thinking skills. Students:

- Learn to work together by creating and designing a plan (first individually then in a group);
- Describe and justify a plan, learn to share and present their thoughts, justify answers, debate/defend/explain their thinking;
- Solve problems by finding answers to questions;
- Collect data, analyze data, make modifications and adaptations;
- Justify why they make changes, state opinion, remedy solution;
- Become self-learners;
- Learn through trial and error and from mistakes; and
- Learn to revise ideas, making and testing predictions.

EDP:

- Promotes deeper understanding of content
- Promotes investigation and research
- Promotes reflection
- Keeps students engaged and involved



Resources:

- <https://www.teachingchannel.org/videos/engineering-design-process>
- <https://www.slideshare.net/marylaliceosborne/essential-questions-for-students>

## Guiding questions

### **ASK (Identify the need and Research):**

- What do you need to do?
- What is the problem?
- What is the relationship between...?
- How would you...?
- What are the constraints and limitations? What are you allowed to do?
- What do you know...?
- Where can you find information about your problem?
- How would you describe...?

### **IMAGINE:**

- What are some different ways to address the problem?
- How have others solved the problem?
- How does... compare with...?
- How would you go about solving the problem...?
- How did you choose...? Why did you choose...?
- What did you decide ...why?
- What factors drove your decision?
- How creative can you be?
- What else could...?
- How does the research data determine your design decisions?
- Why do you believe...?
- What would happen if...?

### **PLAN:**

- Which imagined ideas are possible, given your time, tools, and materials?
- What materials and resources are needed?
- What are some possible issues that may arise as build your project?
- How can a sketch/drawing help clarify your design?
- What do you predict will happen...?
- What would result if...?
- How does your selected design work?
- How will you test and evaluate your selected design?

### **CREATE/TEST/EVALUATE:**

- Why is it a good idea to keep testing a design?
- Does your design work?
- What specific goals are you trying to achieve, and how will you know if you have been successful?
- What are your observations and findings?
- How does your design meet the requirements and constraints of your problem?
- What were the different steps you did to get your design to work?
- What was the hardest issue to solve?

### **IMPROVE:**

- What is the best feature of your design? Why?
- How would you improve...?
- How could you change...?
- What different choice would you have made...?
- What could improve...?
- What would you do differently?