# Engineering Design Process for Student projects
## A process for general problem-solving and design

The Engineering Design Process (EDP) is a process that helps designers in any discipline - not just engineering! - create solutions to problems. While there are many ways that people solve problems, designers often use the EDP because it offers a clear roadmap for them to follow as they work towards a solution. Teachers can help students use this process in K-12 classes as a guide for student project work.  It is an excellent tool for general problem-solving as well as creative design and should not only be reserved only for highly technical projects.



ENGINEERING DESIGN PROCESS

DEFINE
LEARN + EXPLORE
DESIGN
CREATE
OBSERVE + IMPROVE
REFLECT
SHARE

First, designers **Define** the challenge they are facing, then **Learn** more about the problem and **Explore** existing solutions. It's tempting to skip these first few steps and head straight into brainstorming, but don't! When designers take the time to understand the problem clearly, they come up with much better solutions.

The **Design** phase is where brainstorming happens. Designers brainstorm multiple possible solutions, then develop a few of them into more detailed plans. Encourage your students to plan at least 3 of their potential ideas before choosing a design direction and starting to **Create** a product based on their design.  If they hit any roadblocks trying to create their first design choice, they'll be able to revisit their alternate design plans and choose a new direction - without starting from scratch.

Designers then take time to **Observe** their design and see how they can **Improve** it. *We strongly recommend that students have an opportunity for at least 2 Create-Observe-Improve cycles.*  When students feel they have to "get it right the first time," they are less willing to take risks and be creative. By repeating the cycle, they have a chance to fix flaws and adopt successful ideas from classmates, and in fact, they're practicing what professional designers really do.

A good design cycle builds in time for the designer to **Reflect** on their product and the process of making it, looking for learning habits and insights that will help in future challenges.

When the work is complete, designers are ready to **Share**. They bring their work into the real world, by posting, publishing, presenting, or exhibiting - or giving or selling if appropriate! - what they've made. For students working through a design process, a real audience helps students connect their learning and work experiences to the world outside the classroom. For Makerspaces and Maker projects, in particular, this is hugely important for building confidence in every student and a sense of community among Makers.