# Tips for Teachers & Mentors

**Originated By: Purdue Extension and Indiana 4-H**

**What is the NFPA Fluid Power Action Challenge?**

The Action Challenge is an opportunity to introduce youth to hydraulics, pneumatics, engineering design and STEM careers, while giving them an opportunity to build life skills such as teamwork, critical thinking, problem solving, and communication.

**What's my role?**

Teachers and mentors have a very important role. They're charged to help keep students focused and excited during the program. Here are some tips and tricks to guide you through the process:

***DO:***

- Encourage youth to think outside the box.
- Make sure that not just one team member is dominating the discussion, idea sharing, and building.
- Encourage youth to understand their strengths and weaknesses and encourage the group to share those to see where each youth fits best.
- Be a cheerleader.
- Foster inquiry based learning. No answer is wrong, let teams work through the process.
- Teach youth to use their resources. Have them google designs, questions, and solutions! This not only helps them be more independent, but teaches them a great research skill for the future.
- Help teams focus more on the process than the end goal, this will build confidence in their abilities.
- Make sure to help teams understand time management when building and carrying out their design. Have them practice and time areas, so they know how to properly use their time.
- Let them fail. Failure is okay, because failures sometimes end up with an awesome product. We learn more from failing than we do from always doing things correctly.
- Realize that a "messy" drawing is OK if it consolidates an idea and if the idea is rejected. Ascetics don't need to be perfect but sketches should show some detail, particularly when it comes to connecting components together.
- Remember teams are evaluated on the use of vocabulary in context in the non-pictorial parts of the portfolio.
- Use this as an opportunity to engage the A in STEAM through the inclusion of art and graphic rendering.

***DON'T:***

- Take over the idea time. Remember this is their project, not yours.
- Criticize ideas. This is a quick way to shut down creative processes.
- Get frustrated with the group. Try to stay patient even if they are doing things completely different than how you would like them to be done.
- Forget why we are doing this. As much fun as a challenge is, the real reason to have this competition is the learning and STEM experience that the students are having.

**What Should I expect for the time in between the Workshop and the Competition?**
During the period that the students are working together make sure that they are putting a good effort to create their portfolios. The portfolio will be evaluated based on:

- Outlining the division of labor (Describe the skills of each member and how much time was devoted to the activities)
- At least 3 illustrations of initial design concepts
- Detailed list of materials used from the Workshop Kit
- Explanation of the placement of the fluid systems
- Hand drawn Isometric and Orthographic drawings. Many sketches demonstrate that the device was not just put together without considering a soft design.
- Description of the use of principles of structural strength and stability. Have the students explain the best ways to make their structure stable and strong.
- List of alternative materials that would've been useful, including the reasons why.
- Evaluation of prototype including the conclusions from making it. Ultimately, test their design by building it and improving it over time. (Students can take pictures of the process, if desired)

Another aspect of the Action Challenge is teamwork. While it can be difficult to have teams meet consistently, it is important for them to create a plan (timeline) and have vision for milestones they need to achieve between the Workshop and Challenge days. It may be that they work on their own for a while and then convene to combine their work.

NFPA's website has resources to help. **Here are some items to reference:**

- The portfolio is worth 45 points and should be given ample time and consideration to complete. Review various types here:
  - High school sample portfolio
  - Middle school sample portfolio
  - Industry sample portfolio (Daman Products)
- Challenge Rules
- Challenge Rubric
- Iso-Ortho graphic drawings explained
- Cube Instructions
- Lifter & Rotational Platform PowerPoint
- Student consent forms
- Teacher feedback form