NFPA Education and Technology Foundation

Information for Host(s), Organizer(s) and Teachers of Teams Participating in a Community Wide Fluid Power Action Challenge

Please review this document along with the current Workshop Day Presentation, Juges' Rubric, Team Challenge Rubric, and Team Template.

This document highlights key information about the NFPA Fluid Power Action Challenge; what students will learn and experience; and what you should know about the Challenge Day competition.

Pre-Workshop Day Preparation for Hosts and Organizers:

- If this is your first time hosting or organizing an event, be sure to…
  - Read / review the Workshop Day presentation and this document
  - Have a plan for the lunch break, such as releasing team tables by rows
  - Familiarize yourself with the Workshop and Tool Kits; determine who will demonstrate how to safely use each tool on Workshop Day
  - Remember to…
    - Have tablecloths / covers for the Workshop Day tables – glue, food, drinks will be spilled
    - Pack tape and the 11 x 17 team name signs
    - Finalize the Housekeeping slide in the Workshop Day presentation
    - Count and pack the materials for the Workshop Day

Pre-Workshop Day Preparation for Middle and High School Educators:

- Assemble your students into teams of 4, but no fewer than 3.
- Make sure team names are submitted to your event Host and Organizer at least 2 weeks in advance of Workshop Day
- The week prior to Workshop Day…
  - Review the Workshop Day Presentation, agenda, and overall Fluid Power Action Challenge information.
  - Refresh your students on how to use an Imperial Unit (inch, feet, fractions of inch) ruler by showing the 1/16th, 1/8th, 1/4, and ½ inch increments AND conducting measuring exercises.
  - Confirm your school ordered / scheduled transportation to/from the Workshop Day event.

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Workshop Day – Educators, Hosts / Organizers, and Volunteers

- Workshop activities are outlined in the Workshop Day Presentation. Key sections include the Fluid Power Overview, two kit building exercises, safe instructions, the hand tool introduction / demonstration and Challenge Day introduction. The **Team Portfolio requirements** are included in the Challenge Day section.

- **Fluid Power Introduction** - NFPA eliminated the video from its resources, but replaced it with slides about the industry, careers and salaries.

- **Applying Wood Glue** - In the bag without a label, inside the "Workshop Kit" box, there are small cups. These are used to hold a small amount of wood glue. Each team of four needs a bottle of wood glue and there are stirring sticks to apply the glue to the wood and cardboard when assembling a device. Emphasize that only a small amount of glue is required to secure the pieces. Extra cups and stirrers are in the Facilitators' kits.

- **2 "Mini Kit Build" Exercises** - If you are the event Facilitator, it is advisable to have the two models pre-made to show how the Lifter and the Rotating Platform work. There is an extra kit of both in the Facilitator's Kit.

  The kit build instructions are PDF files titled "Cube & Lifter Instructions" and "Rotating Platform Instructions." These two exercises will help teams build confidence before they attempt to design and build their prototype machine. Teams will also learn how to glue and assemble parts, connect syringes (pistons) and hoses, and create a machine that rotates, lifts and picks-up an object.

  The kit materials are pre-cut, so teams should only need safety glasses, scissors, glue, a ruler and possibly sandpaper. Do not show team how to assemble the kits; let them make mistakes and discover that the thickness of the wood matters.

  Hosts, consider pre-building a kit for yourself to use as a reference and build familiarity with the contents and assembly.

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- **Introducing the Hand Tool Kit** - Demonstrate how to clamp the miter box to the table with the C-clamp; safely cut wood by placing it in the miter box's "wide-channels," secure the syringe plunger by pressing the flange into the miter box's "narrow groves," insert the drill-bit into the drill chuck; and how to use the file.

- **Introducing the Challenge Scenario and Challenge Day –** the Workshop Day presentation covers the Challenge Scenario and guides the Host / Organizer through Challenge Day elements and rules.

  Key timing to understand:

  - In the time **between Workshop Day and Challenge Day,** teams will research, design, build, test, and fine-tune their prototype machines during classroom and extracurricular time (about 40-45 hours).

  - **Within that same timeframe**, teams will also prepare their portfolio, which documents their roles, design process/ build instructions, and captures their fluid power knowledge, reasoning, content ownership, and insights.

  - On Challenge Day, **most teams** will reconstruct their final prototype machine from a Challenge Day Kit (**identical to the Workshop kit, minus the two mini kits**) by following the "build instructions" they captured throughout their portfolios. Team will have 3 to 3½ hours to reconstruct their device.

- **Help teams understand the Design Process** and the Team Portfolio - both topics are included in the Workshop Day presentation. A copy needs to be provided for each team on Workshop Day.

- **Using the Judges' Rubric and Team Rubric**- Judges often comment that teams do not maximize their scores in the portfolio because they do not read the Team Rubric.

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The detailed **Judges Rubric** specifies exactly how to score the most points in the portfolio. For example, in the section on "Rationale used to decide on the type of fluid power used and where to place the piston-syringes," the rubric lists the terms that needed to be include in a written response.

On Challenge Day, the event Host, Organizer, or experienced volunteer can instruct the judges on how to use the Judges' Rubric in about 20-30 minutes. It is best to conduct the training early, while teams are working on their machines and before the judging begins.

Each teams needs to receive two copies of the Team Challenge Rubric on Workshop Day. The Workshop Day presentation covers the topic, but it is recommended that the Host or Organizer make sure the teams (and educators) understand the resource. Hosts should also use a copy of the Judges' Rubric to help the teams understand how they will be evaluated and scored.