NFPA
Education and
Technology
Foundation

2023-24 Fluid Power Action Challenge Organizer's Meeting

James Foster – NFPA Workforce Program Manager

Stephen Rogers – Mechanicals Kits Ltd.

2023-24 Season Agenda

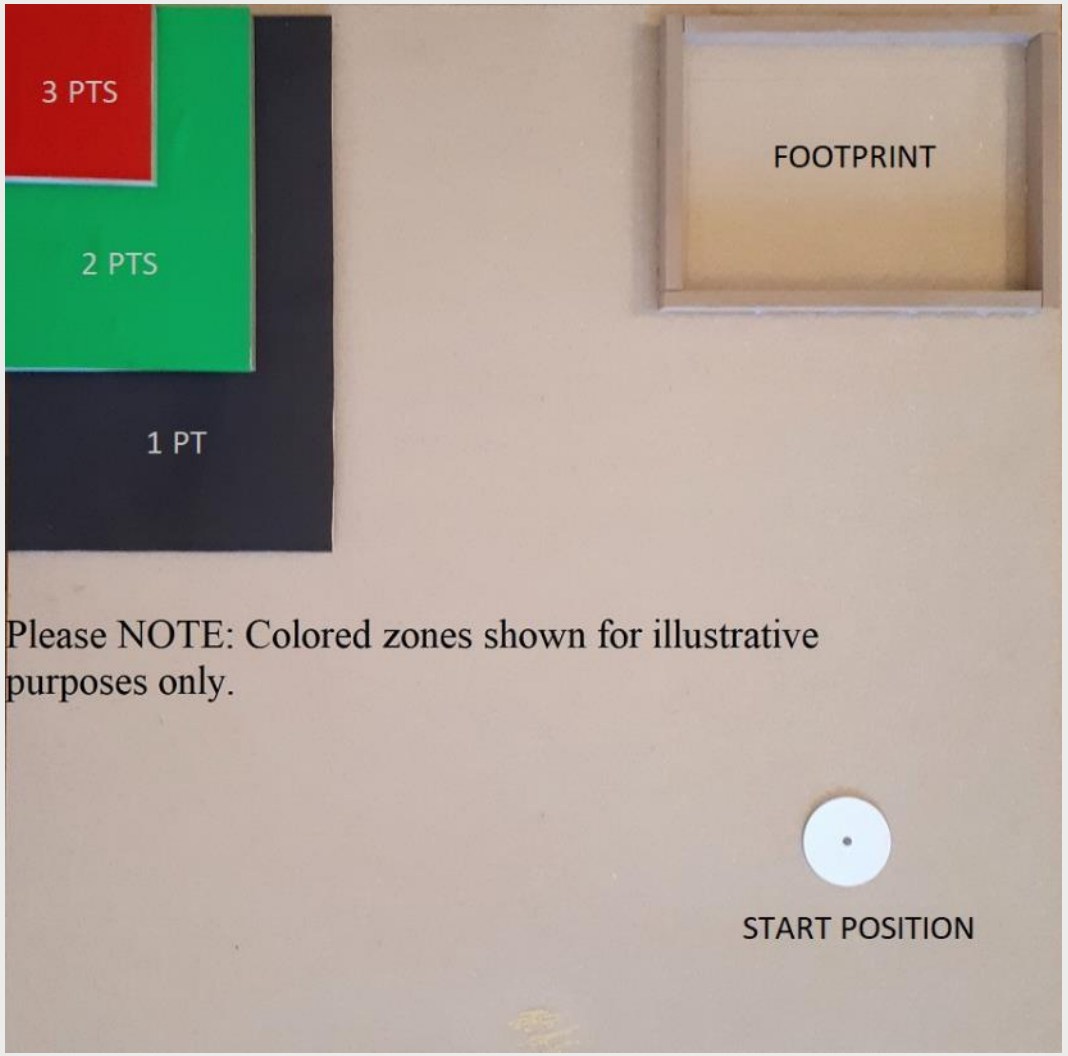
- Event Scenario + Brief Fluid Power Action Challenge Overview
- NFPA Website
- Find a Challenge Event
- $500 Fluid Power Action Challenge Grants
- Extended Fluid Power Action Challenge Overview + Tips
- Questions & Feedback

Mechanical Kits Ltd.

Mechanical Kits Ltd. - https://fluidpowerkits.com/product-category/fpac-kits/

- Company: Organizer & supplier of the NFPA's Action Challenge & Canadian National Fluid Power Challenge
- Stephen Rogers: educator & Mechanical Kits owner

2023-24 Challenge



Fluid Power Action Challenge Web Pages

1. Goto https://nfpafoundation.org/middle-schools/programs-resources/fluid-power-action-challenge/
2. Scroll to “Middle Schools” & click the 
3. Find “Getting Started,” Find a Challenge Event,” & “How It Works” – recommend going to “Getting Started”
4. “**Getting Started**:” overviews of Workshop Day (event introduction) & Challenge Day (competition day)
5. “**Find A Challenge**:” lists Fluid Power Action Challenge events (Workshop + Challenge) by date & includes the name of the host organization & primary contact
6. “**How It Works**:” provides resources to conduct the competition, including presentations, learning materials & instructions
   - Scroll down to “**Marketing & Promoting Your Event**:” for planning & marketing your event

Find A Challenge Event Calendar

https://nfpafoundation.org/middle-schools/programs-resources/fluid-power-action-challenge/find-a-challenge-event/

Event Host / Organizers

- Please email your event information once dates are set & I'll add it to the calendar
- If seeking NFPA member companies to volunteer, please indicate that in your email
- Reminder: place kit orders with Mechanical Kits (Stephen Rogers) 2.5 weeks **minimum** prior to your event

Information	Kick-off / Workshop Day	Challenge Day
Host / Org. Name & Contact Info.	X	X
Event Address, Dates, & Times	X	X
Number of Schools Registered /Expected	X	X
Number of Teams Registered / Expected	X	X
If Seeking NFPA Member Volunteers	X	X
Web Ready Logo (jpeg)	X	X

$500 Fluid Power Action Challenge Grant

- https://nfpafoundation.org/middle-schools/programs-resources/challenge-grants/action-challenge-grant-application/
- NFPA awards up to $500 to schools & community organizations to help support Fluid Power curriculum & programming
- Recipients are allowed one (1) grant per academic year. Maximum of one (1) grant per school
- Funds can help subsidize direct costs associated with attending the Fluid Power Action Challenge (e.g., event registration fees, kit purchases, bus transportation to events, or substitute teacher pay)
- Grant recipients are required to submit a summary report at the conclusion of their event
  - Written summary reports need to be supported with photos, video, &/or students testimonials

Fluid Power Action Challenge – Extended Overview

4 key parts of the event:

1. Kick-off & Workshop Day	**Approx. 5 Hours (Includes lunch BUT Excludes Travel)**
2. Students (Teams) research, plan design, & develop a working prototype	**Plan for 40 - 45 Hours**
3. Challenge Day (aka “the competition”)	**Approx. 6-7 Hours (Includes lunch BUT Excludes Travel)**
4. Share Challenge event information with NFPA	**Approx. 1 Hour**

Three Primary Roles

- **Host / Organizer:**
  - Company, School, or Community Organization hosting & running the event
    - Plans & manages the event in collaboration with the venue, educators & volunteers
    - Assigns & instructs volunteers on their roles (below)

- **Volunteers:**
  - Typically, NFPA member companies, school staff, & community organization staff
    - <u>Workshop Day needs:</u>
      - Help Host, teams & educators understand the kit parts, tools, event resources
      - Help teams think through engineering problems, but do not provide solutions
    - <u>Challenge Day needs:</u>
      - Portfolio review person (or team)
      - Engineers to help mentor teams with engineering problems / questions
      - Manage challenge board process (minimum 3 people / board - timer, scorer & peg-setter)
      - Data entry (spreadsheet) person
      - Monitor& score team safety

- **Educators/ Schools:**
  - Help teams think through problems / questions, BUT do not provide solutions
  - Demonstrate where teams can find Fluid Power Action Challenge resources on the NFPA website & YouTube
  - Monitor student behavior & safety
  - Order transportation to / from the events (as needed)

Event Kick-off & Workshop Day

- Organized by the event Host (e.g., school, company or community organization) with participating schools
- **Goal:** introduce student teams (& educators) to the Fluid Power Action Challenge (industry overview, Tools, Workshop Kit, Challenge Rubric, & project portfolio)
- Teams work on Workshop kit “mini-projects” (refresher for teamwork, using rulers, & getting familiar with kits)
- Educators & team learn where to find useful resources on NFPA Site
  - https://nfpafoundation.org/middle-schools/programs-resources/fluid-power-action-challenge/how-it-works-2/
- Teams return to school(s) with Workshop Kit, Tool Kit, & Rubrics. Some events MAY include the Challenge kits, too.

Examples: Workshop Day

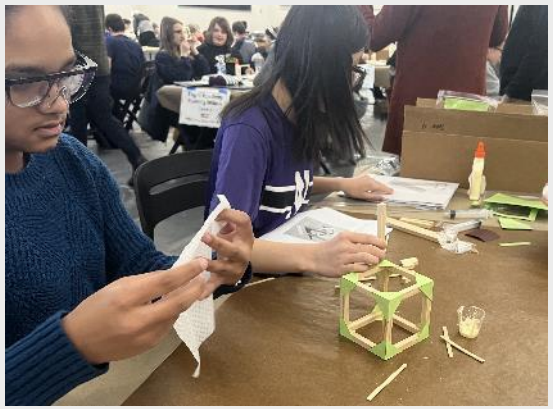
Fluid Power Action Challenge

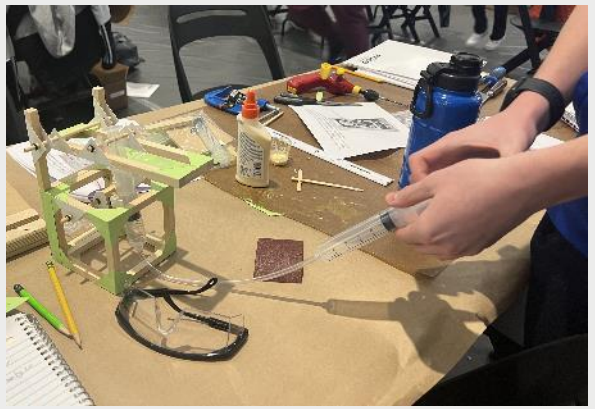
Agenda
Workshop & Challenge Days

Waukesha County Technical College
Audio/Video Gymnasium; Building S

WORKSHOP DAY	Friday, February 3
9:00 a.m. – 9:30 a.m.	Registration
9:30 a.m. – 12:00 p.m.	Learn about fluid power by building a pneumatic device
12:00 p.m. – 12:30 p.m.	Lunch
12:30 p.m. –1:30 p.m.	Introduction to Fluid Power
1:30 p.m. –2:30 p.m.	Receive challenge information and judging criteria
2:30 p.m.	Departure

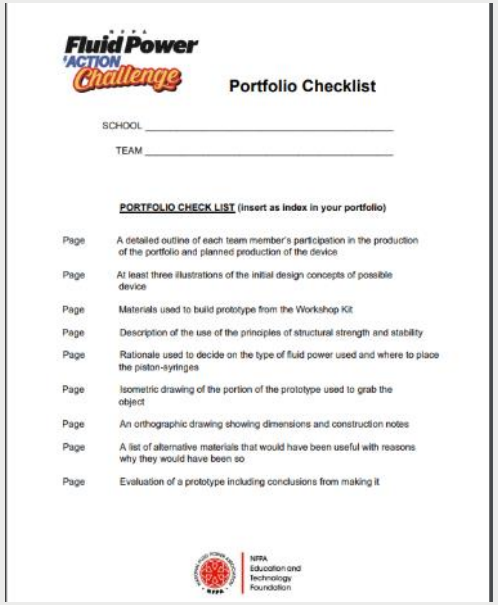
CHALLENGE DAY	Friday, March 10
8:45 a.m. – 9:15 a.m.	Registration
9:15 a.m. – 9:30 a.m.	Judges Meeting
9:15 a.m. – 12:00 p.m.	Construction of prototype
12:00 p.m. – 12:30 p.m.	Lunch
12:30 p.m. – 1:00 p.m.	Finish construction and testing of prototype
1:00 p.m. – 2:30 p.m.	Competition
2:30 p.m. – 3:00 p.m.	Awards
3:00 p.m.	Departure





Teams Research, Plan, Design, & Build

- Teams use the Workshop Kit & Tool Kits (1ea. / team) + research, planning, & design to build / create a working prototype
    - Build a working prototype with Workshop Kit materials…nothing else
- Teams create the project portfolio to capture collaboration, planning, design, failure / successes details, drawings, & outcomes
- Teams turn in one (1) portfolio to the judges on Challenge Day & keep one (1) to help with the Challenge Day build / competition
- Portfolios can be a “key to event success”



Fluid Power Action Challenge

Portfolio Checklist

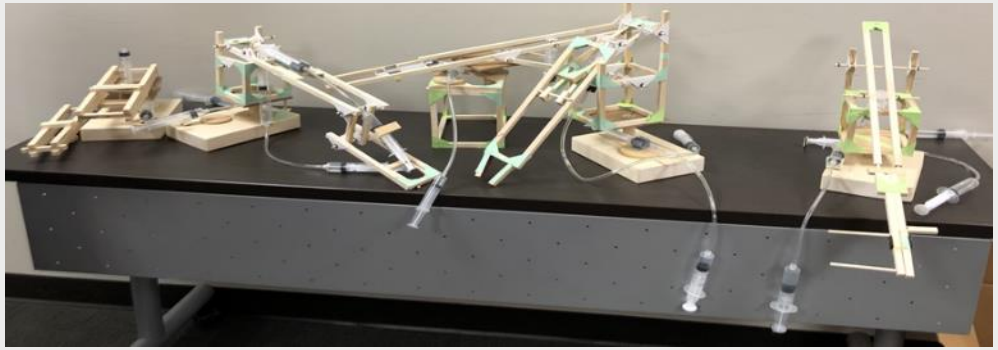
SCHOOL _____

TEAM _____

PORTFOLIO CHECK LIST (insert as index in your portfolio)

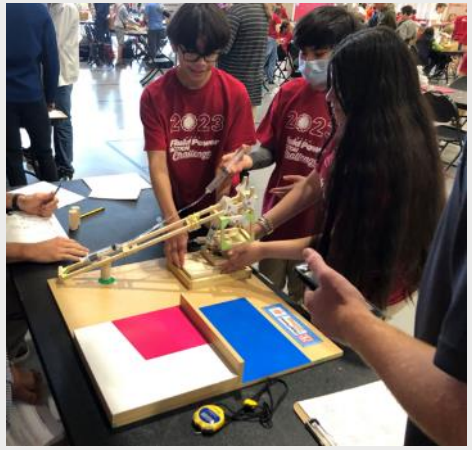
Page	A detailed outline of each team member's participation in the production of the portfolio and planned production of the device
Page	At least three illustrations of the initial design concepts of possible device
Page	Materials used to build prototype from the Workshop Kit
Page	Description of the use of the principles of structural strength and stability
Page	Rationale used to decide on the type of fluid power used and where to place the piston-syringes
Page	Isometric drawing of the portion of the prototype used to grab the object
Page	An orthographic drawing showing dimensions and construction notes
Page	A list of alternative materials that would have been useful with reasons why they would have been so
Page	Evaluation of a prototype including conclusions from making it

NFPA Education and Technology Foundation

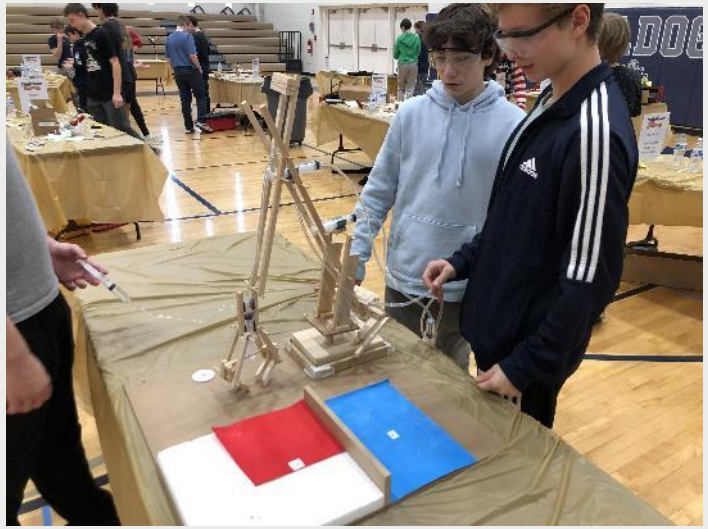


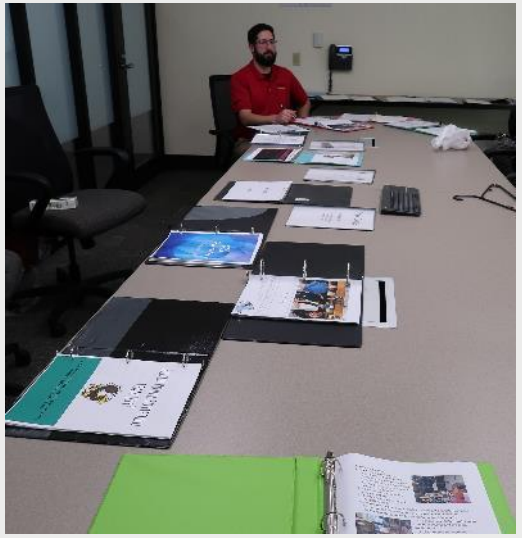
Event Challenge Day ("The Competition")

- Most events require teams to re-construct their final working prototype with the Challenge Competition Kit & compete with it
  - **Some** events allow teams to compete with working prototype machine made from the Workshop Kit
- Teams are judged on their portfolio, machine build, responses to questions, safety, & performance on the competition board
  - Teams who successfully built a working prototype & prepared well documented portfolio, tend to do well
  - A complete & well documented portfolio can help Teams when machines do not perform as expected



Examples: Challenge Day





Share Challenge Event Info With NFPA

Number of participating schools

Number of participating teams

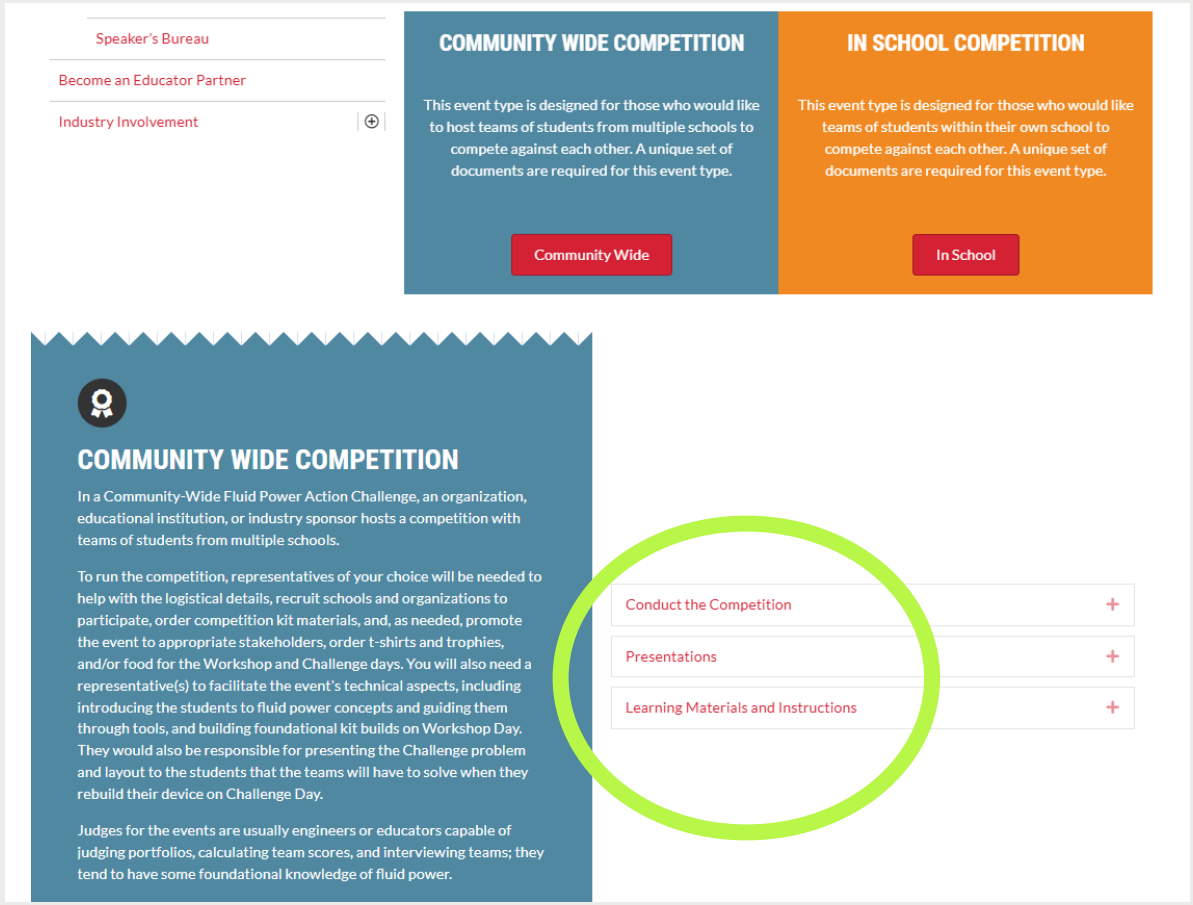
Number of participating students

Names of **NFPA member companies** who provided volunteers, event support, or event sponsorship

Photos of the Challenge Day: students, teams, competitions & volunteers

NFPA Resources For Hosts & Educators

https://nfpafoundation.org/middle-schools/programs-resources/fluid-power-action-challenge/how-it-works-2/



Resources For Hosts & Educators – Cont.

https://nfpafoundation.org/middle-schools/programs-resources/fluid-power-action-challenge/how-it-works-2/

Conduct The Competition	Presentations	Learning Materials & Instructions
Notes for Teachers & Facilitators	Introducing the Challenge	Portfolio Checklist (1 per team)
Challenge Rules (1 per team)	Challenge Layout Dimensions - 2023-24 FPAC ISO	Portfolio Template (1 per team)
Challenge Scenario (2 per team)	Challenge Layout dimensions – 2023-24 FPAC PLAN (1 / team)	Fluid Power Fundamentals
2023-24 Layout Board with Zones	ISO-Ortho Views illustrated	Tips for Teachers and Mentors
Challenge Rubric (2 per team)	Lifter Instructions	Hints for Device Design & Construction (2 per team)
Judges' Rubric	Rotating Platform Instructions	Building a Cube Instructions (legal)*
Judges' Duties	Fluid Power Careers (Sample) (Price Engineering)	Process Cube Sides (legal) (1per team)
Challenge Pre-Survey for Students	Introduction to Fluid Power-Video Presentation	Design Process Diagram (1 per team)
Challenge Post-Survey for Students		Judges Master Scoresheet
Teacher Feedback Survey		ISO-Ortho lesson
Workshop Day Documents		Middle School Portfolio
		Mid-Project Checklist

Veteran Tips & Suggestions

- Bus transportation challenges were common last season. Confirm reservations & maintain communication with bus companies
- Educators - schedule time (**40 – 45 Hours**) for teams to build prototypes & work on portfolios. Exclude holidays from the dates / times planned
- Store kits in a secure & safe place
- Encourage educators & teams to use NFPA's resources + YouTube for machine design ideas
- Add a mid-project check-in for machine prototype & portfolio status (use "Mid-Project Checklist")
- Encourage teams to test prototypes on a Competition Board or paper version during prototyping & before Challenge Day
- Remind students to "measure 2x & cut once" 😀
- Refresh teams on how to use a ruler 😀

Questions & Additional Tips / Suggestions

- Any questions?
- Any additional tips or suggestions from experienced hosts, volunteers or educators?

NFPA Fluid Power Action Challenge

National Fluid Power Association
James Foster, Program Manager
Jfoster@nfpa.com

Mechanical Kits Ltd
Stephen Rogers, President
support@mechanical-kits.com