

**2023-24 NFPA Fluid Power Vehicle Challenge**

**FINAL COMPETITION – April 10-12, 2024**

Norgren | 5400 S. Delaware Street| Littleton, Colorado 80120

**Final Competition**

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# FINAL COMPETITION OVERVIEW

The NFPA Fluid Power Vehicle Challenge (“Challenge”) final competition will be hosted by Norgren, an NFPA Pascal Society Donor, from April 10-12, 2024.

*“Norgren is looking forward to hosting students and teams from across the country for the NFPA Fluid Power Vehicle Challenge. Norgren is excited to meet the students, the world’s future, for the fluid power industry. We are a world leader in fluid power products and can’t wait to share our fluid power passion with all the teams in their innovative bicycle designs. We welcome you to our Norgren site in beautiful Littleton, CO and wish everyone the best of luck in the challenge.”*

*-Jared Amundson, Engineering Manager, Norgren*

The final competition will be an exciting event where students, advisors, industry representatives, and other invited guests experience the final leg of this dynamic undergraduate engineering design challenge. Students will present and demonstrate their designs; industry representatives will judge their work, and winners will emerge.

The final competition is a four-day extravaganza. Student teams travel to Littleton, Colorado Wednesday, April 10th and drop off their bikes at Norgren if they have not previously shipped them. They get to meet other participants and industry representatives at a welcome reception that night.

Thursday, it’s back to Norgren for final vehicle assembly and to demonstrate the system integrity and readiness to operate. The competition kicks off when the action moves outside for four races – the sprint, efficiency, endurance, and regen races. Thursday night, all participants are invited to a networking reception and dinner in Denver.

Competition events continue early Friday with team presentations describing the design phase, vehicle construction, testing, and lessons learned. Presentations are judged by a panel of industry representatives, who evaluate the vehicles for their design concept, reliability, safety, and originality. Then Judges deliberate while teams disassemble and crate their vehicles. To wrap up the event, everyone gathers for an evening reception, dinner, and final awards ceremony. Teams travel home on Saturday.

**\*Schedule subject to change due to weather conditions.**

**IMPORTANT DATES and DEADLINES** (*see additional details below)*

Registration by: March 1, 2024

Proof of working vehicle by:  March 25, 2024

Vehicle Pick-Up if Shipping: April 1, 2024

Hotel reservations by:  March 26, 2024

Final Presentation & All Mentor Summaries by: April 8, 2024

If driving, deliver the vehicle by:  April 10, 2024 between 12:00 - 4:00 PM

Travel Reimbursement and Award Delegation documentation by: May 13, 2024

[Click Here for a Map of Denver Event Locations](https://www.google.com/maps/d/edit?mid=1_sYnt5Li7VAquLkviyZCwaJ6AwZy4xs&usp=sharing)

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**This document is intended to provide more specific details related to the final competition event. Participants should carefully review the Overview, Rules and Awards document to ensure they understand program details and procedures.**

# FPVC Website

For the most up to date details and documentation, refer to the[**Vehicle Challenge website**](https://fpvc.secure-platform.com/a/organizations/main/home)**.**

**SOCIAL MEDIA HASHTAG**

Make sure you abide by the rules of the social media platform you are using. The Vehicle Challenge hashtag is **#FPVC2023**. Norgren’s hashtag is **#BreakthroughEngineering**. Please use these on all of your social media posts about your project and the event. And don’t forget to take and share lots of photos! Show the world your vehicle, your team, and all your favorite parts of the Challenge (like your travel to Littleton, the nightly events, and the Competition). Remember to tag NFPA and Norgren!

|  |  |  |  |
| --- | --- | --- | --- |
|  | Facebook | X (Twitter) | LinkedIn |
| NFPA | @FluidPowerChallenge | @TheNFPA | @TheNFPA |
| Norgren | @Norgren | @NorgrenNews | @Norgren-industrial-automation-us |

As a participant, you are solely responsible and liable for your comments and content made under your name, user name, email address and/or your social media profile. This Challenge is in no way sponsored, endorsed or administered by, or associated with any social media. By participating in this Challenge you agree to a complete release of the social media that you are using from any claims associated with this Challenge.

# REGISTRATION

All general attendees including student teams, faculty advisors, industry supporters, judges, marshals and guests are required to register by **March 1.** [Register here](https://fpvc.secure-platform.com/a/organizations/main/home). Remember to refer to the Overview, Rules and Awards document for details regarding the procedures, stipends and awards.

**Advisors will be asked to:**

* Submit the teams’ needs for hydraulic fluid and nitrogen at the competition.
* Indicate whether the team will be shipping or driving and delivering their competition bike to Norgren.

**Travel and Other Expense Reimbursement**

For travel and qualifying expenses related to the final competition, NFPA will reimburse up to a total of $5,000 directly to universities for one faculty advisor and up to seven students participating in the event. Advisors or university faculty will be required to submit the [Travel Reimbursement Form](https://nfpafoundation.org/wp-content/uploads/2022/05/Travel-Reimbursement-Form-4.xls) in excel format and one PDF file of all receipts and supporting documents to Carrie Berger at cberger@nfpa.com no later than May 13th. NFPA reserves the right to deny reimbursement if expenses are unrelated to the final competition or not a qualified expense. **Travel reimbursements will be paid to the university, not individuals. There will be no exceptions to this rule.** Receipts are required for every expense item, no exceptions. *If travel creates a personal or institutional financial hardship, please inform Mary.*

**Team Accommodations**

Student teams and advisors are to make hotel reservations following these instructions:

**Tru by Hilton Denver South Park Meadows**

9741 Park Meadows Drive, Lone Tree CO, 80124

Phone: 303-799-1800

Check in: 3:00 PM

Check out: 12:00 PM

Group Name: National Fluid Power Assoc.

Rate: $114.00 + Tax

**Cut-off Date: March 26, 2024**

(If you do not book your room by this date, you will not get the reduced rate of $114.00).

Reservations can be made via [link](https://www.hilton.com/en/book/reservation/deeplink/?ctyhocn=DENSPRU&groupCode=NFPA&arrivaldate=2024-04-10&departuredate=2024-04-13&cid=OM,WW,HILTONLINK,EN,DirectLink&fromId=HILTONLINKDIRECT) or direct phone call. Mention the dates of your stay and the group name of “National Fluid Power Association” to receive the group rate. If you would like to book the night of the 9th, please call the hotel's phone number at 303.799.1800 extension 2.

**Qualifying Reimbursable Expenses:**

* Team Accommodations at the hotel that NFPA designates.
* Team Transportation
	+ Airfare (coach/ economy flights only)
	+ Auto rental
	+ Trailer rental
	+ Personal vehicle mileage
* Travel Related Expenses
	+ Meals not provided by NFPA or Vehicle Challenge event host.
	+ Taxi, Uber, Lyft, Tollways, Parking, etc.
	+ Other qualifying expenses as determined by NFPA.

# PROOF of WORKING VEHICLE & PHOTO

It is required that teams demonstrate your vehicle is in working condition by submitting a YouTube video to the website indicating your intent to participate in the final event. The footage must:

* Confirm that the vehicle is safe and operational with a team member riding it at least ½ a block or better.
* Verify stored energy working off the accumulator.
* Confirm the use of pressure indicators and test point.
* Your proof of a working vehicle must be received by **March 25**. Teams can manage who can view content through privacy settings of YouTube videos. [Learn how here](https://support.google.com/youtube/answer/157177?co=GENIE.Platform%3DDesktop&hl=en). Teams are also required to submit one photo of only their vehicle for judges to refer to during the final competition. [Submit your video here!](https://fpvc.secure-platform.com/a/organizations/main/home)
* By participating in this Challenge, you agree to indemnify, defend and hold harmless, release, and discharge, on behalf yourself, and your heirs, executors, and assigns, Norgren LLC and NFPA and their respective officers, directors, employees, agents, parent, subsidiaries, affiliates, shareholders, successors, and assigns from any and all claims, demands, lawsuits, expenses, injuries (including death), losses, damages, and any other liability of any kind, of or to it(him/her)self or any other person, my property, or my rights of privacy or publicity, directly or indirectly arising out of or in connection with the Challenge and the Prize (including the conduct of the Promotion, the awarding of any prizes, participation in the Promotion, acceptance, use, misuse, loss, or damage of or to the Prize or any other prize, and use of Content, name, biographical information, and likeness, even if due to the negligence, omission, or other fault of Sponsor).
* By opening a YouTube account and using any services, products or features of YouTube for the purposes of the Challenge (including without limitation, uploading any materials onto YouTube, you are fully liable and responsible for complying with all terms and conditions as may be imposed by YouTube, and Norgren LLC and NFPA shall not be liable in any way whatsoever for such account and usage. Comments, photos and/or video responses posted to YouTube page are also subject to the terms of use of YouTube.
* This Challenge is in no way sponsored, endorsed or administered by, or associated with YouTube. By participating in this Challenge, you agree to a complete release of YouTube from any claims associated with this Challenge.

# VEHICLE TRANSPORT LOGISTICS

There are two options for transport and delivery of the vehicles. 1) Drive and deliver to Norgren, 2) Ship. Vehicles should be crated no matter which delivery method is chosen, although not required for drive and delivery if properly secured in a trailer**. Be sure the crate is forklift compatible.** Teams may build a crate from scratch or use a crate from a previous year. If shipping, release all oil pressure and lower the nitrogen pressure to 50 PSI. **Do not empty the accumulator all the way and let air into it**. Keep 50 PSI in the accumulator (plus or minus 25 PSI is okay but aim for 50 PSI). If not shipping, you may keep your accumulator charged.

## Drive and Deliver

If you choose to drive and deliver your bike to the Norgren facility, be sure it is secure in every possible way during transport and delivery. The vehicle drop-off window is **strictly** **Wednesday, April 10th, 12:00 PM to 4:00 PM**. Teams will not have access to the facility before 12:00 PM. You must e-mail Mary at mpluta@nfpa.com with travel arrangements by Friday, April 5, 2024. She will assign a time for you to drop off your vehicle. If for any reason teams suspect they will arrive later than 4:00 pm, they must contact Mary at mpluta@nfpa.com as soon as possible*.* **Upon arrival, call (not text) Mark Gallegos at 720-300-2643**. Mark will provide instructions on how to proceed on site. If driving, teams must bring environmentally friendly fluid from Lubrizol to Norgren.

## Shipping

If you choose to ship, each university will be asked for a contact name, phone number, pick- up / return address and any special instructions. Norgren will be creating shipping labels and scheduling a pick-up for each team. April 1st will be the pick-up day for teams that choose to ship their competition bikes.

* Note: NFPA will not support expedited shipping. **If the bike needs to be shipped back to your university by a certain date, the university will be responsible for this expense, and it will not be reimbursed.** If you need to make these arrangements, contact Mary at mpluta@nfpa.com.
* If shipping, teams do not need to ship fluid or nitrogen.

## Materials, Equipment and Supplies

It is required that you bring your own tools, extra equipment or supplies. Environmentally friendly fluids from Lubrizol and nitrogen will be provided on-site. Depending on how you travel, decide which is a better method of transporting extra tools, equipment, and supplies. Packing the tools in the vehicle crate is a good option; be sure to properly secure any additional materials. Bring all extra items to the Norgren site as participants will not be allowed to leave the facility to collect supplies left behind.

# ARRIVAL

## Tuesday, April 9th

Tuesday can be considered a travel day as needed and qualifies as a reimbursable expense. Please see above for hotel accommodation. Check in begins at 3:00 PM.

## Wednesday, April 10th

Vehicle drop-off will be from 12 pm to 4 pm. See instructions above. There will be a welcome reception at 6:00 PM with dinner and beverages for participants held at the Farm House Restaurant at [Breckenridge Brewery](https://www.breckbrew.com/). The address is 2990 Brewery Lane, Littleton, CO 80120. You are responsible for your own transportation.

**INDUSTRY REPRESENTATIVES:**If arriving on Wednesday, April 10th, industry representatives are encouraged to join student teams and advisors at Breckenridge Brewery for the welcome reception for dinner and beverages at 6:00 pm.

## Thursday, April 11th

**EVERYONE:**Upon arrival, participants will collect additional registration materials, apparel, personal protective equipment, etc. and then attend a safety and orientation session. If student teams design a project poster, it can be displayed for other guests to view. The races will begin after lunch.

**INDUSTRY REPRESENTATIVES:**If possible, judges are invited to arrive at Norgren at 7:30 AM to check in and attend a safety and orientation presentation before attending the Judges’ Orientation Meeting at 8:30 AM.

**EVERYONE:**

A networking dinner will be held at 6:30 pm at the Bierstadt Lagerhaus. Their address is 2875 Blake Street, Denver, CO 80205. You are responsible for your own transportation. Bierstadt Lagerhaus does have their own parking lot but there is additional street parking north of Broadway that is free. There is also a parking structure two blocks south by the corner of 27th and Blake for a flat rate.

## Friday, April 12th

All teams and judges will arrive at Norgren for the final team presentations and design review. After the presentations, teams will disassemble their bikes and prepare them to be shipped back to their university, while judges attend a final meeting. The award ceremony and final networking dinner will begin at the [Viewhouse Centennial](https://viewhouse.com/) at 6:30 pm. Their address is 7101 S Clinton St, Centennial, CO 80112. You are responsible for your own transportation.

# ON-SITE PARKING

On-site parking at Norgren is limited on race day (Thursday). **Student teams will be required to use alternative transportation.** Remember, NFPA will reimburse Uber/Lyft, etc.

# DRESS CODE

The dress code for non-competition events is business casual. Explicitly, the dress code is less formal than traditional business wear, but it is intended to give a professional and business-like impression. The dress code for competition events is informal and casual, however, steel toe shoes are required. **No shorts or skirts are allowed for safety reasons**. Remember, there will be long periods of time when teams are outside, dress accordingly and plan for the weather. The wind can be very strong on the competition track. Students are encouraged to wear university-branded shirts to identify different teams on the track.

# SAFETY

During the competition events and facility tours, personal protective equipment is required:

* Footwear: Participants are to wear reasonable footwear for the event and factory tour. No open-toed shoes, sandals, heels, or thick-soled shoes. Steel toe shoes **are** required. Please bring your own steel toe shoes. NFPA stipend funds can be used to purchase these if you do not own them.
* Eyewear: Safety glasses with side shields **are** required. Bring your own or safety glasses will be provided.
* Riders must bring and securely fasten a CPSC-approved bike or motorcycle helmet during the competition events. See photos below.
* Attire to avoid: shorts, loose-fitting clothing, loose necklaces/bracelets.
* Long hair must be tied back during the facility tour.

Note: CPSC Approved Helmets have this sticker. Photo Credit: [Beactivedecatur.com](https://beactivedecatur.com/2021/05/06/buying-and-wearing-a-bike-helmet/)



**PRESENTATION & POSTER**

Teams will submit their final presentations and mentor summaries on the Vehicle challenge [website](https://fpvc.secure-platform.com/a/organizations/main/home) no later than **April 8th at 11 AM CDT**. Consider this to be the final submission. Teams will not be able to modify or resubmit their presentation after the deadline.

Student teams are invited to create a project poster to be displayed at Norgren for general attendees. It is not a requirement to create a project poster, however, it would provide a visual for guests in advance of the final presentations and competition. Please let Mary Pluta know if you are bringing a poster by April 8th. A project poster example is shown on the right.

# EVENT RACES

The event races will demonstrate the various elements of the vehicle design. The straight track for the sprint race is 500 ft long. The track loop for the Efficiency and Endurance Challenge races 750 ft.

Here is a [Track Map](https://nfpafoundation.org/wp-content/uploads/2022/12/Norgren-Track.docx) and a diagram of the [Regen Race](https://nfpafoundation.org/wp-content/uploads/2023/02/Regen-Race-Map.png).

# JUDGING and MARSHALS PROTOCOLS

The final competition relies on the volunteer commitment by industry representatives.

Judging Committee

A team of industry judges is responsible for assessing the vehicle on-site and the documentation in advance. The nature of the assessment is described in the FPVC Assessment Rubric.

Two responsibilities that we ask judges to cover are:

Marshals

A team of marshals will be responsible for ensuring teams operate in a safe and sportsmanlike way during the entire event, and during the three competitions (sprint race, efficiency race, endurance race, regen race). Marshals may choose to engage directly with the competitors or observe from a distance.

Marshals may walk, jog, run, or cycle alongside the vehicle during a competition event. Marshals will provide input to the judging committee on the vehicle performance and teamwork of the event participants.

Timekeepers

A small team of timekeepers will be responsible for the clock, recording time, and submitting data to the Technical Lead on-site.

**AWARDS**

The Judging Committee determines final award winners based on a number of factors, including the overall assessment of (1) the Design and Specification Midway Review, (2) the competition results, (3) final presentations and (4) Interaction with Industry Mentors. The decisions of the judging panel are final.

# WI-FI ACCESS

Guest WI-FI will be available on-site. Username: Norgren1, Password: Norgren1

# HUMAN RESOURCES

Talent scouts and industry representatives will be available during lunches and dinners as an opportunity for students to network with fellow engineers and ask questions in an informal setting. Please bring a printed copy of your resume if you are still looking for a job.

# RESTROOMS

Avoid touring the facility in search of restrooms. Restrooms that are to be used by Fluid Power Vehicle Challenge participants will be clearly marked with signage.

# NFPA FPVC POLICIES

During the final event, any participant demonstrating unsportsmanlike or unsafe conduct will be disqualified from the Challenge and forfeit any and all awards. Driving under the influence is automatic elimination. Same rules apply as driving a motor vehicle on the highway. It is expected that all participants will honor the Host Site’s local zero-tolerance policies.

# HOST SITE POLICIES

All attendees will be required to attend a welcome session and safety presentation, prepared by the event host.

# FINAL THOUGHTS

Let’s make a great impression on Norgren and the other industry representatives that support this program. Both personally, and professionally, you can never have too many friends.