

N F P A

Fluid Power

VEHICLE

Challenge

2024-25 NFPA Fluid Power Vehicle Challenge
FINAL COMPETITION – April 9-11, 2025
IMI | 10914 N. 2nd St. | Machesney Park, IL 61115

Final Competition

VP of Workforce Programs

Stephanie Scaccianoce
National Fluid Power Association
sscaccianoce@nfpa.com
(414) 778-3345

Technical Liaison

Ernie Parker, Retired Faculty
Hennepin Technical College
ernieparker1@msn.com
(952) 200-3359

Final Competition Event Host

Jared Amundson
IMI plc
Jared.Amundson@imi-precision.com
(708) 722-6355

Workforce Program Manager

Mary Pluta
National Fluid Power Association
mpluta@nfpa.com
(414) 736-3584

Workforce Program and Event Manager

Kyla Olson
National Fluid Power Association
kolson@nfpa.com
(414) 259-2025



NFPA
Education and
Technology
Foundation

FINAL COMPETITION OVERVIEW

The NFPA Fluid Power Vehicle Challenge (“Challenge”) final competition will be hosted by Norgren LLC (“IMI”), an NFPA Pascal Society Donor, from April 9-11, 2025.

“IMI is looking forward to hosting students and teams from across the country for the NFPA Fluid Power Vehicle Challenge. IMI 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 IMI site in Machesney Park, IL and wish everyone the best of luck in the challenge.”

-Jared Amundson, Engineering Manager, IMI

The final competition will be an exciting extravaganza 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.

Student teams travel to Machesney Park, Illinois on Wednesday to drop off their bikes at IMI if they have not previously shipped them and complete all necessary assembly. They get to meet other participants and industry representatives at a welcome reception that night.

Thursday, it’s back to IMI for the final presentation and design review to demonstrate the system integrity and readiness to operate. The competition kicks off when the action moves outside for the regenerative braking demonstration and the three races – sprint, efficiency, and endurance. Thursday night, all participants are invited to a networking reception and dinner in Rockford.

Competition events continue early Friday with a vehicle performance roundtable and facility tour. Then Judges deliberate while teams disassemble and crate their vehicles. To wrap up the event, everyone gathers for the final awards ceremony lunch. Teams travel home on Friday afternoon.

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

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

Registration by: March 3, 2025

Proof of working vehicle by: March 24, 2025

Vehicle Pick-Up if Shipping: March 28, 2025

Hotel reservations by: March 28, 2024

Final Presentation & All Mentor Summaries by: April 7, 2025

If driving, deliver the vehicle by: April 9, 2025 between 12:00 - 4:00 PM

Travel Reimbursement and Award Delegation documentation by: May 12, 2025

[Click Here for a Map of Rockford Event Locations](#)

Contents

FINAL COMPETITION OVERVIEW	2
FPVC Website.....	3
REGISTRATION	4

PROOF of WORKING VEHICLE & PHOTO	5
VEHICLE TRANSPORT LOGISTICS	5
DRIVE AND DELIVER	5
SHIPPING	6
MATERIALS, EQUIPMENT AND SUPPLIES.....	7
ARRIVAL.....	7
Tuesday, April 8 th	7
Wednesday, April 9 th	7
Thursday, April 10 th	8
Friday, April 11 th	8
ON-SITE PARKING.....	8
DRESS CODE	8
SAFETY.....	8
EVENT RACES	9
JUDGING and MARSHALS PROTOCOLS	9
WI-FI ACCESS.....	10
HUMAN RESOURCES	10
RESTROOMS.....	10
NFPA FPVC POLICIES	10
HOST SITE POLICIES.....	10
FINAL THOUGHTS.....	11

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](#).

SOCIAL MEDIA HASHTAG

- Make sure you abide by the rules of the social media platform you are using. The Vehicle Challenge hashtag is **#FPVC2025**. IMI's hashtags are **#BreakthroughEngineering, #IMINorgren, #IMIBimba, and #IndustrialAutomation**. Please use these on all 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 Machesney Park, the nightly events, and the competition). Remember to tag NFPA and IMI!

	IMI	NFPA
Facebook	@IMI	
Instagram		the_nfpa
LinkedIn	@IMI	@TheNFPA

REGISTRATION

All general attendees including student teams, faculty advisors, industry supporters, judges, marshals and guests are required to register by **March 3**. [Register here](#). Remember to refer to the Overview, Rules and Awards document for details regarding the procedures, stipends and awards.

Advisors will be asked to:

- Indicate whether the team will be shipping or driving and delivering their competition bike to IMI.

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](#) in excel format and one PDF file of all receipts and supporting documents to Carrie Berger at cberger@nfpa.com no later than May 12th. 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:

Holiday Inn Express & Suites Rockford – Loves Park

7552 Park Pl, Loves Park, IL 61111

Check In: 3:00pm

Check Out: 11:00am

Rate: \$112.00

Complimentary Breakfast

Front desk: [1-815-654-4100](tel:1-815-654-4100)

[Booking Link](#)

Cut-off Date: March 28, 2025

(If you do not book your room by this date, you will not get the reduced rate of \$112.00).

Reservations can be made via [link](#) 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 need to book a room for Monday night, please call the hotel directly.

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 24**. Teams can manage who can view content through privacy settings of YouTube videos. [Learn how here](#). 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!](#)

VEHICLE TRANSPORT LOGISTICS

There are two options for transport and delivery of the vehicles. 1) Drive and deliver to the competition location, or 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. Crates must be sturdy and able to withstand rough handling. Vehicles and any other items must be secured inside of the crate. [Here](#) is an example of a well-made crate from last year’s competition. 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 IMI facility, be sure it is secure in every possible way during transport and delivery. The vehicle drop-off and assembly window is **strictly Wednesday, April**

9th, 12:00 PM to 4:00 PM. Teams will not have access to the facility before 12:00 PM. If driving, teams must bring environmentally friendly fluid from Lubrizol to IMI.

SHIPPING

SHIPPING via eShipping

If you choose to ship, each university will be asked for a contact name, phone number, pick-up / return address and any special instructions. Each team will be creating shipping labels and scheduling a pick-up for themselves. Competition bikes will be picked up 10 days before the Welcome Ceremony. Arrange for shipping as soon as possible.

- Each team will be required to print the Bill of Lading to accompany their crate.
- The crate must be forklift compatible.
- Environmentally friendly fluids from Lubrizol and nitrogen will be provided on-site. Teams do not need to ship fluid or nitrogen.
- NFPA will not pay for expedited shipping. **If the vehicle 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.**

PROCESS: OUTBOUND FROM THE UNIVERSITY

Teams that ship vehicles will need to schedule their pickup online via pickups.eShipping.biz. You will be filling out an online form. Here is the information you need:

- a. Shipper: Full school address where the crate will be picked up and primary contact for the pickup.
- b. Who is paying for this shipment? Enter "NFPA".
- c. Recipient: IMI (ATTN: Jared Amundson)
- d. 10914 N. 2nd St., Machesney Park, IL 61115
- e. The pickup window will be 1-5 pm in your time zone.
- e. Freight Item
 - i. Freight Type: Crate
 - ii. Quantity 1
 - iii. Team to provide the estimated weight of the vehicle/supplies including the crate, as well as the length, width, and height of the crate.
 - iv. Is the freight stackable? Select "No"
 - v. Product Details
 1. Is the product Hazmat? Select "No".
 2. Package Type
 3. Freight Class: 250
 4. Quantity: 1
 - a. NMFC: 189800
 5. Product Description – Bicycles, NOI
 6. Is the product new? Select "New".
- f. Insurance
 - i. Does this shipment require insurance?
 1. Select "Decline Insurance".
- g. Other Instructions
 - i. Does this shipment need a guaranteed delivery date? Select "No".

1. We do not need a guaranteed delivery date if you ship by **March 28**
- ii. Reference Details:
 1. PO Number Required for Pick up? Enter "NFPA"
 2. Reference number required for pick up? Select "No".
- iii. Notes and Instructions: N/A
- iv. Accessorials
 1. Only select "Limited Access Pickup".

March 28th 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 IMI site as participants will not be allowed to leave the facility to collect supplies left behind.

ARRIVAL

Tuesday, April 8th

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. *Note: All teams are expected to arrive at IMI during the 12:00 PM-4:00 PM drop-off window on Wednesday, April 9th to conduct their vehicle assembly.*

Wednesday, April 9th

Vehicle drop-off and final assembly will be from 12 pm to 4 pm. There will be a welcome reception at 6:00 PM with dinner and beverages for participants held at the Nicholas Conservatory and Gardens, 1354 N. 2nd St., Rockford. You are responsible for your own transportation.

INDUSTRY REPRESENTATIVES:

If arriving on Wednesday, April 9th, industry representatives are encouraged to join student teams and advisors at the Nicholas Conservatory and Gardens for the welcome reception for dinner and beverages at 6:00 pm.

Thursday, April 10th

EVERYONE:

Upon arrival, participants will collect additional registration materials, apparel, personal protective equipment, etc. and then attend a safety and orientation session. The races will begin after lunch.

INDUSTRY REPRESENTATIVES:

If possible, judges are invited to arrive at IMI at 7:30 AM to check in and attend a safety and orientation presentation before attending the Judges' Orientation Meeting at 8:00 AM.

EVERYONE:

A networking dinner will be held at the Northern Illinois University Rockford Campus Atrium, 8500 E. State Street, Rockford.

Friday, April 11th

All teams and judges will arrive at IMI for a breakfast Roundtable on Vehicle Performance and facility tour. The roundtable discussion is not a scored element of the competition, but rather, it is an opportunity to talk freely with judges and other teams about vehicle performance. After the tour, 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 lunch will begin at noon at the Rockford Country Club, 2500 Oxford St., Rockford. You are responsible for your own transportation.

ON-SITE PARKING

On-site parking at IMI is limited on race day (Thursday) but street parking is available.

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



FINAL PRESENTATION AND MENTOR SUMMARIES

Teams will submit their final presentations and mentor summaries on the Vehicle challenge [website](#) no later than **April 7th 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.

EVENT RACES

The event races will demonstrate the various elements of the vehicle design. The straight track for the sprint race is 300 ft long. The track loop for the Efficiency and Endurance Challenge races is between 400-450 ft.

Here is a [Track Map](#) for your information.

JUDGING and MARSHALS PROTOCOLS

The final competition relies on the volunteer commitment of 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, the Regenerative Braking Demonstration, and during the three competitions (sprint race, efficiency race, endurance 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.

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 IMI and the other industry representatives that support this program. Both personally, and professionally, you can never have too many friends.