2021-22
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OUR MISSION

In a biennial survey, members of the National Fluid Power Association (NFPA) consistently rank the recruitment of a skilled workforce as the most challenging issue their companies face. This is likely because not enough technical colleges or universities are teaching hydraulics and pneumatics, nor preparing their students for careers in the fluid power industry.

As a result, NFPA has identified growing the fluid power workforce as one of its primary strategic priorities. It is central to its mission of strengthening the fluid power industry. NFPA seeks to increase the number of technical college and university students educated in fluid power, and to connect them to jobs in our industry.

The NFPA Education and Technology Foundation is a tax-exempt, charitable organization, affiliated with NFPA, that is dedicated to meeting this workforce development need. Through the generous support of our donors, we are:

• Creating more educated fluid power technicians, by funding student outreach and education programs, designed to create a pathway into the fluid power industry; and

• Creating more educated fluid power engineers, by funding research and education programs, designed to better engage academic faculty in the teaching of fluid power.

Because of your support, our programs are helping to change the talent pool available to our industry. More young people are aware of the fluid power industry. More 2-year technical college and 4-year university graduates have specific training in fluid power. More universities have research facilities and education programs focused on fluid power. And more partnerships between these schools and our industry are increasing access to highly talented candidates.

This is truly our mission—yours and ours—and it is working. Your donations will make sure it works for many years to come.

Best Regards.

ERIC LANKE
President and CEO
NFPA Education and Technology Foundation
CREATING MORE EDUCATED FLUID POWER TECHNICIANS

To create more fluid power-educated Technical College graduates, the NFPA and the NFPA Foundation conduct a number of student outreach and education programs, designed to create a pathway into the fluid power industry. We have a series of programs that first introduce fluid power in middle schools, then provide fluid power educational experiences in high schools, then fluid power degrees and certificates in tech schools, and finally connections to jobs in the fluid power industry.

Many of these programs are organized under our Fast Track to Fluid Power initiative, which is a workforce development pathway that connects local technical colleges with industry partners and high school teachers. The network creates awareness and interest in fluid power and leads students along a path that leads to careers in our industry.
OUTREACH AND EDUCATION PROGRAMS
BUILDING A PATHWAY INTO THE FLUID POWER INDUSTRY

FLUID POWER ACTION CHALLENGE
Engages thousands of middle school students in learning about and having fun with fluid power. It raises awareness among students, educators, and parents. Industry partners serve as coaches and judges.

FAST TRACK HIGH SCHOOLS
Are each equipped with fluid power lab equipment and curriculum. They teach real-world fluid power and generate interest in fluid power careers. Industry partners visit the schools frequently and provide mentorship and career encouragement.

FLUID POWER SCHOLARSHIPS
A variety of scholarships are offered to graduating high school students in order to pursue fluid power degrees or certificates at designated technical colleges and universities. Industry partners serve on the scholarship review committee that makes funding decisions.

FAST TRACK TECHNICAL COLLEGES
Are schools with a 2-year degree program validated to teach core fluid power competencies. Industry partners provide ongoing curriculum guidance and student internship opportunities.

There are two Fast Track Hubs running - one in Milwaukee, WI headquartered at Waukesha County Technical College and one in Chicago, IL at Triton College. Local NFPA members serve as coaches and judges, they provide mentorship, career encouragement and on-going curriculum guidance as well as student internship opportunities.

FLUID POWER ACTION CHALLENGE
25,000+ ENGAGED THROUGH EVENTS AND CLASSROOM ACTIVITIES

The Fluid Power Action Challenge is a competition that challenges middle or high school students to solve an engineering problem using fluid power. The students work in teams to design and build a fluid power mechanism and then compete against other teams in a timed competition.

The Fluid Power Action Challenge has many benefits:
- Actively engages students in learning about fluid power.
- Gives support and resources to teachers for science and technology curriculum.
- Creates a learning environment where math and science are fun.
- Encourages students to practice teamwork, engineering, and problem-solving skills.
- Introduces students to careers in the fluid power industry.

Hundreds of individuals in NFPA member companies and education partner institutions have been involved in mentorship, classroom activities, and events related to the Fluid Power Action Challenge, which have engaged more than 25,000 students to date.

FLUID POWER ACTION CHALLENGE CHAMPIONS
Thirty-two NFPA member companies and education partners from across the country have been recognized as Fluid Power Action Challenge Champions for their efforts in organizing and running Fluid Power Action Challenge events in their local communities. In doing so, they have not only made serious investments of both time and money, but have also helped spread information about our industry and reaped the benefits that come with connecting their organizations to the schools and science classrooms where the industry’s future employees are learning fluid power for the first time.

These Fluid Power Action Challenge Champions are:
- Bennett Mills Middle School 3 annual events, engaging 120 total students
- Caterpillar 5 annual events, engaging 372 total students
- Cleveland Community College 6 annual events, engaging 198 total students
- Cooper Middle School 3 annual events, engaging 171 total students
- Daman Products Company 10 annual events, engaging 904 total students
- Delta Fluid Products 11 annual events, engaging 2,528 total students
- Dura-Bar 1 annual event, engaging 66 total students
- Eisenhower Junior High 2 annual events, engaging 36 total students
- Florida Technology Student Association 4 annual events, engaging 112 total students
- FORCE America 6 annual events, engaging 373 total students
- Georgia Tech University 2 annual events, engaging 136 total students
- Gulliver 1 annual event, engaging 90 total students
- Husco and Waukesha STEM Academy 4 annual events, engaging 332 total students
- Hydroquip 1 annual event, engaging 20 total students
- Hydroquest 1 annual event, engaging 18 total students
- Jerling Middle School 4 annual events, engaging 803 total students
- Komatsu Mining Corp Group 2 annual events, engaging 96 total students
- LoneStar Community College 2 annual events, engaging 56 total students
- Master Pneumatic 6 annual events, engaging 804 total students
- Mequon School District 1 annual event, engaging 36 total students
- Micromatic 1 annual event, engaging 20 total students
- Milwaukee School of Engineering 12 annual events, engaging 1,210 total students
- Parker Hannifin 2 annual events, engaging 44 total students
- Pennsylvania Small Business Education Fund 5 annual events, engaging 604 total students
- Price Engineering 5 annual events, engaging 716 total students
- Purdue University 7 annual events, engaging 345 total students
- University of Minnesota 5 annual events, engaging 352 total students
- Triton Girls Summer Camp 2 annual events, engaging 80 total students
- Wajanis Supply Company 10 annual events, engaging 911 total students
- SMC Business Councils 2 annual events, engaging 224 total students
- Valley View Junior High School 2 annual events, engaging 256 total students

In total, our Fluid Power Action Challenge Champions have organized 128 events impacting 12,033 students.
FLUID POWER ACTION CHALLENGE GRANTS

The NFPA Foundation also awards grants to middle and high schools to facilitate hydraulics and pneumatics instruction. Grant awards defray the costs related to the educational aspects of the Fluid Power Action Challenge Program—either for the fluid power kits for classroom use or for participation in the Fluid Power Action Challenge event.

TO DATE, 157 SCHOOLS HAVE USED FLUID POWER CHALLENGE MATERIALS IN THEIR CURRICULA, EXPOSING 13,275 STUDENTS TO FLUID POWER.
FAST TRACK HIGH SCHOOLS
STUDENTS LEARNING FLUID POWER IN 15 HIGH SCHOOLS

As each Fast Track to Fluid Power program comes online in communities around the country, the NFPA Foundation provides grants so area high schools can purchase the fluid power training platforms they need to offer targeted fluid power education to their students.

In its third year, the second Fast Track Technical College located at Triton College in River Grove, Illinois has continued to engage students in the area during the COVID-19 pandemic. High schools that are part of that Fast Track network, bringing hands-on fluid power instruction to their students, include:

• Leyden West High School
• Leyden East High School
• Proviso East High School
• Proviso West High School
• Proviso Mathematics and Science Academy
• Ridgewood High School

And, for the fourth year, our first Fast Track Technical College, Waukesha County Technical College (WCTC) in suburban Milwaukee, Wisconsin, continued to engage nine local high schools as part of that Fast Track network during the pandemic. These schools are:

• Menomonee Falls High School
• Arrowhead Union High School
• Brookfield Central High School
• Hamilton High School
• New Berlin Eisenhower Middle-High School
• New Berlin West High School
• Kettle Moraine High School
• Oconomowoc High School

WCTC and Triton, as the affiliated Fast Track Technical Colleges, are providing training to the teachers in their area high schools so that they can more effectively teach the fluid power curriculum associated with their chosen training platform.

In addition, members of our industry donor coalition, who are helping to support these activities and the growth of future Fast Track networks, are offering mentorship and information on careers in fluid power. Companies in this industry partner network include:

• Deltrol Fluid Products
• Festo
• FORCE America
• Husco
• NORGREN
• Poclain Hydraulics
• Price Engineering
• Quality Control Corporation
• SunSource

As a result, students have expressed interest in continuing their fluid power education at the Fast Track Technical Colleges following their high school graduation. This is confirmation that the Fast Track pathway is working, leading students into fluid power careers.
Fluid Power Scholarships are offered to graduating high school students in order to pursue fluid power degrees or certificates at designated technical colleges and universities.

Thanks to a transfer of assets from the now-defunct Fluid Power Educational Foundation, and an ongoing series of annual gifts from the International Fluid Power Society, the NFPA Foundation has set-up a dedicated scholarship fund that has already awarded thirty-nine $2,000 scholarships to students interested in studying fluid power at one of our education partner institutions.

2020-21 Fluid Power Scholarship Awardees:

- **Alejandra Cisneros**, Kent State University
- **Alex Cragan**, Johnson County Community College
- **Alexander Davis**, Virginia Tech
- **Andrew Wilson**, Spokane Community College
- **Ben Ries**, Hennepin Technical College
- **Brendan McCluskey**, Georgia Institute of Technology
- **Dane Rogers**, Spokane Community College
- **Elizabeth Lincoln**, University of Missouri - Columbia
- **Jacob Powers**, Spokane Community College
- **Jordan Bracey**, Florida A&M University
- **Jose Alejandro Solorio**, Purdue University
- **Luke Wille**, Iowa State University
- **Nathan Maki**, Spokane Community College
- **Zoe Kulphongpatana**, University of Kansas (Robert Mackey Memorial Award)

Student Testimonials:

"Being selected as a Fluid Power Scholarship winner means so much to me. Academically, I'm greatly humbled to know that this scholarship is a testament to my hard work over the last four years and that my effort has been recognized. Financially, it is very comforting to know that I'll have a few more dollars for books, supplies, etc., which will relieve some of the stress of moving to college. Thank you, NFPA!"  – Brendan McCluskey

"Winning this scholarship is a great honor because it means that my hard work and the hours I have spent studying and developing my skills have paid off. This scholarship shows me that I am on the right path towards an impactful future and will help me obtain my mechanical engineering degree and ultimately pursue a career in fluid power. I know that with this scholarship, I will be able to reach my goals and make a difference with my career."  – Zoe Kulphongpatana

Industry partners serve on the scholarship review committee that makes funding decisions.
FAST TRACK TECHNICAL COLLEGES
CONNECTING TECH SCHOOL GRADS TO FLUID POWER

Fast Track Technical Colleges are schools with a 2-year degree program validated to teach core fluid power competencies. As determined by NFPA’s Tech School Education Committee, those core competencies are:

- Read circuit diagrams and understand function of components in fluid power systems
- Determine and perform calculations to move loads in fluid power systems (e.g., torque, speed, power)
- Specify and size components for fluid power systems (e.g., pumps, valves, cylinders, hoses, filters, reservoirs, accumulators)
- Analyze and troubleshoot problems with fluid power systems
- Program and connect electronic controls for fluid power systems
- Promote safe working conditions with pressurized systems

In the third year of operation, the fluid power degree programs at WCTC and Triton College provided advanced-level training to 266 students.

 Those students were supported by the coalition of industry partners, who actively engage to provide internship and employment opportunities. Companies in this industry coalition include:

- Deltril Fluid Products
- Festo
- FORCE America
- Husco
- NORGREN
- Poclain Hydraulics
- Price Engineering
- Quality Control Corporation
- SunSource

TEACHING AND LABORATORY GRANTS

Many more 2-year technical colleges are teaching fluid power to their student bodies as a result of Teaching and Laboratory Grant programs. These grants provide schools with the teaching materials and state-of-the-art teaching laboratories that are needed to embed fluid power into their training curriculum. To date, 8 schools have received Teaching Grants and 9 schools have received Laboratory Grants. As a result of these investments, more than 3,400 students are taught fluid power each and every year.

Teaching Grants:

- Central Community College, Grand Island, NE
- Cleveland Community College, Shelby, NC
- Hennepin Technical College, Eden Prairie, MN
- Ivy Tech Community College, Columbus, IN
- Kaskaskia College, Centralia, IL
- Texas State Technical College, Waco, TX
- Triton College, River Grove, IL
- Vernon College, Vernon, TX

Laboratory Grants:

- Angelina College, Lufkin, TX
- Central Community College, Grand Island, NE
- Cleveland Community College, Shelby, NC
- Eastern Iowa Community College, Davenport, IA
- Hennepin Technical College, Eden Prairie, MN
- Macomb Community College, Warren, MI
- Marshalltown Community College, Marshalltown, IA
- South Central College, North Mankato, MN
- Triton College, River Grove, IL
Creating More Educated Fluid Power Engineers

To create more fluid power-educated university engineers, the NFPA and the NFPA Foundation conduct a number of research and education programs, designed to better engage academic faculty in the teaching of fluid power.

Truth be told, there are plenty of engineering students in our nation’s universities. The problem is not getting more kids to study engineering in college, the problem is teaching those kids fluid power when they’re in college.

NFPA’s focus is increasingly on helping funded research faculty build more fluid power education into their undergraduate engineering courses. To educate these students in fluid power and produce graduates that are attractive hires for the fluid power industry, we have built a full fluid power curriculum for insertion into these and other core engineering courses.

Research and Education Programs
Creating Educated Fluid Power Engineers

Research Supplements
Provide funds to academic faculty with fluid power research grants to facilitate their presentation at and the participation of their graduate students in designated industry conferences and research summits. This helps build the careers of faculty who are and will be in a position to teach fluid power to undergraduate students.

Education Grants
Allow academic faculty to either develop or acquire the necessary educational tools or resources to teach validated fluid power curriculum in their undergraduate engineering programs.

Power Partner Program
Is a recognition program designed to showcase universities that actively participate in all NFPA fluid power university educational programs. In order to qualify, a university must consistently conduct five major activities:

• Core Competencies
  Teach the fluid power competencies that our industry members have identified as most important for entry-level engineers in the fluid power industry

• Speaker’s Bureau
  Invite an NFPA member to speak, virtually or in-person, on fluid power careers or technology on their campus.

• Fluid Power Vehicle Challenge
  Is a design/build competition that embeds in the capstone design course of participating universities. It teaches hands-on fluid power and connects students to jobs in the fluid power industry.

• Fluid Power Clubs
  Engage undergraduate engineering students in fluid power education and careers. They organize fluid power study groups and social events, launch student job fairs and resume building workshops, and invite industry professionals to speak with them about career opportunities in fluid power.

• Industry Connection Event
  Host an event on their campus to introduce fluid power-educated students to companies in the NFPA membership.

As of today, there is only one university that has done all five of these things in the same year – and that is Purdue University. When a university is designated as a Power Partner, we continually promote their programs to NFPA members and help support connection events.
RESEARCH SUPPLEMENTS
CONNECTING ACADEMIC FACULTY TO FLUID POWER EDUCATION

Research Supplements provide funds to academic faculty with fluid power research grants to facilitate their presentation at and the participation of their graduate students in designated industry conferences and research summits. In doing so, the program helps achieve two goals:

• Support an industry/academic forum where research and education topics in fluid power can be explored and acted on for mutual benefit.

• Support the careers of current and future academic faculty who are and who will be in a position to teach fluid power to undergraduate engineering students.

A total of 31 Research Supplements have been awarded. In our 2020-21 fiscal year, we awarded ten Research Supplements to the following university faculty members:

Iowa State University
• Brian Steward - Off-Highway Vehicle Chassis Dynamometer

Milwaukee School of Engineering
• Paul Michael – Polymer-Enhanced Fluid Effects on the Dynamic Response of Hydraulic Pumps

Purdue University
• Andrea Vacca – Individual Electro-Hydraulic Drive for Off-Road Vehicles
• Jose Garcia – Lateral Micro-Drilling Autonomous Robotic System

University of California Merced
• Ashlie Martini - Understanding Interfacial Mechanisms to Design and Manufacture High-Performance Ionic Liquid Lubricants

University of Minnesota
• Perry Li – Hybrid Hydraulic-Electric Architecture for Mobile Machines
• Kim Stelson – Short-Term Energy Storage System for Hydraulic Hybrid Wind Turbine Transmissions
• Zongxuan Sun – Electrohydraulic System Diagnostics with Recursive Spectral Analysis
• James Van de Ven – Efficient, Compact, and Smooth Variable Propulsion Motor

Vanderbilt University
• Eric Barth - Soft Robotics: The Next Opportunity for Fluid Power

These research projects independently represent more than $5.9 million in funding from a variety of organizations, including the U.S. Department of Energy, the National Science Foundation, the National Institute of Health, and the Center for Compact and Efficient Fluid Power (CCEFP). They are an excellent sample of the growing body of fluid power research being funded by the federal government and other research organizations.

The research supplements from the NFPA Foundation provide travel support so that each faculty member and one of their graduate students can attend and present their research at a series of designated industry conferences and research summits. In our 2020-21 fiscal year, the designated conferences are the two CCEFP Summits in September 2020 and April 2021.

RESEARCH GRANTS

In addition to our Research Supplements, the NFPA Foundation has also funded individual pre-competitive research projects designed to connect graduate students to the study of fluid power and expand the capabilities of their host institutions to research and teach fluid power.

To date, 7 universities have received 14 of these research grants.

Iowa State University
• Dielectric Spectroscopic Sensor Development for Hydraulic Fluid Contaminant Detection
• An Investigation of Dielectric Spectroscopic Contamination Sensing in a Compressed Air Stream

Marquette University
• Efficient, Integrated, Freeform Flexible Hydraulic Actuators

Purdue University
• Design, Simulation and Control of Hydraulic System Topographies with Integrated Energy Recovery
• Control and Prognostic of Electro-Hydraulic Machines
• Four-Quadrant Multi-Fluid Pump/Motor
• Investigation of Noise Transmission through Pump Casing

University of Illinois at Urbana-Champaign
• Portable Pneumatically Powered Orthoses

University of Minnesota
• Free Piston Engine Based Off-Road Vehicles
• Hybrid MEMS Proportional Fluid Control Valve
• Variable AC Hydraulic Pump/Motor (joint project with Vanderbilt University)

Vanderbilt University
• Pneumatic Exhaust Gas Recovery
• Controlled Stirling Power Unit

Through these research projects, the NFPA Foundation is engaging current and helping to build the careers of future academic faculty who will be in a position to teach fluid power to thousands of undergraduate engineers on their campuses.
EDUCATION GRANTS
7,500 + UNDERGRADUATE STUDENTS TAUGHT FLUID POWER EACH YEAR

Thanks also to the efforts of our University Education Committee, we've defined the nine fluid power competencies that our member companies are most looking for in entry-level engineers coming out of our nation's universities. Using these competencies as a guide, we have sorted all our curriculum products and placed them online in a curriculum tree. This is providing university faculty who wish to add fluid power to one or more of their undergraduate engineering courses with a quick reference, not only for which competencies industry believe belong in their curriculum, but with the downloadable teaching products that will allow them to quickly and easily incorporate them.

AT LAST COUNT, NFPA’S 4-YEAR UNIVERSITY SCHOOL EDUCATION PARTNERS COLLECTIVELY REPORT TEACHING FLUID POWER TO MORE THAN 7,500 STUDENTS.
NFPA Grants allow academic faculty to either develop or acquire the necessary educational tools or resources to teach validated fluid power curriculum in their undergraduate engineering programs. As determined by NFPA’s University Education Committee, the validated curriculum is designed to teach at least one of the following core competencies:

- Understand fluid power benefits and limitations
- Conceptual and theoretical understanding of fluid power laws and principles (including energy transfer and power efficiency)
- Understand fluid power components and circuits
- Understand machine level requirements and translate into fluid power system requirements
- Apply design, simulation and analysis tools to fluid power components and systems
- Appropriately size components in fluid power systems
- Integrate sensing and electronic control functions with fluid power components and systems
- Cite hands-on experience with fluid power components and systems
- Inspect, analyze and develop corrective action for product failure

A variety of different funding programs support this model curriculum. To date, 6 schools have received Fluid Power University Grants, 16 schools have received teaching grants, 2 schools have received laboratory grants, and 4 schools have received curriculum grants.

UNIVERSITY FLUID POWER GRANTS
- Ohio University, Athens, OH
- South Dakota State University, Brookings, SD
- Michigan Technological University, Houghton, MI
- Murray State University, Murray, KY
- Purdue University Northwest, Hammond, IN
- University of Kentucky, Lexington, KY

TEACHING GRANTS
- Georgia Institute of Technology, Atlanta, GA
- Illinois Institute of Technology, Chicago, IL
- Iowa State University, Ames, IA
- Lawrence Technological University, Southfield, MI
- Marquette University, Milwaukee, WI
- Massachusetts Institute of Technology, Cambridge, MA
- Milwaukee School of Engineering, Milwaukee, WI
- Montana State University, Bozeman, MT
- Purdue University, West Lafayette, IN
- Rochester Institute of Technology, Rochester, NY
- University of Illinois at Chicago, Chicago, IL
- University of Illinois at Urbana-Champaign, Urbana-Champaign, IL
- University of Minnesota, Minneapolis, MN
- Western Michigan University, Kalamazoo, MI
- Western New England University, Springfield, MA
- Worcester Polytechnic Institute, Worcester, MA

LABORATORY GRANTS
- Milwaukee School of Engineering, Milwaukee, WI
- Western Michigan University, Kalamazoo, MI

CURRICULUM GRANTS
- Lawrence Technological University, Southfield, MI
- Ohio University, Athens, OH
- University of Missouri, Columbia, MO
- Western Michigan University, Kalamazoo, MI

Each grant creates curriculum that facilitates the teaching of fluid power to dozens or hundreds of students on each campus.
Vehicle Challenge:

Student teams from 15 universities participated in the fourth year of the NFPA Learning and the growth of fluid power industry knowledge. That results in uncommon connections and breakthroughs, while supporting undergraduate engineers with a familiar yet challenging platform for change.

By combining this unlikely pair, the Vehicle Challenge creates an environment of efficiency, especially at low speeds. A fluid powered vehicle, then, presents terms of input vs. output. The second presents more of a challenge in terms of efficiency, especially at low speeds. A fluid powered vehicle, then, presents under-graduate engineers with a familiar yet challenging platform for change.

By combining this unlikely pair, the Vehicle Challenge creates an environment that results in uncommon connections and breakthroughs, while supporting learning and the growth of fluid power industry knowledge.

The first, as exemplified by the bicycle, is recognized as extremely efficient in terms of input vs. output. The second presents more of a challenge in terms of efficiency, especially at low speeds. A fluid powered vehicle, then, presents under-graduate engineers with a familiar yet challenging platform for change.

Student teams from 15 universities participated in the fourth year of the NFPA Vehicle Challenge:

- California Polytechnic State University - San Luis Obispo, CA
- Cleveland State University - Cleveland, OH
- Iowa State University - Ames, IA
- Kennesaw State University - Kennesaw, GA
- Michigan Technological University - Houghton, MI
- Milwaukee School of Engineering - Milwaukee, WI
- Murray State University - Murray, KY
- Northern Illinois University - Dekalb, IL
- South Dakota State University - Brookings, SD
- University of Akron - Akron, OH
- University of Cincinnati - Cincinnati, OH
- University of Louisiana at Lafayette - Lafayette, LA
- University of Utah - Salt Lake City, UT
- West Virginia University Institute of Technology - Beckley, WV
- Western Michigan University - Kalamazoo, MI

This year’s program expanded to support two separate Fluid Power Vehicle Challenge competitions in an effort to reach more students and industry members. Michigan Technological University and Cleveland State University took Overall Champion in the events hosted by Norgren and Danfoss Power Solutions.

This year’s events also highlighted the use of pneumatics and electronics in addition to the traditional hydraulic systems in teams’ designs. The prize for Best Use of Pneumatics, sponsored by Norgren, was taken home by Murray State University and Milwaukee School of Engineering. The prize for Innovative Use of Electronics, sponsored by Iowa Fluid Power, was taken home by Iowa State University and California Polytechnic State University with teams from multiple other universities placing competitively in the program’s additional award categories.

Additional support for this year’s program was provided by:

**Event Hosts**
- Norgren
- Danfoss Power Solutions

**Founding Sponsor**
- Parker Hannifin Corporation

**Program Sponsors**
- Bimba Manufacturing
- Iowa Fluid Power
- SunSource

**Product Suppliers**
- Danfoss Power Solutions
- Eaton Corporation
- Lubrizol
- Source Fluid Power

Many student participants admitted that the Vehicle Challenge was their only exposure to fluid power in their four-year engineering curriculum, greatly underscoring the need for this program. This year, the Vehicle Challenge again achieved all four of its key objectives:

- Stimulate education in practical hydraulics, pneumatics, and sustainable energy devices for motion control.
- Provide students with experience in real world engineering under a strict timeline of designing, simulating, ordering, building, testing and demonstrating their designs.
- Stimulate innovative thinking for designing and testing potential new technologies or concepts integrated into a vehicle platform.
- Provide an industry recruitment opportunity for high potential engineering seniors by engaging directly with practitioners in the field.

FLUID POWER VEHICLE CHALLENGE COMMUNITY

The Fluid Power Vehicle Challenge Community is the volunteer structure tasked with mentoring, coaching, and judging the student teams participating in the Vehicle Challenge. Its membership includes major donors to the NFPA Foundation, including those members who are a part of the Pascal Society.

As a result of these interactions, several Vehicle Challenge students have been hired by companies in our industry network, greatly enhancing the value of the program to industry participants.

Twenty companies participated in the community’s year-long mentoring program or dedicated representatives to act as competition judges or lead career information sessions during the final event:

- Applied Industrial Technologies
- Bosch Rexroth
- Caterpillar
- Continental Hydraulics
- Danfoss Power Solutions
- Deltrol Fluid Products
- FORCE America Inc.
- Gates Corporation
- GPM Controls LLC
- HYDAC
- IFPS
- Iowa Fluid Power
- JARP Industries
- Kawasaki GTF
- Muncie Power Products
- Norgren
- Parker Hannifin Corporation
- QCC
- SunSource
- Trelleborg Sealing Solutions
FLUID POWER CLUBS
CONNECTING STUDENTS TO FLUID POWER CAREERS

In 2019, NFPA launched a Fluid Power Club program on university campuses to expose fluid power to a greater number of students to fluid power education and career possibilities. This year, thirteen universities have established clubs impacting 74 engineering students across the country. NFPA provides annual funding to support these clubs. Students have been organizing fluid power study groups and social events, launching student job fairs and resume building workshops, collaboration with Vehicle Challenge students and inviting industry professionals to speak with them about career opportunities in fluid power.

Fluid Power Club Universities:

- Colorado State University - Fort Collins, CO
- Iowa State University - Ames, IA
- Milwaukee School of Engineering - Milwaukee, WI
- Murray State University - Murray, KY
- North Carolina Agricultural and Technical State University - Greensboro, NC
- Northern Illinois University - Dekalb, IL
- Ohio University - Athens, OH
- Purdue University - West Lafayette, IN
- Purdue University Northwest - Hammond, IN
- University of Alabama at Birmingham - Birmingham, AL
- University of Cincinnati - Cincinnati, OH
- West Virginia University Tech - Beckley, WV
- Western Michigan University - Kalamazoo, MI
THE PASCAL SOCIETY

The Pascal Society is the NFPA Foundation’s annual giving society that has raised more than $4 million for fluid power outreach, education, and research programs. Pascal Society funds support the full range of Foundation programs highlighted in this report.

To maintain membership in the Pascal Society, a donor must annually contribute an amount at least equal to 50% of their NFPA dues. Pascal Society donors combine their financial and volunteer contributions in one concerted effort, developing the resources, tools, and people needed to meet the future technology and workforce needs of the U.S. fluid power industry.

Pascal Society Donors as of **June 30, 2021**

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The NFPA Education and Technology Foundation extends gratitude to the many generous donors who share our mission of meeting the workforce development needs of the U.S. fluid power industry.

The following organizations have achieved Legacy Builder status—cumulative giving of $25,000 of more—as of our last recognition year, ending April 30, 2021.

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- Kawasaki Precision Machinery
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- Norgren & Bimba
- SunSource

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- Festo
- Hitachi
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- OEM Controls
- Trelleborg Sealing Solutions

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- International Fluid Power Society
- Quality Control Corporation

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- Lubrizol
- Proportion Air
- Woodward

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- Bobcat Company
- Chevron
- Donaldson Company
- Evonik Oil Additives USA
- ExxonMobil
- HYDAC Technology Corporation/Schroeder Industries LLC
- Hydra-Power Systems
- Hydraquip
- Netshape Technologies
- Poclain Hydraulics

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- Pall Corporation
- Moog

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- Eaton
- Gates
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- Bosch Rexroth
- Caterpillar
- DeItrol Fluid Products
- Parker Hannifin Corporation

CLASS OF 2012
- Enfield Technologies

CLASS OF 2010
- Sun Hydraulics
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Clippard Instrument Laboratory, Inc.
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Exotic Automation and Supply
FORCE America, Inc./Valve Division
Fordsell Machine Products Company
Gates Corporation
GPM Controls LLC
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HYDAC TECHNOLOGY CORPORATION/ Schroeder Industries
International Fluid Power Society
Hydradyne, LLC
Hydra-Power Systems, Inc.
Industrial Hard Chrome, Ltd.
Iowa Fluid Power
JARP Industries, Inc.
Kaiser Aluminum Corporation
Kawasaki Precision Machinery (U.S.A), Inc.
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Main Manufacturing Products
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Mosey’s Production Machinists, Inc.
Muncie Power Products, Inc.
National Tube Supply Company
OEM Controls, Inc.
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QCC - Quality Control Corporation
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ROSS Controls
Stauff Corporation
Stucchi S.p.A.
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