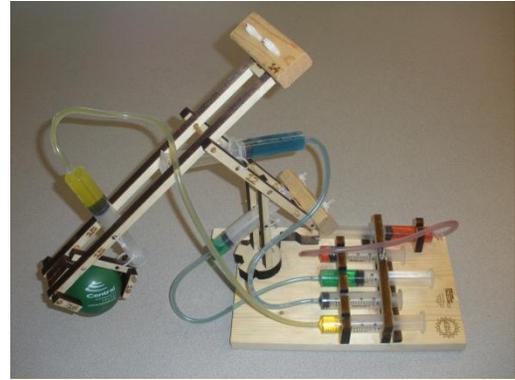


## Project Status Update to the National Fluid Power Association for *SHINE in Fluid Power*

**Project Goal:** To engage secondary and college faculty and students in problem-based learning activities emphasizing fluid power fundamentals as they relate to uses of science, technology, engineering, and mathematics (STEM) in business and industry.

1. To provide hands-on fluid power education kits and related lessons for STEM faculty and students.
2. To share an electronic library of STEM lessons and activities relating to business and industry.
3. To build stronger fluid power career and technical education relationships between the higher and secondary education and business and industry.



CCC Fluid Power Arm kit – (assembled)

Over the past eight months, Central Community College (CCC) has engaged in several activities in support of the project. Approximately 100 Fluid Power Arm kits were distributed and assembled in an educator workshop, student camps, and a national conference during June and July of 2012.



Secondary STEM educators Jess Eckman (L) and LaDonna Miles (R) assemble their fluid power kits with help from their facilitator, high school math instructor, Merlin Lahm.

**June 4-14 2012:** CCC held a two-week educator professional development workshop for middle school, high school and community college educators of science, technology, engineering, and mathematics subjects. Educators participated in industry externships where they were introduced to hydraulic and pneumatic systems. Following the externships, one day of the workshop was dedicated to the construction of Fluid Power Arm kits. After completing the construction of the fluid power units, the educators explored methods for incorporating the device into their classrooms, with a particular emphasis on science and math applications. Several lessons were developed for the classroom. Over 20 educators from 14 different institutions worked with the fluid power arms as part of this workshop.

**June 17-21 and 24-28, 2012:** CCC hosted two residential student academic camps – one camp for 9<sup>th</sup>-10<sup>th</sup> grade girls (June 17-21) and another identical camp for 9<sup>th</sup>-10<sup>th</sup> grade boys (June 24-28). During each camp, the students designed, simulated, and constructed fluid power circuits using the CCC fluid power laboratory resources which



Girls' camp students gain a better understanding of fluid power as they build their own kits.

are part of the college Mechatronics program. They also toured local industry to see pneumatic and hydraulic devices in action. As part of the fluid power awareness activities,

each student camper constructed a Fluid Power Arm kit. The students had the opportunity to take the devices home or share them with their classroom teachers.



Boys' camp students design and build pneumatic circuits before going on an industry tour to see fluid power in action.

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July 23-27, 2012: CCC staff along with the educators from the University of Nebraska at Omaha - College of Education, high school instructors, and industry representatives were competitively selected to present a pre-conference half-day workshop and conference training session during the High Impact Technology Exchange Conference (HI-TEC) in Denver, Colorado. HI-TEC is supported by National and Regional Centers funded by the National Science Foundation's Advanced Technological Education program and is attended by several hundred community college, university, and high school educators, workforce development advocates, trade organizations, industry professionals, and technicians. The CCC Project Team engaged approximately 40 HI-TEC conference participants in contextual applications of STEM education and showed how to use the fluid power arm in science and math classrooms.

During the fall 2012 and winter 2013, CCC has been active with scheduled and new fluid power activities. Several educators from the June workshops and two educators from the HI-TEC conference requested and received Fluid Power Arm kits to use in their schools and institutions. Over 75 fluid power kits were requested by Nebraska educators for use in the classroom.



Students learn about connections between math and science while they build Fluid Power Arm kits as part of their math class at Scotus Central Catholic High School.

January 26-29, 2012: CCC received national recognition for its applied STEM business-education program, Project SHINE, and was selected to conduct a presentation which included the Fluid Power Arm kit at the Community College Futures Assembly in Orlando, Florida. Several key community college leaders learned about SHINE and a member of the conference team, also a Research Fellow and Doctoral Candidate with the University of Florida's College of Education, inquired about using the Fluid Power Arm kit with undergraduate and graduate science students. (He now has an assembled kit.)

On February 16, 2013, simple pneumatic and hydraulic devices along with Fluid Power Arm kits were featured at the CCC booth during the Nebraska Robotics Showcase event held at the Strategic Air and Space museum. Nearly 2,000 people were in attendance at this event and several hundred students, parents, and educators were exposed to hands-on fluid power activities during this event.

CCC has successfully leveraged activities and connections from its concurrent National Science Foundation grant to disseminate fluid power information to a much larger and broader audience of students, educators, and business people than might normally be expected. CCC exposed post-secondary and secondary educators and students to hands-on activities with the Fluid Power Arm kits in Virginia, Arizona, Washington D.C., and Florida as well as connecting Nebraska students and educators to meaningful fluid power activities.

In summer 2013, CCC is planning to host summer camps and workshop for educators and students where more fluid power lessons and activities will be disseminated. Once again, the CCC project team was selected to present a hands-on workshop in July at the 2013 HI-TEC conference in Austin, Texas, where an entire half-day workshop is designed around applied STEM using the Fluid Power Arm kit.