

NFPA Education and Technology Foundation
ME6404 Advanced Controls Pneumatics Upgrade
Dr. William Singhose, Georgia Institute of Technology

The goal of this project is to provide graduate students with experience using pneumatic systems in the design and implementation of advanced control methods. In ME6404: Advanced Control Design and Implementation, students work individually and in groups on various labs to realize simulated and actual working versions of advanced control techniques. Small-scale versions of a bridge crane and a tower crane are utilized during the labs to provide practical experience controlling physical systems. The semester culminates with a six-week project where course concepts are used to design and implement a controller on a real machine. Industry professionals judge the final projects.

In the fall of 2014, a two-week curriculum on theory and programming of PLCs was added to ME6404. Six PLC test panels, as shown in Figure 1, were developed to provide students experience with control equipment that is used throughout industry. Students used the test panels to design, program, and implement a test facility powered by a pneumatic cylinder. Figure 2 shows a 5/2-way solenoid valve and a small pneumatic cylinder used for the project. Near the end of the course, the students completed an anonymous evaluation of the overall course, including the new PLC curriculum. The course comments made it apparent that the students felt that the PLC part of the course was very worthwhile. One student commented, "Implementation of theory and knowledge gained during the class on real-world systems. The PLC programming lab was another unique aspect that was very interesting."

Additional pneumatic kits are being purchased to improve the new PLC curriculum for the upcoming fall semester. The support provided by this project has enabled us to expose a larger number of students to pneumatic systems, and introduce them to a variety of pneumatic components.

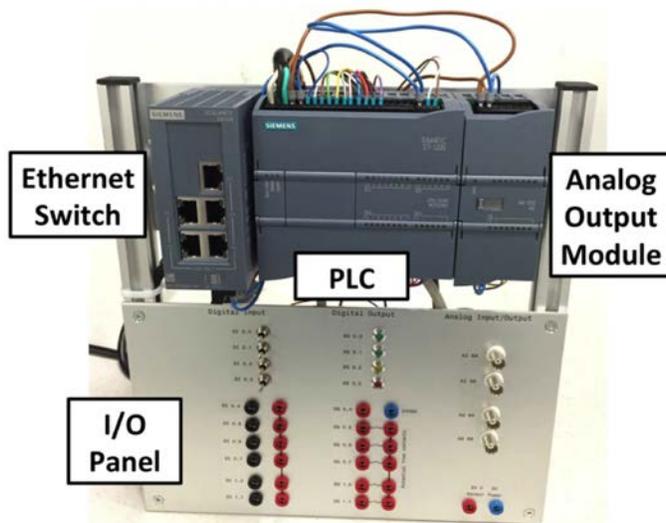


Figure 1. ME6404 PLC Test Panel

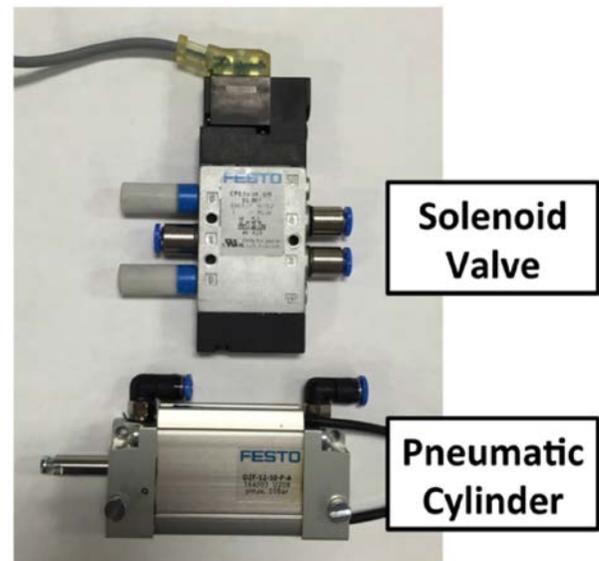


Figure 2. Needle Valve and Cylinder.