Status report for the project: February 28, 2012

Water Hydraulic Test Rig for "Fluid Power in Fluid Mechanics",

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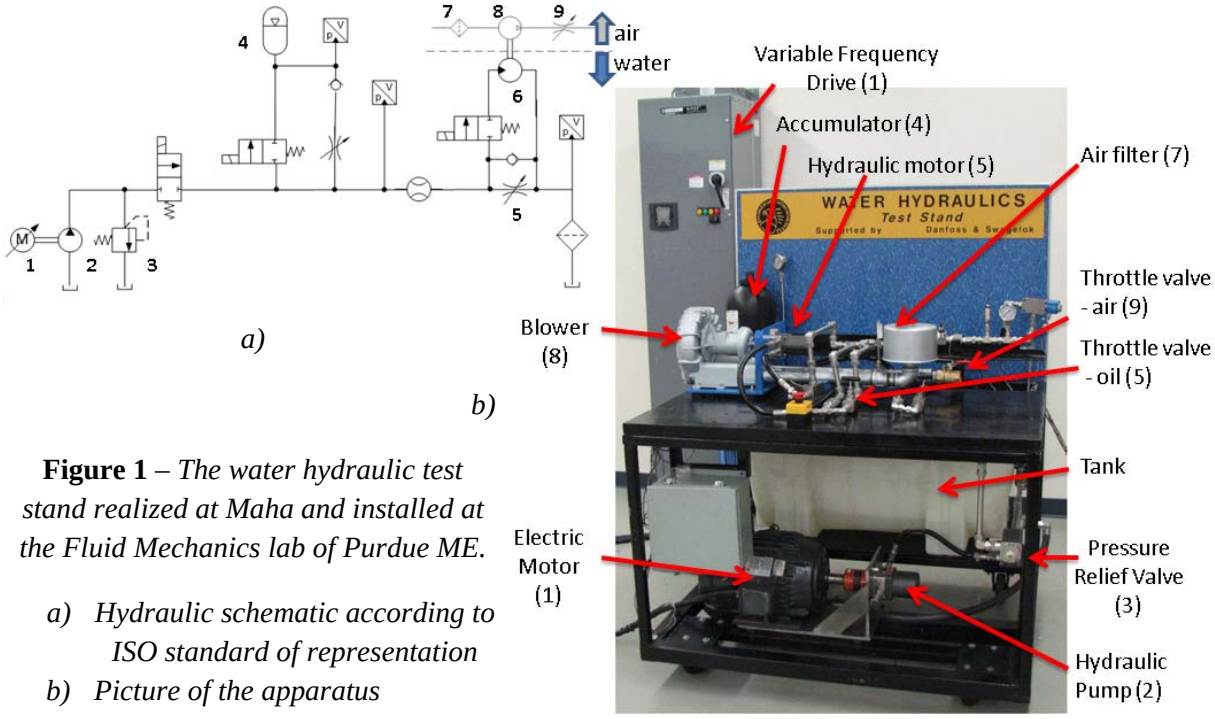
A high pressure (p_{max}=140 bar) test stand with tap water as working fluid has been realized at Purdue University within the project "Fluid Power in Fluid Mechanics" supported by CCEFP (Center for Compact and Efficient Fluid Power) and NFPA (National Fluid Power Association). Installed at the Fluid Mechanics lab of the Mechanical Engineering Dept, the test rig (Fig. 1) is utilized to educate undergraduate students on fluid power topics while taking fundamental classes of fluid mechanics. In particular, the test stand integrates a mini-book on basic examples of hydraulic systems, and permits following experiences:

- characterization of pumps and motors
- study of the operation of pressure relief valves and variable throttle orifices
- analysis of the operation of an open circuit hydrostatic transmission
- study of a hydraulic air blower-drive system
- energy storage in hydraulic accumulators and energy recovery in hydrostatic transmissions

During fall 2011, the project "Fluid Power in Fluid Mechanics was first experimented at Purdue ME309 (Fluid Mechanics). 218 junior engineering students successfully operated the water hydraulic test stand, documenting their work through proper lab reports (Fig. 2).



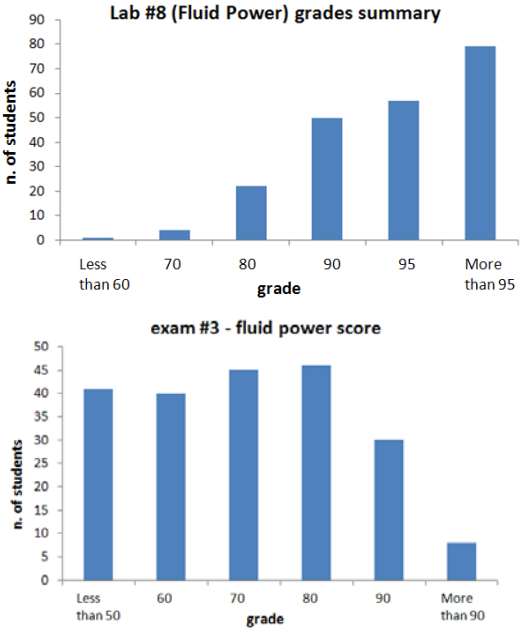
a)

b)

Figure 1 – *The water hydraulic test stand realized at Maha and installed at the Fluid Mechanics lab of Purdue ME.*

a) Hydraulic schematic according to ISO standard of representation
b) Picture of the apparatus

a)



b)

Figure 2 – *a) Students performing acquisitions for the "pump characterization" experiment (lab #9) during Fall 2011*
b) reports grades for lab #9 and for exam #3 (fluid power part)