
by: Mateus Bertolin (PhD Candidate, Maha Fluid Power Research Center)

Abstract

Amidst the increasing need to improve efficiency of fluid power systems for off-road vehicles, different hydraulic control architectures have been recently proposed in literature to either reduce system throttling losses or recover the energy from overrunning loads. Among the most cited ones, are systems based on the use of common-pressure rails (CPR), which consist of connecting hydraulic functions to different pressure supply lines, each at a different pre-determined level and with relatively low pressure variations. The concept recently evolved to a Multi-pressure Rail (MPR) system that adapts rail pressures according to the actuators demands, further reducing throttling losses. These architectures appear to be particularly attractive in systems with several actuators like earthmoving and agricultural equipment. Such machines use centralized hydraulic systems, have high potential for increasing the energy efficiency of their actuation systems, and are not particularly suitable for distributed hydraulic actuation due to the number of hydraulic functions.

The webinar first describes the concept of CPR and MPR, and then illustrates the most significant examples of use documented in literature. Particular references will be done to two reference vehicles being investigated at the Maha Fluid Power Research Center: an agricultural tractor and an excavator. Duty cycle differences are significant between these two machines, and therefore, challenges and specific characteristics of each case will be discussed. The discussion will include circuit design alternatives as well as control challenges associated with this technology.

Join this webinar to learn more about these topics and gain insight into the potential of CPR systems.

(*) The webcast link will be shared to Maha members, as well as to companies interested in joining the Maha center.

For more information on the webcast, and for receiving the webcast link, please contact avacca@purdue.edu, or shangl@purdue.edu, or Prithvi at pchandir@purdue.edu