ELECTROHYDRAULIC COMPACT DRIVES

Ideas on utilisation

Hydraulic drives are used in many machines. As an alternative to conventional valve-controlled systems, speed-variable drive units can control the actuators. These pump-controlled systems offer an energetic advantage as they do not have valves in the main flow paths, which cause considerable pressure losses.

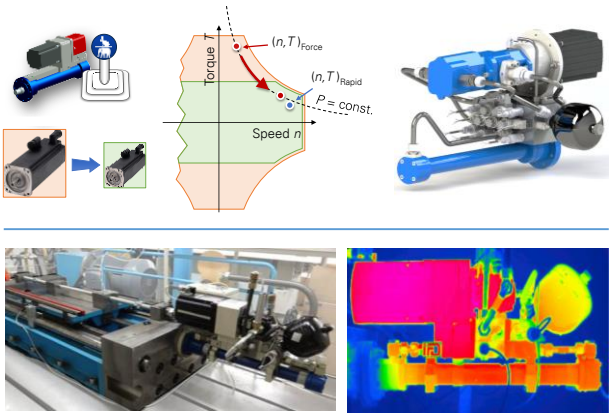

Figure 1: Demonstrator for investigation of switchable gear ratio (top), demonstrator for thermal analysis (bottom)

Electrohydraulic compact drives (ECDs) are a special form of pump-controlled systems. A feature of these drives is the integration of all components in one assembly. So the ECDs only have one electric and one mechanical interface. In addition to the advantages of hydraulic drives, such as high force density and simple overload protection, ECDs have further advantages known from electromechanical drives (EMDs), mainly simple installation as well as simple commissioning and low maintenance effects. In order to fulfil the requirements for ECDs and thus further increase market acceptance, we deal with a large number of research topics, e.g.:

- system structures and their properties,
- thermo-energetic behaviour,
- wear mechanisms,
- development of control concepts for the implementation of a switchable gear ratio,
- development of automated commissioning assistants,
- ECDs made from plastics in order to provide cost effective solutions for the low pressure range.

Potential adopters of technology

By combining the advantages pf hydraulic and electromechanical drives, ECDs can be used in many different machines. Not only manufactures of hydraulic drives but also machine manufacturers benefit from this development. Machine manufacturers need less know-how regarding the drives and can integrate them more easily into the corresponding machines. Machine productivity also increases with improved accuracy and reproducibility, which is a direct benefit for the machine users.

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Advantages of technology

With the help of hydraulic systems a simple realization of linear motion and a generation of large forces is possible within small installation space. In addition, conventional valve-controlled hydraulic drives are robust and have a simple and effective overload protection. The disadvantage of these drives compared to EMDs is their significantly lower energy efficiency. In addition, EMDs can be installed more easily in machines, since piping and subsequent degassing of the system is not necessary. Consequently, commissioning and maintenance costs are reduced. ECDs combine both technologies and use their advantages.

Market and context of technology

In areas with high force requirements, conventional valve-controlled cylinder drives are still the industrial standard today. On the other hand, EMDs are utilized for applications requiring less force. The ECD allows a much wider range of applications to be served. Some companies are already offering such drive solutions to customers. However, there are still many open questions that need to be investigated, for example the use of alternative materials for ECDs. There are no investigations on this issue yet, but the use of plastics can close the application gap in fluid technology at low pressures of up to 50 bar.

Preconditions in adopting enterprises

Adopting enterprises should have knowledge concerning the basics and applications of hydraulic drives and the development of components for fluid power, such as pumps or cylinders. They should be open for alternative, innovative drive solutions.

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