



OPTIMISATION AND IMPROVEMENT OF ELECTRO-MAGNETIC ACTUATORS

Ideas on utilisation

Electro-magnetic actuators are used in a wide range of industry and consumer products. We are focusing on applications of fluid power, such as valve or pump drives. Our main research topics about optimisation and improvement of electro-magnetic actuators are alternative manufacturing (e.g. injection moulding of magnetic material, 3D screen printing), new structures (e.g. energy efficient solutions, optimal functional structures) and condition monitoring (e.g. observation of armature position). There are many uncovered optimisation potentials such as precise thermal dimensioning and alternative manufacturing-oriented structures, which can be starting points for further research and development. Based on current applications of electro-magnetic actuators with its challenges, there can be numerous of other possible topics.

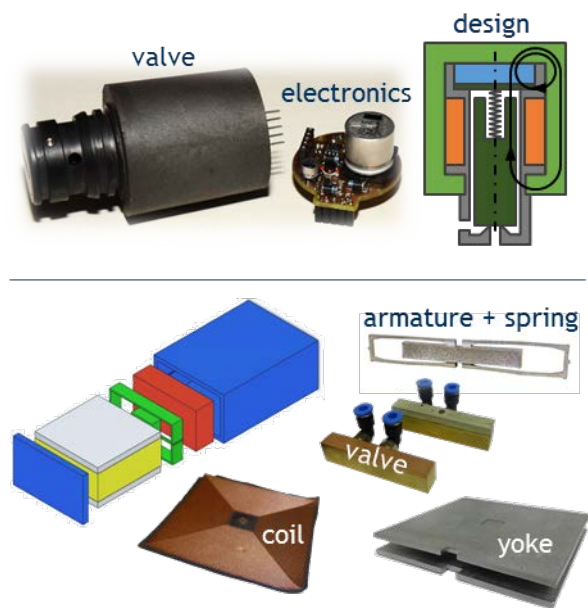


Figure 1: Energy-efficient bi-stable valve with injection moulded magnetic material (top), 3D screen printed valve components (bottom)

Potential adopters of technology

Our main field of research is fluid power in industrial applications. Therefore, our investigations are focused on electro-magnetic actuators as valve drives in hydraulic and pneumatic systems. However, we can deal with all applications or products in the context of fluid supply and distribution.

Based on our wide knowledge, future research and development of electro-magnetic actuators are not restricted in enterprise kind or size. There are a lot of small and medium-sized enterprises producing only fluid power components, which are focused on the actuator subsystem, as well as large enterprises producing beside components also entire systems with complex interaction between the system components. Therefore all kinds of enterprises can benefit from optimisation and improvement of electromagnetic actuators.



Advantages of technology

Electromagnetism is a robust, cost-effective and well-understood technology, especially in contrast to alternative technologies such as piezo elements or shape memory alloys. In combination with new approaches and new materials, existing solutions can be optimised for smaller manufacturing effort, less material usage, increased energy efficiency and more safety and reliability.

Market and context of technology

Conventional electro-magnetic actuators are widely used in different applications. Mostly, new development trends, such as new materials or new structures, are still in prototyping state. With further purposeful research and development, these trends can be lifted into applications to benefit from the advantages. Furthermore, reliability and safety are getting more and more interesting and important. Thus, developed condition monitoring methods have to be transferred into applications. Industrial associates can help to integrate this solutions in the corresponding application areas.

Preconditions in adopting enterprises

Possible enterprises should have knowledge regarding the basics and applications of electromagnetism, development of magnetic material and/or components or applications of fluid power. They should be open for innovations in manufacturing processes and new structures of actuators.