

Current status and future challenges in the development of piezoceramic multilayer actuators

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Since many years, piezoceramic components are well established in different application fields. In the low-end mass market e.g. buzzers or igniters are located, whereas in the high-end field we can find e.g. rotational and linear motors, ultrasound transducer arrays or mass flow controllers.

Nevertheless, up to now the utilization of more sophisticated piezo components in large-scale applications remains quite limited. Bending actuators for textile machines, knock sensors for diesel engines and ink-jet printing heads are good examples for successful system applications, which were created by exploiting the specific advantages of piezo technology.

With the introduction of multilayer technology for the manufacturing of large piezo actuators, interesting new application fields could be opened. In 2003, the fifth millionth piezo stack for common rail diesel injectors was built. Multilayer inkjet printing heads, multilayer piezo transformers, multilayer bending actuators and multilayer micro actuators for fine positioning gain rapidly increasing interest. To launch these innovative piezo components successfully, a deep interaction between all kinds of engineers involved in the system development has to take place.

First, this paper describes actual large-scale applications of multilayer piezo actuators. In the second and third part, some possible future applications of multilayer piezo actuators and important prerequisites and remaining development tasks to solve are highlighted, respectively.