



## ADAPTRONICS

***LCM is deeply engaged in the field of adaptronics, with technologies that focus on building self-adaptive, actively-responsive systems. Thanks to adaptronics, we can improve the quality, efficiency, performance and life cycle of individual components or even entire systems. Our services range from analyses to small-series production.***

### YOUR BENEFITS:

Adaptronics are primarily characterised by the ability of components to adapt, using active materials that convey energy between a system and its surroundings. Active materials, such as sensors, actuators and controllers, are connected to each other and breathe life into structures. This enables them to respond specifically to changing operating conditions and influences, thereby increasing the entire system performance considerably. As a pioneer in the specialist field of adaptronics, LCM has already successfully supported a large number of companies from a variety of sectors in building self-adaptive structure systems, particularly in the field of vibration, noise and structural control.

By taking precise measurements, relevant variables (mechanical, acoustic and electric) can be quantified and access points located. Based on this analysis we can model and simulate the system. We then develop an initial design of the system using adaptronic components and incorporate this into the simulation. To do so, we use e.g. HOTINT, a multibody dynamics simulation program developed by LCM. Taking into account the mechanical structure, external influences and adaptronic components, concepts are implemented, tested and evaluated swiftly and economically. Once a solution has been selected, we produce the prototypes, build them into the system, optimising it where required, until your requirements have been satisfied in every respect.



#### OUR EXPERTISE INCLUDES:

- Comprehensive expertise and years of experience in vibration technology and acoustics
- Vibration and noise measurement
- Vibration and noise analyses
- Modelling and simulation of adaptive components and systems
- System design with LCM's own HOTINT multibody simulation program
- Selection and development of adaptronic components (sensors, actuators, electronics and regulation)
- Passive and active vibration and noise reduction
- In-depth expertise in piezoelectric sensors and actuators
- Development of electrodynamic actuators for active vibration dampening
- Vibration design
- Integrated solutions for systems or individual components
- Prototype and small series development

#### CURRENT REFERENCES:

Our knowledge and expertise in adaptronics can be demonstrated by numerous projects that we have undertaken for customers in a wide variety of branches. This is just a small selection of our references:

- Vibration and noise reduction: Vibration and noise measurements form the basis for analysing problems. By identifying the source of the vibration and noise, specific active and passive measures are designed to improve system performance. Applications range from mechanical and system engineering, robotics, and medical and automotive engineering, to home appliances and ventilation and air conditioning technology.
- Vibration and noise optimisation of high-speed and high-performance rotors: Undesired mechanical vibrations and acoustic phenomena are especially prevalent at very high speeds or high performance. Coupled rotodynamic simulations (e.g. elastic rotor in a sliding or magnetic bearing) can help to identify, analyse and specifically correct these problems through optimisation, in accordance with customer requirements. LCM can build on its years of experience, especially in the energy supply and automotive sector.
- Material handling technology: Vibration design forms an essential part of material handling. LCM offers a broad range of expertise in the design, simulation and optimisation of material handling, positioning and sorting of components and particles.