



Multifunctional fibre-reinforced metal matrix composites with integrated sensor and actuator elements

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Increasing interest in Metal Matrix Composites (MMC) reinforced by continuous fibres and textiles urges the development and utilisation of innovative reliable structures capable of working in demanding complex loading conditions. However, the failure mechanisms of composites have not been thoroughly investigated and thus the prediction of damage and lifetime is hampered. To meet the demands towards modern structures made of MMC the in situ self-monitoring of material effort and structural adaptation by functional integrated sensors and actuators is indispensable. Within this research the development of favourable manufacturing methods for multifunctional structures with embedded sensor and actuator systems (particularly based on the piezoceramic and fibre bragg gratings) in magnesium-based matrix composites reinforced by carbon fibres is performed. Novel manufacturing methods that meets the requirements of series production needs the understanding of main obstacles due to the combination of these different materials. To understand the integration problems and the material behaviour the modelling and optimization of manufacturing process and material laws have to be taken into account.