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# Functionally graded materials obtained by additive manufacturing technology

**Devi K Kalla**
Metropolitan State University of Denver, USA

In the current study, Direct metal laser sintering (DMLS) and Binder jetting technologies are employed for direct manufacturing of functionally graded materials. In the past, the additive manufacturing approach has been limited to non- functional parts and their repair. In this project, we are extending this technology to functional graded gears through design decomposition, process modeling and smart machines. This project aims at developing functionally graded material (FGM) manufacturing technologies that enable creation of light weight "Net Shape" parts for power transmissions used in multiple markets such as transportation and power generation. The technologies include design decomposition, additive manufacturing and material characterization. This transformational approach will enable sustainable manufacturing through reduction in material use, processing steps, energy consumption and carbon footprint and create products which have better performance characteristics. Additive manufacturing technology may provide an efficient alternative way to fabricate customized dental implants based on a CAD (Computer-aided design) file with a functionally graded structure that may minimize stress shielding and improve the long-term performance of dental implants.

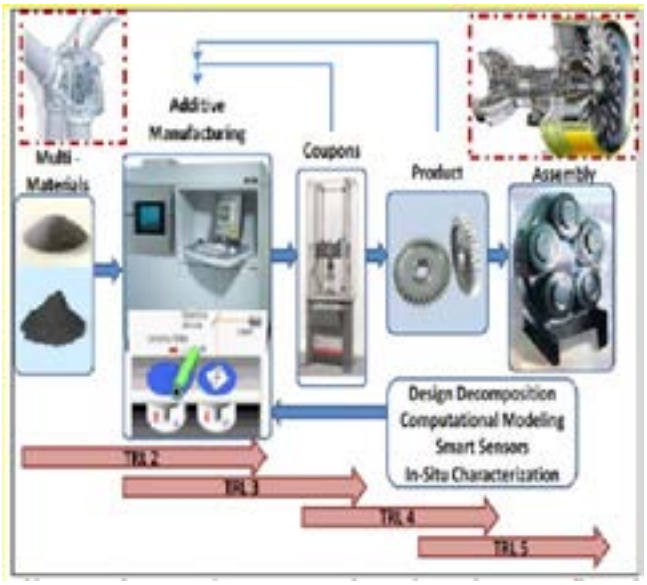


**Figure 1:** *Additive manufacturing of light weight functionally graded materials.*

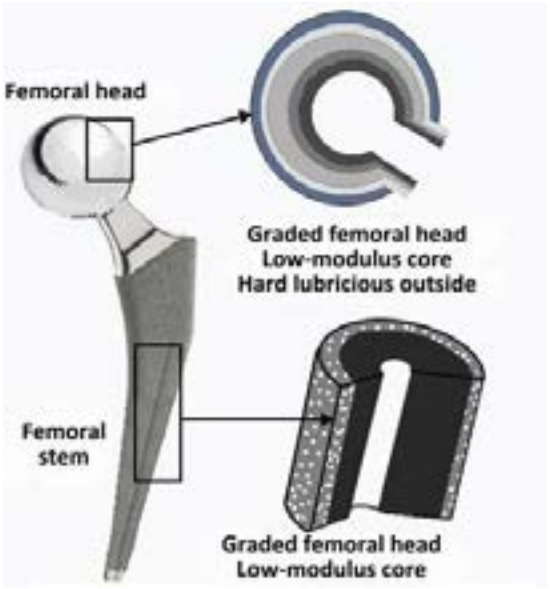


**Figure 2:** *Examples of functionally graded materials (FGM).*

## Biography

Devi K Kalla received his PhD in Industrial Engineering from Wichita State University, Kansas, USA. He is currently an Associate Professor in the Department of Mechanical Engineering Technology at Metropolitan State University of Denver, USA. He has a strong experience in composite manufacturing, 3D printing, and modeling. His research interest includes: sustainable manufacturing and analysis in the machining of carbon fiber- reinforced polymers (CFRP) composites, additive manufacturing, green manufacturing. He has published more than 25 papers in reputed journals and conference proceedings and has been serving as an Editorial Board Member of International Journal of Material Sciences and Technology, International Journal of Industrial Engineering and Technology (IJIET) and more notably, as the Editor-in-Chief of the International Journal of Mechanical and Material Sciences Research).

dkalla@msudenver.edu