Manufacturing – An Integration Platform

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Abstract. Manufacturing translates ideas, innovation and raw materials into products used by societies as a driving force for raising their living standards. To enhance the versatility of manufacturing processes and to fully integrate design and manufacturing for system optimization, research efforts at Cao's group are rooted in advancing new flexible manufacturing processes, and in enhancing system optimization using the combination of the ICME (integrated computational materials engineering) and data-driven approaches. This talk will provide a quick overview of these activities and then focus on selected processes, i.e., rapid dieless forming for producing three-dimensional sheet parts without geometry-specific tooling, and metal-based powder-blown additive manufacturing. The integration of the fundamental process mechanics, techniques including machine learning to achieve effective and efficient predictions of material behavior compared to conventional methods, and process control paves the foundation for translating expertise and skills from the hands of a few to hands of many.

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