

Hybrid Metal Forming Processes for Mass Customized Production

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Industry 4.0 has enabled many industries to realize mass customized productions where products can be individualized cost-effectively for wider market segments. In metal component making industries such as automotive, the shift from mass production towards mass customization demands greater flexibility in tools, processing and machinery. Die-based forming processes such as closed-die forging and stamping area typically rely on part-geometry dependent tools and processes, thus unsuitable for mass customization. Incremental deformation processes in both sheet and bulk metal forming such as incremental sheet forming, spinning, and flow forming do offer more flexibility by using generic-kind of forming tools that able to form a variety of part geometries. These incremental deformation processes can also be hybridized with conventional processes to further increase forming flexibility at competitive costs, such as spinning of aluminum wheel from high-pressure cast preform. Technology and demonstration cases of these incremental deformation processes including their possible hybrid forming processes will be discussed to show their benefits and potential applications towards mass customization in forming metal components.