

# MetaTwin: The Foundation Element of Cloud Manufacturing Metaverse

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**Abstract.** The trend towards manufacturing digitalization facilitates the establishment of a uniform cyber-physical manufacturing world, which forms metaverse of cloud manufacturing (CMfg). As an enabling cyber-physical technology, digital twin (DT) has been widely applied to build vivid instances of physical manufacturing resources in CMfg world. However, current DTs are formulated on different granularities, which makes it difficult to organize and configure these granularities in a uniform CMfg metaverse. Hence, this paper proposes the concept of MetaTwin as the foundational elements of CMfg metaverse. The scientific characteristics of MetaTwin are defined and general relationships between MetaTwins are extracted and summarized to configure fine-grained MetaTwins into different logical DTs in CMfg metaverse. Finally, related cutting-edge technologies are given to develop and implement MetaTwins in terms of characteristics and relationship requirements.

**Keywords.** Industry 4.0, Cloud manufacturing, digital twin, MetaTwin, metaverse

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