



## 论文摘要

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### 大尺寸多层喷射沉积6066Al/SiC<sub>p</sub>/Gr 复合材料管坯的制备

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**摘要:** 采用多层喷射沉积技术与双喷嘴雾化系统制备了外径为650 mm, 内径为300 mm, 长为800 mm的大尺寸6066Al/SiC<sub>p</sub>/Gr颗粒增强复合材料管坯, 并成功挤压外径为350 mm, 内径为250 mm的管材。在大尺寸管坯制备工艺中, 喷射距离较短, 金属液流率较大, 以保证喷射流具有较高液相比, 与固相沉积坯表面结合良好, 避免层间开裂。与传统喷射沉积工艺相比, 多层喷射沉积复合材料坯冷却速较高, 但致密度稍低, 平均致密度约为(88±3)%。采用双环复合雾化器结构以粉包液的方式在雾化前加入增强颗粒, 操作简单, 影响工艺因素少, 能实现增强颗粒的均匀连续加入, 适用于大尺寸喷射沉积复合材料的连续制备。分析了多层喷射沉积大型管坯制备工艺中有待解决的一些问题, 为工业化制备大尺寸喷射沉积复合材料奠定了实验基础。

**关键字:** 多层喷射沉积; SiC颗粒; 铝基复合材料

### Preparation of large-sized 6066Al/SiC<sub>p</sub>/Gr composite tube by multi-layer spray deposition

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**Abstract:** Large scale 6066Al/SiC<sub>p</sub>/Gr composite tubewith size up to 650mm in outer diameter, 300 mm in inner diameter and 800 mm in length has been prepared bymulti-layerspray deposition and twin-atomizer system, and then extruded into tube product of 350 mm in outer diameter and 250 mm in inner diameter. Using the preparation technology of large sized tube, the spray distance becomes shorter and the metal flux is larger, so that larger liquid proportion of spray and good combination between layers may be, and obtained crack between layers avoided. Compared to traditional spray deposition technology, the cooling rate of multi-layer spray deposited tube is higher and the density is relatively low, with a mean density of (88±3)%. By the application of dual-looped atomizer, reinforced particulate can be incorporated uniformly with liquid metal stream in the surrounding of flying particulate. And the process can be easily controlled with relatively few influencing factors, especially suitable for the continual preparation of large-sized spray-formed composites. Some problems to be solved in the preparation process have been analyzed, which lays experimental foundation for the industrialized production of large-sized spray-formed composites.

**Key words:** multi-layer spray deposition; SiC particulate; aluminum MMCs

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