

2nd International Conference on

3D Printing Technology and Innovations

March 19-20, 2018 | London, UK

The fabrication of grinding wheels with 3-dimensional controllable abrasives arrangement using stereolithography apparatus method

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In this paper, a practice to fabricate ultraviolet (UV) cured resin bond grinding wheels with abrasive grits in controllable 3-dimensional (3D) distributions was reported. The challenge in fabrication of resin-bonded grinding wheels with controllable abrasive grits distribution is to simultaneously cure heterogeneous materials with suitable slice thickness and sufficient bonding strength between cured layers. This is beyond the capability of most commercially available 3D printers. A new stereolithography apparatus equipment with automatic functions of resin applying, grits planting, resin curing and wheel lifting was developed. Successively, multi-layered abrasive wheels were fabricated by planting abrasive grits and UV curing resin layer-by-layer. In doing so, 3D grinding wheel with controllable abrasive grits distribution were fabricated. Finally, the grinding performance and wear characteristics of newly developed grinding wheels were revealed through the grinding experiments. The results indicated that the distribution of diamond abrasive grits plays a determining role in the wear behavior, and hence the grinding performance of resin grinding wheels has been greatly improved.

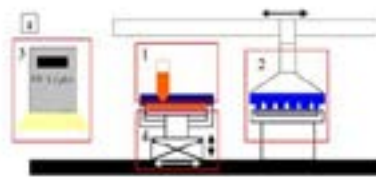


Figure 1: Manufacturing equipment for the resin bond grinding wheels with 3D controllable abrasives arrangement. a: Schematic figure; b-Machine; 1-resin applying institution; 2-abrasive arraying institution; 3-resin curing institution; 4- lifting and striking institution.



Figure 2: The grinding wheel with 3D controllable abrasive arrangement. a-Schematic of diamond abrasive arraying forms; b- The grinding wheels of circular distribution; c- The grinding wheels of Rectangular distribution; d- The grinding wheels of spiral distribution.

Biography

Xipeng Xu is the President of Huaqiao University, China. He has his expertise in machining technology and functional usage of diamond materials. He is an Executive Member of International Committee for Abrasive Technology (ICAT) and gets over 140 technical papers publication in related journals and conference

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