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Design and fabrication of a porous cast using Additive Manufacturing

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These days, additive manufacturing (AM) has been changed from the conventional rapid prototyping (RP) to direct fabrication of functional parts. As a direct fabrication method, a promising application of AM is to make customized parts for biomedical applications. In this study, a customized cast with a porous shell structure is developed to replace traditional plaster casts. Although recent developments of customized casts are based on three-dimensional (3D) scan data of a human body and are designed to fit the body, such as personalized design might not be applicable to real orthopedic treatments because it takes time to prepare 3D scan data (>1 hour), to construct 3D solid model with a number of ventilation holes and assembly features (>1 day), and to fabricate cast parts using additive manufacturing (>2 days). To overcome such a limitation, this study proposes a new design concept for porous casts with the following features: The porous cast shells are prepared as standard sizes (i.e. small, medium, and large); one can choose a cast that is a little larger than his/her size; a number of flexible pins with variable lengths are fabricated using additive manufacturing and are inserted in holes of the porous cast so that the cast can be fully supported on a human body. Considering that a flexible pin can be manufactured within 5 minutes using a commercial 3D printer, the proposed cast can be prepared within an hour and be applicable to orthopedic treatments thereby.

Biography

Keun Park has completed his PhD at Korea Advanced Institute of Science and Technology (KAIST) Korea, and Post-doctoral studies at University of Massachusetts Amherst, USA. He worked as a Senior Researcher at Samsung Electro-Mechanics Co., Korea. He is a Professor of Seoul National University of Science and Technology, Korea. His research fields are "Materials processing and additive manufacturing, including design for manufacturing (DFM) and design for additive manufacturing (DFAM)". He has published more than 40 papers in reputed journals and has been serving as an Editor of *International Journal of Precision Engineering and Manufacturing*.

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