Meetings International SciTechnol

Biomater Med Appl 2018, Volume: 2
DOI: 10.4172/2577-0268-C1-003

Annual Conference on

3D PRINTING & BIO-PRINTING IN HEALTHCARE

August 20-21, 2018 | Singapore City, Singapore

Extending application of 3D printing technologies to manufacture wax patterns for healthcare

Mitesh Popat[1], Amit Sata[2]
[1]Adani Institute of Infrastructure Engineering, India
[2]MEFGI – Faculty of Engineering, India

Investment casting is considered to be one of the oldest manufacturing processes, and its applications were found since 5000 years ago. Investment castings were earlier used in making of idols and jewellery. However, applications of modern investment castings have been extended to other industrial sectors including aerospace, automobile, chemical, defence, medical, etc. in recent times. Modern investment casting process mainly comprised of different sub-processes including wax pattern making, shell making & dewaxing, melting & pouring, solidification and removal of casting for further finishing processes. In general, wax patterns are manufactured by injecting industrial wax into metallic die using wax injection machines. These wax patterns are cleaned, and assembled together for further sub-processes to manufacture castings. It is observed that wax pattern making sub-process highly affects the productivity of the investment casting process especially in manufacturing castings related to medical implants as they are exceptionally tailored castings. Manufacturing of metallic die for such customized castings followed by wax pattern making usually takes more time as well as efforts. It is proposed to deliver a talk on latest development in the field of a 3D printing machine for manufacturing wax patterns that can be further used for different sub-processes in order to produce investment castings related to medical implants. 3D models of different medical implants are usually prepared using different 2D images collected from either CT scanned images or X ray images. The 3D model (after some pre-processing) can be converted into .stl, and will be further used as an input to 3D printing machine for preparation of wax patterns. The proposed 3D printer takes industrial wax as raw material in place of thermosetting plastic filament that is used in typical Fused Deposition Modeling (FDM) based 3D printer. The use of proposed machine helps in avoiding involvement of costly dies in investment casting especially for manufacturing of medical implants. This will also aid in reducing overall lead time of manufacturing medical implants. However, selection of appropriate industrial wax and its composition, deposition rate of wax, and staircase effect in printed pattern are still challenging tasks. A case will be presented based on knee joint manufacturing through 3D printing.

meetpopat1@gmail.com