APEM journal

Advances in Production Engineering & Management
Volume 15 | Number 4 | December 2020 | pp 390–402
https://doi.org/10.14743/apem2020.4.373

ISSN 1854-6250
Journal home: apem-journal.org
Original scientific paper

A review of production technologies and materials for manufacturing of cardiovascular stents

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ABSTRACT

The purpose of this article is to give a general overview of the production technologies of stents with consideration of their design and materials. Since the beginning of the use of stents in medicine for atherosclerosis treatment, their development has changed rapidly. Various stents have also been developed with the development of materials science, treatment techniques and new manufacturing processes. In this way the development has shifted from the initial bare-metal stents (BMS), to drug-eluting stents (DES) and bio-resorbable stents (BRS), which are made of biodegradable polymers or metals. Various studies agree that it will be necessary to further review the experimentally obtained material properties with analytical and numerical studies. Here, the computational modelling (Finite element analysis – FEA and Computational fluid dynamics – CFD) was found as a valuable tool when evaluating stent mechanics and optimizing stent design. The development of the stent manufacturing technologies has also changed and been supplemented over the years. Nowadays, 3D printing could be an exciting manufacturing method to produce polymeric bio-materials, suitable for the latest generation of bio-degradable stents applications.

ARTICLE INFO

Keywords:
Stent;
Bare-metal stent;
Drug-eluting stent;
Bio-resorbable stent;
Stent coatings;
Drug delivery;
Stent manufacturing;
Stent material;
Laser cutting;
Additive manufacturing (3D printing)

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Article history:
Received 22 September 2020
Revised 8 December 2020
Accepted 12 December 2020

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