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Book Review

Principles of Fabric Formation—by Prabir Kumar Banerjee [CRC Press (Taylor and Francis Group)], 2015, pp. 491, Price: £95.00 [ISBN: 13-978-1-4665-5444-3 hardback]

The book titled "Principles of Fabric Forming", published by CRC Press and authored by Dr Prabir Kumar Banerjee, is a state-of-the-art scientific publication on the various techniques to produce fibre-based structures directly from yarns or fibres. The author, in this ~ 500 pages book, has covered the main aspects of fabrics formation, starting from yarn preparation techniques (winding, warping and sizing) to the different fabric production techniques (weaving, knitting, nonwovens and braiding). Considering the subjects included, this book seems to be very interesting, not only for textile technicians and engineers, but also for those who are somehow using textile fabrics as an intermediate product to perform a specific function in the areas like medicine, building, architecture, sports, transports, agriculture, etc.

This book addresses the basic principles to produce conventional textile fabrics including knits, weaves, braids and nonwovens. In this regard, the recent innovations made till date are found quite less in its contents, as these basic principles have been kept constant almost since from their first development. As far as the basic textile fabrics production is concerned, significant innovations have been reported over the last decades in controlling systems to improve production, increase quality and enhance flexibility. Most of these advances have been encountered in mechatronics, the key factor to find the best solutions to achieve the role established. This historical evolution in the technologies associated with the production of fabrics is just mentioned briefly in the book. However, an excellent work has been reported in the this publication, considering the integration of the whole technologies description, giving user the opportunity to perform comparisons in the selection of the most suitable technology/fabric for a particular application. This is an innovative way of writing books in this field, as many of the publications are just focusing in a single technology, making the readers unable to have a broader view on the possibilities offered by textile fabrics. This approach is especially important for those who, even not having a textile background, need to understand the ways fabrics are produced as well as their specific properties and characteristics.

Although the principles of fabric formation have been kept constant for a long time, several research groups all over the world invested a lot in developing new techniques to produce special fabrics, in response to the needs of technical applications, mainly from the composites industry. In this regard, the book is analysing a large set of techniques to produce special fibrous architectures with specific in-plane and out-plane fibre orientations. Hence, the last chapter of the book plays a very important role to establish the ways to produce triaxial, multiaxial and 3D fabrics using weaving, knitting and braiding technologies. This part of the book is assumed as the innovative content of this publication when compared to other books published over the last 20 years on similar related areas. However, on comparing the chapter contents with the achievements obtained within the last years, as published in scientific journals, one may verify the chapter incompleteness in this aspect. Several achievements obtained on 3D knitted fabrics have not been described in the book. 3D shaped knitted fabrics and 3D sandwich knitted fabrics, both based on weft and/or warp knitting technologies, are examples of thematic which are not covered in the book; there have seen important developments over the last 10 years using innovative techniques associated with basic machine principles adaptation (feeding and take-down systems). Furthermore, 3D nonwoven fabrics have also seen significant achievements over the last few years, both in shaped and sandwich fabrics. These topics may be further described in future editions on this subject.

This book presents a detailed description of the textile technologies and principles to be used in the production of fabrics, being organized in different chapters related to each technology analysed and described. This seems to be the most suitable way of

organizing the information in a descriptive book where various technologies, techniques and systems are described in detail. It may be said that the book is organized from the technology to the fabric. Other interesting approach would be to organize it from the fabric properties/characteristics to the technology required for its production. Several authors mainly operating in technical applications of textiles are following this approach. The idea is to start from the basic that a textile fabric is just a fibre-based system with fibres oriented in particular directions, and textile technologies are just used to place the fibres according to the requirements of particular applications. Having this in mind, a 3D shaped fabric might be produced either by weaving, knitting, braiding or nonwoven technologies. The only difference is the fibre orientation in the final fibrous architecture. This approach is focusing more on the material/structure itself and less on the technology associated to its production. In this aspect, a chapter based on a complete comparison of the different types of fabrics produced with the technologies described in the book, would help the reader to understand the role of fibre orientation in the fabric and its influence on the fabric performance. These are ideas that might be considered in future editions on this topic.

In conclusion, this book is a very helpful tool for students, engineers and researchers giving a comprehensive description on the techniques used to produce textile fabrics. Over its 16 chapters, the author provides up-to-date technical information, which might be used as literature reference for further publications on the topic. Covering the entire subject of textile fabrics manufacturing, this book may also represent an important tool for those who need to decide on the textile fabric to be used in a particular application.

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