Coated and laminated textiles

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Dedicated to all my teachers and to all those who have shared their knowledge with me. 'When you drink water, remember the source.'

Walter Fung
(Feng Qing Xiang)

Preface

In writing this textbook it has been the author's intention to produce a work of reference for everyone involved in the business of coated and laminated textile products. Products generally begin with the technologist or marketing specialist who initiates the development, progressing to laboratory staff who carry out pre-production preparatory work and the machine operatives who actually produce the goods, through to the technical service specialist and the salesman who meet the customer. Some focus is on why particular starting materials are used and what specialist properties they possess, because from this comes an understanding of how the materials will behave during production and use. This knowledge is important if problems are to be solved as they arise in the plant so that quality coated or laminated fabric can be produced consistently. This understanding is also essential to the investigation of customer complaints or concerns, and finally – but at least equal in importance to all the other considerations – it enables innovation and the design of new or improved products. Existing products are described in some detail, including background information, so that opportunities for improvements and new product innovation may be identified quickly, especially through making use of the new materials and technology which seem to be becoming available almost on a weekly basis.

The book is written in a clear, concise manner – generally free of intimidating (for the layman) chemical formulae and mathematical equations. Little previous knowledge of the industry or subject is assumed, but it is hoped that the underlying scientific principles are explained adequately for readers to understand why compounds contain different ingredients and why it is important to set processing conditions carefully and adhere to them. Included in the book are properties of materials, details of material preparation and actual processing conditions – some from a 'hands on perspective.' Production management and sales and marketing aspects are also discussed. Test methods are presented along with comments, and the scope for research and new product development is reviewed, together with a section devoted to sources of further information for more detailed

research and for keeping up-to-date. Suggestions for improvements in existing products and for exploratory developments are made.

Coating and laminating offer methods of improving and modifying the physical properties and appearance of fabrics, and also scope for the development of entirely new products by combining the advantages of fabrics, polymers, foams and films. There are development opportunities in the area of industrial and medical protective clothing, with a view to making it more comfortable and washable without affecting performance. Disposability is likely to be less attractive in the face of ecological waste disposal concerns. There are interesting, novel 'smart' materials such as phase change materials, temperature memory shape polymers and surface modification processes which result in improved adhesion; these are still to be fully exploited by the textile industry. Coating and laminating poses challenges, not only for the technologist, physicist and chemist but also for the mechanical, chemical and production engineer whose expertise is frequently called upon to solve a particular problem as well as to develop more efficient machinery. It is hoped that this book will also be of use in explaining to these specialists the overall picture and the need for accurate control of the production variables, the factors involved and how they all interrelate with each other. Coated or laminated fabrics are handled differently from non-coated fabric, and manufacturing processes also involve materials such as solvent and water-based resins, films, foams and hot melt adhesives in powder, web and film form.

Control and handling of potentially toxic liquids and fumes in an increasingly environmentally conscious world are also important tasks in coating or laminating plant management. The influence of issues such as the environment and global warming on the industry and how they are likely to influence future products and processes is discussed. Coated and laminated fabrics are, by definition, composed of different materials, although the disposal of these materials at the end of their useful life is apparently not an issue at the time of writing – apart from carpets and PVC-based products. Careful thought, however, should be given to the choice of materials for future products in order to facilitate recycling and disposal and to protect the environment. Research work on these aspects and the impact of plastics and textiles in general on the environment has been underway for some time, and these items are also reviewed and discussed.

Coating and lamination cut across virtually all of the groups into which the products of the textile industry can be classified, and thus the scope for development is extremely wide. The processes of coating and laminating are important steps in the production of composites, another important area of technical textiles. The technologist responsible for research and development is working in an exciting area with tremendous potential and opportunities for innovation. Textile analysts draw attention to the fact that in the

developed world, technical textiles offer the most potential for innovation and growth and, some say, the main hope for survival of the textile industry in the developed countries. Coating and lamination are two of the processes by which these aims can be realised, but information, imagination, persistence and determination are needed to make the most of these opportunities in an ever-changing world.

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Abbreviations used in references at end of chapters

ATI	America's Textiles International (now America Textile Industries)
BPR	British Plastic and Rubber
EPN	European Plastic News
IMMFC	International Man-Made Fibres Congress, Dornbirn, Austria
JCF	Journal of Coated Fabrics
JSDC	Journal of the Society of Dyers and Colourists
JTN	Japanese Textile News, Monthly
MPI	Modern Plastics International
MRW	Material Recycling Week
PRW	Plastics and Rubber Weekly
TTi	Technical Textiles International
TuT	Technical usage Textiles (France)