PORCELAIN (VITREOUS) ENAMELS and Industrial Enamelling Processes

The Preparation,
Application and Properties
of Enamels

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The Preparation, Application and Properties
of Enamels

BY

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Revised and Expanded with New Technical Information

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Preface - *third edition*

In the past 15 years many discussions have taken place to revise the books written by Dr. A. I. Andrews through various revisions, and I am included among those having suggested such a revision. We can now celebrate the initiative and efforts of Dr. Silvano Pagliuca and Mr. William D. Faust since this revision of the original book is now in our hands. The first book, *Enamels*, published in 1935 and the revision, *Porcelain Enamels*, published in 1961, provided an excellent foundation in the technology of porcelain enamelling; these books have been extensively used all over the world. In the writing of new *Porcelain (Vitreous) Enamel and Industrial Enamelling Processes* it was the authors deliberate intention not to substantially change the original book but to update and expand it with the numerous developments over the past 50 years. Since 1961 there have been significant changes in enamel/frit chemistries, enamel application techniques (i.e. electrostatic powder), base metal chemistry and processing, metal preparation processes, and end-product attributes/requirements. There are an additional five appendices on new topics of interest to enamellers. This third edition reflects the status of porcelain enamelling technology in the early 21st century. Over the years this book has been an invaluable resource for industrial enamellers, frit developers and all students of porcelain enamelling. Our industry is focused on delivering better porcelain enamelled end-products to the consumer while improving manufacturing efficiencies and controlling complex production processes. Porcelain (vitreous) enamelling has progressed as contemporary technologies are employed, new materials are developed, and superior processes are implemented. The many regional organizations who comprise the International Enamellers Institute including the Porcelain Enamel Institute, as well as IEI itself, have been key contributors to the growth of porcelain enamelling technologies by their work to provide venues for the exchange of technical information and the dissemination of this information to porcelain enamellers in published literature. This has truly been an international cooperative effort which you will notice in the English text and in the use of both metric and English units of measurement.

Sincere thanks must also be given to the contributions of the many material and equipment suppliers, industrial enamellers, engineers, scientists, designers and artists who have helped grow the application and use of this technology by sharing the results of the development work with their industry colleagues. Too numerous to mention are the many others within this industry who have made substantial contributions to porcelain enamelling technology as well as to the many people who have encouraged and supported the authors in this revision effort. While there is certainly more information on the topic of porcelain enamelling available in today's wealth of literature, it is the intention of this Third Edition, as it was Dr. Andrews's intention, to put much of it into one book. The readers and users of this book will greatly benefit from both the historical foundations of porcelain enamelling as well as from the combined porcelain enamelling experience of the two authors for this revision. Please use this book as you work in porcelain (vitreous) enamelling and remember that there is a wealth of information to support you in your daily efforts. Remember to share the book with your co-workers and also share, as you are able, your new discoveries with your enamelling industry colleagues around the world. Together we can help keep porcelain (vitreous) enamel developing as an important, valuable engineering material for new products that will help improve the quality of life for everyone.

For me, it has been a great privilege to have been a participant in this effort and I congratulate the authors. *Porcelain (Vitreous) Enamel and Industrial Enamelling Processes* exhibits the diligent work by Dr. Pagliuca and Mr. Faust in this third edition; and we pay tribute to them for having that same pioneering spirit as Dr. Andrews.

Cullen L. Hackler
Executive Vice President
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September 30, 2011, Mantova

CONTENTS

LIST OF TABLE

Table no.

LIST OF PICTURES

LIST OF ILLUSTRATIONS

Figure no.