

# Quality of Machined Wood Surfaces

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 Springer

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# Foreword

The design and manufacture of wood surfaces are of the same age as mankind. Since ancient times, man has worked out everyday utensils and shelters made of wood. The first time, these objects were dug out from a proper piece of wood, but we cannot speak about furniture in this sense of the word. As the first settlements and towns began to appear the need for furniture continuously increased. The basic elements of furniture (bed, seat, table and chest) were developed by the ancient Egyptians and Greeks. They possessed knowledge about the most important tools and operations to cut boards from a log, the hand planer for making plane and smooth surfaces and the turning lathe to shape cylindrical and profiled contours. In the subsequent thousand years, a relatively slow development took place depending highly on the creativity and wealth of particular nations.

In the second millennium of our time, the development had considerably accelerated, especially in Europe, and different furniture styles were subsequently created and introduced. These “style” furniture were very demanding in material, skill and labour, and, therefore affordable only for a very limited range of consumers.

The past century saw a huge change in the manufacture of furniture. Manual labour was replaced by high performance machines and the design of furniture was also accommodated to the requirements of industrial production. These furniture were already attainable for a wider range of consumers.

In our time we have high performance production systems and, at the same time, a scarcity in high quality raw materials. We are forced to use small logs and wood species not used formerly by the furniture industry. There is great need for new developments enabling to manufacture aesthetic and quality furniture from the available raw material.

The visible surface of any furniture plays a decisive role in its general appearance and judgement. Therefore a proper scientific design and manufacture of wood surfaces became an indisputable necessity in the wood industry. In the world literature there are many contributions to this subject. In order to review, relate, evaluate and assemble all significant facts on the subject, a summarizing book may

be of great value to research workers, teachers and application engineers to obtain the existing knowledge in an ordered form. Furthermore, there are interesting experimental results in such a presentation form which are not user-friendly to industrial applications.

This book, *Quality of Machined Wood Surfaces*, is the first attempt to summarize and, in many cases, to complete the existing knowledge on the subject. Several new materials, representation methods and generalizations complete the existing knowledge and making it more usable to application engineers. I would like to emphasize here the importance of only one section: The colour of wood. The colour and gloss are most important aesthetical parameters of wood products, but their practical use in the design and manufacture of wood surfaces is very far from the real possibilities. Effort has been made to change this situation.

I hope this new textbook on the *Quality of Machined Wood Surfaces* will contribute to better understanding of the complicated physical and chemical process associated with the design and manufacture of wood surfaces. The material presented is designed for graduate and postgraduate students, research workers and application engineers working on design and manufacture of wood products.

Sopron, Hungary  
June 2015

György Sitkei

# Preface

The word *quality*, referred to products or services, has become one of the most frequently used phrases in our everyday life. At the same time, quality is a very complex meaning depending on a myriad of influencing factors pertinent to the given product or service.

In the woodworking industry the parts manufactured for a given end product have almost always free surfaces being in service for many years. These generally visible surfaces should be machined, treated and finished from the properly selected raw material in such a way that they retain their required physical, mechanical and aesthetical properties for a long time. Therefore, problems encountered in the manufacture of wood surfaces deserve special attention.

This book *Quality of Machined Wood Surfaces* is the first attempt to summarize the existing knowledge scattered in the literature and to integrate them into a unified and scientifically well-founded topic. The material published in this book draws on the international literature of several languages, but at the same time it relies on own research works to a considerable extent.

The book consists of an *Overview* and three main chapters. Chapter 2 deals with the general problems of surface stability concerning environmental effects and artificial treatments (irradiation, heat, moisture, mechanical loads). Chapter 3 treats the colour characterization of wood surfaces with a considerable amount of practical applications and new representation methods. The gloss of wood surfaces is a quite *new extended experimental result*, the basic regularities of gloss for natural and treated wood surfaces are established. Chapter 4 of the book deals with the roughness properties of machined wood surfaces using also three-dimensional measurement results. The importance of some, less used distribution parameters is introduced and a quite new topic on the roughness modification effect of wetting is presented.

The authors are especially indebted to Prof. G. Sitkei for reading the completed manuscript and offering many useful suggestions, for instance, in working out

generally valid solutions. Special thanks go to Dr. Zoltán Kocsis for offering valuable help in the preparation of illustrations. The authors are also sincerely grateful to the staff of Springer Verlag for their excellent cooperation.

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# Contents

<b>1</b>	<b>Overview</b> . . . . .	1
1.1	Introduction . . . . .	1
1.2	General Remarks . . . . .	2
1.3	Surface Classification . . . . .	4
1.4	Material Classification . . . . .	5
1.5	Surface and Surface Engineering . . . . .	7
1.6	Modelling and Optimisation Methods . . . . .	9
	References . . . . .	12
<b>2</b>	<b>Wood Surface Stability</b> . . . . .	13
2.1	Introduction . . . . .	13
2.2	General Remarks . . . . .	14
2.3	Importance and Problems of Surface Stability . . . . .	15
2.4	Moisture Relations and Wettability . . . . .	16
2.4.1	Moisture Exchange of Wood Surface with the Air . . . . .	16
2.4.2	Fluid Flow in Wood Materials, Infiltration . . . . .	25
2.4.3	Surface Tension and Wetting Properties of Wood . . . . .	32
2.5	Photodegradation of Wood . . . . .	41
2.5.1	Measurement Techniques for Studying Wood Degradation . . . . .	41
2.5.2	Mechanism of Photodegradation . . . . .	51
2.5.3	Photodegradation of Thermally Modified Wood . . . . .	61
2.6	Weathering Processes of Wood . . . . .	67
2.6.1	Photodegradation Due to Sun Radiation . . . . .	68
2.6.2	Temperature Dependence of Photodegradation . . . . .	72
2.6.3	Air Humidity Dependence of Photodegradation . . . . .	82
2.6.4	Effect of Water Leaching . . . . .	87
2.7	Hardness of Wood Surfaces . . . . .	91
2.8	Abrasion Resistance of Wood Surfaces . . . . .	97
	References . . . . .	105



<b>3</b>	<b>Colour Characterisation of Wood</b> . . . . .	109
3.1	Introduction . . . . .	109
3.2	The Colour of Wood . . . . .	110
3.3	The Origin of Wood Colour . . . . .	115
3.4	A New Colour Estimation Method . . . . .	119
3.5	Interrelations of the CIELAB System . . . . .	124
3.6	Multi-angle Colour Measurement . . . . .	128
3.7	Gloss of Colour Surfaces. . . . .	131
3.7.1	Measurement of Gloss . . . . .	132
3.7.2	Measurement Results on Wood Samples . . . . .	135
3.7.3	Measurement Results on Furniture . . . . .	143
3.8	Practical Applications . . . . .	154
3.8.1	Effect of Machining on Colour and Gloss . . . . .	154
3.8.2	Enhance of Colour . . . . .	157
3.8.3	Representation of Colour Inhomogeneity. . . . .	160
3.8.4	Colour Modification by Heat Treatment . . . . .	165
3.8.5	Colour Change with Steaming . . . . .	168
3.9	Colour Change Due to Sun Irradiation . . . . .	173
3.9.1	Weathering of Wood and Its Modelling . . . . .	177
	References . . . . .	180
<b>4</b>	<b>Surface Roughness of Wood</b> . . . . .	183
4.1	Introduction . . . . .	183
4.2	Surface Texture of Wood in Relation to Machining . . . . .	184
4.3	Origin of Surface Roughness . . . . .	190
4.4	Roughness Characterisation . . . . .	195
4.5	Effect of Machining Operational Parameters on Roughness . . . . .	201
4.6	Interrelations Among Roughness Parameters . . . . .	208
4.7	The Use of Structure Number . . . . .	212
4.8	Surface Roughness at Sanding . . . . .	215
4.9	Effect of Tool Wear on Surface Roughness . . . . .	221
4.10	Effect of Wetting on Surface Roughness . . . . .	225
4.11	Scattering of Roughness Data . . . . .	232
	References . . . . .	235
	<b>Appendix 1</b> . . . . .	237
	<b>Appendix 2</b> . . . . .	241
	<b>Index</b> . . . . .	255