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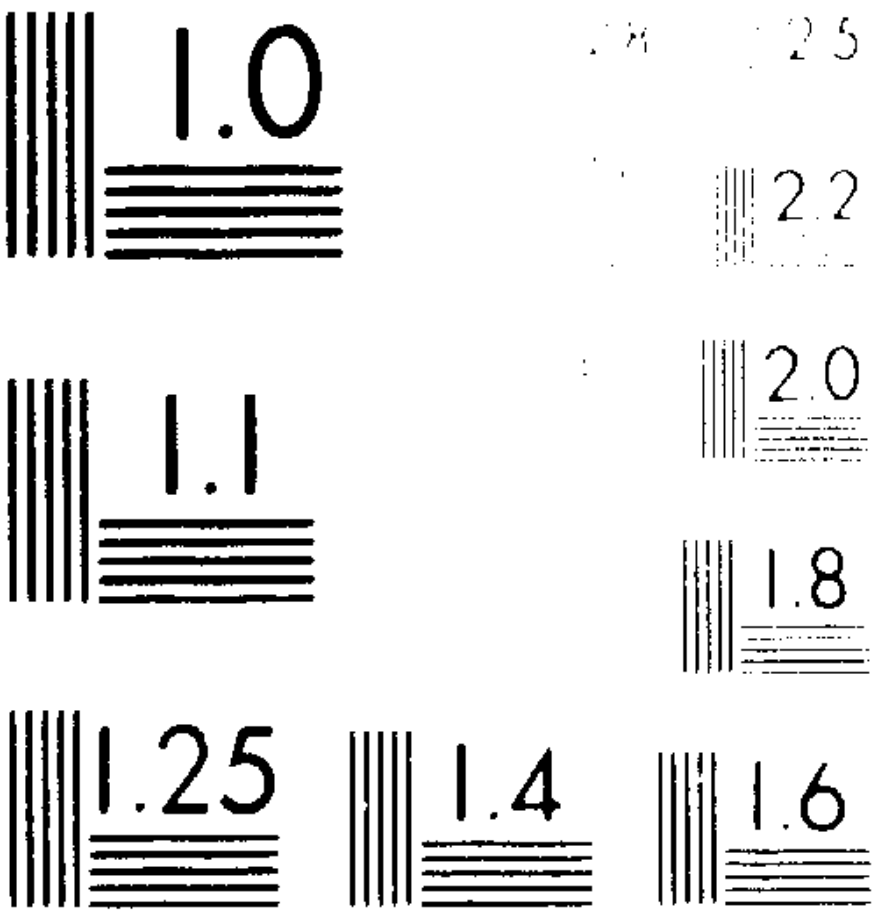
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DEVELOPMENT OF THE FURNITURE AND JOINERY INDUSTRY AND CREATION OF A CENTRE

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YUGOSLAVIA

Technical report: The importance of finishing*

Prepared for the Government of Yugoslavia
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

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Introduction

In the style-conscious furniture business, good finishing is perhaps the most critical factor in the manufacturing process. The sale of furniture is highly influenced by its decorative value and its eye appeal. Even in lower priced lines, there is an ever-increasing demand for excellence in finishing.

Good design is of course essential, and it must be attuned to demands of the market place, but many factors of appearance - color, sheen, depth, wood value - are determined in finishing. For these reasons, the finishing operation has been, and likely will continue to be, a major concern in furniture production management.

Furniture finishing is inherently complex and demanding. This is true for two broad reasons. The first is that we are working with wood, which is a highly variable material. It varies widely in color and structure between species and even in separate parts of the same tree. While the effect of this variation can be controlled by carefully selecting and matching various pieces of wood, factors of waste and cost impose definite limits to this procedure.

Wood contains natrual dyes or colorants which are not evenly distributed, and thus produce color variations in different areas of the surface. Wood is hygroscopic and absorbes or gives off moisture with changes in atmospheric conditions.

Wood is fibrous in nature - the individual fibres are prone to swell and raise on the surface when moisture is absorbed, thus affecting the performance of stains and other finishing materials. Add these factors together and one has a variable and changeable surface over which to achieve a rather exacting artistic result.

The second broad reason for complexity in furniture finishing is inherent in the requirements of the finish itself. The primary objective of finishing is to add beauty and artistic merit. One must develop

all the possible beauty inherent in the wood, in addition to complementing features of design. All this means that personal judgement and skill are involved, adjusting to, and compensating for, variations, in the wood and shape.

Along with artistic merit, the finish must have protective value and good durability. It must be resistant to damage by accidental spillage of various household materials, to scrapes and scratches, and to drastic color change with age or light exposure.

Obviously, not all finishes a complex or difficult. It is possible to give wood sufficient protection for the average conditions of interior service with a very simple finish. The thing that makes wood finishing complex, the controlling reason for the ocnsiderable number of operations and materials involved in many systems is the demand for artistic values and the sales that are generated as a result. Furniture manufacturers in the United States typically spend from 5 to 10 per cent or more of the total factory selling price on the finishing operation. The simplest type of finishing with satisfactory protection and durability could be obtained for less than 5 per cent. Everything beyond that is for improving the beauty and sales appeal.

1. The Finishing System

The beauty of finish that we see in a well-done piece of furniture is produced by a sequence of operations involving a number of separate and distinct materials. Whatever the number of operations included, they tend to follow a certain sequence.

As a good approach to the general understanding of wood finishing, we will start by outlining a complete finishing system as used by a manufacturer of medium priced furniture in the United States. The system described does not list all the possible operations as might be used on very high quality furniture. Very high quality furniture may two or three times as many operations as those we will describe.

1.1 Pre-staining or Uniforming the Wood Color

For many finishes we can start with natural wood color, but there may be undesirable color variations in specific pieces. In this sample, we have used a NGR (non-grain raising stain) to achieve uniform color. A NGR stain is produced from an acid dye that is soluble in water-free solvent mixtures, hence the term, "non-grain raising". Scuff sanding is not required following the stain application.

1.2 Washcoating

If a filler or glaze is to be used, it is usually necessary to control the staining action of the filler or glaze which is applied next. We do this by applying over the stain a "washcoat". This is a very thin sealer coating which leaves the pores of the wood open, but seals the areas between, causing the filler or glaze to wipe away more cleanly. In some finishes the washcoat is tinted, the general idea being that this adds more depth to the undertone color. A properly selected washcoat also adds materially to the toughness and adhesion of the complete finish. Scuff sanding is required before the next operation.

1.3 Glazing

This operation is included in nearly all better finishes. It consists of a very thin application of translucent pigment color in a solvent that can be wiped or brushed. It is applied overall and wiped clean, or in some cases it is wiped or brush-blended to a desired distribution of over tone color. Glazing color remains in low spots of carvings or edge moulding accentuating these features. Overall, glazing adds an effect of color depth. By contrast, unglazed finishes have a "raw" look.

1.4 Spattering and distressing

These additional color operations may be done almost anywhere in the finishing system. Distressing is occassionally done on the raw

wood or after the overall staining operation. Spattering is more commonly done after glazing or sealing. The purpose of these operations is to produce an antique effect.

1.5 Sealing

After filling or glazing, the next step in most finishes is a coat of transparent sealer. As with the washcoat, it can be tinted for additional color depth. This seals off the surface and provides a smooth surface and foundation for subsequent overtone color treatments and for topcoats. The sealer is normally sanded to a smooth surface.

1.6 Lacquer Topcoat

When all coloring operations are completed, the piece is given one or more transparent topcoats. The topcoat in the sample is nitrocellulose lacquer.

1.7 Rubbing

When the finish is completely dry, it is rubbed to the desired sheen. This can be accomplished through a combination of solvents and abrasive materials such as pumice stone and very light oil or fine steel wool and paste wax.

2. The Significance of Prefinish Operations

The importance of correct wood sanding ahead of the finishing operation is a point on which finishers will universally agree.

It is beyond the scope of this seminar to go into a complete discussion of sanding abrasives and sanding machines, the relative merits of each, and how each should be used.

The common practice in furniture manufacturing has been to start with the sanding of flat surface after machining, with wide belt sanders; followed by one or two belt sanding operations; and finally, though not always, jigger sanding or hand sanding just ahead of the first finishing

operation. Whatever the method, each successive sanding oepration is done with a finer grit than the one preceeding (but no more than 2 grit sizes in one time). Special sanding machines are available for the sanding of mouldings, turnings, and other complex surfaces.

The discussion of wood sanding here will be limited to the question of what constitutes adequate sanding - how much, how fine, etc. As might be expected, this depends on the type of finishing to be done and the final quality of finish demanded. As a general statement, each successively finer grit employed will improve clarity and smoothness of a transparent finish - so long as it is actually cutting or removing stock. Any sanding beyond this point is merely burnishing or matting the surface, whether due to fineness of grit, or the use of wornout paper, or too much machine speed causing over heating all these things will decrease clarity and the fullest development of the wood tones.

Any coarse scratches in the surface will be intensified in the finishing operation, since they catch and hold colorants that are applied by staining, filling and glazing. A common example of trouble due to coarse or uneven sanding is caused by improper jigger or spotsanding after repairs to a piece, or as a final touch-up sanding before finishing. Unless the abrasive is of the same fineness as the final overall belt polishing that preceeded it, and unless the operation is carefully done, dark smudges due to scratching will be especially prominent.

There are certain finishes, however, for which controlled coarse scratches are desirable. For example, excellent finishes are produced on soft maple or beech, which are generally lacking in distinctive wood grain or figure, by deliberately scratch sanding in parallel lines with the grain, using a rather coarse abrasive. In the subsequent staining with a pigmented wiping stain, the scratches fill up with color and produce a brush-blended glaze effect of pleasing appearance.

The sanding requirement for good finishing then is not that the wood must always be sanded to a perfect fineness or smoothness, but that sanding should be to the degree required by the specific finish and should be uniform over all critical areas of the piece, and from piece to piece, and order to order.