The Haptic Nature of Wood Finishes

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With the growth of touch-screen technology there has been an increased interest in the friction characteristics of skin, especially the fingertip on flat surfaces. This haptic nature of many different materials had been studied, but wood finishes have not been explored. This is an important area to study because friction affects interactions with objects. Wood finishes are used for many purposes and serve to protect the wood from deterioration. In some applications, the tactile quality of the finish is important. Wood-based products like furniture, sports equipment, tools, and instruments can be judged more functional as a result of their tactile quality. Surfaces with a slippery response will function differently than those with a sticky response. Moreover, it has often been noted that a wood masterpiece invites the viewer to touch it, and that action has a significant impact on perceived quality. The goal of this project was to quantitatively define the frictional effects of different wood finishes for the use of fine woodworking.

Using a state-of-the-art test device, the frictional properties of skin on different wood species and wood finishes were tested. Chosen for their closed-grain structures, the woods used were Eastern White Pine (*Pinus Strobus*), North American Cherry (*Prunus Serotina*), and Birdseye Maple (*Acer Suchrum*). Chosen for their ability to be applied by spraying so that surface textures could be consistent, the finishes used were Zinsser® shellac (product number 00408), Deft® lacquer (both clear gloss and clear satin), and Minwax® polyurethane (both clear gloss and clear satin).

The friction coefficients of a finger on those surfaces ranged from kinetic values of 0.22 to 5.42 and static values of 0.46 to 4.80. Unfinished wood had the lowest friction coefficients of the samples evaluated. The results showed that the satin finishes had lower friction than the gloss finishes on each type of wood. On average, a satin finish has 1/3 the friction of a gloss finish. The increased and very high friction from skin on gloss finish suggests an adhesion mechanism is a strong factor in the friction system. The data also demonstrated that moisture in a hydrated finger increases friction in both satin and gloss finishes. The research presented is the first to quantitatively define the tactile feel of wood surfaces. These results show that there is a tremendous difference in friction between wood finishes. This addresses the gap in literature by quantitatively describing the tactile feel of a wood surface and finish. These consumer-friendly results will be of use not only in the fine woodworking world, but also to anyone purchasing furniture or finishing wood. Also, finishes with a higher static friction, such as lacquer gloss and shellac, will now be known for having a better grip.