Friction Between Simulated Finger Skin and Device Screens

The screen on a smartphone is one of the most important interfaces between a phone and its user. The user often has to touch the screen to unlock the phone first, and then touch the specific function icon the user would like to use. How a touchscreen is felt during the interactions between its user and an electronic device determines both the perceived and actual comfort of use, which can be an important factor influencing decision when a consumer buys an electronic device. The sticky or sleek feeling of the finger on an electronic device screen can be tested and quantified by friction measurement. By definition, friction represents a surface's resistance to relative motion against another surface. When two surfaces rub against each other, friction acts as the force that prevents the two surfaces from moving apart.

In this application note, friction coefficients between a flat silicone rubber block, simulating a piece of finger skin, and two commercial smart phone screens with or without screen protectors at different levels of cleanliness, and also a glass slide were measured at room temperature under lab ambient conditions. Figures 1 and 2 show the friction coefficients of the smart phone screens and screen protectors sliding against the silicone rubber block, as a function of sliding distance. Figure 3 presents average static and kinetic friction coefficients for all samples tested.

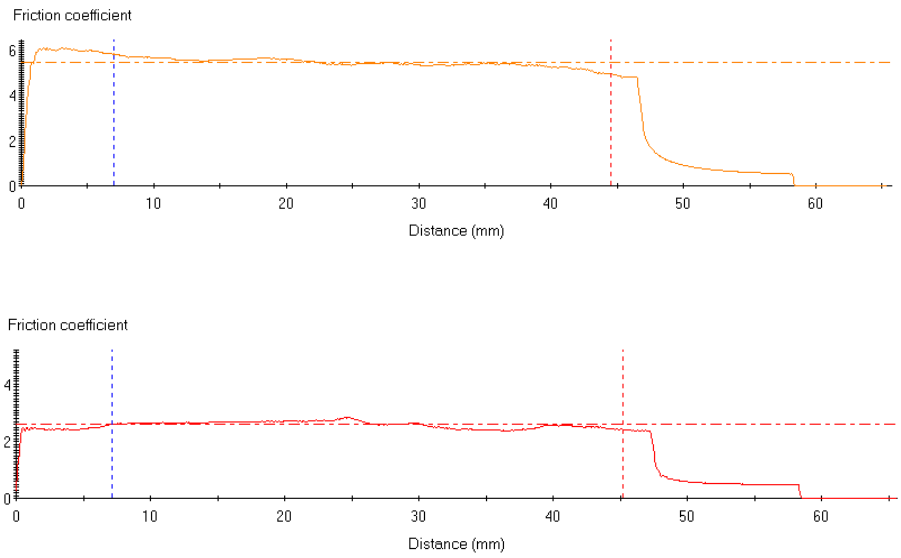

Figure 1. Friction coefficients of Phone 1 with the screen uncleaned (top) and cleaned (bottom) sliding against a silicone rubber block simulating finger skin.

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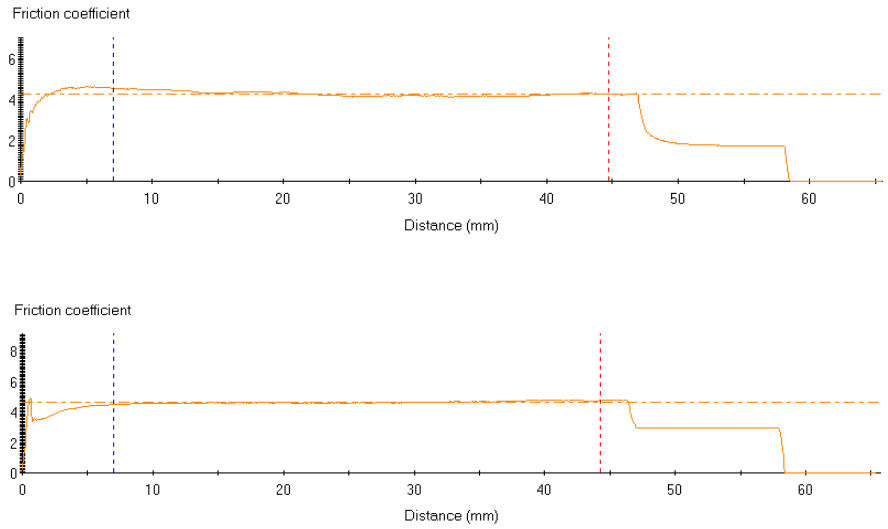

Figure 2. Friction coefficients of Phone 2 with a screen protector uncleaned (top) and cleaned (bottom) sliding against a silicone rubber block simulating finger skin.

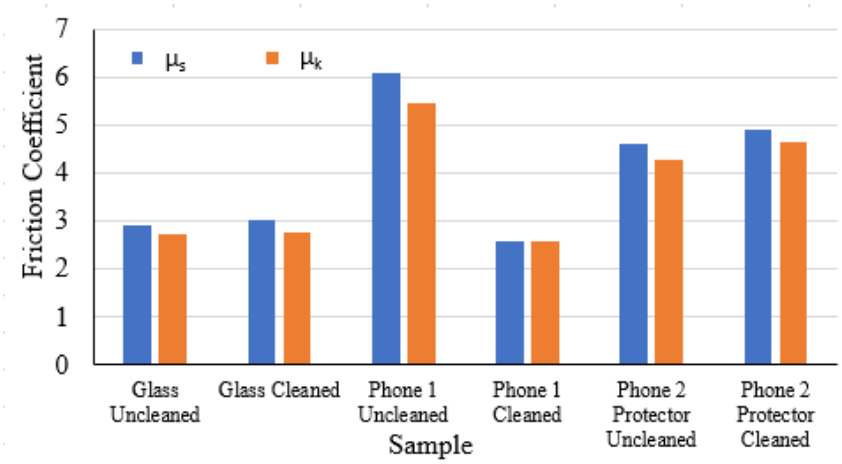

Figure 3. Average static and kinetic coefficients of friction for each sample sliding against a silicone rubber block simulating finger skin.

As can be seen from Figures 1 - 3, static friction coefficients (μ_s) are higher than kinetic friction coefficients (μ_k) as they should be. Cleaning did not change the friction coefficients much for both Glass Slide sample and Phone 2 with a screen protector, most likely because their surfaces were not that dirty to begin with. However, cleaning did change the friction coefficients of Phone 1 screen dramatically. Clearly, the touch screens of electronics would need to have desired sleek/friction specifications in order to maximize users' experience. Friction measurements can be useful to aid the designers to measure and fine tune the touch screen surface properties.