

# Corning® Gorilla® Glass の開発と応用

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## Development and Applications for Corning® Gorilla® Glass

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### 1. Background

Launched in 2007, Corning® Gorilla® Glass is a damage resistant cover glass for consumer electronics. It is featured in more than 30 major brands and 900 product models spanning more than one billion devices worldwide.

Corning's "A Day Made of Glass" video showcases various possibilities for interactive touch displays in the near future. Corning's research and development organization is focusing its efforts on technologies that promote thinner, lighter, larger and brighter display-related applications to help make the vision portrayed in the videos a reality. This report will discuss Gorilla Glass and Corning's one glass solution.



Figure 1 : Applications featured in Corning's 'A Day Made of Glass' and 'A Day Made of Glass 2' videos.

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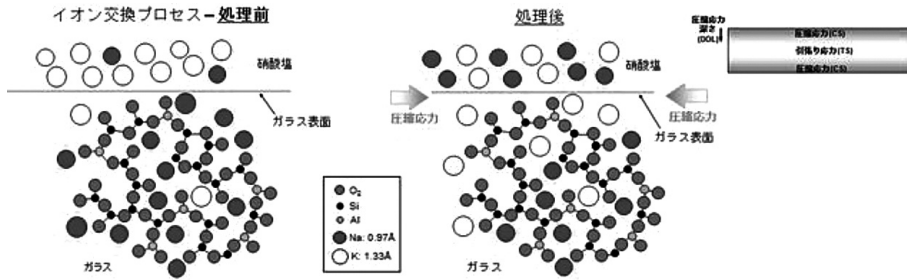


Figure 2 : Strengthening of glass via the ion exchange process

## 2. Gorilla Glass

Glass is theoretically a strong material but once a crack forms, it can propagate and lead to failure of the glass. In order to overcome this problem, several techniques have been developed to help control crack propagation. For example, a glass applied to a windshield of an automobile is known as a physically strengthened glass (thermal tempering). Other tempering methods include: leaching of alkali ions, crystallization of surface and ion exchange. Figure 2 shows the mechanism of chemical tempering by ion exchange.

The unique composition of Gorilla Glass allows for a deep layer of high compressive stress (created through an ion-exchange process). This compression acts as a sort of “armor,” making the glass exceptionally tough and damage resistant. Gorilla Glass is formed via Corning’s fusion draw process which creates a thin, flat piece of glass with a highly

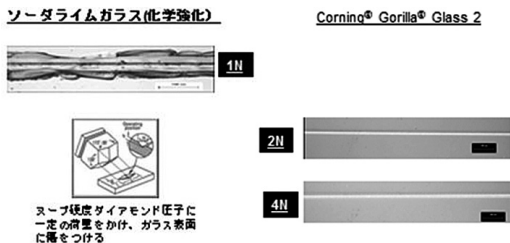


Figure 3 : Scratch-resistant, chemically tempered glass

smooth surface. (Figure 3)

## 3. Cover glass for large size touch panels and digital signage

Typically thick (4 mm-6 mm) soda lime glass is used as a cover for large-size touch panels and digital signage displays. However, Gorilla Glass offers manufacturers a thinner solution (0.7 or 1.0 mm) that dramatically reduces the weight of the device but maintains the same impact resistance as soda lime.

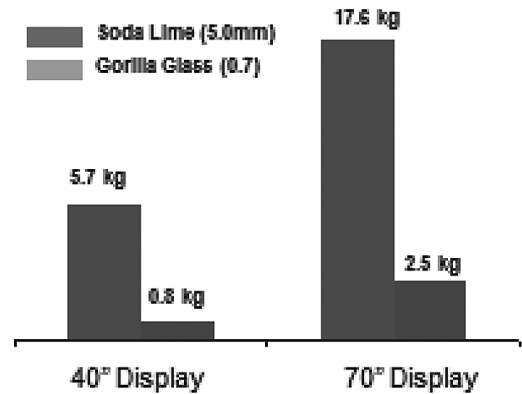


Figure 4 : Compares the weight soda lime cover glass versus Gorilla Glass

Additionally, the accuracy of touch is an issue with thick soda lime glass because of a long optical length. Gorilla Glass enables a thinner solution that can be combined with optical bonding. For example, 10 mm of optical deviation was observed at an angle of 75 de-

### タッチによる位置精度

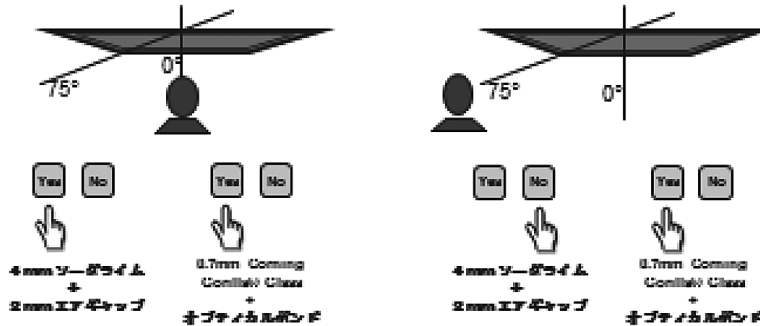


Figure 5 : Position accuracy of a touch panel

grees when a 4 mm of soda lime glass (with 2 mm air gap) is used. However, if Gorilla Glass (0.7 or 1.0 mm) is used with 0.1 mm optical adhesive, it is negligible. It also enables the improvement of signal to noise ratio for capacitance touch sensors and the image quality of displays.

#### 4. One Glass Solution (OGS)

The touch panel industry has dramatically spread to tablet PCs and other technologies since the “smart phone” was introduced in

2007. At present, new applications such as notebooks, PC monitors and large touch panel displays are moving towards touch technology. Two glass substrates were used for conventional discrete touch modules (touch sensor and cover glass), shown in figure 6.

Corning has been developing cutting and machining technologies for chemically tempered glass since 2009. Commercialized in 2011, Corning® IOX-FS offers touch panel makers a preferred option for one glass solution. It enables size and thickness reductions on devices and also decreases costs and simplifies the supply chain process by reducing the number of parts required. Figure 7 shows a concept of production. For IOX-FS, the ITO is patterned onto a large sheet of glass before it is processed, cut and machined.

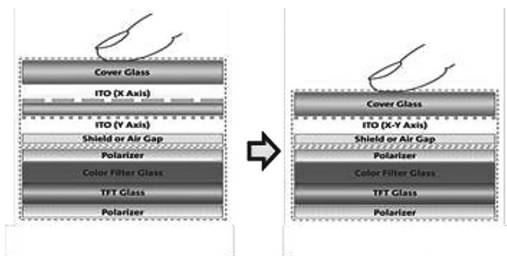


Figure 6 : Discrete and OGS touch modules

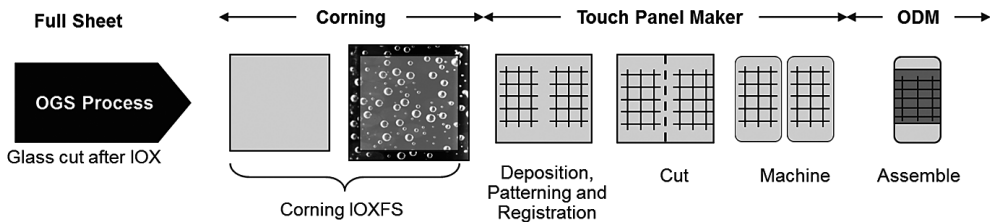


Figure 7 : IOX-FS manufacturing process

## 5. Summary

Information gadgets such as cell phones and notebook PCs are quickly becoming a ubiquitous part of our society. To keep pace with the growing consumer electronics indus-

try, the requirements for displays are changing quickly. Corning has been providing glass for the display technology industry for a long time and will continue to develop new glasses in response to future market needs.