CORNING Gorilla Glass

Always Tough. Always Innovating.

**CORNING** Class

Always Tough. Always Innovating.

What's Next?

John Bayne Vice President and General Manager



## Forward looking and cautionary statements

Certain statements in this presentation constitute "forward looking statements" within the meaning of the U.S. Private Securities Litigation Reform Act of 1995. Such forward looking statements are based on current expectations and involve certain risks and uncertainties. Actual results might differ from those projected in the forward looking statements. Additional information concerning factors that could cause actual results to materially differ from those in the forward looking statements is contained in the Securities and Exchange Commission filings on the Company and at the end of this presentation.

## Corning is the world leader in specialty glass and ceramics

For 165 years, we have been creating keystone components that enable life-changing innovations



## R&D has global reach with core technology residing in Corning, NY



# Corning Specialty Materials manufactures where our customers are



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Big Flats, NY

Fairport, NY

Canton, NY

Keene, NH

Wilmington, NC

Harrodsburg, KY

#### Europe

Bagneaux, France

Krailling, Germany

#### Asia

Fuzhou, China

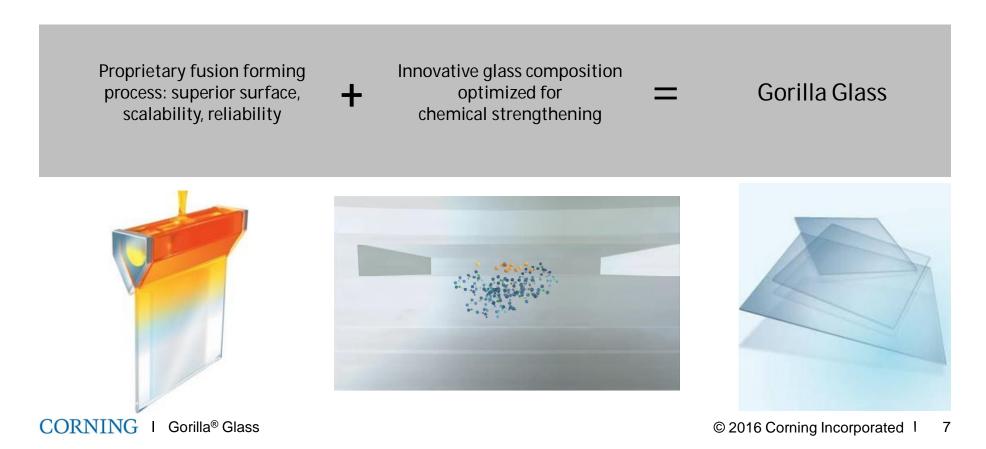
Jiangmen, China

Shizuoka, Japan

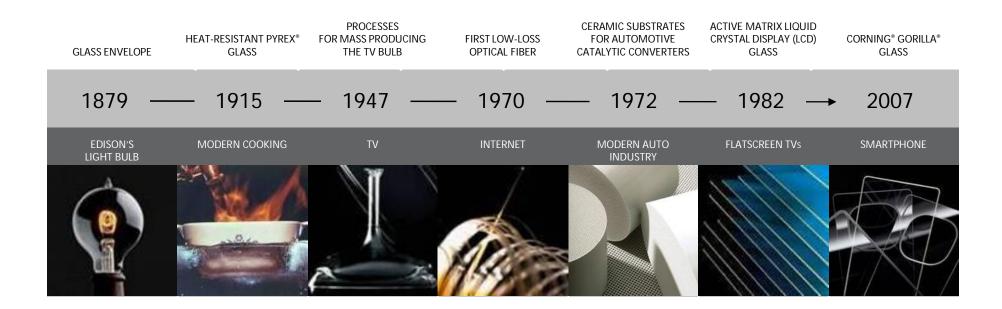
Asan, Korea

Tainan, Taiwan

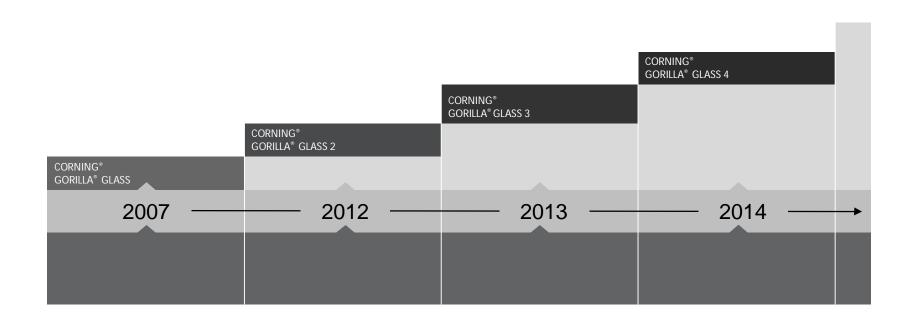
## Corning® Gorilla® Glass uses two essential Corning processes



# Corning delivers life changing innovations



## Corning started a continuous journey of glass innovation in 2007



## We started with...





#### **Scratch Resistance**

Gorilla Glass significantly outperforms plastic covers

#### **Retained Strength**

Gorilla Glass retained strength is nearly 3x at ~half the thickness of soda lime

## We made it tougher...





### Higher performance

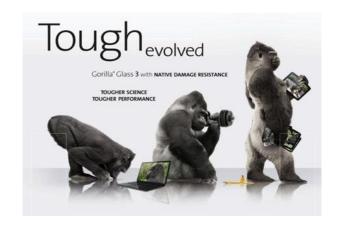
Improve damage resistance by 25% at same thickness

#### **Thinner**

Up to 20% reduced thickness while maintaining Gorilla Glass damage resistance

## We improved scratch...





#### Improves scratch resistance

3x improvement in the force required to cause lateral cracking

#### Reduces scratch visibility

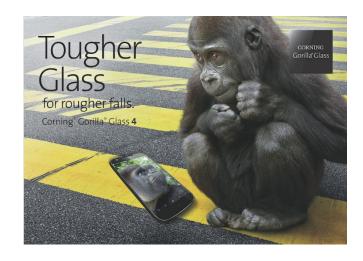
• >40% reduction in the number of highly visible scratches

#### Enables improved strength after scratch

• >40% improvement in retained strength IF a deep flaw/scratch occurs

# We addressed the key consumer pain point...

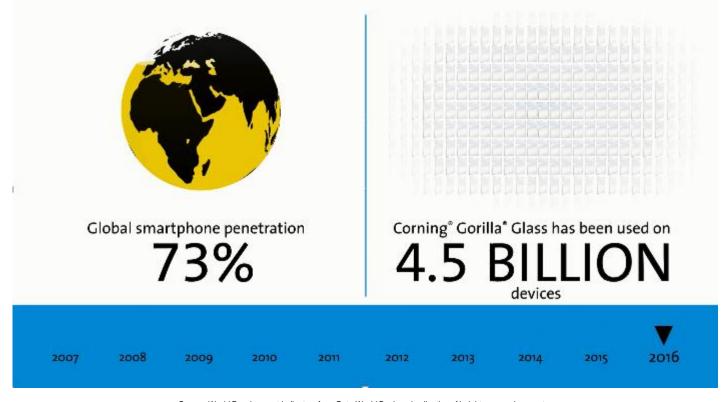




### **Drop Performance**

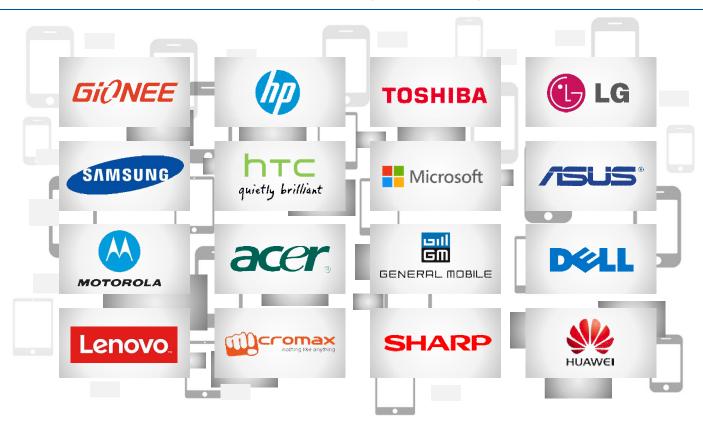
Corning Gorilla Glass 4 survives up to 80% of the time when dropped from 1 meter onto a rough surface

## Which is why Corning is the industry standard in cover glass

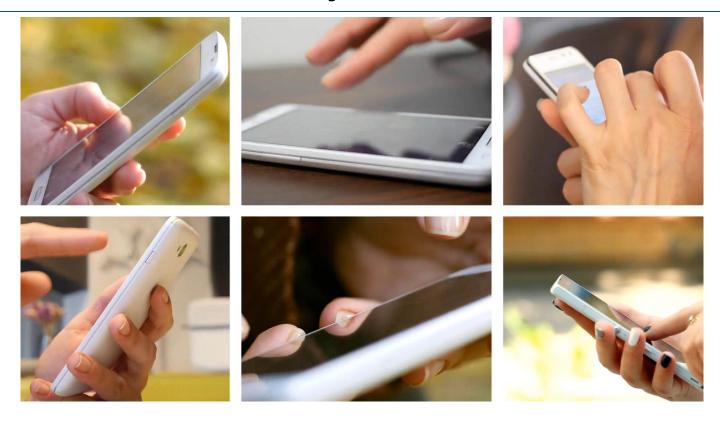


Source: World Development Indicators from Data World Bank and collection of height sources by country

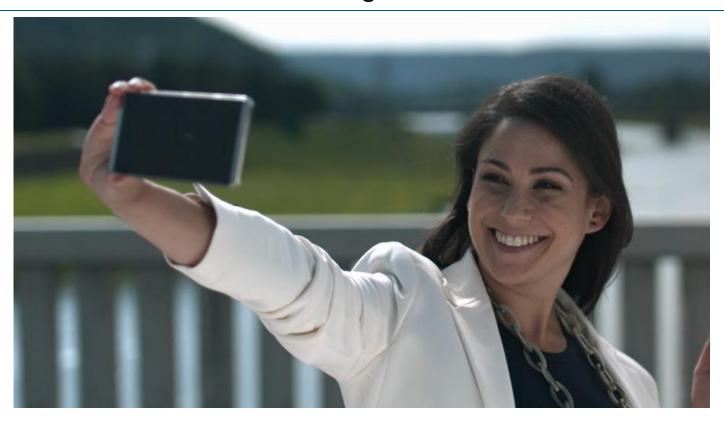
## Today there are 40 major OEMs using Corning® Gorilla® Glass



# Where does this leave us today?



# While Corning® Gorilla® Glass 4 focused on test drop from 1 meter, we decided to take it higher



# Global study of smartphone owners



\* Numbers above are averages of an 11 country study of global smartphone users using Toluna's Quicksurvey panel. Countries included U.S., Brazil, U.K., France, Germany, Italy, Turkey, India, Russia, China, Indonesia. Collectively these countries represent 3.9 billion people or 54% of the world's population.

## Global study of smartphone owners



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## Global study of smartphone owners





On average, nearly two thirds (63%) respondents said they have dropped their smartphones from a height between shoulder and waist

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## Taking Tough To New Heights

Corning® Gorilla® Glass 5 improves drop performance while preserving optical clarity, touch sensitivity and damage resistance

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Corning® Gorilla® Glass 5
A highly damage-resistant cover glass for improved drop survivability in mobile devices

Dr. Jaymin Amin Division Vice President



#### Corning<sup>®</sup> Gorilla<sup>®</sup> Glass 5

# Step change in damage-resistant glass technology with potential for significant drop improvement in mobile device cover glasses

Up to 2x improvement in damage resistance over Corning® Gorilla® Glass 4, and up to 4x improvement over alternate glasses

 Damage resistance = ability of a material to survive sharp-contact damage

Up to 1.8 x improvement over Gorilla Glass 4 in drop performance on rough surfaces

Gorilla Glass 5 survives up to 80% of the time from drops at 1.6 meters

<sup>3)</sup> As measured in Corning 's internal drop test, glass thickness > 0.6mm





<sup>1)</sup> As measured in Corning's dynamic impact test

<sup>2)</sup> As measured in Corning's internal drop test (incremental face drops on 180-grit sandpaper), using a puck. Glass thickness 0.4 – 0.8mm

## What causes cover glass failure in a handheld device?

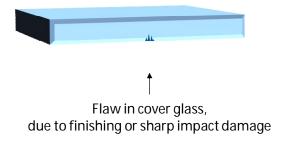
#### Theoretical strength of glass is very high

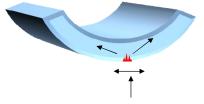
- Glass strength is greatly reduced when a defect or flaw is introduced
- During finishing or through sharp contact damage during a drop event

# Glass typically breaks from a surface flaw that is subjected to tensile stress (pulling apart/stretching)

Such tensile stresses can be imparted through bending during a drop event

## Flaw + tensile stress = break

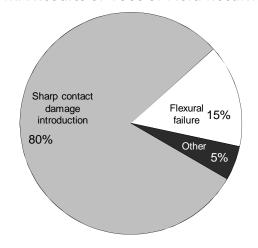




Placed in tension with bending during drop, initiating fracture

# Our glass innovation approach always starts with failure mode analysis (FMA) of field returns

#### FMA Results of 100s of Field Returns



Primary field failures for cover glass are associated with sharp-contact damage from drop on rough surfaces

 Typically accompanied with simultaneous bending that puts the flaw into tension

When designed well, phones with strengthened glass do not generally encounter flexural failures

While cover glass failures cannot be eliminated, we strive to reduce the frequency by developing glasses with increasing damage resistance

We designed Corning® Gorilla® Glass 5 to improve survivability on rough surfaces

# What is Corning® Gorilla® Glass 5?

# New strengthened glass demonstrating significantly improved damage resistance over previous glasses

 Outperforms all existing glasses for sharp contact damage and associated drop survivability on rough surfaces

#### Validated at Corning

- At glass level using newly developed dynamic impact test
- With drop testing in Corning pucks on rough surfaces

#### Validated by OEMs

At component level and with actual device drops

In production now



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## Corning® Gorilla® Glass 5 will improve in-field reliability for cover glass

Up to 2x improvement in damage resistance over Corning® Gorilla® Glass 4, and up to 4x improvement over alternate glasses¹

Up to 1.8 x improvement over Gorilla Glass 4 in drop performance on rough surfaces<sup>2</sup>

Gorilla Glass 5 survives up to 80% of the time from drops at 1.6 meters<sup>3</sup>

In-field performance improvement with Gorilla Glass 5 will depend upon the overall device design

Gorilla Glass 5 is in production now



<sup>2)</sup> As measured in Corning's internal drop test (incremental face drops on 180-grit sandpaper), using a puck. Glass thickness 0.4 – 0.8mm

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