

CORNING

A Path to the Realization of “A
Day Made of Glass”

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Corporate Research
CGT

A Day Made of Glass 2 – Advancing the Vision



Corning Incorporated

Founded:
1851

Corning is the world leader in specialty glass and ceramics.

Headquarters:
Corning, New York

We create and make keystone components that enable high-technology systems for consumer electronics, mobile emissions control, telecommunications, and life sciences.

Employees:
29,000 worldwide







We succeed through sustained investment in R&D, more than 150 years of materials science and process engineering knowledge, and a distinctive collaborative culture.

2011 Sales:
\$7.9 Billion

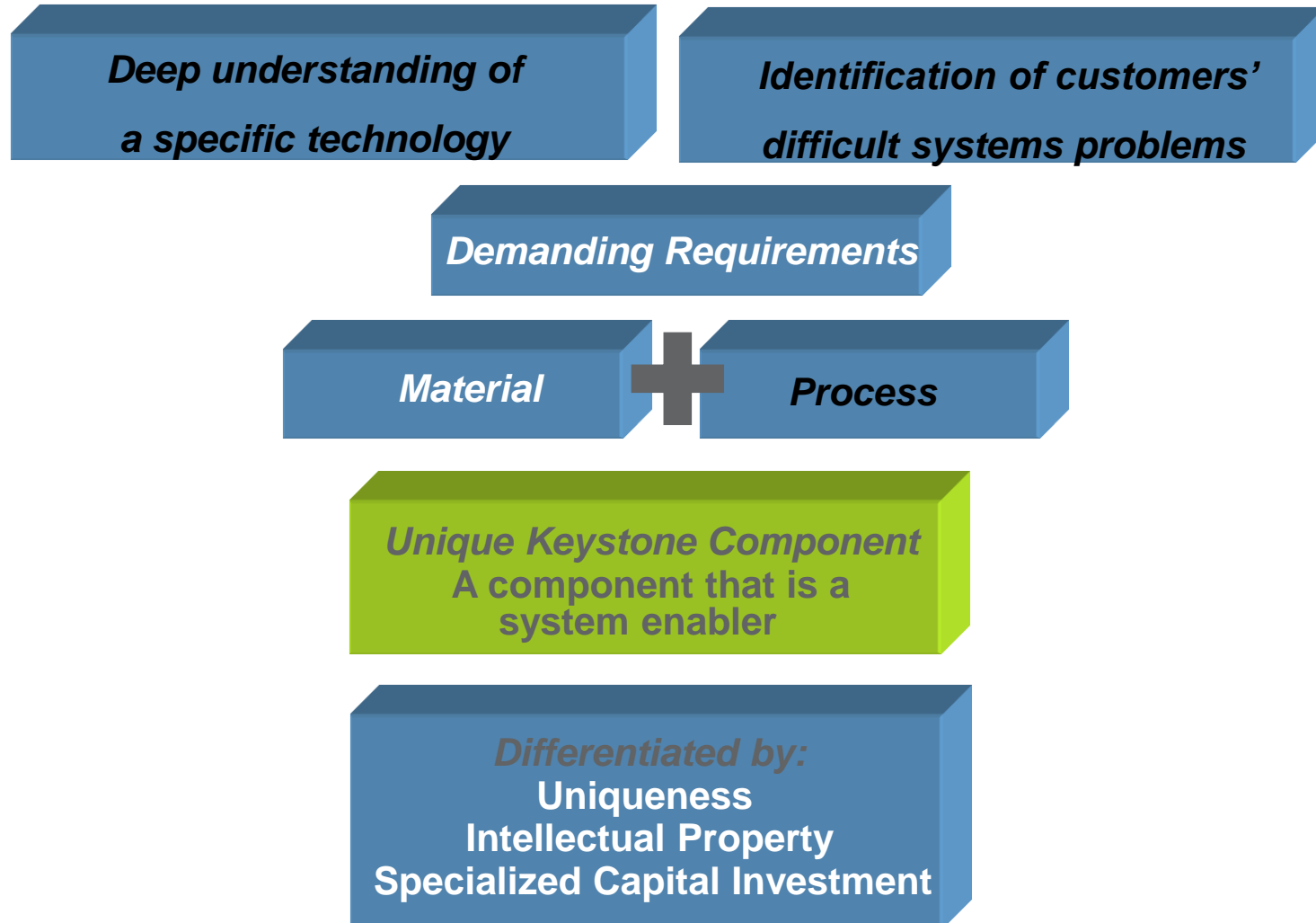
Fortune 500 Rank (2012):
328



Corning Market Segments and Additional Operations

 <p>Display Technology</p>	 <p>Telecom</p>	 <p>Environmental Technologies</p>	 <p>Life Sciences</p>	 <p>Specialty Materials</p>	 <p>Other Products and Services</p>
<ul style="list-style-type: none"> • LCD Glass Substrates • Glass Substrates for OLED and high-performance LCD platforms 	<ul style="list-style-type: none"> • Optical Fiber and Cable • Hardware and Equipment <ul style="list-style-type: none"> • Fiber optic connectivity products 	<ul style="list-style-type: none"> • Emissions Control Products <ul style="list-style-type: none"> • Light-duty gasoline vehicles • Light-duty and heavy-duty on-road diesel vehicles • Heavy-duty non-road diesel vehicles • Stationary 	<ul style="list-style-type: none"> • Cell Culture and Bioprocess • Assay and High-Throughput Screening • Genomics and Proteomics • General Laboratory Products 	<ul style="list-style-type: none"> • Corning® Gorilla® Glass • Display Optics and Components • Optical Materials <ul style="list-style-type: none"> • Semiconductor materials • Specialty fiber • Polarcor™ • Optics • Aerospace and Defense • Ophthalmic 	<ul style="list-style-type: none"> • Emerging Display Technology • Drug Discovery Technology • New Business Development • Equity Companies <ul style="list-style-type: none"> • Cormetech, Inc. • Dow Corning Corp. • Eurokera, S.N.C. • Samsung Corning Precision Materials Co., LTD (SCP)

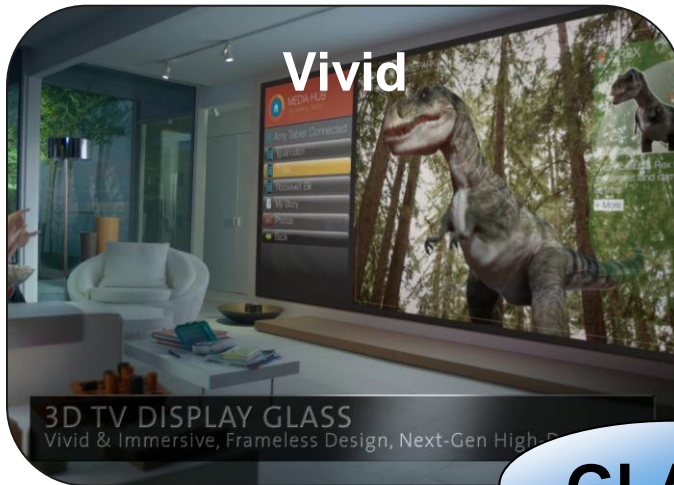
Innovation Recipe Drives Strategic Actions



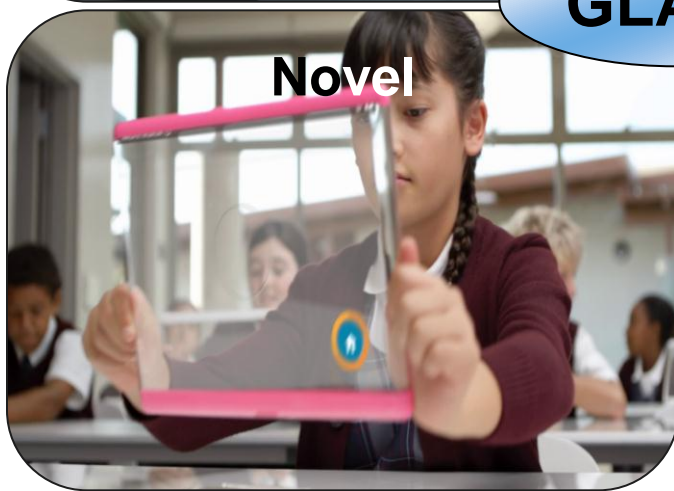
Outline

- The history of a trend...and the making of a vision
- Underlying technology...what is real, what is ready, what is not
- Opportunities and Challenges

Key themes of display with glass as the common denominator...why?



GLASS



Attributes needed to realize the vision of DMOG

DISPLAY

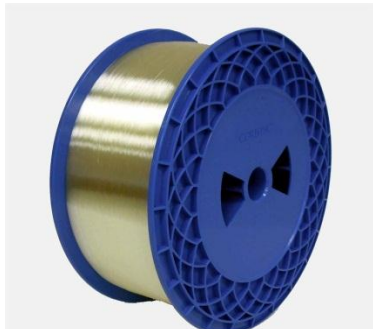
- Thin
- Light weight
- High resolution
- Small-large size
- Damage resistant
- Flexible
- Bezel free
- Touch
- Smudge free
- Anti-microbial
- Low power
- Environmentally friendly

COMMUNICATION

- Bandwidth
- High speed
- Wireless
- Flexible
- Software
- Device to device communication

Our products in the value chain for Ubiquitous Connectivity & Display

Information Delivery



**Corning Optical Fiber,
Cable, Components &
Wireless Solutions**

Information Display



**EAGLE XG® & Lotus™
Substrate Glass for High
Performance LCD & OLED**

User Interface: Touch Screen Cover



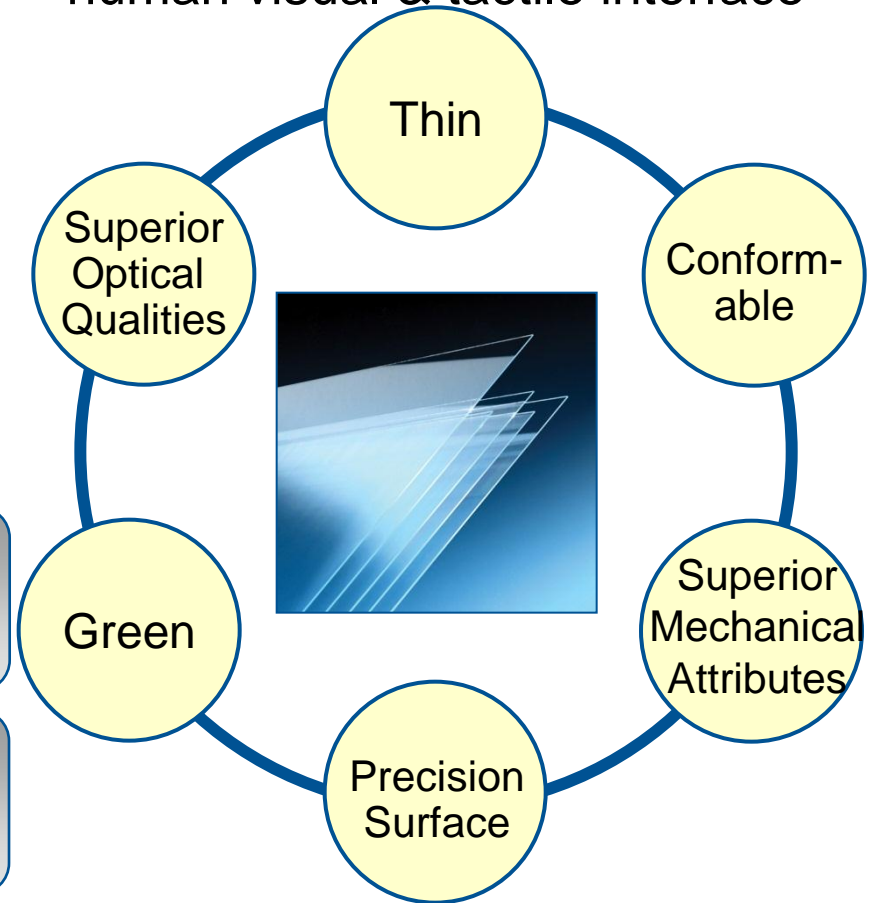
**Corning® Gorilla®
Cover Glass**

A Day Made of Glass... "Why Glass"?

Consumers want to interact with information anytime, anywhere



Specialized glass delivers enabling attributes at the human visual & tactile interface



Vivid & Compelling Display

Accurate & Engaging Touch Experience

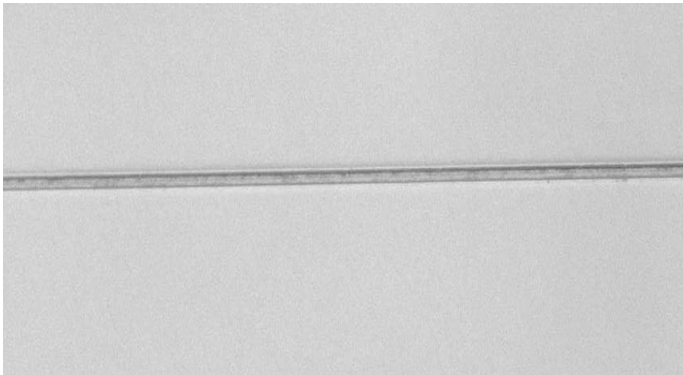
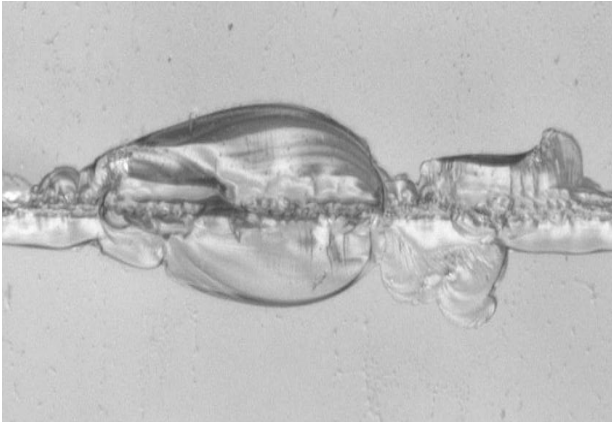
Light, Slim & Green

Arresting Design

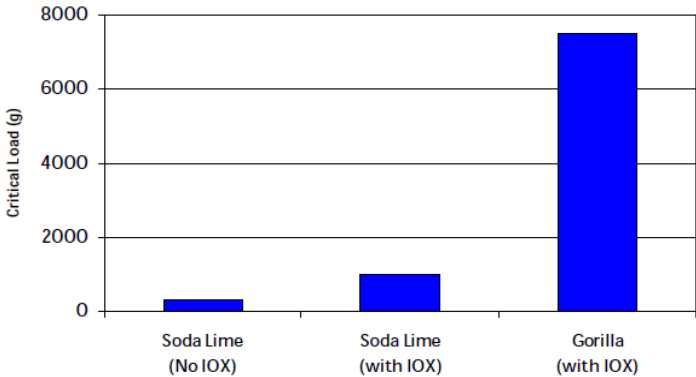
3D

Value Add (e.g. Sound)

Damage resistance is a critical attribute for many applications

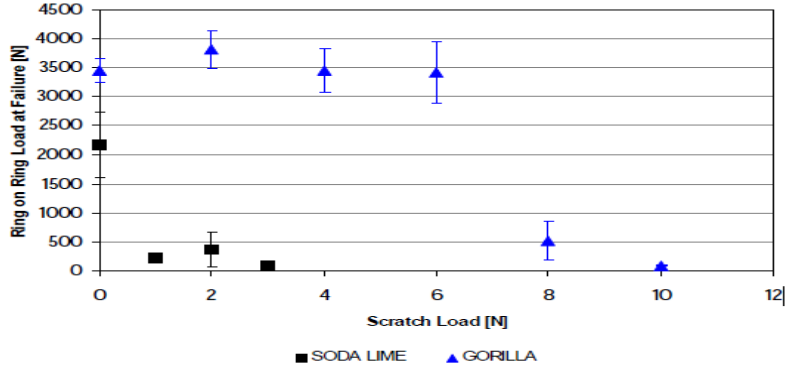


Greater damage resistance.



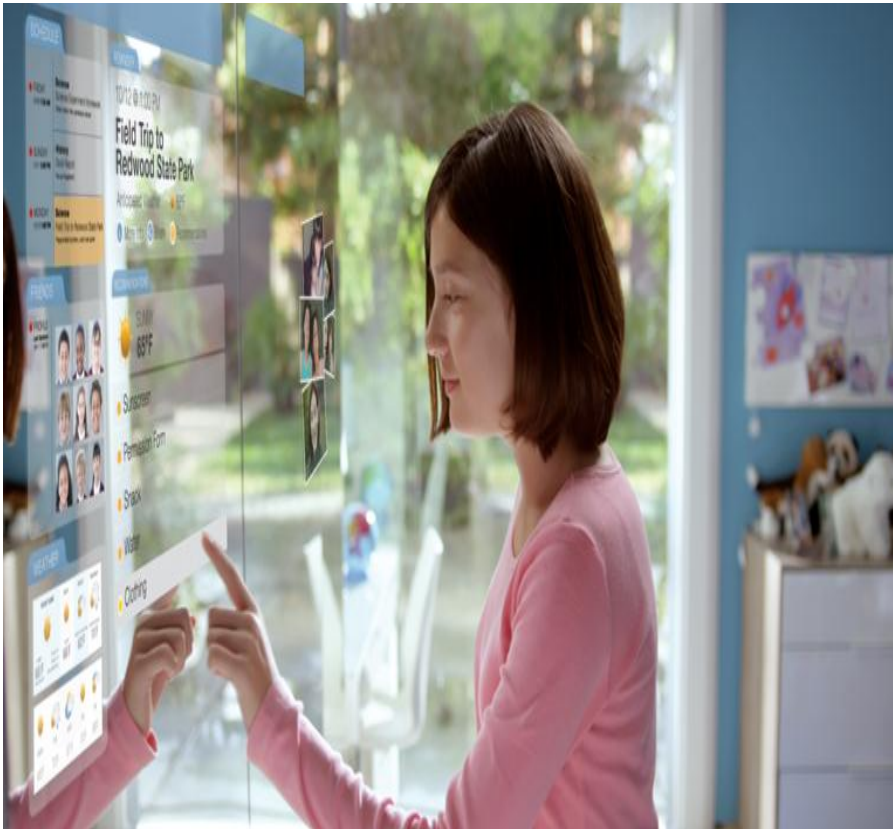
It takes more load to initiate radial cracks in the glass.

Greater retained strength



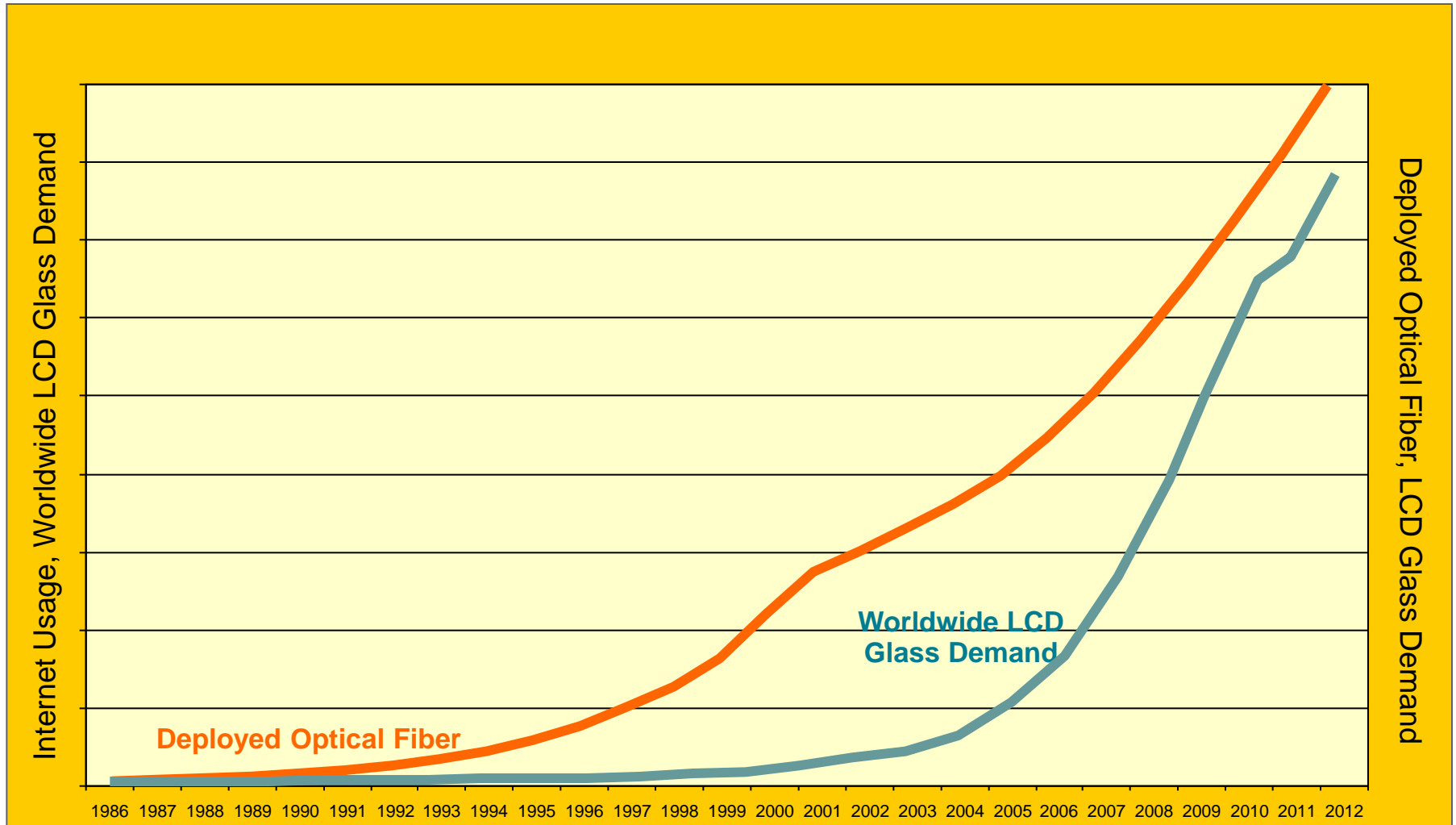
There is less strength degradation after scratching.

High Resolution display is required for next generation display



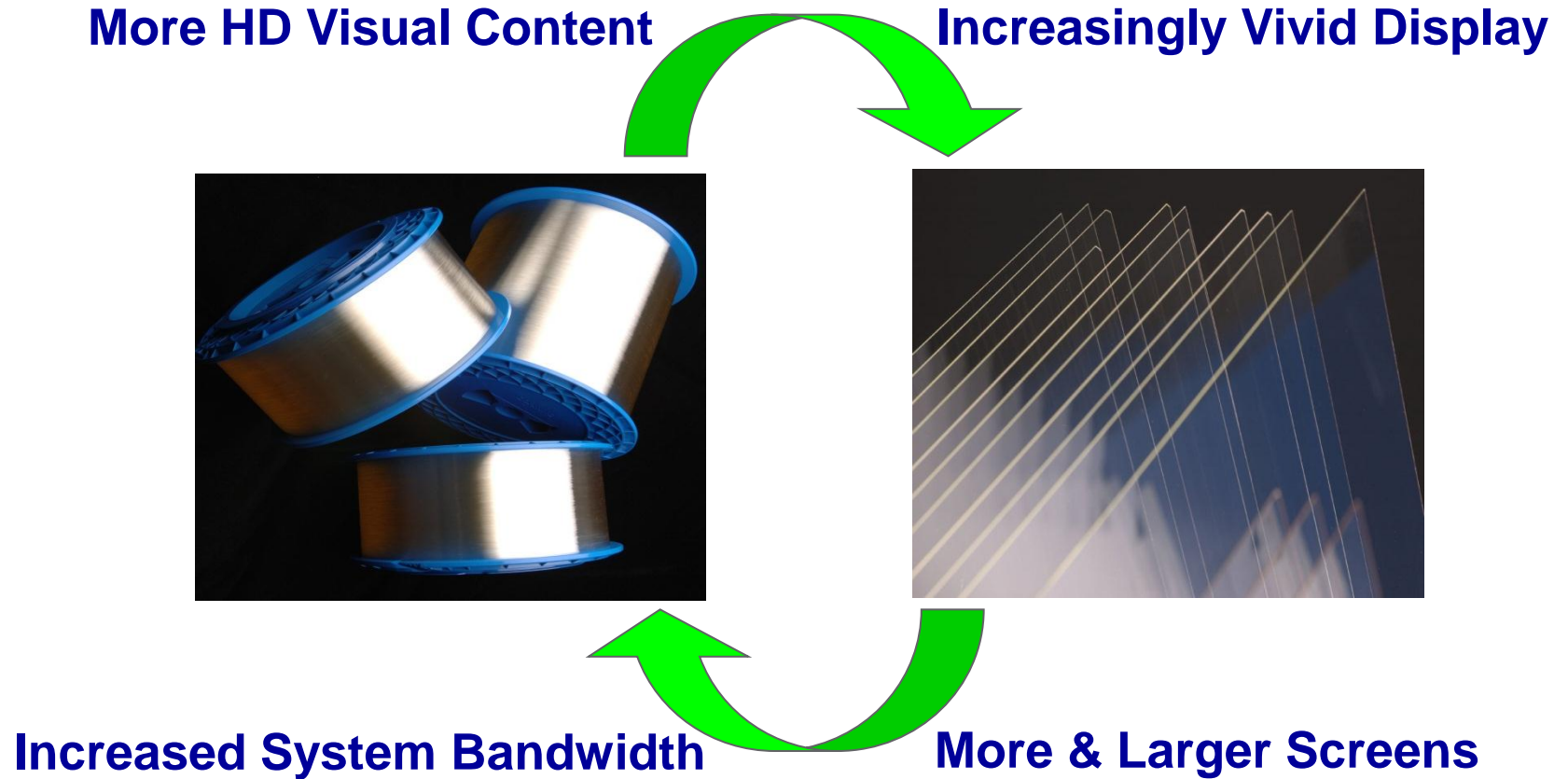
- Lower compaction
- Lower compaction variation
- Higher modulus
- Enhanced mechanical properties

Internet growth has enabled display revolution which in turn drives need for bandwidth



Source: Corning

A virtuous cycle enabled by Corning capabilities



A Technology Scale applied to key effects in the original “Day Made of Glass” video



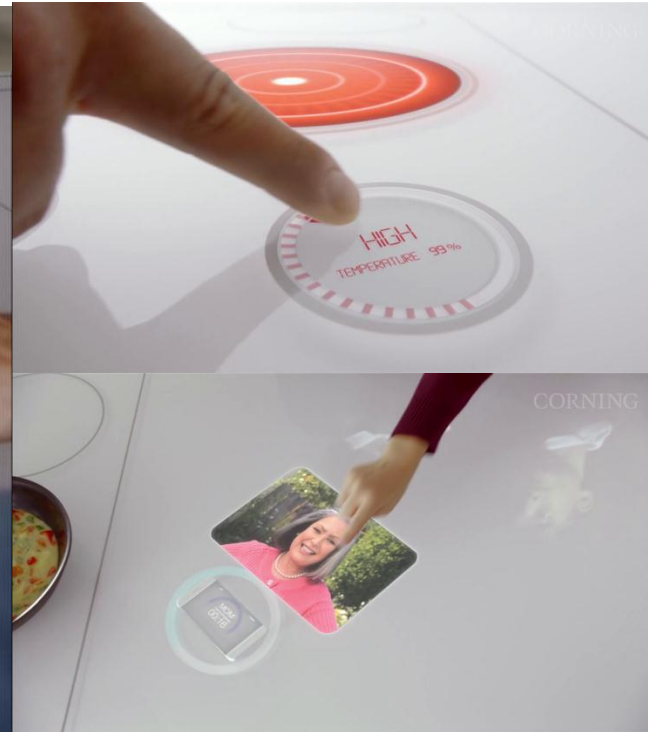


Interactive Bathroom Mirror

- Displays in mirror exist today – very expensive, just for TV and non-interactive
- It would be possible to use existing technology to incorporate touch
- Requires additional function to toggle between reflective & viewable.



Multifunctional Kitchen Surface



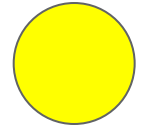


Specialty glass enables PV application



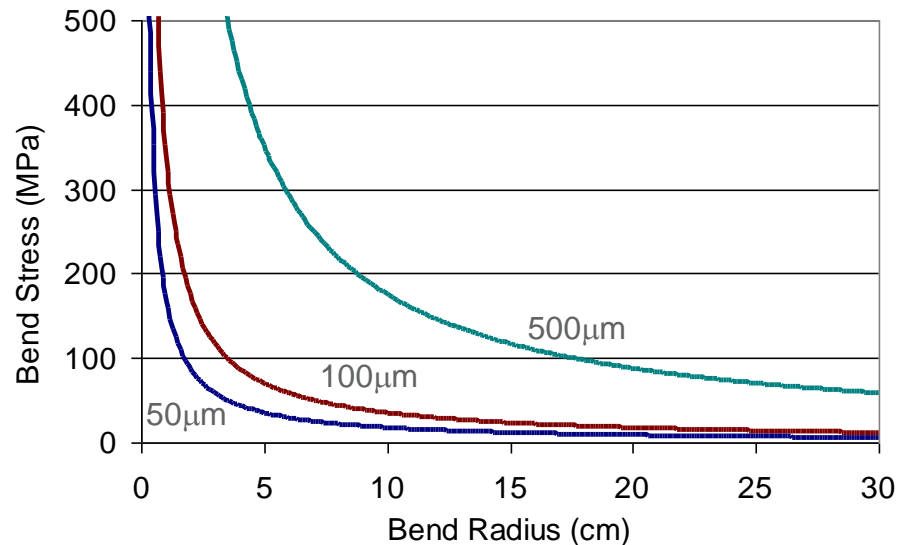
Demonstrated 2% improvement in efficiency

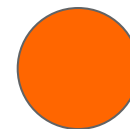
Flexible Display, Transparent Display, Displays Talking to Displays



Corning's ultra-slim glass is flexible enough to be rolled

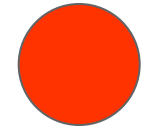
Typical 100 μ m thick glass can be rolled on a 150mm spool





Large-Format Sunlight-Readable Displays





Autostereoscopic 3D

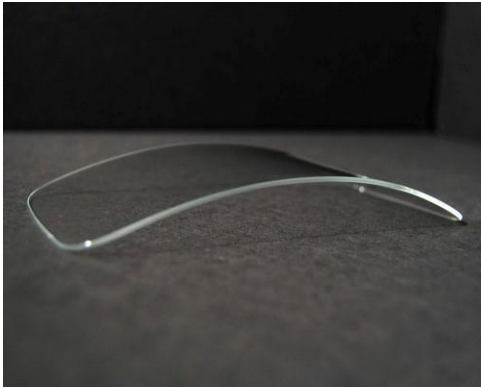


Challenges with the Day Made of Glass Vision

Smudge free surface enhances touch - Progress made with anti-smear coating



Low Cost, High Volume Capability For 3D Parts

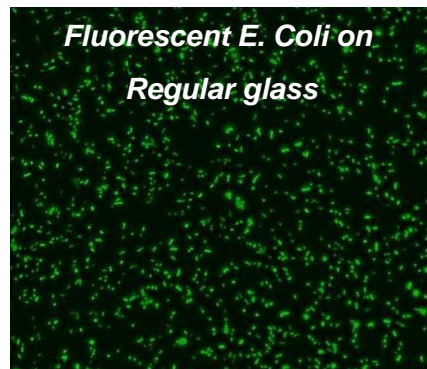
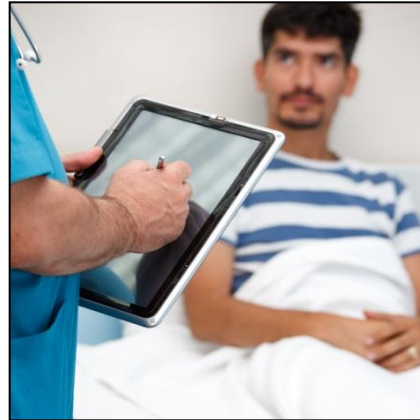


Edge-to-edge Display

Technology to create bezel-free display is under development



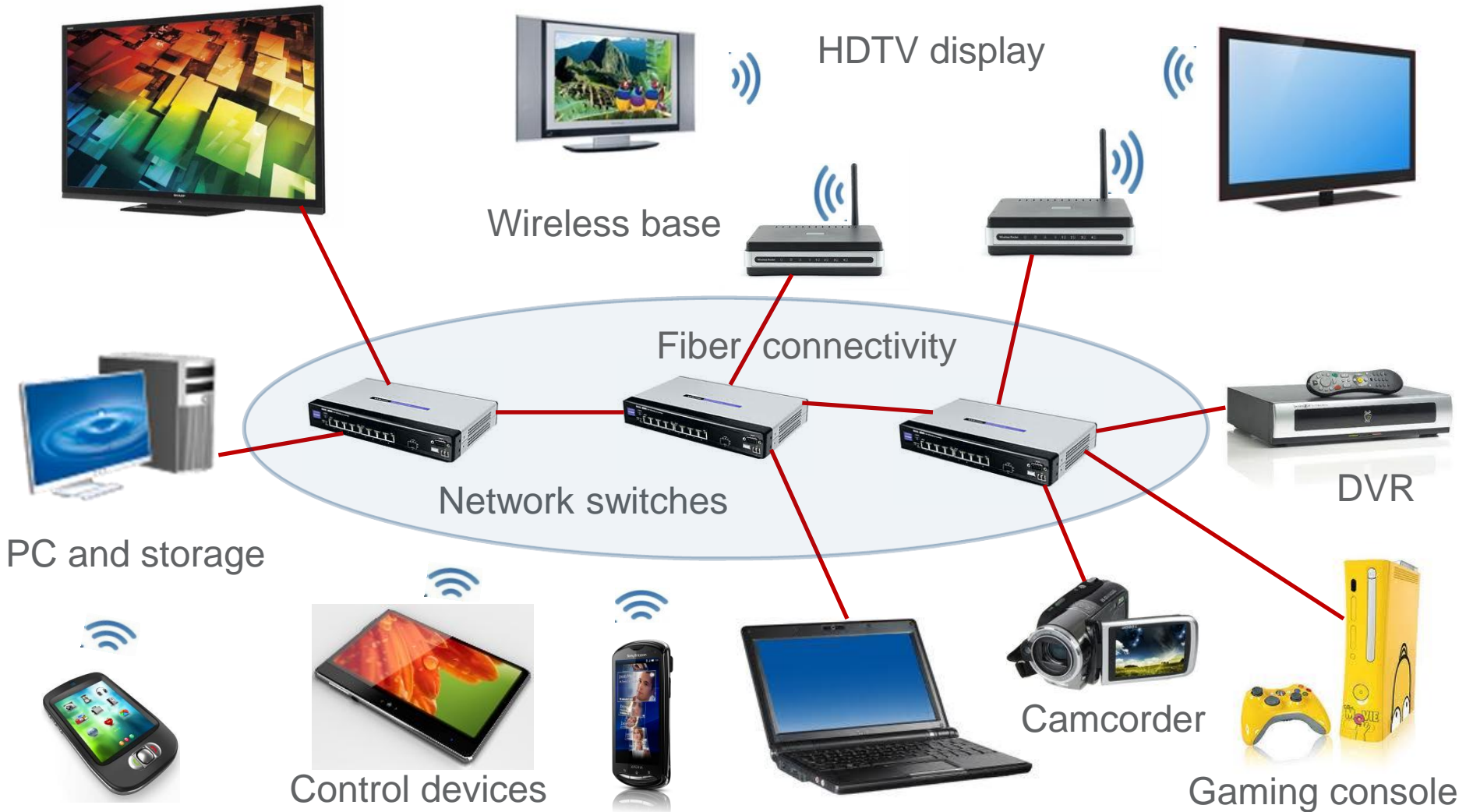
Anti-microbial surfaces with high kill rate and low cost will enable new applications



* Based on JIS Z 2801 Japanese Test for Anti-microbial Activity and Efficacy

A Day Made of Glass Vision for the Future Connected Home

A combination of wireless and fiber connectivity



Device-to-device communication can be enhanced by 60 GHz technology and AOC

USB 3.0 at 4.8 Gb/s



Copper

2m max length

Bulky

Fiber

50m length

Small, light, flexible

Challenges

- Combine functionality
- Anti smudge
- Glass mold interaction
- Lower loss fiber
- Low temperature sealants
- Role of Sodium in CIGS
- Lower cost high strain point glass
- Modeling of composition
- Process innovation

Acknowledgements

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