
3M
Science.
Applied to Life.™
3M Converter Connection
TRENDS

Industry Trends

 Electronics

 Automotive

 Appliances

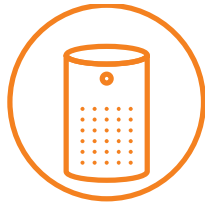
INDUSTRY TRENDS

Electronics

Electronic Megatrends

Smartphones

Virtual Reality



Smart Speakers

TV Sets

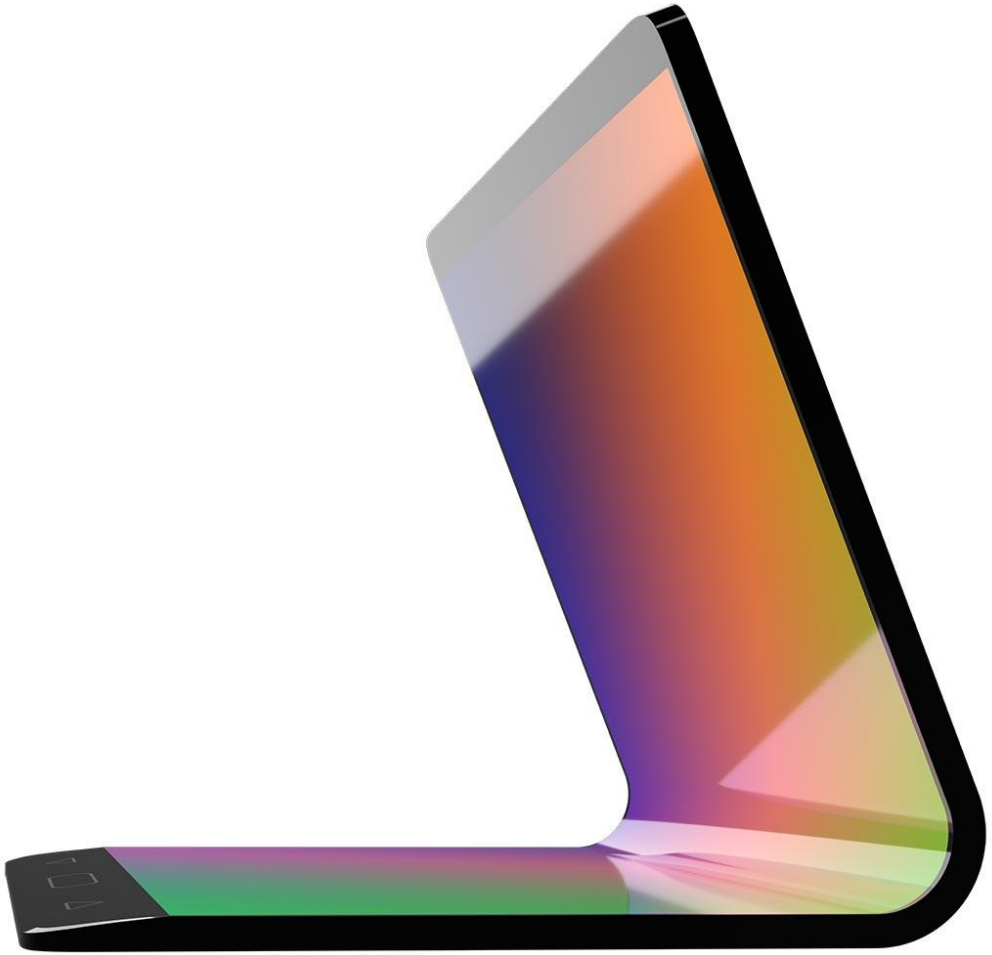
IoT

Drones

Service Robots

Connected Cars

Source: IHS.com



TREND

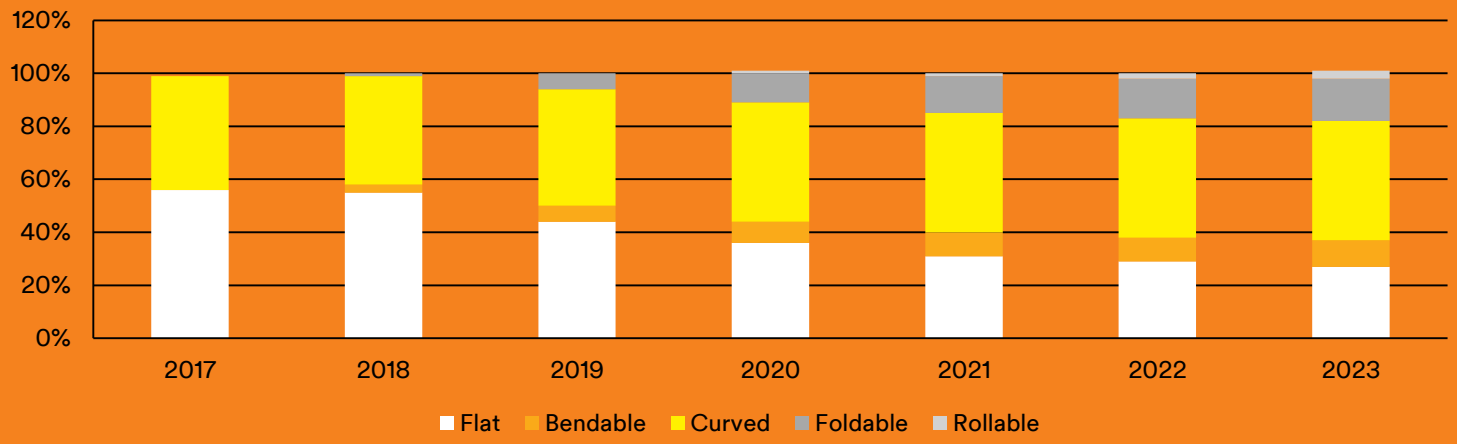
OLED display technology

Hello, flexible. The future of displays is in OLED technology. People love its superb contrast, color and resolution from all viewing angles, combined with form-factor flexibility, larger screen sizes and improved resolution.

What does it mean for you?

More projects. Higher demands on engineering, mechanical performance and adhesive reliability. OLED technology enables smartphones and other screens to be bendable, creating both design challenges and opportunities for those in the know.

OLED technology trend forecast



Curved screens are expected to gain popularity in the next 5 years.

Bonding needs:

Bezel-free designs require anti-lifting adhesives

Flexible screens need high-impact, tough adhesives

OLED's sensitivity to moisture and chemicals requires adhesives robust to extreme environments

TREND

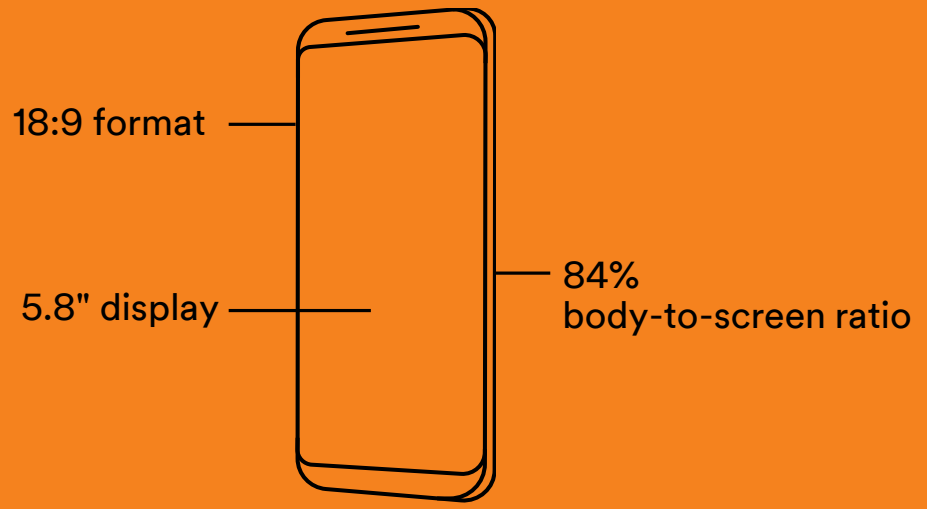
Thinner devices with larger displays

Consumers prefer larger displays on electronic devices, such as TVs and smartphones, because they offer greater viewing pleasure. Compared to traditional 16:9 aspect ratio displays, 18:9 provides a larger display area on a mobile device of the same size. A slim bezel design and thin profile also offer a unique and attractive appearance while taking up less space.

What does it mean for you?

Need for thinner, high-performance adhesives that prevent costly rework. Staying on top of this trend will help you enable your customers to design high-demand smartphones, tablets, TVs and more.

A bezel-free design creates a larger display area



Source: displaydaily.com

Bonding needs:

Bezel-free designs require anti-lifting adhesives

Thinner attachment systems with high mechanical performance

Easy-to-use, reworkable adhesives will save on manufacturing costs

TREND

Wearable technology

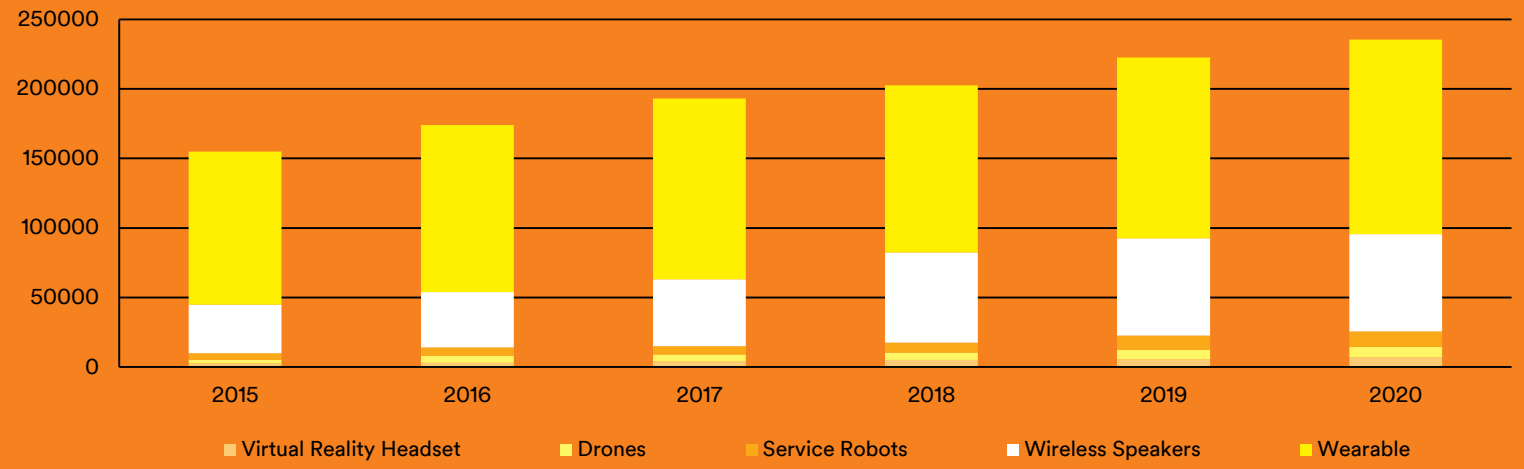
Virtual and augmented reality wearable displays are growing in popularity. Devices range from smart clothing to healthcare gadgets to entertainment products. This vibrant market is expected to grow in value to almost $17 billion by 2021. By 2020, smart eyewear will account for 40% of total revenue of the wearables market.

(Sources: i-scoop, 2016; wearable technologies, 2017)

What does it mean for you?

Expertise in reliable bonding solutions for hard-to-bond materials will mean more opportunities for new products. High demand for thin, high-performance adhesives that are waterproof and resistant to lotions, perfumes and sweat.

Shipments of new device types since 2015



Source: IHS.com

Bonding needs:

Ability to bond to difficult surfaces (such as new plastics)

Thinner attachment systems with high mechanical performance

Reliable adhesives robust to extreme environments

TREND

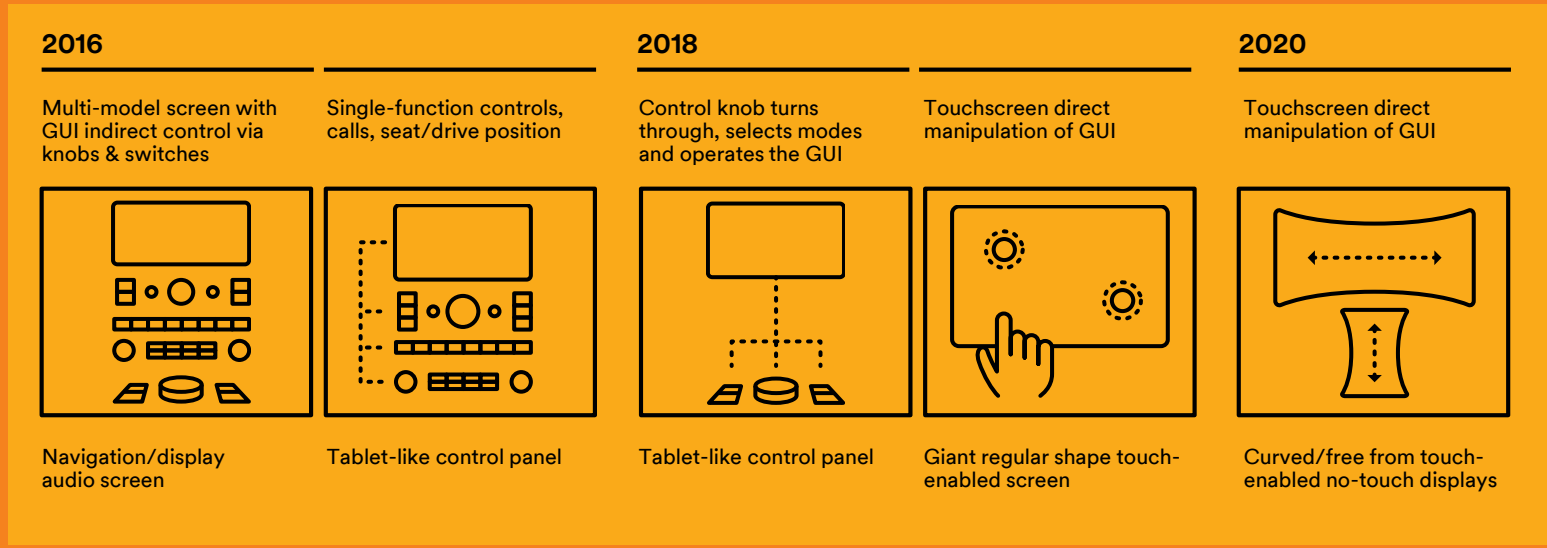
Automotive electronics

Two major industries — automotive and electronics — are working together to provide breakthrough experiences for drivers. From one-touch phone calls to advanced navigation systems to cars that parallel park themselves, vehicles are becoming as smart as the people who drive them.

What does it mean for you?

Growing demand for FPC bonding and low-VOC materials. A need for high-impact adhesives that can resist the vibrations of the road. Opportunities are growing for those who know how to successfully attach sensors, displays, cameras and batteries within vehicles.

Evolution of center console displays



Source: IHS.com

Bonding needs:

Low-VOC, low-odor adhesives for passenger comfort

High-impact, tough adhesives that resist vibration

High mechanical performance to attach sensors, displays and more

INDUSTRY TRENDS

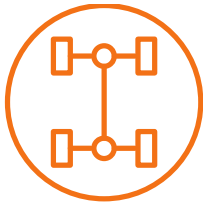
Automotive

Automotive Megatrends

Weight Reduction

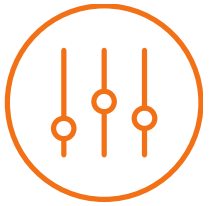
Passenger Comfort

Automotive Electrification/ Electronics



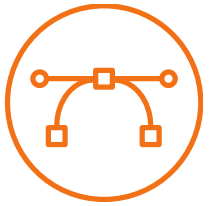
Powertrain Innovation

Quality and Process Improvement



Personalization and Styling

NVH Reduction



Design Flexibility

TREND

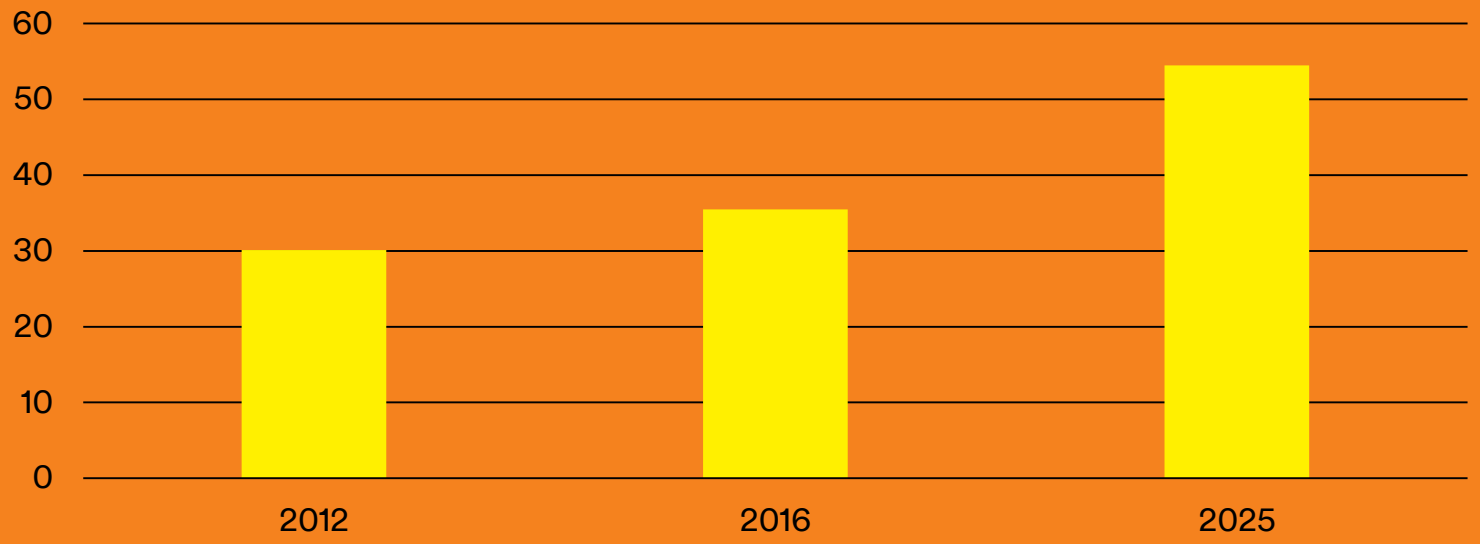
Weight reduction

Lighter cars mean consumers use less fuel for cleaner air and reduced dependence on fossil fuels. Fuel efficiency and CO_2 GHG regulations are challenging OEMs to design vehicles using lightweight materials, such as polypropylene (PP), thermoplastic polyolefin (TPO), carbon fiber and new epoxy resins.

What does it mean for you?

Lightweight materials can be challenging to bond and can cause unwanted noise. The need to attach difficult-to-bond materials and reduce noise while reducing weight will continue to grow.

CAFÉ Standards
Miles per gallon – equivalent (mpg-e)



Bonding needs:

Buzz, squeak, rattle noise reduction

Ability to bond to difficult surfaces (such as new plastics)

Ability to bond lightweight materials

TREND

Passenger comfort: low VOC, low odor, low noise

An enjoyable driving experience means that providing odorless interiors and quiet, smooth rides are top priorities. However, VOCs are inherently present in newly produced components for auto interiors, which are made of rubber, plastic, foam and leather. Increasing government regulations and VDA278 and JAMA industry standards have resulted in more stringent OEM regulations. Low-VOC and low-odor interiors continue to grow in popularity, as well as finding ways to eliminate buzz, squeak and rattle noise.

What does it mean for you?

Identifying technologies and incorporating low-VOC, low-odor and low-noise materials and ways to attach them is crucial. Common applications include headliner, door panel, seating and instrument panel. Leading manufacturers are responding to new demands in design and low VOC requirements with interiors made from a continually expanding range of new materials.

Vehicle interior emissions and their sources

Organic sources

HEADLINER
- Aldehyde
- Toluene

SEAT
- Aldehyde
- Toluene

I-PANEL
- Aldehyde (leather)
- Isoalkane
- Phthalate (PVC)

DOOR PANEL
- Aldehyde
- Butadiene
- Toluene

CARPET
- Aldehyde
- Org. acid
- Toluene

Average commuting time in the U.S.:

329
hours/year

Source: Organization for Economic Cooperation and Development report

Bonding needs:

Low-VOC, low-odor, low-noise adhesives

Adhesives designed to bond to new, low-surface-energy materials

Low-fogging adhesives

TREND

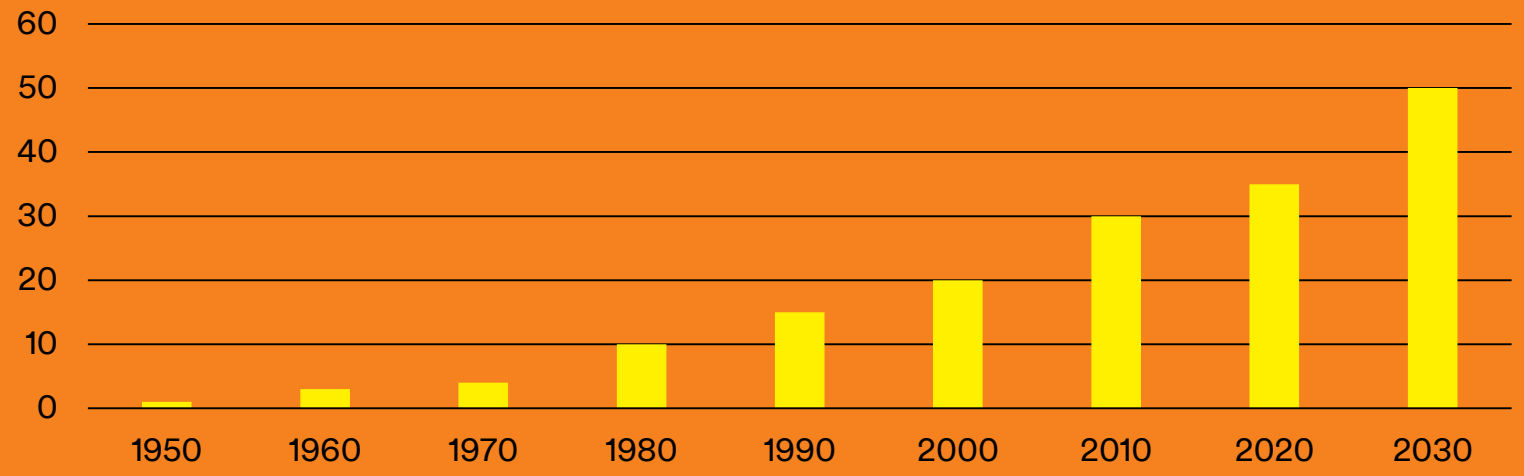
Automotive electronics

Electronics technology leaders have moved into the automotive electrification market. Driver information systems are digital, including instrument cluster and driver heads up displays. Smart sensing functions are getting more sophisticated, with parking sensors, collision sensors and even window dimming sensors becoming standard features. In the near future: adoption of system capabilities enabling autonomous driving.

What does it mean for you?

Seamless integration of electronics into vehicle interiors is important for OEMs. Understanding the best ways to bond new materials to create breakthrough designs will lead to more opportunities.

Electronics and software as percent of total car cost



Source: Statista/Lux Research

Bonding needs:

Adhesives designed to bond to new, low-surface-energy materials

High-impact, tough adhesives that resist vibration

High mechanical performance flexible printed circuit bonding to attach sensors, displays and more

TREND

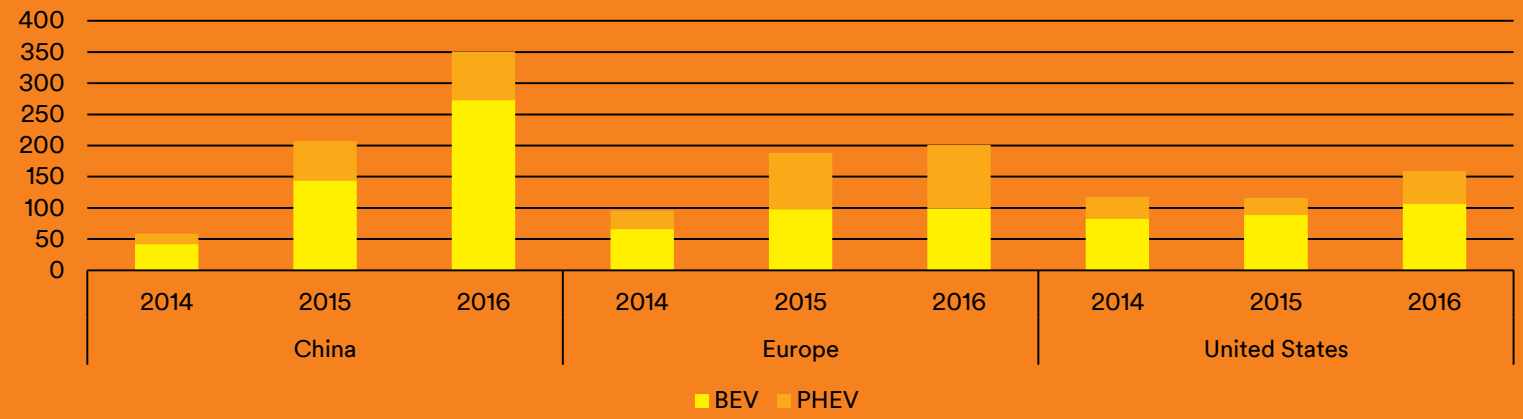
Powertrain innovation: EV

Electric Vehicles (EV) pave the road for emission-free mobility combined with driving enjoyment. Plug-In Electric Vehicle, Extended Range Electric Vehicle and Battery Electric Vehicle Powertrain Systems integrate powertrain components, internal combustion engine and transmission with new electric components.

What does it mean for you?

The new eMobility marks a major shift in powertrain technology. EV manufacturers want adhesive and sealant solutions that are proven to work: They need to be electrically insulating or conductive, self-extinguishing and temperature resistant. Along with the design of the vehicles and batteries are the charging stations, so the need for ways to successfully meet these challenges will continue to grow.

New registrations of electric vehicles



Worldwide sales of pure battery EVs (excluding hybrids) grew by 45% in 2016.
Source: mckinsey.com

Bonding needs:

Innovative
EV battery bonding

Adhesives that
enable new
lightweight designs

Adhesives that are
electrically insulating
or conductive, self-
extinguishing and
temperature resistant

INDUSTRY TRENDS

Appliances

Appliance Megatrends

Emphasis on Aesthetics

Matte Stainless Steel

Smudge-Proof Finishes

Time-Saving Features

Noise Reduction

IoT-Connected HVAC Systems

Smart Connectivity

Smart Monitoring

TREND

Emphasis on aesthetics

Matte finishes for refrigerators, dishwashers, ranges and hoods are growing in popularity. A modern slate finish creates a sleek look and a matte surface to avoid fingerprints. Another hot trend is using glass in smart touch panel design instead of mechanical switches, which intuitively guides use and is durable and easy to clean.

What does it mean for you?

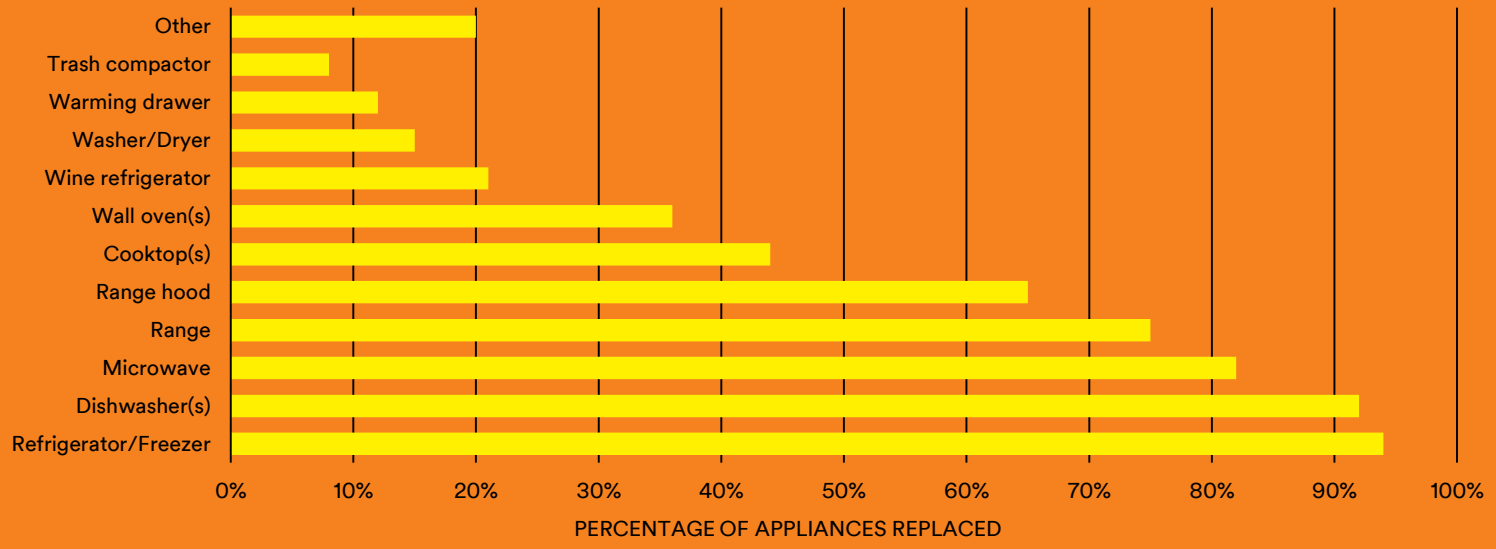
Increased opportunities for those who understand how to turn design concepts into reality. Manufacturing aesthetically pleasing appliances presents numerous challenges in assembly, mounting, fastening and sealing. There is a growing need for high-performance adhesives resistant to extreme temperatures, chemicals and liquids.

90%

of homeowners replace all or some appliances during kitchen renovations.

25%

of new appliances have high-tech features like color-touchscreen controls or built-in speakers.



Source: houzz.com

Bonding needs:

Ability to bond to difficult substrates (such as glass to metal)

Reworkable adhesives to save manufacturing costs

Reliable adhesives robust to extreme environments

TREND

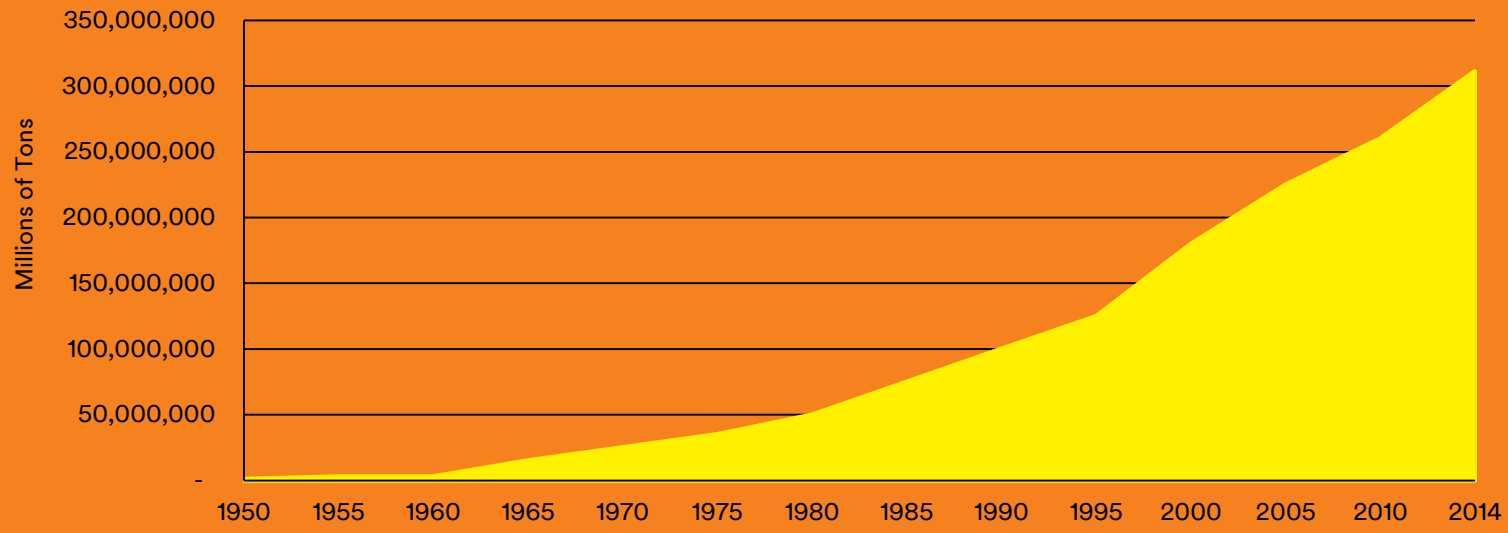
Low-cost materials

Many mid/low-end appliance manufacturers are using plastics like polypropylene for light weighting and cost saving. This allows quality mass production at a low price to make more options available to more people.

What does it mean for you?

Many appliance manufacturers are turning to bonding for easier assembly, reworkability, vibration damping and the ability to join dissimilar substrates and sensitive materials with a continuous joint. Choosing the right adhesive can mean increased durability, strength and cost savings.

Global use of plastics has grown steadily since 1950.



Source: World Economic Forum: The New Plastics Economy — Rethinking the Future of Plastics, Jan. 2016

Bonding needs:

Ability to bond to difficult surfaces (such as plastics)

Reworkable adhesives to save manufacturing costs

Reliable adhesives robust to extreme environments

TREND

Smart connectivity

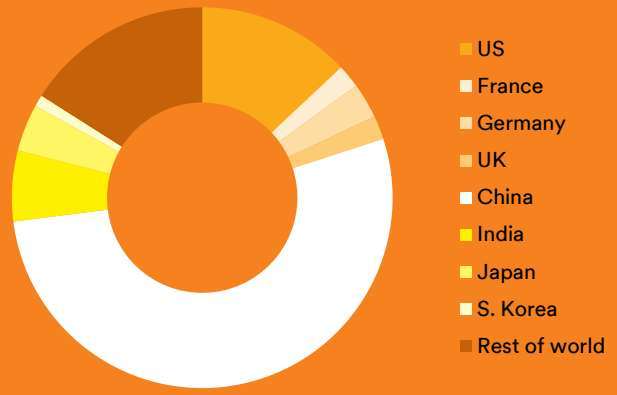
Living in a smart home is not a dream anymore. A new wave of smart technologies makes domestic life more efficient, productive and entertaining. Imagine ovens that let you know when dinner is ready, refrigerators that can order groceries and dishwashers that can be operated remotely.

What does it mean for you?

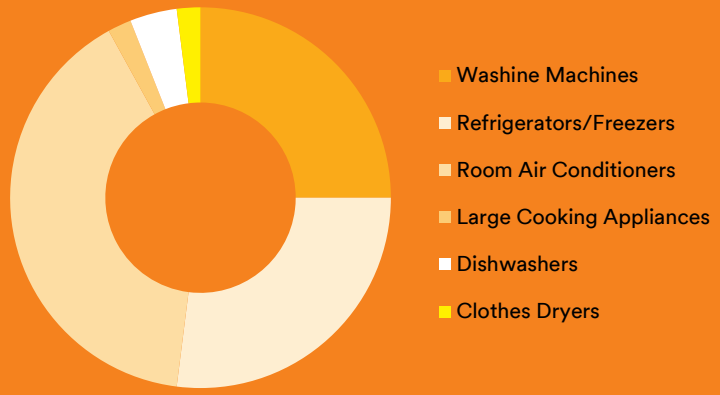
Smart appliances are forcing engineers to rethink age-old product designs — and how to build them. There will be more bonding opportunities for accessories with connectivity and appliances like air conditioners, coffee makers, washing machines, refrigerators and more. Knowing how to bring smart products to market will give you a competitive advantage.

Smart connected appliances may reach 200M units by 2020

Share by 8 Key Markets



Share by Major Appliance Type



Bonding needs:

Ability to bond to difficult surfaces (such as plastics)

High mechanical performance flexible printed circuit bonding to attach sensors, displays and more

Reliable adhesives robust to extreme environments

TREND

Noise reduction

Some of the noisiest products are some of the most essential — including food processors, washing machines, vacuum cleaners and extractor fans. Noise reduction is even more important for consumers in China, since washers are typically located in kitchen or living areas.

What does it mean for you?

The need for new noise-damping solutions, including foil tape, damping pads and more from a capable provider will continue to grow. Understanding the design challenges of appliances will be essential.

Top 10 loudest household appliances

Anything over 85 decibels can harm your hearing, but household appliances in the 50-decibel range can be harmful over time. It's time to take the buzz out of your morning coffee buzz.

1. Blender: 80-90 db
2. Food processor: 80-90 db
3. Juicer: 80-90 db
4. Coffee grinder: 70-80 db
5. TV: 70 db
6. Hair dryer: 60-95 db
7. Vacuum cleaner: 60-85 db
8. Washing machine: 50-75 db
9. Dishwasher: 55-75 db
10. Coffee percolator: 55 db

Source: quiethomelab.com

Bonding needs:

Adhesives that reduce buzz, squeak and rattle

Ability to bond foam for noise damping

Adhesives that bond 3M™ Thinsulate Insulation for noise reduction