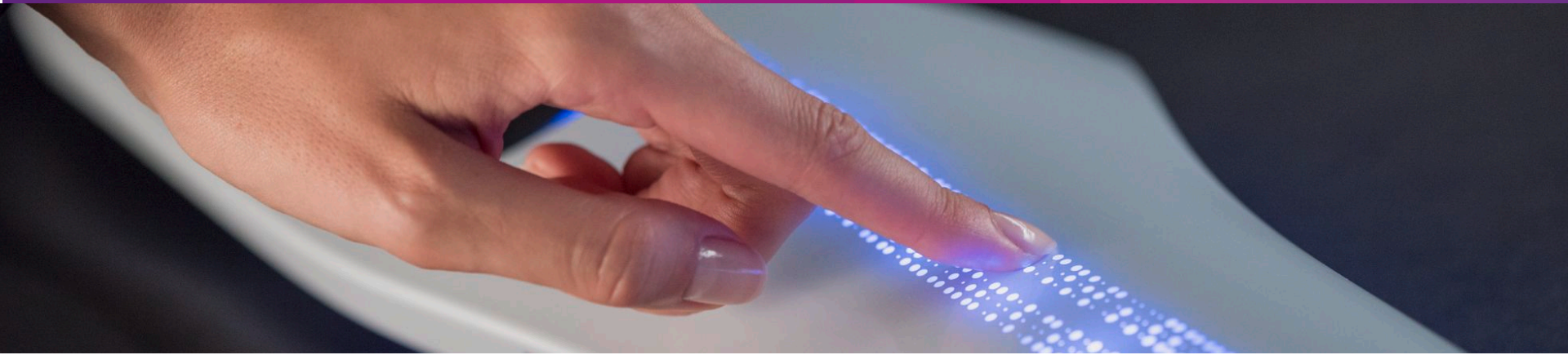
TopCon & Symposium

2019 SPE Decorating & Assembly Division & IMDA

June 2-4 • Franklin, TN



SMART SURFACE, A harmony of design and function HMI Solutions

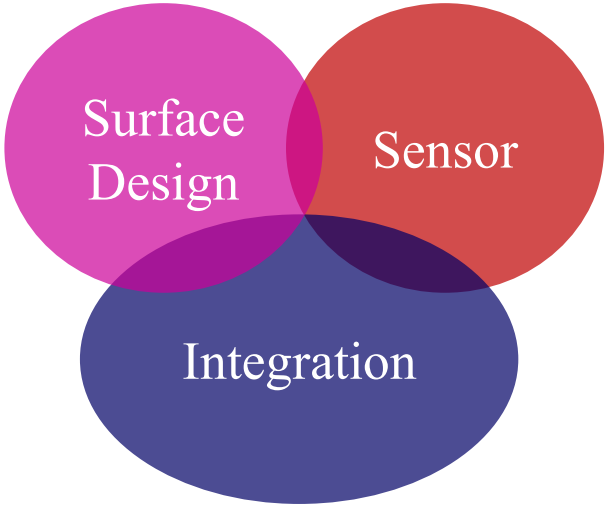
Scott Tacosik
Director, Business Area Plastics
Kurz
scott.tacosik@kurzusa.com

KURZ PolyIC a KURZ company

Smart Surfaces

HMI Solutions by Functional Integration of Design.

1. HMI Trends in Consumer & Automotive
2. Surface Design - Plastic decoration
3. Sensor - PolyTC Touch Sensors
4. Integration - System



HMI Trends – The Trend creates the Need

HMI Trends in Consumer & Automotive

inspired by CES, IAA, NAIAS, IFA, and by daily life

HMI Trends

It is not about what you really need.

It is about how a trend develops as
a combination of necessity, demand,
inspiration and available technology.

The Trend Creates the Need

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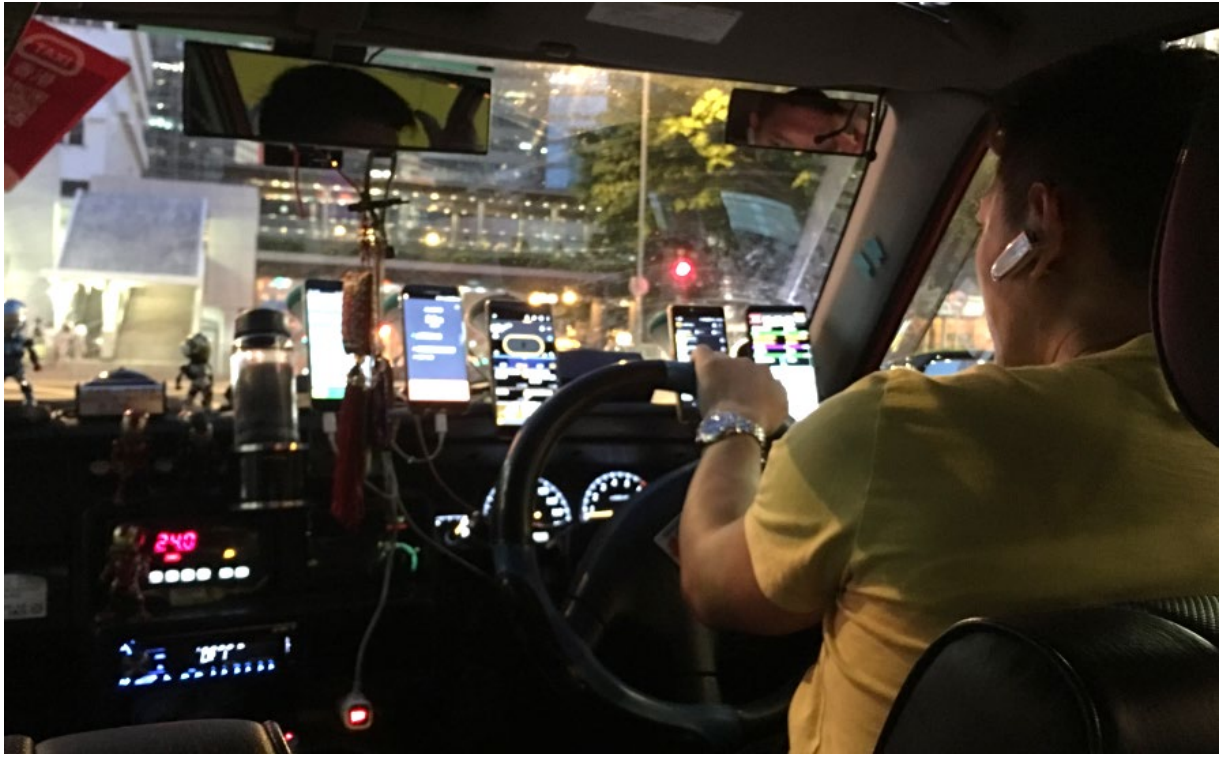
HMI Trends – Automotive

The Need

**Mahindra Roxor

HMI Trends – Automotive

The Reality



**Hong Kong Taxi 2018

HMI Trends – Automotive

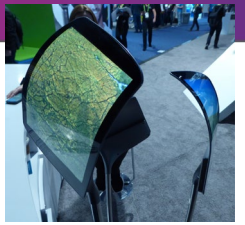
The Designer´s Dream

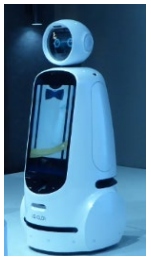
**Infinity QX Inspiration

HMI Trends

Human Machine Interfaces (HMI) are in a rapid change in all industries, with similar basic trends in Consumer and Automotive:

- Interaction by **capacitive controls, touch screens** and **voice**
- Surface is **Seamless & Clean**
- Panels are **Large & Curved**
- Decoration with integrated **Light & Function**
- **Connectivity** and **Autonomous** functions





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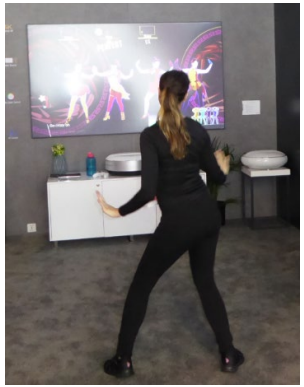
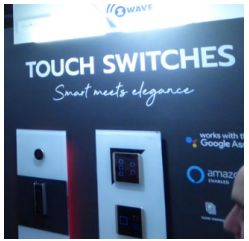
HMI Trends – Consumer

Large, curved, seamless, integrated, backlit, …





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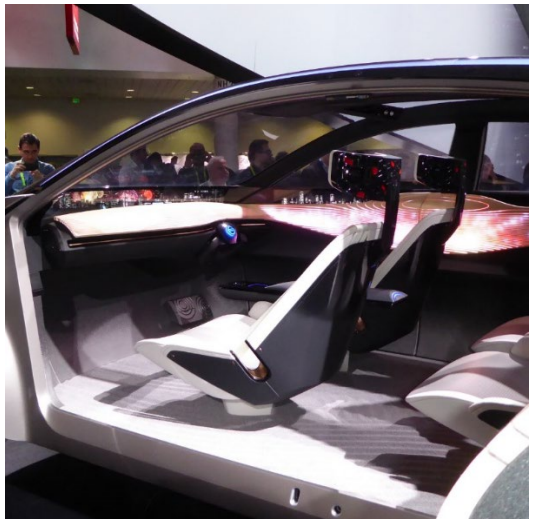
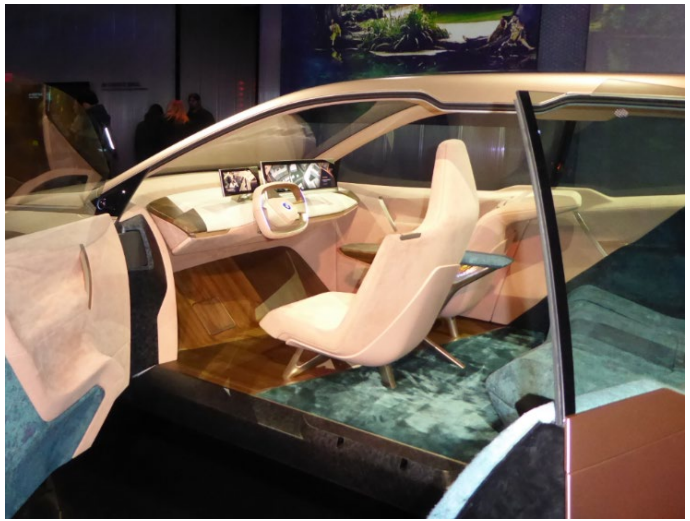
HMI Trends – Automotive

Interior becomes Clean and Seamless

Audi



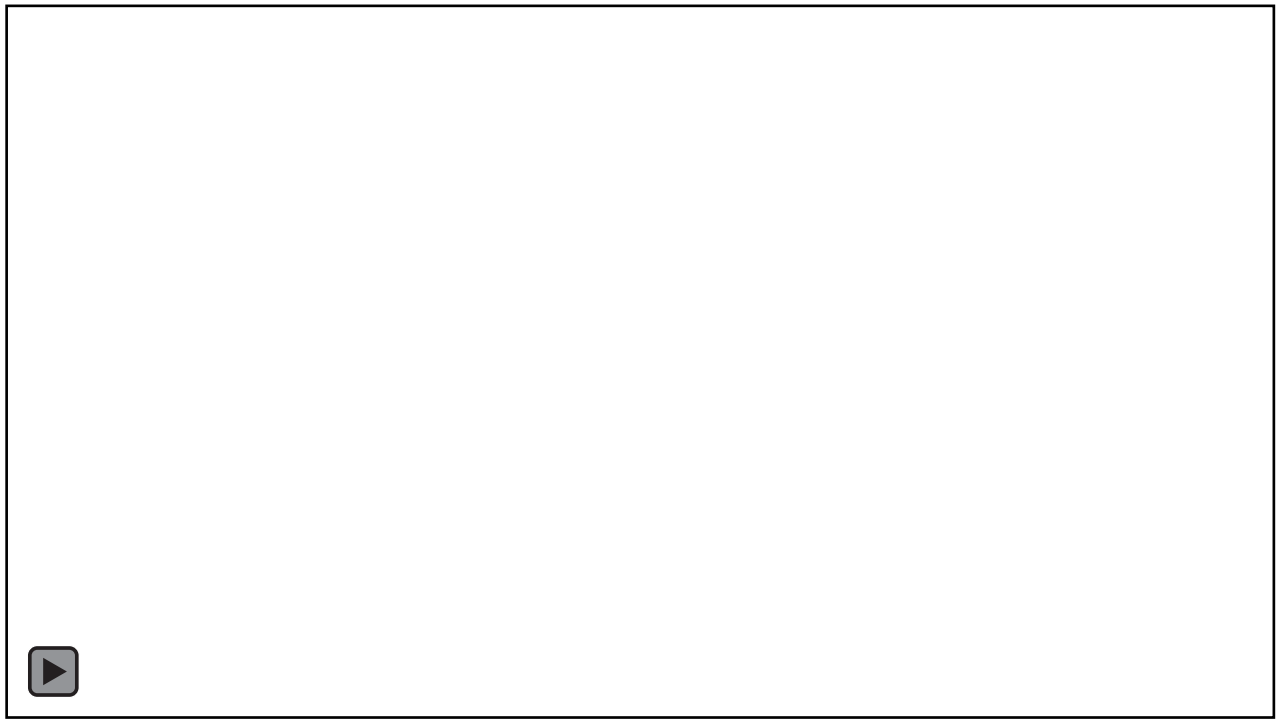
Nissan



BMW

HMI Trends – Automotive

Interior with integrated “hidden till lit” light effects



Nissan

HMI Trends – Automotive

Capacitive Touchpads are integrated and backlit

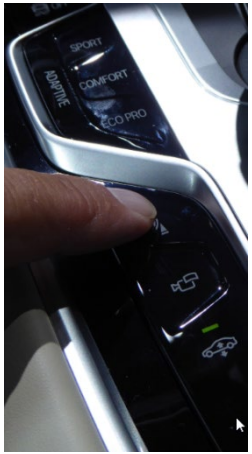
BMW

Daimler

Daimler

HMI Trends – Automotive

Capacitive buttons and sliders replace mechanical buttons and rotary knobs



BMW

BMW

Porsche

VW

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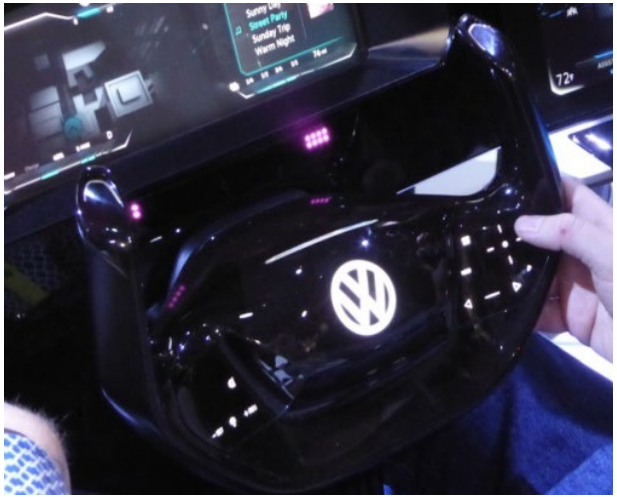
HMI Trends – Automotive

Capacitive steering wheel controls substitute mechanical controls

Landrover



VW

Ge-T & KURZ

HMI Trends – Automotive

Multiple Touchscreens

Audi

Daimler

Continental

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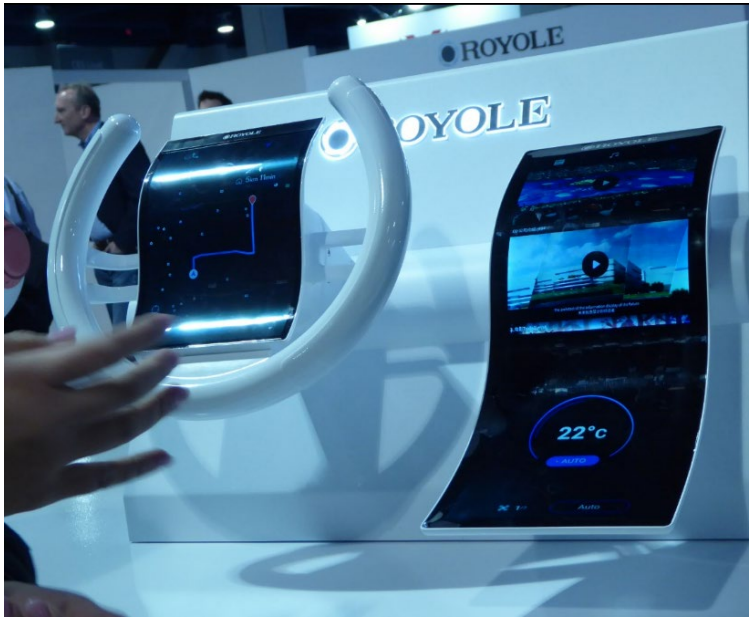
HMI Trends – Automotive

Large and Curved Touch Screens

Byton



Royole

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HMI Trends – Automotive

Gesture Control

BMW

VW

Microchip & KURZ

HMI Trends – Automotive

Voice Control, Connectivity, Autonomous,
Alternative (electro, hybrid, fuel cell…), Ride Sharing

Alexa
Hey Google

Bosch

Toyota

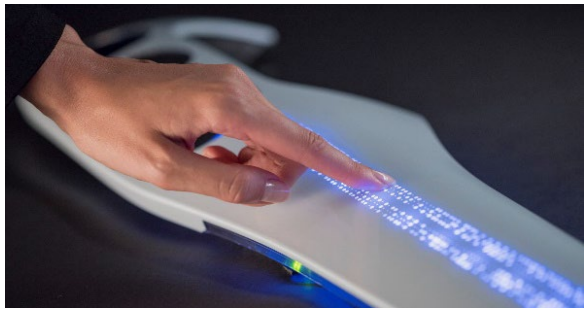
HMI Trends – Automotive

Control Units

IN: Capacitive touch buttons, sliders (but **haptic feedback important**)

OUT: Mechanical buttons
(only left for safety-relevant functions or design elements)

?: Rotary knobs (remain as design element?)



Touchscreens & Displays

IN: More, larger, seamless, free shape, curved

OUT: Small displays, non-touch displays

Decoration

IN: Seamless, curved, large, backlight, integrated function

OUT: Decorated trims and panels without function or light
Trims with holes for electronics

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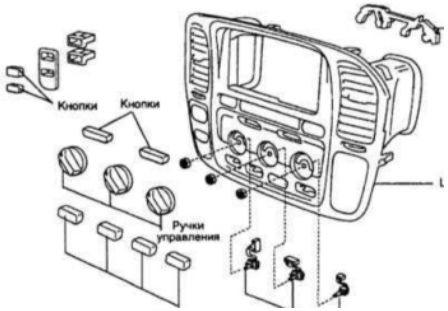
Capacitive Touch supports HMI Trends

- Flat, Curved or 3D **Smart Surfaces**
- **Seamless**: No more holes or grooves
- Less or **no more mechanical** parts
- **Thin and light** weight
- **New design** & UI options
- Functions with capacitive Sensors:
  - **Touch Screens**
  - **Touch Pads**
  - **Buttons, Sliders**
  - **Rotary Wheels**
  - **Gesture Control**

standard



touch

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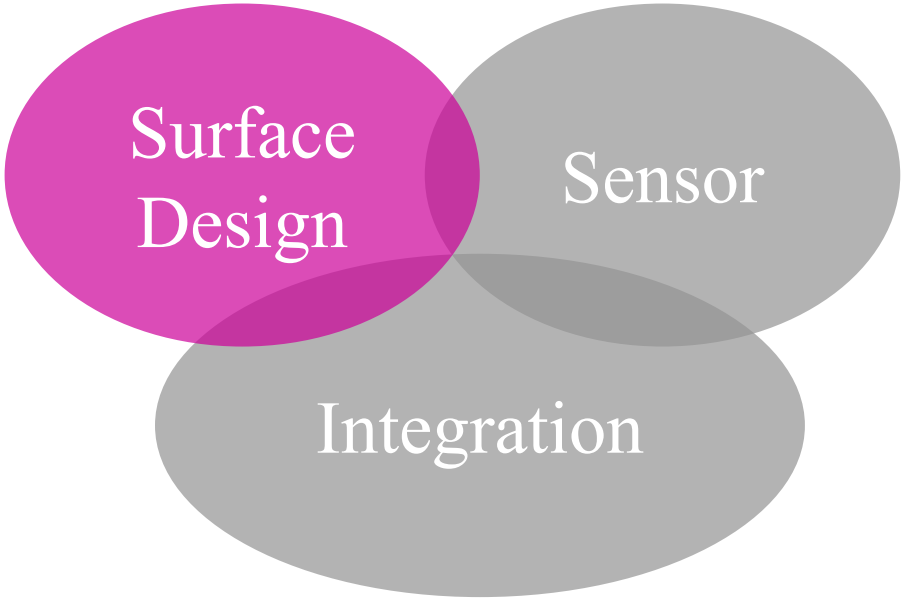
Smart Surfaces - Surface Design

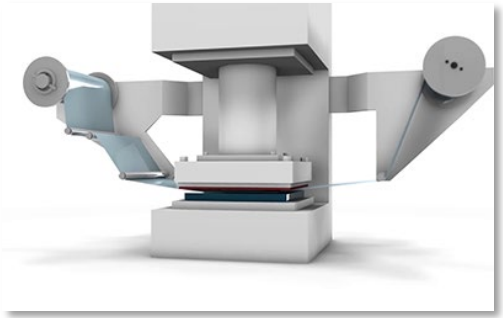


Plastic Decoration - Hotstamping

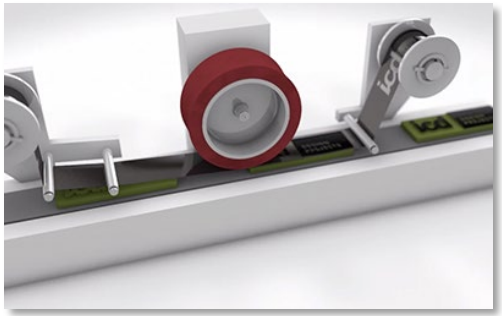
Product geometry:

Degree of deformation:

Up-and-down stamping



Roll-on stamping



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Plastic Decoration – Hot Stamping

Hot Stamping metallized

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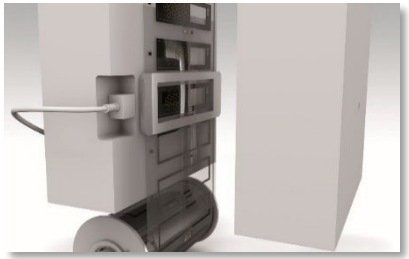
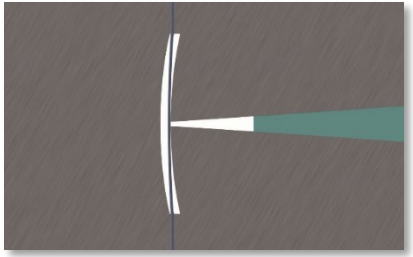
Plastic Decoration -IMD

Product geometry:

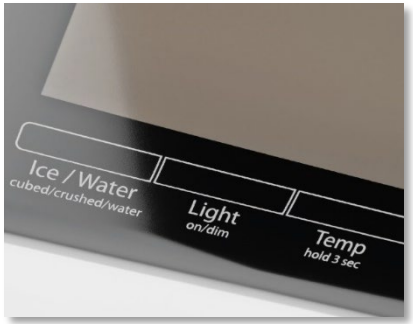
Degree of deformation:

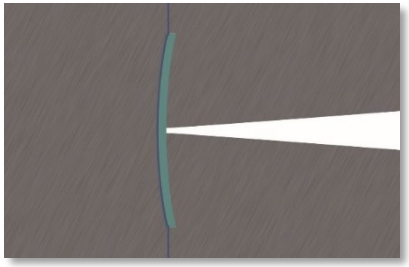


The IMD foil is positioned.

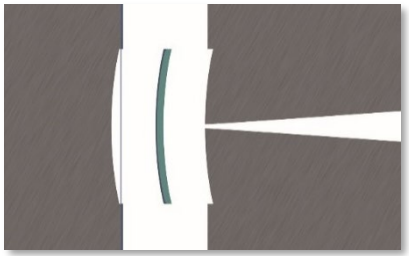


The tool closes and the plastic is injected.

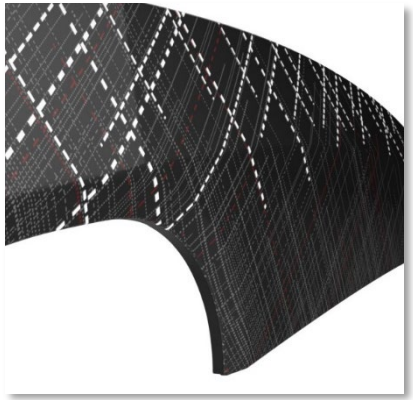




The hot plastic material fills the mold cavity, pressing the decorative foil against the wall. This securely bonds the decorating layer to the plastic material.



The tool opens and the part can be removed.



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Kurz Plastic Decoration Automotive

IMD Decoration

IMD Display Applications

Clearcoat

- Anti Reflective properties
- Anti Glare properties
- Anti Fingerprint
- Automotive Grade

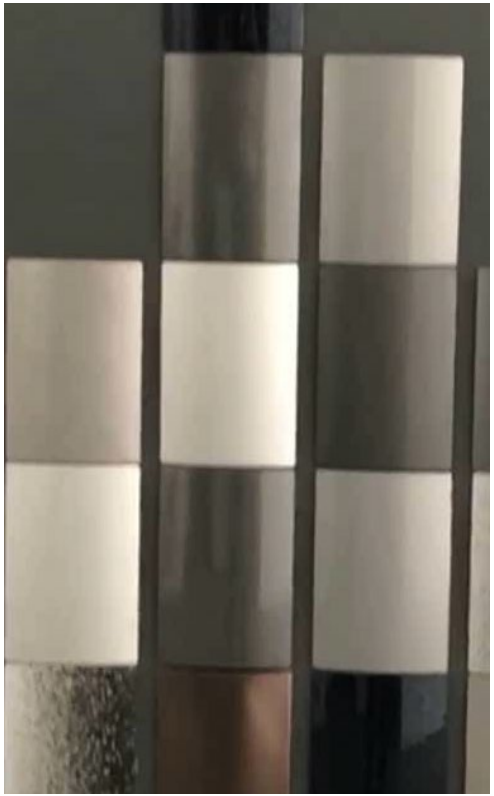
Continental

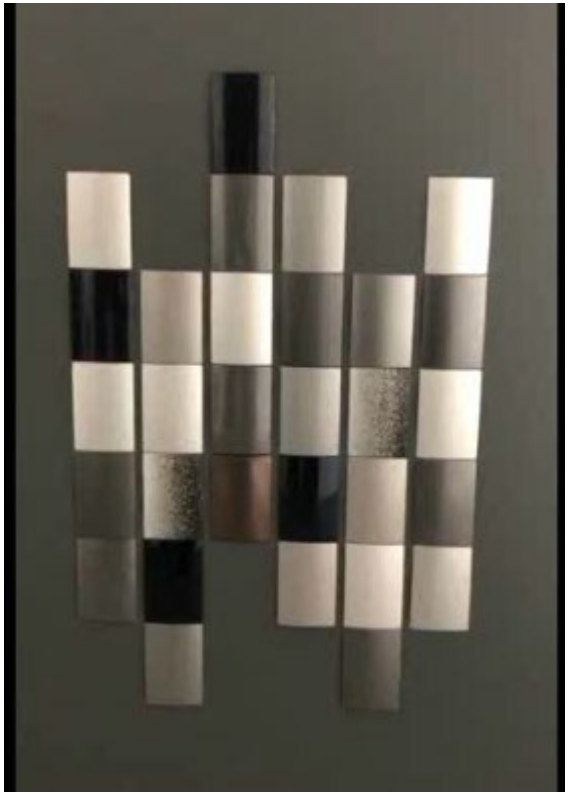
SUBARU

KURZ

IMD / Insert

Backlighting





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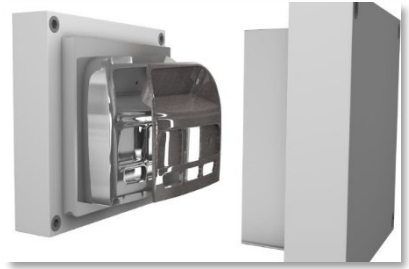
Plastic Decoration INSert

Product geometry:

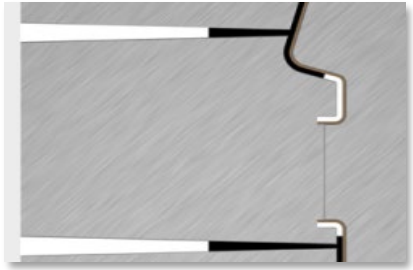
Degree of deformation:

A deep-drawable plastic foil is decorated by hot stamping. The decorated plastic foil is heated and deformed by vacuum or compressed air.

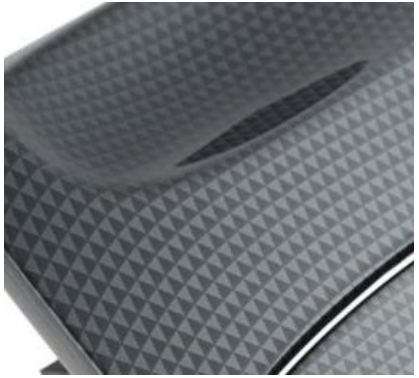
The formed plastic foil is then cut true to contour.



Now the insert that has been produced can be put into the injection mold.



The insert has been inseparably bonded to the back-injection molded plastic material.



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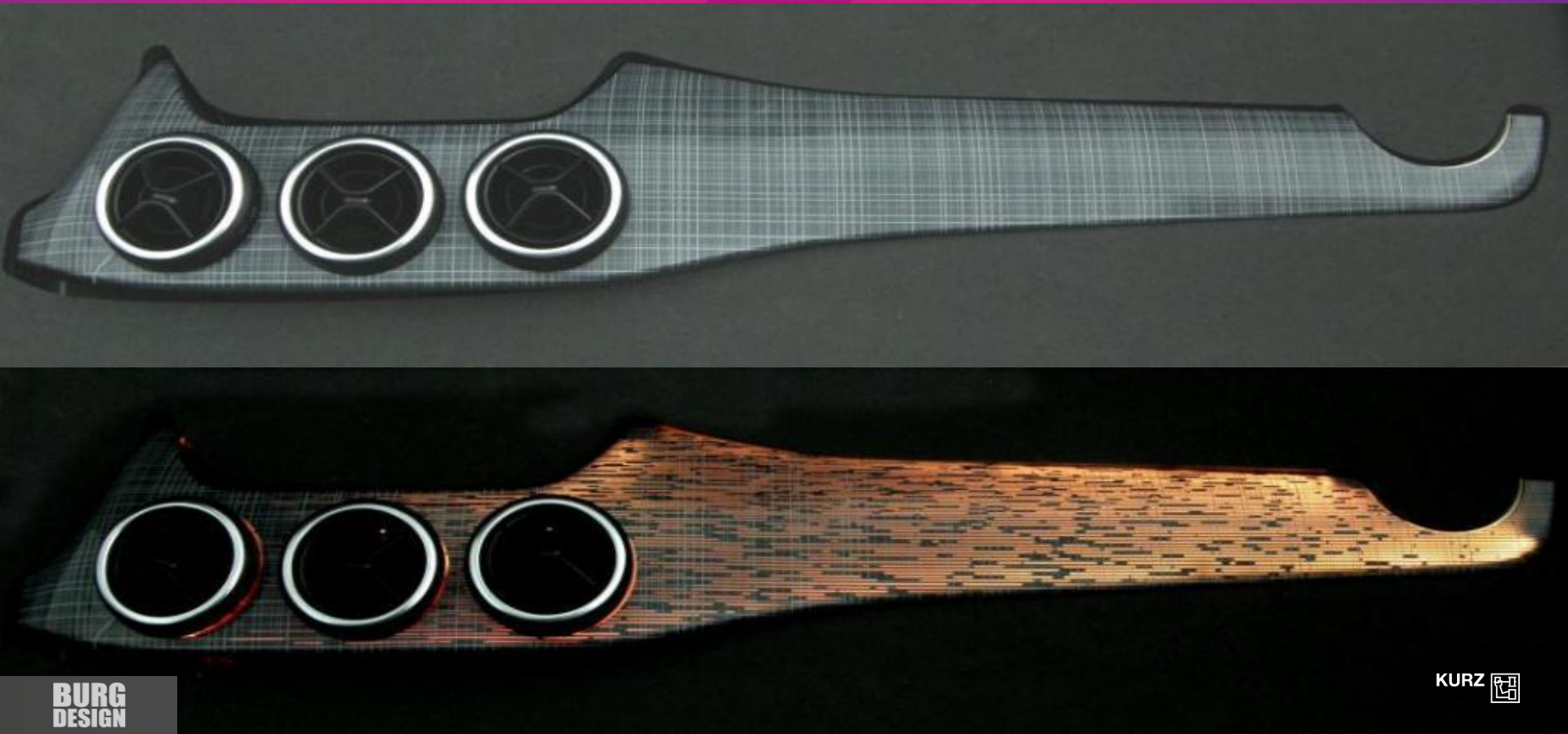
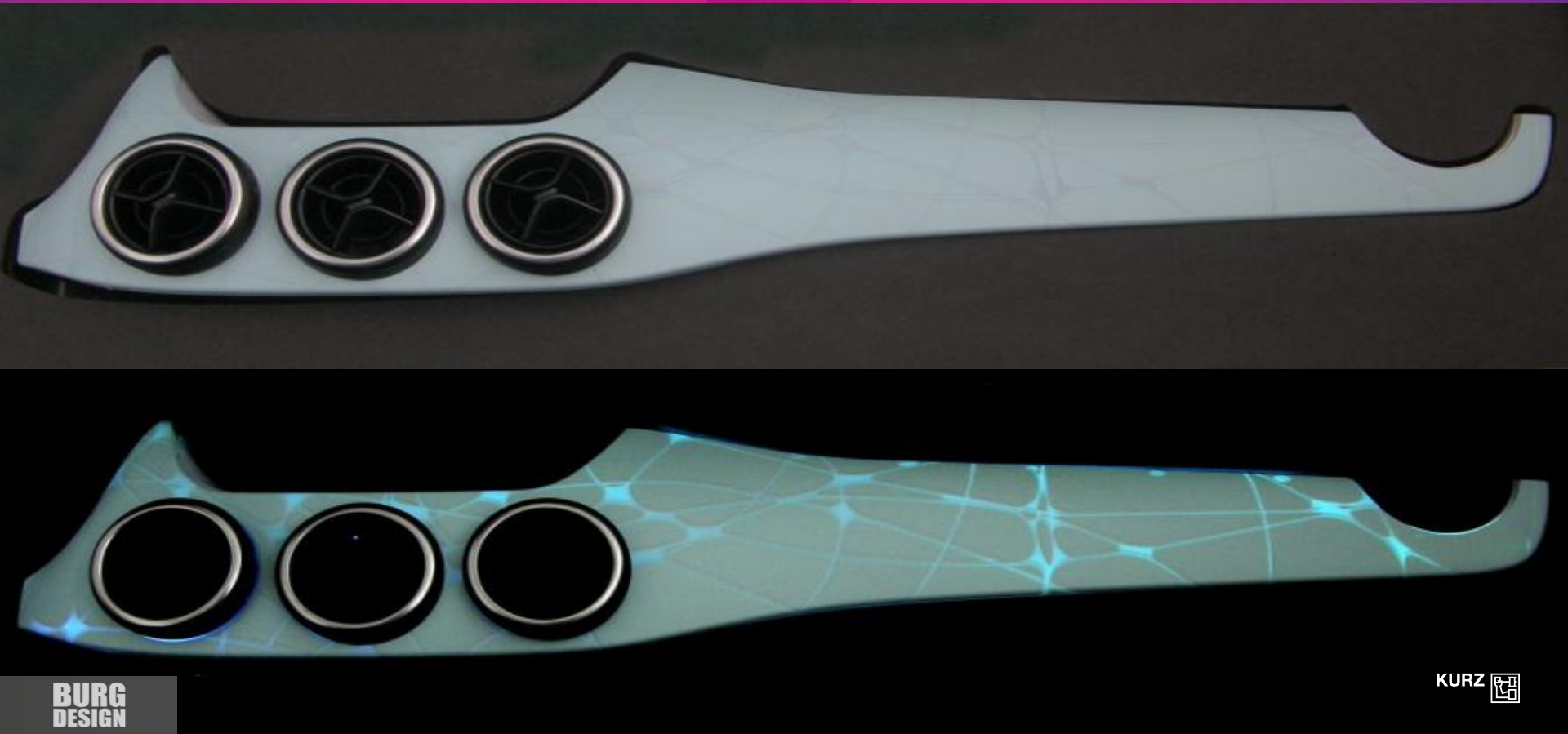
PMD – Flip/Flop Design



BURG DESIGN

KURZ

PMD – Flip/Flop Design



BURG DESIGN

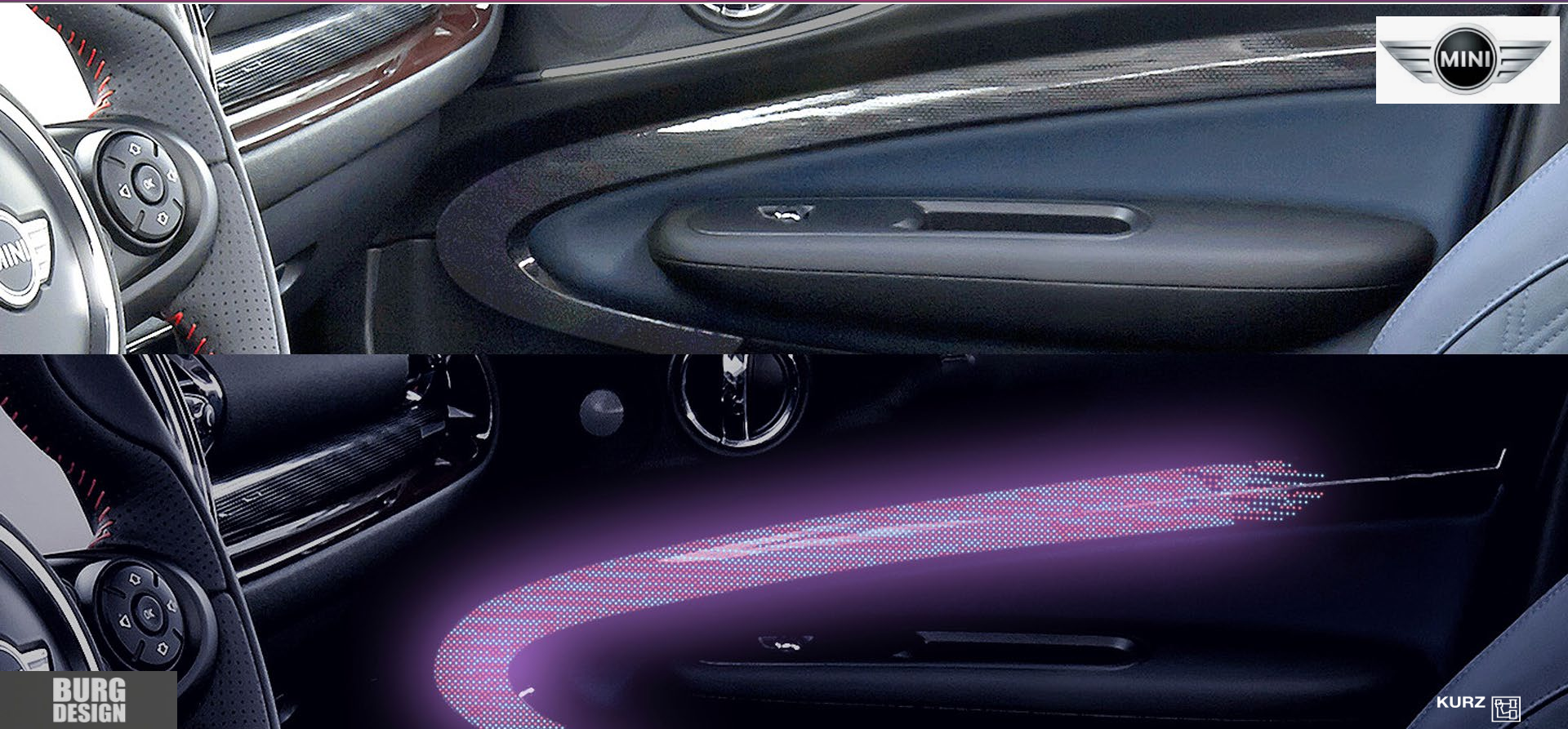
KURZ

PMD – Flip/Flop Design

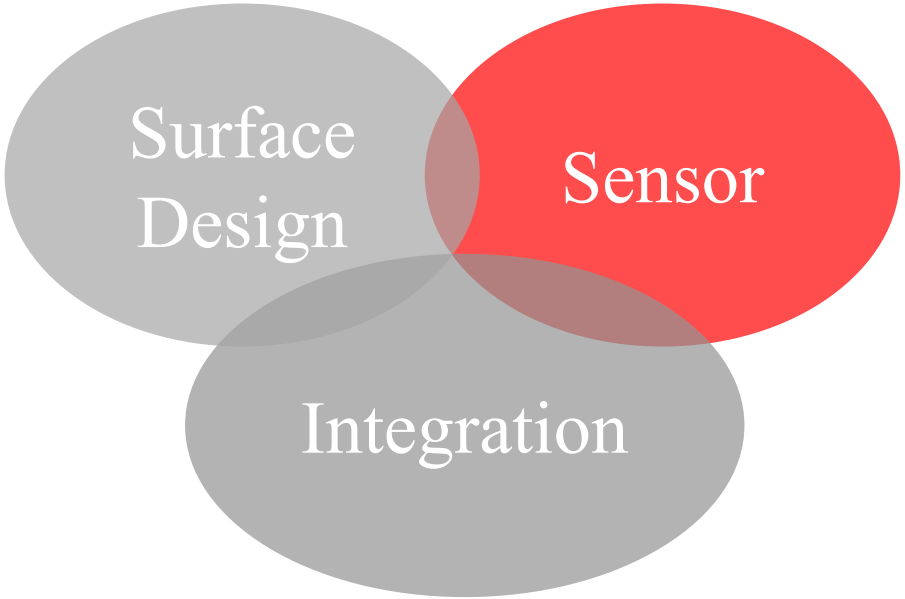
BURG DESIGN

KURZ

PMD – Flip/Flop Design



Smart Surfaces - Sensor



Properties of Established Touch Sensor Technologies

Touch Screens

- Nearly all applications today are based on projected capacitive touch systems
- Today, for touch screens like in smart phones, Indium Tin Oxide (ITO) is the established technology

Limits: low mechanical flexibility, low conductivity

Buttons, Sliders, Rotary Wheels / Dials

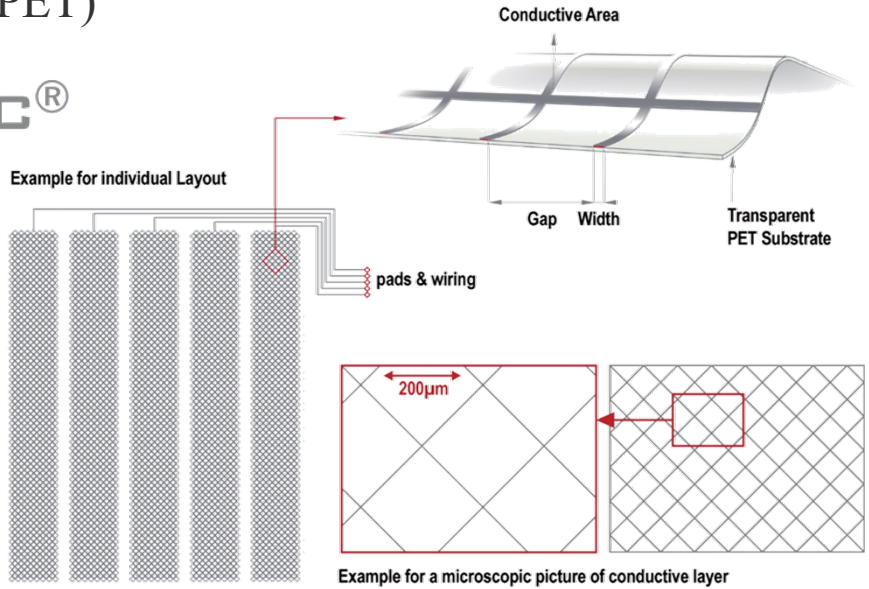
- More and more electromechanical buttons and wheels/dials are now substituted by touch systems
- Today, for ***touch buttons, sliders or wheels,*** flexible circuit boards are the established technology

Limits: low or no transparency, limited integration possibilities

Metal Mesh Sensors

Transparent Conductive film with Individual high-resolution layout of micron structured silver (Ag) **Metal Mesh**“ patterns on flexible and transparent polyester (PET)

PolyTC®

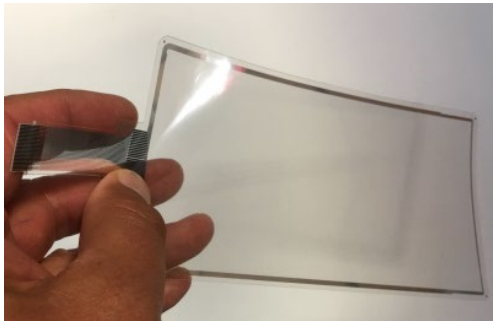


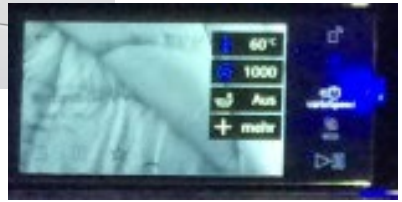
Touch Screen – Platform

KURZ

PolyTC® Touch Screen sensor

- Single layer 7" touch screen sensor
- Curved surface, Plastic cover
- Platform Technology enables high volumes
  - 1 Sensor for >12 different products





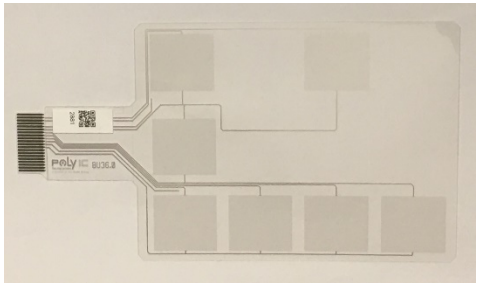
- Different Displays
- Different Curvatures

KURZ PolyIC

Deadfront & Touch

IMD deadfront decoration with touch

- Capacitive transparent button sensor
- Registered Image Black piano IMD deadfront decoration
- Symbols hidden till lit – “deadfront”
- Curved surface



ON

OFF

Automotive Control Panel

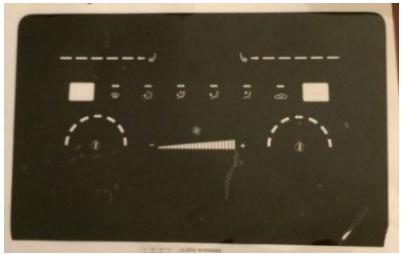
KURZ

Capacitive Air Condition Control Panel

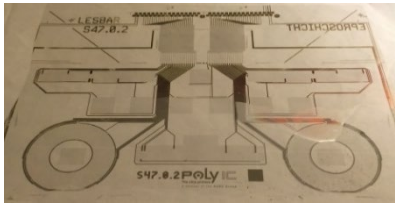
- buttons, sliders, wheels with single layer sensor
- decorated with black piano IMD
- backlit buttons, Intuitive use, seamless surface
- ultra thin setup, haptic feedback

On

IMD foil
(1st surface)



Sensor Label
(2nd surface)



Off

KURZ Poly IC

Multitouch – Pad

In cooperation with OECHSLER

Case Study: Touchpad

- single layer Multi-touchsensor
- IMD black piano decoration
- semi-transparent backlit function
- Full integrated solution

Single layer multitouch sensor

IMD decoration

Molded Pad

Large 3D curved Center Stack

Case Study: Fully Integrated Touch and Decoration on curved Surfaces

- Capacitive Control panel sensor
- Capacitive multitouch Touch panel sensor
- Single picture IMD decoration
- Full integrated single molding step process
- 3D curved large Panel

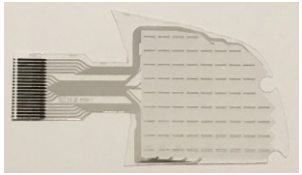
Deadfront & Active Haptics

Steering wheel – multifunctional panel

- Capacitive, transparent **multitouch sensor**
- Black piano **deadfront** decoration
- **3D Panel** with embossed surface
- **Active haptic feedback**

In cooperation with GE-T GmbH

PolyTC Touch sensor



Steering Wheel Switch with active feedback and hidden till lit optics

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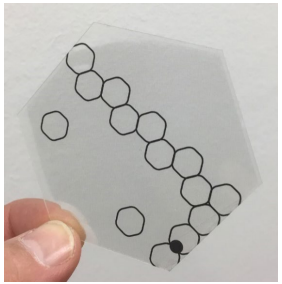
Active Ambient Light Control

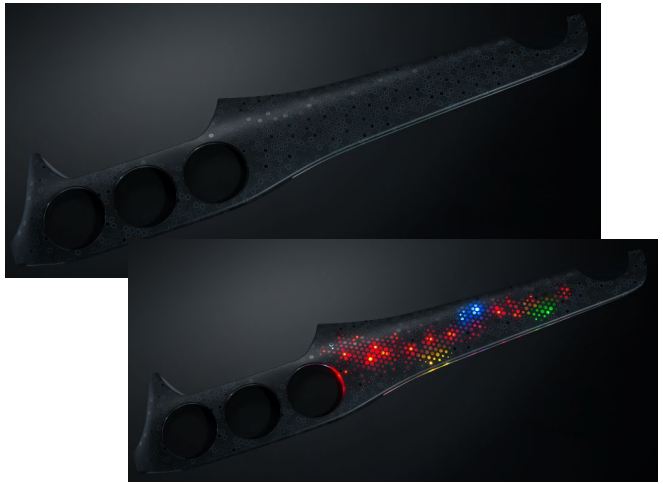
Dashboard with day / night effect

Touch Control & Light management

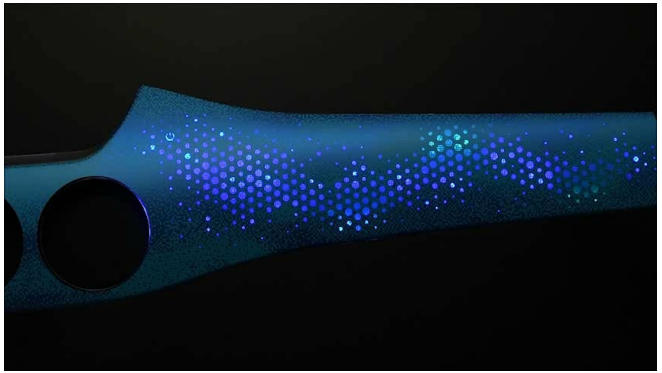
- Capacitive transparent touch slider (button & slider)
- PMD decoration with day / night effect
- Integrated active control of backlight



Touch sensor
(2nd surface)



PMD decorated parts



Active backlight control

Active Ambient Light Control

KURZ

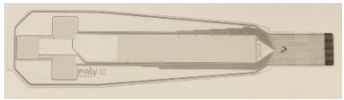
Doortrim with day / night effect

Touch Control & Light management

- Capacitive transparent touch sensor (buttons & slider)
- IMD decoration with day / night effect
- Integrated active control of backlight

WINNER
AUTOMOTIVE BRAND CONTEST 2018

Touch sensor
(3 buttons, 1 slider)



IMD decorated part

Active backlight control

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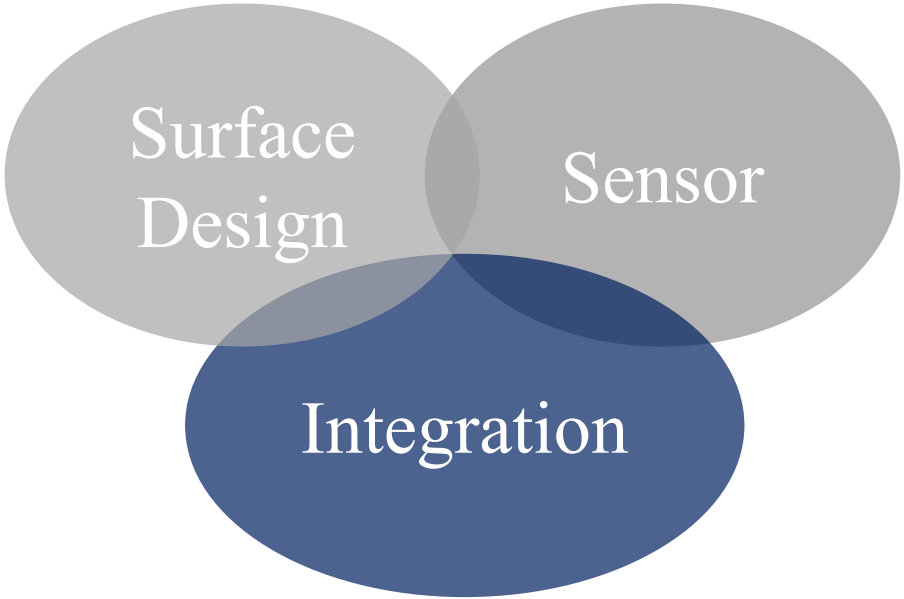
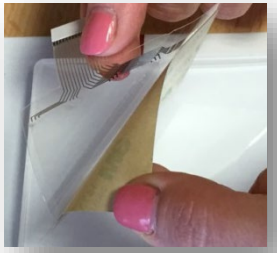
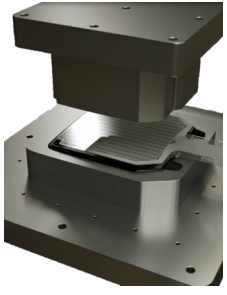
Smart Surfaces



Sensor Integration Options

- Self adhesive label, Pressure Sensitive Adhesive (PSA)
- Lamination with Optical Clear Adhesive (OCA)
- Inmold Labeling (IML)
- Functional Foil Bonding (FFB)





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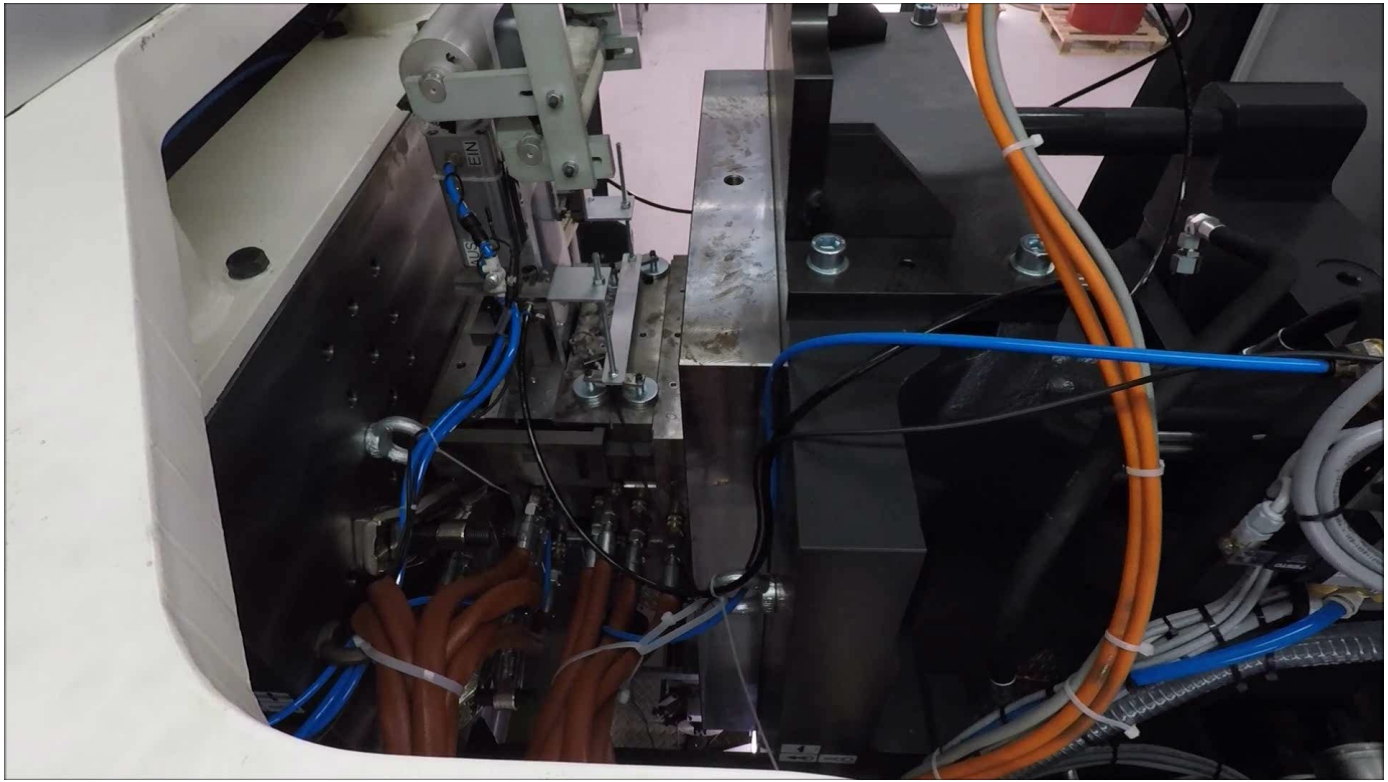
Sensor Inmold Labeling (IML) plus IMD Decoration

In cooperation with

OECHSLER

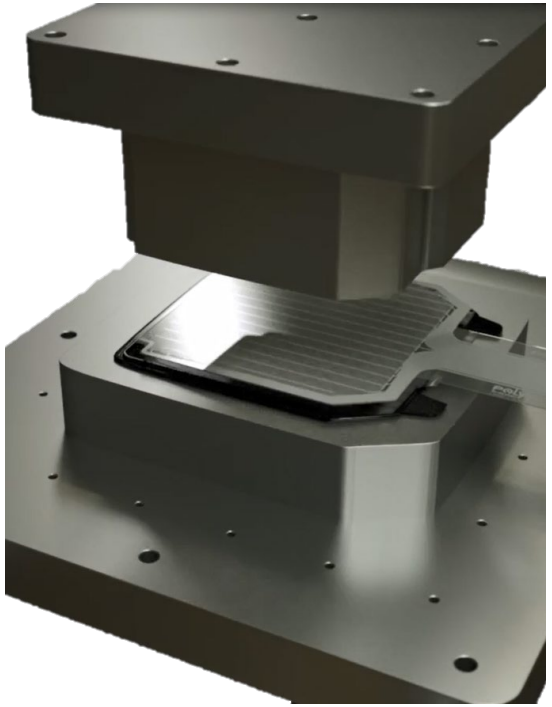


movie

FFB – Functional Foil Bonding

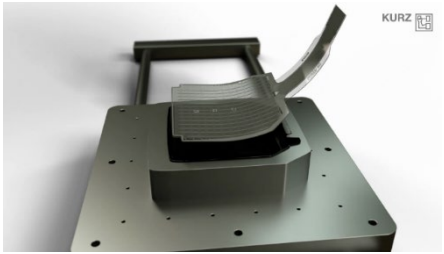
FFB = Bonding of PolyTC® Touch Sensors on Plastic Parts

- Developed by KURZ
- Highly automated options possible
- Post Mold Process
- Turnkey solution possible

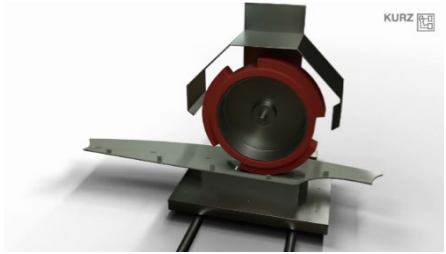


FFB – Methods: Up and Down & Roll-On

Up and Down



Roll-On

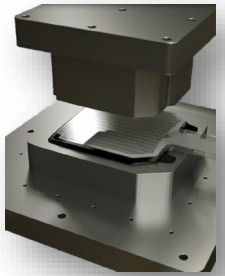


FFB – Advantages (example)

FFB causes no delamination with degassing plastic substrate

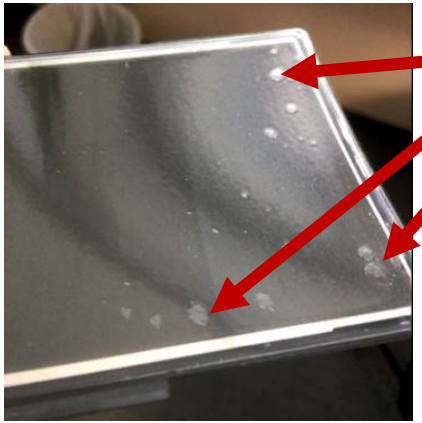
- Example after cycling damp heat test: 25-65°C, 93%rH, 204h

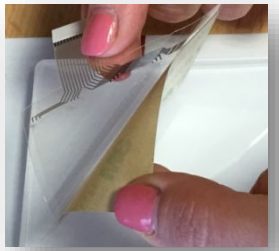
Sensor with FFB integration



No Bubbles

Sensor laminated with PSA adhesive



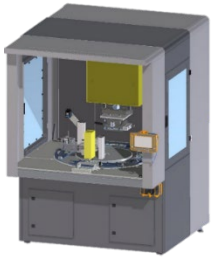


Bubbles

FFB – Advantages (example)

High Automatization possible- attractive for markets with high labor costs

- Rotary plate machine with four stations
- Up/down – bond process
- Camera inspection
- Functional test



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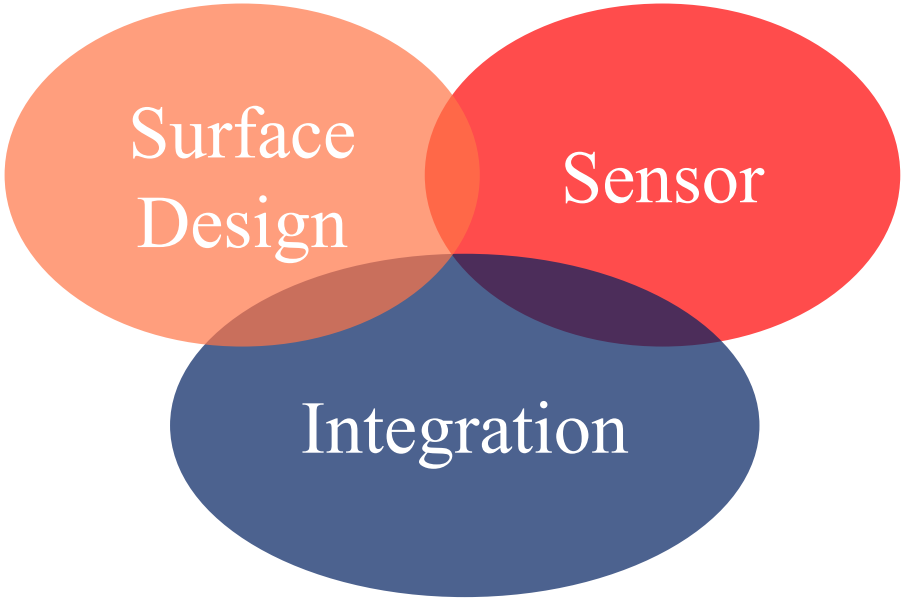
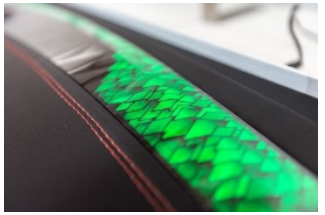
Summary and Outlook

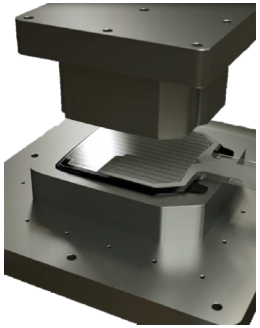


Summary HMI – Design – Sensor – Integration

Major HMI trends can be fulfilled with Decoration and Integration Options

- Seamless capacitive Touchscreens & Control panels
- Curved surfaces & true 3D shapes
- Active control of ambient backlight decoration
- Customized integration of Touch & decoration methods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Issue 10/2018 - This document completely replaces all previous issues.