Makrolon® Makrolon® RE Makrofol®

“Nighthawk” IMSE® demonstrator

Enabling smart surface design with high-performance materials

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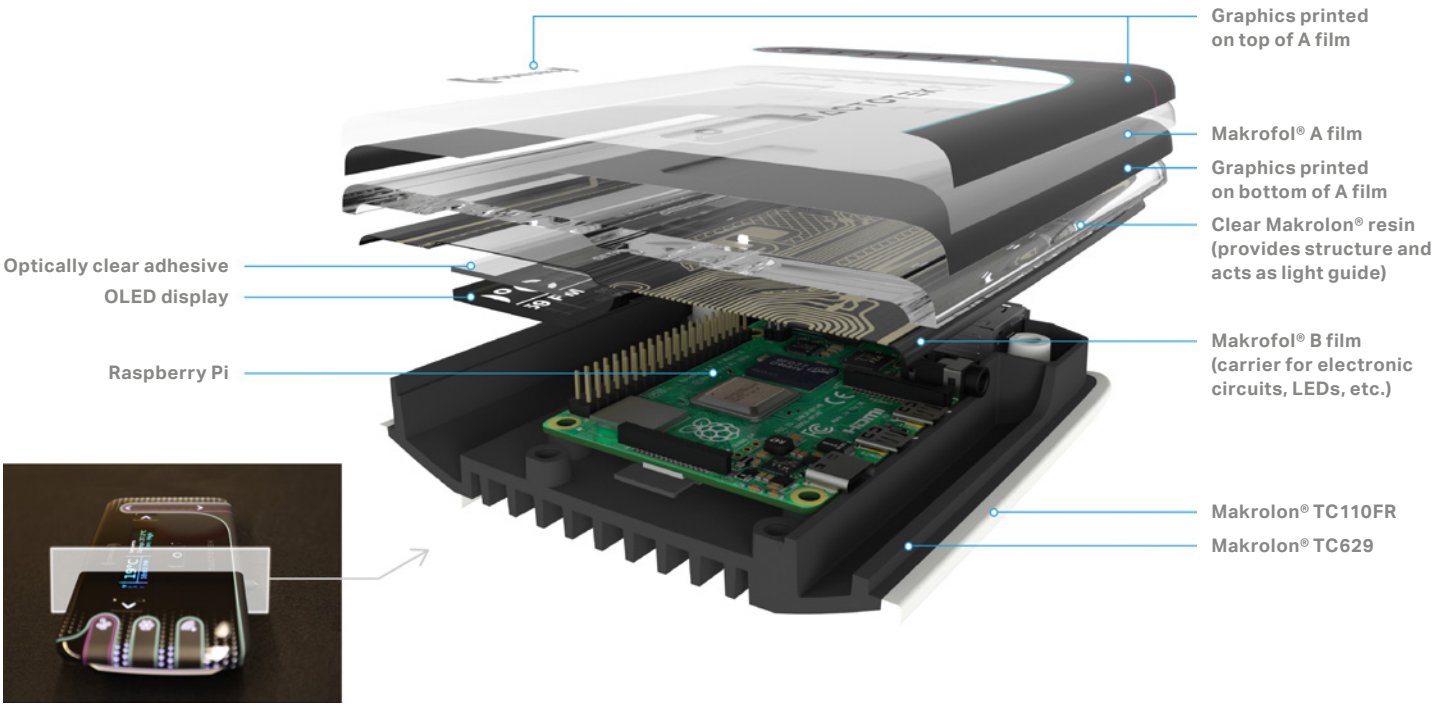
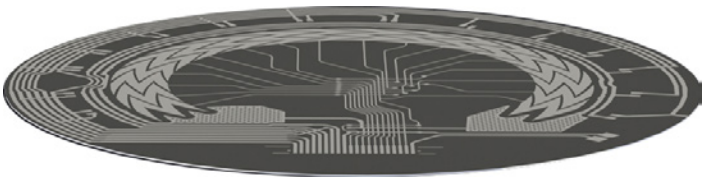
The Nighthawk demonstrator is the result of a collaboration between Covestro and TactoTek, leveraging IMSE® (In-Mold Structural Electronics) technology and high-performance materials. IMSE® parts offer numerous advantages over traditional electro-mechanical assemblies. By achieving electronics functionality, esthetics, and structure in a single part, IMSE® maximizes resource efficiency, design flexibility, and reliability.

Sandwich structure of IMSE® part

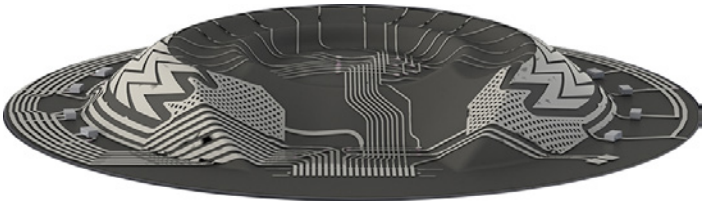


The IMSE® manufacturing process



1. Film printing – decoration applied to A film, silver ink applied to B film

2. Component mounting – LEDs and other components mounted to B film



Any surface becomes a smart surface

The Nighthawk demonstrator illustrates the next-generation design of functionalized and seamless smart surfaces. Using state-of-the-art polycarbonate (PC) materials from Covestro, harmonized with TactoTek's advanced approach to electronics integration, the Nighthawk demonstrator highlights how any device can be:

Thinner & Lighter

- Electronics embedded in structure
- 90% space reduction
- 50% weight reduction
- Efficient use of plastics

Infinitely Customizable

- State-of-the-art materials enable infinite surface functions
- Maximum design freedom (e.g. color, finish, geometry)

Reliable & Sustainable

- Reduced modes of failure through component encapsulation
- Reduces CO_2 emissions up to 60%, cradle to gate
- Easily upgraded through software updates

Cost-Effective

- Reduced value chain complexity
- Cost-effective versus traditional HMI manufacturing
- Reduces SKUs for multiple models

At Covestro, creating a brighter future means embracing full circularity to achieve 100% climate neutrality by 2035. Our circularity initiatives leverage alternative energy and raw material sources, and extend polymer life cycles through advanced recycling initiatives.

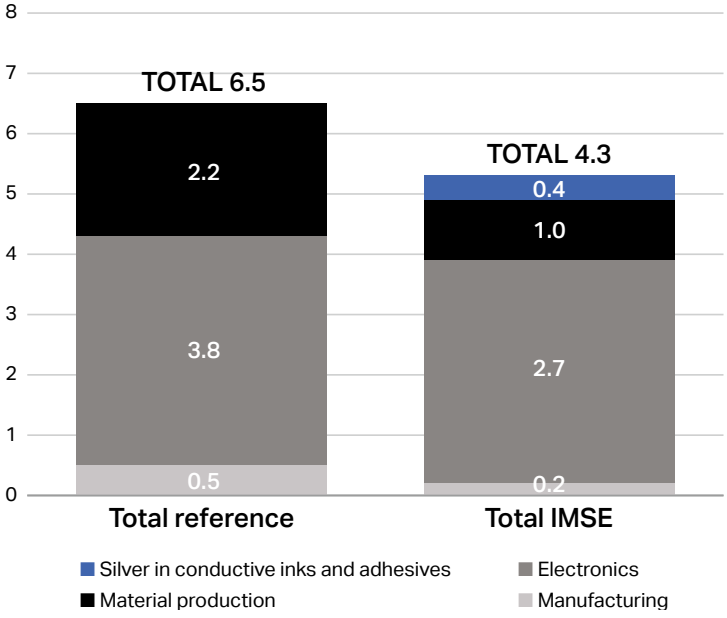
IMSE® technology unlocks the future of sustainable electronics by generating applications with

- **Greater material efficiency:** Reducing size and weight generates applications that require less material.
- **Longer lifespan:** IMSE® applications are mono-material solutions, very reliable, and easy to upgrade and recycle.
- **Reduced production complexity:** IMSE® simplifies traditional manufacturing tooling while also reducing waste.

At the forefront of innovation and sustainability, Covestro launched the world's first carbon-neutral polycarbonate in 2021. By replacing fossil-based materials with biomass materials, **Makrolon® RE** polycarbonate offers the same high-quality performance with net-zero carbon footprint. **Makrofol®** PC films partly made from biomass materials further contribute to reducing CO_2.

IMSE® and reference global warming potentials, in kg CO_2-eq.

Life cycle stages stacked. Functional unit: one piece of car control panel



"Covestro materials, Makrolon® for polycarbonates, Makrofol® for polycarbonate films, are instrumental in the structural integrity and performance of those parts in demanding industries like automotive and high-end electronics."

– Dave Rice, SVP, Marketing and Business Development TactoTek

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Solutions for a more circular, climate-neutral world

Find out about our more sustainable materials and how they can contribute to a circular economy.

Circular Economy | Covestro AG

Makrolon® RE – the more sustainable and renewable future of polycarbonates

Discover the circular and more sustainable RE product series as part of the circular intelligent product solutions from Covestro.

Circular polycarbonates for a reduced carbon footprint with a high renewable share | Covestro AG

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[1]Please see the "Guidance on Use of Covestro Products in a Medical Application" document.

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