

PRINTED & FLEXIBLE
ELECTRONICS

LINEPRO[®]
CONTROLS PVT. LTD.
Key Solutions in Electronics
www.lineproindia.com



Since
1993

LINEPRO
PRINTED ELECTRONICS



Certifications



एन एस आई सी
N S I C

ISO 9001:2008

National Small Industries Corporation

(A Government Of India Enterprise)

Facilitating The Growth Of Small Enterprise Since 1955



ISO 9001 : 2015 CERTIFIED ORGANISATION

About Linepro - A Snapshot View

Linepro Controls provides customized solutions in Printed Electronics components to Electric Vehicle – EV and automobile industry helping clients benefit with their critical strategic business decisions.

Linepro started as local PCB design center in 1993, then gradually evolved into pioneer of input device and then printed electronics, this being possible of exceptional leadership line within us. today we thrive on cutting edge manufacturing technology and access to experts in industry

Our Manufacturing Facility



Automatic Roll-To-Roll Screen Printing



Quality Control



Metal Keyboard Assembly



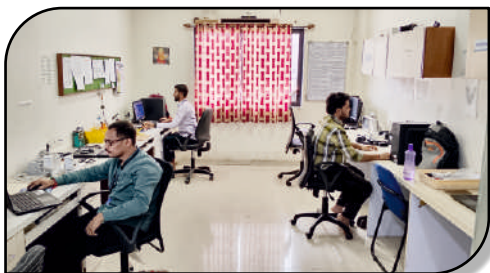
SMT Pick-and-Place



Membrane Keypad Assembly



Design & Engineering

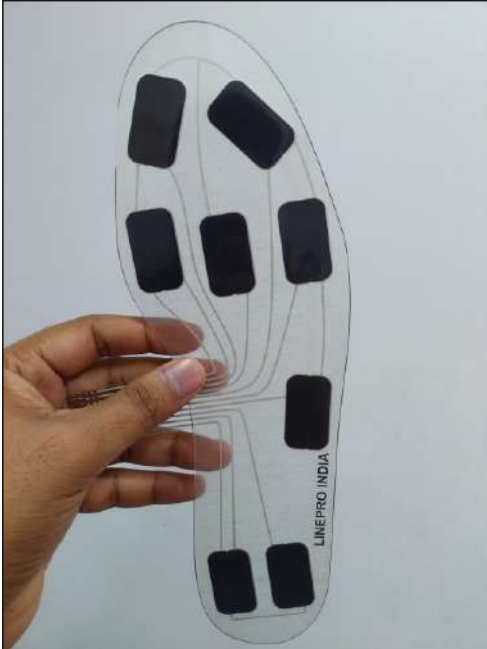


Research and Development Department



Digital Printing

Flexible Pressure Sensors



Foot Pressure In-sole Sensors

FOOT PRESSURE SENSOR AS WEARABLE TECHNOLOGY USING FORCE SENSING RESISTOR

Linepro provides a wide range of user-friendly and tested Foot Pressure Sensor to assess foot function via pressure and force distribution analysis. The unique information about the function of feet provided by these sensors can help doctors to determine the abnormalities in lower body parts.

THE FOOT PRESSURE SENSOR INSOLES OF LINEPRO GIVE YOU INSIGHTS TO ASSIST YOU ON:

- Find out the asymmetries that exist between the right and left foot
- Verify the efficacy of the treatments
- Our Foot Pressure Sensors are easy to compare pre and post treatments by using automated reporting if integrated with remote monitoring system(RMS)
- Inform patients about the causes of their ailments by using visual biofeedback
- Find discrepancies in the plantar pressure profile between right and left feet

WHY SHOULD YOU CHOOSE LINEPRO'S SMART FOOT SENSOR SOLUTIONS FOR FOOTWEAR?

- Flexible and thin, non-intrusive printed electronic components
- Accurate and reliable analysis for gait (person's pattern of walking) and posture aiding.
- Flexible, cost-effective, and can be customized for specific uses and has a range of possibilities for integration
- Experienced, knowledgeable technical personnel can assist you in designing the most cost-effective, efficient foot pressure sensors to meet your individual needs. Manufacturing takes place in the ISO 9001 compliant state-of-art headquarters facility
- 100% factory inspection assures that your sensors perform to the established specifications.

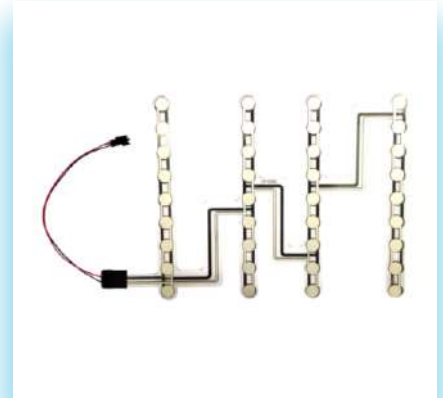
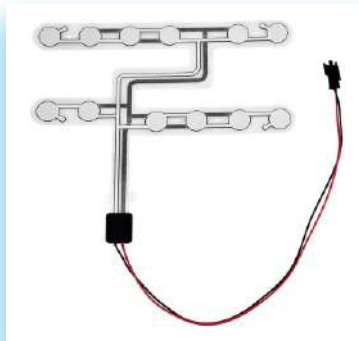
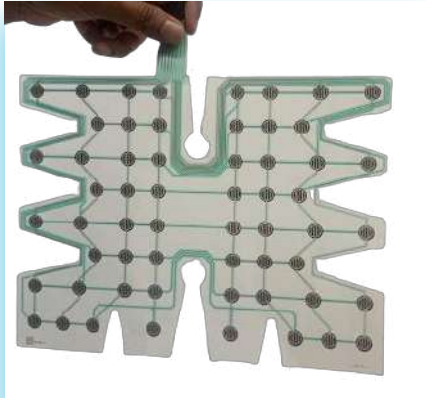
APPLICATIONS OF FOOT PRESSURE SENSOR:

- Healthcare purposes: Foot Pressure Sensors are used for Orthotic prescriptions and corrective footwear to treat Diabetic ulcers, plantar pressure measurement, posture and activity classification, body weight and energy expenditure, fall risk applications, navigation patterns and footwear based energy application solutions better stability and confidence of older people, etc.
- Sports: Therapy, biomechanics, rehabilitation, prevention of injuries and training, among others.



Force Sensing Resistor

Automobile Seat Occupancy Sensors



Salient Features of Automobile Seat Occupancy Sensors

- 1. Weight Sensing :** These sensors can detect the presence and weight of occupants on vehicle seats.
- 2. Occupant Classification :** They can classify occupants based on their weight, distinguishing between adults, children, or objects.
- 3. Multi-Point Sensing:** Some sensors offer multi-point sensing, recognizing occupancy across different areas of the seat.
- 4. Pressure-Sensitive Technology :** Utilizes pressure-sensitive materials or sensors to determine seat occupancy accurately.
- 5. Real-Time Monitoring :** Continuously monitor seat occupancy in realtime, updating the system as occupants enter or leave.
- 6. Integration Capability:** Easily integrate with vehicle's safety and airbag systems.
- 7. Reliability:** Provide reliable data for airbag deployment decisions and seatbelt reminders.
- 8. Low Power Consumption :** Designed for minimal power consumption to prevent battery drain.
- 9. Durability :** Built to withstand wear and tear from regular use.

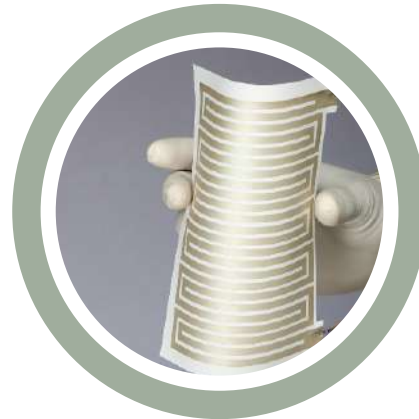
Applications of Automobile Seat Occupancy Sensors

- 1. Airbag Deployment :** Determine whether to deploy airbags based on the weight and classification of the seat occupant to reduce the risk of injury during a collision.
- 2. Seatbelt Reminder :** Remind occupants to fasten their seatbelts if the system detects an occupant on a seat without a seatbelt fastened.
- 3. Child Safety :** Ensure the safety of child passengers by deactivating airbags when a child is detected in the front passenger seat.
- 4. Smart Climate Control :** Adjust climate control settings based on the number of occupants to optimize comfort and energy efficiency.
- 5. Anti-Theft:** Enable or disable vehicle functions like ignition or engine start based on the presence of an authorized key or occupant.
- 6. Occupant Monitoring :** Assist in monitoring the well-being of passengers, such as infants or elderly individuals, by alerting caregivers or parents if they are left unattended.
- 7. Ride-Sharing and Fleet Management :** Enhance safety and security in ride-sharing services and fleet management by tracking the number and location of passengers.
- 8. Customized User Profiles :** Enable customized vehicle settings and preferences for different drivers based on seat occupancy data.
- 9. Data Collection :** Gather data for research and development purposes in the automotive industry to improve safety and comfort features in vehicles.
- 10. Future Autonomous Vehicles :** Provide valuable data for autonomous vehicles to ensure safety by verifying the presence and readiness of occupants for hands-free driving modes used in automotive interiors for touch-sensitive control panels, dashboard displays, and illuminated surfaces.

Printed Electronics Based Flexible Heaters



**Transparent
Flexible Heater**



**Printed
Flexible Heater**

Applications of Transparent Heaters

1. Automotive Industry :

- Defrosting and demisting car windshields and rearview mirrors.
- Heating car seats, steering wheels, and side mirrors.
- Keeping sensors and cameras free from ice and fog.

2. Electronics and Displays :

- Preventing condensation and fogging on touchscreens, displays, and camera lenses.
- Ensuring the functionality of LCDs in cold environments.
- Maintaining proper operating temperatures for sensitive electronic components.

3. Aerospace and Aviation :

- De-icing aircraft windows and sensors.
- Maintaining visibility for pilots and sensors in extreme weather conditions.

4. Medical Devices :

- Warming incubators and medical beds for neonates.
- Maintaining a controlled temperature for laboratory equipment.
- Heating blankets for patients.

5. Consumer Electronics :

- Preventing fogging on VR headsets and camera lenses.
- Keeping smartphones and tablets operational in cold weather.

6. Food and Beverage Industry :

- Maintaining consistent temperatures in food display cases and beverage dispensers.
- Preventing condensation on refrigerated display windows.

8. Photovoltaic Panels :

- De-icing solar panels to maintain energy production in cold climates.

9. Laboratory Equipment :

- Maintaining precise temperatures in chemical reactors and laboratory glassware.

10. Military and Defense :

- De-icing optics and sensors on military equipment.
- Preventing fogging on military helmet visors.

Applications of Printed Heaters

1. Medical Devices :

- Warming blankets for patients in hospitals.
- Laboratory equipment for precise temperature control.
- Medical fluid and IV bag warmers.

2. Automotive Industry :

- Seat and steering wheel heaters for cold weather comfort.
- Defrosting and de-icing of windows, mirrors, and sensors.
- Battery thermal management in electric vehicles.

3. Aerospace and Aviation :

- De-icing systems for aircraft wings, tail fins, and sensors.
- Cabin comfort enhancements through heated seating and flooring.

4. Industrial Processes :

- Heating of pipes, tanks, and equipment to prevent freezing or maintain viscosity.
- Semiconductor wafer processing for precise temperature control.

5. Food and Beverage Industry :

- Flexible heaters for food warming trays and countertops.
- Freeze protection for pipes and tanks in food processing plants.

6. Textile Industry :

- Heated clothing and accessories like heated jackets, gloves, and insoles.
- Heat sealing and welding in textile manufacturing.

7. Military and Defense:

- Heated clothing for soldiers in extreme cold conditions.
- De-icing systems for military aircraft and equipment.

8. Consumer Goods :

- Heated massage mats and cushions.
- Heated pet beds for pets in colder climates.

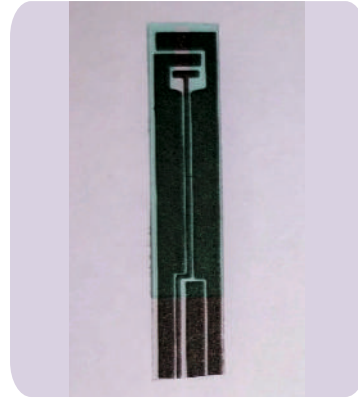
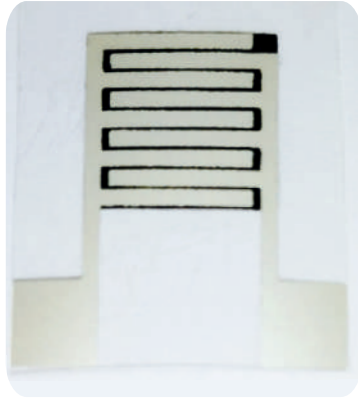
9. Space Exploration :

- Use in spacecraft and satellite systems for thermal control.
- Surface heating on planetary rovers.

10. Environmental Monitoring :

- Heating elements in weather stations and sensors to prevent ice buildup.

Biomedical Electrodes



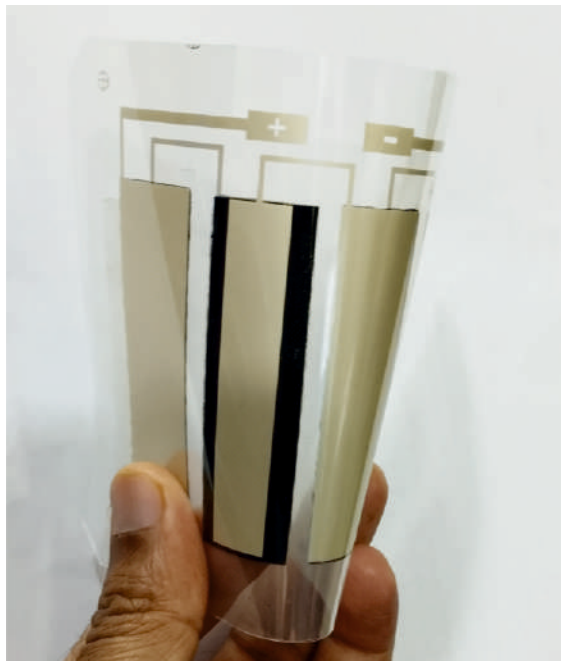
Salient Features of Biomedical Electrodes

- 1. Flexible and Lightweight :** Printed electronics allow for the creation of flexible and lightweight electrodes, which conform to the body's contours, making them comfortable for patients.
- 2. Cost-Effective Production :** Printing techniques, such as screen printing or inkjet printing, are cost-effective for mass production of electrodes compared to traditional fabrication methods.
- 3. Customization :** Printed electronics enable the customization of electrode designs, sizes, and shapes to suit specific medical applications and patient needs.
- 4. Conductive Inks :** Specialized conductive inks, such as silver nanoparticle inks, are used to create the conductive traces on the electrode, ensuring reliable electrical performance.
- 5. Biocompatible Materials :** Biocompatible materials can be incorporated into printed electrodes to minimize skin irritation and allergic reactions.
- 6. Low Profile :** Printed electrodes can be made with a low profile, reducing their visibility and improving patient comfort.

Applications of Biomedical Electrodes

- 1. Wearable Health Devices :**
 - Printed electrodes are integrated into wearable health devices, such as fitness trackers and smartwatches, for vital sign monitoring.
 - They enable continuous data collection for health and fitness assessment.
- 2. Biosensors :**
 - Printed electronics-based electrodes can serve as the sensing component in biosensors, detecting biomarkers in bodily fluids for disease diagnosis and monitoring.
- 3. Implantable Devices :**
 - In some cases, printed electrodes can be incorporated into implantable medical devices for neural stimulation, such as deep brain stimulation (DBS) electrodes.
- 4. Research and Development:**
 - Printed electronics-based electrodes are also used in research settings for developing new medical diagnostic tools and therapeutic devices

Printed Batteries



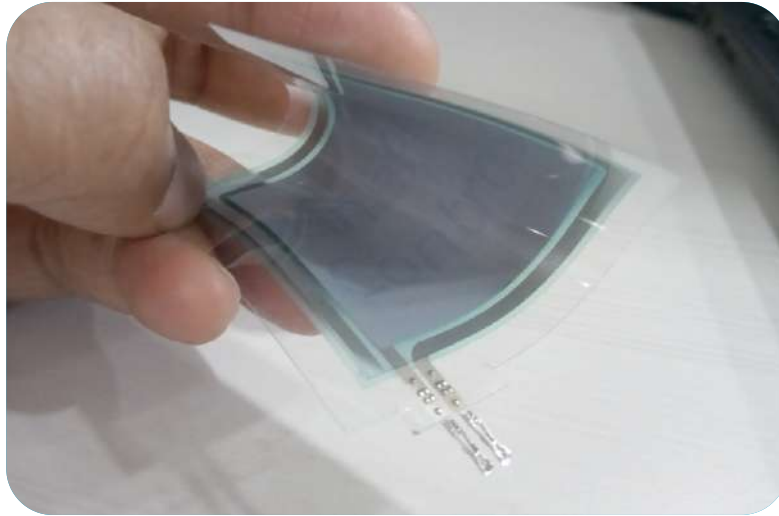
Salient Features of Printed Batteries

- 1. Flexibility** : Our printed batteries are designed to be flexible, allowing them to conform to a variety of shapes and sizes. Whether you need a curved battery for a wearable device or a compact battery for a smart card, our technology can adapt to your requirements.
- 2. Customization** : We understand that one size doesn't fit all. With our printed batteries, you have the freedom to customize the size, shape, and capacity to precisely match your product's needs. Say goodbye to the limitations of standard battery shapes!
- 3. Low Cost** : We've streamlined the manufacturing process to offer you cost-effective solutions without compromising on quality. Our printed batteries provide exceptional value for a wide range of applications.
- 4. Lightweight** : In today's world, every gram counts. Our printed batteries are exceptionally lightweight, making them ideal for applications where weight is a critical factor, such as wearable technology and lightweight electronics.
- 5. Thin Profile** : Space-saving design is at the heart of our printed battery technology. Enjoy the benefits of a slim profile, perfect for devices where space is limited.
- 6. Rapid Prototyping** : We understand the importance of speed to market. With our technology, you can accelerate your product development cycles by quickly creating prototypes that match your vision.

Application of Printed Batteries

- 1. Wearable Electronics** : Power your smartwatches, fitness trackers, and medical wearables with our flexible and lightweight printed batteries.
- 2. Medical Applications** : Our printed flexible batteries are vital for lab-on-chip devices and diabetes sensors, ensuring uninterrupted power for precise health diagnostics and glucose monitoring, enhancing patient care and well-being.
- 3. Smart Packaging** : Elevate your product packaging with interactive displays and tracking features powered by our printed batteries.
- 4. IoT Devices** : Enable your Internet of Things devices with energy-efficient power solutions that can be customized to fit any form factor.
- 5. Consumer Electronics** : Enhance electronic toys and gadgets with our cost-effective and versatile printed battery technology.
- 6. Environmental Sensors** : Ensure accurate data collection in agriculture and industrial monitoring applications with batteries that are tailored to your sensor needs.
- 7. Smart Cards and Labels** : Secure access control, contactless payment, and inventory management with our reliable printed batteries.

Electrochromic Displays



Salient Features of Electrochromic Displays

1. Low Power Consumption:

- Electrochromic displays consume minimal power compared to other mode of displays, making them energy-efficient for battery-powered devices.

2. High Contrast Ratio:

- They offer high contrast between the displayed content and the background, enhancing readability in various lighting conditions.

3. Wide Viewing Angle:

- Electrochromic displays provide excellent visibility from various angles without significant distortion or loss of contrast.

4. Fast Response Times:

- Modern electrochromic displays have improved response times, enabling smoother transitions between states.

5. Flexible and Thin:

- Electrochromic materials can be incorporated into flexible and thin substrates, allowing for the creation of curved or conformable displays.

6. Longevity :

- These displays have a long operational life, with millions of switching cycles before degradation.

Applications of Electrochromic Displays

1. Wearable Devices :

- Flexible electrochromic displays are used in smartwatches and fitness trackers for their energy efficiency and compact form factor.

2. Electronic Shelf Labels :

- Retail stores use electrochromic displays on price tags to update product information dynamically.

3. Information Signage :

- Public transportation systems and public spaces employ electrochromic displays for real-time information updates.

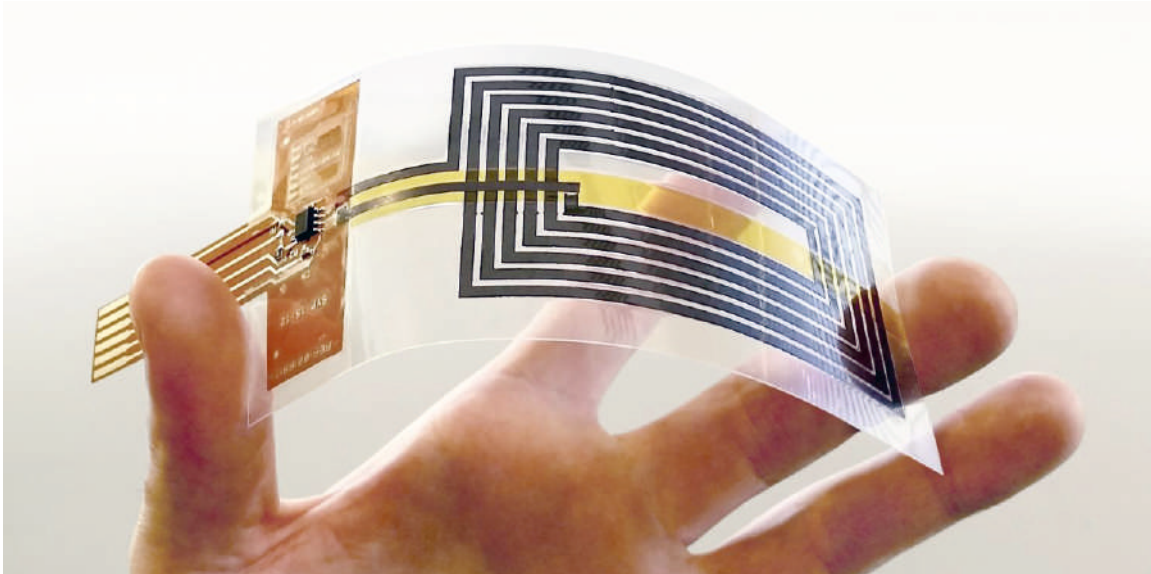
4. Industrial Controls :

- These displays are used in industrial settings for their durability and readability in harsh conditions.

5. Consumer Electronics :

- Electrochromic displays find applications in digital thermometers, home automation systems, and other small appliances

NFC Antennas



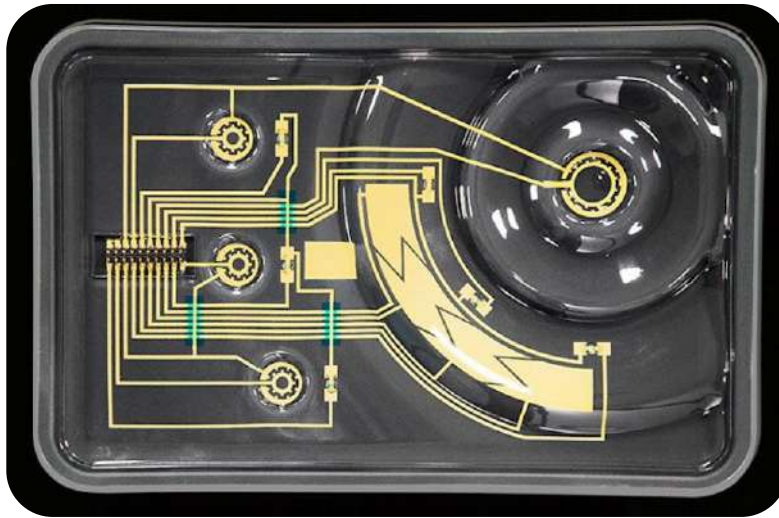
— Features —

- Fully Printed Antenna
- Compatible with Phone
- Can be read by NFC
- Hybrid Electronics
- Read range upto 100mm

— Applications —

- NFC Compliant mobiles
- NFC Payments Readers
- ID Scanners
- Supply Chain & Logistics
- Data Loggers
- Ticketing Systems

In-mold Electronics (IME)



Salient Features of In-Mold Electronics

- 1. Integration:** In-mold electronics (IME) seamlessly integrates electronic components, such as circuits, sensors, and LEDs, into the surface of molded parts.
- 2. Lightweight :** IME technology allows for the creation of lightweight, compact, and slim electronic devices, reducing overall product weight.
- 3. Aesthetics :** IME offers design flexibility, enabling the creation of visually appealing, seamless, and customizable electronic surfaces with various shapes and colors.
- 4. Durability :** The electronics are protected within the molded substrate, enhancing resistance to environmental factors like moisture, heat, and physical damage.
- 5. Reduced Assembly :** Eliminates the need for conventional assembly processes, reducing production time and costs.
- 6. 3D Surfaces :** IME can be applied to complex 3D surfaces, expanding design possibilities for curved or irregularly shaped objects.

Applications of In-Mold Electronics

- 1. Automotive :** IME is used in automotive interiors for touch-sensitive control panels, dashboard displays, and illuminated surfaces.
- 2. Consumer Electronics :** IME is employed in smartphones, tablets, and wearables to create seamless touch interfaces, buttons, and indicators.
- 3. Home Appliances :** In-mold electronics are used in appliances like washing machines and refrigerators for control panels and displays.
- 4. Medical Devices :** IME technology enables the creation of medical devices with integrated touchscreens, buttons, and sensors.
- 5. Wearable Technology :** Smart clothing and wearables incorporate IME for biometric monitoring, lighting, and user interfaces.
- 6. Industrial Equipment :** IME is used in industrial machines for control panels and status indicators, offering ruggedness and customization.
- 7. Gaming :** IME is employed in gaming controllers, adding responsive touch surfaces and LED illumination.
- 8. Aerospace :** In the aerospace industry, IME is used in cockpit displays and control panels, taking advantage of its lightweight and robust nature.
- 9. Packaging :** IME can be integrated into packaging to provide interactive labels, product information, and branding.
- 10. IoT Devices :** IME technology is used in various Internet of Things (IoT) devices, allowing for compact and integrated electronics in smart devices.
- 11. Military and Defense:** In-mold electronics find applications in military equipment for robust user interfaces and displays.
- 12. Retail Displays :** Retail environments use IME for interactive product displays, signage, and advertising.
- 13. Home Automation :** IME is employed in home automation systems for touchsensitive switches and control interfaces.



Pioneering The Future,
Transforming Printed Electronics For Tomorrow!

- ✓ **Products**
 - ✓ **Research**
 - ✓ **Consulting**
-

Head Office & Factory:

MUMBAI :

Phone: +91-9320460555 / 9321086044 /
7030930699

Email: sales@lineproindia.com

Add: B4, Parasnath Industrial Complex, Valpada'
Bhiwandi , Mumbai-421302, India.



- ✓ **Bangalore**
- ✓ **New York, US**



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