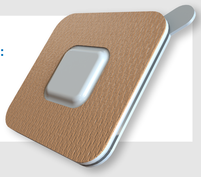
Selecting materials for **wearable medical devices**

From diagnostic and monitoring devices to drug delivery patches and more, wearable medical technology is revolutionizing healthcare and creating new opportunities for innovation. But material selection is critical to achieve optimal performance and longevity. By combining Boyd's comprehensive converting services with Berry's industry-leading materials, medical device manufacturers can enhance products, streamline production and improve patient outcomes while capturing new market share.

Types of wearable medical devices we help innovate:

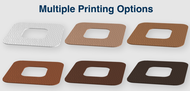
- Continuous glucose monitors (CGM)
- Biosensors
- ECG monitors
- Blood pressure monitors
- Drug delivery devices
- Transdermal patches



Decorative Protective Layer

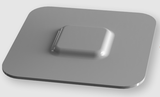
The outermost layer of a wearable device provides sealing protection and holds all components together while differentiating your branding and enhancing device aesthetics. This layer can be a printable film or a molded component. Cover films are often made from nonwoven, foam or tech-fabric materials, and Boyd can print logos, branding elements or user instructions directly onto films and molded materials. The key is to select materials that are durable enough to withstand regular wear, routine cleaning and potentially harsh sanitizing chemicals without compromising adhesion to the skin or causing patient discomfort.

Multiple Printing Options



Common decorative-protective layer materials:

- Fabric (woven/non-woven /non-woven PU)
- Foam
- White film
- PE
- PU
- LDPE
- BOPP
- 3621A
- 3619A (patent pending)



Housing Layer

The housing layer adds further protection for sensitive internal components within the complete device stack-up. Materials like 3395A Single-Coated Medical Flexible Film Tape are used to waterproof devices and are ideal to mount or laminate electrical components. When selecting these materials, product developers need to make sure all layers are compatible to maintain breathability and prevent damage to a patient's skin.

Common housing layer materials:

- 3395A single-coated medical flexible film tape

Cushioning Layer

Cushioning materials not only encase wearable internal electrical assemblies to provide impact protection, but they also enhance user comfort by making sure internal components don't agitate the skin. Cushioning materials like foams and foam tapes can be easily die cut or thermoformed to cover 3D features such as pockets or cavities within device designs. Conductive foams can also provide EMI/RFI protection to further prevent damage to sensitive electrical components.

Common cushioning layer materials:

- 3355H single-coated foam tape
- 3493Y single-coated foam tape

Printed Flex Circuit Layer

The electronic circuit that connects stick-to-skin electrodes to device electronics can be made from flexible copper traces or printed with conductive inks. Boyd offers single- or dual-side printing to connect hydrogels to the PCB. Using both sides of the flexible circuit maximizes design flexibility and creativity for product developers. Boyd and Berry can develop complete printed circuit board assemblies (PCBA) to connect power and sensors, house on-board data storage, or facilitate data transmission via Bluetooth or other signals.

Common flexible circuit layer materials:

- 3577C double-coated foam tape
- 3589A
- 3395A film
- Conductive inks

Skin Contact Layer

Perhaps the most important layer in any stick-to-skin medical device assembly, materials must be chosen carefully to ensure patient comfort and avoid damaging the skin. Biocompatible adhesives used to attach wearable devices to skin should be chosen based on wear time, removability, skin sensitivity, moisture management characteristics and other specific application needs. Foam materials are also used on the back of skin contact adhesives to improve wearability and user comfort. Specifically, hydrophobic and hydrophilic foams are often used to improve sealing and breathability.

Common skin contact layer materials:

- Short-term-wear acrylic adhesives (M106, M107, M111, M116, M123, M129, M130, M131)
- Medium-term-wear acrylic adhesives (M108, M109, M117, M118)
- Long-term-wear acrylic adhesives (M102, M110, M119, M121)
- 3621A
- 3619A
- 3426A

Delivery Liner

Easy-to-remove liners are designed to maximize application efficiency and patient comfort. Adhesives must be strong enough to maintain adhesion during transport while still being easy to remove for a range of patient populations. Liner materials can be easily die cut into complex shapes to match device designs and limit material waste. Boyd can also create delivery liners with pull tab features, split liners and folded liners for easy removal and application.

Common delivery liner materials:

- Polycoated paper
- Super calendered Kraft
- Polymeric film: PET, HDPE, BOPP
- Single-side siliconized
- Double-side siliconized
- Custom liners

BOYD

Berry Elite CONVERTER

Boyd engineers and Berry materials experts have the knowledge and converting capabilities to guide materials selection and enhance wearable medical devices.

Contact us to start your next project today.

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