



Material Considerations for Different Layers of a Wearable Device

There are basic principles that Design Engineers need to understand when specifying adhesive layers for wearable devices. Wearable Devices need to adhere to the skin and accurately collect data and monitor patients remotely, all while staying comfortable on the human body.

Below are a few wearable adhesive basics that can help familiarize device designers and managers with their adhesive material choices. There are three primary types of adhesive material layers used in wearable devices:

- **Skin-contact layer adhesives:** These are the materials that ultimately hold a wearable device directly to the patient's body. The skin is a complicated substrate with oils, sweat and hair. The skin also sheds its exterior layer, the epidermis, every 7-14 days, saturating adhesives with dead skin cells. For long-term wear devices, they must be able to remain adhered to the skin through showering, exercise and normal activities. This requires an effective management of moisture and proper design for user comfort.
- **Tie-layer adhesives:** These materials are known as tie-layer adhesives because they tie, or connect, the different components of the wearable device together. While tie layers usually do not directly touch the patient's skin, they must be compatible with the skin-contact layer. For example, if the skin-contact layer adhesive material is breathable, the construction-layer material must also be breathable. If not, it will negate much of the skin-layer material's ability to allow for the patient's skin to stay dry, comfortable and irritation-free.
- **Cover/Overlay Tapes:** The need to protect the device from moisture and dirt is at the forefront of our product development. Cover/overlay tapes are used as waterproof "covers" that are applied over the top of a stick to skin wearable device in order to protect the device from getting wet or dirty during every day use. Typically, cover tapes are worn anywhere from 20 minutes to 3 days before they are removed and a new cover/overlay patch is applied. They are a simple and inexpensive solution to protecting your wearable device.

Different device types and end-use requirements will impact the needs for each layer of the device. There will be different requirements for continuous glucose monitoring (CGM) devices than there are for ECG monitors. The main differences would be the placement of the device on the body, its intended function, duration of wear required and the patient's activity during wear.

Reference: 1. Prakash, Deepak. "Designing Wearables: How to Make Sense of Your Material Options." Medical Design & Outsourcing, 9 Mar. 2018, www.medicaldesignandoutsourcing.com/designing-wearables-material-options/.

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