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Waterproofing Electronics—Evolution to Revolution

For many of us, electronic communication devices are essential. But how do we communicate safely in stormy weather or during a day at the beach? Electronics and water don't mix, and when one gets into the other, the outcome isn't pleasant. The chance that your turned-on electronic device will survive a major soaking is usually quite slim.

In the past, waterproofing electronic devices for use in wet environments revolved around building a waterproof case. For military and marine use, the job fell to the manufacturers of the products. For consumer products that are not specifically designed for underwater use or a harsh environment, manufacturers abdicated all responsibility for weather resistance by clearly stating that water damage would void all warranties.

When I attend each year's Consumer Electronics Show (CES) in Las Vegas, NV, my goal is to find at least one new and emerging technology that will be of interest to technology educators and their students. At this year's show, HzO's waterproofing electronics process caught my interest.

The representatives from HzO were dropping cell phones and tablet computers into a fish tank to show off how their WaterBlock™ process keeps electronics dry. (See Photo 1.) The Apple and Samsung cases of the submerged phones and tablets that they were dunking were not keeping the water out—but the devices continued to work even though their cases were flooded with water.

Rick Peterson, an HzO executive, told me that the devices in the company's exhibit work underwater without a waterproof case because

they are protected by an invisible vapor coating that HzO produces. The coating is made up of nano-sized molecules that block water penetration. Peterson explained that



HzO

Photo 1—HzO's WaterBlock is an almost invisible protective coating that will be deposited directly onto electronic circuitry by the manufacturer.

the coating is almost invisible and it is applied directly to electronic circuitry. He told me that HzO's waterproofing process for electronics protects from the inside out without disrupting the normal activities of the electronic circuits. Peterson's presentation at first sounded too good to be true.

I told him that I could see that the process worked but that applying the coating to a device after purchasing it would definitely void the manufacturer's warranty. He interrupted me to explain that their process will be applied during the original manufacturing of future electronic devices. HzO is negotiating with representatives from various major manufacturers of electronic devices to have the coating applied during the manufacturing process. This is definitely a new and emerging technology.

During manufacturing, a vacuum deposition process will be used to build up a solid, thin film of WaterBlock on all electronic surfaces and other internal structures that are to be protected from water. In the vacuum chamber, the film is deposited as a gas and it solidifies on the components to form a solid film.

The length of time the components are in the chamber, the pressure in the chamber, and gas chemistry determine the final thickness of the film coating. The technology is designed to protect electronic devices against such events as accidental spills, being used in the rain, being dropped in snow, or an accidental dip in a swimming pool. You can further explore this technology at www.HzOinside.com.

Later, I spoke to a representative at LifeProof™ and immediately saw that the WaterBlock process and the LifeProof case belong together. WaterBlock protects electronics from the inside out and the new LifeProof



LifeProof™

Photo 2—The LifeProof case is designed to shield a cell phone from shock, water, dirt, and snow.

case protects electronics by preventing water from getting into the device.

The engineers and designers at LifeProof have created a one-ounce

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iPhone case that adds only 1/16" to each side of a phone. (See Photo 2.) They say that their case makes an iPhone water, dirt, snow, and shock proof. To build their case, they combined a polycarbonate frame, waterproof acoustic vents, built-in optical glass over the phone's camera lenses, and a waterproof screen protector that is still fully touch sensitive. They put it all together in a two-part snap-together case that has a thin polymer seal where it closes.


The case becomes fully watertight when you snap it together and close its charging port door. The earphone port has a screw-in seal to keep water out when the earphone is not in use. To use earphones without sacrificing water protection, LifeProof provides a short earphone wire extension that screws into the earphone port on the case.

I tested a LifeProof case by assembling it with a tissue inside where you would normally place an iPhone. I then submerged it in water to see if the case was truly watertight. It isn't easy opening the case once it is

correctly closed, but it did keep the tissue totally dry. You can further explore LifeProof online at www.lifeproof.com.

A phone with WaterBlock on the inside and LifeProof on the outside would certainly be an interesting product to own. The manufacturers of both products won't absolutely guarantee that your electronics will survive a water disaster. But they both point the way to a future where personal electronics will be safe from snow, sleet, or torrential rain. You can view related videos for both technologies at www.technologytoday.us/page13.html.

Recalling the Facts

1. What is the most significant difference between the HzO and the LifeProof approaches to waterproofing electronic devices?
2. Pieces of military and marine electronic equipment that are designed for use underwater or in very wet environments have been waterproofed for years. How are they waterproofed? 

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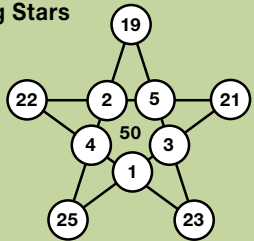
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