



Providence Enterprise

Full-Service Global Contract Manufacturing



SMART MANUFACTURING FOR SMART WEAR:

How to Avoid Costly Mistakes By
Ensuring Your Design is both Consumer
and Production-Ready

Augmented reality headsets that onboard factory workers, field service providers and soldiers. Caps that combat truck driver fatigue. Leggings that help you refine your yoga poses. An in-shirt air conditioner that keeps wearers cool during the summer.

They are not just for gamers or fitness buffs anymore. Collectively known as 'smart wear' or 'wearables', innovations in high-tech clothing, headgear and accessories are propelling us into a future that is more... futuristic.

Miniaturization's tailor-made OPPORTUNITIES



The wearables market, predicted to be worth \$265.4 billion by 2026, depends on miniaturization technology. **Microelectromechanical systems (MEMS)** can be made small enough to be woven into fabric, light enough to be undetectable in a pair of glasses, and advanced enough to add numerous functionalities to a wristwatch.

So, you have a healthy growth market and the technology to feed it. Shouldn't you jump right in?

Yes, but No.

Wearables are the Champions League of electronics. The list of things users demand from them is long and unique. Luckily, we are at the tail end of what the New York Times called "the awkward teenage years" for wearables, refined by trial and lots of error.

Lessons from GROWING PAINS

1 Clothes will be clothes

Wearables should be comfortable, of course, but beyond that, users want smart wear that is trendy (clothes and accessories), or discreet (wearable health devices). We are finally seeing more collaboration between fashion and tech companies, which will likely appeal to a greater audience than a business suit with an electronics company on the label.

2 Smartwear should be smart

Users don't want to be burdened with a ton of single-use devices. Think about the functionalities constantly added to your smartwatch. Then yourself whether sneakers that do one thing are really that smart... even if that one thing is ordering pizza.

3 If you depend on it, it must be dependable

Like all MEMS-fitted products, smart wear needs a power source. It's not just medical devices that have to be reliable; no one wants to remove their GPS-fitted jacket in the middle of a commute because it needs recharging.

4 Anything you wear on your body should be safe

Ray Ban Smart glasses ticked the fashion, functionality, and reliability boxes. They also rated as 'super creepy', in Mozilla's *privacy not included buyer's guide. Manufacturers need to be aware that, more and more, users want to know what data is being collected and how it is being used.

5 Anything you want customers to buy must be affordable

Wearable innovations are expensive because they are costly to make. Especially if the right considerations are ignored.

Which takes us to the type of challenges you won't see in user reviews.

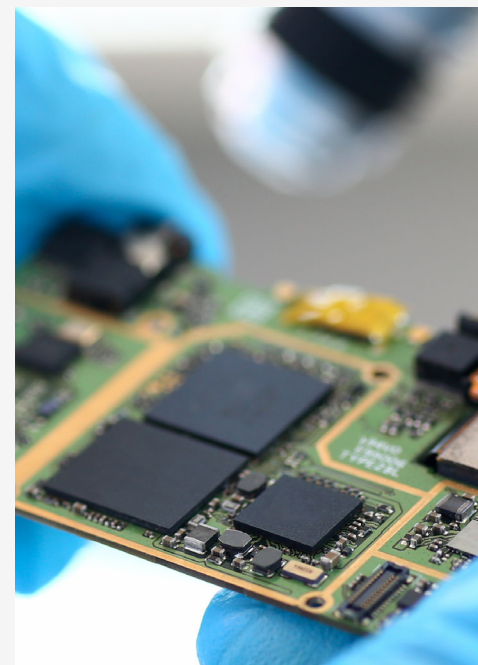
Smart manufacturing FOR SMART WEAR

New wearables need to prove themselves before achieving that critical mass of users. Low runs drive up their cost, but so does a more preventable factor: mistakes at the products design and production stages.

MEMS used in wearables are much more sensitive than your average integrated circuit. They need to be placed on the PCB in such a way that enables sensors, for example, to detect environmental and user stimulus, but not be harmed by it. This means protecting their finely calibrated workings from thermo-mechanical stress, radio-frequency interference, and, in the case of smart clothing, multiple cycles of washing, drying and folding.

Wearables perform in real-time. The technology that enables this – from smart software to sophisticated in-sensor algorithms to low-latency data processing – saps the battery. One of the many puzzles that needs to be solved at the design phase is how to power the wearable without affecting performance, reliability, or comfort.

In addition, sensors must withstand damaging impacts during manufacturing and shipping. A savvy manufacturer will know when it's necessary to sacrifice velocity to soften automated processes, and design packaging that will cushion wearables during shipping.



The first two items on your ROADMAP

If you are venturing into wearables, there are two things you can do to maximize your chances of success.



Start with the right product

Don't get too ambitious, not yet. As we have seen, smart wear requires special considerations. Get some experience (and street cred) with a lower-risk kick-off wearable that fits nicely in your product portfolio. Grow from there and, as technology and the market continue their upward trajectory, you will be well-placed to be more innovative.



Work with the right contract manufacturer

Get yourself an experienced CM partner who can guide you in the right approach to minimize waste in your R&D processes. Whose engineers will work with yours to hone your design into something that fits all your criteria and de-risks the manufacturing process.

This CM must have an in-depth experience in MEMS technology from design, to fabrication, to placement, not to mention calibration and re-calibration. They will also provide you with the best, most reliable ways to keep your device running – including the incorporation of ultra-low power or self-learning sensors and the intelligence to keep your smart wear on stand-by mode unless it is being used.



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Keen to start discussing your ideas for wearables right way?



TALK TO US

We're ready.

About Providence Enterprise

Providence Enterprise is a Hong Kong contract manufacturer with manufacturing in China & Vietnam. We specialize in electronics, electro-mechanical assemblies and high-volume disposables. We are FDA registered and ISO 13485, ISO 14971, ISO 14001, ISO 27001, IATF 16949, and ISO 45001 certified. Our capabilities include fabricating tooling for silicone rubber and injection molded plastics, clean room injection molding, electronics, clean room assembly, and sterilization.



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