

WEARME FASHION
feel good



WHEN A TECH GARMENT CAN COME IN *Handy*



Name of the project
Closed Loop
Smart Athleisure
Fashion

**Year of
establishment**
2017

Country
The Netherlands

Dutch fashion technologist Marina Toeters has spent more than ten years making smart garment prototypes for the medical sector, as well as for sportswear and workwear. Marina has now turned her ambition to innovating everyday garments, working with a team of technicians, fashion designers and business experts to bring a smart, closed-loop athleisure collection to the market.

The journey that Marina shared with us highlights the challenges and complex issues that need to be addressed in order to turn dreams into reality. But these issues don't seem to be stopping her. Perhaps the biggest difficulty for Marina is actually her own ambition: "It doesn't matter what is currently existing and what is not yet, I'm always going towards these complex things," Marina explained, laughing.

Thanks to an interdisciplinary approach she developed as a university student in Utrecht, the determined Dutch fashion technologist learned early on the importance of positive collaboration between designers and technologists, a concept she fully embraced in her jobs as a freelance prototyper and educator. For more than ten years, Marina created innovative garments for many different firms, including Philips, playing a designer role with technology companies and the role of a technologist with design companies. "When I started to work in this field in The Netherlands, I was the only one doing it. So, I was quite a pioneer," Marina noted. For this reason, she began educating people, building a bridge not only between institutions, but also between different approaches of developing a common language.

Marina's continuous role-shifting helped boost her confidence to focus on her own

fashion project. "We have so much to win in the fashion industry," she pointed out. This inclusive perspective can be beneficial, she explained, "for us as human beings, and for the environment." She also elaborated on how she and her collaborators wanted to help alter the state of fashion, to the benefit of the customer. After all, Marina believes that clothing should take care of its owner – and that in the current fashion climate, innovation is struggling to be heard.

Conceived with active working women in mind, the collection, which is set to include four smart items and some complementary pieces, addresses the inconveniences of stress. It is one of the most relevant issues today, as mental problems at work are now eclipsing physical problems, Marina said, at least in The Netherlands, her home country. That's when a tech garment can come in handy. As conventional athleisure clothes, the items are conceived for women to wear during regular office work and to a yoga session or a light training activity right afterwards, without any need for an outfit change. The sensors embedded on the upper back of the garments, tight to the skin – the optimal position for sensing on the female body – allow the wearer to learn more about her own breathing patterns and heart rhythm, helping to promote self-awareness.

A better conception of what goes on within our own bodies, like how the body responds to stressful environments and stress-relieving activities, can give people the knowledge and opportunity to take action accordingly, whether it is simply changing behavior and mindset or seeking medical support. The choice is up to the person. "I really want these data to be for personal use. It's not my purpose, nor interest, to store or sell them," Marina



explained.

“We have been contacted by a lot of companies from different sectors that are interested in gathering data through our products,” she said, “but this is, actually, something quite scary. Especially for those companies that want to arrange employments based on the employees’ data. Not to mention the ethical dimension that this behavior would involve. I’m certainly going to do my best so that my technology is used for the better, but I guess that at some point it will be out of my influence. That’s why I am making sure that these items are for the wearer, and that we are not going to enable the data to go out or be hacked through the wireless connection. It’s totally out of scope.”

To develop the right technology for the realization of the closed-loop athleisure collection, Marina got the support of the Holst Centre, an independent research and development center specializing in technologies for wireless autonomous sensors and flexible electronics, which she has worked with since 2015. Marina teamed up with Margreet de Kok, an expert in the field, to create the subtle, printed sensors embedded in the gar-

ments, which measure health parameters and inform the user about their personal data on a smartphone screen, via a wireless connection to an app. “During the making of prototypes, we found out that sensors would move to the back and that female wearers would come into scope, so these key vital body signals are measured at the back through a sensor technology,” Marina explained. “There’s not at all a focus on innovation for women yet,” she added, speaking of one industry issue that was on her mind while developing the technology.

The technological core of the project remains invisible, thus enhancing the more fashion-forward aspect of the garments. On the surface, nothing screams “technological toy;” rather, the clothes appeal with the everyday feminine look that Marina – a trained fashion designer herself – and team member Melissa Bonvie, a designer specializing in ultra-personalized fashion, want to confer. Though embedded electronics components are invisible to the eye, when it comes to detaching and recovering these pieces, things get more complicated. It is already challenging enough to create, care for and recycle ordinary garments, but more technologically-savvy garments require an even more complex process.

The printed sensors require metal dyes for conductivity and although they prove to be completely skin-friendly and harmless to the wearer, the same does not apply for the environment. “That’s why we are putting this delamination and recycling process into place,” Marina explained. “We don’t want to get those into the environment.” The process of delamination is the first step in closing the loop and enabling the tech components to be easily removed from the garment. They are recovered to be eventually recycled,

so that they don't get dispersed into the environment. "That was the second thing I was really concerned about," she said, "also because I like being inspired by tech and by innovation, but always of course for the better, not to make even more rubbish in our world."

Marina explained: "All this has to come into society and – in my opinion – to do so, we need a new business model that can embrace the complexity of these items, a sort of service model. This one could deal with how we are going to get along, how we are going to work with guarantees, how we are going to service them, to update them, or to repair them. A whole new business model needs to be put in place, especially now that we are coming close to the market, but we still don't have an appropriate market for our items."

The concern for the sustainable outcome of the project also extends to the fabrics and raw materials. Following the circular, closed loop perspective, mainly recycled fibers have been selected, specifically recycled polyamide, recycled nylon (ECO-NYL) from Carvico, and recycled cotton. Although the clothes currently contain

a small percentage of elastane to guarantee adherence for better sensing and for performance requirements, the collective is looking for alternatives, since elastane itself is difficult to recycle, and solutions concerning that are still being researched.

Combining a designer approach with a technological push is what Marina eventually wants to achieve, although she will admit that the fashion industry and its labels are not yet ready for it. "So, for me, WEARSUSTAIN represents a huge opportunity to take things further. I can finally seduce tech companies to work in the direction that I think is the most efficient on the long run," she added, referring to everyday garments and recyclability. In order to develop a new business model, hopefully supported by a new mindset, Marina is also working in collaboration with Catherine Delevoye, from Technoport, a firm supporting innovative and technology-oriented companies. They aim to successfully engage in innovating everyday garments while using a circular perspective, setting a precedent for many other companies to follow.

Electronic components
Printed Sensor Technology, PCB, BLE & Lipo

Durability
25 washes

Fabrics
PA-EA Nylon

Measures
Female Size 36/38

Resistance to weathering
Water, sweat and washing machine safe

Recycle
Return for disassembly and recycling



The sensors are seamlessly laminated onto the fabric