Philips Lumea

Breaking new ground in hair removal

Over a decade of research and testing, and one Friday afternoon flash of inspiration all went into creating the award-winning Philips Lumea. The sleek futuristic device, that uses light to help women stay hair free easily and effectively, is the product of a diverse team including skin scientists, designers, engineers and dermatologists. Together they harnessed a powerful professional technology known as Intense Pulsed Light (IPL) for home use, to break new ground in hair removal.

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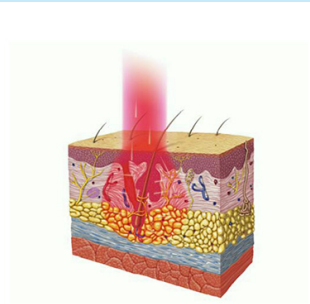
Learning from the pros

Light-based hair removal is a well-established technology used in beauty salons and clinics around the world. The two light technologies, laser and IPL (which stands for Intense Pulsed Light), are both hugely appealing. Just a handful of sessions results in long-lasting hair-free skin. The main downside is the cost. Salon treatment bills quickly run to thousands of dollars.

Philips has a long history of producing innovative hair removal devices for women, and its researchers are always looking to offer women the best technology for use at home. Aware of the effectiveness of salon light therapies (also known as photo-epilation), they were keen to explore the potential of adapting it for home use. It was quickly realized that IPL offered the best route to helping women realize visible results, easily and in the comfort of their homes, and so the journey to develop Lumea began.



Intense Pulsed Light (IPL) for photoepilation

How does IPL work?

Intense Pulsed Light (IPL) reduces the re-growth of hair by applying pulses of light to the follicle beneath the skin. The pulses of light are absorbed by the hair's melanin (color pigment), so effectiveness depends on the level of melanin in the hair.

Professional IPL devices use light energy at a level that destroys the hair follicle to inhibit new growth. The Lumea uses gentler pulses of light that stimulate follicles in their growth phase to go into a resting phase, the hairs shed and regrowth is slowed down. At any given time, around 30% of hairs are in the growth phase. So to treat all hairs successfully, the treatment initially needs to be repeated every two weeks for four to five times. After this initial period, the treatment should be repeated only every four to eight weeks to ensure skin stays smooth and hair free.

Initial challenges

"At the time, IPL represented a new product category for Philips," explains the project lead of the research team Dr. Tom Nuijs. "The company has been in the hair removal market for several decades, but had never used light technology in this way before."

Safety first

When introducing any new technology, early research is always dominated by ensuring that the safety and effectiveness meet Philips' high standards. So the team's first task was to adapt the powerful IPL technology into an effective device that was safe to use at home. In a salon or clinic, the IPL device can remove hair permanently by using high amounts of light energy.

"We asked ourselves what would happen if we brought the professional IPL settings down," explains Lenieke Evers-Derkx, who at the time was the clinical researcher responsible for carrying out many of the initial studies. "Using a professional system with adjustable settings, we found to our amazement that we could achieve hair removal using significantly lower energy and short pulse durations." The only difference was that the initial results were temporary, so users needed treatments every two weeks to maintain hair-free skin.

Successful testing

The color pigment melanin is the key to IPL (see box *'How does IPL work?'*), but it is present in skin as well as hair. For this reason Philips first had to be sure that the Lumea light settings were safe for use on darker skin types which contain much more melanin than fair skin types. Once this had been confirmed, the in-depth clinical testing began.

A group of female volunteers with a range of skin tones and hair colors were treated with Lumea on their lower legs at two-week intervals, initially under the watchful eye of renowned Danish dermatologist Peter Bjerring, then in further trials in the Netherlands. The results surprised and impressed everyone.

Can I keep it?

After just a few treatments, the team found that nearly all of the volunteers' treated hair had shed. The system even worked well on the darker skinned women, because there was still enough optical contrast between their hair and skin for the IPL to work. However, the team used much lower settings for these than their fairer counterparts. Lenieke was taken aback by the results. "My background is in chemistry, so I couldn't really believe my eyes. I found it all so sci-fi." She wasn't alone. Many of the women were so impressed that they were desperate to get hold of the final product as soon as possible. "'*Can I keep it?*' was a

regular request," says Lenieke. "As was *'where can I buy it?'* and *'will you tell us as soon as it's launched?'*"

Size matters

With most of the technical issues solved, and a growing fan base for the product, the team thought they were home free. But perhaps their biggest challenge, and one that almost ended the project, was yet to come. Put simply, the initial prototypes were huge. "Drastically reducing the IPL settings had helped the engineering team get the device down from fridge-sized to something that resembled two shoe boxes, but it was still too big," says Lenieke.

The team knew that for the project to work it had to be comfortably hand-held. Extensive user research strongly suggested that women wanted a portable device that could get to areas that are difficult to reach, like under the arms and the bikini line. Crucially, they didn't want something that looked too technical. Yet with its base station, cord and hand piece the latest prototype still looked semi-professional and daunting.

Flash of inspiration

Faced with what looked like a dead end, research lead Tom Nuijs started wondering if the solution might lie in technology already used in other products. He knew that the biggest elements in the prototype were the charging electronics and cooling system.

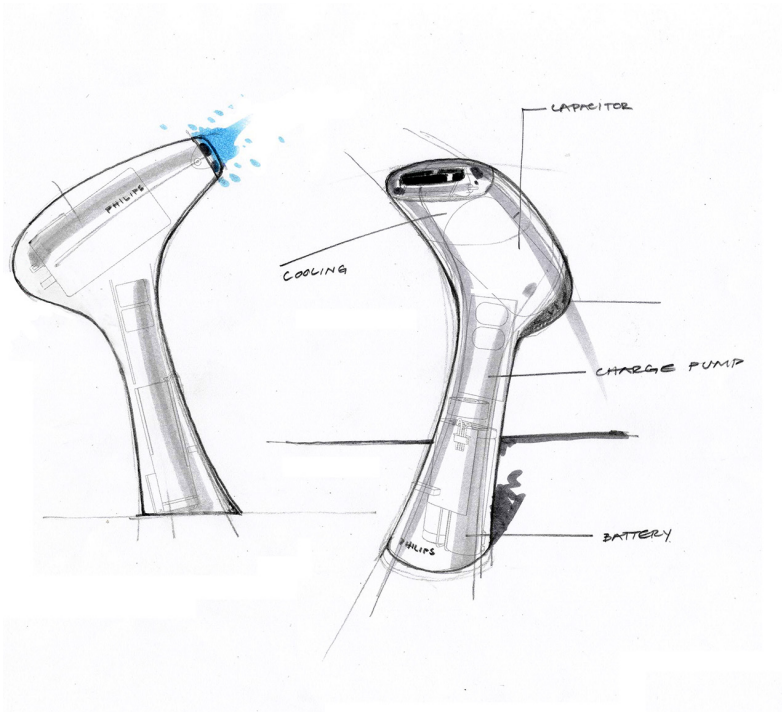
"Then one evening at home, I came across my camera which had a separate photo flash," Tom recounts. "Wondering how much light the flash would produce, I took it into the lab to test it one Friday afternoon." To his astonishment, the parameters were very close to those created by the prototypes. "Suddenly, with just a few tweaks, we had a solution that was small and rechargeable," he says. "By modifying it to emit precisely the right wavelengths and amount of light, that flash technology became the key to Lumea."

The camera flash however was not designed for rapid use, so further modifications were needed. After some tinkering, the engineering team created a version that flashed rapidly and reliably using a small cooling system.

Inviting design

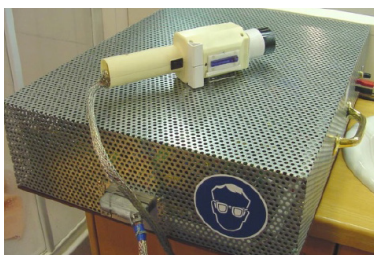
In the hands of the design team, the Lumea really took shape. Their challenge was to make such a technically complex device look safe and intuitive to use, as well as cordless. The team carried out extensive research to learn about what look and feel would resonate the most with users.

"With a new product category like this, there's no established archetypal design. So we set about defining one with Lumea," says designer Ozgur Tasar, creative lead for the project. The trick was to design something that made sense to women and was the right balance of functional and psychological appeal.



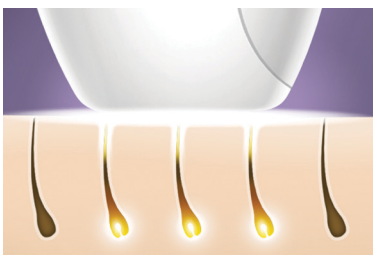
Creating a new archetype

Initially it wasn't easy to create a feminine and ergonomic shape for Lumea, but the breakthrough came when the team managed to split the components into separate hand and head sections. A slightly tilted neck, purple details, and soft lines lend a certain futuristic elegance and feminine style to the final form. The designers were also mindful to reduce visual stimuli to retain Lumea's simple appeal, so the only buttons users can choose from are five light settings depending on skin tone, and the on/off switch.



Early working protoype

The camera flash that inspired the flash technology used in the Lumea



How the light works

Extensive home testing with more than 2,000 women confirmed the success of the look and feel of Lumea, as well as its effectiveness.

"For such a simple looking device, the Lumea was incredibly complex to create." says Tom. "We got there in the end thanks to a diverse team of specialists, and their endless patience and enthusiasm."

Further information on the Philips Lumea
www.lumea.philips.com

The Lumea family

After launching in 2010, Lumea went on to win an iF award for outstanding product design. Philips followed up in 2011 with Lumea Precision, which features an extra attachment for upper-lip hair removal. The most advanced Lumea yet, the Precision Plus, launched in 2012. It offers a larger flash window and Slide & Flash technology that enables users to treat their lower legs in only 15 minutes. Philips recently also launched corded models, like Lumea Essential, enabling Philips IPL technology, including Slide & Flash, to be offered at a lower price point. Today over 500,000 Lumeas have been sold to women across the world.

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