Press kit
The C-Leg turns 25

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The C-Leg turns 25: A milestone for people with prosthetic legs

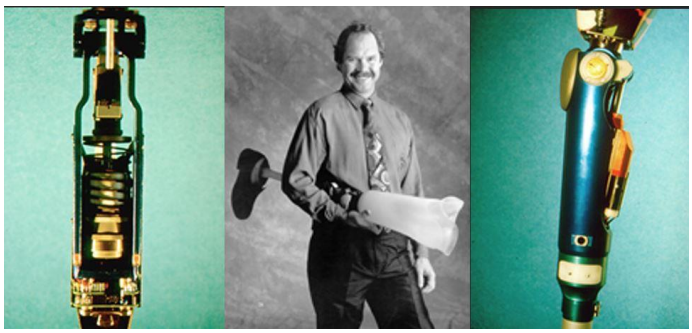
Duderstadt, 05.05.2022

Ottobock is celebrating a quarter century of the C-Leg on May 10th – just in time for the start of the OTWorld trade fair in Leipzig. At the same time, the new C-Leg is being launched.

The C-Leg is a prosthesis for people with a limb difference or who have lost their leg due to an accident or a disease such as cancer. With it, thousands of users have been able to walk again for the first time, as if with healthy legs. A small computer in the prosthesis ensures this: The microprocessor turns data collected by sensors into digital control commands. Thus the prosthesis automatically sets the appropriate gait for the respective environment. Walking on stairs, level streets or gradients becomes intuitive for users without having to think about the next step.

Professor Hans Georg Näder, owner and Chairman of the Board of Ottobock SE & Co. KGaA, recognised the potential of this innovation early on: “With the C-Leg, we have introduced a new dimension of walking for transfemoral amputees, a true milestone in prosthetics. Mechatronics puts people first – they no longer have to think about every step, they gain freedom and safety for an active everyday life. With 100,000 fittings and numerous studies, the C-Leg is rightly regarded as the gold standard in prosthetics today.”

The C-Leg birthday party on May 10th (2 p.m.) at OTWorld in Leipzig will be attended by the C-Leg inventor, Kelly James, the former head of development, Hans Dietl, and Patient Zero, Bernd Schwien!: More about the program and live streams at ottobock.com or from May 10 here!.



Prototypes of the C-Leg with inventor Kelly James (Ottobock)

The C-Leg story in bullet points

- Canadian engineer PhD Kelly James invented the prototype of the C-Leg and presented it at the ISPO (International Society for Prosthetics & Orthotics) World Congress in Chicago in 1992.
- Hans Georg Näder, then managing partner of Ottobock, became aware of the revolutionary innovation and signed an exclusive contract with Kelly James on the spot.
- Ottobock continued to develop the C-Leg over the following years so that it could go into series production in 1997. Dr. Hans Dietl was in charge of the technological development. The head of development in Vienna at the time led the innovation to market maturity.
- For the first time, the rechargeable battery became so small that it no longer had to be carried externally in a backpack, as with other mechatronic knee joints of its time. The rechargeable battery was fully integrated into the microprocessor knee (MPK) and still lasted for about 40 hours.
- Users were able to fine tune the gait themselves for the first time using a home computer, and later a smartphone via a Bluetooth connection.
- The C in C-Leg stands for the C programming language, new at the time of development, in which the software of the computer-controlled prosthesis is written.
- Equipping a prosthesis with a small computer enabled users to walk more naturally and safely. The microprocessor can evaluate data from integrated sensors and control the leg depending on the ground conditions.
- A patented method made it easier to walk on surfaces such as sand, grass or gravel. The sequence of smaller steps and the flowing gait at changing walking speeds were harmoniously controlled.
- To date, 100,000 prosthetic leg fittings have been performed with a C-Leg. This makes it the most commonly fitted microprocessor-controlled knee joint (MPK) today.

The new C-Leg: Safe, intuitive, customisable

Ottobock will present the new C-Leg on 10 May 2022 at the OTWorld trade fair in Leipzig - exactly 25 years after the first C-Leg was presented at the World Prosthetics Congress in Nuremberg.

”Twenty-five years of C-Leg impressively demonstrate our leadership in innovative technologies,” says Ottobock's Chief Technology Officer, Dr. Andreas Goppelt. ”We are consistently continuing on this path to enable our users the life they want to lead.” Twenty-five years of continuous research and user requests have been incorporated in the latest update: An exchangeable, paintable cover now allows you to create your own designs. Equipped with stumble recovery Plus, the joint is also even safer. Support for going down ramps and stairs step-over-step ensures an even more natural, safer gait. ”The C-Leg is a prime example of human empowerment. Cycling with the family again, strolling through the weekly market or working in the garden, the C-Leg breaks down barriers in everyday life,” says Martin Böhm, Chief Experience Officer. ”It enables the small moments that many of us take for granted. And they make life wonderful.”

The C-Leg with new charging function (photo: Ottobock)

The new C-Leg in bullet points

- **Availability:** The new C-Leg will be presented on May 10th at the OTWorld trade fair in Leipzig.
- **Customisable design:** The users spoke, we listened: The new C-Leg gets a new look and new functions – inspired by wearers. The new C-Leg gets a new colour variant with Midnight Shadow next to Desert Pearl. There is also a customisable shield insert (cover) with instructions for painting and designing it yourself.
- **Stumble recovery Plus:** The increased resistance compared to the stance phase is active during the entire swing phase. As a result, the new C-Leg helps to prevent falls even more effectively.
- **Even safer and more natural:** The improved supported descent of ramps and stairs ensures a safe, natural gait. Sitting support ensures controlled, smooth sitting down. The intuitive stance function detects from the movement when users want to stand relaxed and when they need support for the next step.
- **MyMode Plus:** Users can configure even more settings using their smartphone in order to optimally adapt the C-Leg: Whereas previously only settings in the flexion direction could be adjusted in MyMode Plus, settings in the flexion and extension direction can now be configured in MyMode Plus.
- **Simplified training:** A new training function helps users get used to the new joint and get the best out of their microprocessor knee. Acoustic feedback helps to initiate the swing phase correctly.
- **Simplified charging:** The new C-Leg is easy to charge with one hand. Sleep mode that can be selected in the cockpit app ensures a longer battery life when the joint is not active, for example, while sitting.
- **Digital:** Software changes improve user-friendliness for O&P professionals. New video tutorials simplify handling of the prosthesis and provide expert knowledge. In addition, the software provides suggestions for setting values, appropriate for the respective user, which technicians can adopt, adjust or configure entirely themselves.

“Patient Zero” is flying around the world today

“My friend said to me on the trip: Bernd, you are not disabled!” says Bernd Schwien. “When it comes to lugging a 40-litre canister through the jungle, the amputation doesn't matter anymore. That means the world to me!” “Patient zero,” the first wearer of the C-Leg mechatronic knee joint (MPK), was present at its market launch in 1997. He says the prosthesis that was revolutionary at the time enabled him to live his life as freely and actively as he does today. So he fulfilled his big dream in March and flew through Costa Rica in an open gyrocopter. Ottobock was allowed to accompany him.

Bernd Schwien 58 in Costa Rica (Photo: Willie Schumann)

He witnessed the development of the first C-Leg

In 1983 the university professor from Lower Saxony would not have believed that he was able to do this. He lost his left leg at the age of 19 after being run over by a driver while standing at a traffic light. He barely survived and developed a new attitude to life: “Nothing is impossible!” He even managed to earn every available hobby pilot's license with his prosthetic foot. Schwien became one of about a dozen Europeans with a leg prosthesis and a pilot's license – thanks to his C-Leg, as he says. His path led the young doctoral student to the prosthesis manufacturer Ottobock after his amputation.

There he had the opportunity to tell the developers what he wanted as a user. In 1993, he became a test runner for the prototype of the new C-Leg mechatronic knee joint: “Every technology I had used up to that point quickly reached its limits. No knee joint lasted longer than seven or eight months.” It was different with the C-Leg. Schwien was able to move for the first time at the walking speed he desired as a young man, to climb stairs as before, and the automatic stumble recovery caught him if he faltered. Sensors registered the surface on which he was moving, so that the leg could automatically switch to the appropriate setting – a milestone. “This gave me confidence and security. For the first time after my accident, I no longer needed to consciously think about my movements”, he says.

Bernd Schwien in 1993 with the prototype of the first C-Leg (photos: Bernd Schwien)

”Mr. C-Leg's” flight through Costa Rica

After his doctorate in economics, Bernd Schwien joined Ottobock as Product Manager and worked on the further development of the C-Leg: “At one point, my name in the team was Mr. C-Leg, because I was always patient zero for new prototypes,” he says. ”That was exciting! At the time, I couldn't imagine that this would set such standards.” Later, Bernd Schwien accompanied other users as they tried out the new mechatronic prosthesis: “I looked them in the eye and experienced pure happiness,” he recalls.

The new feeling of security allowed them to do things in a very short time that they could not imagine before. Bernd Schwien doesn't wear a C-Leg anymore, but the Genium for highly active users: “I rode unsteady boats in Costa Rica and ran through soft sand,” he says. ”And, of course, I carried canisters. A lot has happened since 1997. Mechatronic prostheses have undergone a giant leap in development.” The C-Leg has paved the way for Bernd Schwien's life to no longer feel like a handicap: “I no longer say in the morning that I'm putting on my prosthesis. I'm putting my leg on!” Instead of a handicap, he says, he now refers to a functional impairment that can be compensated - also because of prostheses such as the C-Leg.

Over Costa Rica's nature: Bernd Schwien in an open gyrocopter (Photo: Willie Schumann)

Interview material from Bernd Schwien in Costa Rica and videos for journalists are available online (press / ottobock.com).

Bernd Schwien, Dr. Hans Dietl and Kelly James will attend the OTWorld C-Leg Show for the C-Leg birthday party (May 10th, 2pm)..

12 Stories from C-Leg users

Julia Porzelt (DE): Rider with leg prostheses
The 26-year-old from Chiemsee was born without knees, lower legs and feet. Therefore, she wears the C-Leg from Ottobock on both legs. She says, “The prostheses are part of me. I put them on in the morning and take them off at night. They allow me to live my life as independently as possible.” Her great passion is sports: “I have been riding horses since I was a child. Meanwhile, I'm competing in international tournaments and have already been a Bavarian champion several times and a German junior champion once.” She does not wear the prostheses while riding, only when handling the horse – for feeding and saddling. (Instagram: @julia.porzelt)

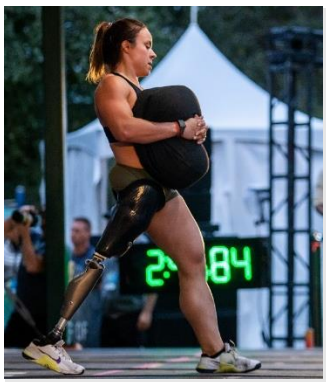
Andrew Lourake (USA): Ready for takeoff
The pilot flew members of congress and prominent politicians from Hillary Clinton to Al Gore on the presidential plane “Air Force Two.” He lost his leg due to an infection after a motorcycle accident and was on the verge of losing his pilot's license. But with the C-Leg, he managed to pass the pilot test anew. Andrew Lourake was able to take off again – and the photo of his handicapped parking card in the cockpit went around the world.

Dima Aktaa (Great Britain): Escape from Syria
28-year-old Dima Aktaa loves sports and especially sprinting – despite her amputation. She lost her left leg after a bomb attack in Syria. Since her escape, she lives with her family in Central Bedfordshire and works in a school. Now she can even pursue her passion as a runner again. She also feels much safer with the C-Leg: “One day I was on holiday with my family in Turkey and went shopping at the mall. Suddenly we heard an alarm and ran faster – nothing happened in the end, but my prosthesis allowed me to run and jump normally.” (Instagram: @dima_aktaa)

Curtis Grimsley (USA): Lifesaver at the World Trade Center
The IT specialist was working in the World Trade Center when the floor suddenly shook: “I looked out the window and saw a lot of paper flying by,” says the transfemoral amputee. He immediately went to the stairwell. With his artificial leg, he made it down the many floors of the skyscraper in time: “The C-Leg made the difference between life and death for me because it allowed me to walk down the stairs normally.”

Georg Schober (Austria): Training for the Paralympic Games
Georg Schober had a bone tumour as a child, causing problems with his leg for a long time because he couldn't put weight on it. An amputation became inevitable. He says this gave him a new perspective on his freedom. With the prosthesis, he was able to walk normally and do sports for the first time. He liked it so much that he now even wants to compete in the javelin throw at the Paralympic Games: “For me, the prospect of sports is simply fulfilling.”

Amy Bream (USA): CrossFit and boxing with a prosthesis
“I have a passion for pushing myself to the limits,” says athlete Amy Bream. She was born with a proximal femoral defect, a rare limb difference of the thigh bone. ”I've never had an amputation and have been wearing a prosthesis since I was one year old.” The American only started professional sports in 2015, when she moved to Nashville and began training in a boxing studio. First she wore a C-Leg, later the Genium X3 for highly active users. ”Since then, my skills and self-confidence as an athlete have grown exponentially.” She took part in the Crossfit Games and Wodapalooza. Today she is sponsored by Nike Adaptive. (Instagram: @onelegtostandon)



Patricia van der Voort (NL): Reclaiming her old life
55-year-old Patricia van der Voort from the Netherlands is mother of two grown-up daughters and loves her job as a school secretary. When she fell off the stairs at the age of 52, she fractured her knee so badly that it could not be fully restored. ”One and a half years later, I decided to have my leg amputated and to walk on a prosthesis from now on. It was the best decision I could make. I've gotten my old life back and I'm independent again! Before my amputation, I could only walk on crutches and stand for no more than 5 minutes.”

Billy Brimblecom Jr. (USA): Drummer and founder of a foundation
The drummer has been active in the music scene for over 30 years. He has toured the world as a musician. Shortly after he formed his band, a tumour was discovered in his left ankle. Brimblecom had his left leg amputated and has been wearing a C-Leg ever since. This has made his passion for music stronger than ever, he says. His prosthesis gets him into conversations. Since 2013, he has been supporting other amputees who need prostheses in the USA as managing director of the Steps of Faith Foundation. Every autumn, he organises the “Thundergong!” benefit concert in Kansas City to raise money for amputees in need. (Instagram: @billybrimblecom)

Geir Arne Hageland (Norway): Adventure in the wilderness
The 50-year-old was one of the first bilateral C-Leg wearers in the world and says he is Norway's “most flexible man”: "I wear short and long prostheses alternately, so my height changes”, he says. The short legs improve his balance when sawing in the woods. Due to a limb difference, his legs were amputated when he was five. He and other people who overcome physical limitations were portrayed in the documentary series “Ingen Grenser”. For this he spent 30 days in the wilderness. The former local politician lives in the midst of mountains and national parks. From there, he runs the Funkibator organisation: “We realise outdoor projects with other amputees and report on them in order to increase visibility.” Meanwhile, he wears a Genium X3. (Instagram: @leglessgear / @funkibator)

Brandon Todd (USA): His own fashion label
29-year-old Brandon Todd from Georgia has founded many start-ups. When he lost his leg in a motorcycle accident, this was out of the question at first: “I was going shopping, saw another motorcyclist in the breakdown lane and wanted to help them. Then a car hit me from behind.” Thanks to his prosthesis, he is now able to live his life normally again. For example, he founded his own fashion company “The Mind Clothing” and now designs inspiring clothing for sports and leisure: “I can do anything with one leg,” he says. “And I love to inspire others with it.” (Instagram: @the_brandontodd)

Sita Kuhne (NL): Always active
The 59-year-old Dutchwoman helps people re-enter the workforce after an illness. Her own experience with disability helps her. Sita Kuhne wears her C-Leg prosthesis due to a congenital limb difference of the leg. She came into contact with Ottobock through her daughter, an O&P professional, and became a test runner: “I volunteered. I am a very active person and I like to help wherever I can,” she says. She has been supporting research and development ever since. ”I can do almost anything with my prostheses. We like hiking in the mountains. When we go downhill, the C-Leg is the actual walking leg for me and I feel very safe.”

Zainab Al-Eqabi (United Arab Emirates): On the cover of Vogue
The 31-year-old lives in Dubai and, among other things, works as a motivational speaker. She is moved by the fact that she made it to the cover of the renowned fashion magazine Vogue. A bomb fragment caused the loss of her left leg in Baghdad in 1997. The C-Leg was her first mechatronic prosthesis: “It was my best friend, my partner in every step I took! I am so grateful for the freedom it has given me,” she says. Today she wears a Genium X3, the prosthesis for highly active people from Ottobock, and says: “I have a passion for everything that makes me happy and raises my adrenaline; adventure, travel and breaking the norms!” (Instagram: @zainab.aleqabi)

Interview Rebecca Brunner

"My prosthesis is a great eye-catcher"

Fashion student Rebecca Brunner from Austria lost her left leg in a moped accident. accident. She thinks it is important that her prosthesis is not perceived as something negative. Immediately after the first fitting she began to paint it: "With the adjustable protective shield I can play with colors and motifs," says the 21-year-old. She dedicated her final project "Game of life" to individual prosthesis designs: "If you're already in a situation that you can't change, you can at least make the best of it. My C-Leg has thus become a part of my personality!"

Rebecca Brunner (Credit: Ottobock)

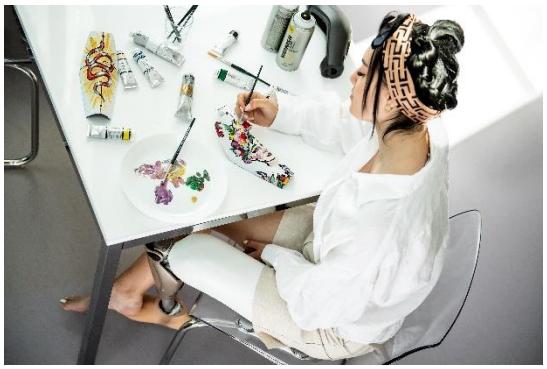
Four years ago, you were involved in an accident with your moped, as a result of which your leg was amputated. How would you say you've developed personally?
Rebecca Brunner: I feel I've really come a long way. Of course I didn't really have any alternative! I'm glad I was young and adaptable when it happened, because that probably made it easier for me to adjust.

You're interested in fashion and beauty, and study at a school of fashion design. Has your accident changed the way you perceive beauty?
Rebecca Brunner: Definitely. It's shown me that you can take anything life hits you with and turn it into something positive for yourself. I've learned that even flaws can be beautiful, and that supposed weaknesses can be turned into strengths. Fashion can have different effects, depending on how you wear it. If you have a confident personality and people sense that

you're comfortable in your own skin, you automatically appear more attractive to them – and vice versa. The same is true of the prosthesis. I've now started to get to grips with it on a deeper level.

Why did you start changing the look of your prosthesis?
Rebecca Brunner: I wanted to create something more individual, more special. It started when it occurred to me that I could process the whole prosthesis situation much better by tackling it head-on. So I made an active effort to make the best of it. It really helped me to accept it.

So how exactly do you beautify your prosthesis?
Rebecca Brunner: I use paint to draw my own pictures on the replaceable cover. I also get a car paint shop to spray my prosthesis in new colours, such as metallic gold. And I've sewn various fabric covers with elasticated tops and bottoms that I can slip over the prosthesis.


Rebecca Brunner painting (Credit: Ottobock)

Prostheses are medical devices. Do you have to be very careful?
Rebecca Brunner: I've always discussed the whole process first with my O&P professional to make sure I'm not about to damage anything. Also, most of the materials I use are self-adhesive. The paints I use have to be suitable for the prosthesis material and not damage it, of course. I always draw the image on a piece of paper first and then copy it onto the shield. I usually don't have a real plan, I just start scribbling until I come up with an idea I like, and then I finalise it.

What happens if you decide you no longer like a particular colour? Can you paint over it? How much does that cost?
Rebecca Brunner: If there ever comes a point in time when I don't like a colour any more, I'm sure it won't be a problem to paint over it. But before I begin, I always think long and hard about the long term. It costs me around €200 to have the shaft and cover sprayed with car paint.

Acrylic paints are good for the shield, they wear well and work better than oil-based paints. I definitely want to incorporate a pattern next time. Maybe I'll even go for something abstract. Next time I want to try something a bit louder, more colourful.

If you start working for a fashion company, what will be your goal?
Rebecca Brunner: To create more fashion choices for people with disabilities. By which I don't necessarily mean designing and sewing clothes differently – it's more about the way they're presented, to begin with. People who wear a prosthesis don't necessarily need different types of clothing. I want to show the world that dresses and skirts look just as good on women with prostheses as they do on women with two healthy legs!

Some fashion magazines now include women who wear prostheses. The digital cover of Vogue Arabia, for instance, recently featured Zainab Al-Eqabi wearing an Alexander McQueen dress!?
Rebecca Brunner: I'm convinced the fashion world is moving in the right direction. People are less wary than they once were. Seeing what others have achieved is inspiring and encouraging. It shows you just how much you can make of a challenging situation, and that it's worth accepting the prosthesis as a part of your identity, not as some foreign object attached to your body. It's something that belongs to you, and you should wear it just the way you want to.

Talking of prosthesis design, do you prefer a high-tech look or a natural look?
Rebecca Brunner: I'm definitely an advocate of the high-tech look. In my opinion, a prosthesis is something special, something you can flaunt! I'm proud to wear something so unique, which is why I prefer to showcase it and not hide it under a natural-look foam cover.

So how exactly do you "showcase" your prosthesis?
Rebecca Brunner: I display my prosthesis openly. I actually feel most comfortable wearing dresses and skirts. I like accessorizing my outfits with jewellery, and a prosthesis in a matching colour is like an extra accessory. On days when I'm not wearing bright colours, the prosthesis is a great eye-catcher.

Thank you!

Interview with Ottobock Designer Andreas Hogh

Prostheses design: “Expressing personality is a deeply rooted need.”

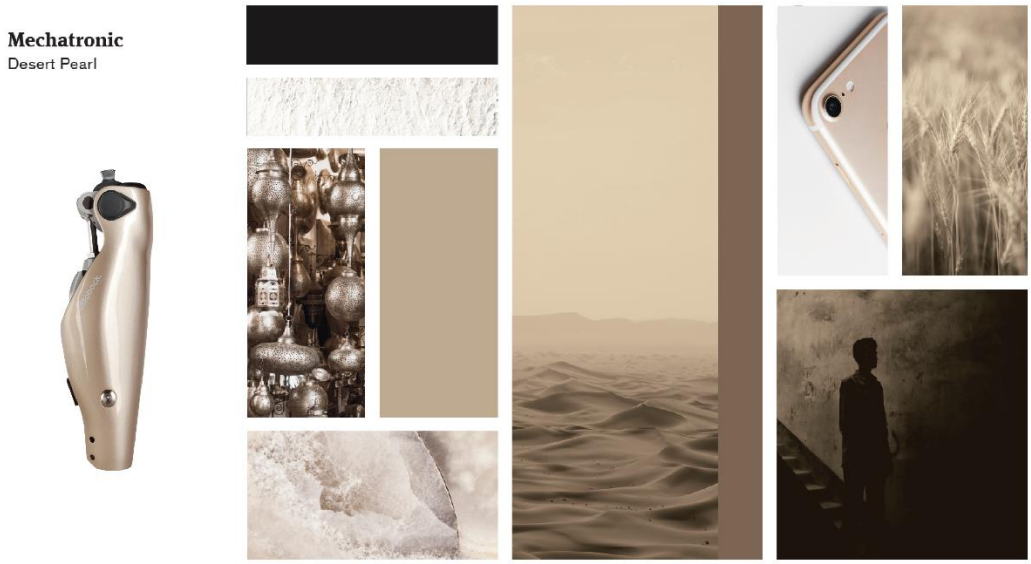
Twenty-five years ago, Ottobock launched the first computer-controlled leg prosthesis in the market: The C-Leg. It sets standards to this day – also in terms of its design. The design came from design agencies for a long time. Today, more in-house designers are developing the characteristic look of Ottobock prostheses. Among them is the industrial designer Andreas Hogh from Vienna. He is involved in the design of prostheses such as the latest C-Leg update, which will be launched on 10 May 2022. In this interview, he talks about what matters, how the appearance has changed over time and how prosthetic design in films and video games has contributed.

Andreas Hogh, Industrial Designer Systems Engineering at Ottobock Vienna (photo: Ottobock)

The first prostheses were simple devices made of wood. How has prosthetic design changed compared to the early days?
Andreas Hogh: When you look at the history of prosthetics, it all started with pragmatic solutions. Ottobock laid the foundation for modern prosthetic design with the C-Leg in 1997. Everything builds on that. Today more than ever, people are trying to get closer to the human anatomy, with 3D printing playing a role. Forms that could not be realised before can be easily manufactured.

What forms are these, for example?
Andreas Hogh: Structural forms on a bionic basis, such as frame structures, which are computer-simulated for strength. This can be imagined as the beams of a half-timbered house or bone structures. In prototype construction, we can test the shield inserts of the joints very quickly in a near-series quality. This makes the work easier because we can make changes faster.

Is it possible to draw parallels between prostheses and other products?
Andreas Hogh: Perhaps the development cycles from model series to model series are comparable for cars. Design trends influence perceptions. The C-Leg design of 1997 has changed a lot compared to today, just as the VW Golf of yesteryear has changed. The design fits with its time. Curvilinear forms and dynamic surface reflections are used more commonly in prostheses today than they were in the past. Without disregarding the human model, I think it's OK to see their technical character.



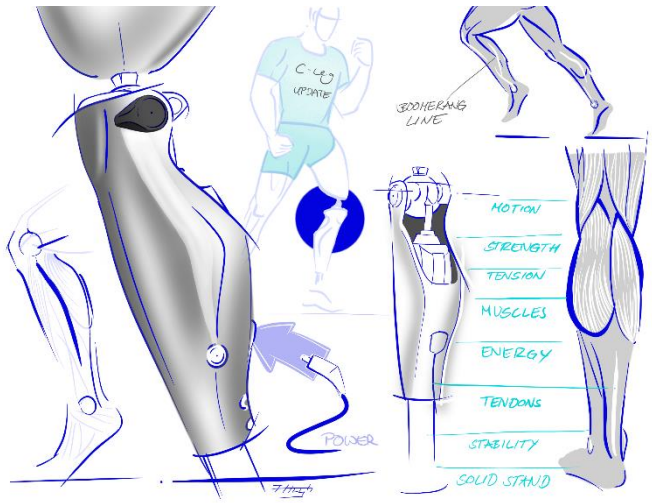
Design mood board of the new C-Leg 4 by Ottobock (Credit: Ottobock / Unsplash)

What was important in the design of the first C-Leg 25 years ago and the latest C-Leg from 2022?
Andreas Hogh: We have the longest history with the C-Leg. Therefore, we took care that an evolutionary step is visible, based on the previous models. The carbon frame of the C-Leg reflects dynamics, representing activity.

This can be seen in the shape of the kneecap and in calf muscles highlighted by a contour edge. The lateral surfaces are also more curved. With this deliberately set contour edge, we join the knee axis with the axis of the hydraulics. The colour scheme has become more differentiated as well.

Development of the C-Leg design (from left to right, Credit: Ottobock)

How did you design the new C-Leg?
Andreas Hogh: The product evolves step by step: Sometimes you make models out of rigid foam as a decision-making aid. Sketching and modelling in CAD help with product development. I follow the anatomy of the human body, such as musculature, tendons and the like. Nevertheless, I try not to copy this one to one. Rather, I develop a controlled, defined, organic form. It is after all a technical product, and this can and should be apparent.



Draft of the new C-Leg design (Credit: Andreas Hogh / Ottobock)

The shield inserts on the front of the prostheses can be painted in the new C-Leg update. Why?
Andreas Hogh: We did this to create a kind of individualisation. The standard shield inserts are available in different colours and in graphic patterns. To express one's personality is a deep-seated need.

You keep seeing models with prostheses that present the "high-tech look." Is there a general trend towards the conscious display of the prosthesis?
Andreas Hogh: We monitor trends very closely and respond to them where we can. Many people are more progressive with their prostheses than they were a few years ago. Social media also drives this perception. Perhaps one could even go so far as to call this a trend towards education or de-stigmatisation. Nothing gives us more pleasure than to see that a person likes to wear our product and is proud to show it off.

What examples can you think of?
Andreas Hogh: Nike presented models with prostheses and designed the "Nike Go FlyEase" with a slip-in mechanism, so that arm amputees do not need hands to tie the shoes. For hand prostheses, which are covered by clothing even less frequently, there is also a noticeable trend in favour of a high-tech look. The film and computer game industry has changed people's viewing habits and created more acceptance for the tech look.

What role do computer games and movies play?
Andreas Hogh: Time and again, we see people from the cosplay scene recreating bionic limbs or entire suits of game characters that actually work. A company has also functionally recreated a hand prosthesis from the game "Deus Ex." This again is a good example of how 3D printing has revolutionised the industry. That's good for an eye-catcher, but our approach at Ottobock is fundamentally different. We want to empower people with our products to take back their everyday lives.

How could the desire for individuality in the O&P industry be met even more effectively?
Andreas Hogh: Through iFab, meaning “individual fabrication”, Ottobock offers the possibility of individualisation. Perhaps in the future, we will be able to generate solutions in cooperation with iFab that form a symbiosis of the user's wishes and the Ottobock design language. O&P professionals also offer further possibilities for individualisation of the socket design.

Users want more and more different colours and patterns. Why are they not offered?
Andreas Hogh: In order to understand this, I have to elaborate a bit. The frames and surface finishing are created by hand. This is a complex process that we as a medical device manufacturer have to maintain over a long period of time. I learned how to paint cars, and I know what that means. You get a Porsche in the colour you want. It costs extra, and not a little. So there is no way to do this yet. However, this is not the first time we have heard about this topic and we have ideas on how to further implement individualisation requests. As with cars, you could work with a different technology instead of painting and offer a larger selection of hues. However, these should fit into the product portfolio and colour schemes. We also have to consider the durability and visual quality of our current products. The most beautiful joint is of little value if it gets totally scratched during the first walk.

How do you describe this line between design demands and feasibility?
Andreas Hogh: Design is a purchasing criterion and a flagship for quality. In addition, it is not limited to the external form alone. Much is aimed at manufacturability, user-friendliness and the use of resources. There is little point in pushing through a design that drives up costs, for example. Industrial design is about a daily struggle for the best solution. Wearers don't want a “lump on the leg.” A beautiful and well-functioning product that you like to wear is an enrichment for your quality of life.

What design criteria are the most important in prosthetics?
Andreas Hogh: User-friendliness above all else. A product that looks beautiful but doesn't work won't last. The often quoted design motto is “form follows function”! Nevertheless: A prosthesis is a very emotional product and is worn on the body. Design is the bridge to the human being. An overloaded product is unnecessarily confusing and often regarded as a foreign object. To mention one more design principle: The “MAYA principle”

means “most advanced, yet acceptable.” It describes the need to meet people in their place and time, because perceptions only change gradually.

Is there still such as thing classic masculine or feminine design in prosthetics? And if so, what are the differences?
Andreas Hogh: The concepts of classic masculine or feminine are blurred. There is no difference with regard to formal aesthetics, since body parts such as the calf or the hands are similar in their basic structure. We developed two colour schemes: Grey and technical, as well as a champagne hue combined with a brown hue, which is perceived as warmer and closer to the body.

The design of the new C-Leg

A prosthesis must have the perfect design for everyone – for the teenager as well as for the pensioner. How are the differences reflected in the design?
Andreas Hogh: Research and studies help us take such differences into account. A precise understanding of the target group is the most important thing, meaning who they are and what their everyday life looks like. Thus, the sneaker-wearing teenager will have a different requirement profile than the pensioner. What we use as design tools, among other things, are the design vocabulary derived from the human body and the requirements the product has to meet. Thus we employ a design vocabulary that ranges from restrained, quiet or rounded to more expressive, active or curvilinear.

Is it possible to design different prostheses for older and for younger people?

Andreas Hogh: It is important to consider the person's mobility grade in our analysis. Differences such as age, height, weight, motivation, mobility, experience, environment and personal taste open up a wide corridor. This needs to be simplified. We reduce or increase form factors depending on the requirement profile. For example, we see that older people tend to resort to natural foam cosmetics, which they pull over the prosthesis. Younger ones hide the prosthesis less often.

Can you give a concrete example of such form factors?
Andreas Hogh: With the Kenevo, a prosthesis for less active users, we have joined two circles. They appear calm and closed. With the more dynamic C-Leg, two circular segments are connected, which describe a drop shape and indicate a direction. The third level of dynamics, as with the Genium, is to form an ellipse from the circle, which appears more dynamic. In addition, the ellipse was tilted by 45 degrees to create an ascending diagonal. The sum of such details creates a more active and dynamic or a more stable and secure impression.

Increase in dynamics with the Kenevo (1), C-Leg (2) and Genium (3, from left to right)

Which prosthesis is the best from a designer's perspective and why?
Andreas Hogh: That's like asking a father which of his children he loves most! Each prosthesis serves a specific purpose. There are restrained models like the Kenevo and expressive models like the Genium X3 and the bebionic hand prosthesis. Personally, I am fascinated by the expressive models. But what fascinates me even more is what a prosthesis means to a person and what you can do with it.

Thank you!

Further Details & Links

- C-Leg Birthday Party on OTWorld (Leipzig): Tuesday, 10th. May 2022, 14:00–14:30 h / Daily show: 10.-13. May, 13:30–14:00h
- OTWorld Programm
- Video: 25 years of C-Leg
- 25 years of C-Leg Website (from 10.05.2022)
- Videos of the new C-Leg (for professionals):
  New Factory Settings
  Prosthetic Alignment
  Walking down ramps and stairs
  Supported Sitting Down
  Safety mode flexion resistance
  Training Function
  Stance Function
  MyMode Plus

About Ottobock
For more than 100 years, Ottobock has been developing innovative fitting solutions for people with reduced mobility. As a Human Empowerment Company, Ottobock promotes freedom of movement, quality for life and independence. This is supported by more than 8,000 employees. With innovative power, outstanding technical solutions and services in the fields of Prosthetics, Orthotics, NeuroMobility and Patient Care, they enable people in more than 130 countries to live their lives the way they want them to. As the world market leader in technical orthopaedics, the company founded in 1919 is constantly setting new standards and pushing ahead with the digitalisation of the industry – together with its partners, the medical supply companies and international research institutions. Since 2012, Ottobock has been transferring its expertise in biomechanics to exoskeletons for ergonomic workplaces. The international activities of the company are coordinated from the head office in Duderstadt (state of Lower Saxony). Ottobock has been supporting the Paralympic Games with its technical expertise since 1988.

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