

### **Compact, robust, light – the world's first touch-sensing prosthetic hand**

The start-up company Vincent Systems in Karlsruhe has developed and marketed the world's first touch-sensing prosthetic hand – and a lightweight construction that uses aluminium is an integral part of it. For the first time it achieves anatomical proportions. This was made possible by small drives, which were developed especially for this application, a compact and robust construction, and lightweight aluminium-magnesium alloys in the structure.

In form, dimensions and feel, the highly complex Vincent evolution2 prosthesis seems like a real hand, and all of the fingers can be moved by electric motors. Until now, other electronic models have been heavier than the human hand, because of the integrated technology. Made of high-strength aluminium-magnesium alloys, the bionic model weighs only 380 grams and matches its human counterpart in terms of size, weight and anatomical form.

Light materials such as carbon or titanium are also used. The production of parts such as drives and couplings is quite involved. Techniques such as machining, laser sintering, laser welding, water jet cutting, grinding or eroding are used for this.

The filigree prosthetic hand is driven by six small battery-operated motors. They allow a selection of 12 grip types, more than 20 hand positions, and any number of intermediate positions, which can be achieved by the wearer in a short time using merely 2 muscle signals – so-called EMG signals – without any other aids.

VINCENTevolution2 is also the first prosthetic hand to have a sense of touch. A force feedback conveys a feeling of touch and gripping force to the wearer, from the tip of the prosthetic finger. A soft-shell adaptation creates a natural feel similar to the human hand. A silicon skin drawn over it – a so-called cosmetic glove – allows the prosthetic hand to look very natural.

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