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Precise thumb movement with grease-free lead screw technology in bionic hand prosthesis

Polish company Aether Biomedical is building a bionic hand prosthesis. Its control system is based on EMG signals that come from the patient's muscles. Up to 152 N can be applied, giving the wearer a strong grip — for carrying bags up to 77 pounds, for example. To move the fingers precisely, Aether Biomedical's engineers rely on smooth-running, grease-free and quiet dryspin® lead screw assemblies.

Overview

- What was needed: High helix lead screw assembly for precise adjustment of the thumb position.
- Product requirements: Long service life, high efficiency, low weight, 100% grease and maintenance-free, cost-effective.
- Success for the customer: With the current solution, costs are optimized in relation to the function of the hand prosthesis.

Problem

The biggest challenge in the development of hand prostheses is the finger mechanism. The aim is to achieve the most accurate possible reproduction of human anatomical capabilities. Achieving a gripping force that meets the needs of everyday patient life is another major challenge.

The thumb is the strongest finger of the hand and its correct position is crucial to enable certain grips that are necessary for everyday use. When the thumb is positioned correctly, the patient can grip and lift more effectively.

This is particularly important for activities such as holding cutlery or opening doors. When adjusting the finger position, it is important to ensure that the thumb can make small, precise movements that correspond to its vertical axis. This should enable finer control and accuracy when handling objects.

The designers at Aether Biomedical were looking for the right linear technology to optimize the thumb's movement mechanism.

Solution

A dryspin high-helix lead screw with a lead screw nut made of iglide® W300 offers the patient the ability to safely perform precise movements to change the position of the thumb. This is immensely important for accuracy and control in everyday activities.

The lead screw assembly operates quietly, which increases patient comfort. In addition, the coordinated components ensure smooth movement without the patient having to exert any additional force. For example, objects weighing up to 77 pounds can be lifted.

The prosthesis helps the patient to stand up from a seated position, thus ensuring additional stability and safety. The patient can be 100% confident that the movements will be reliable and without unexpected disruptions. dryspin lead screw technology requires no external lubrication or maintenance. From both the designer's and the patient's point of view, these are important advantages in terms of both functionality and user-friendliness.

"We have not considered alternative bearing products. There was direct cooperation with representatives from igus. It worked very well and we are very satisfied with the form of cooperation and its results"

Marta Szymanowska
COO, Aether Biomedical