

Case Study: Erik Bjarnason

Age:	53 y/o male
Cause:	Amputation secondary to frostbite
Vocation:	Firefighter; Search-and-Rescue Volunteer
Interventions:	Four MCPDrivers™, ThumbDriver™

Purpose

A discussion of the benefits provided by a functional, prosthetic intervention for an individual with multidigit finger amputations, after provision of four Naked Prosthetics' MCPDrivers™ and a ThumbDriver™.

Patient History

Erik is a 39-year-old male who presented with severe, bilateral upper extremity frostbite resulting in the partial amputations of nine digits. Following the initial amputation and debridement of necrotic tissue, an additional combined subdermal pocket procedure and abdominal flap was performed to salvage and recreate additional length to his right digits. This process required a total of 12 subsequent operations over the course of two years to shape new digits from the abdominal tissue.

Upon the completion of all surgical procedures, digits two through four of the right hand had gained length approximate to middle phalanx length with non-functioning PIP joints. The lengths of his left digits were untouched surgically leaving him with midproximal phalanx amputations on digits 2-5 and an IP disarticulation of the thumb as a result of the initial frostbite amputation.

Patient Objectives

Post injury, Erik was vocationally required to retest in firefighting physical ability and aptitude, including events such as swinging a fire axe, working a chainsaw, and holding large hoses charged with extreme water pressure. Due to his inability to grasp large objects safely, these tasks were both challenging and dangerous for Erik to perform. He noted, "Everything was different, everything was more difficult, everything was harder."



Psychologically, this physical change also had a dramatic impact on Erik's outlook. As he says, "The first thing people who lose their hands do is buy a hoodie, so they can hide their hands." He felt stigmatized by others and

invisible to the outside world. He began isolating himself. "I started to really suffer. I started to self-medicate with alcohol. I walked away from a beautiful marriage. I just couldn't deal with it."

Prosthetic Intervention

Erik was initially fit with a cosmetic restoration, which was unable to provide adequate strength and functionality for his necessary tasks, and which he quickly abandoned. "It was like living my life wearing an oven mitt."

14 years after his injury, in early 2019, Erik was fit with a five-digit Naked Prosthetics system for his left hand – four MCPDrivers™ and one ThumbDriver™. Each digit was custom-designed to his unique residua for an intimate fit and robust ability to provide intuitive articulation.



Each device is driven off the intact MCP joint proximal to the amputation and actuates artificial PIP and DIP joints and phalanges to mimic the natural motion of each digit. The ThumbDriver™ is uniquely driven off both the intact CMC and MCP joint, providing IP

joint flexion and real-time tracking of the complex, multi-axial motion of the thumb. These devices help restore length, dexterity, and power to the hand.

Outcome

Since receiving his devices, Erik is now able to safely operate a chainsaw and hold a powerful water hose with ease. "If I grab something big, it feels natural... Swinging a fire axe, holding heavy equipment – it's automatic, so much easier. It's fantastic." Psychologically, Erik reports that he feels like he has "a complete, full hand again." He no longer feels self-conscious about the way his hands look. "Now when people stare, it is because they see something interesting."

Of his right hand, he notes that given the choice to go back with the knowledge he has now, he likely would have opted not to have the abdominal flap surgery. He finds the additional length gained in his digits "doesn't make much difference" but will make future prosthetic fit more challenging due to the added length. The surgeries also took years of time and energy, and the resultant aesthetic is still displeasing to him. Conversely, he notes of his left prosthesis, "I've been waiting for this since my accident. This is the best thing that I've ever found."

