

MULTI- ARTICULATING PROSTHESES

Functional and Clinical
Evidence *

FUNCTIONAL BENEFITS

Product Feature	Multi-Articulating Technology
Functional benefit	Improves function: "Improved function for individuals after being fit with multi-articulating full and partial hand prostheses"
Reference	Whelan, L., and N. Wagner. "Analysis of Factors Influencing Outcomes of Full and Partial Hand Multi-Articulating Prostheses." Journal of Hand Therapy 29, no. 3 (July 2016): 363. https://doi.org/10.1016/j.jht.2014.08.015 . (Abstract)

Product Feature	Multi-Articulating Technology
Functional benefit	Reduction in self-perception of disability: "Subjects who utilize electric multi- articulating hand and digits perceived themselves 'less disabled' when compared to hand transplant subjects"
Reference	Atkins, D. "Preliminary Outcomes Comparing Function of Electric Multi-Articulating Hands and Digits, Toe-to-Hand Transfers and Hand Transplantations." Journal of Proceedings from the American Academy of Orthotists and Prosthetists, 2014. Accessed August 30, 2018. http://media.mycrowdwisdom.com.s3.amazonaws.com/aaop/Resources/JOP/2014/2014-08.pdf . (Abstract)

Product Feature	Multi-Articulating Technology: i-Digits™
Functional benefit	Restores hand function for partial hand amputees: "The prosthesis reduced functional deficits and decreased joint range of motion in individuals with partial hand loss." "Significant improvement was seen in Southampton Hand Assessment Procedure scores in the five-digit limb loss participants using the prosthesis compared with not using the device"
Reference	Wanamaker, Andrea B, Lynsay R Whelan, Jeremy Farley, and Ajit MW Chaudhari. "Biomechanical Analysis of Users of Multi-Articulating Externally Powered Prostheses with and without Their Device." Prosthetics and Orthotics International, August 30, 2019, 030936461987118. https://doi.org/10.1177/0309364619871185 . (Abstract)

Product Feature	Multiple Control Strategy Options
Functional benefit	Individualisation of control methods improves user function: "By allowing the user to choose which strategy to use for each trigger, the user is empowered with improved control and functionality of the device"
Reference	Vilarino, Martin, Jayet Moon, Kasey Rogner Pool, Joby Varghese, Tiffany Ryan, Nitish V Thakor, and Rahul Kaliki. "Outcomes and Perception of a Conventional and Alternative Myoelectric Control Strategy: A Study of Experienced and New Multiarticulating Hand Users." Journal of Prosthetics and Orthotics 27, no. 2 (2015): 10.

Product Feature	Pre-Defined Grips
Functional benefit	Improved satisfaction by simplifying the use of the multi-articulated hand: "The preset grip patterns simplified the complex control of the multiarticulated i-Limb hand, which also contributed to patient satisfaction"
Reference	Niet, Olga van der, Raoul M. Bongers, and Corry K. van der Sluis. "Functionality of i-Limb and i-Limb Pulse Hands: Case Report." Journal of Rehabilitation Research and Development 50, no. 8 (2013): 1123–28. https://doi.org/10.1682/JRRD.2012.08.0140 .

FUNCTIONAL BENEFITS

Product Feature	Individually Powered Digits
Functional benefit	Enabling users to achieve finer, more complex control: “More dexterity can be achieved”
Reference	Castellini, Claudio. “ Upper Limb Active Prosthetic Systems—Overview. ” In <i>Wearable Robotics</i> , 365–76. Elsevier, 2020. https://doi.org/10.1016/B978-0-12-814659-0.00019-9 .

Product Feature	Externally Powered Partial Hand Prosthesis: i-Digits™
Functional benefit	Significant functional improvements in objective hand functional and individualised goals.
Reference	Whelan, L., and J. Farley. “ Functional Outcomes With Externally Powered Partial Hand Prostheses. ” <i>Prosthetics and Orthotics International</i> , no. 2018;30 (2018): 69–73. https://journals.lww.com/jpojournal/Fulltext/2018/04000/Functional_Outcomes_with_Externally_Powered.3.aspx Migueluez, J., Conyers, D., Prigge, P., Ryan, T., Peterson, J. “ Electric Digits Case Studies: Unique Prosthetic Solutions for Contrasting Limb Presentations ” <i>Journal of Proceedings from the American Academy of Orthotists and Prosthetists</i> , 2014. http://media.mycrowdwisdom.com.s3.amazonaws.com/aaop/Resources/JOP/2014/2014-14.pdf (Abstract)

Product Feature	Gesture Control
Functional benefit	Provides a simplified alternative control strategy for changing grips: “participants showing proficient proportional control were not automatically good at producing well-tuned grip-switching”
Reference	Heerschop, Anniek, Corry K. van der Sluis, Egbert Otten, and Raoul M. Bongers. “ Looking beyond Proportional Control: The Relevance of Mode Switching in Learning to Operate Multi-Articulating Myoelectric Upper-Limb Prostheses. ” <i>Biomedical Signal Processing and Control</i> 55 (January 2020): 101647. https://doi.org/10.1016/j.bspc.2019.101647 .

Product Feature	Stall Out and Compliant Grip
Functional benefit	Allows user to individualise a grip quickly for ease of use in daily tasks: “i-Limb prosthetic hands have six degrees of freedom where some are passively operated; they must be activated by the user using a counteracting surface or the intact limb.”
Reference	Castellini, Claudio. “ Upper Limb Active Prosthetic Systems—Overview. ” In <i>Wearable Robotics</i> , 365–76. Elsevier, 2020. https://doi.org/10.1016/B978-0-12-814659-0.00019-9 .

HEALTH BENEFITS

Product Feature	Multi-Articulating Technology
Health benefit	Protection of sound limb by reducing compensatory movements: “The presence of a functioning prosthesis may limit the development of overuse injuries when compared with the use of a static, cosmetic prosthesis or no prosthesis at all.”
Reference	Gambrell, Christina Rock. “Overuse Syndrome and the Unilateral Upper Limb Amputee: Consequences and Prevention.” JPO Journal of Prosthetics and Orthotics 20, no. 3 (July 2008): 126–32. https://doi.org/10.1097/JPO.0b013e31817ecb16

Product Feature	Myo-Electric Control
Health benefit	Reduction in overuse injuries. Carpal tunnel syndrome was found in 0% of myoelectric participants, 33% of body-powered participants, 46% of passive prosthesis wearers, and 100% of non-prosthesis wearers showing a significant association between CTS and type of prosthesis.
Reference	Burger, Helena, and Gaj Vidmar. “A Survey of Overuse Problems in Patients with Acquired or Congenital Upper Limb Deficiency.” Prosthetics and Orthotics International 40, no. 4 (August 1, 2016): 497–502. https://doi.org/10.1177/0309364615584658 .

Product Feature	Multi-Articulating Technology
Health benefit	Gains in Quality of Life. Prosthetic use may increase the functional capacity of a person with a missing hand and could shorten the return-to-work process
Reference	“Upper Limb Prostheses - A Review of the Literature With a Focus on Myoelectric Hands.” 2011, 90. WorkSafe BC Evidence-Based Practice Group; Dr. Craig W. Martin (Working group/meta analysis)

Product Feature	Microprocessor Technology
Health benefit	Improvements in upper limb Kinematics: “an externally powered hand prosthesis restores function to individuals with partial-hand limb loss, as demonstrated by improved SHAP scores and changes in upper limb kinematics.”
Reference	Wanamaker, Andrea B, Lynsay R Whelan, Jeremy Farley, and Ajit MW Chaudhari. “Biomechanical Analysis of Users of Multi-Articulating Externally Powered Prostheses with and without Their Device.” Prosthetics and Orthotics International, August 30, 2019, 030936461987118. https://doi.org/10.1177/0309364619871185 . (Abstract)

Product Feature	Multi-Articulating Technology: i-Digits™
Health benefit	Reduced compensatory movements: “An externally powered hand prosthesis restores function to individuals with partial-hand limb loss, as demonstrated by improved SHAP scores and changes in upper limb kinematics. The kinematic analysis of three functional tasks resulted in the prosthesis condition having decreased upper limb joint range of motion (ROM) compared to the non-prosthesis condition.”
Reference	Wanamaker, Andrea B, Lynsay R Whelan, Jeremy Farley, and Ajit MW Chaudhari. “Biomechanical Analysis of Users of Multi-Articulating Externally Powered Prostheses with and without Their Device.” Prosthetics and Orthotics International, August 30, 2019, 030936461987118. https://doi.org/10.1177/0309364619871185 . (Abstract)

HEALTH BENEFITS

Product Feature	Myo-Electric Technology: i-Digits™
Health benefit	Reduction in phantom pain/sensation: "CAPROQ-R responses also indicate that with electric digits, subjects rely less on others and perceive a reduction in phantom pain/sensation"
Reference	Migueluez, J., Conyers, D., Prigge, P., Ryan, T., Peterson, J. "Electric Digits Case Studies: Unique Prosthetic Solutions for Contrasting Limb Presentations" Journal of Proceedings from the American Academy of Orthotists and Prosthetists, 2014. http://media.mycrowdwisdom.com.s3.amazonaws.com/aaop/Resources/JOP/2014/2014-14.pdf (Abstract)

Product Feature	Myo-Electric Technology: i-Digits
Health benefit	Psychosocial benefit: 'Increased independence' and 'Improved self-image'
Reference	Atkins, D, J. "A One Year Retrospective Overview of Partial Hand Patients Using ProDigits" From "MEC 11 Raising the Standard," Proceedings of the 2011 MyoElectric Controls/Powered Prosthetics Symposium in Fredericton, New Brunswick, Canada, 2011 (Abstract)

Product Feature	Multi-Articulating Technology: i-Digits
Health benefit	Prevention of overuse injuries: 'Improvements were noted in addressing psychological challenges, preventing overuse of the uninjured hand, and improving patient acceptance of the prosthesis'
Reference	Varghese, J. "Therapeutic Challenges in Partial Hand Prosthetic Rehabilitation" Journal of Proceedings from the American Academy of Orthotists and Prosthetists, 2014 (Abstract)

LIFESTYLE BENEFITS

Product Feature	Myo-Electric Control
Lifestyle benefit	Gains in Quality of Life: "Prosthetic use may increase the functional capacity of a person with a missing hand and could shorten the return-to-work process."
Reference	"Upper Limb Prostheses - A Review of the Literature With a Focus on Myoelectric Hands." 2011, 90. WorkSafe BC Evidence-Based Practice Group; Dr. Craig W. Martin (Working group/meta analysis)

Product Feature	Control Method Technology (Gesture, App and Grip Chips)
Lifestyle benefit	Choice of control strategy for improved control and function: "By allowing the user to choose which strategy to use for each trigger, the user is empowered with improved control and functionality of the device"
Reference	Vilarino, Martin, Jayet Moon, Kasey Rogner Pool, Joby Varghese, Tiffany Ryan, Nitish V Thakor, and Rahul Kaliki. "Outcomes and Perception of a Conventional and Alternative Myoelectric Control Strategy: A Study of Experienced and New Multiarticulating Hand Users." Journal of Prosthetics and Orthotics 27, no. 2 (2015): 10.

LIFESTYLE BENEFITS

Product Feature	i-Digits™
Lifestyle benefit	Independence: "With no prosthesis, partial hand amputees have compromised hand function on the injured side. Electric digits restore significant functional ability to the injured hand. CAPROQ-R responses also indicate that with electric digits, subjects rely less on others and perceive a reduction in phantom pain/sensation."
Reference	Migueluez, J., Conyers, D., Prigge, P., Ryan, T., Peterson, J. "Electric Digits Case Studies: Unique Prosthetic Solutions for Contrasting Limb Presentations" Journal of Proceedings from the American Academy of Orthotists and Prosthetists, 2014. http://media.mycrowdwisdom.com.s3.amazonaws.com/aaop/Resources/JOP/2014/2014-14.pdf (Abstract)

Product Feature	i-Digits: Customisation
Lifestyle benefit	Highly customisable for specific requirements: "Customised to meet the various presentations and needs of partial hand patients will meet the patient's expectations for rehabilitation and result in improved outcomes. Externally powered prostheses are functional for many daily activities"
Reference	Baun, K., N. Kearns, and T. Ryan. "Partial Hand Amputation – Outcome Measure Data to Support a Patient-Centred Approach to Successful Fitting of New Technologies." Journal of Hand Therapy 31, no. 1 (January 2018): 160–61. https://doi.org/10.1016/j.jht.2017.11.026 (Abstract)

Product Feature	i-Digits
Lifestyle benefit	Increased independence and Improved self-image: "Those with congenital limb absence found value and benefit with ProDigits particularly as it related to 'Feeling greater potential for successes and 'Overall feeling more capable.' In spite of their perceived independence prior to receiving ProDigits, they indeed see benefits and value in ProDigits as it related to 'Increased independence' and 'Improved self-image.' The eleven individuals who had lost part of one or both hands in traumatic injury or disease, had similar objective responses particularly in the areas of 'Overall well-being' and 'Independence.' Those with bilateral partial hand loss were impacted most by ProDigits as it related to 'Increased activity and participation in life.'
Reference	Atkins, D, J. "A One Year Retrospective Overview of Partial Hand Patients Using ProDigits" From "MEC 11 Raising the Standard," Proceedings of the 2011 MyoElectric Controls/Powered Prosthetics Symposium in Fredericton, New Brunswick, Canada, 2011 (Abstract)

Product Feature	i-Digits
Lifestyle benefit	Overcoming psychological challenges and patient acceptance of the prosthesis: "Improvements were noted in addressing psychological challenges, preventing overuse of the uninjured hand, and improving patient acceptance of the prosthesis"
Reference	Varghese, J. "Therapeutic Challenges in Partial Hand Prosthetic Rehabilitation" Journal of Proceedings from the American Academy of Orthotists and Prosthetists, 2014 (Abstract)

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