

ROBOTICDESIGN

The Publication for Precision Robotic Design

Fall 2017

A silhouette of a person running on a hill at sunset. The person is in mid-stride, wearing a long-sleeved shirt and pants. The background shows a sunset sky with clouds and a rocky outcrop on the right.

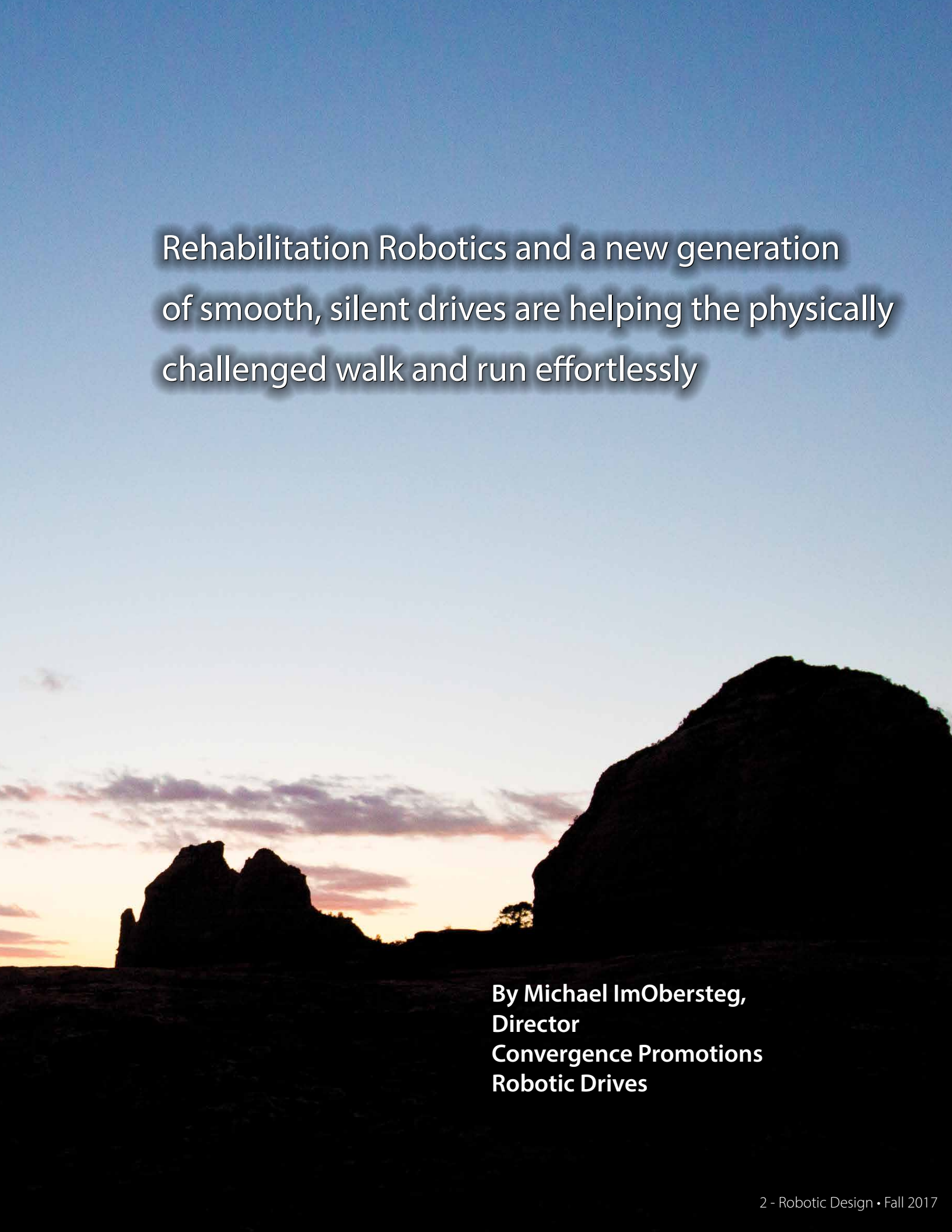
Precision Drives
Power a New
Generation of
Medical Devices

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Precision Drives Power a New Generation of Prosthetics



A landscape photograph showing a sunset or sunrise over a field. The sky is a mix of blue, orange, and yellow, with some clouds. In the foreground, there are dark silhouettes of hills and mountains. The text is overlaid on the upper part of the image.

Rehabilitation Robotics and a new generation
of smooth, silent drives are helping the physically
challenged walk and run effortlessly

**By Michael ImObersteg,
Director
Convergence Promotions
Robotic Drives**

This article will illustrate how a mechanical element of the robotics, a break-through motor designed for this type of application, is helping to revolutionize the prosthetic limb.

Recent innovations in a new field called Rehabilitation Robotics are helping people all over the world overcome their disabilities. Technology is struggling to keep up with the new demand for solutions that provide the realism and accuracy their products demand.

One such area is motion control and the other is the motor itself. RoboDrive motors by TQ-Group has been specifically designed to meet the demanding requirements of the new generation of medical products.

RoboDrive – a new lightweight, precision, high-torque solution for Robotics

Challenges faced by the robotic community in the field of prosthetics are seen in other physical human-robot interaction (PHRI) and include power, size, weight, and safety. Also, motors that drive prosthe

A New Paradigm in Precision and Power

Prosthetic designers can control RoboDrive motors to stop at up to 6.3 million increments for extreme positioning accuracy in position control leg movement, providing a quick, smooth, continuous operation or gait, and the incredible torque produces power to spare.

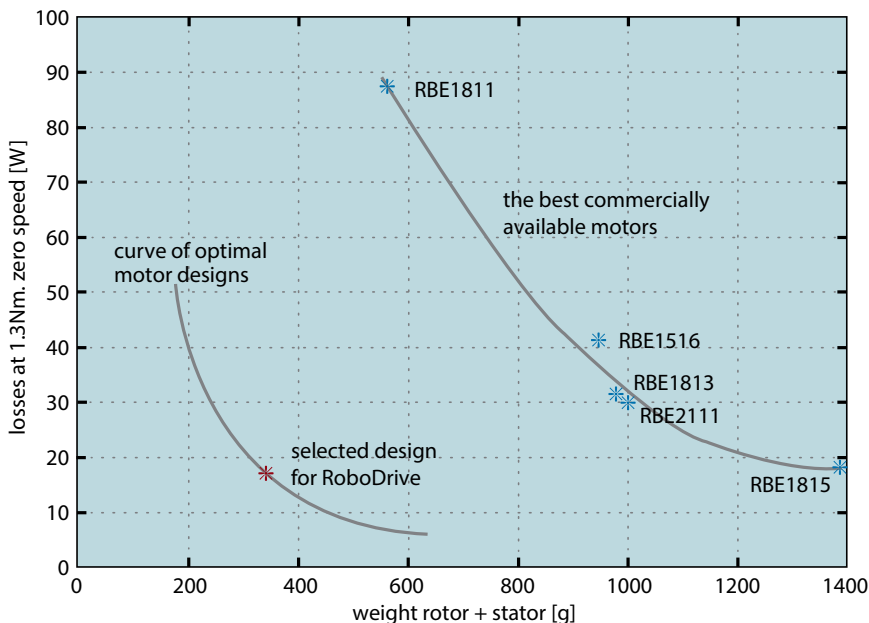
A major goal of prosthetic design is to closely resemble a human leg, so it is essential to keep the mechanics as compact as possible (the Rotor and Stator of the smallest TQ RoboDrive is an incredibly tiny 25m).

TQ-Group has designed these motors with a hollow shaft so that wires, fluids, and other media can pass through the inside of the motor. By eliminating bulky outside wire or cable routing, this feature helps designers reach their goal of casting a natural outward appearance of a real leg.

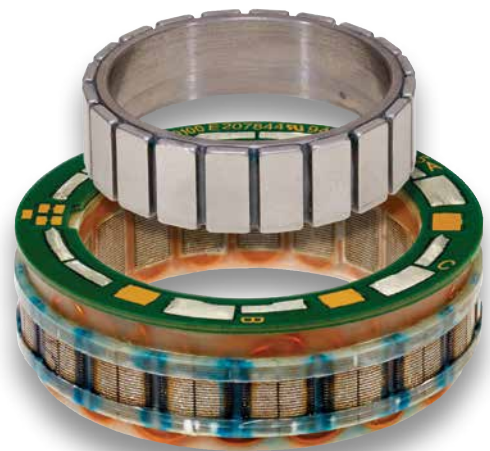
RoboDrive technology provides the highest power density at maximum torque range and overload capability in a compact design, providing:

- High Dynamics
- Alternative voltage levels
- Increased speeds
- Customized torque adaptations

Optional hollow shaft motors allow designers to run fluids, cables or lasers through the center of the motor—providing maximum functionality with minimal footprint.



A comparison of TQ's RoboDrive motors with the best commercially available motors show TQ's RoboDrive motors provide the same torque at half the size and weight, dissipating only half of the losses (performance curve on the left).





“RoboDrives occupy a unique place in the robotics industry: They are specifically designed for applications requiring high dynamics and a level of precision not found in standard motors.”

Michael ImObersteg
Director,
Convergence
Promotions LLC,
Robotic Design

Summary

The future goal of prosthetics and exoskeletons is to provide relief for more than just people suffering from limb loss—the elderly will benefit as well. Today, almost 20% of the world population is over 65, and this figure is predicted to exceed 35% by 2050. This demographic shift will impose an enormous burden of care required to treat the elderly, and robotic solutions will enable them to regain their independence and maintain an enriching, fulfilling lifestyle.



With the stator-rotor installation kits of the ILM series RoboDrive offers solutions for structurally integrated drive engineering. The RoboDrive technology provides the highest power density at maximum torque range and overload capability in a compact design. The flexible concept offers solutions for a variety of demanding drive applications and is available in sizes from 25mm to 115 mm. On request alternative voltage levels, increased speeds and customized torque adaptations are possible.

In the future, the ability to replace entire limbs with prosthetics will be used everywhere. Not only will these prosthetics be a replication of the wearer's biological functions, but they will also cast a natural outward appearance and require minimal upkeep. To accomplish these future goals, new technology including motors, sensors, microprocessors, actuators, drivers and the HMI interface have to be continuously developed and improved.

Continuing the progress of prosthetic technology calls for funding from organizations willing to provide resources, and Convergence Promotions is helping to lead the movement to accelerate the prosthetics of the future.

The Rehabilitation Robotics Initiative

Led by Michael ImObersteg and Convergence Promotions LLC, the goal of this initiative is to provide motors, documentation, and engineering support to research institutions, companies, and universities developing robotic prosthetics. We are currently working with half a dozen Universities on this program, and expect the participation to expand rapidly in 2018 as the interest in providing robotic prosthetics and exoskeletons grows.

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Contact Michael at (925) 640-7042, or
michael@convergencepromotions.com.
For more information on RoboDrive:
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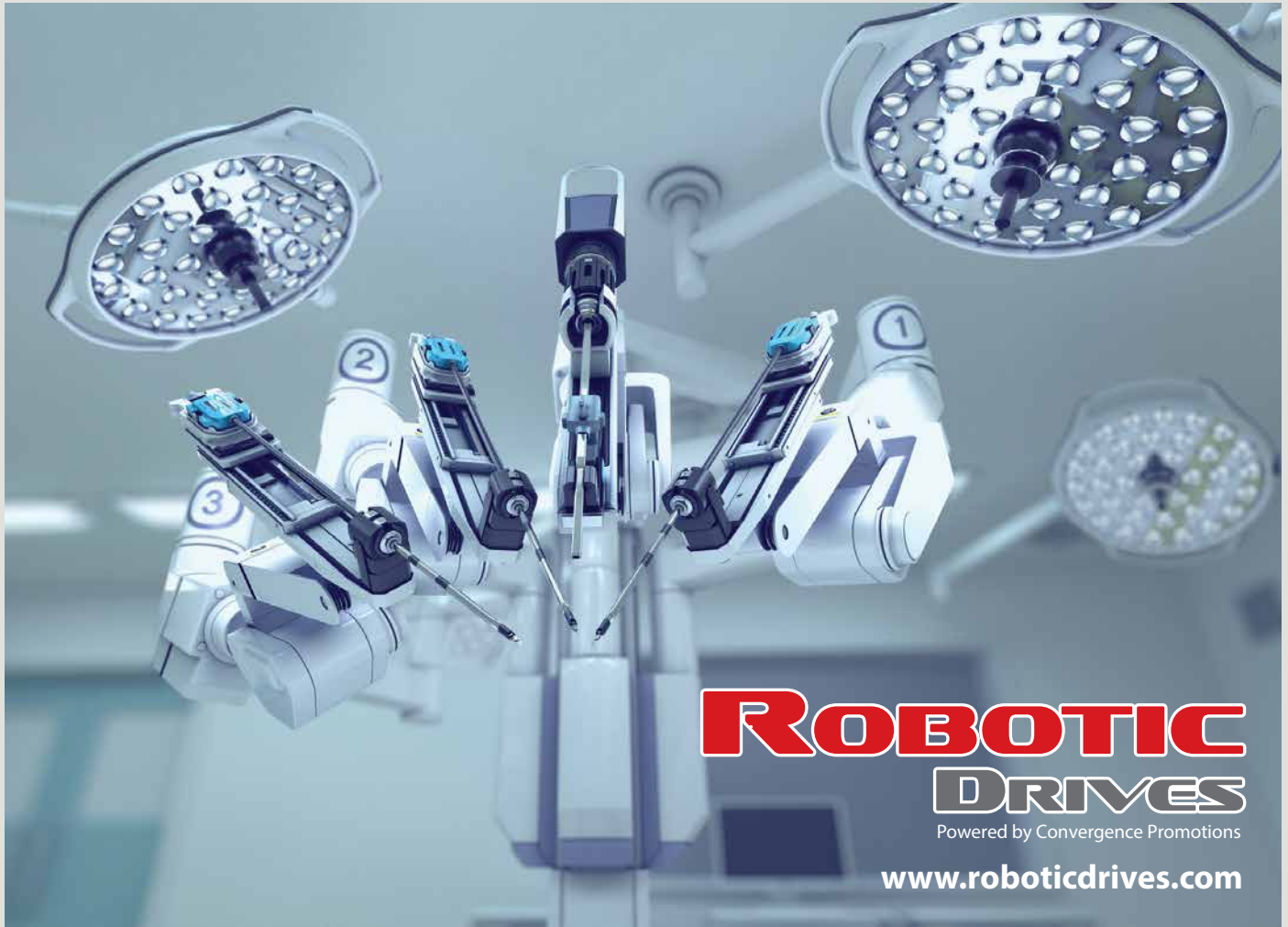
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RoboDrive: when 'Standard' isn't good enough

RoboDrive technology provides the highest power density at maximum torque range and overload capability in a compact design. These exceptional performance characteristics make RoboDrive the ideal choice for medical, robotic and aerospace applications. The variable concept offers solutions for a variety of demanding drive applications, including:

- High Dynamics
- Alternative voltage levels
- Increased speeds
- Customized torque adaptations
- Select from a variety of sizes, from small (25mm) to large (115mm)
- Available as rotor and stator kits for design-ins, or in housings.
- Optional hollow shaft motors allow designers to run fluids, cables or lasers through the center of the motor--providing maximum functionality with minimal footprint.

For more information about TQ RoboDrive: www.roboticdrives.com.

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