

# SHAMP BIONICS QUARTERLY

Three Generations of Prosthetic Care

Since 1957

# Some Amazing Feats Are Possible

**Prosthetics** 

**Today** 

he terms "blazing speed" and "amputee" don't seem to belong in the same sentence. Neither do "Nordic skiing" and "limb loss" or "wakeboarding" and "disarticulation."

But the fact is, a great many people with congenital or acquired limb deficiencies are turning in some amazing athletic performances these days in a variety of sports competitions. Moreover, for every "serious" competitor in organized events, there are a hundreds more amputees now competing in recreational sports

from golf to soccer to snowboarding to baseball, thanks to steadily improving prosthetic limb designs.

Each year, the number and skill level of amputee athletes increases, aided by innovative specialized componentry designed



Courtesy Extremity Events Network

specifically to boost their performance and enjoyment of life. Moreover, these improvements are blurring the line between "able" and "disabled" competitors.

Consider South African sprinter Oscar Pistorius, 20, who in April 2007 became the first bilateral amputee to run the 100 meters in under 11 seconds. Sprinting on carbon-fibre leaf-spring Cheetah "running feet," Pistorius blistered the track in 10.91 seconds, a new amputee world record, then proceeded to

establish new world standards in the 200 meters (21.58 seconds) and 400 meters (49.16 seconds) for good measure.

His times are so fast that "the fastest man on no legs" is considered by some to have an unfair advantage over "able" sprinters due to the advanced performance of his prosthetic limbs. How to relate the performances of prosthetically "enhanced" athletes with those of their able-bodied counterparts is a growing issue as componentry continues to improve.

Conceivably, top amputee athletes could begin competing in standard athletic events instead of separate competitions designed specifically for disabled participants, such as the Paralympics, O&P Extreme Games and others (see page 2). For our part, however, we

will leave those questions to the sports ethicists. As rehabilitation professionals dedicated to helping our patients

achieve all they can in life, we are excited at the new capabilities these advanced components are making possible.

Only a rare few amputees are capable of setting world records, of course. But these improvements have a trickle-down effect, making possible enhanced ability for "weekend warriors" who wear prostheses and even the far greater population



Advanced running foot
Courtesy Bionix Prosthetic Solutions

of amputees whose great performance is simply being able to walk across the room.

In this issue, we examine sports and recreation prosthetic components and some of the unique competitive events and organizations established for amputees.

We hope you find the discussion informative and helpful.

# **About Shamp Bionics**

Shamp Bionics Quarterly is a newsletter published by Shamp Bionics to keep physicians, therapists and other rehabilitation practitioners abreast of developments in the prosthetics discipline. We hope you find our publication to be current, interesting and professionally relevant.

Shamp Bionics is now approaching its sixth decade of meeting the needs of amputees since its founding by Norm Shamp in 1957. Now, as then, our professional focus is on providing the highest attainable level of patient care, combining leading edge technology with a small family atmosphere. Norm's grandson, certified prosthetist Mark Shamp, is now the company's lead practitioner.

Shamp Bionics is conveniently located off I-77 at the Arlington Road exit. We welcome your comments, suggestions, requests for additional information and referrals. Call us at 330-644-4201 or visit us on the internet at www.shampbionics.com.

# Amputee Athletes —Where There's a Will, There's a Game

rganized sports and recreation opportunities for amputees, both adults and children, have hit the big time. Where once only a handful organized sporting activities were available to amputees, there are now dozens.

If you visit the web site **www.activeamp.org**, you will find a directory containing no fewer than 36 different organized sports

activities for people with disabilities, notably amputees, along with contact information for the governing bodies. From Archery to Windsurfing, Scuba Diving to Sky Diving, Skiing to Sailing, and Hockey to Soccer, opportunities exist for motivated individuals with limb loss to remain active and socially engaged.

### **Competitive Sports**

Probably the best-known competition for true athletes with disabilities is the Paralympics, conducted after each Summer and Winter Olympic Games at the same venues. The Paralympic movement dates back to 1960 when the first Olympic-style games for athletes with a disability was conducted in Rome.

Courtesy Ohio Willow Wood In 1976, the first Paralympic Winter Games were held in Sweden. The governing body is the International Paralympic Committee, headquartered in Bonn, Germany.

The most recent Paralympic Summer Games held in 2004 in Athens, Greece attracted more than 3800 athletes from 136 countries competing in 19 events. The next Summer Games will be contested in Beijing, China in September 2008. The 2006 Winter Games brought 477 athletes from 39 countries to Turin, Italy to compete in alpine



Courtesy Extremity Events Network

skiing, ice sledge hockey, nordic skiing and/or wheelchair curling. The next Winter Games will open March 12, 2010 in Vancouver, Canada.

The U.S. Paralympic Committee, a division of the United States Olympic Committee (USOC), was formed in 2001 and is now an active force in preparing U.S. parathletes for international competitions.

Since 1967, **Disabled** Sports USA, a non-profit

organization founded by disabled Vietnam War veterans, has worked with amputees as well as people with various other orthopedic, neuromuscular and visual disabilities. Founded as the National Amputee Skiers Association, DS/USA now offers competitions and training camps across the country in many sports for both serious and recreational athletes who have a permanent disability.

The organization's programs are built around an understanding of the role sports activities and competition play in rehabilitation, rebuilding self-confidence and dignity, and learning to cope with challenge and change. Further,



incorporates shock

Courtesy Ohio

absorber.

DS/USA, as a member of the USOC, helps athletes with disabilities train for the Paralympic Summer and Winter Games in nordic skiing, swimming, track and field, power-lifting, volleyball, cycling, and other sports.

For recreational athletes, DS/USA chapters sponsor various competition opportunities in water sports (water skiing, sailing, kayaking, etc.), snow skiing, cycling, climbing, horseback riding and golf, among others. Of particular note is the annual Hartford Ski Spectacular, which showcases and teaches disabled skiers of all ages and skill levels in various events.

A new concept for amputee athletes, the **O&P Extremity Games**, made its debut in 2006 in Orlando with more than 500 athletes competing in four "extreme" events: skateboarding, rock climbing, wakeboarding and BMX racing. In addition, armed forces amputees wounded in Iraq or Afghanistan presented exhibitions in a variety of other sports.

The Extremity Games are sponsored by College Park Industries to raise awareness of the ability of individuals with limb loss or limb difference to compete in extreme sports, and to highlight current state-of-the-art prosthetic componentry. The 2007 Games, to be held July 19-21 again in Orlando, will include competition in kayaking, surfing, BMX and mountain biking, skateboarding, wakeboarding,

moto-X and rock climbing with \$5000 in cash prizes up for grabs in each event.

The Challenged Athletes Foundation raises funds to make sure that people with physical challenges have the same freedom to enjoy sports that able-bodied people take for granted. The CAF sponsors the annual San Diego Triathlon Challenge—a half Ironman event, which attracts world-class challenged athletes, professional triathletes and celebrities—and other events to fund its grants. The event has raised more than \$11 million over the past 13 years.

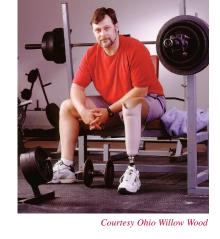
### **Recreational Opportunities**

While competition-level amputee athletes are the most newsworthy. those who compete for fun and fitness outnumber them many times over. The most popular of these recreational sports, at least among adults, is golf...hands down.

The National Amputee Golf Association was founded in 1954 and now sports more than 2500 members from the U.S. and 170



other countries. NAGA coordinates an active schedule of tournaments throughout the year, including the 59th National Amputee Championships and 9th Robinson Cup International Matches, Aug. 28-31 in Aurora, Ill. The association also presents a series of First Swing seminars and Learn to Golf clinics each year, designed to extend the fun and cama-



and people with other disabilities.

Courtesy Otto Bock Healthcare

The Eastern Amputee Golf Association serves as a regional amputee golfer organization, conducting tourna-

> ments and First Swing events in the Northeast U.S. and mid-Atlantic states and serving as a bridge between its more than 900 members and the national

association. Many other recreational sports programs for amputees and others with physical disabilities are available in different communities and states around the country. Check local listings and organizations as well as the major Internet search engines to check out those of your particular



Check Them out Additional information on the various competitions and organizations discussed in this article, as well as some others, can be found at the following web sites: Amputee Sports Directory - www.activeamp.org/sport\_dir.htm International Paralympics Committee - www.paralympic.org U.S. Paralympic team - www.usolympicteam.com/Paralympics/ Disabled Sports USA - www.dsusa.org 0&P Extremity Games - www.extremitygames.com Challenged Athletes Foundation - www.challengedathletes.org National Amputee Golf Association - www.nagagolf.org Eastern Amputee Golf Association - www.eaga.com American Amputee Soccer Association - www.ampsoccer.org American Amputee Hockey Association - www.usahockey.com Sailing Alternatives - sailingalternatives.org Amputee Surfers Association - www.ampsurf.com

Courtesy Eastern Amputee
Golf Association raderie of golf to amputees

# Sports Componentry No Longer a Barrier for Motivated Amputees

ccompanying the surge in competitive and recreation-fitness programs and events for amputees has been a resounding growth in research and development of high-tech, high impact and specialty prosthetic componentry to enable these special individuals to turn in some amazing sports performances or simply to enhance their enjoyment of life. Pathfinder foot

## **Lower-Extremity Systems**

The defining moment in the specialization of lower-limb prosthetic components for athletes probably occurred with application of ad-vanced carbon graphite materials, widely used in the aerospace industry for their high strength and flexibility properties, to create a dynamic-response foot. Not only did that innovation put a "spring" in the

amputee's step by storing, then releasing energy to assist in forward propulsion, it also provided enhanced shock absorption, reducing

> repetitive impact trauma on the wearer's residual limb, an important consideration for athletes whose sports involve walking or running.

Over the intervening 20-plus years, manufacturers have introduced dozens of dynamic response models for amputees of various capabilities, but the most rugged and dynamic are reserved for amputee athletes. For runners and other competitors seeking maximum performance from their prosthetic feet, the trend is to wear the prosthesis bare, i.e., without cosmesis, giving the world a normally unseen view of what a dynamic response foot looks like inside a footshell. Courtesy College Park Industries

Another option for reducing impact stress on an amputee athlete's residual limb is to incorporate a "shock pylon" between the prosthetic ankle and the distal prosthetic socket. In addition certain advanced prosthetic feet, such as the Ohio Willow Wood Pathfinder now incorporate a shock absorber in the foot assembly.

Socket design and stability are critical to an amputee athlete's performance and endurance. A popular design for active amputees is a "flexible" socket consisting of a high-strength outer frame and flexible inner socket, which accommodates muscle movement in the residual limb. Suction is the most common suspension method, using either a roll-on locking liner or a pure "pull-in" design. Some competitors also add secondary suspension, such as an external suspension sleeve, supracondylar cuff or, for above-knee amputees, a total elastic suspension (TES) belt.

(Continued on page 4)

# **Cutting-Edge Prosthetic Components Enable Amputees to Compete, Excel**

(Continued from page 3)

For recreational sports, an amputee's walking socket may well suffice, or at least serve as a starting point. Serious athletes likely will need specially customized sockets employing advanced designs and materials.

Knee components for above-knee amputee athletes must be rugged, responsive and reliable. Preferred knee systems for sports participants feature swing-phase or both swing- and stance-phase



Courtesy Eastern

hydraulic control. A new concept, the waterproof Energy Storing Prosthetic Knee, has been designed specifically for above-knee amputees competing in intense athletic competition and extreme sports, including rock climbing, inline skating, ice skating, skiing, snowboarding, surfing, wakeboarding and other water events.

Specialty components are available for use in specific sports. The Ski Foot, for example, connects directly to a ski binding, eliminating the need for (and the weight and movement restrictions of) a ski boot. Swim legs incorporate holes in the outer shell through which water enters to reduce buoyancy while swimming and drains when exiting the water. A foot specific for rock climbing provides increased traction and a reduced profile for fitting into small crevices.

Prosthetists often work directly with amputees to design custom components designed to maximize their enjoyment and performance when engaged in a particular sports endeavor.

### **Upper-Extremity Components**

As a general rule, simpler is better when adapting upper-limb prostheses for competitive sports applications. The advanced capa-

bilities and sensitivity of high-tech myoelectric systems are often incompatible with the rugged and demanding environment of physical sports, though they may be appropriate for less-arduous pursuits. A passive terminal device or one controlled by



Courtesy TRS Inc.

mechanical cable is often the preferred choice for serious athletes.

Creating terminal devices specially designed for upper-limb amputees engaged in recreation and particular lifestyle activities is the unique niche of TRS Inc. The company has designed hand replacements for fishermen, golfers, climbers, marksmen, skiers, cyclists, weightlifters, home handymen, photographers, musicians, kayakers, swimmers, archers, and basketball, baseball, soccer and hockey players, among others.

With these and other options now available, lack of componentry is no longer a barrier for amputees who want to be all they can be. If you have a specific interest in a particular sport or activity for an amputee, get in touch with us. This is what we do.

# Note to Our Readers

Mention of specific products in our newsletter neither constitutes endorsement nor implies that we will recommend selection of those particular products for use with any particular patient or application. We offer this information to enhance professional and individual understanding of the orthotic and prosthetic disciplines and the experience and capabilities of our practice.

We gratefully acknowledge the assistance of the following resources used in compiling this issue:

Bionix Prosthetic Solutions • College Park Industries
Eastern Amputee Golf Association
Extremity Events Network • Ohio Willow Wood
Otto Bock HealthCare • TRS Inc.

# Shamp Bionics Quarterly

A publication of Shamp Bionics

2656 South Arlington Rd. Akron, OH 44319

> Tel.: 330-644-4201 Fax: 330-644-4202

www.shampbionics.com

D. Mark Shamp, C.P.

All contents copyright 2007

Shamp Bionics

2656 S. Arlington Rd. Akron, OH 44319