

# Adaptive Skis

Cameron Elliott, *Biomedical Engineering, University of Rhode Island*  
BME 181 Second Presentation, April 15, 2013 <cameron\_elliott@my.uri.edu>

**Abstract—** People with amputations on the leg are unable to use traditional ski equipment. This can be devastating to people who love the sport. This paper discusses how adaptive skiing came to be and the equipment necessary for skiing with disabilities.

## I. INTRODUCTION

ADAPTIVE skiing originated during World War II. Wounded German and Austrian Mountain troops, who grew up skiing, wanted to get back to the slopes despite their disability. When a German, by the name of Franz Wendel, attached a pair of crutches to a pair of short skis, he became the first innovator of adaptive skiing. He became known for his 'three track' skiing since he used a normal sized ski on his remaining leg and two small skis attached to crutches. Word of handicapped skiing soon spread by word of mouth. World War II, the Korean War, and Vietnam had resulted in many amputees. Doctors realized that it would benefit amputees to become involved in skiing because skiing combines physical strength, flexibility, balance, and endurance with a sense of accomplishment, speed, and an opportunity to socialize with other amputees and skiers.

## II. METHODS

There are three main pieces of equipment used by amputees for skiing, outriggers, monoskis, and alpine skis. Outriggers are short skis attached to a crutch that assist with balance, turning, controlling speed, and stopping. Tessier, a French company, produces outriggers that feature a Velcro strap that attaches to the forearm, adjustable armrests, and aluminum tubes that allow for height adjustments. Tessier produces 3 different tips, one for beginners, one for advanced skiers, and one for freeriders that ski in deep snow.



The monoski contains 4 main parts, a molded seat, a footrest, a frame, and a ski. The frame is made of aluminum and steel. It contains a boot that attaches to the ski and a suspension unit that absorbs shock, keeps the ski edges on the ground for better control, and connects to the seat and footrest. The seat is the equivalent of the ski boot to stand up skiers. It attaches your body to the ski and requires a good fit. The seat is made of composite materials and foam and has

straps for the user's thighs, hips, and torso. The footrest is made of carbon fiber and holds the user's feet in place. The fourth component, the ski, is a single alpine ski that attaches to the boot on the frame.



## III. RESULTS

Adaptive ski packages have been developed for several types of amputees. The type of amputee determines the equipment that is needed. Amputees with one leg can use a single alpine ski and two outriggers. Paraplegics can use a monoski and two outriggers.

## IV. DISCUSSION

Handicapped skiing started as a rehab tool for amputees, but has now evolved into an elite sport and recreational fun. There are now dozens of programs in the U.S. and throughout the world that allow amputees to learn adaptive skiing. Disabled skiers can choose to ski recreationally or train competitively for the chance to race in the Winter Olympics.



## REFERENCES

- [1] Batcheller, Lori. "Adaptive Skiing History: Shaped by Disabled Veterans - Disaboom ." *Disability Information & Resources - Disaboom* . N.p., n.d. Web. 10 Apr. 2013. <<http://admin.disaboom.com/adaptive-skiing/from-rehab-tool-to-elite-sport-a-history-of-adaptive-skiing> >.
- [2] "Tessier » Sitski technology." *Tessier » La technologie du ski assis*. N.p., n.d. Web. 10 Apr. 2013. <<http://www.dualski.com/en/>> . Blake G, Bly RW. *The elements of technical writing*. Longman, 1993.