

Photo: Malcolm Carmichael/Alpine Canada



Alice McKennis rips to 8th in her first World Cup race since breaking her knee in December 2010.

## *Upper-Level Testing and Training with* **Optojump**

How technology is improving the way we train Olympic athletes

BY ERNIE RIMER, BS, MED

**O**ptojump Next is a timing and measurement system that uses infrared light-emitting-diodes (LEDs) to assess a variety of gait and jump actions. At the Center of Excellence (COE) in Park City, Utah, we use our 10-meter-long Optojump system for three main purposes:

1. Daily field testing
2. Off-season training monitoring
3. Rehabilitation

We use the Optojump to assess the performance of our athletes on a daily basis. Every day an athlete intends to perform a resistance training session, they will stand in the Optojump and perform a triple broad jump. The triple broad jump is a

common test used to assess power. We instruct the athlete to perform three consecutive jumps while minimizing ground contact time and jumping as far as possible. To encourage safe jumping movements, we disqualify the effort if the athlete lands the third jump with their hips below the knees. The athlete gives the best effort they can give, and we use the result to determine how hard the athlete will train that day.

Interestingly, we see significant day-to-day fluctuations in each athlete's triple jump performance. If the athlete's jump distance is below their average, we prescribe a light day. If the athlete jumps within their average

ability, we prescribe a medium day. If the athlete jumps beyond their usual ability, perhaps achieving a personal best, then they can expect a heavy training day that may lead to further personal records.

By tracking day-to-day fluctuations in the triple broad jump, we can also monitor an athlete's progress throughout the year. It's easy to track progress with the lifts with tools like the BFS Set-Rep Log Book, but what about monitoring other explosive movements like jumping? Unfortunately, most laboratory and field testing devices do not allow coaches to quickly assess large numbers of athletes. The Optojump is the first

tool that allows us to test dozens of athletes within minutes. It has become an essential component of our work at the COE. It sits in the middle of our floor and we never turn it off because we use it every day. Over time we can see the progress each athlete has made.

Of course, every coach wants to see their athletes succeed, but what happens if an athlete suffers an injury? How do we know when an athlete is ready to return to play?

At the USSA [United States Ski & Snowboard Association] we use each athlete's personal records from before their injury as an indicator for "return to snow." Injured athletes must demonstrate that their fitness is within 98 percent of their previous healthy abilities before they can compete again.



Coach Ernie Rimer

of advanced equipment to assess our athletes, but most gyms in colleges and high schools do not have access to such equipment. They must rely on field tests. For instance, athletic trainers at

jump are used as indicators for return to play. Here's why: During an exercise such as the back squat, the muscles of the ankles, knees, hips and spine work together to lift the weight. If a rehabilitating athlete suddenly ties their personal record, it's possible that all of the other working joints are working harder to compensate for the injured joint.

When undergoing field tests, rehabilitating athletes can often reach their previous healthy abilities and usually find symmetry between both legs. However, even when the athletes accomplish these criteria, their coaches may see that the injured leg still has a deficiency. We may not know what the deficiency is, but from the naked eye we can see there is a difference.

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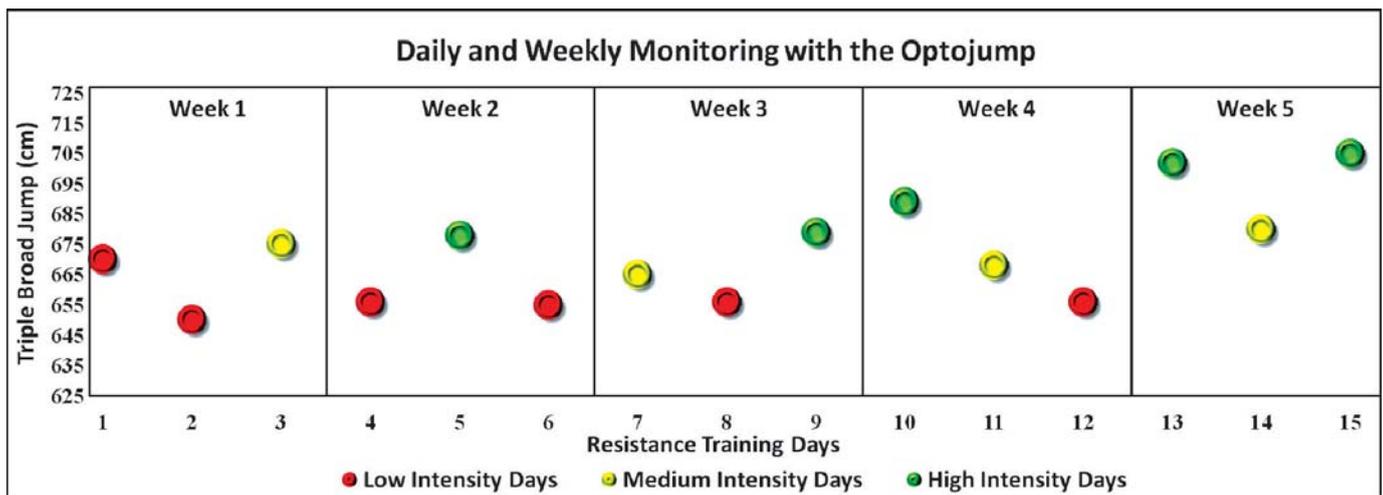
Additionally, when the injury involves one of their legs, each athlete also must show that the previously injured leg is just as strong and powerful as the uninjured limb.

We are fortunate to have an array

a high school may use an athlete's personal best records in the six core lifts to assess their readiness to play.

There are major limitations when resistance exercise performances and other field tests such as the vertical

Using the Optojump, we can detect and verify that difference. We have begun to explore the use of a single-leg triple jump to assess an athlete's ability to return to sport. In the single-leg triple jump, the athlete



Each day, athletes perform a triple broad jump. We use a red-light, yellow-light, and green-light system to determine their daily intensity. A below-average jump is indicated by a red light; the athlete will focus on endurance and technique. An average jump is indicated by a yellow light; the athlete will train with moderate loads. An above-average jump is indicated by a green light; the athlete has the freedom to break personal barriers. Additionally, we can use each daily performance to track an athlete's progress over time.

will jump three times with the same leg and will land with both feet after the third jump. Again, we discourage unsafe actions by disqualifying an athlete's effort if they land with their hips below their knees.

During rehabilitation, skiers and snowboarders commonly match their single-leg jump distances, but the Optojump shows that the injured leg spends more time on the ground to jump the same distance. What this means is that we need

Photo: Malcom Carmichael/Alpine Canada



**Laurene Ross**

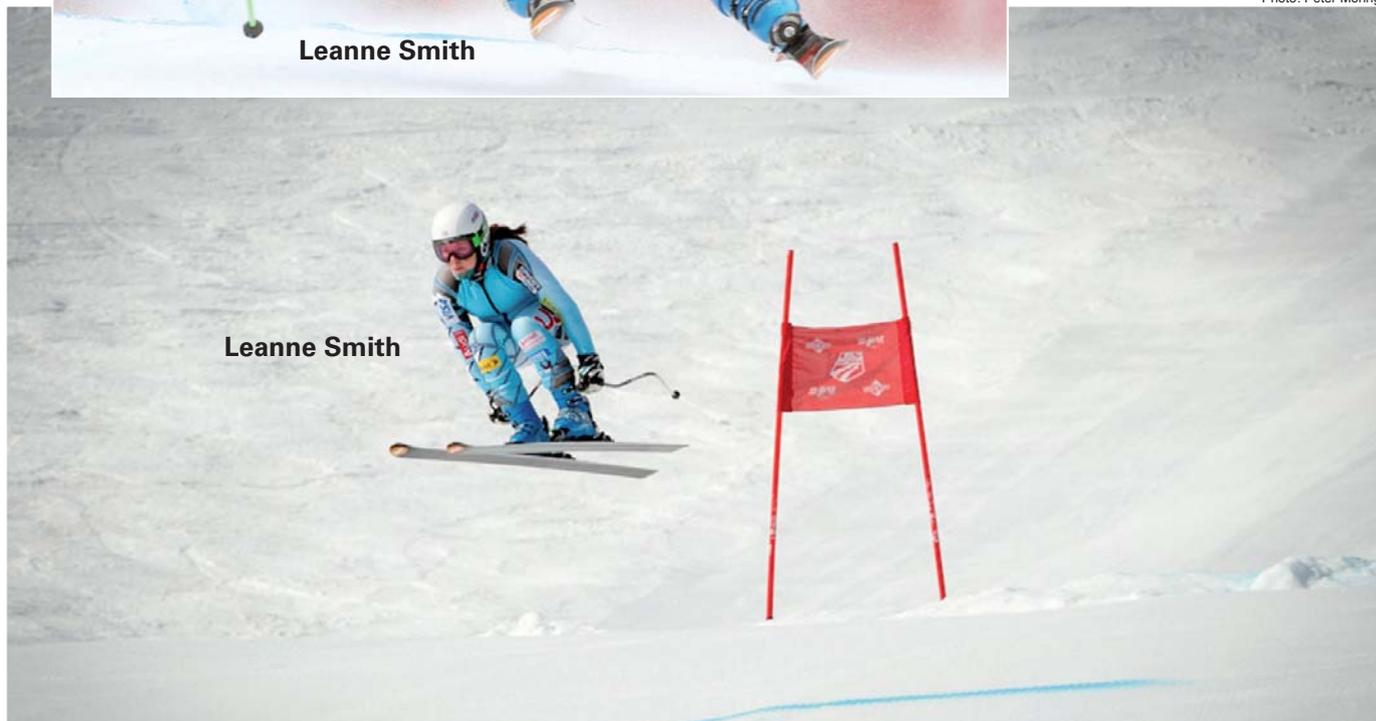
Laurene Ross looking for speed in the final downhill training run in Lake Louise and Leanne Smith soaring during super G training at Mammoth.

Photo: Malcom Carmichael/Alpine Canada



**Leanne Smith**

Photo: Peter Moring



**Leanne Smith**

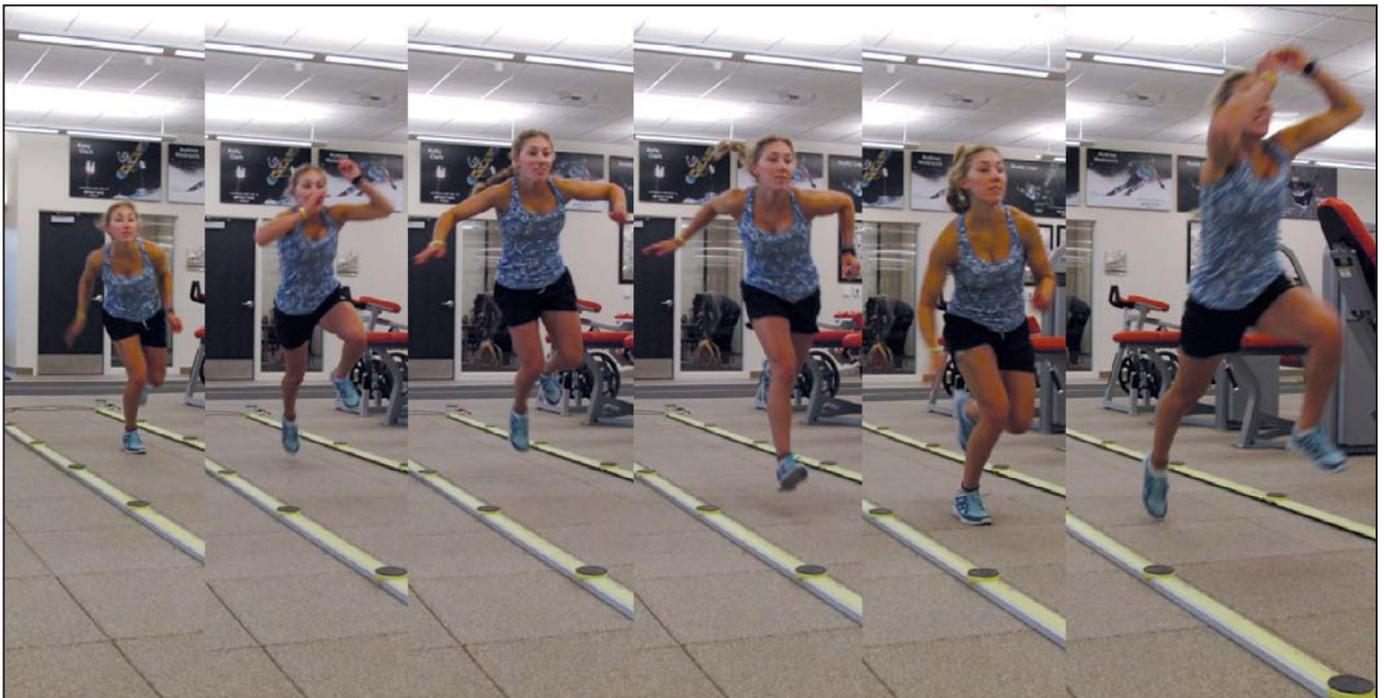
to spend a little more time before we let the athlete play again. In other words, the Optojump gives us a closer look at an athlete's left and right leg symmetry.

Daily assessments help us make immediate decisions about the workout. We monitor training progress by keeping track of the athlete's triple jump performances through the weeks. Finally, we use single-leg contact time and jump distance to help us evaluate

an athlete's readiness to return.

These are just three applications we have been using with the Optojump, but it is capable of assessing many other attributes. Recently, representatives from Optojump came out to Park City and helped us program approximately 20 new field tests that we think may be relevant to skiers and snowboarders. As we experiment with these new field tests, we hope to see many exciting applications in the future. 

The United States Ski & Snowboard Association (USSA) is the national governing body for Olympic skiing and snowboarding sports. Located in Park City, Utah, the Center of Excellence (COE) is the official training center for these American athletes. The training facilities at the COE have a variety of state-of-the-art laboratory training equipment, including the Optojump Next.



US Ski Team racer Foreste Peterson performs a single-leg triple jump before her summer workout at the Center of Excellence in Park City, Utah.



Foreste Peterson performs a triple jump (two legs).