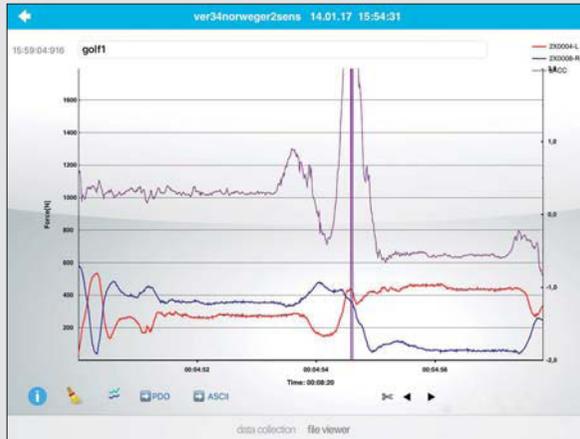


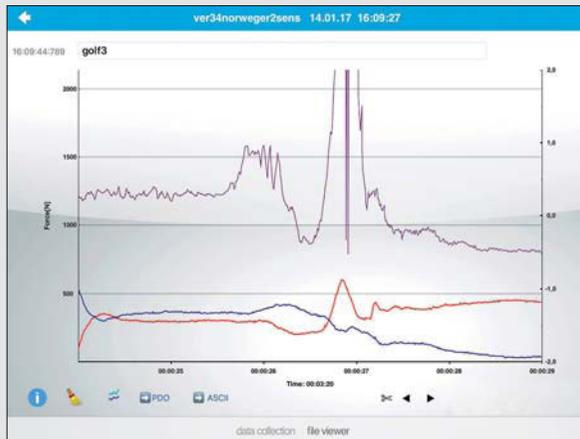


First series of golf measurements were made with the novel golf loadsol®. In addition, an iPod was attached to the forearm to retrieve acceleration data. Below, two examples of different swings can be seen.

The difference between the weight shift pattern of both swings can clearly be observed. The data can be used to help golfers to improve their game.



Measurement golf swing (1)



Measurement golf swing (2)



Features of the novel golf loadsol®

- Enables golfers to visualize weight shift patterns
- Mobile and durable textile sensor
- Connects to any iOS device
- Accurate and precise force measurement
- Patented technology used in science and research



novel golf loadsol®, attached to shoes

About novel

The novel golf loadsol® is developed by the leader in accurate plantar pressure measurement systems like emed.de, pedar.de, and pliance.de. novel represents art in science®.

novel gmbh (Germany) • Ismaninger Str. 51 • 81675 Munich
 tel: +49 (89) 417767-0 • fax: +49 (89) 417767-99
 e-mail: novel@novel.de • web: www.novel.de

novel electronics inc. (USA) • 964 Grand Avenue • Saint Paul, MN 55105
 tel: +1 (651) 221-0505 • fax: +1 (651) 221-0404
 e-mail: novelinc@novelusa.com • web: www.novelusa.com

MG Atzori Consultants Ltd (UK) • tel: +44 (115) 9622622
 e-mail: noveluk@novel.de

All systems from novel operate with high quality, calibrated sensors and provide reliable and reproducible long term measurements. loadsol®, artinscience®, and the novel logo (colored foot) are the registered trademarks of novel gmbh © 1992-2017



Weight shift in golf



It has long been known, that different weight shift patterns in the golf swing can be observed between golfers of different skill levels (Williams and Cavanagh 1983; Wallace et al. 1990; Barrentine et al. 1991). During the backswing weight shifts to the back foot. Then during the downswing and onwards the weight transfers to the front foot. To maximize the club head velocity at impact, considerable ground reaction force must be produced.

It is well documented that low handicap and professional golfers have significantly higher ground reaction forces and a faster weight transfer to the front foot than high handicap golfers (Griffith 2010).

It is however difficult to observe the weight shift parameters with the bare eye. That makes it difficult for coaches to help their students to improve these parameters.

While stationary sensor plates at golf ranges exist to assist coaches, they do not cover the whole game.

If a student is playing golf out on the field, observing the forces and adjusting remains very difficult.

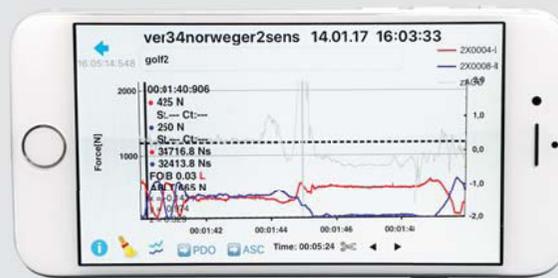
The novel golf loadsol® is a mobile device that allows to monitor and record ground reaction forces. It can support coaches to visualize their students weight shift patterns in every situation.



novel golf loadsol®



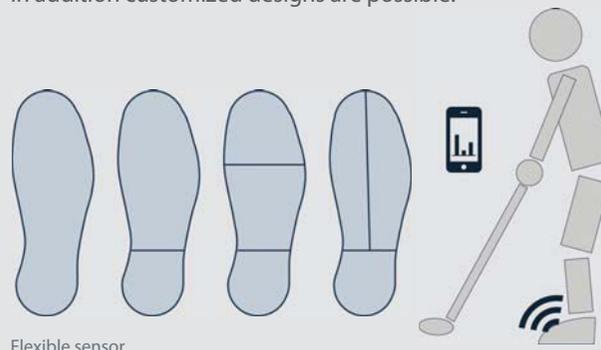
The new novel golf loadsol® monitors the normal force between the plantar side of the foot and the shoe. It is based on a newly patented large linear flat sensor. The benefit of the large sensor is that the load on the complete sensor area can reliably be monitored regardless of the local force distribution on that area. Up to now, this was not possible with other known single flat surface pressure sensors due to nonlinear responses.



Real time data collection on an iPhone

The sensor technology of novel enables simple but precise and accurate force measurements (static or dynamic) that can be observed and recorded on a smartphone during different activities.

The novel golf loadsol® comes in any foot size and can be equipped with up to three sensing fields in different setups. In addition customized designs are possible.



Flexible sensor

novel golf loadsol®



novel golf loadsol® in action

This new technology has matchbox sized electronics and communicates wirelessly with a smartphone via Bluetooth®. The data is transmitted to the smartphone in real-time so that the subject can receive an instantaneous biofeedback via sound or vibration. All data can be stored inside the smartphone and later be transferred to a computer for multiple analysis of the data. The small electronics are connected to the insole via a very thin flexible band and then attached to the lacing or shoe upper. This method was chosen over embedding the electronics directly into the insole where electronic parts influence the sensitivity of the player's plantar sole.

Several golf apps will be available for the novel golf loadsol®, tailored to the specific application. Integrating accelerometer data to the analysis will be possible, too.