XO·NANO SMARTFOAM™

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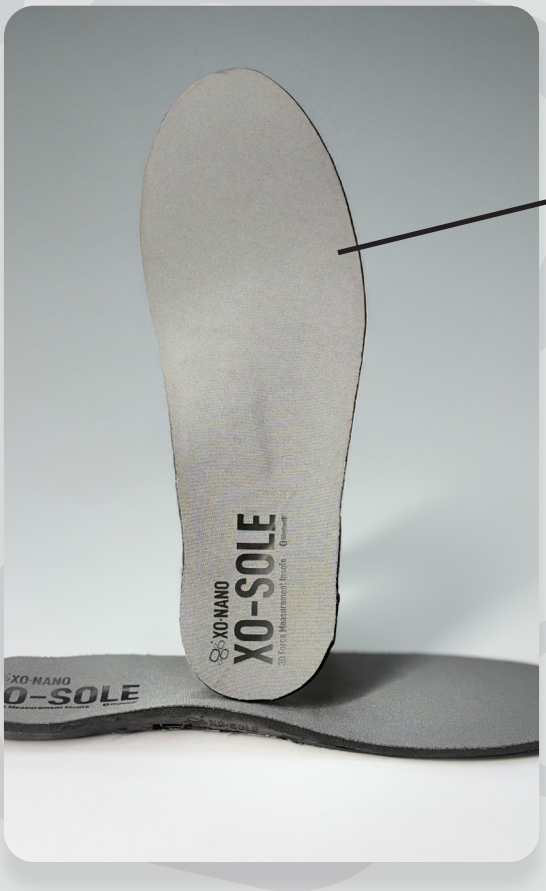
XO·SOLE

3D Force Measurement Insoles

The XO-SOLE is an advanced smart insole powered by XO-NANO Smartfoam™, our patented piezoresponsive material that converts mechanical stress into measurable electrical signals. Designed for accuracy, comfort, and repeatable data collection, the XO-SOLE brings lab-grade insights into real-world environments.

With its unmatched ability to capture ground reaction forces (GRF) in all three dimensions and in real time, the XO-SOLE provides data you can trust for confident, evidence-based decisions.



Comfort and 3D Force Measuring enabled by SMARTFOAM

KEY BENEFITS

- Objective return-to-play decisions
- Baseline to breakthrough—establish a performance baseline
- Simple, accurate tracking
- Performance insights that matter
- Injury detection & prevention
- Exclusive 3D force measurement

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COMPONENTS

XO-SOLE SPECS

- Only insole on the market that can accurately measure 3D GRF, including shear forces.
- Fully integrated, standard-sized insole.
- XO-NANO's patented Smartfoam technology (no calibration required).
- Up to 14 hours of onboard data storage at 250 Hz sampling rate (7 hours at 500Hz).
- Full day battery life for ease of use (20+ hours).
- Bluetooth Low Energy (BLE) connectivity for seamless data transfer and real-time data visualization.

Feature	Specification
Smartfoam Sensors	The entire insole surface is Smartfoam with 8 dual pressure and impact measurement areas
Additional Sensors	3-axis accelerometer; 3-axis gyroscope; 3-axis magnetometer
Data Storage	1GB of onboard storage; 7-hours @ 500Hz; 12-hours @ 250Hz
Wireless	Bluetooth Low Energy 5.4; Real-time data transmission
Power Supply	110 mAh rechargeable Lipo battery; 20-hours continuous use; 30-Day Standby
Insole Sizes	7 trimmable double sizes ranging from men's size 4 -18, women's 5.5 - 19.5

WHY IS GRF SO IMPORTANT?

INJURY PREDICTION

- **It's Not Just the Impact:** Research shows loading rate (how fast force is applied) is a stronger predictor of stress fractures than peak force alone.
- **The "Invisible Risk":** Visual observation misses critical risk factors. Mediolateral force signatures during cutting can identify ACL risk that the naked eye cannot see.

TRAINING & BIOFEEDBACK

- **5-Fold Risk Reduction:** Runners utilizing real-time GRF biofeedback to correct braking forces achieved a 5-fold decrease in injury risk compared to control groups.
- **Instant Correction:** Visualizing GRF during resistance training allows athletes to immediately self-correct imbalances, ensuring symmetrical muscle development.

HUMAN PERFORMANCE

- **Direction Over Magnitude:** Elite runners are distinguished not by how hard they hit the ground, but by significantly higher propulsive (forward) forces and lower vertical loading rates.
- **Power Metrics:** Rate of Force Development (RFD) derived from 3D GRF is the definitive metric for explosive power and jump height.

REHABILITATION

- **The Visual Lie:** Post-ACL reconstruction patients often walk with a "visually normal" gait while still exhibiting significant unloading of the surgical limb detectable only through GRF analysis.
- **Objective Return-to-Sport:** 3D GRF provides the only objective data to validate that a patient can handle multidirectional loads (braking/cutting) before returning to the field.

SCIENTIFIC VALIDATION

TESTED AGAINST THE GOLD STANDARD

Our XO-SOLE has undergone comprehensive validation against gold-standard equipment to confirm its accuracy and reliability in measuring 3D GRF, including vertical and shear forces, outside the traditional lab environment.

In a recent study, the XO-SOLE was compared against a fully instrumented treadmill, the industry gold standard for force measurement. The study included 63 participants, providing a large, diverse dataset that ensures real-world accuracy across varied users and movement patterns.