SWIFT PERFORMANCE

# The DynaSled Guide

Set up, measure, train and return to sport with horizontal force you can actually see.


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PART 1

# Owner's guide

Everything you need to get the sled out of the box and recording good data.

## 1. What DynaSled measures

DynaSled is a friction-resistance sled with a sensor built into its nose, the DynaSensor. The DynaSensor carries a load cell and an inertial measurement unit (IMU). Together they record the force the athlete puts through the tether or handle, and how the sled accelerates in response, many times a second for the whole rep.

A normal sled tells you how heavy it was and how long the athlete took. DynaSled shows you what happened inside the rep: how hard the athlete pulled on every step and where it faded. That is horizontal force, the force that actually moves an athlete down the field, and it is the thing a force plate measuring vertical force cannot give you.

Resistance comes from friction between the sled and the ground. Nothing on the sled drives it. Every newton recorded is produced by the athlete.

| You get | How it is measured |
|---|---|
| Force | Directly, by the load cell in the DynaSensor |
| Velocity | From the IMU, calculated from the sled's acceleration |
| Step-by-step force trace | Each push of the stride shows as its own peak, so you can compare alternate steps and see where the rep was won or lost. To tell which step is the left leg, film the run alongside it. |
| Load profile | Built in Swift Labs from runs at several loads (Part 2) |

> **Pull is where the best data is**
>
> Pull drills give the cleanest force trace. In a push drill the athlete leans their body weight on the handle, which adds a constant load the sensor cannot separate from drive. Push drills still record and are useful for training, but use pull for testing.

## 2. Getting started

### In the case

- DynaSled chassis with the DynaSensor fitted
- Push handle frame
- Weight tube for loading plates

- Athlete vest and full-length tether
- USB-C charger for the DynaSensor
- Tsunami storage case

### Your Swift Labs account

Your DynaSled lease includes Swift Labs at the TEAM level for the full term. When your sled ships you receive an onboarding email. If you already use Swift Labs, the sled is added to your existing organisation and login; if not, an account is set up on the email address you gave us.

1. Find the onboarding email and confirm your login.
2. Install the **Swift Syncro** app on your iPad from the App Store.
3. Log in to Syncro with the same email and password.
4. Charge the DynaSensor fully before the first session (section 7).

### Where to use it

Pick a surface and stick with it. Friction depends on the surface, and if the surface changes between sessions the resistance changes with it, which makes week-to-week comparison meaningless. A consistent synthetic track, turf or court is ideal. Allow at least 10 m for the rep plus room for the athlete and sled to stop safely.

## 3. Connecting the DynaSensor

### Wake it up

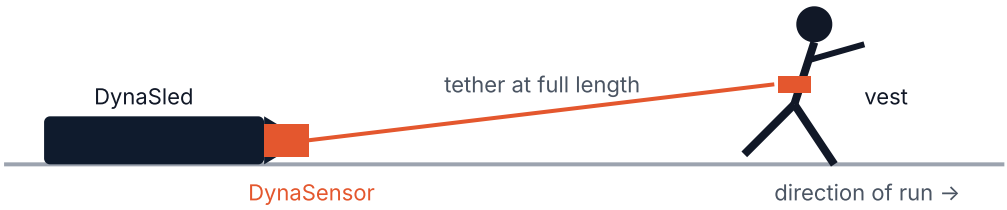
1. Tap the DynaSensor a few times, or give the tether a tug. The motion wakes it.
2. It beeps softly three times and the front LED flashes red, then changes to **flashing green**. It is now ready to pair.
3. If it does not connect to Syncro within 30 seconds it switches itself off to save charge. Just wake it again.

### Pair in Syncro

1. Open Syncro and go to the **Sled** tab.
2. Syncro scans for devices. Tap the DynaSled icon when it appears and connect.
3. Once connected, the LED flashes green once a second. While paired, the DynaSensor stays awake.
4. Tap **Finish** (top right) to move to the run screen.
5. When a drill starts the LED goes **solid green**, meaning data is streaming.

| LED | Meaning |
|---|---|
| Flashing red, then flashing green | Waking up, ready to pair |
| Green flash once a second | Paired with Syncro |
| Solid green during a drill | Streaming data |
| Solid red on the charger | Charging |
| Solid green on the charger | Fully charged |

# 4. Running a pull drill




Pull drill: tether from the back of the vest to the front of the DynaSensor, at full length.

### Set up the sled

1. **Remove the handle.** Pull the red release knob at the bottom outwards, then lift the handle frame up and out. Store it in the case.
2. **Fit the weight tube** into the centre socket if you are adding plates.
3. **Load the plates** you need, and enter the added weight in Syncro as the loaded weight.

### Set up the athlete

1. Athlete puts on the vest. Clip one end of the tether to the back of it.
2. Clip the other end to the front of the DynaSensor, where the transverse pin passes through the reaction fork.

> **Always use the tether at full length**
> Never double up or shorten the tether. A short tether pulls at a steeper angle, which lifts the nose of the sled and makes it bounce under hard efforts. That spoils the data and the rep.

### Run it

1. In Syncro, choose **Pull DynaSled** and select the athlete.
2. Have the athlete step forward just enough to take the slack out of the tether, without pulling on it.
3. Press **Start**. The athlete runs. Press **Stop** when they are done.

# 5. Running a push drill

1. **Fit the handle frame** and check the front runner pins are secure: the long pin on the left, the short pin on the right.
2. **Set the handle height** to suit the athlete.
3. **Note the pin position number** shown in the window on the handle. You must enter this number in Syncro when you set up the drill, because it tells Syncro the handle angle.
4. In Syncro, choose **Push DynaSled**, enter the pin position and select the athlete.
5. Press **Start**. The athlete pushes. Press **Stop** when complete.

See the note in section 1: use push for training and pull for testing.

# 6. Your data in Syncro and Swift Labs

### Crop and save

After each rep Syncro marks where it thinks the run started and finished. If that looks right, tap the green tick. If not, drag the start and finish cursors to the right place, then tap the tick. Good cropping matters: it is what every metric is calculated from.

### Upload

When the iPad is online, Syncro uploads each rep in the background to Swift Labs. Allow a minute or so for it to appear online.

### Where to look

- **Syncro** shows the headline numbers straight after each rep, so you can coach between efforts.
- **Swift Labs** (in a browser) holds the full history: force traces, load profiles, comparisons over time and reports to share with athletes and staff.

> **Record the conditions every session**
>
> Surface, footwear, added load, time of day and how the athlete feels. When a number looks odd, these notes usually explain it.

# 7. Charging, care and troubleshooting

### Charging the DynaSensor

The DynaSensor comes out of the sled to charge.

1. Press the button on the front retaining pin and pull the pin fully out.
2. Reach inside the front of the sled, press the button on the lower retaining pin and pull it out.
3. Lift the DynaSensor slightly up and forward to free it.
4. Remove the red plug on the back of the DynaSensor and connect the USB-C charger.

5. The LED shows solid red while charging and solid green when full. A full charge from flat takes 3 to 4 hours and gives about 8 hours of use.

Refit in reverse order and make sure both pins click home before the next rep.

### Care

- Keep the red charging plug in whenever the sensor is in use, to keep dirt and water out.
- Check the tether and vest clips for wear before each session. Replace a frayed tether.
- Wipe the runners and sensor down after wet or sandy sessions, and store the sled dry in its case.

### Troubleshooting

| Problem | Try this |
|---|---|
| Syncro cannot find the sled | Wake the DynaSensor again (it sleeps after 30 seconds unpaired). Check Bluetooth is on and the sensor is charged. |
| Sensor will not wake | Charge it. If the charger LED does not light, contact support. |
| Sled bounces on hard efforts | The tether is too short or doubled. Use it at full length. |
| Numbers jump between sessions | Check the surface, footwear and loaded weight are the same as last time. |
| Rep not showing in Swift Labs | Check the iPad is online and give it a minute. Open Syncro to let any queued reps finish uploading. |
| Push data looks flat or offset | Expected when the athlete leans on the handle. Use a pull drill for testing. |

PART 2

# Practitioner guide

How to test, train and bring athletes back from injury with DynaSled.

## 8. Testing: building a load profile

A test is only worth doing if you can repeat it. The aim here is one standard way of testing that gives you the same answer for the same athlete, week after week, so that when a number changes you can trust that the athlete changed.

### Fix the conditions

| Variable | Standard | Why |
|---|---|---|
| Surface | The same surface every test | Friction sets the resistance. A new surface is a new test. |
| Footwear | The same shoes for each athlete; spikes for track athletes | Grip changes what the athlete can put into the ground. |
| Distance | 10 m, measured and marked | Covers early acceleration without adding fatigue. |
| Start | Standing two-point start, front foot at the line, no rolling start | Starts are the biggest source of noise. |
| Rest | At least 3 minutes, passive | Horizontal force drops quickly with fatigue. |
| Time of day | Within 2 hours of the last test | Output varies through the day. |

### Load includes the sled

DynaSled itself weighs about 17 kg. When a protocol calls for a load as a percentage of body weight, that load is the sled plus any plates. A free sprint, with no sled and no tether, is the zero-load point.

### Warm-up

About 15 minutes, the same every time: dynamic mobility (leg swings, hip and ankle circles), acceleration drills (A-skips, wall drills), then build-up runs at 60, 75 and 90% effort. Rather than jumping straight from a light to a heavy sled, finish the warm-up with progressively loaded runs on the sled itself. The athlete arrives at the heavy runs prepared, and the light runs double as data.

### The load profile

1. **Free sprint baseline.** Time an unloaded 10 m sprint. You need a start device for this, as there is no sled to start the clock. A Swift G4 gate at the start line, placed at the front foot, with timing starting

when the beam clears, works well, with a second gate at 10 m. Take the best of two or three.

2. **Loaded runs.** Run 10 m pulls at three or more loads, light to heavy, for example around 20%, 40% and 60% of body weight (sled included). One or two good reps at each.
3. **Let Swift Labs build the profile.** It plots force against velocity across the runs and extrapolates the line to zero velocity. We call that intercept sF0, the sled force at zero velocity, to keep it distinct from F0 in the sprint profiling method of Morin and Samozino.

> **Throw out bad reps, keep the best one**
> Discard any rep where the athlete stumbles, checks their stride or eases off before 10 m, and replace it after full rest. Report the best rep at each load, not the average: averaging builds fatigue into the result.

### How often

Every four to six weeks in pre-season and about every eight weeks in-season. Horizontal force changes over weeks, not days, so testing more often mostly measures noise.

## 9. Training: choosing the load

DynaSled is not a conditioning tool. It is for building the horizontal force that drives acceleration. Programme it in two distinct zones and keep them separate.

| Zone | Typical load | Speed loss vs free sprint | Purpose |
|---|---|---|---|
| **Resisted acceleration** | About 10 to 20% of body weight | Around 10% | Overload acceleration without changing sprint mechanics. Suits most athletes. |
| **Horizontal power** | About 70 to 100% of body weight | Up to 50%, not more | Maximum horizontal power. For advanced, well-conditioned athletes. |

### Setting the load by speed loss

The simplest way to set a load is by how much it slows the athlete compared with their free sprint.

1. Record the athlete's best free 10 m time, for example 1.83 s.
2. For resisted acceleration, multiply by 1.10 to get the ceiling: 1.83 × 1.10 = 2.01 s.
3. Run the sled and adjust the plates until the 10 m time sits just under that ceiling. That is the training load.
4. For the power zone, find the load that roughly halves the athlete's speed over the 10 m.

Recheck the load every four to six weeks. As the athlete gets stronger the same load slows them less, and the stimulus fades unless you add weight.

### Session guide

| | Development phase | Maintenance phase |
|---|---|---|
| Distance | 10 to 15 m | 10 m |
| Reps | 6 to 8 | 4 to 6 |
| Effort | Maximal every rep | Maximal every rep |
| Rest | 3 to 4 minutes | 3 minutes |
| Frequency | 2 per week, not on consecutive days | 1 per week |

Watch the reps. If the 10 m time on rep six is more than 5% slower than rep one, the volume is too high for that athlete today.

### Pair the sled with free sprints

Follow sled reps with one or two free sprints of 20 to 30 m, 2 to 4 minutes later. The heavy horizontal effort tends to prime the next free sprint, which is often the athlete's best of the session. Time those too.

### When not to use it

- Within 48 hours after a match.
- After heavy lower-body gym work. If both are on the same day, do the sled first.
- As fitness or repeat-sprint conditioning. Use something else for that.

## 10. Return to sport

Typical return timelines are averages. Some athletes are ready sooner and some later. DynaSled lets you replace the calendar with numbers: a baseline taken while the athlete is healthy, and a steady, measured progression back to it.

### Step 1: bank a baseline before you need it

Add these short efforts to normal testing so every athlete has a reference on file:

| Effort | Load (incl. sled) | Notes |
|---|---|---|
| 10 m resisted walk | About 30% of body weight | Around 1.5 m/s |
| 10 m resisted march | About 30% of body weight | Fast walking with no flight phase, around 2.5 m/s |
| 10 m resisted sprint | About 15% of body weight | Stationary start, same posture every time |

If no pre-injury data exists, use the uninjured leg and the athlete's own earliest sessions as the reference, and be more conservative.

### Step 2: progress by percentage of baseline

Walk, then march, then sprint, moving to the next stage when the current one is pain-free and stable. Programme sessions as a percentage of the athlete's baseline force rather than by week, and raise the target by no more than 10% of baseline per week in mid-rehab. Athletes' confidence usually runs ahead of their tissue.

### Step 3: track the trend

| Watch | You want | Flag it if |
|---|---|---|
| Peak force | A steady climb back to baseline | It stalls for two tests in a row |
| Speed at the same load | Rising back toward baseline | Falling while force rises, or flat for two tests |

Test every two weeks or so during active rehab, always at the same load and on the same surface, so the trend means something.

### Step 4: clearance is a profile, not one number

- Peak force within 5% of baseline on two tests at least seven days apart.
- Speed at the baseline load back to within 5% of baseline.
- No pain or hesitation on maximal sled efforts.
- Where it applies, a psychological readiness score such as ACL-RSI of 7 or more.

All of them, not most of them. Test under the same conditions as the baseline, record the result alongside the decision, and keep it: it becomes the athlete's new baseline.

DynaSled data supports clinical decisions. It does not replace the judgement of the treating clinician.

## References and support

The resisted-sprint methods behind DynaSled trace to the sled research at AUT's Sports Performance Research Institute New Zealand (SPRINZ) by Matt Cross, Matt Brughelli and colleagues, working with Jean-Benoît Morin and Pierre Samozino.


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## Need help?

Email **support@swiftperformance.com** or visit **swiftperformance.com/products/dynasled**.

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