TROIKA PERFORMANCE INTELLIGENCE

METABOLIC PERFORMANCE INTELLIGENCE

Executive Brief

A plain-language guide to what TPI is, what it does for your programme, and how to get your first athlete report in your hands.

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CREDENTIALS

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APPLIED RECORD

Olympians · Olympic medallists
& World Records since 2004

PUBLICATIONS

12 peer-reviewed articles
15,000+ reads

> *"Every coach knows their swimmer faded on the third 50. What very few coaches know is exactly why — and therefore exactly what to fix in tomorrow's practice."*

2004	12	35+	3
Supporting Olympians & World Records since	Peer-reviewed publications · 15,000+ reads	Years of elite coaching science	Active US university partnerships

THE PLATFORM

THREE TOOLS. ONE COMPLETE PICTURE.

TPI is not a fitness tracker or a generic analytics platform. It is a purpose-built metabolic intelligence system developed over 35 years of elite international coaching science — peer-reviewed, published, and field-tested at the highest levels of the sport.

01

SWIMMER PROFILER

The physiological fingerprint of your athlete.

Builds a complete metabolic profile from a single 90-minute poolside test. Calculates WERP — your swimmer's individual aerobic ceiling — and W′, the total anaerobic energy reserve available for racing. Every training pace in your programme is then derived from their own data, not population norms.

- Individual energy ceiling velocity (WERP)
- Anaerobic reserve (W′) — sized and mapped to race distance
- 9-zone training table accurate to 0.1 seconds per 100m
- Energy system triangle — where this athlete sits metabolically

02

RACE INTELLIGENCE REPORT

The story of what happened in that race.

Takes any timed swim — time trial, dual meet, or championship — and produces a complete metabolic breakdown split by split. Shows exactly where energy was spent, where the anaerobic reserve ran out, and what training stimulus would have prevented it.

- Split-by-split velocity vs personal energy ceiling
- Metabolic energy partition (aerobic / glycolytic / anaerobic)
- W′ depletion mapped across the race distance
- Specific training prescription — what to do next and why

03

FUELEDGE CGM

Real-time metabolic intelligence at the pool deck.

A continuous glucose monitor worn on the athlete's arm gives coaches a live readout of training intensity during every session — no blood draws, no stopping the set, no laboratory. When glucose crosses the athlete's personal threshold, the aerobic system is genuinely loaded. Below it, the set is too easy.

- Real-time glucose readout via Abbott Libre Sense sensor
- Intensity zone tracking against athlete's personal threshold
- Session-by-session metabolic load history
- Integrates directly with Swimmer Profiler data

WHY IT MATTERS TO A COACH

THE QUESTIONS IT ANSWERS.

Most training decisions are built on feel, experience, and general principles. TPI makes the invisible visible — turning questions coaches have always had into numbers they can act on.

"Why does my swimmer always die on the third 50?"

The Profiler calculates exactly how large the anaerobic fuel tank is, and at what point in the race it runs empty. In most cases a third-50 collapse is not a fitness problem — it's a pacing problem. The first 50 was 4% too fast, the tank was empty at 140m, and the last length was on fumes. That is a fixable problem the moment you can see it. The report tells you the exact target pace for each split to prevent it happening again.

"Are my training paces actually right for this athlete?"

The Profiler generates a 9-zone training table built entirely from the swimmer's own physiological data. Not percentages of best time. Not age-group charts. Paces derived from their personal aerobic ceiling, their personal lactate curve, and their personal glucose response — accurate to the tenth of a second. Two swimmers with identical 200m personal bests can have completely different optimal training paces.

"Which energy system do I actually need to develop?"

The Race Intelligence Report partitions every race into its three metabolic contributions — aerobic oxidative, aerobic-glycolytic, and anaerobic — using simultaneously measured lactate and glucose, not estimates. A 200m swimmer running 54% aerobic contribution is undertrained anaerobically for their event. A 400m swimmer at 22% anaerobic is over-training the wrong system. A concrete percentage leads to a concrete training decision.

"Is my athlete actually hitting the right intensity in training?"

FuelEdge gives you a real-time answer to this question during every session. When the athlete's glucose rises above their personal Glucose Turn Point, the aerobic system is genuinely loaded. When it stays flat below that line, the set is too easy regardless of how hard they look. For the first time, coaches can see metabolic loading in real time at poolside — and adjust the session accordingly, while it's still happening.

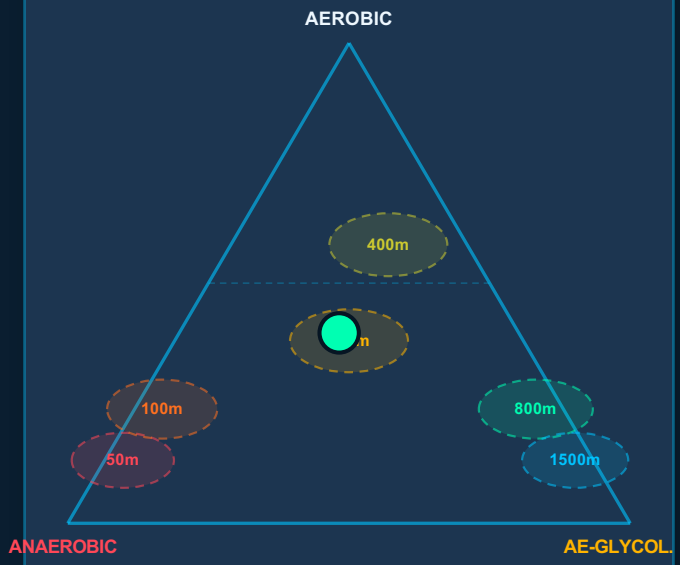
SWIMMER PROFILER — OUTPUTS

YOUR ATHLETE'S COMPLETE PHYSIOLOGICAL FINGERPRINT.

Generated from a single 90-minute poolside test. Every number below is derived from this swimmer's own measured data — not estimates, not population norms, not percentages of best time.

ENERGY SYSTEM TRIANGLE

CPr-corrected position · event zone clouds shown



47.8%	17.5%	34.7%
Aerobic	Anaerobic	Ae-Glycol.

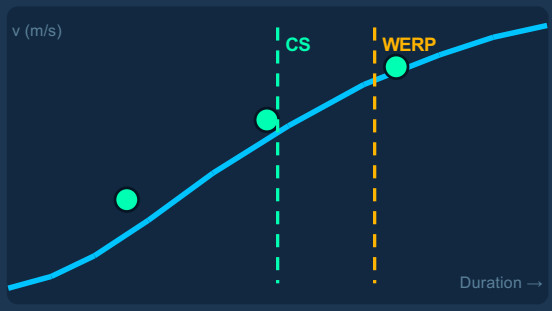
WERP — WEIGHTED EVENT REFERENCE POINT

Individual aerobic ceiling velocity — the fastest pace sustainable without depleting the anaerobic reserve.

1.78	1.702	18.4
m/s	m/s	kJ
WERP	Critical Speed	W′ Prime

FROUDE-ADAPTIVE POWER–VELOCITY CURVE (P ∝ V³)

Water-physics model — replaces land-based CP formulas for aquatic environments



Below = aerobic development · Above = W′ depletes

W′ ANAEROBIC RESERVE

18.4 kJ

Total anaerobic energy reserve above aerobic ceiling

9-ZONE TRAINING TABLE — PACE PER 100m

All paces derived from this swimmer's own WERP and critical speed

Z1	Base Aerobic	1:12/100
Z2	Tempo	1:06/100
Z3	Threshold	1:02/100
Z4	Clr. Tolerance	1:00/100
Z5	Critical Vel.	59.5/100
Z6	MVO_2	58.8/100
Z7	An. Capacity	57.9/100
Z8	An. Power	56.5/100
Z9	CPr Sprint	<55/100

Z4–Z6 are the primary training zones for this event

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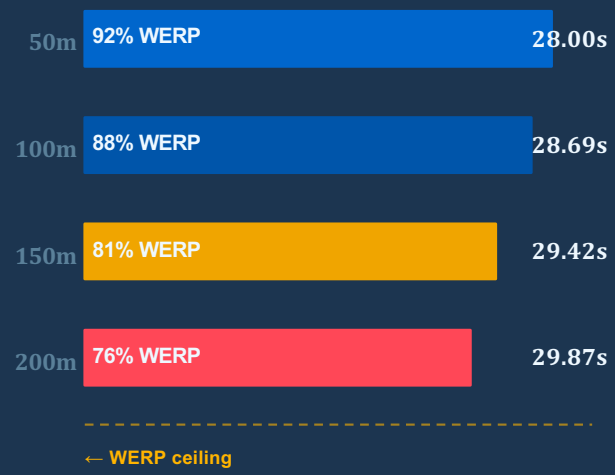
RACE INTELLIGENCE REPORT

WHAT HAPPENED IN THAT RACE. AND WHAT TO DO ABOUT IT.

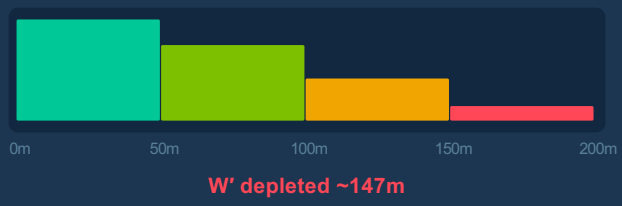
Every timed swim becomes a data set. The Race Intelligence Report breaks it down split by split, maps the energy systems used, identifies the moment the race was lost, and prescribes the exact training to prevent it next time.

SPLIT ANALYSIS — 200m FREESTYLE

Each split shown as % of WERP — the athlete's personal energy ceiling



W'BAL — Reserve remaining through race



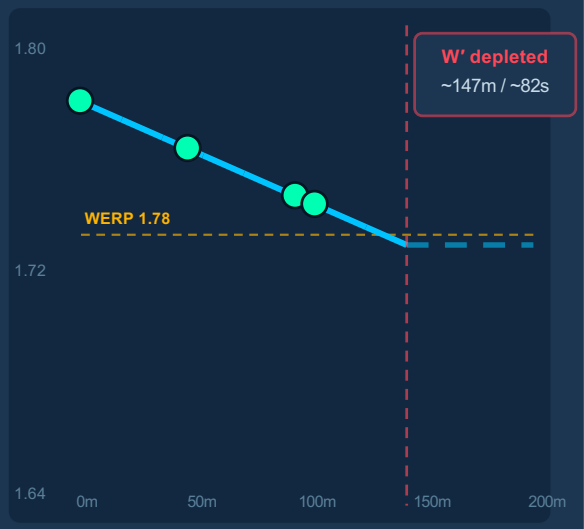
W′ depleted ~147m

METABOLIC ENERGY PARTITION

54%	28%	18%
Aerobic	Ae-Glycolytic	Anaerobic

VELOCITY vs DISTANCE — W′ Depletion in Race

Solid = sustained pace · Dotted = target pace after W′ exhaustion



COACHING INSIGHT

W′ is exhausted at ~147m — the race cannot be held at target pace for the final 53m. Two options: (1) extend W′ through severe-domain interval training, increasing the tank; or (2) race the first 110m at WERP pace then accelerate — preserving W′ for the final push. The data tells you which problem you're dealing with. Both are trainable.

4-WEEK TRAINING PRESCRIPTION

- 4–6 × 100m at 1.726 m/s (race pace) · 60–90s rest — neuromuscular economy at target speed
- 8–10 × 25m all-out · 3–4 min full recovery — extend W′ anaerobic reserve
- 3 × 150m at 88–90% WERP · 3 min rest — W′ partial-recovery interval to increase capacity
- +5% power output target → projected 1:55.90 (-1.90s). Requires 2–3 hard sessions/week with full recovery

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FUELEDGE CGM — CONTINUOUS GLUCOSE MONITORING

REAL-TIME METABOLIC INTELLIGENCE. AT THE POOL DECK.

For the first time, coaches can see metabolic loading in real time during every training session — without interrupting the set, without blood draws, and without a laboratory. FuelEdge brings the science to poolside.

HOW IT WORKS

1. Athlete wears an Abbott Libre Sense sensor on their upper arm — a patch smaller than a £2 coin. Placed once, lasts 14 days.
2. Glucose is sampled every minute and transmitted to the coach's tablet or phone. No fingersticks. No interruption to training.
3. When glucose rises above the athlete's personal Glucose Turn Point, the aerobic system is genuinely stressed. Below it — the set is too easy.
4. Session data feeds back into the Swimmer Profiler, building a picture of how each athlete's metabolism responds to training load across the full season.

LIVE SESSION DASHBOARD

128

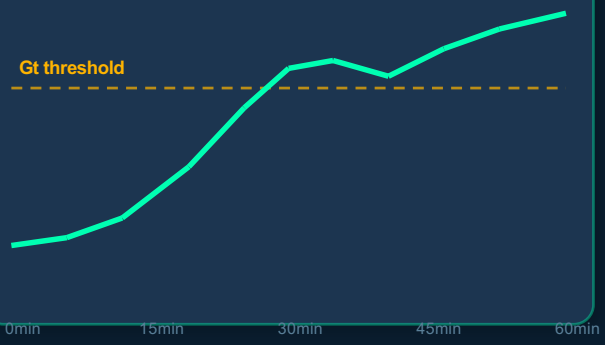
mg·dL⁻¹ · Above Glucose Turn Point

Z3 TRAINING ZONE — AEROBIC STRESS

WHAT THE COACH SEES — POOLSIDE

- Live glucose value updated every minute
- Training zone automatically assigned
- Alert when athlete crosses threshold
- Session load score updated in real time
- Post-session metabolic report generated automatically

GLUCOSE TRACE — 60min SESSION



No blood draws. No lab. No interruptions.

One sensor. Every session. Full metabolic picture.

THE SCIENCE BEHIND IT

The Glucose Turn Point (Gt) was published by Swanwick & Matthews (2017) as a non-invasive metabolic threshold marker. FuelEdge operationalises this peer-reviewed research into real-time pool-deck intelligence — a first in competitive swimming.

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THE PROCESS & NEXT STEPS

FOUR STEPS. THEN YOU HAVE YOUR REPORT.

"The testing takes 90 minutes. One athlete. Your pool, your lane. Results back within 48 hours."

1 Gather what you need

A lane, a stopwatch, and a basic lactate testing kit. No specialist equipment, no laboratory. If you have an athletic trainer on staff, they run the session. We walk your staff through the protocol on a 30-minute video call before the first test.

2 Run the test battery

Three timed efforts in the primary event — roughly 85%, 92%, and 100% intensity. Push start or dive. Time each effort, count strokes, take one finger-prick blood sample at the end of each swim. Total time: 60–90 minutes including recovery.

3 Send the data

Fill in the contact form with times, stroke counts, and blood values. Include race split times for the Race Intelligence Report. No spreadsheets, no software to install. Takes five minutes.

4 Receive your report — within 48 hours

One-page coach report: energy system triangle, WERP velocity, 9-zone training table, anaerobic reserve, race split breakdown, and a five-point training prescription. A 30-minute follow-up call is included with every first report.

WHAT YOU COLLECT AT THE POOLSIDE

Swim times	*Stopwatch or touchpad*	Required
Stroke count/length	*Coach on deck — paper and pen*	Required
Blood lactate	*Finger-prick at end of each effort*	Required
Blood glucose	*Same finger-prick sample*	Required
Heart rate	*Chest strap or manual pulse*	Optional
Race split times	*Meet results / splits sheet*	Optional

BOOK A DEMO CALL

30 minutes. Live report walkthrough using real elite swimmer data. No commitment required.

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SUBMIT ATHLETE DATA

Already have test data? Submit via the contact form — report within 48 hours, follow-up call included.

→ apexfueledge.netlify.app

EXPLORE THE PLATFORM:

Swimmer Profiler
→ apexfueledge.netlify.app

Race Intelligence Report
→ apexfueledge.netlify.app

FuelEdge CGM Dashboard
→ apexfueledge.netlify.app