

Hypokinetic Training for Hyperkinetic Racing



Neal Henderson, MS CSCS



Introduction



- **Owner: APEX Coaching & Consulting, LLC**
- **USA Triathlon & USA Cycling Elite Certified Coach**
 - 2012 USA Olympic Team Coaching Staff – Track cycling
 - USOC National Doc Counsilman Science Award, 2011
 - USA Cycling Developmental Coach of the Year, 2007
 - USA Cycling National Coach of the Year, 2009
- **Boulder Center for Sports Medicine**
 - Sport Science Director, 2001-2013
- **Past-President - Rocky Mountain Chapter ACSM**

Coaching Background

World Champions: Jane Finsterwald (50-54 Masters MTB); Taylor Phinney (Jr TT; Jr 3K Pursuit, U23 TT, Elite 4K (2009 & 2010); Steven Worley (60-64 yrs 2K TT); Evelyn Stevens (TTT 2012-2014), Rohan Dennis (TTT 2014); Jamie Whitmore (Para TT & RR 2013 & 2014, 500M & 3K 2014); Flora Duffy (XTERRA Triathlon)



Neal's High Performance Algorithm

- (**Training** + Rest)^{Genetics} = Capacity to Perform
- Performance = (**Capacity** X Execution) / Tactics



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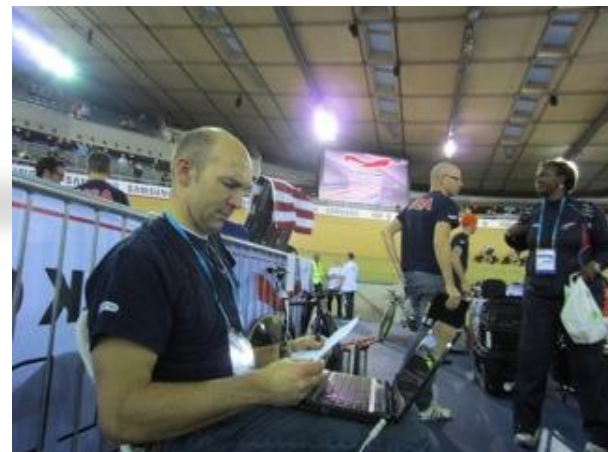
Hypokinetic Training for Hyperkinetic Racing



Stationary Training for Fast Paced Racing

curious info challenge knowledge knowing
answers when questions info knowing information
ask knowledge when info **HOW** curious
curious **WHO** who when answers when
how knowledge challenge what info questions who ask
why who questions ask knowing **WHERE** info ask
ask info **WHAT** curious why info knowledge curious
who answers what challenge answers what questions
knowledge info who how **WHY** when info
who ask questions **WHEN** questions knowing what
curious when questions ask challenge
what how why questions how
answers knowing ask
how why ask

???????



Who



What

- Stationary Bike
 - Wattbike, Spin bike, Erg, etc.
- Stationary Trainer
 - Fan, Magnet, Fluid, Inertial, Electromagnetic
- Rollers



Where

- Wherever you can!
 - Outdoors, garage, cycling-specific studio, etc.



When All year long!



If you want to be fast...

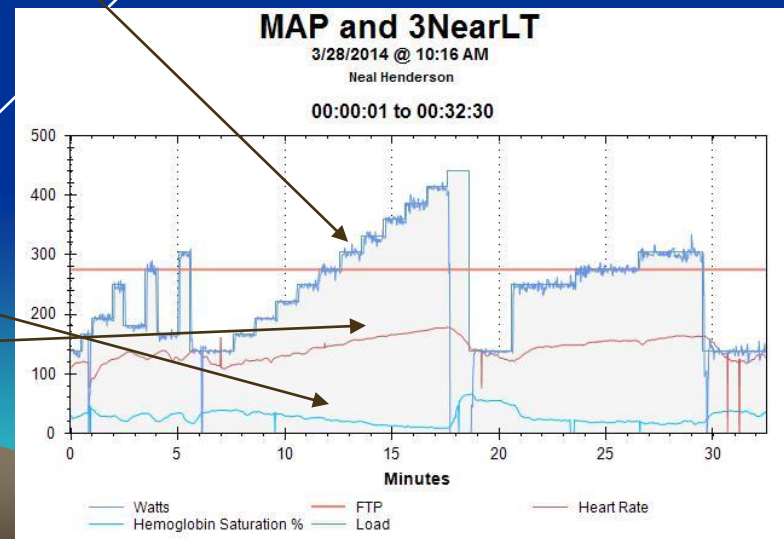
Why

- Safety
 - Groups/Juniors/Road Conditions/Weather
- Time Management
 - Masters/Multisport
- Quality > Quantity
 - Specific training goals
- Workout Control
 - Manage specific effort for session

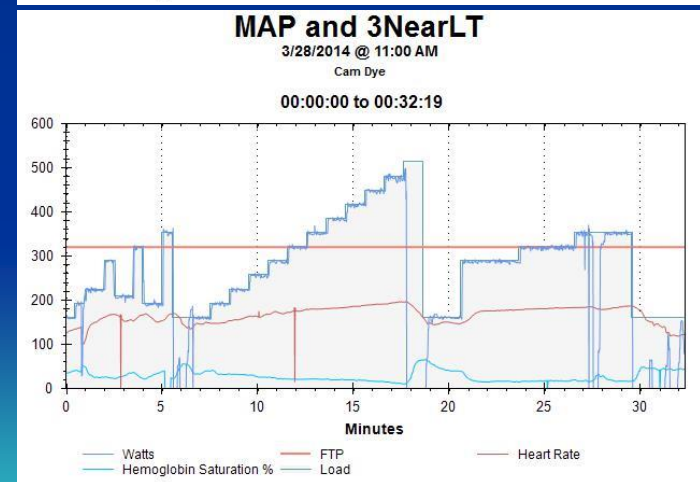
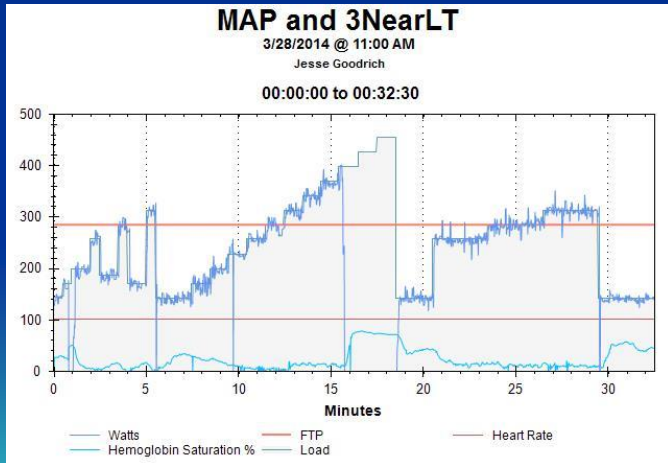
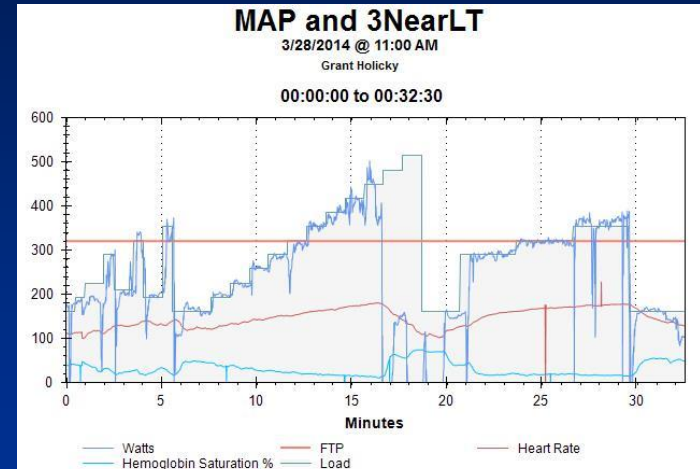
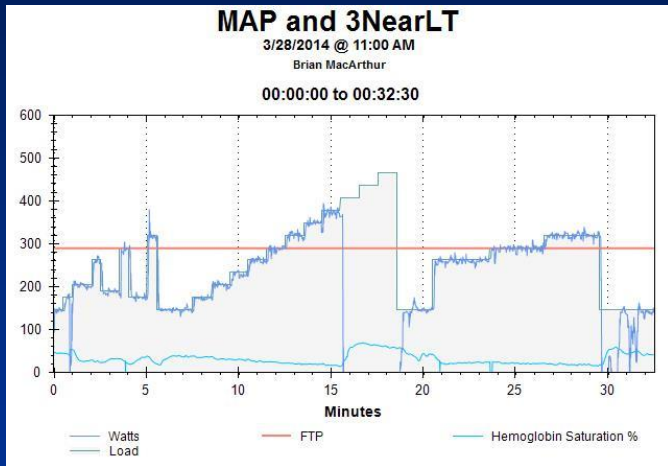


Why - Monitoring

- Speed/Power
 - How much work is being done (Stress)
- Effort
 - Rating of Perceived Exertion (Strain)
- Physiologic Responses
 - VO_2 , Blood Lactate Concentration, SMO_2 , Fuel, Heart Rate



Why - 4 Individual Responses



How

Planned Specific Training Purpose

- Frequency
- Intensity
- Type
- Time/Duration

Intensity Specific

- Tempo/Medio
- Threshold
- VO_2 (Sustained/Micro)
- Mixed/Anaerobic Capacity
- Sprint



Neal calling splits for Taylor at 2010 UCI Track World Championships.



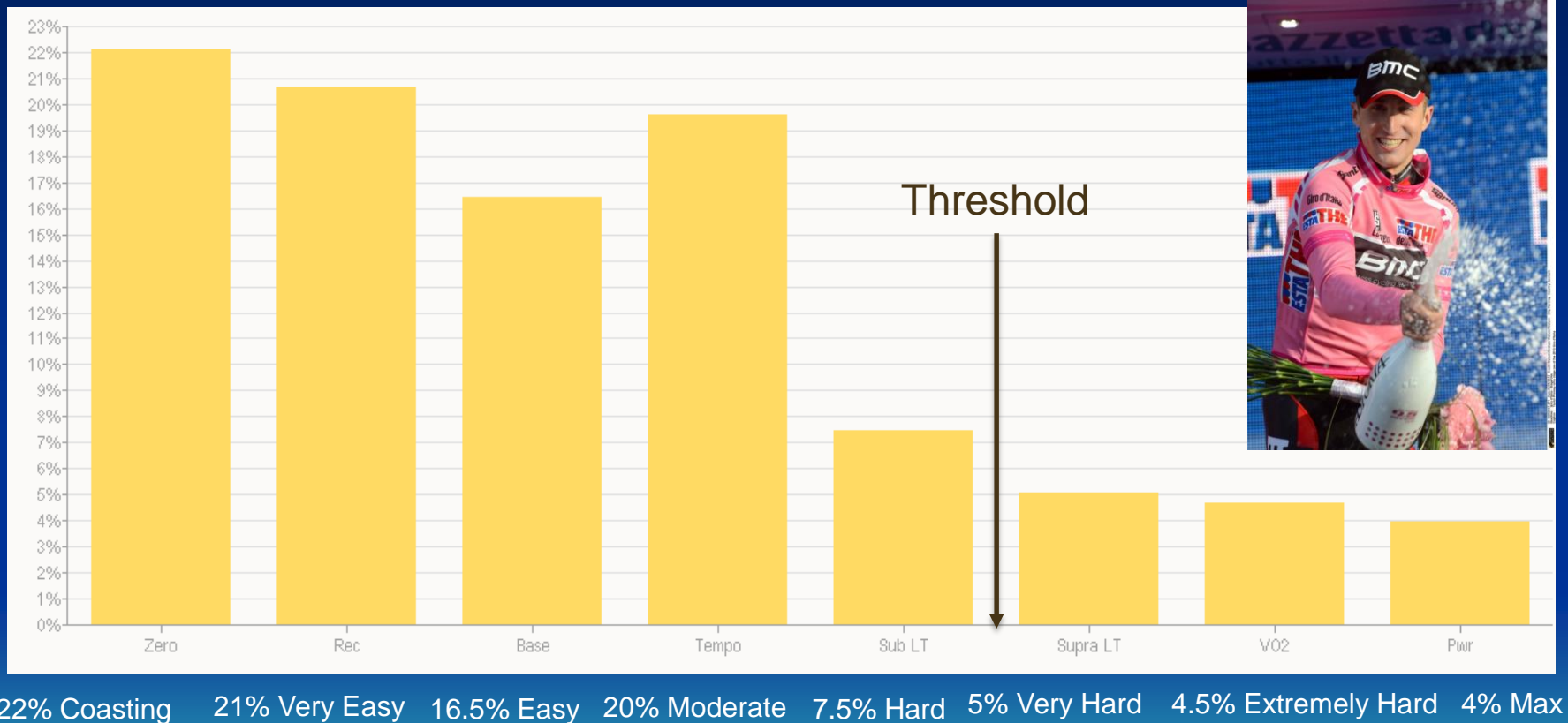
Video: Rohan Dennis testing position

How (Progression)

- Recruit
 - Hit the goal intensity/output
- Sustain
 - Increase the length of time that goal intensity/output can be maintained (effort specific)
- Repeat
 - Improve ability to reproduce goal output with varying intensity & duration of recovery



2012 Giro d'Italia – Power Output



97 hours total race time in 3 weeks (Grand Tour = overtraining?)

How - Specificity

- Replicate overall training loads
- Task specific training sessions
 - Virtual pre-ride TT courses/climbs
 - Video plus GPS/Google Earth
- “A failure to plan is a plan to fail.”



How (specifically)

Endurance with Sprints

5s seated sprint every 10 minutes
5s alternating standing/seated every 10 minutes
10s seated sprint every 10 minutes
10s alternating standing/seated every 10 minutes
10s alternating standing/seated sprint every 5 minutes
10s standing start/seated finish sprint every 5 minutes

Standing Start Progressions

3-4 X 15-20s Slow roll starts
3-6 X 15-20s Standing starts
3-5 X 20s Standing Start/40s Threshold
3-6 X 30s Standing Starts/30s Threshold
3-6 X 20s Standing Starts/40-60s VO2 (130-150% LT)
3-6 X 30s Standing Start/30-90s VO2 (120-150% LT)

Tempo/Medio Intervals

3-6 X 5 minutes 80-90% LT/5 minutes recovery
4-6 X 6 minute 80-90% LT builds/3-4 minutes recovery
3-4 X 8-12 minutes at 80-90% LT/ 4-6 minutes recovery
2-4 X 15 minutes at 80-90% LT/5 minutes recovery
2-3 X 20 minutes at 80-90% LT/5-10 minutes recovery



How (specifically, part II)



Short VO2 Intervals

10 X 30s @ 150-180% / 90s recovery		
2 sets of 10 X 20s @ 180-200% LT/60s recovery		
15 X 30s @ 180-200% LT / 90s recovery		
2 sets of 8 X 40s @ 130-150% / 120s recovery		
10 X 1 minute @ 150% / 3 minutes recovery		
20 X 30s at 150-180% / 60s recovery		
2 sets of 8 X 45s @ 150-180% / 90s recovery		
12 X 1 minute @ 150% / 2 minutes recovery		

Micro VO2 Intervals

3-4 sets of 8-10 X 20s @ 160-180% / 10s recovery (Tabata)		
3-4 sets of 8-10 X 30s @ 150% / 30s recovery		
3-4 sets of 8-10 X 40s @ 130% / 20s recovery		
10-20 X 1 minute at 130-150% / 1 minute recovery		

Sub LT Intervals

4-10 X 3 minutes Sub LT/1-2 minutes recovery		
4-8 X 4 minutes Sub LT/1-2 minutes recovery		
3-8 X 5 minutes Sub LT/2-3 minutes recovery		
3-7 X 8 minutes Sub LT/2-4 minutes recovery		
3-6 X 10 minutes Sub LT/3-5 minutes recovery		
3-5 X 12 minutes Sub LT/3-6 minutes recovery		
2-4 X 15 minutes Sub LT/5-8 minutes recovery		
2-3 X 20 minutes Sub LT/5-10 minutes recovery		
30 minutes continuous		
40 minutes continuous		
30/20 minutes with 5 minutes recovery		
2 X 30 minutes continuous		



How (specifically, part III)



Long VO2 Intervals

8-10 X 1.5 minutes @ 130-150% / 1.5 to 4.5 minutes recovery

6-10 X 2 minutes at 120-150% LT / 2-6 minutes recovery

3-7 X 3 minutes at 120-140% LT/ 3-7 minutes recovery

3-5 X 4 minutes at 120-130% LT / 3-6 minutes recovery



Mixed Intensity/Anaerobic Capacity

Sprint 1: 2-4 sets of 4-6 X 5s / 55s

Sprint 2: 2-4 sets of 4-6 X 10/50s

Sprint 3: 2-3 sets of 4-8 X 15s/45s

Sprint 4: 2-3 sets of 4-8 X 20s/40s

3 sets of 6-10 X 10/20s @ 200+%; 20/20s @ 160%; 20/10s @ 180%

3 sets of 6-10 X 20/40s @ 180-200%; 30/30s @ 150%; 40/20s @ 120%

Mini POP - 10s/50s; 20/40s; 30/30s; 40/20s; 50/10; 60s

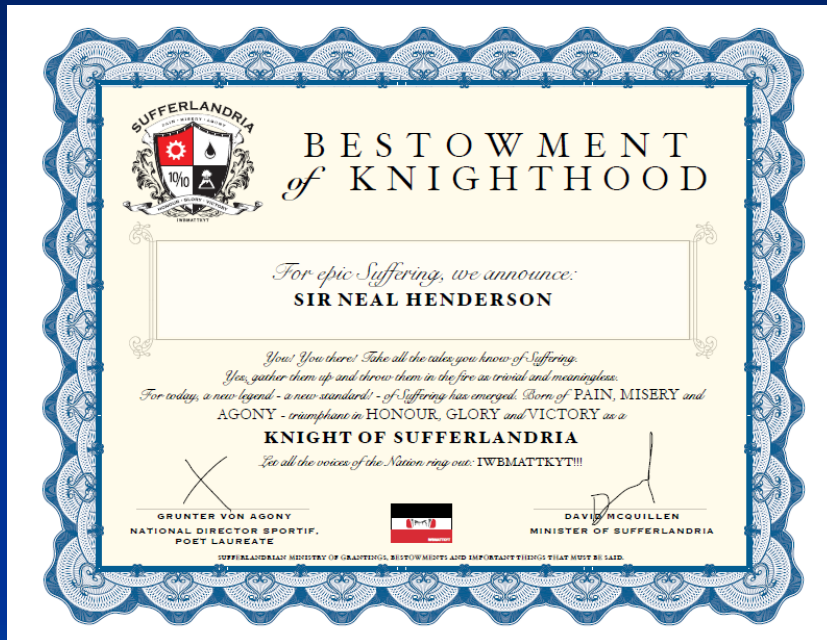
Full POP - 5/55s; 10/50; 15/45s; 20/40s, 25/35s, etc. to 60s

Short Decreasing Rest Sprint 6/4/2 of 5/10/15s at 6:1.. 3:1, 1:1

Short Decreasing Rest Sprint 8/6/4 of 5/10/15s at 6:1.. 3:1, 1:1

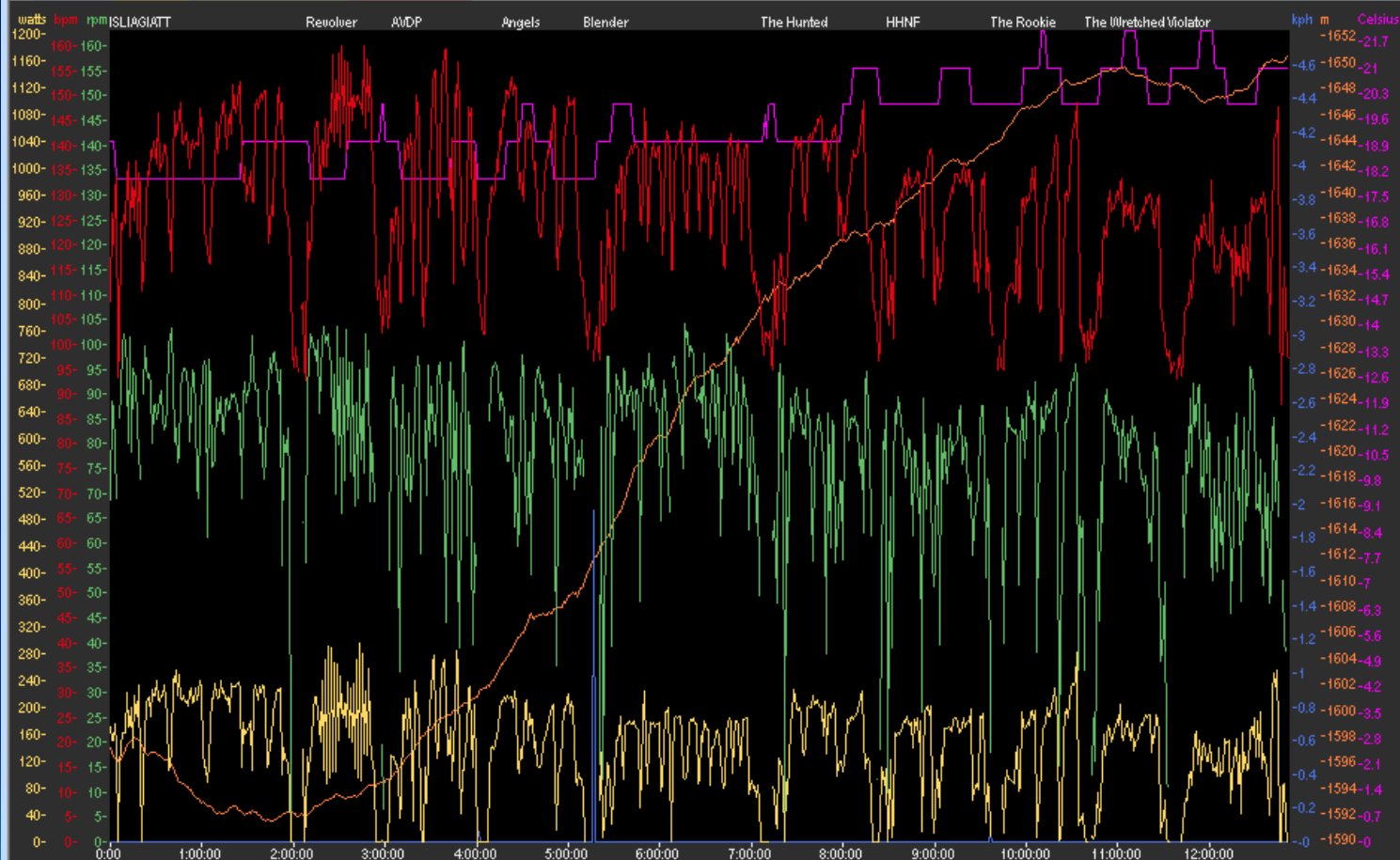
Short Decreasing Rest Sprint 10/8/6 of 5/10/15s at 6:1.. 3:1, 1:1

Race Winners: 2-4 X 3 X 15s sprint/30-60s recovery/ 3-5 minutes LT+/10-20s sprint



Henderson, Neal on Sat 10/25/2014

Journal Graph Quadrant Analysis Scatter Graph



Ranges Bar

- Entire workout (144 watts)
- Peak 5s (930 watts)
- Peak 10s (681 watts)
- Peak 20s (437 watts)
- Peak 30s (374 watts)
- Peak 1min (319 watts)
- Peak 2min (280 watts)
- Peak 5min (244 watts)
- Peak 10min (226 watts)
- Peak 20min (223 watts)
- Peak 30min (211 watts)

Duration: 12:53:05.05

Work: 6340 kJ

TSS: 585.5 (0.694)

min Power: 181

VI: 1.25

Pw:HR: 9.95%

Pa:HR: 96.87%

Distance: 141 m

lev. Gain: 60 m

lev. Loss: 9 m

Grade: 40.9 % (53 m)

	Min	Max	Avg
Power:	0	1205	144 watt
Heart Rate:	76	163	128 bpm
Cadence:	6	163	84 rpm
Speed:	0	4.8	0.0 kph
Pace:	12:30	0:00	23019:53 min
Altitude:	1591	1651	1622 m
nk Torque:	0	173.8	18.8 N-m
temperature:	18	22	19.4 Cels

Questions



Thank You!

