



Case Study: 2016 BMX World Champs Preparation (Nov 2015 to Mar 2016)

Integrating on-bike & off-bike training

Andrew Keene

November 2017

Integrating on-bike & off-bike training

- Setting the scene
- Key S&C related factors for BMX
- On-bike vs off-bike training
- What we did
- What she achieved



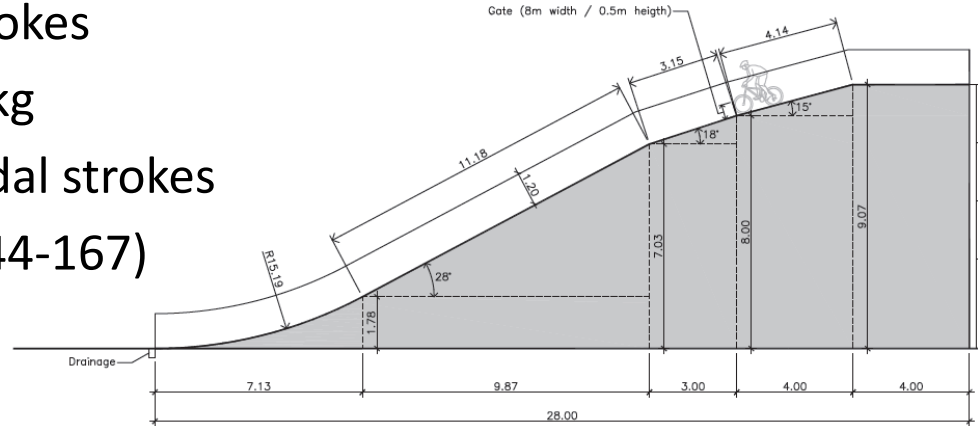
Setting the scene

- 2016 BMX World Champs Preparation: Nov 2015 to Mar 2016
 - 1st World Cup 25th Mar 16 → Worlds 23rd May 16
- My role = Gym based delivery
- Athlete = Sarah Walker
 - Injured 24th February
- Sarah
 - High training age
 - Good base leading into phase
 - During phase was prepared to put herself in the box
 - Pushing limits, not holding back, failure was an option (In gym)
 - Historic back injuries restricting using of traditional lifts such as Power Cleans, Deadlifts, Squats



Key S&C related factors for BMX

- The start is important
 - Win the start win 50-70% of the races
 - High power for first pedal strokes
 - Peak power 19-26watts/kg
 - High speed for remaining pedal strokes
 - Max RPM = 250 (Avg = 144-167)
 - 44-53km/hr

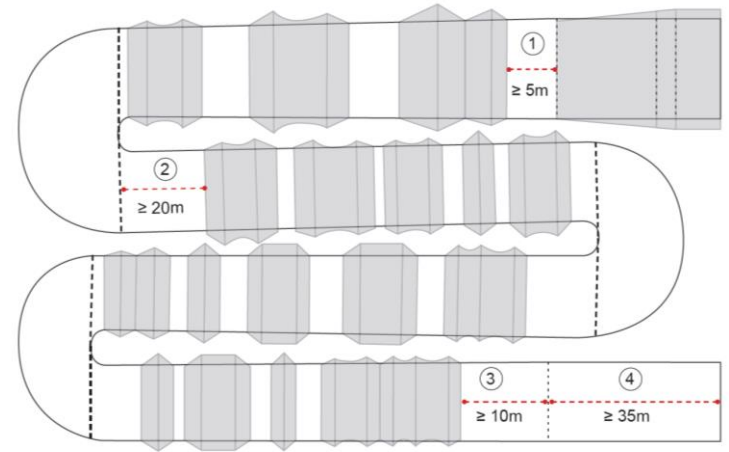


References: Bosse (2016), Debraux et al (2013), Louis et al (2013)



Key S&C related factors

- Race involves short, high intensity bursts
 - 1-3 sec of pedalling
 - ~9 seconds total
- Races require repeated performance ability
 - 3 x (30-40sec races :20-25min rest)
 - Lactates >10 mmol.l



Straight 1 typical section



Straight 2 typical section



Straight 3 typical section



Straight 4 typical section

References: Debraux et al (2013), Louis et al (2013)

On-bike vs off-bike training

1. On-bike ticks a lot of boxes

- Metabolic eg. Rep work
- Strength eg. Seated, big gear hill efforts
- RFD eg. Big gear starts, Rolling accelerations
- Speed eg. Tow in's, Down hill, short crank sprints
- Proprioception eg. Track stands, off-road work

2. On bike: Low Risk - High Reward

- Cycling, especially erg work, is a low-impact, low-risk, high return mode
 - Injuries related to long times spent in fixed postural position.

3. On bike: Low Cost – High Benefit

- Its specific!
 - Skill
 - RFD
 - Velocity



So, what did we do?

- Collaboration amongst: Coach-Athlete- Sport Scientist-S&C
 - Tried new modalities: Uphill big gear standing starts, Ecc Erg
- We integrated on & off bike work in to sessions to improve Sarah's Strength & Power
 - Eg. Strength Days:
 - Heavy Squats + Big Gear Up Hill Starts
 - Eg. Conversion Days:
 - Heavy Leg Press + Power Step-ups/Assisted Jumps + Short Crank bike sprints



Plan Overview (Nov 16-Jan 16)

Phase	Conditioning		Strength				Power			Nationals & Continentals
Week Beginning	23-Nov-15	30-Nov-15	7-Dec-15	14-Dec-15	21-Dec-15	28-Dec-15	4-Jan-16	11-Jan-16	18-Jan-16	25-Jan-16
Where	Cambridge		Cambridge				Cambridge			Puni
Weeks to RIO	38	37	36	35	34	33	32	31	30	29
Weeks to Worlds	26	25	24	23	22	21	20	19	18	17
Load	Re-Entry	Mod	Intro	Heavy	Heavy	Heavy	Mod	Mod	Light	Light
Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Testing			Gym testing				Gym testing			
Track -Skills/Simulation (2-3/week)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gym (2-3/week)	Mod Rep Lifts + Circuits	Mod Rep Lifts + Circuits	Low Rep Lifts	Low Rep Lifts	Low Rep Lifts	Low Rep Lifts	Low Rep Lifts	Low Rep Lifts	Low Rep Lifts	Low Rep Lifts
Eccentrics (2/week)			Intro	ECC1	ECC2	Unload	ECC1	ECC2	Unload	Unloaded
Big Gear (1/week)							Gate Starts	Gate Starts		
Gate Starts (1/week)		✓	✓	✓	✓	✓	✓	✓	✓	✓
Short Crank (1/week)		✓	✓	✓	✓	✓	✓	✓	✓	✓
Down Hill (1/week)							✓	✓	✓	
Road (1/week)	✓			✓		✓	✓			
Velo Track (1/week)	500m Progressives	500m Progressives	500m Progressives		500m TTs	500m TTs				

Performances changes (Nov 15 to Feb 16)

- **Increased Strength**
 - 12% Increase in Single Leg Press Strength
 - 9% Increase in Bench Pull Strength
- **Increased Power**
 - 13-44% Increase in Barbell Squat Mean Velocity (> ↑with > weight lifted)
 - 20% Increase in Jump Relative Power (SJ > CMJ)
 - 13% increase in relative Inertial Erg Peak Power (PB @ 21.7 watts/kg)
 - 7% reduced time to peak Inertial Erg Peak Power
 - 8% increase in RPM @ peak power
- **Improved 1m Ramp Times**
 - 5m - 10% faster; 10 & 20m – 6% faster
- **Continental Champion (February 2016)**

