SLIDING TOWARD SOCHI—PART II: A REVIEW OF PROGRAMMING TACTICS USED DURING THE 2010 – 2014 QUADRENNIAL

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INTRODUCTION

Part I of this two-part series on athletic development for bobsled athletes highlighted the theoretical constructs used during the creation of practice agendas. Our programming model, termed Seamless Sequential Integration (SSI), describes the combination of previously separate training theories and components including conjugate sequential training, phase potentiation, and vertical integration. This mode of programming was used to ensure that the development of individual fitness qualities occurred in a logical and complementary manner. In addition, this model allowed the coaches to address the tenants of periodization through the inclusion of an objective athlete-monitoring program that provided unique insight into each athlete's physiological adaptations to the training stimuli (1).

Part II continues the discussion on bobsled training with an overview of how information collected through a performance-monitoring program can be used to assist in the development of a sliding sport talent identification program and the fine-tuning of training blocks throughout each annual plan. The monitoring program should treat each athlete as an individual case with intra-individual longitudinal monitoring being the primary focus.

IDENTIFICATION OF BOBSLED-SPECIFIC PHYSICAL CHARACTERISTICS

With little to no information regarding the physical characteristics of elite bobsled athletes in existence, coaches will first need to get a handle on what physical characteristics are needed to excel in the sport. With no information to start, baseline data needs to be compiled. Based on the sport requirements, some suggested variables that should be tested include morphological and anthropometric measures, reactive and isometric strength, and power. Some tests may require specific equipment. For example, isometric mid-thigh pulls (IMTP) can be assessed using PASCO force plates and analyzed using LabVIEW data analysis software (2). Reactive strength is another variable that can be monitored through a series of maximal jumps on a force plate. It is valuable to test these jumps using a variety of loads (an example load progression for these jumps could be unweighted, 10 kg, 20 kg, 40 kg for both the men and women, and then an additional weighted jump of 60 kg for the men).

This compilation of data can provide the strength and conditioning coach a better understanding of the physical attributes needed for the sport and current standing of their athletes. For example, as bobsledders sprint for the initial part of their races, this time period may be an important variable to examine when testing an incoming athlete. Since this time period is so crucial, the rate of force development would be a valuable measure to test.

Another aspect that may be noteworthy is the anthropometric profile of the athletes. Bobsled is unique in that it is a sport that requires an athlete to find balance between maintaining a weight that will create and sustain momentum when traveling down the track, and avoiding a body composition that is so high that it deleteriously affects sprint performance.

Mentioned previously, the SSI model is built to ensure potentiation of one phase into another, with each block of training having a particular training focus and expectations for which adaptation in performance measures should occur. The use of testing for performance monitoring can help determine if the intended results are indeed occurring, and if not, the coaches can then make the proper program adjustments moving forward. For instance, Table 1 is a theoretical representation of what may result from exposing an athlete to varying block foci, as revealed by the iMTP performance test. Data analysis and interpretation can provide the attending coach an opportunity to determine whether or not those results in performance adaptations are being achieved.

PRACTICAL CONSIDERATIONS IN PROGRAM DESIGN

A successful start in bobsled requires the athlete to overcome the sled's inertia and displace it with high forces. Since the time available to produce force is limited by the duration of the stance phase (ground contact time) of the sprint, rate of force development is an important training priority when optimizing competitive readiness.

Through the utilization of blocks of concentrated loads, rate of force development (RFD) can be trained successfully. This approach can be carried out through the prescription of a range of relative intensities for each set-rep scenario. These differing intensities will expose the athletes to a large spectrum of movement speeds during a training block, which may assist in shifting the athlete's entire force-velocity curve to the right, as theorized in Figure 1. Recall from part I, relative intensities are used to bridge the gap between an athlete's calculated load (based on a set-rep maximum) and the residual effects of summated fatigue that the athlete may "bring" into that training session. Furthermore, set-rep best systems differ from a one-set maximum system in that the percentage prescribed for a training session is based on what the athlete can hypothetically perform for that given set-rep scenario (for instance a 3 x 5) instead of a 1 or 3 repetition maximum. It should be noted that this method of prescribing intensity can account for varying levels of training status and physiological differences exhibited by athletes.

Figure 2 illustrates how a bobsled athlete may progress through sequential phases of training through the implementation of concentrated loads and varying intensities. Coaches should select exercises for each block based on the training emphasis. For instance, in Figure 2, back squats stayed a staple for most, if not all, of the training year in order to mature and optimize force production. In conjunction, weightlifting movements increased in complexity (e.g., movement skill, range of motion, etc.) so that RFD could be fully matured once the season began. The weightlifting movements are also broken down into derivatives (e.g., clean grip shoulder shrug and clean grip pull to knee) in order to stabilize movement efficiency and force output before commencing with more complete lifts such as the mid-thigh clean or power clean. Lastly, auxiliary exercises such as unilateral squats, upper body presses, and posterior chain can be prescribed to compliment individual athlete needs as well as to maintain an adequate volume-load.

CONCLUSION

This training model, which attempts to cohesively blend strength and speed development through strategic exercise selection and loading paradigms, guided the process of program planning for these bobsled athletes. Given the nature of most bobsled training programs, a quadrennial plan is most logical. This longer period of time allows for the maturity of required fitness qualities in a successive manner. Prioritizing each year of the quadrennial toward a specific training agenda (e.g., maximal strength) may allow subsequent years to build toward a more narrow and specific focus (e.g., rate of force development and explosive speed). In order to ensure the proper development of an athlete within each stage of training, a performance-monitoring program can also be implemented.

While any sport can be largely chaotic, effective training can maximize preparedness and the chances for competitive success. At no other level of sport is this more apparent than the Olympic Games, where fractions of a second separate a podium-performance from fourth place. The authors hope that providing insight into the training model used by a select group of elite-level bobsled athletes over the past quadrennial will further bolster the successful development of future bobsled training programs.

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FIGURE 1. THEORETICAL REPRESENTATION OF THE SHIFT IN FORCE-VELOCITY CURVE AS RESULT OF EXPOSURE TO VARYING LOADS AND MOVEMENT SPEEDS

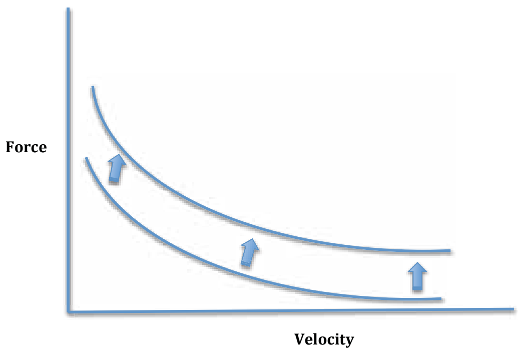

FIGURE 2. EXAMPLE OF STRENGTH DEVELOPMENT PROGRAMMING WITH PHASE POTENTIATION AND RELATIVE INTENSITIES

WEEK:	OBJECTIVE	VOLUME	DAY 1	DAY 2	DAY 3
1	RTF	3 x 5	80%	80%	75%
2	RTF	3 x 5	80 – 82.5%	80 – 82.5%	75 – 77.5%
3	SE	3 x 10	82.5 – 85%	82.5 – 85%	75 – 77.5%
4	SE	3 x 10	87.5%	87.5%	80%
5	SE	3 x 10	90%	90%	80 – 82.5%

DAY 1 (PUSH EMPHASIS)	DAY 2 (PULL EMPHASIS)	DAY 3 (PUSH-PULL COMBO)
Back squat	Pull to knee	Snatch grip shoulder shrug
Overhead press	Clean grip shoulder shrug	Back squat
Lunges	Stiff-legged deadlift	Incline bench press
Bench press	Pull-ups	Step-ups

6	MS	3 x 5	85%	85%	75%
7	MS	3 x 5	90%	90%	77.5 – 80%
8	MS	3 x 5	95%	95%	80 – 82.5%
9	MS	3 x 5	82.5%	82.5%	75 – 77.5%

DAY 1 (PUSH EMPHASIS)	DAY 2 (PULL EMPHASIS)	DAY 3 (PUSH-PULL COMBO)
Front squat	Mid-thigh pull	Mid-thigh pull
Overhead press	Clean pull	Back squat
Split squat	Glute ham	Bench press
Incline bench press	Bent-over row	Reverse hyper

FIGURE 2. EXAMPLE OF STRENGTH DEVELOPMENT PROGRAMMING WITH PHASE POTENTIATION AND RELATIVE INTENSITIES *(continued)*

WEEK:	OBJECTIVE	VOLUME	DAY 1	DAY 2	DAY 3
10	MS	5 x 5	87.5%	87.5%	75 – 77.5%
11	MS	3 x 5	92.5%	92.5%	80%
12	MS	3 x 5	95 – 97.5%	95 – 97.5%	82.5%
13	MS-AS	3 x 3	80 – 82.5%	80 – 82.5%	75%

DAY 1 (PUSH EMPHASIS)	DAY 2 (PULL EMPHASIS)	DAY 3 (PUSH-PULL COMBO)
Push press	Mid-thigh clean	Countermovement shrug
Back squat	Clean pull	Back squat
Bench press	Stiff-legged deadlift	Incline bench press
Squat to press	Pull-ups	Split squat

WEEK:	OBJECTIVE	VOLUME	DAY 1	DAY 2	DAY 3
14	AS	5 x 3	85 – 87.5%	85 – 87.5%	75%
15	AS	3 x 3	92.5%	92.5%	75 – 77.5%
16	AS	3 x 3	95%	95%	80 – 82.5%
17	CV	3 x 3	80 – 82.5%	80 – 82.5%	75%
18	CV	3 x 2	85%	85%	75%

DAY 1 (PUSH EMPHASIS)	DAY 2 (PULL EMPHASIS)	DAY 3 (PUSH-PULL COMBO)
Push jerk	Power clean	Countermovement shrug
Back squat	Mid-thigh pull	Back squat
Bench press	Bent-over row	Incline bench press
Squat jumps		

Key:
RTF=Return to fitness
SE=Strength endurance
MS=Maximal strength
AS=Absolute strength
CV=Convergence

TABLE 1. REPRESENTATION OF TRAINING BLOCK FOCUS WITH THEORETICAL CHANGES IN IMTP PERFORMANCE POST-BLOCK AND RELATIVE INTENSITIES

VARIABLE	STRENGTH ENDURANCE BLOCK	STRENGTH BLOCK	ABSOLUTE STRENGTH BLOCK	CONVERGENCE BLOCK	EXPLOSIVE SPEED BLOCK
Peak Force (PF)	→, ↑	↑	↑	→, ↑	→, ↑)
Force at 90ms	→, ↑	↑	↑	→, ↑	→, ↑
Force at 250ms	→, ↑	↑	↑	→, ↑	→, ↑
RFD at 90ms	↓	→, ↑	→, ↑	↑	↑)
RFD at 250ms	↓	→, ↑	→, ↑	↑	↑

Indicates an expected increase (↑), decrease (↓), or no significant change (→) in specific performance measures.