INTEGRATION OF CLEAN VARIATIONS, PROGRESSIONS, AND APPLICATION IN STRENGTH AND CONDITIONING PROGRAMS

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INTRODUCTION

The clean exercise and its various iterations have been used in strength and conditioning planning or programming for improving athletic performance in numerous sports at various levels (4,8,14,23,34). The clean is a major part of the sport of weightlifting, where athletes compete in the snatch and clean and jerk. The clean and power clean (PCL) have been used for a long time in strength and conditioning for the development of muscular strength and power in athletic preparation (1,24,27). The incorporation of the PCL or its variations (e.g., hang above knee clean, clean pull) has been shown to develop high levels of muscular absolute and relative power, force, impulse, and rate of force development that are needed for sport performance success (6,18,19,21,28,31). The PCL is categorized as a power exercise and thus is included in strength and conditioning programs at the beginning of general preparation phases to develop athletes' lower body power and "triple extension" of the ankle, knee, and hip joints (9,12,22). Beyond using the PCL during the general preparation phases of training, the numerous variations can be included into other phases of training to maximize the power development of a wide range of athletic endeavors. Triathlon, speed skating, sprinting, swimming, and other sports have been recommended to include the PCL in their weight training sessions during phases that focus on developing muscular power and strength (2,20,22,29,34). Coaching the PCL in a strength and conditioning session follows the same principles as other exercises or drills and, with proficient application, athletes can improve their technique and physical ability. The purpose of this article is to provide the strength and conditioning coach with a template on how to integrate the PCL into athletic training programs.

The PCL is typically performed with a barbell and bumper plates where an athlete lifts the barbell from the platform vertically and catches the bar across the anterior deltoids and upper chest in a ¼ to ½ front squat position or the hamstrings (back of the thighs) are above parallel (7). Other variations of the PCL may involve dumbbells or kettlebells, but those variations are outside the scope of this article. There are several phases and positions that can be used by the strength and conditioning coach to observe, instruct, and apply in a program. The order of the full PCL phases and positions includes: the start position, first pull, transition (also referred to as the second knee bend), second pull, triple extension, pull under or turn over, catch, and the recovery (5,7,12,28,32). The start position has the athlete in a squatted position with the barbell about one inch away from the shins and shoulders either over or in front of the bar. The arms will be outside of the legs with the hands grasping the barbell with a pronated (overhand) grip, preferably a hook grip and flat back (5,7,12,33).

Prior to addressing the approach of coaching a team, the different coaching methods and PCL progressions need to be established. A common coaching method that is used for all skill development is "part to whole skill," where an exercise is broken down into phases to develop a specific technique that will translate into the full exercise. Specific to the PCL, a strength and conditioning plan begins with an athlete developing a starting clean position by using the same basic setup as a clean grip deadlift, which is like the conventional deadlift except the shoulders are in front of the barbell. Along with the clean grip deadlift, the addition of the front squat in the same training sessions would not only increase muscular strength, but also reinforce the proper catch and rack positions of a PCL. Table 1 provides a list of possible progressions that can be incorporated into a strength and conditioning plan that may last 2 – 4 weeks or 2 – 4 months depending on the coachability of the athlete and the coach's instructions. There is no clear consensus on the best approach to the ideal exercise progression for PCL utilization, but rather the most effective progressions are based on the coach's experience, athletes' ability, sport, and equipment availability. A planning challenge is implementing the most appropriate PCL progression for the athletes' sport because competitive weightlifters use the PCL as a variation of the clean and jerk, whereas athletes in other sports utilize the PCL as a core lift for developing power, but may never progress to the full competition clean and jerk lift. The testing, assessing, and progressions for the PCL will be discussed in this article for the first- to fourth- or fifth-year college student-athlete for improving their athletic performance.

INITIAL TESTING AND ASSESSMENT

Successfully executing the following tests prior to integrating the PCL into a strength and conditioning program include a clear demonstration of "safe and effective ranges of motion" for the front squat (FSQ) with clean rack position, clean grip deadlift (CLDL), stiff-leg deadlift (SLDL) Romanian deadlift (RDL), and the vertical countermovement jump (vCMJ) (22). For example, an athlete should be able to FSQ into their deepest descended position while maintaining the bar across the chest and anterior deltoids, while the arms maintain a minimal downward drop of the elbows. Athletes should demonstrate the ability to maintain a flat back, hip hinge, and upper body movement in unison with the lower body during the CLDL and SLDL. The vCMJ reinforces the triple extension that will occur during the pulling phase of the PCL and athletes should be able to execute with a "coordinated" descent followed by a rapid vertical displacement. The amount of weight lifted in these tests are secondary to the motor skills proficiency of the athletes performing the tests. Some may choose to design specific testing sessions to assess these exercises or they may decide to assess them informally as part of the athlete's training program, while making notes on their individual success or deficiencies after each session. If quantitative data is of interest to the strength and conditioning coach, these tests can be performed while using video motion analysis, force plates, or linear position transducers. If the focus of the assessment is primarily qualitative, then the strength and conditioning coach can use a checklist for each test. This method can be used as a "pass/fail" or "proficient/needs improvement/poor" scaling system (see FSQ example in Table 2). When considering the PCL progressions, each exercise serves to address specific aspects of the full PCL. A

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proper front squat is necessary to properly catch and recover the bar during the PCL. The CLDL reinforces the athlete's start position and the overall pull motion of the PCL. The SLDL strengthens the posterior chain muscles and teaches the athlete to emphasize the posterior chain during the second pull. The vCMJ is indicative of an athlete's ability to achieve a triple extension of the ankle, knee, and hip joints, which is an essential aspect of a proper PCL. The various pulls and cleans from different heights (e.g., hang above knee, hang mid-thigh) are all designed to emphasize different aspects of the lift and can be used as prescriptive corrective exercises if athletes are struggling to grasp a specific body position during the PCL.

Strength and conditioning coaches can plan and program using the previously listed tests as appropriate for the athlete and sport. The exact tests based on a sport needs analysis is beyond the scope of this article, and readers should refer to the literature for further guidance (5,12). In general, the test battery should include technique assessments of the most applicable and transferable abilities for a given sport. Once the athletes demonstrate proficiency in the basic movements, planning the most appropriate progressions can be developed and implemented.

PROGRESSION PLANNING

Introducing a PCL progression into a strength and conditioning program could be as simple as incorporating a barbell warm-up for the weight room sessions using clean grip upright row, clean grip jump shrug, hang mid-thigh muscle clean, front squat, shoulder press, and SLDL. This warm-up would be performed for 2 – 3 sets of five repetitions each and should be emphasized in first-year student-athletes or transfers. Table 1 has sample PCL planning progressions, though strength and conditioning coaches may have other variations that can be developed specific to their college student-athletes' sport. Table 3 outlines a progression for athletes that will have a supervised strength and conditioning plan until their fourth or fifth year in collegiate sports. The number of exercises in the first year is laid out to address the general physical preparation of the athletes' strength as these individuals are new to the strength and conditioning plan and will need to learn the strength and conditioning department mission, coaching cues, and strength and conditioning coach expectations. As athletes progress through the program and demonstrate technical proficiencies, they can specialize more on the primary, and most power-producing, PCL variants.

How a strength and conditioning coach progresses athletes can differ based on the different variations of the clean, pulls, and ancillary exercises that are part of a program. Figure 1 provides a comparison of how weightlifters' and basketball players' progressions may vary over their training plan, as the weightlifters will be completing the clean and jerk. The progressions presented are examples that have been used for different sports and should be altered by the strength and conditioning coach based on the athletes' abilities and capability to effectively execute the exercise skill. Additionally, there needs to be a clear indication of start positions when using a hang or block, as these can be positions of below knee, above knee, mid-thigh, and hip (7,22,30,33). These hang and block positions allows the strength and conditioning coach to divide the full lifts into parts to reinforce a specific movement pattern prior to progressing onto the full PCL. Additionally, other clean variations can be implemented into a program such as split cleans, drop cleans, halt cleans, along with the use of dumbbells or kettlebells. The application of a progression for a team should start with the basic skills that all athletes will need to execute (e.g., front squat) for the PCL with each subsequent phase adding to the completion of the full lift. Individual progressions should be based on the athlete's ability to execute the skills, which may not be practical in a large team setting due to staffing, time, and size of team.

PROGRAMMING EXAMPLES

Programming the PCL for a sport's strength and conditioning plan requires forethought to have the most effective starting lift, complementing exercises, clean variations, and a logical progressive order for the athlete and sport. For example, the sport of wrestling can benefit from the use of the PCL in a program for improving a wrestler's ability to execute skills during a match. With a complex demand of physical abilities including lower body strength and power, wrestlers need to be able to maximize efficiency during training sessions (17). Developing these physical abilities by way of weightlifting movements may best be suited

FIGURE 1. PCL PROGRESSION EXAMPLES COMPARING WEIGHTLIFTER TO BASKETBALL PLANNING

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through progressions of a PCL. Application of these progressions are listed in Table 4 that start with the top-down method solidifying proper technique and positioning (33). For improving the effectiveness of the wrestling strength and conditioning program, a volume of 1 – 6 sets plus less than six repetitions paired with intensities between 20 – 80% one-repetition maximum (1RM) are applied, with the understanding that wrestling is dictated by high levels of force for skill execution (16,26). Thus, an emphasis on moderate to heavy load while maintaining proficient technique should be made prior to competition, once technical proficiency is achieved. Rest intervals with the PCL ideally can vary between 2 – 5 min per set or can be paired with inter-set rest, such as cluster sets, providing additional rest though reality may require less time according to established work:rest ratios (12,26). Training frequency may be 2 – 3 days per week depending on athlete availability, training objectives, metabolic demands intended, and athlete strength and conditioning experience. The addition of speed, agility, and quickness (SAQ) and conditioning can be implemented with the weight training or on separate days. However, when SAQ or conditioning is performed on the same day as weight training, the strength and conditioning coach needs to choose if SAQ and conditioning will have the greatest benefit before or after the weight training session.

The placement of a strength and conditioning session in an athlete's weekly schedule with their sport practices becomes a critical decision for maximizing athletic performance. For example, a strength and conditioning plan for swimming can benefit from including the PCL by assisting in developing total body power for the athlete that can have a specific transfer of training effect to their block starts. Barbosa et al. observed significant relationships ($r = 0.426$; $p < 0.001$) between power output and overall swimming performance, while the greatest relationship was seen between power and block starts in sprint races (3). These results suggest the inclusion of exercises into a program that would increase an athlete's power development. The benefit of the PCL in a swimming strength and conditioning program is supported by Hawley et al. and West et al. that suggest benefits to 50-m sprint speed, start times (first 15 m of a 50-m sprint swim) by increasing mean leg power, jump height, peak power, and relative power (13,35). Moreover, accounting for the crouched stance prior to starting off the blocks and significance to sprint distance swim times, the PCL and its variations can be reasonably inferred for application during training for positive transfer of training effect in swim performance. Table 5 provides a training template of a power clean progression for a collegiate swimmer, beginning in the early off-season through the in-season period. Wrestling and swimming are individual sports that have their own variables that influence strength and conditioning planning and programming while team sports have positions and teamwork variables that should be considered to maximize performance.

Several sources suggest that sports such as volleyball, American football, and basketball include the PCL for the development of total body power (11,14,15,22,25). The single session set volume for a PCL or its variations can range from 2 – 10 sets depending on session duration, phase, and additional exercises that are part of the program. Strength and conditioning coaches are challenged on assigning the most appropriate volume because maximum power development will be less than three repetitions, while the ability to perform repeated performances of total body power may range from 5 – 10 repetitions. The inclusion of cluster sets may also be effective for collegiate athletes' strength and conditioning programming so power can be sustained for the duration of a set (10).

CONCLUSION

Prior to starting a training session, the strength and conditioning plan must be developed. An effective approach may be to work backwards determining what will be the final objectives of a strength and conditioning plan. Because the PCL is at the end of the strength and conditioning phases presented in the article, each phase should build upon the last one. Although coaching the PCL from the floor to recovery in the first phase is acceptable, the process of instructing in smaller lifts (e.g. block mid-thigh PCL to block above knee PCL) may demonstrate improved motor learning. Dividing the PCL into smaller exercise movements can provide the athlete with a more rapid development of technique success and subsequently build confidence. Once a program is developed from the plan and implemented, the strength and conditioning coach will observe and monitor athlete progress and should consider where adjustments in the plan and program can be made. These adjustments should be based on improving the athlete's abilities without an increased risk of injury. Lastly, the strength and conditioning coach should avoid using an exercise because "that is what has always been done, and my coach said so," but instead should be looking at the long-term objectives of the strength and conditioning plan and athlete's best interest.

REFERENCES

1. Alejo, B. UCLA Bruins soccer weight training. *NSCA Journal* 9(1): 43-46, 1987.

2. Baldwin, KM, Badenhorst, CE, Cripps, AJ, Landers, GJ, Merrells, RJ, Bulsara, MK, and Hoyne, GF. Strength training for long-distance triathletes: Theory to practice. *Strength Conditioning Journal* 44(1): 1-14, 2022.

3. Barbosa, TM, Morais, JE, Marques, MC, Costa, MJ, and Marinho, DA. The power output and sprinting performance of young swimmers. *Journal of Strength and Conditioning Research* 29(2): 440-450, 2015.

4. Bishop, C, Cree, J, Read, P, Chavda, S, Edwards, M, and Turner, A. Strength and conditioning for sprint swimming. *Strength Conditioning Journal* 35(6): 1-6, 2013.

5. Brown, LE. *Strength Training.* (2nd ed.) Human Kinetics: Champaign, IL; 2017.

6. Comfort, P, Williams, R, Suchomel, TJ, and Lake, JP. A comparison of catch phase force-time characteristics during clean derivatives from the knee. *Journal of Strength and Conditioning Research* 31(7): 1911–1918, 2017.

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7. Dreschler, A. *The Weightlifting Encyclopedia: A Guide to World Class Performance*. A is A Communications: Whitestone, NY; 1998.

8. Durguerian, A, Piscione, J, Mathieu, B, and Lacome, M. Integrating strength and power development in the long-term athletic development of young Rugby Union players: Methodological and practical applications. *Strength Conditioning Journal* 41(4): 18-33, 2019.

9. Epley, B. *The Path to Athletic Power*. Human Kinetics: Champaign, IL; 2004.

10. Haff, GG, Hobbs, RT, Haff, EE, Sands, WA, Pierce, KC, and Stone, MH. Cluster training: A novel method for introducing training program variation. *Journal of Strength and Conditioning Research* 30: 67–76, 2008.

11. Haff, GG, and Stone, MH. Methods of developing power with special reference to football players. *Strength Conditioning Journal* 32(6): 1-14, 2015.

12. Haff, GG, and Triplett, NT. *Essentials of Strength Training and Conditioning*. (4th ed.) Human Kinetics: Champaign, IL; 2016.

13. Hawley, JA, Williams, MM, Vickovic, MM, and Handcock, PJ. Muscle power predicts freestyle swimming performance. *British Journal of Sports Medicine* 26(3): 151–155, 1992.

14. Hoffman, JR, Cooper, J. Wendell, M, and Kang, J. Comparison of Olympic versus traditional power lifting training programs in football players. *Journal of Strength and Conditioning Research* 18(1): 129-135, 2004.

15. Holmberg, PM. Preseason preparatory training for a Division III women's college basketball team. *Strength Conditioning Journal* 32(6): 42-54, 2010.

16. James, LP, Haff, GG, Kelly, VG, and Beckman, EM. Towards a determination of the physiological characteristics distinguishing successful Mixed Martial Arts athletes: A systematic review of combat sport literature. *Sports Medicine* (Auckland, N.Z.) 46(10): 1525–1551, 2016.

17. James, LP, Comfort, P, Suchomel, TJ, Kelly, VG, Beckman, EM, and Haff, GG. Influence of power clean ability and training age on adaptations to weightlifting-style training. *Journal of Strength and Conditioning Research* 33(11): 2936-2944, 2019.

18. James, LP, Suchomel, TJ, Comfort, P, Haff, GG, and Connick, M. Rate of force development adaptations after weightlifting-style training: the influence of power clean ability. *Journal of Strength and Conditioning Research* 36(6): 1560-1567, 2022.

19. Kipp, K, Malloy, PJ, Smith, J, Giordanelli, MD, Kiely, MT, Geiser, CF, and Suchomel, TJ. Mechanical demands of the hang power clean and jump shrug: a joint-level perspective *Journal of Strength and Conditioning Research* 32(2): 466-474, 2018.

20. Lockie, RG. A 6-week base strength training program for sprint acceleration development and foundation for future progression in amateur athletes. *Strength Conditioning Journal* 40(1): 2-12, 2018.

21. Meechan, D, McMahon, JJ, Suchomel, TJ, and Comfort, P. A comparison of kinetic and kinematic variables during the pull from the knee and hang pull, across loads. *Journal of Strength and Conditioning Research* 34(7): 1819-1829, 2020.

22. Newton, H. *Explosive Lifting for Sports*. (Enhanced edition.) Human Kinetics: Champaign, IL; 2010.

23. Nightingale, SC. A strength and conditioning approach for ice hockey. *Strength Conditioning Journal* 36(6): 28-36, 2014.

24. O'Shea, P. *Scientific Principles and Methods of Strength Fitness.* (2nd ed.) Addison-Wesley Publishing Company, Inc.: Reading, MA; 1976.

25. Piper, TJ. In-season strength/power mesocycle for women's collegiate volleyball. *Strength Conditioning Journal* 19(3): 21-25, 1997.

26. Sheppard, J, and Triplett, N. Program design for resistance training. In: Haff, GG, Triplett, NT, (Eds.), *Essentials of Strength and Conditioning.* (4th ed.) Human Kinetics: Champaign, IL; 439-470, 2016.

27. Stone, MH, and O'Bryant, H. *Weight Training: A Scientific Approach*. Bellwether Press: Minneapolis, MN; 1987.

28. Storey, A, and Smith, HK. Unique aspects of competitive weightlifting: Performance, training and physiology. *Sports Medicine* 42 (9): 769-790, 2012.

29. Stuart, A, and Cochrane-Snyman, KC. Strength training and development in competitive speed skating. *Strength and Conditioning Journal* 36(6): 1-10, 2022.

30. Suchomel, TJ, DeWeese, BH, and Serrano, AJ. The power clean and power snatch from the knee. *Strength Conditioning Journal* 38(4): 98–105, 2016.

31. Suchomel, TJ, McKeever, SM, and Comfort, P. Training with weightlifting derivatives: The effects of force and velocity overload stimuli. *Journal of Strength and Conditioning Researc* 34(7): 1808–1818, 2020.

32. Verhoeff, WJ, Millar, SK, Oldham, ARH, and Cronin, J. Coaching the power clean: A constraints-led approach. *Strength Conditioning Journal* 42(2): 16-25, 2020.

33. Waller, M, Piper, T, and Miller, J. Coaching of the snatch/clean pulls with the high pull variation. *Strength Conditioning Journal* 31(3): 47-54, 2009.

34. Waller, M, Shim, A, and Piper, T. Strength and conditioning off-season programming for high school swimmers. *Strength Conditioning Journal* 41(5): 79-85, 2019.

35. West, DJ, Owen, NJ, Cunningham, DJ, Cook, CJ, and Kilduff, LP. Strength and power predictors of swimming starts in international sprint swimmers. *Journal of Strength and Conditioning Research* 25(4): 950-955, 2011.

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TABLE 1. POWER CLEAN PROGRESSION OPTIONS

WEEKS	PROGRESSION #1	PROGRESSION #2	PROGRESSION #3	PROGRESSION #4
1 – 3	Conventional Deadlift Front Squat	Block Mid-Thigh Power Clean Hang Abover Knee Clean Pull	Hang Mid-Thigh Muscle Clean Stiff-Leg Deadlift	Drop Clean Clean Jump Shrug
4 – 6	Hang Above Knee Power Clean Hang Above Knee Clean Pull	Block Above Knee Power Clean Clean High Pull	Hang Mid-Thigh Power Clean Hang Mid-Thigh Clean High Pull	Hang Above Knee Muscle Clean Front Squat
7 – 8	Power Clean Clean Pull	Power Clean Clean Pull	Hang Above Knee Power Clean Hang Above Knee Clean Pull	Hang Mid-Thigh Power Clean Hang Above Knee Clean High Pull
9 – 10	NA	NA	Power Clean Clean Pull	Power Clean Clean High Pull

TABLE 2. EXAMPLE OF FRONT SQUAT CHECKLIST

PART	SKILL	PROFICIENT	NEEDS IMPROVEMENT	POOR
Start	Bar rests across the upper pectoralis major and anterior deltoids			
	Hands grasp bar outside of shoulder width (clean grip)			
	Elbows up with upper arms parallel to the floor			
	Neutral head position			
	Feet shoulder-width apart and slightly externally rotated			
Descending	Hips shift back before knee flexion			
	Neutral spine maintained			
	Knees stay aligned with feet and may slightly pass in front of toes			
	Thighs are parallel to floor			
	Feet should remain flat			
Ascending	Chest and elbows remain “up”			
	Stand up until knees are extended			
	Bar weight “line of force” passes through the center of the foot			
	Neutral spine maintained			
	Pushes through the feet remaining flat			

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TABLE 3. PLANNING A POWER CLEAN PROGRESSION FOR COLLEGIATE STUDENT-ATHLETES

	1ST YEAR / TRANSFER	2ND YEAR	3RD – 5TH YEAR
EXERCISE SELECTION	1. Front Squat 2. Clean Grip Deadlift 3. Stiff-Leg Deadlift 4. Vertical Countermovement Jump 5. Clean Jump Shrug 6. Hang Above Knee Clean 7. Block Above Knee Clean Pull 8. Block Mid-Thigh Power Clean	1. Block Above Knee Clean Pull 2. Block Mid-Thigh Clean High Pull 3. 6-in. Block Clean Pull 4. Hang Mid-Thigh Power Clean 5. Block Above Knee Power Clean 6. Hang Above Knee Power Clean	1. Clean Pull 2. Clean High Pull 3. Power Clean

TABLE 4. COLLEGIATE WRESTLING CLEAN PROGRESSIONS (OFF-SEASON – IN-SEASON)

Off-Season (Technical Progression)	**Weeks 1 – 4: 70 – 75% 1RM Each Movement** • Rack Mid-Thigh Clean Pull (Hold Shrug) 4 x 5 • Front Squats 4 x 6 – 8 • Block Below Knee Conventional Deadlifts 4 x 6 – 8 **Weeks 5 – 8: 75 – 80% 1RM each movement** • Hang Above Knee Clean Pulls 5 x 3 – 4 • Hang Above Knee Clean High Pull 5 x 3 – 4 • Front Squat 5 x 4 – 6 • Conventional Deadlifts 5 x 4 – 6 **Weeks 9 – 12: 70 – 85% 1RM Each Movement** • Hang Above Knee Power Clean 6 x 2 – 3 • Block Below Knee Clean High Pulls 6 x 2 – 3 (movements starting from below the knee may initially require lower intensities [e.g., 70% 1RM]) • Deficit (2 – 3 in.) Conventional Deadlifts 6 x 2 – 3 (movements starting from below the knee may initially require lower intensities [e.g., 70% 1RM])
Transition (Deload)	**Weeks 1 – 4: 30 – 50% 1RM Each Movement** • Hang Above Knee Power Clean 3 x 4 – 5 • Block Below Knee Clean High Pulls 3 x 4 – 5 • Stiff-Leg Deadlift 3 x 4 – 5
Pre-Season (Full Progression)	**Weeks 1 – 4: 70 – 80% 1RM Each Movement** • Hang Below Knee Power Clean 5 x 2 – 3 (implementation of cluster sets recommended) • Clean High Pull 5 x 2 – 3 (implementation of cluster sets recommended) **Weeks 5 – 8: 80 – 90% 1RM Each Movement** • Power Clean 6 x 1 – 2 (implementation of cluster sets recommended)
Transition (Deload)	**Weeks 1 – 4: 30 – 50% 1RM Each Movement** • Power Clean 5 x 2 – 3
In-Season	**Ensure Appropriate Load/Volume Relationship Through Season**

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TABLE 5. COLLEGIATE SWIMMING OFF-SEASON THROUGH IN-SEASON POWER CLEAN PROGRESSION EXAMPLE

Off-Season Progression (Technical Proficiency Focus)	**Weeks 1 – 4: 70 – 80% 1RM for Each Movement** • Conventional Deadlift 4 x 4 – 6 • Stiff-Leg Deadlift 4 x 4 – 6 • Front Squat: 4 x 4 – 6 **Weeks 5 – 8: 80 – 85% 1RM for Each Movement** • Conventional Deadlift 5 x 3 – 4 • Stiff-Leg Deadlift 5 x 3 – 4 • Front Squat 5 x 3 • Rack at Knees Clean Pull 3 x 4 **Weeks 9 – 12: 85 – 90% 1RM for Each Movement** • Banded Rack at Knees Clean Pull 3 x 3 (resistance bands = 25% of total load) • Hang Mid-Thigh Calf Raise to Shrug 4 x 3 – 4 • Block Mid-Thigh Barbell Shrug (bar starts on blocks) 4 x 3 • Hang Above Knee Power Clean 4 x 3 – 4
Transition Week (Deload All Movements to 40 – 50% 1RM)	• Focus on Movement Intent, Speed, and Quality • Hand Mid-Thigh Calf Raise to Shrug 4 x 3 – 4 • Barbell Shrug from Block Above Knee 4 x 3 • Hang Above Knee Clean 4 x 3 – 4
Pre-Season (Full Progression)	**Weeks 1 – 4: 70 – 80% 1RM for Each Movement** • Hang Above Knee Power Clean 5 x 2 – 3 • Barbell Shrug 5 x 2 – 3 **Weeks 5 – 8: 85 – 95% 1RM** • Power Clean: 6 x 1 – 2
Transition Week (Deload All Movements to 40–50% 1RM)	• Focus on Movement Intent, Speed, and Quality • Power Clean 6 x 2 – 3
In-Season (Monitor Total Volume and Volume-Load; 80 – 95% 1RM)	• Power Clean 6 x 1 – 3

Note: Volume and intensity should fluctuate in an undulating fashion throughout the season

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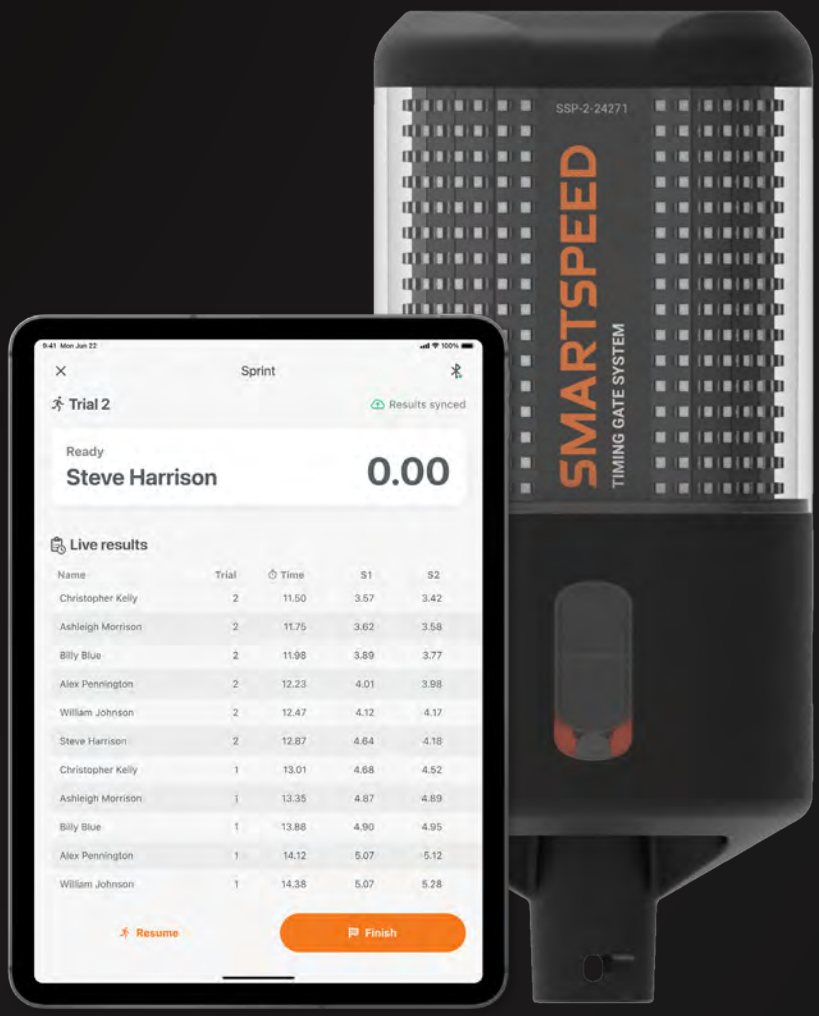

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