

Reconstructing the Multisport Swimmer: Part 1- Examining Flexibility, Specific Strength, and Power

By Tim Crowley, BS, CSCS, USAT Level III Coach
And Al Lyman, CSCS, USAT Level 1 Coach

Multisport athletes are known to train for the swim portion of a triathlon like elite swimmers or club swimmers, when in reality the optimal approach needs to be different from those of elite swimmers or club swimmers due to time constraints, CNS fatigue issues, and often sub-optimal skills. This is especially true for age group swimmers who often have limited training time. As coaches, the questions we need to ask ourselves and our athletes are: Where should the focus of our swim training be to maximize time, effort, and efficiency? Are we getting maximum benefit from the time we are spending? Is there a better, more efficient way?

Where We Race: The Open Water

Swimming in the open water presents difficult challenges for both elite and age-group triathletes, such as currents, swells, wind chop, and physical contact with other competitors. These unique challenges mean that, among other things such as reducing drag and remaining as streamlined and relaxed as possible, the triathletes we coach need to:

- Be able to maintain consistent pressure on the water to maintain control of forward momentum.
- Be as technically efficient as possible by refining and building correct stroke technique.
- Improve upon and continually develop muscular endurance, to maintain a relatively high level of muscular effort for a relatively longer period of time compared to pool swimmers.
- Improve and build upon muscular power and force to overcome those specific challenges that the environment or other competitors may throw at them.

Swimming endless yardage, be it in the pool or in the open water, without also addressing these specific challenges inherent in our sport, as well as potential limiters such as a lack of mobility/flexibility, specific strength, technical skills, and power, leads to mediocre performance and plateaus for our athletes. If the multisport swimmer commits to addressing these four key areas integral to effective, efficient multisport swimming, the result can be improved training adaptation, faster and more efficient swim legs, improved bike and run legs (due to improved efficiency), and overall daily training time savings.

Improving Upper Body Flexibility and Mobility: *A Path of Less Resistance*

Essential attributes for efficient swimming such as upper body mobility and flexibility, can be achieved with smart dry-land flexibility training and strength training, along with specific inwater sets designed to assist the swimmer in relaxing the torso for a more effective reach and catch. Even small improvements in shoulder flexibility and scapula mobility that address relaxation vs. tension through the stroke cycle can result in measurable improvements in efficiency and speed. Lack of mobility in the upper back and shoulder can lead to a faulty freestyle stroke and expose the swimmer to shoulder injury. Riding in the aerobars for long periods of time compounds this problem due to extended periods in an internally rotated position. Functional movement screens (www.functionalmovement.com) can uncover faulty movement patterns and is a good start toward developing an effective dry land program that leads to improved mobility and flexibility. We accept that each athlete we work with will have unique levels of these attributes, yet it is our responsibility to make them aware that moving through correct movement patterns efficiently while being relaxed, is near impossible without a good range of motion in the upper back/shoulder region.

Improving Specific Strength and Coordination: *Understanding What to Do vs. Being Able to Do It*

One of our primary goals as multisport coaches is to help our athletes learn (and then train) to be able to repeatedly apply effective pressure to the water at the front end of the stroke without fatiguing. Modern freestyle requires the swimmer to maintain a high elbow underwater, which requires correct neuromuscular coordination and specific strength. Specific strength can be defined as simply the strength gained by moving ONLY through the correct movement patterns of an efficient swimmer. The focus should first be on developing correct neural pathways to ensure the swimmer can repeatedly "catch" and hold water more effectively, leading to optimal improvement of nerve and muscle coordination and thus specific strength. As the swimmer begins to catch and hold more water on the pulling arm, power and reactivity can be developed via a well designed training program, and continued focus on correct movement patterns. Flexibility and mobility continue to be an obvious factor as the more you can stretch the leading-arm as you pull the pulling-arm, then the more power is transferred via body roll and core strength and reactivity.

It is interesting to note that in our experience coaching novice to intermediate level triathletes who are seeking to improve their swim, we have consistently found that even when we helped them to understand intuitively what their bodies should be doing during the catch and pull phase of the stroke, a vast majority simply don't have the specific strength or flexibility to be able to do what they know they should do. Many are simply too weak in a swimming specific way, AND inflexible in their shoulders, back, and arms, to be able to swim effectively and efficiently. This may lead to faulty stroke patterns that will become ingrained if not corrected early in an athlete's development.

Elite and competent swimmers who possess more effective and efficient stroke mechanics often have much room for improvement in muscular endurance and power. Attention needs to be paid toward developing shoulder mobility and strength through the use of overhead pressing, horizontal pulling, scapula mobility and strength oriented dry-land training such as pull ups and stretch cords, which are effective at developing pulling strength and scapula mobility, and help ingrain correct coordination.

Using the Vasa Ergometer to Build Freestyle Skill, Specific Strength, Power, and Muscular Endurance:

Both of us have extensive experience using and coaching athletes on the Vasa Ergometer, and believe it can be a very effective swim training tool to develop correct coordination that leads to improved "catch and pull" skills, in both elite and age-group athletes. The Ergometer is an efficient and effective tool because it gives the user the ability to evaluate efficiency of each arm stroke independent of in-water factors, and its digital monitor provides immediate feedback on average and maximum force (watts - both right and left arm), stroke rate, 100m pace, total volume, and calorie expenditure. The Ergometer is not a replacement for in-water swim training, but is a supplemental tool that when used properly and consistently, will enhance skill, specific strength, muscular endurance, and power, for both elite and age-group triathletes. In instances where a person is time-challenged, the Ergometer can be used in lieu of frequent in-water pool workouts to effectively train for the triathlon swim. Also, for instances when the Ergometer is available on-deck, it can be used effectively to ingrain proper front-end technique/mechanics and perform muscle activation prior to entering the pool.

A Power Meter for Swimming: Using New Technology to Train Smarter.

In addition to using the Ergometer to supplement our athlete's swim training, for intermediate to advanced triathletes whose stroke is well grooved in, we are both now using the Vasa as a power meter for swimming. We have both found this to be hugely beneficial to assess the athlete's training progression, as well as provide the athlete with motivation to continue working hard. In Part Two of this article, we will present testing protocols, training progressions, specific examples of workouts and sets on the Ergometer, as well as our experience in integrating use of the Ergometer into an effective and efficient triathlon swim training program for both the elite and age-group competitor.

Conclusion

Flaws in swim mechanics and lack of adaptation to swim training for both the elite and age-group triathlete may be due to four primary factors: lack of adequate flexibility and mobility, lack of specific strength, lack of power and muscular endurance, and poor technical skills. If the multisport swimmer doesn't address these factors, countless laps of swimming will likely lead only to fatigue without contributing to improvements in long term efficiency or in-race performance.

Note: In Part Two of this article, we will address more specific aspects of training on the Vasa Ergometer for both elite and age grouper, including factors such as testing, workout development, and integration of both the Vasa Ergometer and in-water swim training.

Part Two of this article will be published in a future edition of USAT E-News.

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**To read part two of this article, go to:
www.vasatrainer.com/USATarticle**

Reconstructing the Multisport Swimmer: Part 2- Using the Vasa Ergometer: Drills, Testing, Specific Training

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In part one of "Reconstructing the Multisport Swimmer," we challenged the typical ways in which many multisport swimmers prepare for the swim portion of their races, and discussed the relationship between the inherent nature of the swim (open water and chaotic), and the tools and training protocols we use and develop for our athletes, that hopefully prepare them better for their races. We highlighted the need for a balanced approach to in-water training, strength and power development in the weight room, the need for shoulder flexibility and mobility, and briefly introduced how we use the Vasa Ergometer (VE) as a training tool. In part two, we will go into more specific detail on the VE: specific drills, field testing, and different types of training, all of which we believe make the VE an invaluable tool for every multisport athlete.

Drills on the Vasa Ergometer:

Every Vasa Ergometer (VE) session should begin with a minimum 100-200m easy warm-up. The warm-up is a good time to focus on correct front-end technique, and to work on making the stroke efficient and powerful. Particular attention should be paid to achieving and maintaining an EVF (early vertical forearm) and correct "catch," where there is good activation of the larger muscles of the back during the pull. Use of the VE "power paddles" enhances this effect by emphasizing the "Power of the Y."¹

The VE has several resistance door settings ranging from very light (1) to very heavy (7). We recommend doing warm-up and cool-down reps and sets on a door setting of one. We also recommend that for most drilling and full stroke swimming, an "underwater" recovery be used (as opposed to swinging the arm high above the rail), so as to protect the shoulder joint. In our experience, the focus of training on the VE is on engaging a correct catch, and developing a powerful pull phase of the stroke.

There are several drills that can be easily integrated into the warm up or during active recovery between intervals. Here are some examples:

1. One-Arm Freestyle with Underwater Recovery: single arm free for a specified number of strokes or meters. This allows you to focus completely on one arm at a time. The non-stroking arm can be extended straight out in a "reach" position, or left down at the side.

Examples: 3 rounds of 15m right arm/ 15m left arm/ 20m both arms. Again the focus here is on achieving an EVF and being sure of a correct pulling path, such as to engage the correct neuromuscular timing and firing.

2. Two Stroke Drill: This is similar to the one-arm drill, except that you are alternating two strokes with the right then two strokes with the left, for a certain set time or distance. This drill progresses closer toward actual full-stroke swimming, and allows the swimmer to continue to focus on stroke quality, as opposed to focusing only on achieving a training stimulus. Attention should be paid to engaging the catch early, and keep the forearm vertical throughout the pull phase of the stroke.

3. Power Pull Drill: Keeping the door setting at 1, alternate 3 to 10 strokes cycling with a very strong and powerful pull, followed by very easy relaxed pulling. With the door setting at 1, higher stroke rates can be more easily achieved. This drill can be used effectively for great neuromuscular activation, to progress the warm-up prior to the main set.

4. Mirror Swimming Drill: Set a full length mirror under the VE (not breakable recommended), or a smaller mirror angled against the front of the Ergometer. Both are designed so that you can view your stroke for immediate feedback. This can be useful during any part of your VE workout as form tends to deteriorate once fatigue begins to set in.

5. Right / Left Force Balance Drill: Separate Right/Left arm force production readings from the VE monitor provide immediate feedback on the pulling power and proper muscle engagement during each arm's stroke. This functions much like a spin scan on a Computrainer, and can be used during one and two-stroke drills, and full stroke swimming.

6. Recovery Stroke Freestyle: To do this drill, lie with your head near the rear of the VE, and have your feet up near the front of the machine. Using the handles (not paddles), swim normal freestyle, focusing on correct EVF technique. Swim 30sec straight, then rest for 10sec, and repeat. A set of 4-6 reps works great as part of a cool-down from a main set. This drill builds strength and fatigue resistance through the recovery phase of the stroke.

7. Alternate Stroke Swimming: The VE can be used effectively for both breast and butterfly swimming. While these are short-arc strokes and thus different than freestyle, the same basic EVF technique can be practiced and used effectively to enhance balanced swim specific strength and endurance.

¹ The "Power of the Y" is a concept developed by renowned masters swimmer and coach, Karlyn Pipes-Neilsen, that involves enhanced muscle activation by pushing through the heel of the hand during the pull phase of the stroke. Coach Al developed a modified VASA paddle to enhance this concept, which results in more power applied during the pull. For more information, consult the New DVD just released from Vasa, which features Karlyn, Tim, and Al. <http://vasatrainer.com>

Examples: alternate 25m fly or breast, with 25m freestyle, or integrate 30sec alternate stroke-30sec free drill-30sec freestyle, as part of your warm-up or cool-down.

Power Testing on the Vasa Ergometer:

The VE can be used successfully to build overall and swimming-specific fitness via special conditioning sessions and swimming specific sessions of nearly limitless variety. However, to take advantage of the unique features of the VE, we need to go further in our thinking by treating the VE monitor similarly to how we use a power meter on a bike. Establishing baseline power outputs and stroke rates on the VE allows coaches to very specifically make the swimmer more powerful and can enhance training effectiveness.

With the unique features of the VE monitor and a smart and well conceived testing protocol, we have the ability to do four things:

1. Establish a baseline fitness level at the beginning of any training phase that gives us insight into relative strengths and weaknesses over both short and long duration.
2. Create progressive and effective practice sessions using a controlled power output. Workout progression and subsequent improvement becomes something we can structure progressively and predict.
3. Continually compare and analyze our work-rate and rate of improvement, not only from session to session but from week to week and month to year.
4. Acquire practice/workout data that allows us to effectively progressively structure (and then modify) VE workouts to ensure continued improvement where it is needed most. No guesswork!

Every coach is free to create his/her own field testing protocols on the VE, however through our experience, we have developed a variety of field tests that can be used to help program workouts on the VE. Al proposes using a two-test protocol that can easily be repeated on a regular basis: a 1000m or ~ 20-minute Time Trial and a 200m or ~ 3-minute Time Trial, both of which can be used to establish a critical power benchmark. These practical field tests allow us to set specific training targets based upon a user's relative strengths and weaknesses, e.g. comparative power output between these two durations of 200m and 1k. That is, if a user displays a relative weakness in one of these two tests, we could design training accordingly to lift that lower ability to a higher level. Adapting training design accordingly, should result in a "rising tide that floats the whole boat." Similar yet different, Tim likes to use 100 and 400m TT field tests to determine neuromuscular power and threshold power.

Regular field testing helps us to determine precise training wattages to develop specific energy systems, as well as develop specific workout protocols to prepare athletes for their specific events of varying duration or distance. We remove any guesswork as to the effectiveness of the current training program and can adjust accordingly as the athlete develops.

With these test results in hand, we can now see where a relative weakness might exist and begin to work on progressively improving it with a progressive systematic approach to practices. With a value for CP, we now have an evidenced based benchmark for establishing future practices, AND for tracking improvements in strength and fitness over time. As always, the key thing that will be the most difficult to account for is recovery!

Training Methods

As a Supplement To Normal Swim Training: The VE can be used very successfully for any level multisport athlete, as a supplemental tool to normal swim practices. These sessions can vary from short easy VE workout designs to increase frequency of training and / or focus on front-end skill development, to high intensity neuromuscular power development.

Examples:

1. Frequency: During the base or off-season phase of training (or during the early phase of swim development), get on the VE five out of seven days in the morning before the first workout of the day.

- 100 w/up at door setting 1. Keep stroke easy and relaxed.
- 350m on continuous freestyle at door setting 1, alternating 20m of a selected drill / 30m relaxed freestyle, or alternating 10-15m of "surging" to up-tempo intensity, with 20-35m of relaxed correct swimming..
- 50m cool down

2. Neuromuscular Power: This short but high intensity session will help lift your swim power ceiling

- 100 w/up at door setting 1. Begin by keeping stroke easy and relaxed and build steadily.
- 4x 50 progressive, with the door at 2. Swim a very easy 25m recovery interval, building in each 50 to a slightly higher intensity. 1min rest between each rep.
- 10x 25m at door 2, 3, or 4. Hold best average watts. Rest interval should equal 60 to 90 seconds. Alternate odd (freestyle) and even (fly)
- 50m cool down

3. Over / Under Fartleks: this workout has many variations. It is an excellent way to raise sustainable power and fatigue resistance, and can be used to enhance the ability to accelerate or "surge".

Examples: 1. Alternate 25m hard-25m easy, for a sustained duration, progressing over time. 2. Do 75m steady-25m hard, in a set of 100s. There are endless options!

As a Substitute for Swim Practice

Occasionally the multisport swimmer is limited in his/her swim training by available time or pool access. In these instances, the VE provides an excellent alternative to missing swim training entirely. In fact, in our experience there can be significant benefit to substituting VE sessions for swim practices in certain situations. Here are three examples that represent a sample of how we use the VE as a substitute to actual swim practices

Session #1

Warm up: 100 at door setting 1. Keep stroke easy and relaxed.

Main Set: door 2, complete 2x 300m of 25m close to 100mTT watts, immediately followed by 25m at a moderate stroke rate and intensity. Rest 2 min between sets.

Cool down: 50m very easy and relaxed.

Session #2

Warm up: 100 to 300m, progressively, at door 1.

Main Set#1: door at 2, do 2x 500m - #1 steady, #2 at a slightly higher up-tempo intensity. Take 30sec rest between sets.

Main Set#2: 4x 100m, build from steady to threshold (10sec rest to adjust door setting):

- #1: door at 4,
- #2: door at 3,
- #3: door at 2,
- #4: door at 1

Goal for this set: hold at least your 1k TT pace, and even up to about 10-15w above test. These should be good and hard, yet controlled, efforts!

Main Set#3: 4x 25m on 40sec. Goal: sprint! Highest watts without stroke deterioration!

Cool down: 100 easy, door 1

Session #3

Warm up: 100 to 300m progressively, door at 1.

Main Set#1: 5x 200m holding steady endurance to threshold intensity (at or slightly above your TT test watts/pace).

Alternate door settings this way: 2 - 1 - 4 - 3 - 1.

***Note: swim a VERY easy 50m recovery between each 200m rep. Focus on perfect form and relaxed yet continuous movement.*

Cool down: 100 easy, door 1.

Your goal: despite variable resistance from the different door settings, seek to hold the same watts through the entire set. On door 1, SR should be quite high, e.g. in the 40-50 range. Never allow form to slip in favor of intensity! Form first!

Combination Workouts

These types of training sessions are where the VE can really shine. The variations are only limited by your creativity, the specific focus areas you are trying to develop in your athletes, and the available training tools. We have divided this section into sport specific / triathlon specific sessions, and complimentary total-conditioning sessions, combining the VE with a complimentary training goal such as flexibility, mobility, strength, all of which can be used in a circuit training format.

Sport Specific

ITU swim to bike: This is designed to recreate the very fast pace of ITU swim with the very hard effort required to catch the lead pack out of the swim. This is often where races are won and lost. If the bike is done on rollers, then getting feet into the bike shoes while on the rollers is an added bonus.

- Begin with a good 300-500 warm up on the VE, and also a 10 to 15min progressive bike warm up.
- Complete 3 sets of 400 swim/ 8min bike, plus 2min spin recovery, this way:

A. Swim (door at 3): 100m sprint - 10sec rest to set VE at door 2, then 250m at threshold power. Finish with a high powered 50m all out.

B. Jump on bike and do a 5min TT, followed by a 1 min easy to moderate high-cadence spin.

C. Finish the 8 min segment with 4x (15 sec max power / 15 sec soft pedal). Then an easy 2 min spin to recover. Take 5 min of rest between sets.

Olym/Half Iron/Iron Distance Swim to Bike:

These transition swim to bike workouts can be used in different ways, in preparation for race distances from olympic to ironman. For these sessions, prepare your bike in advance. When ready, jump on the VE and complete a 300m to 1k swim at goal race intensity. Options include inserting pack surges every 50-75m to

above race intensity. Follow the VE session with your bike. Off-season or base training phase options include multiple swim/bike "bricks", and can even include running via use of a treadmill, to create a complete 3-sport combination training protocol that is great for training variety and to build overall endurance and stamina. When specific race preparation becomes the goal and open water isn't available or convenient for the athlete, the VE can be used frequently to train the swim to bike transition. We have our athletes complete a short VE swim prior to nearly every bike session, and especially longer race-specific training rides.

Complimentary:

The nature of the swim portion of our races, dictates that the athlete with the ability to resist fatigue and maintain stroke quality in chaotic swim conditions, is going to be more successful. These types of complimentary sessions, which can vary from short (20minutes) to long (1 hour or more) depending on the length of VE intervals and the number of complimentary exercises you wish to include, are effective at enhancing these abilities. For time and training efficiency, a complimentary exercise is inserted between intervals. This allows for better quality when on the VE, and enhances the overall fitness benefit of the session. Note that many of these workouts can found on the new Vasa Ergometer DVD.

A. Foam roll: In between swim intervals on the Ergometer, complete a foam roll exercise such as Upper back, Hips, Hamstrings, calves, and IT bands.

B. Flexibility / Mobility Circuit - Similar to the foam roll version, insert a flexibility or mobility exercise in between intervals.

C. Functional Strength: there are a huge number of options here. One of Tim's favorites is a full body strength session incorporating a TRX, stability ball and a slide board following a 100m easy warm up on the VE. All swims are 50m and will alternate between easy, moderate and max power outputs. Al likes to use resistance bands, a stability ball, and dumbbells, to create total body strength exercises which challenge pelvic stability, coordination, balance, fatigue resistance, and flexibility.

Some Examples:

1. Strength Workout / Circuit: Should include 2 sets of the 8 reps.

One exercise is done between each swim interval

- stability ball push up (feet elevated)
- split squats in a slide board
- TRX inverted row
- Ball or TRX rollouts
- TRX or slide leg curls

2. Total Body Conditioning Workout:

Warm up: door at 1, 300m this way: 100 free, 25 fly, 25 breast, 25 fly, 25 breast, 100 free. Then hop off the bench and onto the floor...

- Set #1: Perfect push ups to near failure, then grab a medium weight medicine ball and go into 1 minute straight of bicycle kicks (with the med ball overhead in a lat pull down position/motion), then immediately do 1 min flutter and/or scissor kicks. Rest for 20-30 sec while you get back on the VE.
- Do 200m at door 1. Your target is a relatively high stroke rate (SR) at what you perceive to be your steady state aerobic effort/watts with the primary goal being to maintain perfect form at this higher SR, then back off the VE.
- Repeat Set #1, then get back on the VE.
- Do 4x 50m at door 3. Target a higher RPE at a slightly slower SR, again with focus on perfect form and solid effort, then back off and onto the floor...
- Repeat Set #1. Once done with this set, grab a pair of med weight dumbbells and add in 1 set of 10-15 Rotational Dumbbell Shrugs (10-15 each of both forward and rearward rotation).
- Cool down on the VE: Do 100 very easy at door 1, again w/ with perfect form! Relaxed and effortless. Stretch lightly, focusing on the lats, upper back, and arms.

Note: with this and all similar sessions, there are endless opportunities to vary both the exercises and the tools that can be used. We suggest you experiment and work to keep it varied and fun!

Conclusion

Our hope is that coaches will see the incredible versatility that the Vasa Ergometer allows to both the multisport swimmer and coach. As an athlete develops, the VE remains a powerful training tool for all levels of ability, regardless of goal race distance. Since training time is often the biggest obstacle many athletes face, because of its convenience and effectiveness, the VE may be the tool to take you and your athlete to the next level. So now the secret is out. Be creative and share your training ideas. Best of luck!!!

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