Fast Turns

GREAT TURNS: HOW TO GET IN FAST AND OUT FAR

Paper written to Skip Kenney, Head Coach, Men's Swimming Stanford University Nov. 21, 1991,

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Hi Skip,

I finally figured out the theory about how close to swim to the wall to have great turns and to be able to push off deep enough to miss the incoming water (For description of 'incoming water', see paragraph on 'ENTRAINED WATER' below). About 2 1/2 years ago, I began working on these ideas when we were at the NCAA meet. I noticed that swimmers who pushed off from a position lower on the wall traveled faster and farther on the push-off than those who pushed off closer to the surface. The idea I had at that time was to have the swimmers swim a little closer to the wall, maybe 4 or 5 inches, before initiating the flip turn. Swimming closer made them flip more abruptly which seemed to make them dive down a little more as they turned. This seemed to be what was necessary to get the body deep enough to be able to push out under the incoming water. I worked on this with Jeff Rouse and several others and it seemed to help. The results were good, but also somewhat inconsistent. This was an over-simplification of the situation. I believe I now understand it more fully.

A few variables:

1. ENTRAINED WATER: Water we pull along with us which will slow us down if we run into it on the way out of the turn
2. PUSH-OFF TIMING AND PUSH-OFF DEPTH:
3. ROTATION SPEED
4. STROKE ADJUSTMENTS for the last stroke:
5. PROPULSION GAPS: Loss of propulsion on the way into the wall

1. ENTRAINED WATER: As a swimmer swims through the water, a stream of water is drawn along with and behind the swimmer. This is called entrained water. (I incorrectly referred to this as 'laminar flow' in an article in Swim Technique in 1990). This moving water is fairly shallow, travelling along near the surface. It is approximately 8 to 10 inches deep. This is what we draft on in workouts when we follow someone. (The free ride!) At the end of a lap, this entrained water is moving toward the wall. The swimmer reaches the wall, executes a turn thereby changing direction, and pushes off the wall. If he pushes off the wall close to the surface, he will run into this incoming water. This will slow the swimmer and will decrease the distance the swimmer travels on the push-off. If the swimmer can push off a little deeper, thereby missing the incoming water, the swimmer will carry out a greater distance before slowing down to the speed at which the swim stroke must be initiated.

2. PUSH-OFF TIMING and PUSH-OFF DEPTH: The deeper push-off position is very important, but not as important as pushing off the wall immediately once the feet reach the wall. If the swimmer completes a turn with the body in a shallow position, the push-off still occurs immediately. The swimmer cannot postpone the push-off while trying to move the body lower in the water in order to have a deeper push off. The deeper positioning must be set up before and during the turn, not after the turn has been completed.

3. ROTATION SPEED: The speed of the forward roll of the flip turn is determined primarily by the speed at which the swimmer approaches the wall. When the swimmer tucks into the flip turn, the swimmer converts his forward momentum into rotation. The greater the forward

momentum, the greater the rotation rate will be. Thus, it is very important to maintain a very high speed all of the way to the wall. Many swimmers slow once they reach the backstroke turn flags. That is a major error.

4. STROKE ADJUSTMENTS: As the swimmer approaches the wall, the last stroke frequently must be adjusted so that the swimmer can maintain propulsion without exerting forces which would tend to slow the flip turn rotation rate. During a normal arm-stroke, the arm exerts some downward force against the water as each stroke begins. This downward force helps the swimmer maintain planing height in the water. If this downward force were to occur as the flip turn is initiated, the downward force would slow (or prevent) the flip turn. To avoid this, the last arm-stroke should be adjusted so that it provides forward propulsion but very little downward force. To do this, the first portion of the arm-stroke is altered or eliminated by changing the entry position of the hand. The hand enters the water closer to the shoulder instead of fully extended in front. The hand then reaches down and pushes back. This adjustment often results in both hands finishing the stroke at the same time. For each turn the swimmer makes adjustments on the spot to do the turn correctly.

5. PROPULSION GAPS: Propulsion comes from the arms and legs. Any time there is a decrease in propulsion, the swimmer will slow very quickly. As described above, on most turns, the arm-stroke must be adjusted to prepare for the turn which results in some decrease in arm propulsion. If propulsion from the kick is not aggressively maintained, then the swimmer rather suddenly decelerates. At a slower speed, there is not as much forward momentum to convert into the rotation of the flip turn. If no other adjustments are made, the flip would be slower. To prevent a slower rotation rate, many swimmers use their hands to generate a faster flip. Both hands sweep back under the body at the end of the last stroke, pushing the swimmer up and forward. When the hands are about at the waist level, the hands are turned upside down so the palms face the bottom of the pool, then a quick wrist movement flips the hands downward. This helps increase the rate of rotation but also positions the swimmer higher in the water. When this flip is completed, the swimmer is higher in the water, the push off is closer to the surface and the swimmer hits the incoming water. The incoming water causes the push off speed to drop quickly. The glide is shorter and the swimmer is then forced to initiate the arm stroke sooner.

THE FIX!!! How to maintain speed into the wall, flip fast, end up deep, and miss the incoming water:

If swimming speed is maintained by aggressive use of the legs ALL THE WAY TO THE WALL, then the swimmer will not decelerate, the wrist flip need not be used, the swimmer will complete the turn in a slightly lower position in the water, enabling him to push off a little deeper (under the incoming water). The swimmer will also be slightly closer to the wall which provides a longer distance for the legs to push. The swimmer will be able to reach a higher speed by the time the feet leave the wall but will not have to use as high a muscle force because the pushing force is exerted over a slightly longer distance and time. This combination produces a faster turn, greater distance on the push-off and a faster next lap. Setting up this turn every time takes discipline because it is easier to let the kick drop off once you reach the flags, then roll into the flip, using the hands to increase flip rate.

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BACKSTROKE: In backstroke, the turn must be very precise. Once the swimmer rolls over onto the front, propulsion must stop. A premature roll over can leave the swimmer floating there, stranded. In the 200 IM on Sat, (Stanford dual meet against Texas) Trip Zedlitz rolled over too early on the backstroke turn (at the 75 yard point in the race), and lost forward speed which slowed his flip rotation speed. Jeff Rouse picked up almost one full body length on that one turn. Jeff hits very precise turns, does not decelerate into the wall, gets a great rotation rate, great push-off, and gets out under the incoming water.

SPRINT FREESTYLE VS. DISTANCE FREESTYLE:

Sprint freestylers must just maintain the level of kick they use when sprinting. Since distance freestylers don't use the kick as much when swimming, they must increase the intensity of the kick as they come into the wall so speed can be maintained. Increasing the kick intensity for the distance freestyler requires the intake of more oxygen. A place to increase oxygen intake is to grab a small breath as the swimmer rolls into the turn. It is possible to take this breath without disturbing streamlining characteristics.

BREAST AND FLY:

For breaststroke and fly, the same ideas apply. The higher the speed with which the swimmer approaches the wall, the more forward momentum there is available to convert to rotation. In this case, the rotation is in the opposite direction, The knees are drawn up to the torso once the hands hit the wall. If the swimmer does not maintain speed into the wall, he must 'muscle' the turn, grabbing the wall with the hands and using more upper body force to rotate. This increased upper body force keeps the torso higher in the water. As soon as the body has rotated, the swimmer must push off. It takes too much time to let the body drop down and then to push off. The push off takes place when the body is higher in the water. The swimmer runs into the incoming water. .

Pablo Morales (Butterflyer) and John Moffet (Breaststroker) both had very high 'approach the wall' speeds. I once remarked that their turns looked majestically slow and the whole team thought I had 'lost it' because they felt that John and Pablo had fast turns. What Pablo and John did was control the amount of arm force used so that the torso could stay low, so they could get down just the extra couple of inches and push of

f under the incoming water, and start a new flow of water to be used for the next entire lap. They could have turned slightly faster if they muscled the turn, but they are very sophisticated in their sense of feel and although the rate of rotation was slightly below the absolute maximum rate, the net result was a faster race.

Maintaining propulsion while approaching the wall in fly is much different than in free and back. In fly, the stroke must be adjusted during the lap so that the swimmer ends correctly on the wall. If the swimmer ends up a little short, then the up-kick is accentuated to drive the swimmer to the wall. Adjustments for fly turns and fly strokes is the topic of another paper titled, 'Attention to detail'.

TORSO POSITION AND ROTATION RATE: A very effective hand movement in breast and fly can help keep the torso lower in the water and increase rotation rate. If a swimmer turns to the right on a fly or breast turn, then the right hand is the first hand off the wall. As soon as the right hand comes off the wall, the swimmer reaches the hand down (it works well to reach the hand down toward the lane line cross on the bottom of the pool) and then firmly pulls up toward the surface (with the palm facing upward). This helps keep the swimmer lower in the water and increases rotation rate, resulting in a fast turn with a deep push off.

Dr. Marty Hull

Zoomers