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Supporting narrated video (NV) demonstrations, high-speed video (HSV) clips, technical proofs (TP), and all past articles are available online at [billiards.colostate.edu](http://billiards.colostate.edu). Reference numbers used in the articles help you locate the resources on the website.

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Next to pocketing balls and controlling cue ball (CB) direction, speed control is the most important fundamental of pool. You need to be able to aim and pocket a shot, but you also need to send the CB the right distance to be able to easily pocket the next ball. The only way to develop and improve your speed control is through practice and experience, but it can also help to understand some basic principles and effects. I recently posted an online video ([NV J.38](#)) that demonstrates the top 10 tips to help you with your speed control.. I summarize some of the highlights below.

### 1. Stun Shot Ball Speeds

With a stun shot, where the CB is sliding with no top or bottom spin at the object ball (OB), if the shot is straight, the CB stops in place and delivers all its speed to the OB. This is called a stop shot. As shown in **Image 1** from the video, with a 45° cut-angle stun shot, the CB and OB head at the same angles. And as demonstrated in the video, the speeds and travel distances are also equal. The video shows a safety example where this principle comes in really handy.



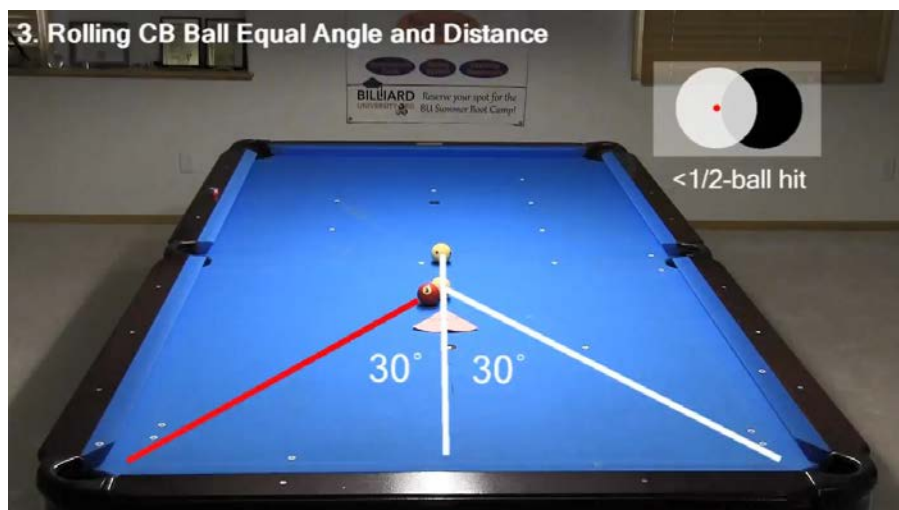
**Image 1** Stun shot equal separation angle and speed

### 2. Stun Shot Ball-Hit Fraction

With a stun shot, the percentage or fraction of speed the CB loses when hitting the OB is the same as the ball-hit fraction (BHF), or how much the CB eclipses or overlaps the OB during the hit (see the inset in **Image 2**). Obviously, when the ball-hit fraction is 0, the CB loses no speed. As demonstrated in the video, with a ¼-ball hit, the CB loses only a ¼ of its speed when it hits the OB. And with a ½-ball hit, the CB loses ½ of its speed. The CB loses ¾ of its speed with a ¾-ball hit. And with a full-ball hit, the CB loses all its speed.

### 3. Rolling CB Ball Equal Angle and Distance

As shown in **Image 2** from the video, with a rolling CB, the ball speeds and distances are the same at a little less than a ½-ball hit, which is slightly more than a 30° cut angle. And as with the 45° cut stun shot, the balls also separate at the same angles. As demonstrated in the video, this is useful to know for slow-roll equal-separation safeties.



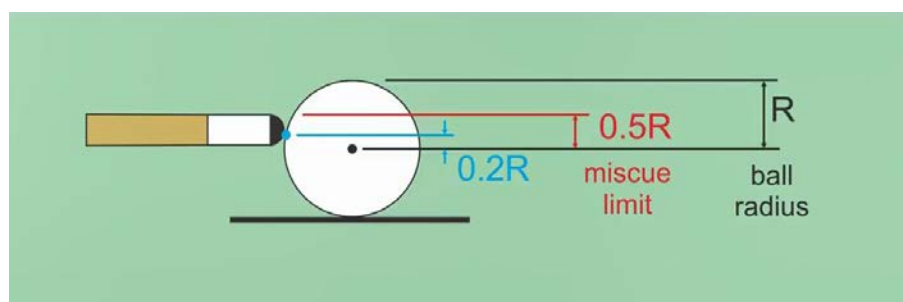
**Image 2 Rolling CB equal separation angle and speed**

#### 4. Straight Rolling CB Ball Travel Distance

If a rolling CB hits an OB squarely, the OB will travel about 7 times as far as the CB after impact. This number can vary some with ball and cloth conditions, so be sure to test it out on your table. The balls travel different distances at different speeds, but the OB always travels 7-times the distance of the CB, neglecting cushion rebound losses. Because this relationship is constant, it is relatively easy to learn follow-distance control with a little practice. That's one reason we often say: "Draw for show ... follow for the dough."

#### 5. Best Tip Height

For a rolling-ball shot, to help achieve good speed and distance consistency, it is best to hit the CB at about 20% of the radius above the center (see **Image 3**). This is the tip height you should use for a lag shot. With a lag shot, you always want to try to hit the 2nd cushion, which slows the CB giving you a greater margin for error with shot speed. If you hit the shot a little fast, the CB will still stop close to the rail. But, as demonstrated in the video, with a similar error in speed on the slow side, the CB ends up much farther from the rail. Again, with a lag shot, try to reach the 2nd cushion for better results.



**Image 3 Optimal tip height for rolling CB speed control**

#### 6. Use a Shorter Backstroke for Slower Speed

Probably the most useful speed control advice is to vary your stroke length in proportion to the speed you want. Smooth acceleration over increasing distances creates increasing speeds. It's like a car accelerator. The longer you hold down the pedal, the faster the car goes. In the video, I demonstrate follow and draw shots of increasing stroke length to control CB speed. I use the same tip position for each of the shots. You want to use the same non-rushed and smooth acceleration each stroke length. Varying the stroke length with a consistent stroke style will give you good speed control accuracy and consistency. Try it.

## 7. Finish the Stroke

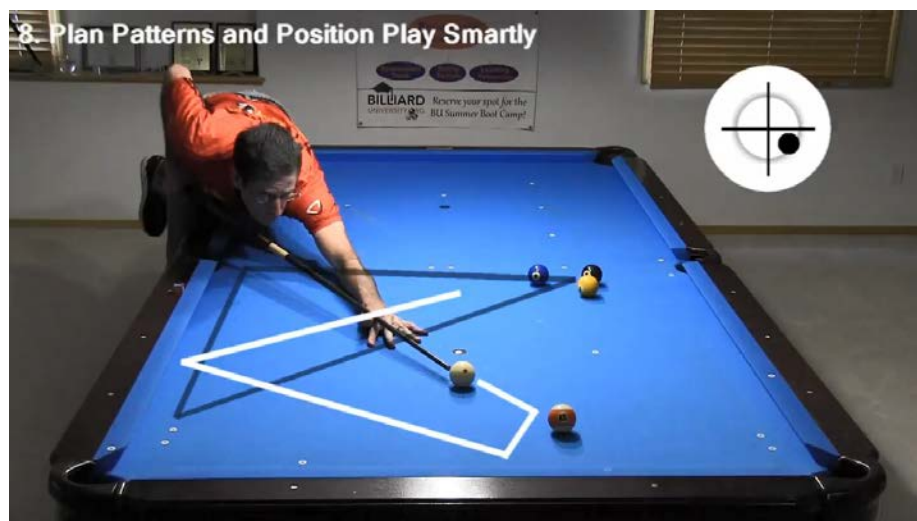
Another important tip is to make sure you finish your stroke. If you decelerate into the CB, it will be very difficult to control CB speed. Instead, accelerate smoothly through the ball for better accuracy and consistency. Also, with finesses shots, don't use a long stroke and try to push the cue forward with a constant speed. You will generally have much better control with a short, smoothly accelerating stroke. With a short stroke length, you can use a shorter bridge length to help prevent a longer stroke if necessary. This can also help reduce stroking error if your stroke is not very straight.

## 8. Plan Patterns and Position Play Smartly

There are also some useful speed-control principles related to position and pattern play. When possible, you want to try to avoid crossing the line of the next shot. Crossing the line reduces your margin for error with shot speed, especially if you are crossing the narrow part of the shape zone. Instead, try to come into the line and wide part of the shape zone for the next shot as shown in **Image 4**. This will give you a much larger margin for error with shot speed.

Another important pattern-play strategy is to try to minimize CB motion. If the CB doesn't move very much, it is much easier to predict the final position more accurately. If the CB travels a longer distance, especially off cushions, it is much more difficult to be accurate and consistent with both direction and distance.

Another important position control principle is to use the rails as your friends. As shown in the video, don't try to finesse a shot well short of a cushion. It is very easy to overrun shots like this and get too close to the cushion. I know I said earlier it is best to limit CB travel, but sometimes it is much better to go straight into and off a cushion. Because the cushion slows the CB by about half, this gives you twice the margin for error with shot speed.



**Image 4** Coming into the line and shape zone of the next shot

## 9. Speed Consistency and Control Drills

A good way to develop and improve your speed consistency and control is to work on speed control drills. The simplest drill is to hit the CB straight down the table to different target distances. Vary your stroke length for the distance you want and hit the CB 20% above its center for the best control. If you land within a diamond on either side of your target, consider that good. As you increase the speed to come off cushions, you will need to add much more speed to get the desired distance since the cushions absorb energy.

**Image 5** is from a good drill to test your finesse speed control and consistency. Set up 10 balls across the head string and hit them in order straight up the table, sending each only far enough pass the previous

ball. The goal is to hit as many balls as you can before reaching the end cushion. Start by hitting the 1 as softly as possible with a very short stroke. This drill is tougher than you might think. After the 10, if you haven't reached the end cushion yet, bring earlier balls back to the head string to continue. In the video, I was able to hit 12 before reaching the end cushion, which is pretty good. How many you can get? Keep track of your scores to see how you improve over time.



**Image 5 Finesse drill**

## **10. Position-Play Speed Control Drills**

To master the speed control required in most game situations, it helps to practice speed control for a wide range of shot types. The [Billiard University \(BU\) playing-ability exams](#) contains some excellent drills for position play speed control. Drills F2-F5 and F8 in BU Exam I, and drill S5 in BU Exam II will test and help you develop and improve your skills. Again, track your drill scores to see how you improve over time. The [Video Encyclopedia of Pool Practice \(VEPP\)](#) also includes a wide assortment of scored speed-control drills to help you develop and improve your skills.

Again, everything in this article is demonstrated in online video [NV J.38](#). Be sure to watch the video and try out the drills the next time you practice. If you want more information, links to many supporting resources can be found in the [YouTube video](#) description. Have fun with the drills.

Good luck with your game,  
Dr. Dave



**NV J.38** – Top 10 Speed Control Tips and Drills

**PS:**

- I know other authors and I tend to use lots of terminology, and I know not all readers are totally familiar with these terms. If you ever come across a word or phrase you do not fully understand, please refer to the [online glossary](#) at [billiards.colostate.edu](#).

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