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

In a recent online video (**NV L.30**), I did a careful experiment to find the ideal banking lines for sliding banks over a wide range of angles. A sliding bank is when the object ball (OB) hits the cushion with stun, meaning it has no top or bottom spin. If the OB is frozen to or very close to the cushion, almost any speed will work since the OB does not have time or distance to develop topspin. If the OB is farther from the cushion, fast speed is required; otherwise, the OB would pick up topspin as it dragged across the cloth. In **NV L.30**, I compared various diamond systems people use to aim sliding banks, including my **1/3-more-than-twice system**, which is the best of the previous systems. In a more-recent video (**NV L.32**), I present a new system that performs even better. I discovered it by plotting the data from the careful experiment and finding an approach that best matched the measured banking angles. If you want to see the analysis, which also compares the new system to the others, check out **TP B.27**.

The new and improved system is called the **twice-plus-tenths** (TPT) system (see **Diagram 1**). Just as with the 1/3-more-than-twice system, everything is measured relative to the rail grooves across from the diamonds instead of through the diamonds. The rail grooves, visible on worn cloth, are where balls sit when in contact with the cushions. The reason why this system measures across from the diamonds instead of through the diamonds, like many other systems, is it results in better bank accuracy over a larger range than any existing through-diamond system.

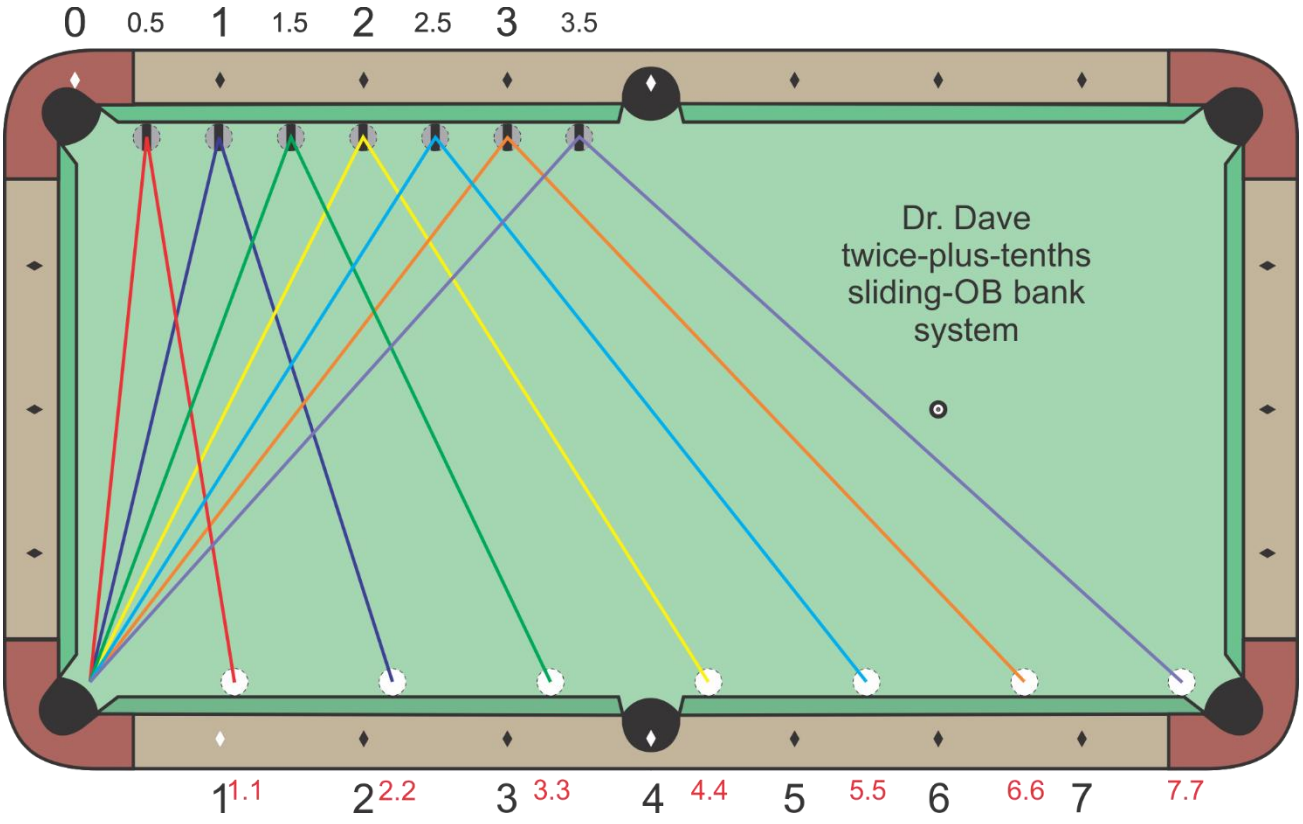

Diagram 1 “Twice Plus Tenths” sliding-bank diamond system

The twice-plus-tenths system is relatively simple. The origination rail number is twice the banking rail number plus that many tenths. For example, twice 1 is 2 and adding 2 tenths gives 2.2. Twice 1.5 is 3 and adding 3 tenths gives 3.3, and so on. Again, the original rail number is always twice plus that many tenths. If you prefer using 10s instead of 1s for the diamond numbers, just move the decimal place, but the numbers are really the same (22-to-10 instead of 2.2 to 1.0, 33-to-15 instead of 3.3 to 1.5, etc.).

A good way to learn the system is to set up and practice straight shots on each of the system lines. It can be helpful to use the **printable diamond ruler** linked in the YouTube video description to visualize the tenths until you get enough practice to do it on your own. For example, in **Image 1**, I've placed a ball at the ½ diamond point on the banking rail. I've placed another ball at 1.1 on the opposite rail. These balls (which are removed before hitting the shot) help you visualize the reference line when practicing. And as shown in **Image 2**, the cue ball (CB) and 8 are placed along the 1.1-to-0.5 line. Because of the steep angle on this shot, I had to place the 8 a little far from the rail to avoid a double kiss; but, in general, place it as close to the cushion as possible so speed won't be a factor. Try to hit a stop shot to make sure your aim is true. And repeat this for each of the system tracks shown in Diagram 1, as I demonstrate in the video.

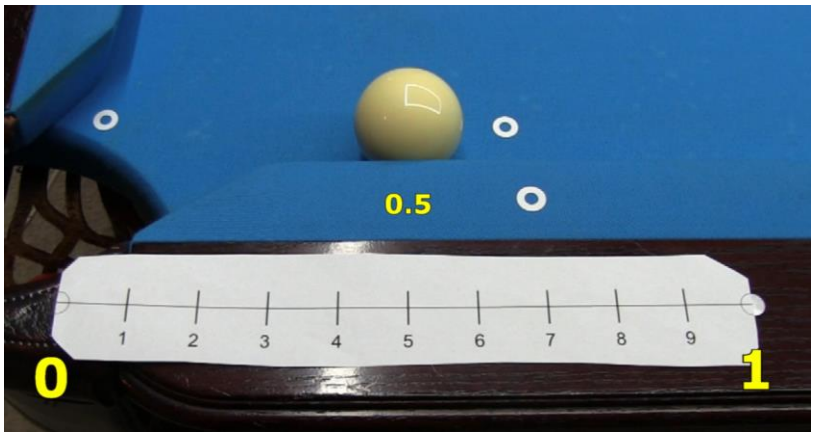

Image 1 Ball placed across from ½, using the diamond ruler

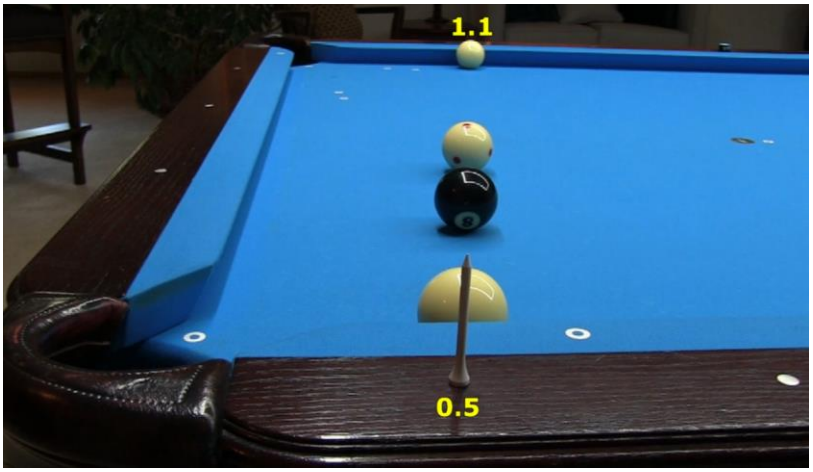

Image 2 Shot setup for 1.1-to-0.5 reference track

Remember, this is not a through-diamond system. As shown in **Image 3** (for the 4.4-to-2 reference track), the ball is across from 2 in the rail groove. If you were aiming through the line of diamonds instead, the number would be a little less than 1.8. Remember, the opposite rail number is always twice the banking rail number plus that number of tenths. And the measurements are done in the rail grooves across from the diamonds, not through the diamonds like many other systems.

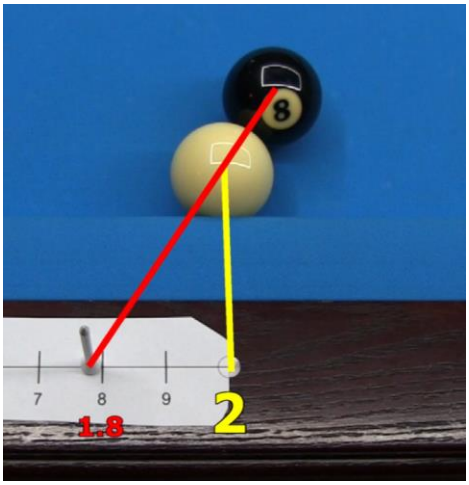

Image 3 Rail-groove aim vs. through-diamond aim

There are several factors and effects you need to consider when using a banking system like this. First, if your aim is off even a hair, you won't be successful. A slight outside cut will go long, and a slight inside cut will come up short. With a straight shot, you need to be very careful to not have any sidespin. Any sidespin on the CB will transfer some sidespin to the OB making it miss the target. Speed has very little effect when the OB is frozen to or very close to the cushion; but at a larger distance from the rail, faster speed is required to make the OB slide into the cushion, as required by the system. The video demonstrates all these effects along with how to adjust your aim when there is a cut angle on the bank.

One message from the bank-effects section of the video is: Banks are difficult, and they should be avoided whenever possible. Another message is: Learn and develop a feel for all the effects so you can account for them and use them to your advantage when necessary. For more info, see the **bank effects link** in the video description.

One way to use the twice-plus-tenths system is to visualize the system reference lines and just aim between the lines. In **Image 4**, the short cues on the table help you see the 3.3-to-1.5 and 4.4-to-2 lines. Because the 8 is right between these two lines, you just need to aim in the middle. The video demonstrates how to use your playing cue to visualize all of this while playing.

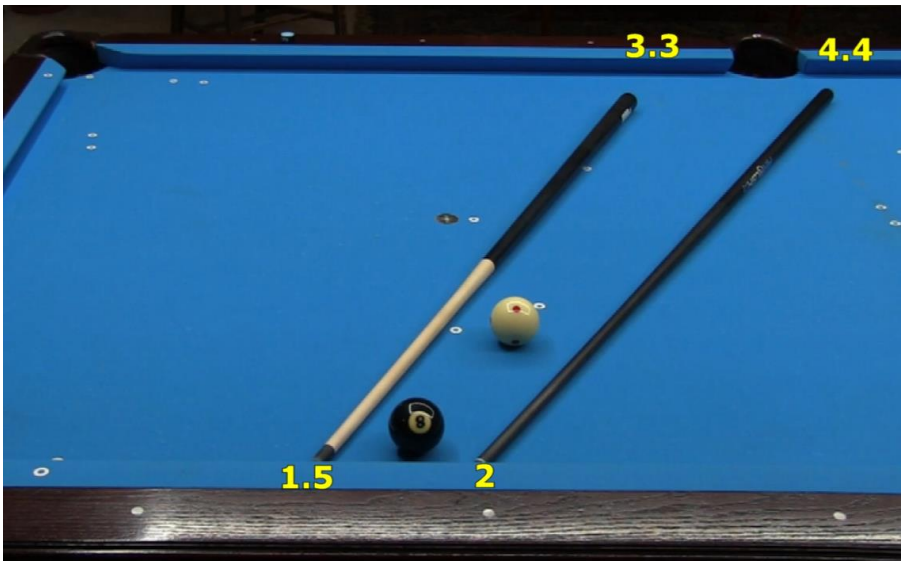

Image 4 Aiming between the lines

Another way to use the system is with numbers. If the OB is close to the cushion, it is easy to estimate where it will hit the cushion. Even if your approximation for the banking line is off, your estimate for where the ball will hit the cushion will still be good. For example, in **Image 5**, the 8 will hit the cushion very close to 1 3/4 or 1.75. Twice that is 3 1/2 or 3.5. Add between 3 and 4 tenths to arrive at a little more than 3.8.

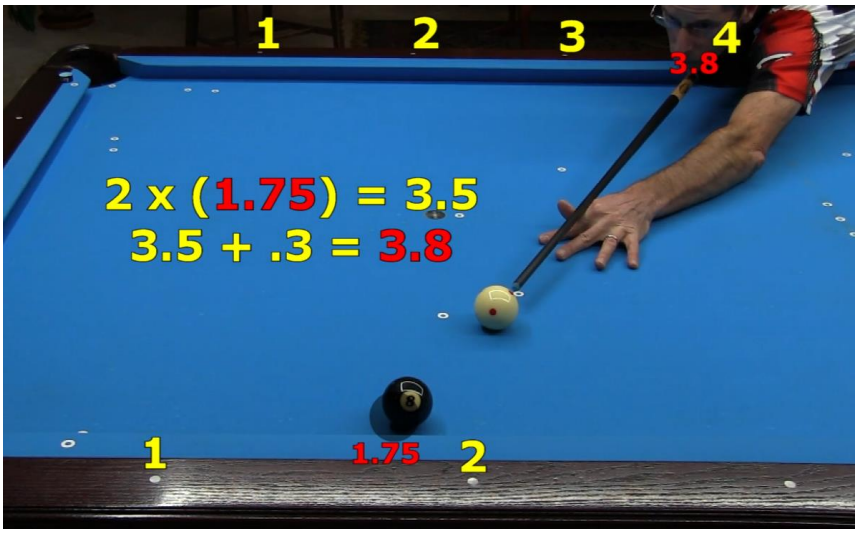

Image 5 Calculation example

Online video **NV L.32** includes game-situation examples so you can see the system being applied effectively for a wide range of banks, including long banks off end rails. I hope you find the new twice-plus-tenths system helpful in your game. It is very accurate and works well over a wide range of angles, and you can take that to the bank!

Good luck with your game from Dr. Dave!

normal video

NV L.30 – SLIDING BANK SHOT DIAMOND SYSTEMS … How to Aim Banks at Fast-Speed or Close-to-the-Cushion

NV L.32 – TWICE-PLUS-TENTH … The Most Useful Bank Shot Diamond System You'll Ever Learn

technical proof

TP B.27 – Sliding Bank System Comparison

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***.

Dr. Dave is a PBIA Master Instructor, Dean of the Billiard University, and author of the book: The Illustrated Principles of Pool and Billiards and numerous instructional DVD series, all available at: ***DrDaveBilliards.com****.*