EQUIPMENT SPECIFICATIONS & CERTIFICATION

Purpose: To determine the RG about the x, y and z axes of bowling balls with symmetrical cores.

Materials:

- Ball cup
- Bowling ball to be tested (should not have asymmetrical bowling ball markings)
- Bowling Ball Radius of Gyration Worksheet which should include calibration information for the RG Swing being used
- Grease Pencil
- MoRich DeTerminator
- RG Swing with timing mechanism and electric eye counter
- Bowling ball total weight scale
- Turbo 2-N-1 Pro Sect

Procedure:

1. Using SOP-BALL-4, find the total weight of the bowling ball.

2. Record the total weight of the bowling ball on the "Bowling Ball Radius of Gyration Worksheet."

3. Place the bowling ball in the DeTerminator with the manufacturer's pin pointing directly through the eyehole of the side arm.

4. Place the point of the grease pencil through the eyehole of the side arm on the DeTerminator.

5. Energize the DeTerminator and allow the grease pencil to draw a path on the bowling ball as it spins.

6. Wait until the grease pencil is creating a line of concentric circles around a circumference of the bowling ball. This line of concentric circles around a circumference of the bowling ball is known as the bowling ball's "equator."

7. Switch off the DeTerminator.

8. Remove the bowling ball from the DeTerminator and place in a ball cup.

9. Align the Pro Sect on the line of concentric circles and proceed to draw a line with the grease pencil around an entire circumference of the bowling ball. See Figure 1 which

displays the path drawn on the bowling ball from being on the DeTerminator and the "equator" that was drawn with a Pro Sect and grease pencil.

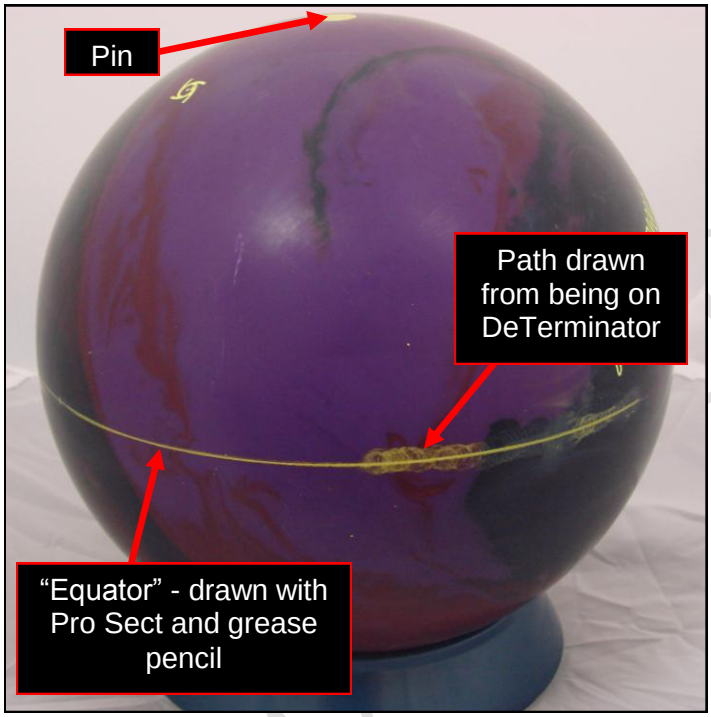

Figure 1 - The "equator" is drawn with the grease pencil by aligning the Pro Sect on the path that was drawn on the bowling ball while it was on the DeTerminator

10. Position the bowling ball in the ball cup so the pin is upwards and the CG marking is facing you.

11. Place the "0" mark of the Pro Sect on the "equator" of the bowling ball and use the center "rib" to keep the Pro Sect square to the "equator." Using the grease pencil draw a line, perpendicular to the "equator," 6 ¾'' long through or towards the pin. By doing so, one end of the x-axis and one end of the y-axis of the bowling ball are located. See Figure 2 which has the CG marker, x-axis point, y-axis point, pin and "equator" labeled on the bowling ball.

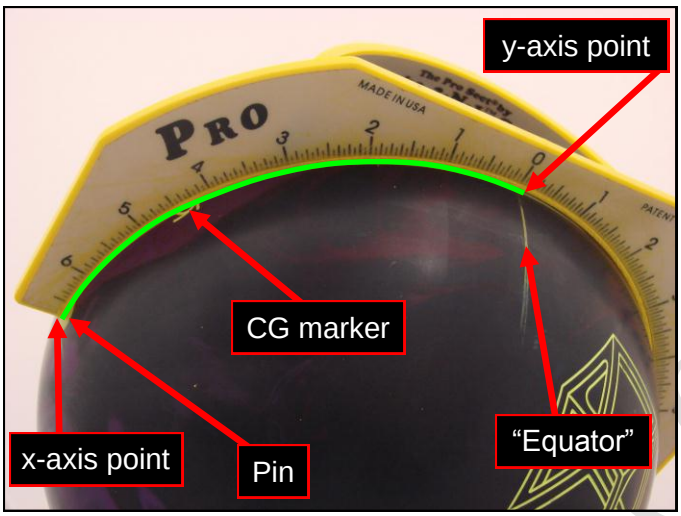

Figure 2 - A line is drawn from perpendicular to the equator from the equator through or towards the pin of the bowling ball. The x and y-axis points are located.

12. Align the Pro Sect so the "0" mark is on the x-axis point and the center "rib" of the Pro Sect is covering the line from the y-axis point to the x-axis point. Draw a line with the grease pencil 6 ¾'' from the x- axis point and mark a point at the end of that line characterizing one end of the z-axis. See Figure 3 which shows the z-axis point 90 degrees away from the x-axis point. The z-axis point is also mutually perpendicular to the y-axis point and the x-axis point which is further illustrated in Figure 4.

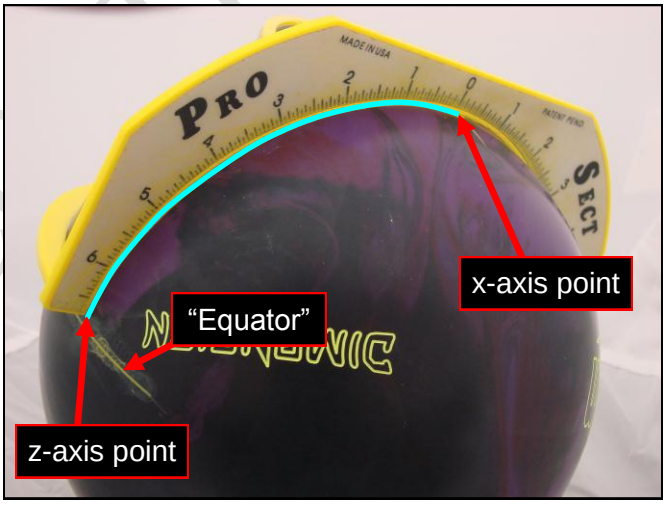

Figure 3 - The x-axis point and z-axis point are labeled on the bowling ball. The z-axis point is 90 degrees to the line from the equator to the x-axis point.

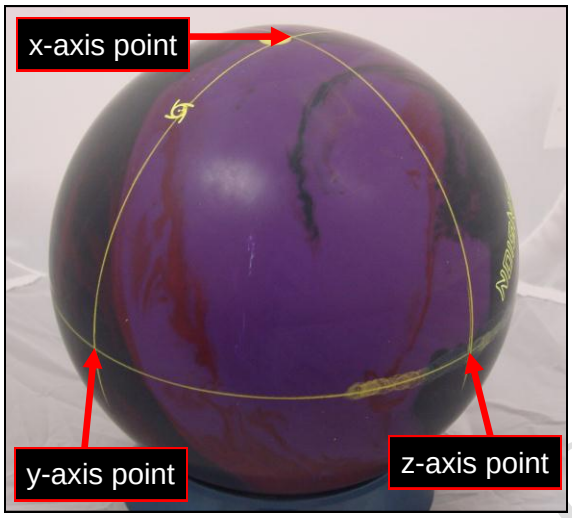

Figure 4 - X-axis point, y-axis point and z-axis point labeled relative to one another.

13. Supply power to the RG Swing timing mechanism and electric eye counter and wait for the display to stop flashing.

14. Place the bowling ball in the RG Swing cradle with the x- axis at the very top pointing up through the string on the RG Swing. To assist with centering the bowling ball, align the line from the y-axis point to the x-axis point with the side bar of the cradle on the RG Swing.

15. Rotate and hold the left side of the RG Swing cradle towards you so the left side of the cradle is in front of the timing and counting sensor (approximately rotated to the corner of the base of the RG swing). Continue to hold the cradle and push the "R" button on the timing and counting display so the display reads zero.

16. Carefully release the cradle so it rotates smoothly with as little wobble as possible.

17. Allow the bowling ball to "swing" for 5 periods (the timing mechanism and counter will stop once it reaches 11).

18. Once the timer stops, record the time for 5 periods on the "Bowling Ball Radius of Gyration Worksheet" for the RG Swing being used under "swing time" for the axis being tested.

19. Reset the timing mechanism and electric eye counter without stopping the bowling ball from swinging. The RG Swing should be on the same side of the counter as it was in step 15.

20. Repeat steps 17-18.

21. If the two swing times recorded for the x-axis have a difference of greater than 0.08 seconds, repeat steps 15-21. If not, continue.

22. Stop the bowling ball from swinging and rotate the bowling ball so the y-axis point is now at the very top pointing up through the string on the RG Swing. To assist with centering the bowling ball, align the line from the y-axis point to the x-axis point with the opposite side bar of the cradle on the RG Swing.

23. Repeat steps 15-20.

24. If the two swing times recorded for the y-axis have a difference of greater than 0.08 seconds, repeat steps 15-20 and then step 24. If not, continue.

25. Stop the bowling ball from swinging and rotate the bowling ball in the cradle of the RG swing so the z-axis point is now at the very top pointing up through the string on the RG Swing. To assist with centering the bowling ball, align the line from the x-axis point to the z-axis point with the side bar of the cradle on the RG Swing that is nearest the operator.

26. Repeat steps 15-20.

27. If the two swing times recorded for the z-axis have a difference greater than 0.08 seconds, repeat steps 15-20 and then step 27. If not, continue.

28. Once 2 swing times for each axis have been recorded on the "Bowling Ball Radius of Gyration Worksheet," the RG for each axis, the differential and the intermediate differential will be displayed on the worksheet in inches.