The Shape of Things to come!

Effective Ball Motion without a hole!

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Today’s Guide:

Mo Pinel
Hey, MO!

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Facebook: radicalmop
Let’s review...

USBC Intent of the Spec. Changes

Modern bowling balls and the higher revolution bowling style require an increasing amount of oil on the lanes, and patterns are changing faster. This trend is NOT sustainable.

USBC conducted extensive research and surveyed all of bowling’s stakeholders.

To protect bowling’s future:

- USBC is eliminating balance holes
- Setting a new specification for oil absorption
- The overall result will slightly limit hook potential

Noble Intentions!

USBC research shows these changes will:

- Slow oil pattern transition
- Cause bowlers to move less
- Keep the same scoring pace with lower oil volume

Time will tell!

No current USBC approved balls will be deemed illegal. All equipment is grandfathered in, indefinitely. Balance holes need to be plugged by August 1, 2020.

The goal IS to protect the playing environment for the future, NOT lower scoring!
We applaud the USBC for not implementing the current oil absorption rule until August 1, 2020. We consider the oil absorption rule to be a work in progress. We feel that time is needed to further analyze the data to reduce the standard deviation in order to significantly reduce the margin for error on this test.

The good news is that ALL of the current coverstocks pass this test!
New USBC Ball Approval Procedure

de. Differential radius of gyration – for new core designs only
i. Eight additional balls must be submitted (specific weight to be determined by USBC)
for balls with a measured differential radius of gyration between 0.050” and 0.060”.

ii. The average differential radius of gyration of all samples of similar weight must be no
higher than 0.055” for the ball to be approved without participation in the optional
supplemental testing process.

iii. If through the supplemental testing process it can be proven that balls are not designed
above the maximum specification of 0.060” and have less than 0.6% rate of non-con-
forming balls, the ball will be approved.

SUPPLEMENTAL TESTING
The supplemental testing process requires the manufacturer to test 24 samples from the same
model and weight for the specification in question and report the values to USBC. USBC can
compare the mean and standard deviations of the supplemental data to the 10 samples tested
by USBC using the appropriate statistical tests to assure they come from the same population. If
the samples are from the same population, and process capability shows the model can be pro-
duced with less than 0.6% defects (6,000 out of 1,000,000 DPMO-Defects Per Million Opportu-
nities), the product will be approved. If the data indicates the 24 belong to a different population
than the original 10 samples, the 24 supplemental samples need to be submitted to USBC to be
tested. If the data still indicates the 24 supplemental samples belong to a different population, or
if testing indicates the model will be produced with more than 0.6% DPMO, the model will not
be approved.

WOW! & more new restrictions added!
Timeline for specification changes

Aug. 1, 2018

- For balls over 10 pounds **without a weight hole**, allowable static weights will be 3 ounces of side, thumb or finger weight.

- For balls over 10 pounds **with a weight hole**, the current specification of 1 ounces of side, thumb or finger weight remains.

- No-thumb bowlers who choose the increased static weight/no weight hole option would need to mark by scribe, engraver or tool near the intended center of palm with a plus (+) mark.

USBC Handout
More Timeline Info

**Aug. 1, 2019**
- Only a dry towel can be used to clean a bowling ball during competition

*This rule just means NO LIQUIDS during competition!*

**Aug. 1, 2020**
- A bowling ball’s oil absorption rate must be more than 2 minutes, 15 seconds for the ball to be approved

**Aug. 1, 2020**
- Elimination of balance holes; bowlers may have up to five holes for gripping purposes and all must be used on every delivery
- No-thumb bowlers would need to mark by scribe, engraver or tool near the intended center of palm with a plus (+) mark

Another part of the USBC Handout
They change the RULES, so

*We have to change the TOOLS!*
Eliminating balance holes will have a profound effect on SUCCESSFUL BALL DRILLING and BOWLING BALL DESIGN.
IMMEDIATE BENEFIT of New Specs.
Pin to CG distance **NO LONGER** matters!

Pin Out Distance vs. Core Shift (in Inches)

- **4” Pin Out Ball has 0.160” core shift**
- **2” Pin Out Ball has 0.060” core shift**

Core Shift is virtually **INSIGNIFICANT!**
The **USBC** understands, as we have preached, that it’s the numbers of the **DRILLED BALL** that really matter.
That’s why they chose to eliminate balance holes, instead of lowering the total differential of the undrilled ball.
To understand ball motion accurately, we have to realize that **CORE SHAPE DETERMINES MOTION.** That motion is, then, modified by the **LAYOUT** chosen, and the **COVERSTOCK** of the ball. Finally, the surface of the ball is adjusted so the **BREAKPOINT** is the right distance down the lane on a given **LANE CONDITION.**
The **CORE SHAPE** of the drilled ball, resulting from the **LAYOUT** chosen, and the **BOWLER’S GRIP** drilled into the ball, will determine the shape of the **RG CONTOURS** of that drilled ball.

Those RG contours will, then, determine the **AXIS MIGRATION PATH** of the ball as the ball goes down the lane. This will result in the **MOTION** of the **DRILLED BALL** as it travels down the lane.
Let’s study the effect of drilled RG Contours and the PIN to SPIN Line on BALL MOTION.
Understand that ALL DRILLED BALLS are at least slightly ASYMMETRICAL.
RG Contours of the drilled RADICAL RIDICULOUS

RG Contours

PSA after drilling
RG Contours of the drilled RADICAL RIDICULOUS
a bowler’s PAP added
RG Contours of the drilled RADICAL RIDICULOUS with a bowler’s PAP & Axis Migration Path added
Spinning a Drilled Symmetrical Ball
BEYOND RIDICULOUS

40 / 3 ¾ / 20
Spinning a Drilled Symmetrical Ball with a Balance Hole

the Balance Hole moved the PSA 2 ½” RIGHT
Bowler moved his feet 3 boards left & sent it right!
The PSA moved 2 1/2” right when the 1 1/8” Balance Hole was drilled. This resulted in the ball revving up & reading the lane sooner, creating more overall hook, because the ball revs up when the migrating axis crosses the “Pin to Spin” line.
That will **NO LONGER** be possible after 8/1/2020 under the **new USBC rules**.
Eliminating the ability of ball drillers to use a balance hole when drilling symmetrical balls will significantly reduce the overall hook and versatility of those drilled symmetrical balls.

Adding additional surface to a symmetrical ball after the balance hole has been plugged will help offset some of the loss of hook of that symmetrical ball, but the hitting power of the plugged symmetrical ball will probably still be negatively affected.
Understanding the effect of the **PSA LOCATION** on the **MOTION** of a **DRILLED BALL**.
Asymmetrical PSA Positions

- In the Thumbhole
- In between
- On the VAL
Asymmetrical PSA Positions

In the Thumbhole

On the VAL

In between

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This is only possible with an **ASYMMETRICAL BALL**.
CAUTION:

Without the luxury of being able to adjust the ball reaction for your customer by adding a balance hole, YOU HAVE TO GET IT RIGHT THE 1st TIME!!!
With the **USBC** recently relaxing the lane dressing requirements, the difference between competitive lane conditions and league lane conditions is **GREATER** than it has ever been!

Make sure you ask your customer on what lane conditions he wants to use the ball.

Competitive and sport lane conditions are still the same, but **ANYTHING GOES** on league lane conditions **NOW!**
**RADICAL** Ball Development Process

1. Set very specific ball performance targets.
2. Design cores that will provide the desired numbers after drilling to hit the performance targets.
3. Select and test at least three coverstock formulations to hit the performance target and confirm that the ball is effective for multiple bowler styles.
4. Test a variety of ball finishes to tune the ball motion for the best “out of the box” performance.
Most bowlers believe that there are only three “types” of coverstocks

**SOLID, PEARL, or HYBRID.**

However, there are many base reactive systems with a variety of additive package formulations each with the option of **SOLID, PEARL, or HYBRID.**

We put lots of time and effort into making sure that the **CORE/COVERSTOCK COMBINATION** provides the best possible **BALL MOTION** and **PIN CARRY.**
Your PROCESS for getting it RIGHT!

- **BALL** Selection
- **LAYOUT** Choice
- **Surface** Adjustment

Then, it’s up to the bowler to put their feet in the right place and **REPEAT**!
BALL Selection

Starting the process properly begins with selecting the ball with the correct motion potential for the bowler for the situation in which it is supposed to be used.

• What are the bowler’s delivery specs?
• On what lane condition is it to be used?
BALL Categories

In order to aid pro shops in choosing ball designs more effectively, we are announcing 2 current ball categories:

True Symmetric

Moderate Asymmetric
True Symmetric Balls

• Longer transition at the breakpoint.
• More continuous motion.
• \textit{CG} location on the drilled ball does \textit{NOT} matter.
• Motion controlled by the \textit{pin to PAP distance} and the \textit{VAL angle}.
• Use ball surface to move the breakpoint distance on the lane.
True Symmetric Balls

- Balls with INTERMEDIATE differentials up to .007”.

- Balls with TOTAL differentials up to .053”.

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**Moderate Asymmetric Balls**

- More drilling versatility.
- More defined breakpoints.
- Moving the *PSA* creates different shapes in ball motion.
- Use *pin to PAP* distance, *VAL angle*, and *PSA location* to create the desired shape for the ball motion.
- Use ball surface to adjust the breakpoint distance on the lane.
Moderate Asymmetric Balls

• Balls with INTERMEDIATE differentials between .012 and .022”.

• Balls with TOTAL differentials up to .053”.

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New categories of ball designs will be added to increase the total versatility of the RADICAL line as the USBC deadline of 8/1/2020 for the elimination of ALL balance holes approaches.
The ball layout is used to adapt the bowling ball’s design to the bowler’s style and the lane condition.
RADICAL has specific recommended layouts in each ball category to MAXIMIZE the ball’s PERFORMANCE and VERSATILY.
MEET our BOWLER

Marcus McClain – Detroit, Michigan
Sophomore – Indiana Tech
USBC Eagle Winner
This chart uses a 5” horizontal axis co-ordinate. Adjust the drilling angle for other horizontal co-ordinates. Always use the pin to PAP distance and VAL angle to get the desired ball motion.

Please remember that the drilling angle of a drilled symmetrical ball really DOESN’T matter because the PSA of a drilled symmetrical ball is always by the thumb.

If the bowler has a preference for a CG location, I suggest you use their choice.

<table>
<thead>
<tr>
<th>Layout Specs</th>
<th>Low RG</th>
<th>Int. Diff.</th>
<th>Total Diff.</th>
<th>Performance Differential</th>
<th>RG PAP</th>
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<tbody>
<tr>
<td>Undrilled</td>
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<tr>
<td>A Maximum Flip</td>
<td>Pin Over 70° x 3 1/2” x 20°</td>
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<tr>
<td>B Most Versatile</td>
<td>Pin Over 75° x 4” x 30°</td>
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<tr>
<td>C Smoother Motion</td>
<td>Pin Over 80° x 4 1/2” x 40°</td>
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<tr>
<td>D Smaller Hook</td>
<td>Pin Beside 90° x 2 1/4” x 45°</td>
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# True Symmetric

## SQUATCH SOLID DRILLING CHART (Symmetrical)

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<tr>
<td>A Maximum Flip</td>
<td></td>
<td>0.018</td>
<td>0.064</td>
<td>0.067</td>
<td>2.508</td>
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<td>B Most Versatile</td>
<td></td>
<td>0.020</td>
<td>0.063</td>
<td>0.066</td>
<td>2.514</td>
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<tr>
<td>C Smoother Motion</td>
<td></td>
<td>0.019</td>
<td>0.058</td>
<td>0.061</td>
<td>2.519</td>
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<tr>
<td>D Smaller Hook</td>
<td></td>
<td>0.014</td>
<td>0.060</td>
<td>0.062</td>
<td>2.494</td>
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True Symmetric

SQUATCH
SOLID

MAXIMUM FLIP
LAYOUT

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True Symmetric

Brunswick

SQUATCH
SOLID

MAXIMUM FLIP
LAYOUT tape

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True Symmetric

SQUATCH SOLID

MAXIMUM FLIP LAYOUT tape slo
True Symmetric

MOST VERSATILE LAYOUT tape

© 2019 Mo Pinel
True Symmetric

SQUATCH SOLID

MOST VERSATILE LAYOUT tape slo
True Symmetric

SMOOTHER MOTION LAYOUT

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True Symmetric

SMOOTHER MOTION
LAYOUT tape

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True Symmetric

SMALLER HOOK LAYOUT

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True Symmetric

SMALLER HOOK
LAYOUT tape
True Symmetric

SMALLER HOOK LAYOUT tape slo
Pros and Cons of Urethane vs. the Short Pin (Smaller Hook) Layout

Both balls *flare less* resulting in *less hook!*

*Urethane ball* results in much more carrydown. *Urethane ball* tends to destroy oil pattern. *Urethane ball* will lose hook more quickly.

*Short Pin Reactive ball* definitely creates less carrydown. *Short Pin Reactive ball* will result in pattern lasting longer. *Short Pin Reactive Ball* will promote the pattern opening up.

YOU DECIDE!

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Moderate Asymmetric

This chart uses a 5” horizontal axis co-ordinate. Adjust the drilling angle for other horizontal co-ordinates. Always use the pin to PAP distance and VAL angle to get the desired ball motion.

When doing asymmetrical balls, use the **drilling angle**, the **pin to PAP distance**, and the **VAL angle** to create the desired shape of the ball motion.

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<td>Pin Over 70° x 3 1/2&quot; x 20°</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Most Versatile</td>
<td>Pin Over 45° x 4&quot; x 35°</td>
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<tr>
<td>Smoother Motion</td>
<td>Pin Over 20° x 4 1/2&quot; x 40°</td>
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<tr>
<td>Midlane Hook</td>
<td>Pin Under 40° x 4 1/4&quot; x 75°</td>
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<tr>
<td>Smaller Hook</td>
<td>Pin Beside 90° x 2 1/4&quot; x 45°</td>
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# Moderate Asymmetric

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<tr>
<td>A Maximum Flip</td>
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© 2019 Mo Pinel
Moderate Asymmetric

MAXIMUM FLIP LAYOUT

© 2019 Mo Pinel
Moderate Asymmetric

MAXIMUM FLIP LAYOUT tape

© 2019 Mo Pinel
Moderate Asymmetric

MAXIMUM FLIP LAYOUT tape slo

© 2019 Mo Pinel
Moderate Asymmetric

CONSPIRACY

Hybrid

MOST VERSATILE LAYOUT

© 2019 Mo Pinel
Moderate Asymmetric

MOST VERSATILE LAYOUT tape
Moderate Asymmetric

CONSPIRACY

Hybrid

MOST VERSATILE LAYOUT tape slo

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Moderate Asymmetric

SMOOTHER HOOK LAYOUT

© 2019 Mo Pinel
Moderate Asymmetric

SMOOTHER HOOK LAYOUT tape

CONSPIRACY Hybrid

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Moderate Asymmetric

CONSPIRACY
Hybrid

SMOOTHER HOOK
LAYOUT tape slo

© 2019 Mo Pinel
Moderate Asymmetric

MIDLANE HOOK LAYOUT

CONSPIRACY

Hybrid

© 2019 Mo Pinel
Moderate Asymmetric

CONSPIRACY

Hybrid

MIDLANE HOOK LAYOUT tape

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Moderate Asymmetric

CONSPIRACY

Hybrid

MIDLANE HOOK LAYOUT tape slo

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Moderate Asymmetric

CONSPIRACY

Hybrid

SMALLER HOOK LAYOUT

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Moderate Asymmetric

CONSPIRACY
Hybrid

SMALLER HOOK
LAYOUT tape
Moderate Asymmetric

CONSPIRACY Hybrid

SMALLER HOOK LAYOUT tape slo
BONUS
INFO!!!
Surface Adjustment

After choosing the BALL with the right MOTION POTENTIAL, and using the LAYOUT that matches the BOWLER to the LANE CONDITION being bowled on, the final step is to adjust the surface to get the ball to SLOW DOWN at the right place as the ball travels down the lane to MAXIMIZE SCORING.
For a bowling ball to strike, it must **SLOW DOWN!**
Do not hesitate to alter the factory surface to fit the bowler’s game and the lane conditions being bowled on.

*Factory* surfaces are for display and to set the *tone* for the ball only.

The most common mistake with ball surface that I see is **TOO LITTLE SURFACE!**
RADICAL Factory Surfaces

- 500 / 1500
- 500 / 3000
- 500 / 1000 / 2000
- 500 / 1000 / 3000
- 500 / compound
- 500 / 1000 / compound
- 500 / 1000 / polish
- 500 / compound / polish

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Surface Texture

Wet sanded with 240, 320 or 360 paper or pad
Scuffed with a good burgundy pad
Sanded with 500 grit paper or pad
Sanded with 800 grit paper or pad
Scuffed with a grey pad
Wet sanded with 1000 grit paper or pad
Wet sanded with 1500 grit pad
Wet sanded with 2000 grit paper or pad
Wet sanded with 3000 grit pad
Wet sanded with 4000 grit paper or pad
Wet sanded with used 4000 grit pad
Polished with compound
Polished with ball polish
Polished with ball polish containing a slip agent
TRUE Surface vs “SKIP Sanding”

500 GRIT SANDED
1000 GRIT SANDED
2000 GRIT SANDED
4000 GRIT SANDED
500/2000 "SKIP SANDED"
500/4000 "SKIP SANDED"
500/3000 “SKIP SANDED”
POLISHED SMOOTH :)

© 2019 Mo Pinel
“SKIP Sanding” is used to increase the ball’s ability to **READ** and **REACT** to a pattern better.

Makes it harder to **throw** the ball **thru the breakpoint**!
Keys to **SCORING**!

- Good **SHOT** making!
- Put your **FEET** in the right place.
- Put the right **BALL** in your hand.
Brunswick® presents
Pro Shop and Ball Motion Training Class
(formerly the IBPSIA Advanced Hands On training class)

- 4 days and 4 evenings with on lane sessions
- All Attendees will receive 2 new balls
  (one performance and one plastic)
  - Attendees should bring their best fitting bowling ball and bowling shoes; as bowling
    is a part of the class.

Learn about drilling for the new USBC specifications and
the either/or rule, for the benefit of your customer!

New Completely Revised Manual!

Dates: 11/3/19 - 11/7/19
Cost: $995 per person
Location:
Innovative Bowling Products
250 N Main St
Jacobus, PA 17407

Faculty:
John Jameson
CEO of VISE and Innovative Bowling Products
Mo Pinel
Technology Director of Radical BT - USBC Silver Coach
Tom Carter
USBC Silver Coach - 38 years of pro shop experience
Mark Moon
30 years pro shop experience
Todd Porter
USBC Bronze Coach - 17 years pro shop experience

For more information or to register,
call Sarah at Innovative 800-226-5891
or email sarah@innovativebowling.com.

Anyone purchasing a Mill Package from INNOVATIVE between 6/1/19 and 11/1/19
can send one attendee for FREE!
Now, it’s **YOUR** turn!

Any **QUESTIONS**, **COMMENTS**, or **CONCERNS**!
LOONEY TUNES

“Thats all Folks!”

Radical
Bowling Technologies