

A Future for the Sport





Presenters

★ Danny Speranza

- Senior Director Equipment Specifications

★ Scott Sterbenz

- Technical Adviser Equipment Specifications

★ Tom Frenzel

- USBC Research Engineer



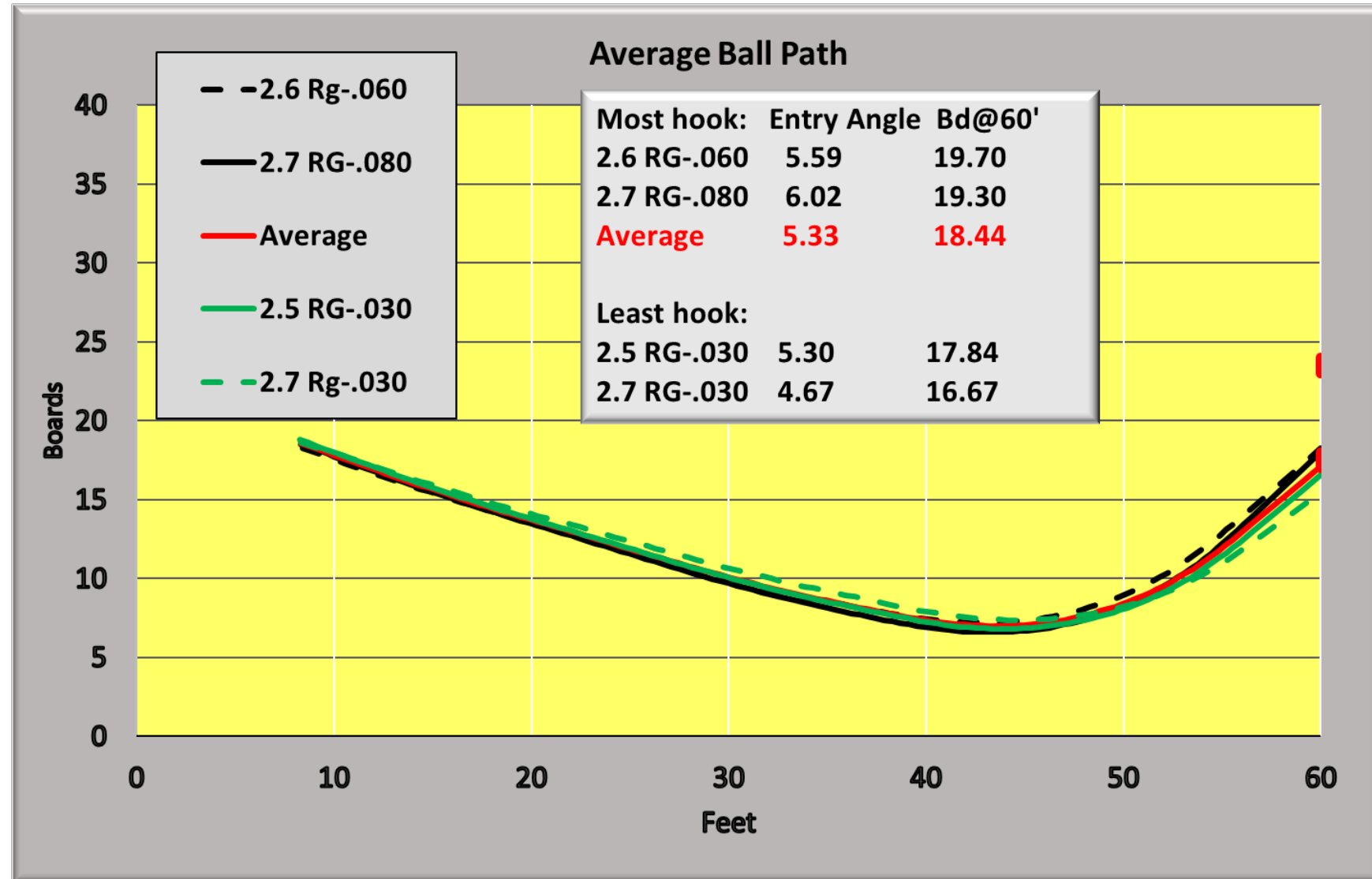
Research Summary

★ July 2015, ongoing

- Cores
- Coverstocks
- League simulation

RG and Differential RG Findings

- ★ 2 most hook
 - High diff RG (.060, .080)
- ★ 2 least hook
 - Low diff RG (both .030)
- ★ Difference
 - 3 boards
 - 1.3 degrees of entry angle





Balance Hole

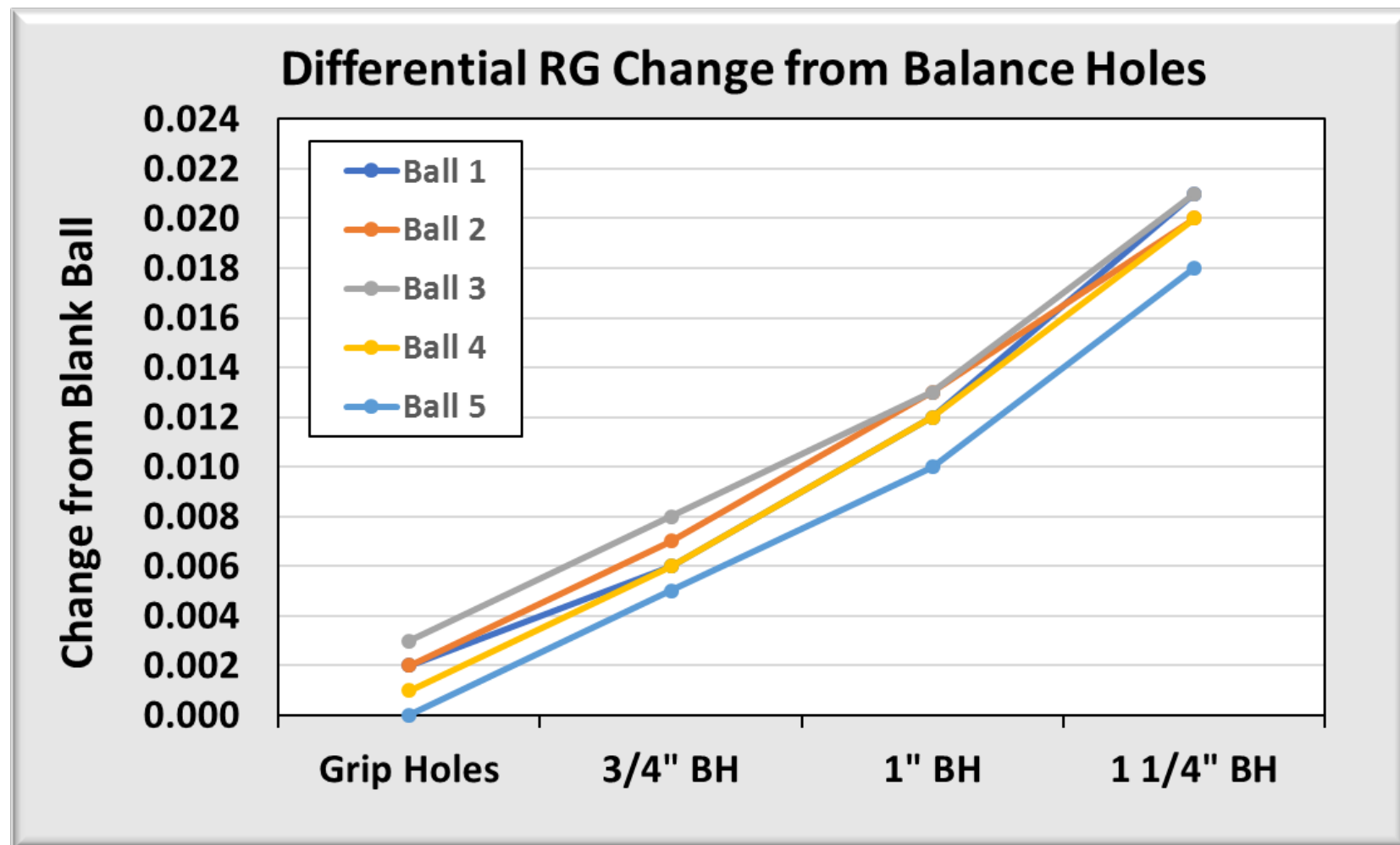
 Pro Shop suggestion

Balance Hole (BH)

★ Pro Shop suggestion

★ Gripping holes-
small effect on
differential RG

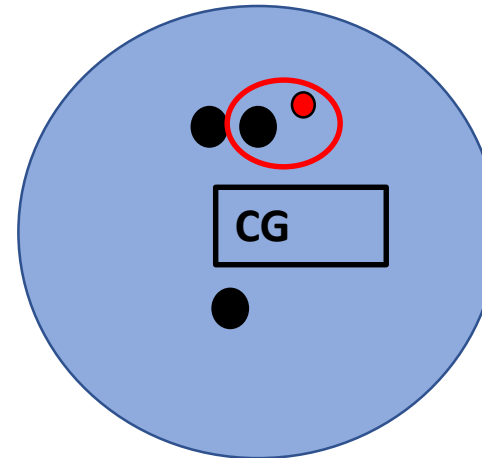
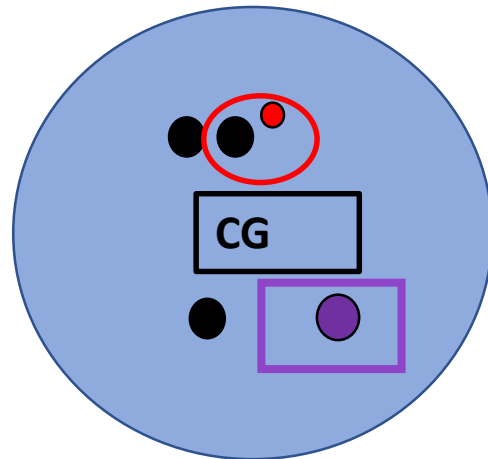
★ Balance holes
added .018" -
.021" to the
differential RG



Balance Holes

- ★ Intended to achieve legal static weight
- ★ Being utilized to strengthen reaction
- ★ What if balance holes were removed?

**Typical
Balance Hole
Layouts**

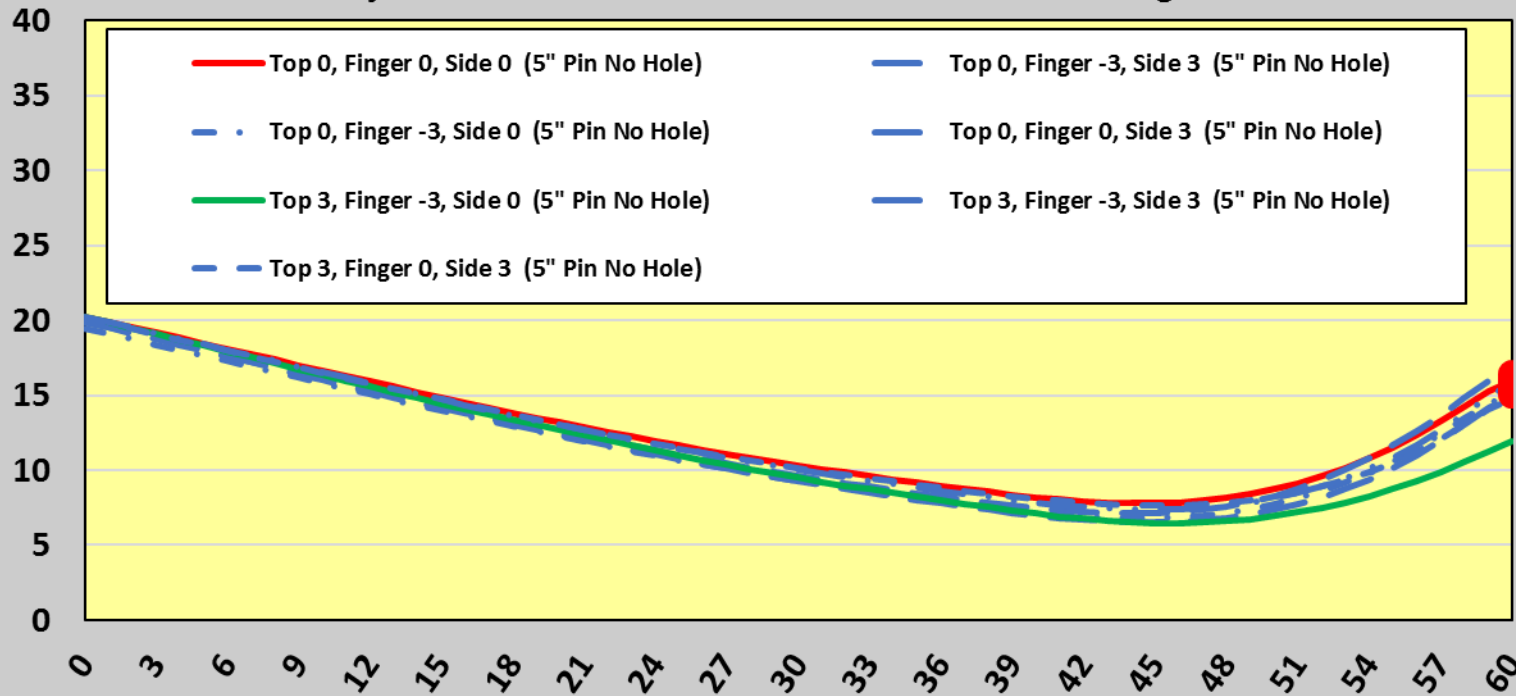


**What happens
without balance
holes?**

Bowler Test

5" Pin, 3 oz. Static Weight Outside Specs

Adjustable Ball-3 oz NO Wt Hole vs. Wt Hole & Existing Static Wt

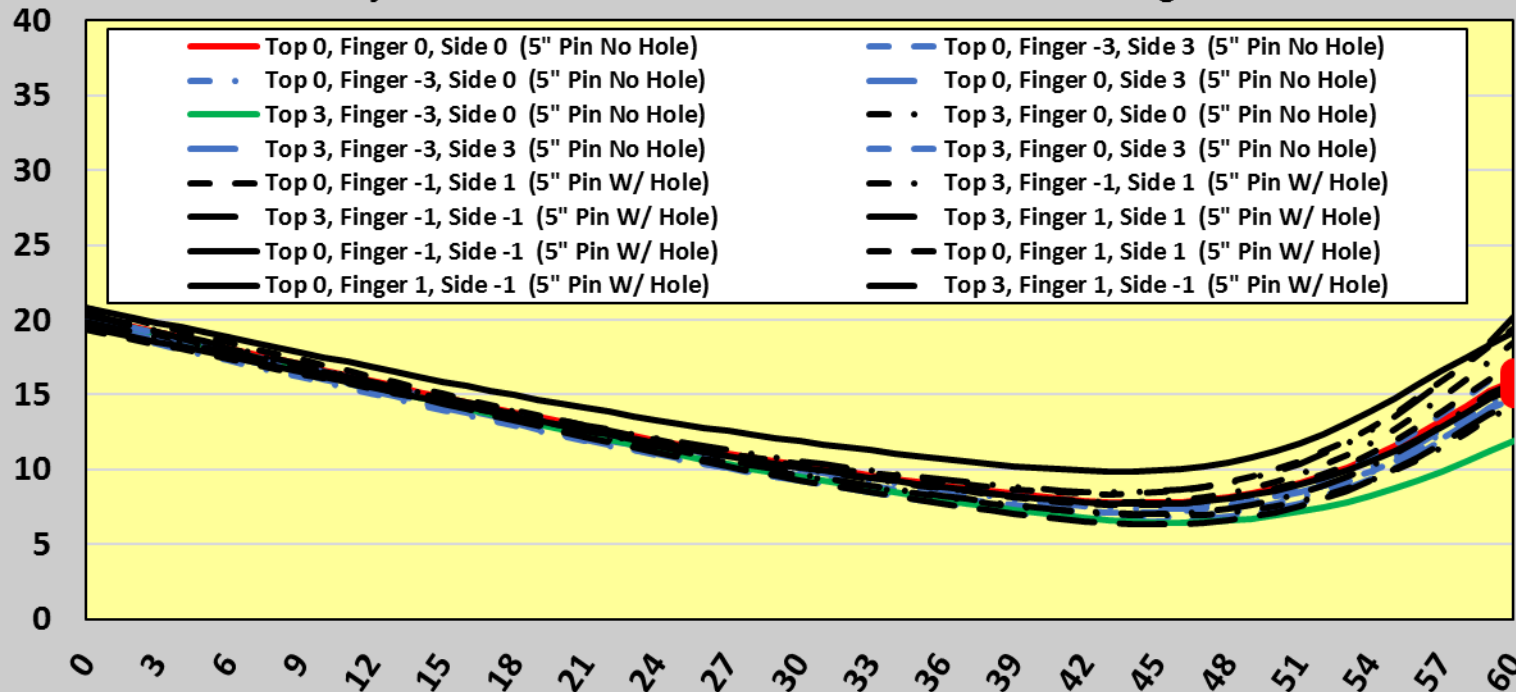


- ★ Red line= baseline
 - 0 static weight
 - no weight hole
- ★ Blue = 3 oz static weight
 - outside spec
- ★ Green= 3 top, 3 thumb, 0 side weight
 - Least hooking

Bowler Test

5" Pin, Legal Today vs. 3 oz. Extra Static Weight

Adjustable Ball-3 oz NO Wt Hole vs. Wt Hole & Existing Static Wt



★ Red line= baseline

- 0 static weight
- no weight hole

★ Black= legal balls

- Most with balance hole

★ Blue = 3 oz static weight

- outside spec

★ Green= 3 top, 3 thumb, 0 side weight

- Least hooking

Conclusion from Balance Hole Testing

- ★ Balance holes create extra flare and hook
- ★ This effect forces bowlers to start further inside on the lane to hit the pocket
- ★ Balls with balance holes hooked approximately two more boards
- ★ **Key Takeaway** – Removal of balance holes has most impact on reducing hook potential



Oil Absorption

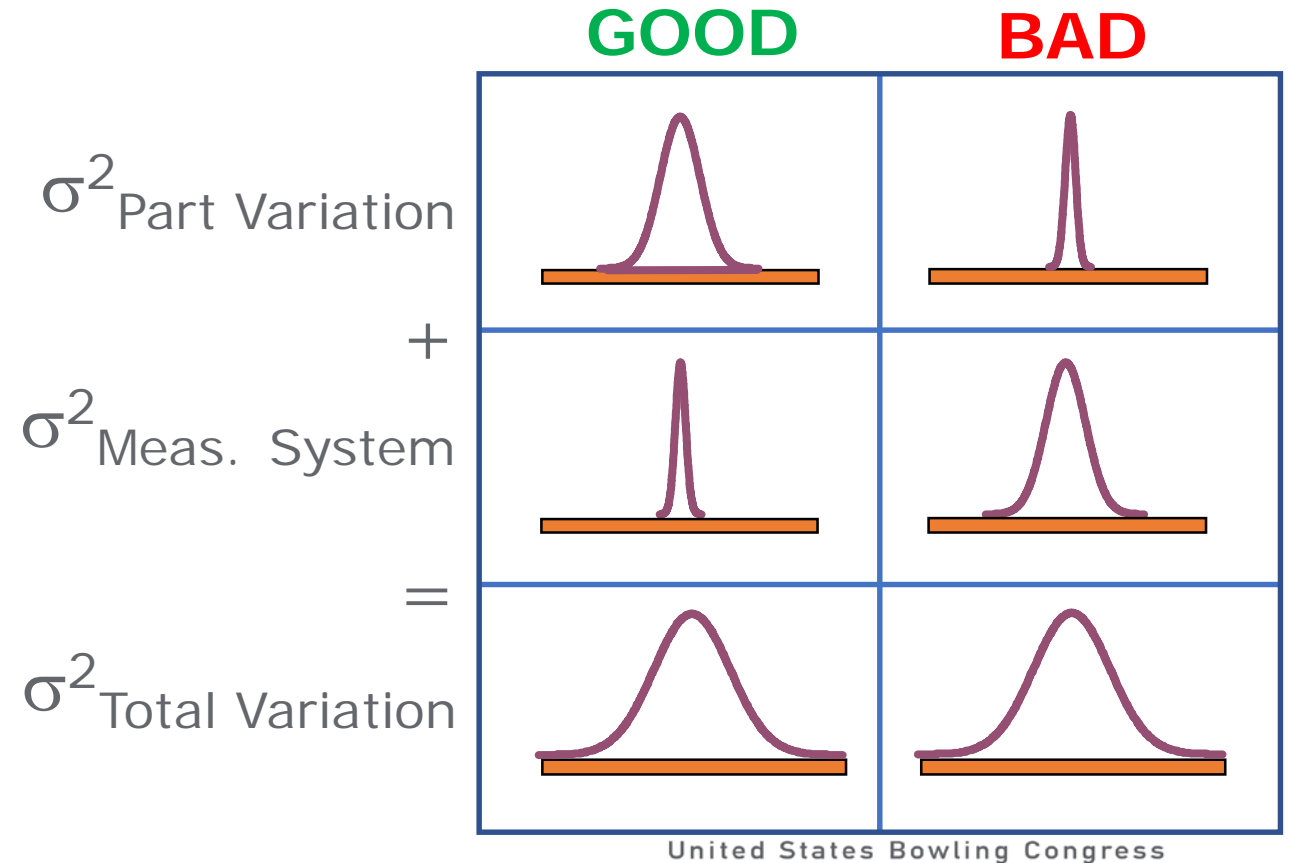


Can we measure it? Can we trust the measurements?

Scott Sterbenz – Technical Adviser
Equipment Specifications Committee

Gauge Repeatability & Reproducibility

Before performing statistical calculations on any measurement, the measurement system must be evaluated to prove that it is not significantly contributing to the observed variability.



Gauge Discrimination

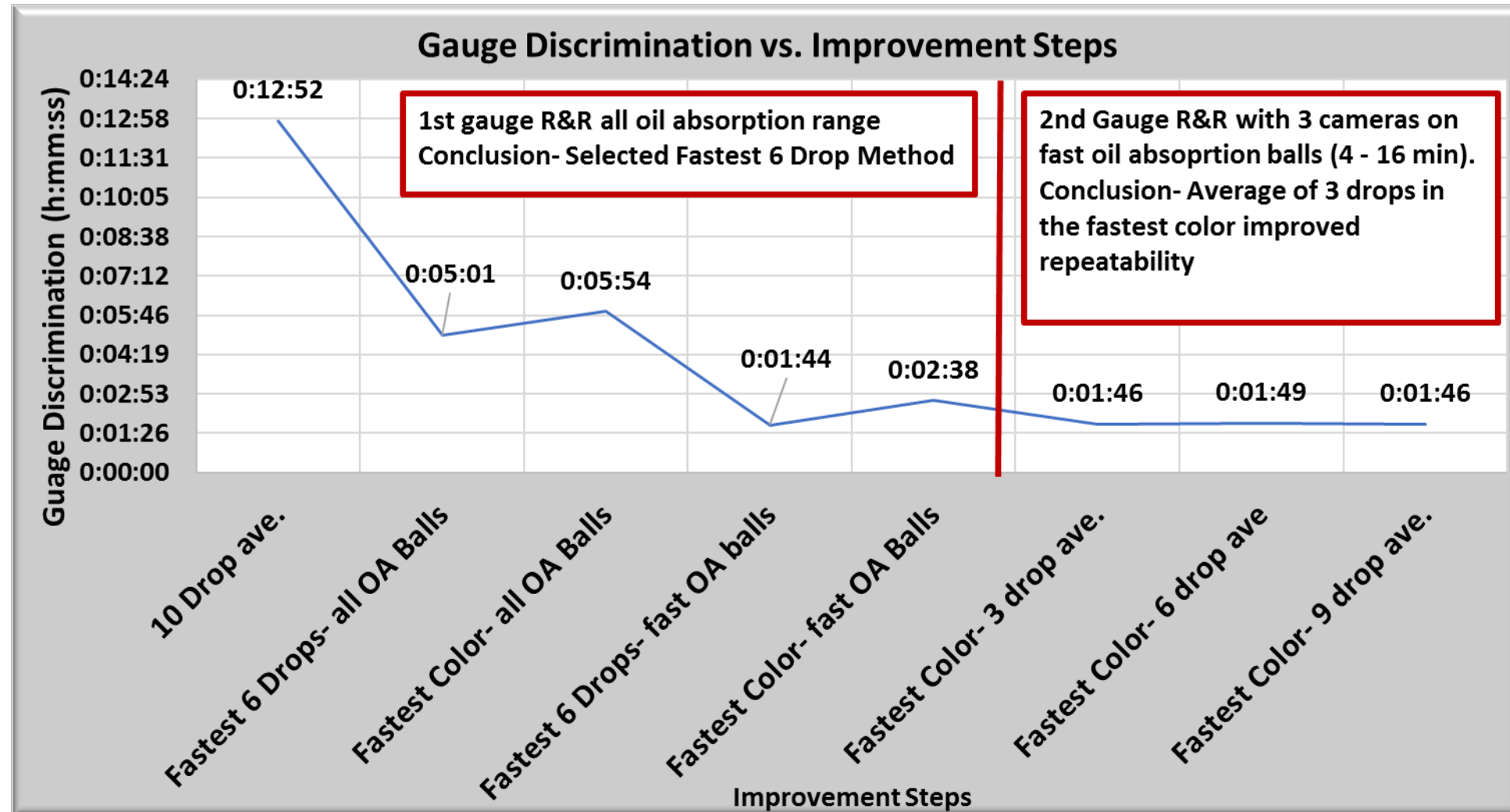
The variability of the measurement system can be reported as gauge discrimination, which is a mathematical calculation based on gauge error and operator use of the gauge.



$$\begin{array}{l} \text{Range of Part Averages} \\ \div \\ \# \text{ of Distinct Categories} \\ = \\ \text{Size of Each Category} \end{array}$$

Progression of Gauge Discrimination

Steps taken to improve oil absorption repeatability





Measurement System Conclusion

- ★ Test procedure iterated and improved over time
- ★ Significant reduction in measurement uncertainty
- ★ Statistically validated for acceptable repeatability
- ★ Additional continuous improvement actions will be discovered over time



Oil Absorption League Simulation Study

Tom Frenzel, USBC Research Engineer



Oil Absorption League Simulation Study

10-Bowler Test over three days

DAY

1. Slow oil absorption balls (average. 27.5 min).
2. Fast oil absorption balls (average. 6.5 min).
3. Slow oil absorption balls - 80% oil volume.



League Simulation Study Results

- ★ Scoring
- ★ Starting Positions
- ★ Moves
- ★ Oil depletion

League Simulation Study Results

★ **Scoring**

★ Starting
Positions

★ Moves

★ Oil depletion

Day	Equipment Type	Group Average Score
1	Slow Oil Absorption, Additional Side Weight.	209.0
2	Fast Oil Absorption, Additional Side Weight.	206.8
3	Day 1 with 80% oil volume.	208.2

★ **No significant difference in scoring**

League Simulation Study Results



Scoring



**Starting
Positions**



Moves



Oil depletion

Day	Equipment Type	Starting position	Starting Target
1	Slow Oil Absorption, Additional Side Weight.	29.8	16.6
2	Fast Oil Absorption, Additional Side Weight.	33.1	18.4
3	Day 1 with 80% oil volume.	30.5	16.6



**Fast oil absorption equipment starts
further inside.**

League Simulation Study Results

★ Scoring

★ Starting
Positions

Day	Equipment Type	Position Moves	Target Moves
1	Slow Oil Absorption, Additional Side Weight.	7.3	3.9
2	Fast Oil Absorption, Additional Side Weight.	9.2	5.8
3	Day 1 with 80% oil volume.	7.9	4.8

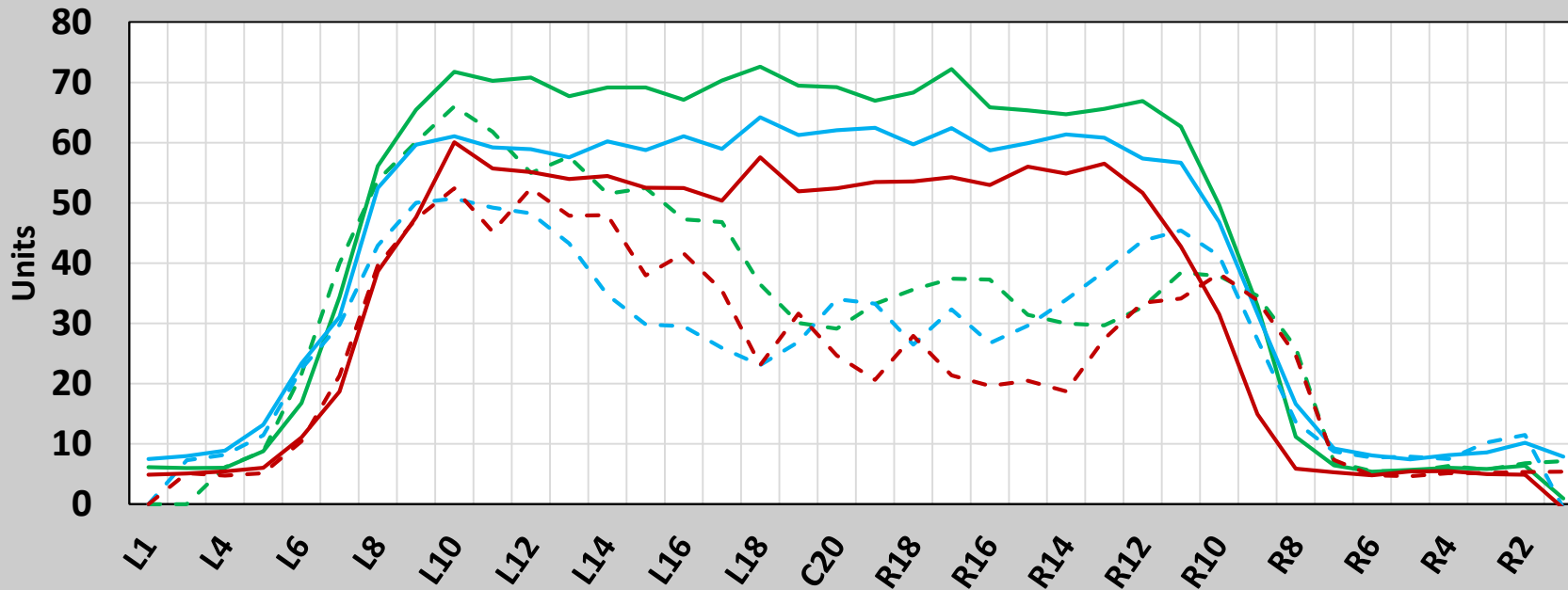
★ Moves

★ Oil depletion

★ **Fast oil absorption equipment causes bowlers to move more.**

Oil Depletion

House Pattern for 10 Bowler test- 8 ft



— Day 1: Slow Oil Absorption, No Balance Hole.

- - - Day 1: Slow Oil Absorption, No Balance Hole.

— Day 2: Fast Oil Absorption, No Balance Hole.

- - - Day 2: Fast Oil Absorption, No Balance Hole.

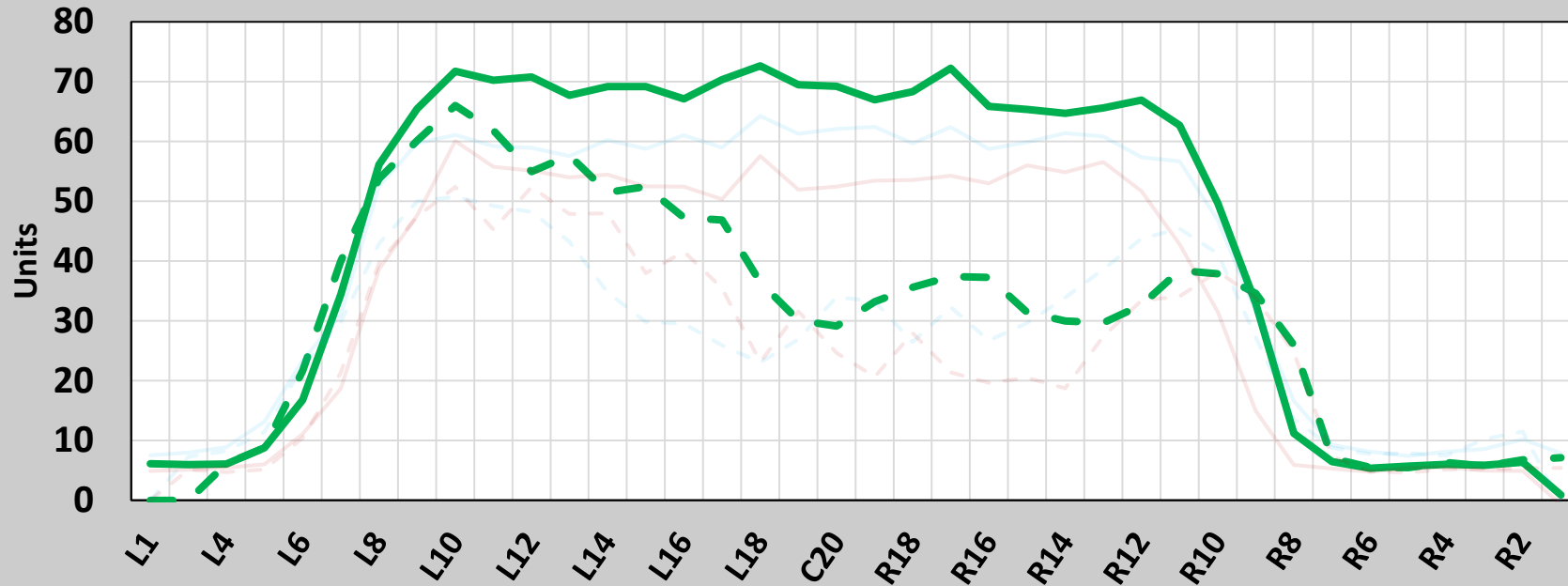
— Day 3: Slow Oil Absorption, No Balance Hole, 80% Oil.

- - - Day 3: Slow Oil Absorption, No Balance Hole, 80% Oil.

- ★ Tapes from 8 ft down-lane
- ★ Slow Oil Absorption Balls
- ★ Fast Oil Absorption Balls
- ★ Slow Oil Absorption Balls with 80% oil

Oil Depletion

House Pattern for 10 Bowler test- 8 ft



Day 1: Slow Oil Absorption, No Balance Hole.

Day 1: Slow Oil Absorption, No Balance Hole.

Day 2: Fast Oil Absorption, No Balance Hole.

Day 2: Fast Oil Absorption, No Balance Hole.

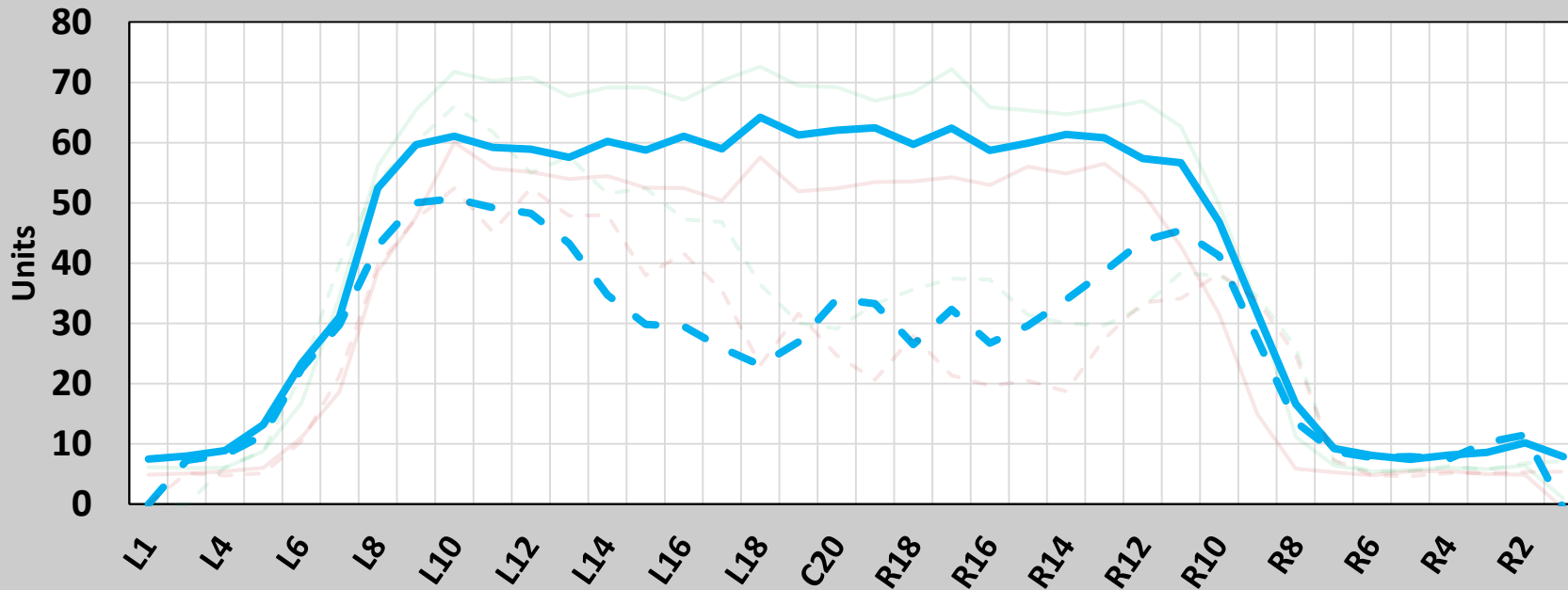
Day 3: Slow Oil Absorption, No Balance Hole, 80% Oil.

Day 3: Slow Oil Absorption, No Balance Hole, 80% Oil.

- Tapes from 8 ft down-lane
- Slow Oil Absorption Balls
- Fast Oil Absorption Balls
- Slow Oil Absorption Balls with 80% oil

Oil Depletion

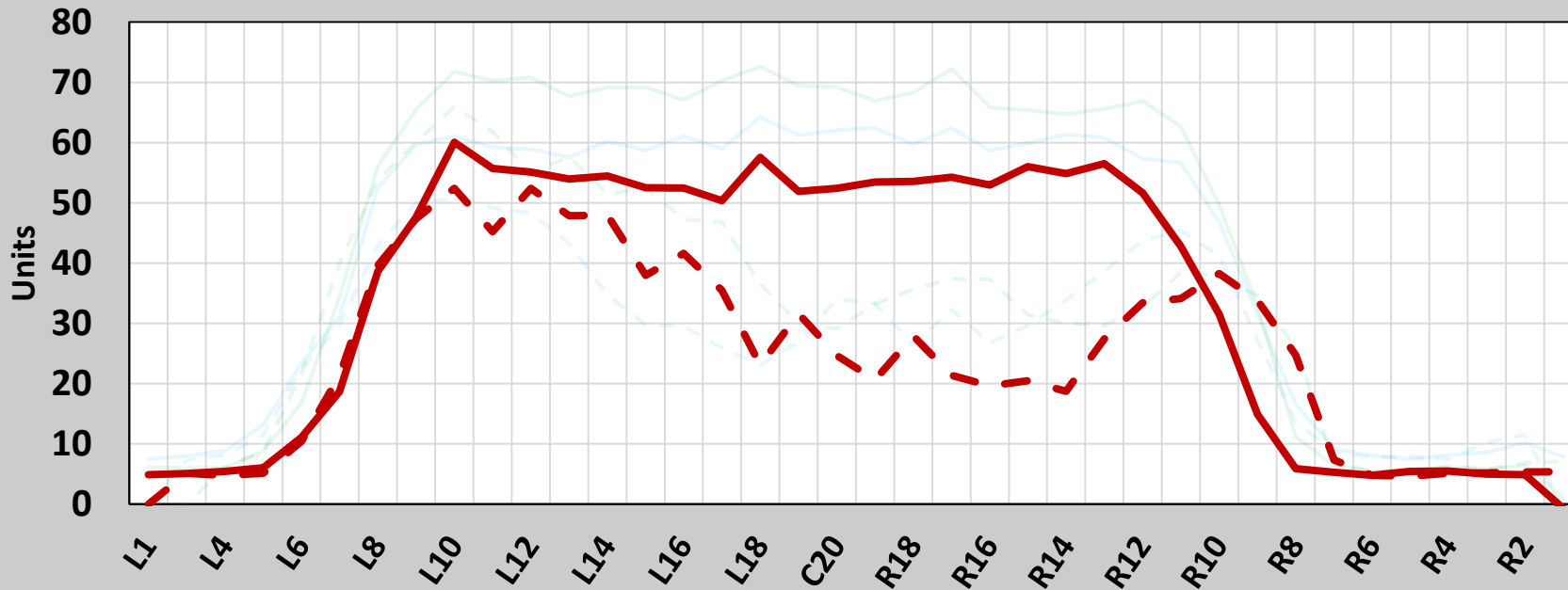
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- ★ Tapes from 8 ft down-lane
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- ★ Fast Oil Absorption Balls
- ★ Slow Oil Absorption Balls with 80% oil

Oil Depletion

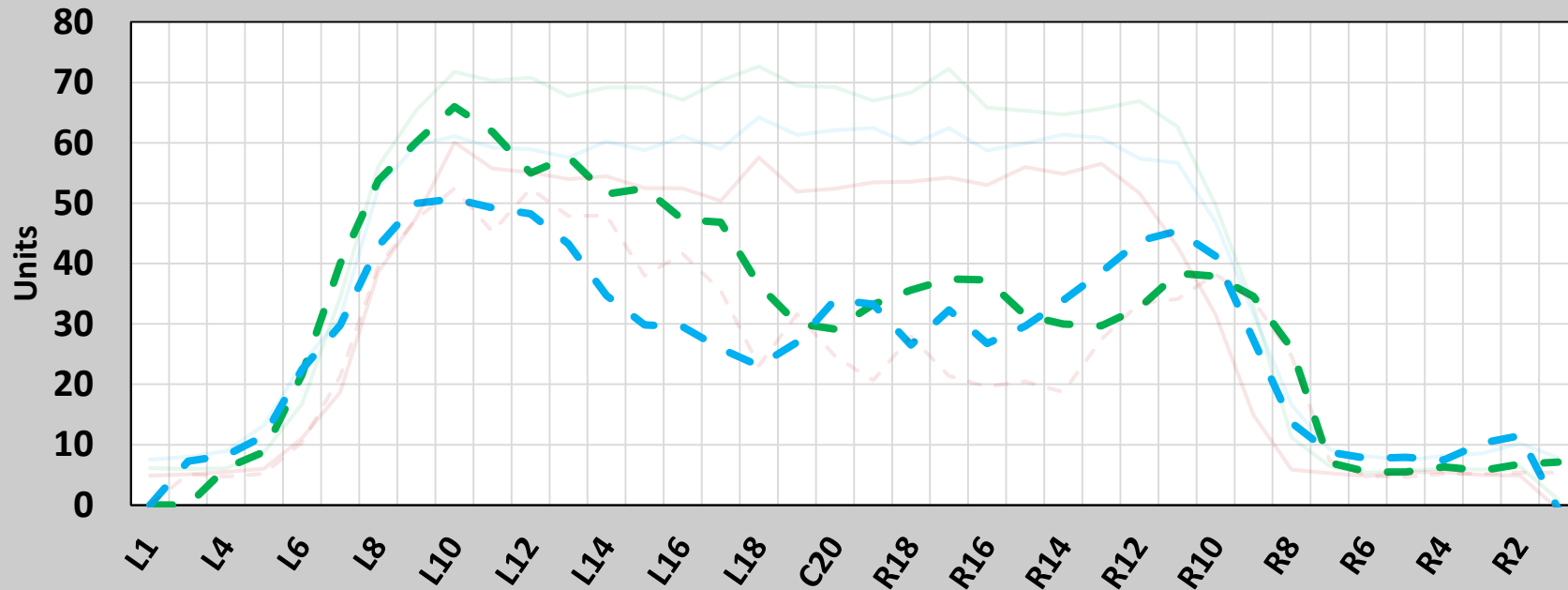
House Pattern for 10 Bowler test- 8 ft



- ★ Tapes from 8 ft down-lane
- ★ Slow Oil Absorption Balls
- ★ Fast Oil Absorption Balls
- ★ Slow Oil Absorption Balls with 80% oil

Oil Depletion

House Pattern for 10 Bowler test- 8 ft



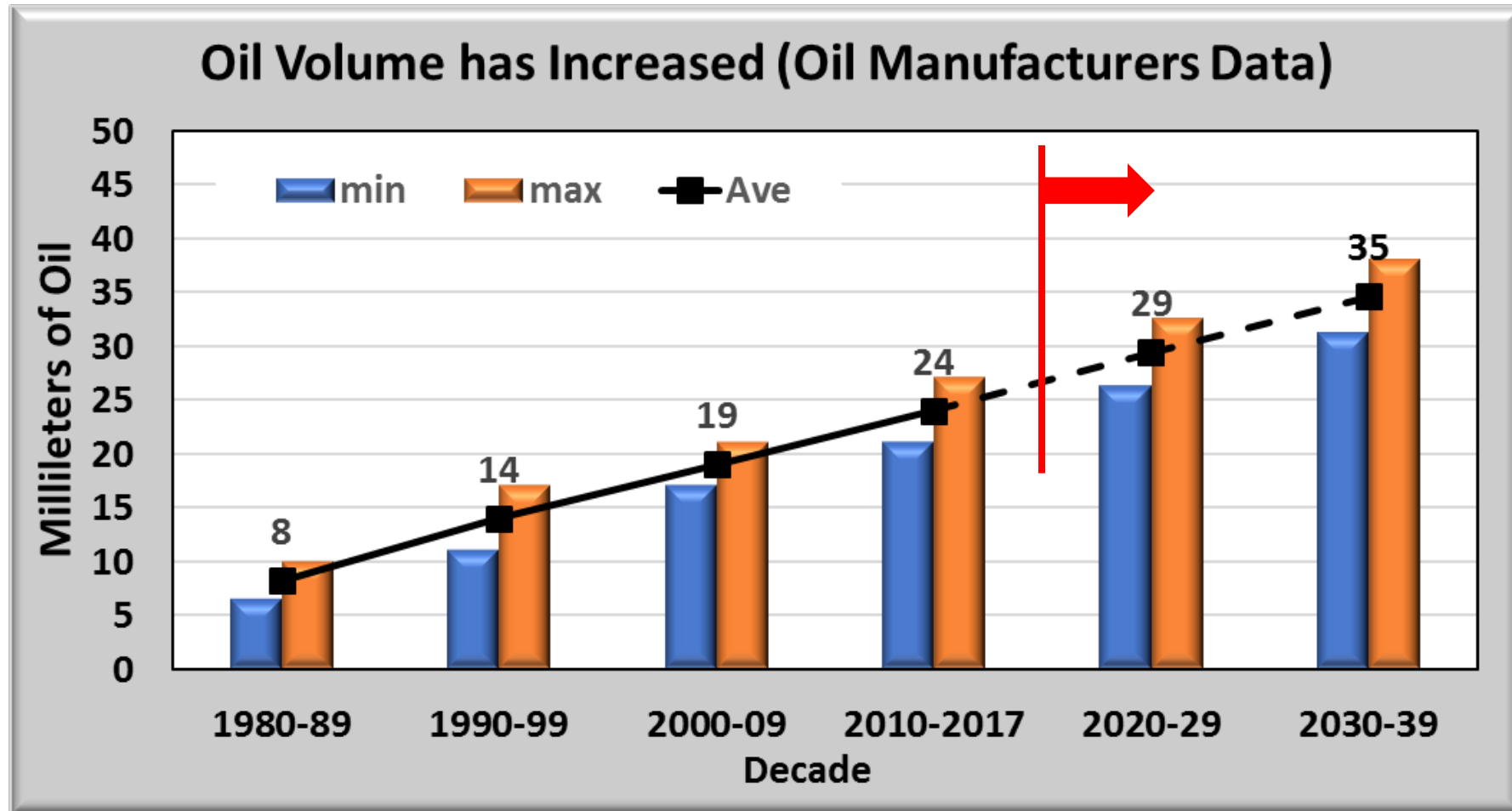
- ★ Tapes from 8 ft down-lane
- ★ Slow Oil Absorption Balls
- ★ Fast Oil Absorption Balls
- ★ Slow Oil Absorption Balls with 80% oil



Conclusion from League Simulation Study

- ★ Oil absorption had No significant difference in scoring.
- ★ Fast oil absorption equipment starts bowlers further inside.
- ★ Fast oil absorption equipment causes bowlers to move more.
- ★ Oil depletion occurs where the balls touch the lane.
- ★ Starting deeper inside the lane, and moving more often deteriorates lane conditions quicker.

Oil Volume on the Lane





Summary

- ★ To protect bowling's future
- ★ USBC is eliminating balance holes – Effective Aug 1, 2020
- ★ Setting a new specification for oil absorption

- ★ USBC research shows these changes will
 - Slow oil pattern transition
 - Cause bowlers to move less
 - Keep the same scoring pace with lower oil volume

**NO current USBC approved balls
will be deemed illegal**



A *Future* FOR THE *Sport*

Your (our) National Governing Body is hard at work. Know that and know this is creating the true value of your membership.

USBC is one organization that includes local associations, state associations, bowling centers, as well as our members dedicated to building A Future for the Sport.

2018

YOUTH
DEVELOPMENT

COMPETITIVE
BOWLING

MARKETING

TECHNOLOGY

MEMBERSHIP
VALUE

EDUCATION AND
TRAINING

EQUIPMENT
SPECIFICATIONS

SUMMARY



USBC Mission

The USBC is the National Governing Body for Bowling. Our mission is to provide services, resources and the standards for the sport.



USBC Promise

Our promise is to celebrate the past, be mindful of the present and ensure bowling's future through thoughtful research, planning and delivery.

A Future for the Sport

