



# **2020 U.S. OPEN BALL HARDNESS TESTING REPORT**

## **Overview**

USBC conducted a ball hardness field test at the 2020 U.S. Open. As the National Governing Body for bowling, USBC is responsible for governing the rules and specifications of the sport. Recently, there had been discussion in the field concerning the hardness of some urethane balls. The USBC has done research in this area, publishing a Hardness Research Report in 2019. In 2020, USBC received additional information and conducted additional spot checks.

In order to collect field data and govern the U.S. Open, USBC took an additional step to verify urethane balls used in the event. The goal was to collect valid data related to a topic where public discussions are continuing, and to ensure all balls used in the competition meet USBC specifications.

In order to be used in the competition, urethane balls were required to pass the newly established field test procedure for hardness found in the USBC Equipment Specification Manual, which requires balls to measure above 68D for hardness.

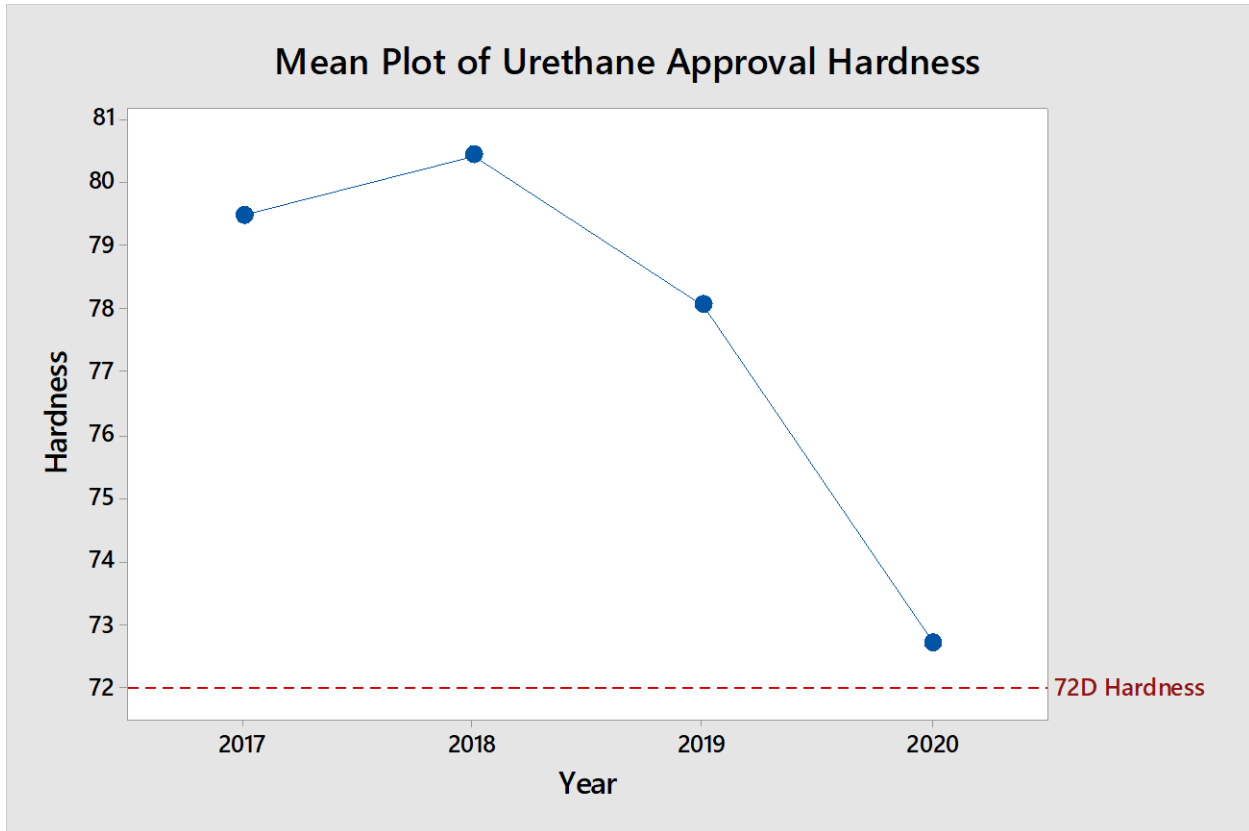
Appendix A lists all balls tested and every measurement collected by USBC during the test.

All USBC-approved bowling balls must measure at least 72D for hardness at the time of manufacture. This is the out-of-the-box specification required for USBC approval. USBC spot-checks balls against this number and the data indicates all balls start above this line.

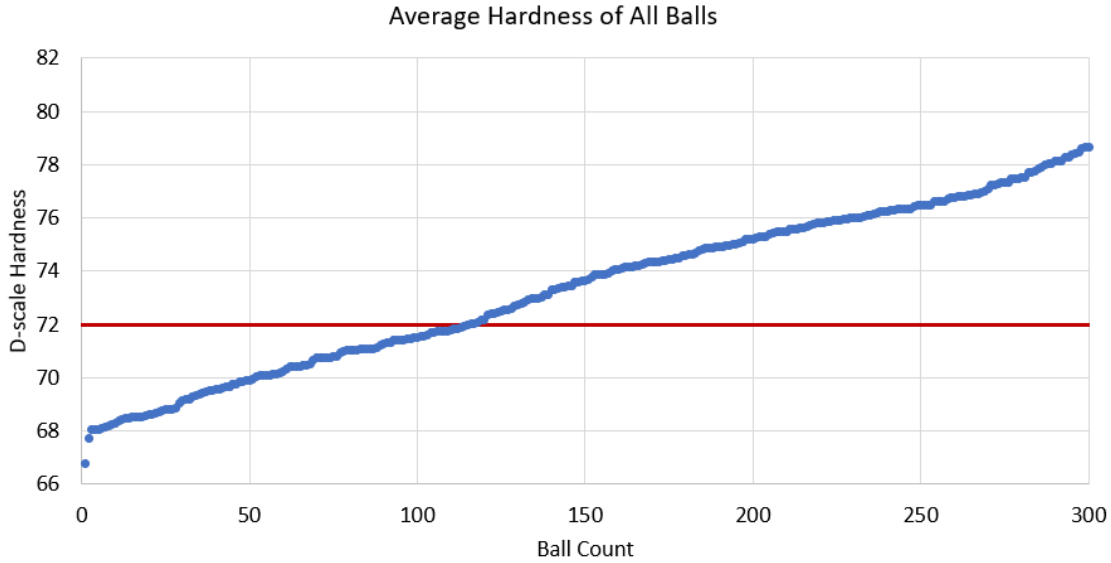
In the 2019 Hardness Research Report, USBC stated bowling balls will measure softer immediately after use. USBC did not have data showing to what extent use over time causes urethane balls to become softer.

## **U.S. Open test results**

A total of 302 unique bowling balls, including 20 models, were measured. Test data indicated that over the last three years, across the population of urethane balls, recent releases have lower hardness values.

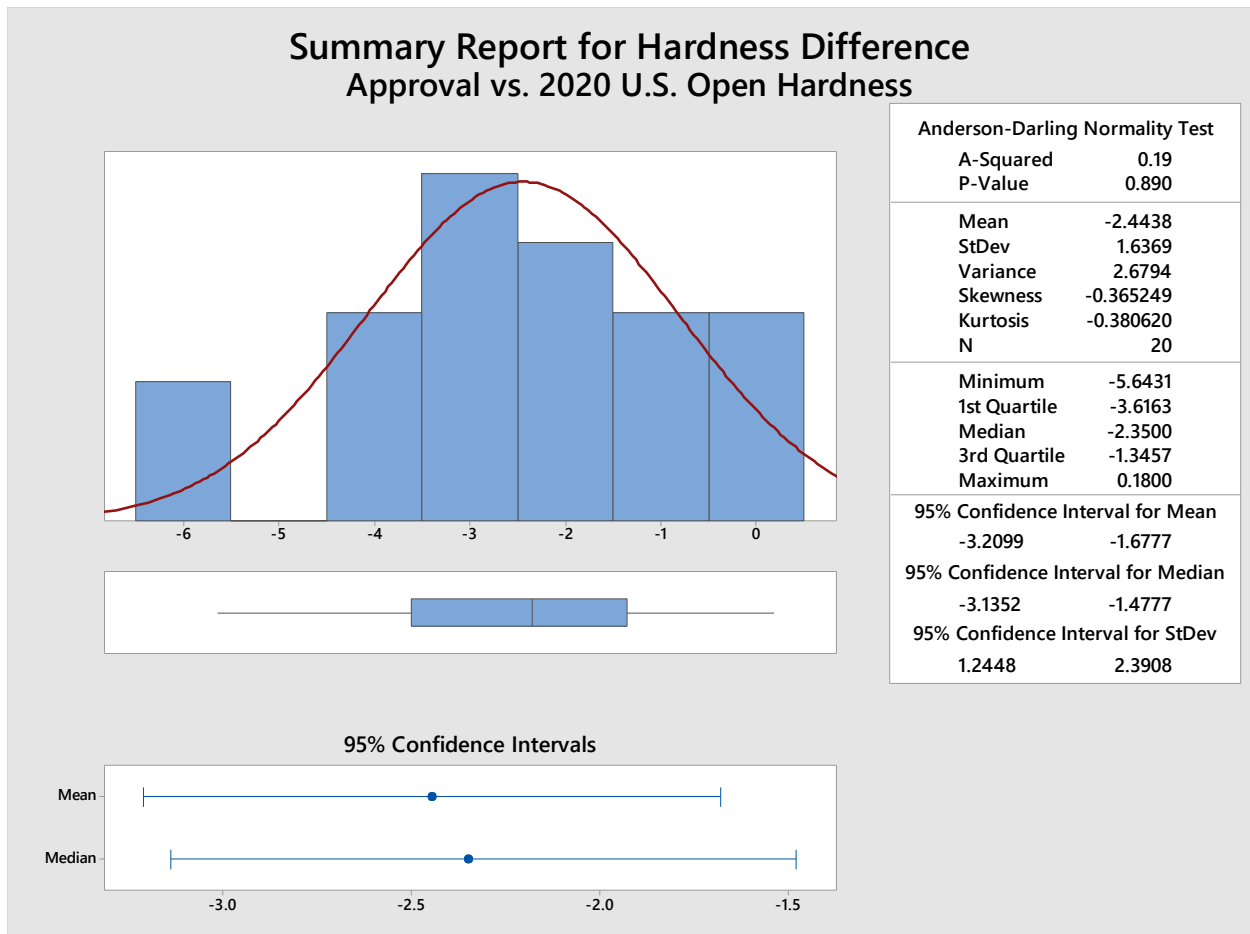


Results of the U.S. Open field test show 115 of 302 used balls tested, or about 38%, measured under 72D. The balls measuring under 72D included balls from multiple manufacturers and models.



**The data indicates urethane balls are getting progressively softer with use over time.**

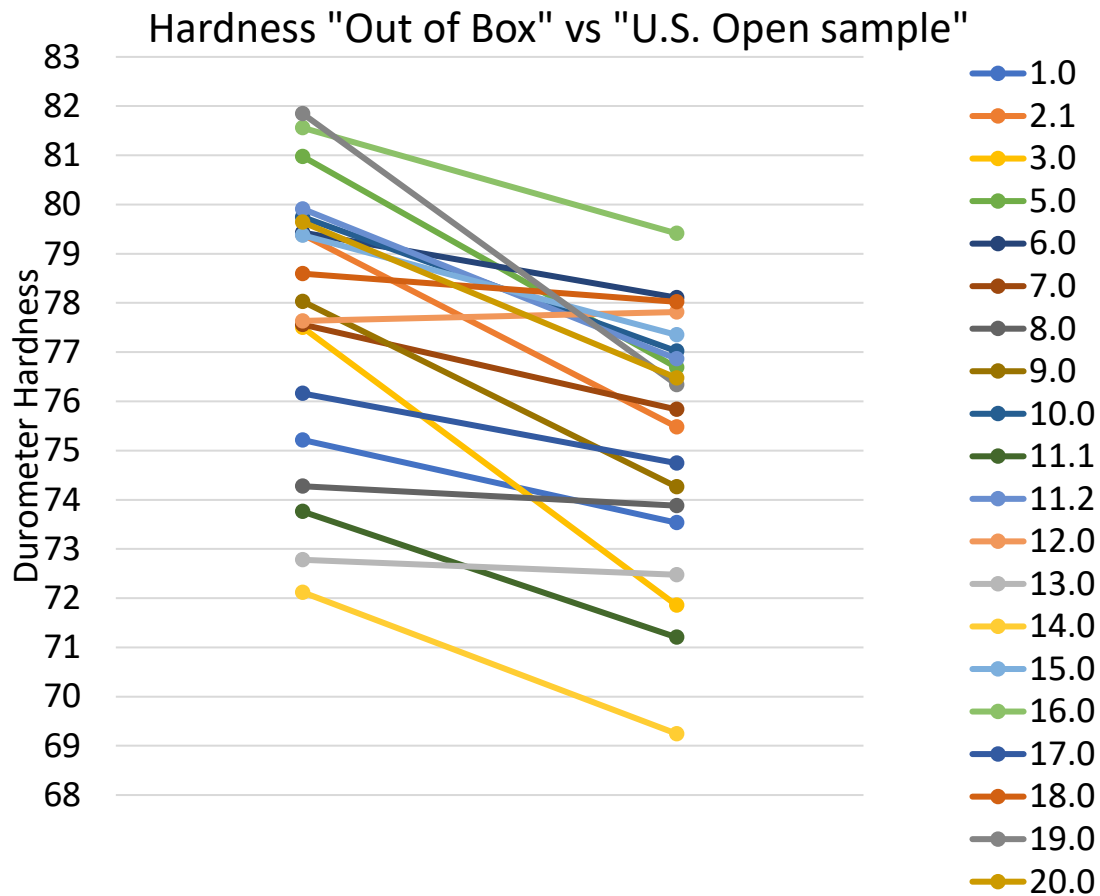
On average, the 20 models measured 2.4D lower than their approval measurement, with the largest decrease over time averaging 5.64D.



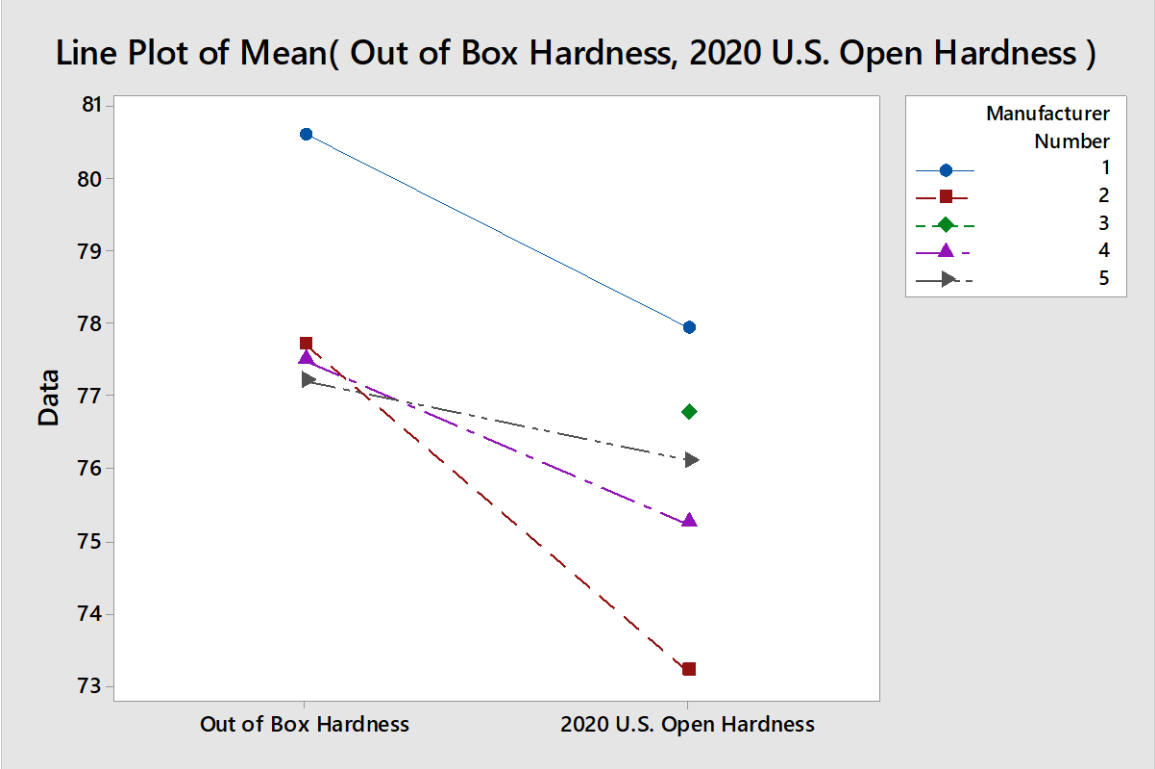
**The effect is not isolated to one manufacturer and can be seen across several models.**

USBC's independent technical expert has analyzed the data and concluded the results indicate it is not a batch-to-batch variance that is causing balls to measure softer than originally approved. Instead, the technical expert says data indicates that use over time is causing some balls to progressively test softer.

This data validates USBC's 2019 Hardness Research Report that concluded urethane balls will measure softer immediately after use. The 2020 U.S. Open data indicates that, to some extent, the effect also can be progressive over time.



\*Graphic shows the 20 ball models tested at U.S. Open and each model's decrease in hardness compared to its "Out of Box" measurement.



\*Graphic shows the effect is seen for all current manufacturers. (Manufacture #3 no longer exists. Its balls are more than 25 years old and USBC does not have comparable out-of-box data).

Ball manufacturers do not report exact composition of coverstock for each model of ball. However, models marketed as having a blend of urethane and reactive cover decrease in hardness at a lower rate than those marketed as only urethane.

Model Number	Manufacturer	Brand	Tournament Balls	Tournament Hardness	Out of Box Hardness	Difference
1.0	4	4-1	5.0	73.5	75.2	-1.7
2.1	2	2-1	31.0	75.5	79.4	-3.9
3.0	2	2-1	13.0	71.9	77.5	-5.6
5.0	4	4-1	20.0	76.7	81.0	-4.3
6.0	5	5-1	4.0	78.1	79.4	-1.3
7.0	5	5-1	6.0	75.8	77.6	-1.7
8.0	5	5-1	19.0	73.9	74.3	-0.4
9.0	4	4-1	4.0	74.3	78.0	-3.8
10.0	4	4-2	1.0	77.0	79.7	-2.7
11.1	4	4-3	39.0	71.2	73.8	-2.6
11.2	4	Known Blends	30.0	76.9	79.9	-3.0
12.0	4		2.0	77.8	77.6	0.2
13.0	4	4-3	18.0	72.5	72.8	-0.3
14.0	2	2-1	74.0	69.2	72.1	-2.9
15.0	4	4-1	1.0	77.4	79.4	-2.0
16.0	1	1-2	1.0	79.4	81.6	-2.1
17.0	5	5-1	25.0	74.7	76.2	-1.4
18.0	5	5-1	3.0	78.0	78.6	-0.6
19.0	2	2-1	1.0	76.3	81.8	-5.5
20.0	1	1-1	7.0	76.5	79.6	-3.2

### **Balls outside specification for U.S. Open**

USBC's ball check at the U.S. Open identified two balls had fallen below the minimum 68D allowed in the U.S. Open Tournament rules. USBC removed those balls from the competition, as required per U.S. Open Tournament rules. Each of the balls that tested under 68D had more than two years of use.

There is no data or evidence to indicate any player tampered with a ball, and there is no reasonable way to know a ball is progressing past the hardness specification limit over time other than by regularly testing the ball through the USBC test process.

### **Summary**

The U.S. Open field test data indicates urethane balls become progressively softer with use over time. The effect can be seen for all current manufacturers. Models marketed as having a blend of urethane and reactive cover decrease in hardness at a lower rate than those marketed as only urethane.

Data indicates the effect of becoming softer with use over time eventually levels out and the ball's hardness stabilizes.

USBC will continue to conduct more research to better understand the variables causing the decrease in hardness over time, as well as factors contributing to stabilization. USBC also will conduct additional research to investigate to what extent, if any, reactive shell balls decrease in hardness with use over time.

In the meantime, all balls on the USBC Approved Ball List remain approved for all USBC competition unless an individual ball measures below the minimum 68D specification when tested in accordance with the field-test process in the USBC Equipment Specifications Manual.

### **APPENDIX A**