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PADDLE BREAK-IN TRENDS

Introduction

The development of dynamic paddle performance metrics such as paddle-ball coefficient of restitution (PBCOR) have allowed paddle performance to be more accurately measured. Such improved performance measurements and the implementation of certification requirements based on these measurements have benefitted the sport of pickleball by helping ensure that all paddles on the market meet the same performance ceiling under a standard set of conditions and parameters.

One issue that has the potential to undermine the validity and reliability of the newly implemented dynamic performance-based certification standards is paddle break-in. Paddle break-in is a phenomenon whereby through either common use or abuse the structure of a paddle begins to break down and its performance increases as a result of the break down. If paddle break-in is not accounted for during the initial certification process it has the potential to undercut the credibility of the certification process because paddle performance that users see and experience on the court will not align with the performance that is measured in a lab setting.

In order to account for paddle break-in during the certification process, a standardized method for breaking in paddles has been developed. The detailed procedures for the break in process can be found within the test procedures portion of the PPL website, but for the purposes of this discussion, it is sufficient to note that the break-in procedure is focused on applying wide ranging series of loading cycles that put the paddle face through an increasing level of both compressive and flexural bending cycles.

A study has been completed to evaluate how the performance of various paddles, as measured by PBCOR, is affected by the standardized break-in method previously described. Paddles of varying construction styles and of varying physical attributes were selected for the study. More specifically, during this study paddle PBCOR and ADF are shown as a function of break-in severity.

Paddle Construction Styles and Physical Attributes

Paddles in the study were grouped into four Construction Styles and three Thickness Groupings. The Construction Styles and Thickness Groupings included

CS1 – Cold Pressed / Sandwich Construction (Composite faces with honeycomb core)
CS2 – Hot Pressed / Thermal Formed Construction (Composite faces and edge wrapping w/ honeycomb core)
CS3 – Floating Core Construction (Composite faces and edge wrapping w/ honeycomb core and a foam layer separating the honeycomb and paddle edge)
CS4 – Foam Core Construction (Composite faces and edge wrapping w/ foam, partial foam, or reinforced foam core)
TG1 – Thickness less than 13mm
TG2 – Thickness greater than or equal to 13mm and less than 16.0mm

TG3 – Thickness greater than or equal to 16.0mm

These groupings were identified to help clearly illustrate the trends in how the various attributes are affected by the break in process.

Testing Procedure

Paddles were selected for use in this study based on their market prevalence, construction style and physical attributes. Once the desired paddles were identified, all were purchased through standard retail channels.

Once obtained, the paddles used in this study underwent the following test plan:

1) Condition paddles per PPL's standard operating procedures
2) "New" – Test for ADF values and PEF (PBCOR) scores
3) Subject paddles to 1st round of ABI testing
4) "ABI r1" – Test for ADF values and PEF (PBCOR) scores
5) Subject paddles to 2nd round of ABI testing
6) "ABI r2" – Test for ADF values and PEF (PBCOR) scores

Results

The performance results are presented in a graphical format whereby the PBCOR scores for each paddle are grouped together. The results have further been sorted/grouped in two ways. First, by Construction Style and second, by Thickness Grouping. Multiple sorting methods have been utilized because each method highlights key trends that may otherwise be missed.


Construction Style 1 (CS1)
PBCOR
0.500
0.450
0.400
0.350
0.300
ABI_250303_01
ABI_250303_02
ABI_250303_03
ABI_250303_04
ABI_250303_05
New
ABI r1
ABI r2


Construction Style 2 (CS2)
PBCOR
0.500
0.450
0.400
0.350
0.300
ABI_250303_06
ABI_250303_07
ABI_250303_08
ABI_250303_09
ABI_250303_10
ABI_250303_11
New
ABI r1
ABI r2


Construction Style 3 (CS3)
PBCOR
0.500
0.450
0.400
0.350
0.300
ABI_250303_12
ABI_250303_13
ABI_250303_14
New
ABI r1
ABI r2


Constuction Style 4 (CS4)
PBCOR
0.500
0.450
0.400
0.350
0.300
ABI_250303_15
ABI_250303_16
ABI_250303_17
ABI_250303_18
ABI_250303_19
New
ABI r1
ABI r2

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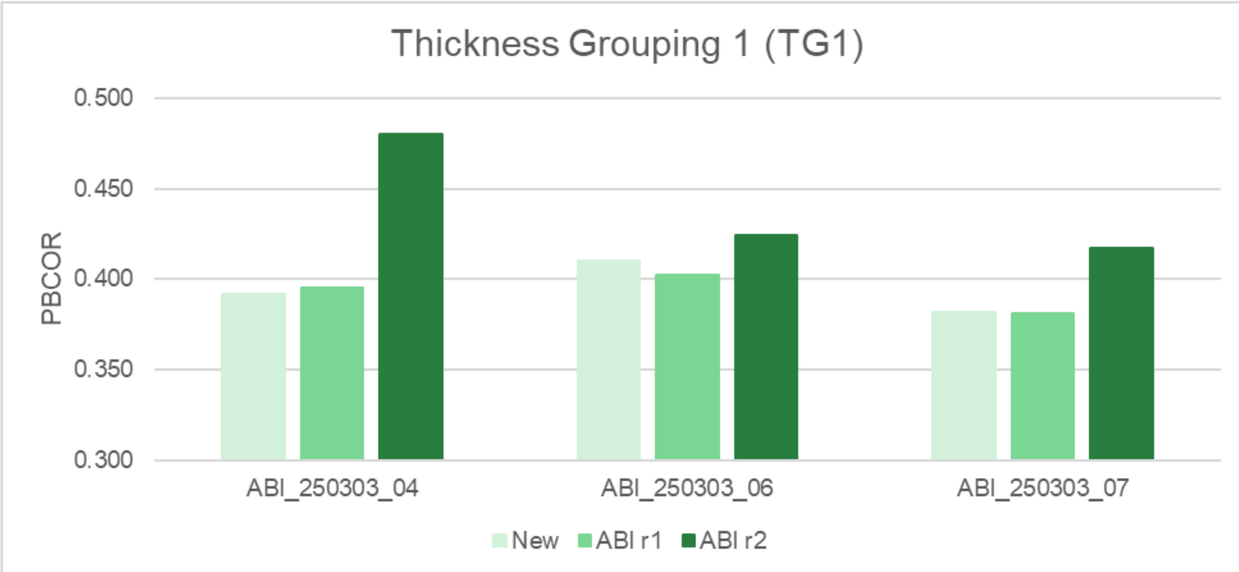

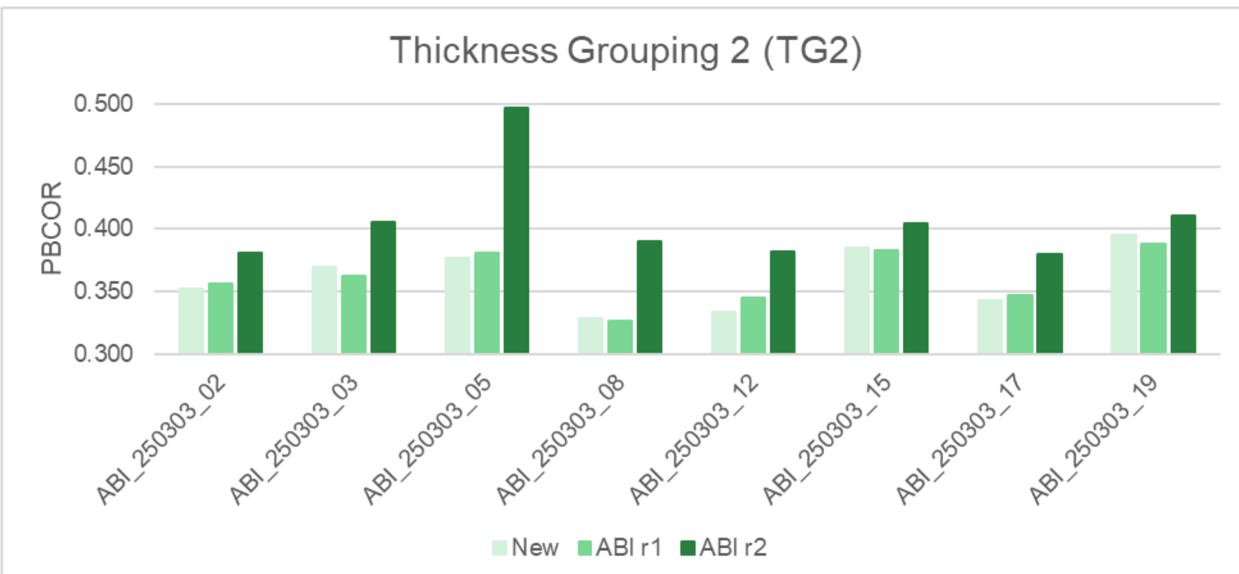

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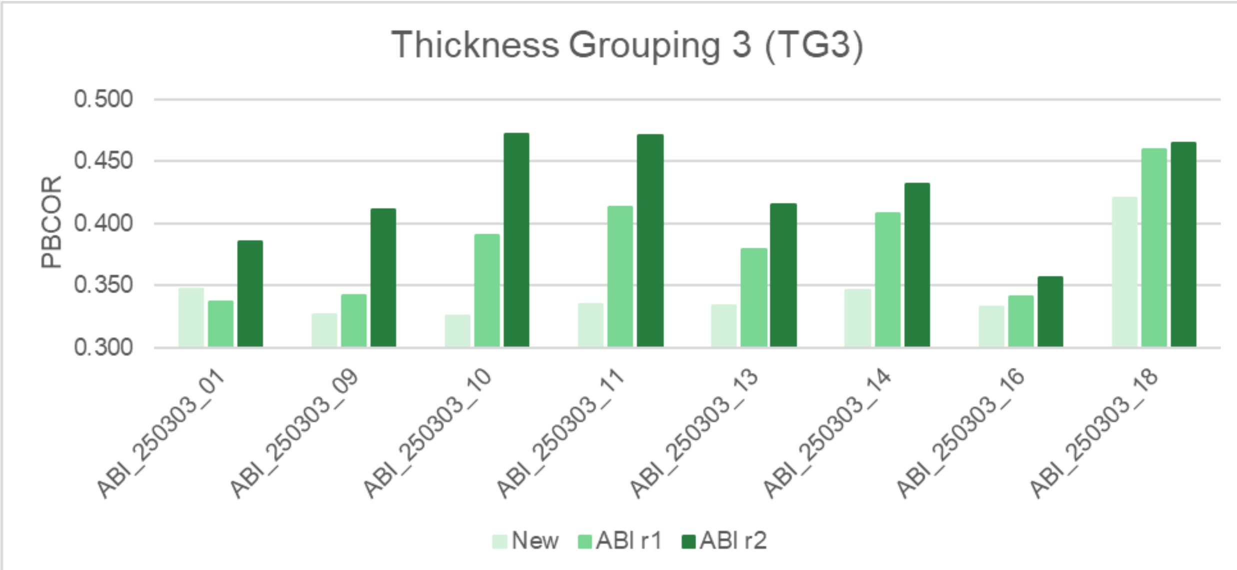

Discussion

The overall PBCOR trend resulting from only two rounds of increasingly aggressive break-in testing are readily apparent in the enclosed charts – all paddles evaluated in this study improve in performance. While it is outside the scope of this study to prove the mechanism for how or why each paddle's performance increased, we will point out and discuss some key trends. Additionally, for the sake of clarity and brevity, Construction Style and Thickness Grouping trends will be discussed separately.

Regarding paddle Construction Styles, styles 1 and 2 do not show significant style-dependent performance. Said another way, styles 1 and 2 show the same trend (or lack thereof) for break in. From a design standpoint, it makes sense that these designs will perform and break-in in a comparable manner because their finished constructions are so similar. Additionally, paddles of these construction styles do not show any clear performance change until some nominal level of break-in has been achieved.

While Construction Style 3 has the fewest data points, the trend that the performance of these paddles increases at a steady rate during the break in process is consistent with on-court observations. It is also aligned with the characteristics one might expect based on these paddles' unique construction, which allows performance to be driven by more than one set of boundary conditions.

Construction Style 4 shows the most variation in performance change through the break-in process. Given that this Construction Style encompasses the most diverse types of core designs, this is not unexpected. The main point that can be learned from this data set is that these types of paddles follow a break-in pattern that is highly dependent on core design. For example, paddles whose cores are built from mostly resilient foam break-in in different ways than paddles whose cores are built from rigid, or deformable foams.

Regarding paddle Thickness Grouping trends, Group 1 (< 13 mm) tends to have the highest initial PBCOR performance and paddles within this group do not demonstrate significant performance improvement until some nominal level of break-in has been achieved. This observation can also be interpreted to mean these paddles require a relatively higher force to be broken-in.

Group 2 (≥ 13 mm and < 16 mm) has a wide range of initial performance levels and tends to not demonstrate significant performance improvement until some nominal level of break-in has been achieved. This observation can also be interpreted to mean these paddles require a relatively higher force to be broken-in.

Group 3 (≥ 16 mm) tends to have the lowest initial PBCOR performance and paddles within this group do tend to show a noteworthy performance increase with each successive round of break-in. This observation can also be interpreted to mean these paddles require a relatively lower force to be broken-in.

Conclusion

The primary purpose of this study has been to demonstrate the significant impact break-in can have on paddle performance. Not only is it clear that nearly all paddles will increase in performance with break-in, it should now also be unsurprising that with continued or further break-in, many paddles' performance will continue to rise even further than has been shown here.

We have elected to break the data into subsets that align with paddle characteristics consistent with the market in an attempt to more readily educate manufacturers to the risk/challenges their paddles may face as break-in requirements are incorporated into initial certification standards.

Finally, the appendix of this paper includes the ADF vs break-in data for each of the paddles. These results have not been discussed in this paper because ADF is simply a proxy for PBCOR, however, it is noteworthy to review the data given that it unambiguously demonstrates that ADF is correlated with break-in.

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Appendix

ADF values vs Break In for all paddles in the study