

Bat Performance Factor

What is this about?

The COR of a baseball slammed against a wall is about 54.6%. Is it the same for a ball hitting a bat? Well, that depends upon the bat. The Bat Performance Factor or BPF is listed on most aluminum bats you buy. You will understand why the rules of many leagues only allow bats with a BPF of 1.20 or less.

What do I need?

You need to buy a set of happy/unhappy balls (try Sargent-Welch item WL0709 at www.sargentwelch.com). You will also need an empty aluminum soda can.

What will I be doing?

You will drop an unhappy ball on a wooden floor or desktop and measure the height of the bounce. Then you will drop it on an empty aluminum can and see if it bounces higher or lower.

What do I think will happen?

Take a minute and write down a description of what you think will happen and why you think it. Will the unhappy ball bounce higher when it hits the floor or when it hits the can?

What really happened?

1. Drop the happy ball on the wooden surface from a height of a few feet. Then drop the unhappy ball from the same height. Did you notice that the COR of the unhappy ball on a wooden surface is about equal to zero!
2. Now drop the unhappy ball from the height of around one foot on to the empty aluminum can. Compare the height of the bounce to the height of the bounce from a wooden surface.

Write a description of your results.

What did I learn?

Since the unhappy ball bounces higher from the can than from the wooden surface, the COR of the collision between the unhappy ball with the aluminum can is higher than the collision between the unhappy ball and wood. Apparently, the COR actually depends not just on the ball, but also on the object the ball collides with. This is sometimes called the “trampoline effect” because the extra “bounciness” is just like the way a trampoline works.

What else should I think about?

The COR for the collision between a baseball and a wooden bat is about the same as the COR for a collision between a baseball and a wall, about 54.6%. The COR for the collision between a baseball and an aluminum bat is generally a bit higher. How much higher? That is what the BPF is all about. The BPF is the ratio of the COR for a given bat with the COR with the wall. Many baseball leagues that allow aluminum bats restrict the BPF to 1.2 or less. Can you guess why?

