

Quick Reactions

What is this about?

When the ball hits the bat it exerts a huge force, usually more than one ton! The reaction force on your hands depends upon where on the bat the ball is hit. There is a spot on the bat called the “center of percussion” or CP where you won’t feel anything. You will learn to find this spot on a bat.

What do I need?

You will need a baseball bat, some string to hang it from, and a hammer.

What will I be doing?

The hammer is like the ball hitting the bat. You will hit the bat in different places and watch the resulting motion of the handle.

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. Which direction will the handle move if you hit the bat near the handle? Which direction will the handle move if you hit the bat on the lower part of the barrel? What about if you hit it at the CM? or the RG?

What really happened?

1. Strike the bat near the handle and note which way the handle moves.
2. Strike the bat near the barrel end and see which way the handle goes.
3. Now try it at the CM and RG.
4. Find the spot where you can hit the bat and the handle doesn’t jerk to either side. This spot is the CP.



Write a description of your results. Compare your CP value to your CO value?

What did I learn?

At the CP, the handle of the bat doesn’t jerk when it hits the ball. Therefore, the batter’s hands won’t feel any force even though over one ton of force is exerted on the bat by the ball. When the ball is struck at the CP the batter really senses that they have hit the ball well.

It turns out that the CP and the CO are exactly the same spot! You now have learned two different ways to find the place.

What else should I think about?

When a ball strikes a bat at the CP, little energy is wasted exerting forces back on the hands of the batter. This leaves more energy for the ball, allowing it to go further. The CP is sometimes referred to as the “sweet spot.” There are other ways for the bat to steal energy, so before you declare the CP to be the sweet spot, look at the activity on vibrating bats.

 Catch it in the Web!

 Physics and Acoustics of Baseball & Softball Bats by Daniel A. Russell.
(<http://www.acs.psu.edu/drussell/bats/cop.html>)

What is the COP (Center-of-Percussion) and does it matter?

 Physics of Baseball on c|net tv
(http://cnettv.cnet.com/2001-1_53-50001775.html?tag=mncol%253btxt)

Paul Dougherty of the Exploratorium explain the center of mass and center of percussion with commentary by major league players.