

# Tennis Match Turns into a Helicopter War: Featuring Bugs Bunny and the Avengers

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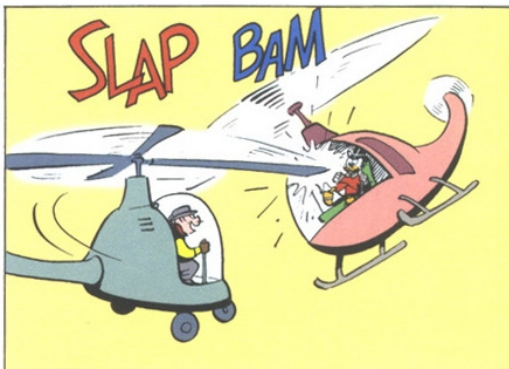
On a warm summer day in Australia, Bugs Bunny and Captain America were playing a very intense match of tennis. As the ball was being rocketed from one side to the other, Captain America had the hit of his life and punctured the racket of Bugs bunny. Stunned, Mr. Bunny analyzed his racket seeing the damage first hand. He could not believe his carbon fiber tennis racquet just broke, for it was a gift given to him by his favorite Uncle, Bill.

He ran his hands over the nylon strings as hot tears started to weld in his eyes. Bugs analyzed it and further deduced that the racquet had buckled due to the stress of Captain America's backhanded shot. He remembered a conversation he had with his Uncle—a civil engineer who had explained to him that it would take up to 3.5 N to cause damage to the racquet. Bill told him to stay away from the Avengers, for they were the only ones who could produce enough force to break the racquet. Bugs Bunny



knew deep down that he should not have accepted Captain America's invitation to hash it out on the courts, but he could not stand being made fun of anymore. He bounded over the net, and before he could say anything Captain America busted out laughing. Bugs responded, "Do you think this is funny? You think this racquet was only \$200 in worth to me? That I can go get a replacement after this? Well think again, this was a gift given to me by my favorite Uncle." Captain America stopped abruptly and looked at the indentation of the racquet, the strings strewn and tangled. He then called on the Avengers to help get him out of this jam.

Amazed at what happened, newscasters flew in from all over. Since the court can't hold more than one helicopter, there was an issue when three tried to land at once. The extremely bright pilots crashed into one another, leaving parts of the helicopters all over the audience. Iron man examined a damaged propeller in his lab and discovered it was made of an aluminum alloy. By taking a closer look at the dent on the edge and top of the propeller blade Iron man determined that the impact from the crash must have been between the Ultimate and Yield strength for the



alloy because the blade was deformed but not broken—making the impact between 38580 and 48298 psi (Matweb). Propeller blades are not able to withstand that much force for they need to be light weight and flexible to do their job of keeping a helicopter in the air. That is why helicopters aren't meant for dog fights. The cost of replacing a single blade can be upwards of \$35,000, so those pilots better be wary of the owner who they just cost millions of dollars.

One of the owners of the helicopters was the Hulk. Furious that his precious toy was ruined, he decided to attack the other pilots with bowling balls. Little did he know, one of the helicopters was built using the same strength used to make Captain America. The bowling ball shattered into about fifteen pieces. Under great impact, the failure was determined to be impact fracture. This is because the magnitude of stresses and strain that occurred resulted in separation of two or more parts. Even though the ball was a standard bowling ball made from a plastic urethane and a reactive resin, it was no match for the helicopter since it is made for the simple sport of bowling. The fracture site was rough but didn't have super big mountains. After examined, Dr. Evil determined the holes for the fingers could have contributed to the failure. In order to not shatter bowling balls, Hulk should not throw it at a helicopter and simply use it for rolling it on a bowling lane. All in all, the Columbia 300 bowling did not stand a chance against the super strength bowling ball. After all, the normal stress of the bowling ball only ranges from 44.96 to 646.24 Psi (Matweb).



The crazy series of events was finally ended when the Hulk changed his method of attack. He jumped on the helicopter and pulled out the pilots. One by one he set them back on the scene where the tennis racket first broke. Then, the Hulk recruited Thor and his ability to throw objects for his next plan. The pilots were soon attacked with flying drumsticks. The VIC FIRTH sticks were not used for their original purpose and were not really injuring the pilots, so the duo found a new plan. They would beat the helicopters and break them, as the Hulk's chopper was broken. The stick in Thor's hand was used to hit the plane about fifty times before it failed. The impact caused an impact fracture since the magnitude of stress and strain was enough to break the stick into two pieces. The hickory drumstick put up a good fight against the chopper but barely made any damage. It split smoothly and wavy with no big mountains. The impact almost looks as if it were sanded. The ultimate strength of the material is 680 Psi (Matweb). Thankfully, drumsticks are easy to replace and are not hard to get a hold of. The only people injured in this war were the pilots and a few tennis fans. All in all, materials should be used for their intended purposes, not in a helicopter war.

## References

- What American bowling balls are made of: [bowlingball.com/BowlVersity/what-are-american-bowling-balls-made-of-2#idc-cover](http://bowlingball.com/BowlVersity/what-are-american-bowling-balls-made-of-2#idc-cover)
- Breaking a bowling ball: [forums.newtek.com/showthread.php?134954-breaking-a-bowling-ball](http://forums.newtek.com/showthread.php?134954-breaking-a-bowling-ball)
- Matweb: [matweb.com/search/DataSheet.aspx?MatGUID=677752e8e6bf4727b917c242bfc665ef&ckck=1](http://matweb.com/search/DataSheet.aspx?MatGUID=677752e8e6bf4727b917c242bfc665ef&ckck=1)
- Helicopter cartoon fighting: [tvtropes.org/pmwiki/pmwiki.php/Main/HelicopterBlender](http://tvtropes.org/pmwiki/pmwiki.php/Main/HelicopterBlender)
- Broken Tennis racquet: [zimbio.com/pictures/4\\_frId2zRbU/Championships+Wimbledon+2012+Day+Two/7cpo-JSyb6U/Feliciano+Lopez](http://zimbio.com/pictures/4_frId2zRbU/Championships+Wimbledon+2012+Day+Two/7cpo-JSyb6U/Feliciano+Lopez)
- Broken Drumstick: [flickr.com/photos/davidking/4017099662/](http://flickr.com/photos/davidking/4017099662/)
- Vic Firth Drumsticks: [vicfirth.com](http://vicfirth.com)