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The Evolution of Baseball Technology: 1884-Present

From the United States to Japan, every athlete who has ever played the game of baseball has used the basic "tools of the trade": a baseball, a bat, a glove, protective equipment, and a uniform. Babe Ruth, Ty Cobb, Ted Williams, and Sammy Sosa have made a living out of using these tools to play baseball, but there are also a great number of people who play baseball as a source of enjoyment. The crack of the bat connecting with a fastball, the slap of the ball on the mitt, and the roar of the crowd after a homerun are all common sounds of a baseball game. The thing that many people may not realize, however, is that the bat, ball, and glove that make those sounds possible have undergone major transformations since the early days of the game. The technology of baseball has improved significantly since 1884.

Among the necessities to play a baseball game is the baseball. Since the game's beginnings, the ball has always been between nine and 9 ¼ inches in circumference and five to 5 ¼ ounces (Honig 125). There have been two major time periods in baseball with regards to the ball: the Dead Ball Era and the Lively Ball Era. A "dead ball" was a baseball that stayed in play for an entire game. These hand wound balls were big and heavy with an inconsistent shape (Wanner). Nearly no homeruns were hit during the Dead Ball Era because of the weight and shape of the ball. Al Spalding, the maker of Professional Baseball's "dead balls" said, "It (the ball) was usually made on the spot by some boy offering up his woolen socks as an oblation, and these were raveled and wound round a bullet, a handful of strips cut from a rubber overshoe, a piece of cork, or almost anything. The winding of this ball was an art, and whoever could excel

in this art was looked upon as a superior being" (Gutman 12). The Dead Ball Era lasted until 1911 when George Reach invented the cork centered baseball, jumpstarting offensive production in the Major Leagues (Gutman 13).

The start of the Lively Ball Era was influenced not only by the introduction of the cork-centered baseball, but also by the fact that baseballs were machine wound. This caused each ball to have a uniform shape, which in turn led to balls being squarely hit every time (Gutman 8). With the new and improved balls and great hitters such as Babe Ruth and Ted Williams, homeruns were being hit with more power and greater consistency. During World War II, there was a great rubber shortage that prevented baseball manufacturers from obtaining the rubber cork coverings they needed to complete a baseball. A South American rubber-like gum called balata was used instead as a substitute. The problem with these new balata balls was that there were only two homeruns hit in the first month of the 1943 season (Wanner).

Today, baseballs consist of many layers wrapped around a cork and rubber center (Honig 125). Wrapped around this cork and rubber center are hundreds of yards of gray and white woolen yarn (Buckley 12). A layer of white cotton string is wrapped around the yarn (Honig 125). Finally, a cowhide leather cover is sewn onto the ball with 108 red cotton stitches (Gutman 8). Before 1974, a horsehide cover was used on baseballs instead of the cowhide covers that appear on today's baseballs (Gutman 13).

Another important tool of baseball is the bat. Baseball bats can be no longer than 42 inches and no thicker than 2 ¾ inches at the broadest part of the bat. There is no limit on the weight of the bat (Buckley 12).

Legend says that John A. Hillerich crafted the first Louisville Slugger formerly called Falls City Slugger in 1884. As the legend goes, Hillerich played hooky from his father's woodworking shop so he could watch a baseball game. After Pete Browning, a star player of the

time, broke his bat, Hillerich approached him and offered to make him a bat in his father's workshop. The next day, Browning went three for three and attributed his success to his new bat. From that point on, Falls City Slugger bats were coveted among baseball players. Hillerich went into business selling the highly popular bats shortly thereafter (Wanner). Before Hillerich began selling his Falls City Slugger bats, players had their bats handmade by any local carpenter without any specific instructions on the size and weight of the bat. Baseball bats today are constructed using a pattern guide from a template instead of being carved by hand because hand carving was too time consuming and expensive (Oldham).

Although there have been baseball bats of all shapes and sizes throughout the ages, all bats have traditionally been made out of ash (Oldham). Modern players prefer lightweight, thin handled bats, as opposed to the heavy, thick handled bats used by players in the Dead Ball Era (Good Wood: Premium 76-79). Aiding in making today's bats as lightweight as possible is the cup, invented in 1972 by Jose Cardinal. A cup in a bat scoops away an area of the bat two inches wide by one inch deep from the end of the bat, resulting in a much lighter weight. Over half of the wooden bats sold by Hillerich and Bradsby, the parent company of Louisville Slugger, are cupped (Wanner).

One of the biggest changes in the making of a wooden baseball bat occurred in 1999 when Sam Holman, a Canadian carpenter, introduced maple bats to Major Leaguers (Cannella 86-87). Maple wood is much harder and more durable than ash, but it does not weigh much more. Many Major Leaguers such as Albert Pujols and Paul Lo Duca insist that the increased density in the wood gives them more power on the pitches they hit (Cannella 87-88). Barry Bonds used a "Sam Bat" in the 2001-2002 season when he hit seventy-three homeruns, and he is currently helping Sam Holman make improvements to maple bats (Cannella 86-87).

The aluminum baseball bat was introduced in 1970 (Wanner). This new invention was

lighter, more durable, and more powerful than a wooden baseball bat (Wanner). Although the aluminum bat was approved for Little League use in 1971 and for college use in 1974, many baseball enthusiasts insisted that the bats were dangerous to pitchers and infielders and created too much of an advantage for hitters (Gutman 20).

Richard H. Durbin spoke before the House of Representatives in 1989 and stated the following:

> Are we willing to hear the crack of the bat replaced by the dinky ping? Are we ready to see the Louisville Slugger replaced by the aluminum ping dinger? Is nothing sacred? I do not want to hear about saving trees. Any tree in America would gladly give its life for the glory of a day at home plate. I do not know if it will take a Constitutional Amendment to keep baseball traditions alive, but if we forsake the great Americana of broken bat singles and pine tar, we will have certainly lost our way as a nation. (Gutman 21)

Today, aluminum bats account for nearly 75 % of all baseball bat sales and are used by nearly all Little League and college baseball teams (Wanner).

The first baseball gloves were created in the 1880's. They were work gloves that had the fingers chopped off after the first knuckle, aiding in protecting a player's hands (Buckley 14). Later on, gloves became heavy leather pillows with fingers. Players were forced to catch the ball with two hands because there was nothing to keep the ball in the glove until 1922 (Gutman 24-25).

In 1922, Bill Doak was tired of catching a ball with two hands. He decided to sew a piece of leather between the first finger and the thumb of his glove, creating the earliest glove pocket (Gutman 24). The new pocket trapped the ball in the glove and allowed players to catch the ball with one hand.

Baseball gloves have traditionally been made out of leather, but a handful of manufacturers such as Rawlings and Wilson have begun to experiment with synthetic materials. These new synthetic materials make a glove lighter and more durable (Wanner). Another characteristic of today's gloves is that the fingers are sewn tightly together to allow maximum ease in catching and retaining a ball (Buckley 14-15). Also aiding in the retaining of a ball is the very deep pocket found on nearly all of today's gloves. In the 1920's and 30's when the Bill Doak model was first introduced, pockets were fairly small (Buckley 14-15).

Of all the changes in the technology of baseball, protective gear has undergone the most radical transformation since 1884. Major League catchers began to wear chest protectors in 1885 (Stewart 121). These were made from leather because it was strong and durable. (Buckley 18). In 1889 shortly after catchers began to wear chest protectors, Harry Decker developed the first "modern" catcher's mitt, which resembled an oven mitt (Gutman 34). Catchers were the first players to wear baseball gloves (Stewart 122). In 1905, Roger Bresnahan developed the first shin guards for catchers. They were made from leather, as opposed to today's high impact plastic shin guards (Gutman 36).

The other protective piece that catchers have worn since 1884 is the facemask. Early masks were made out of solid iron, causing them to be very heavy, but extremely protective. These early masks lacked the throat protector that appears on all masks today (Gutman 33). Today, masks are made with hollow steel that makes them lightweight, but susceptible to bending (Gromer). Charlie O'Brien, a long time Major League catcher, wanted to develop a mask that would be lightweight, comfortable, and protective. He observed that hockey goalies would get hit in the head with a puck, which is denser and harder than a baseball, and get right back to playing, so he thought that the technology behind a hockey helmet could be incorporated into a catcher's mask. His result was a one piece, high impact helmet with a solid steel cage that

resisted bending, while offering maximum vision and comfort to a catcher (Gromer).

Another major advance in the technology of catcher's gear today came from Rawlings Sporting Goods. They used OSI fiberglass technology from the medical industry to create a custom fit chest protector. OSI fiberglass is a substance that conforms to a person's body when wet. The inserts in the chest protector add more protection against foul balls that can cause serious injury to a catcher (Protective 96).

Roger Bresnahan developed the first batting helmet in 1905. This "helmet" was little more than an inflatable pillow wrapped around a player's head (Gutman 36). In 1969, batting helmets became mandatory for all Major League players. Athletes before that time wore only their caps when they were at bat (Buckley 16). Baseball players today wear batting helmets made out of high-impact polycarbonate alloy to protect them from the increasingly faster pitches (Gutman 36). Charlie Hayes, a player for the Colorado Rockies, was hit in the face with a pitch in 1993. He returned to the game with a batting helmet equipped with a facemask that is used on all Little League helmets today (Gutman 37).

Finally, a baseball player uses a uniform to designate the team he plays for and to let the fans know who he is. The first pro baseball team, the Cincinnati Red Stockings, was named after the color of the players' socks (Gutman 29). The New York Yankees were the first team to put numbers on the back of their regular uniforms, beginning the era of baseball where the players on the team became more important than the team itself. The Yankees assigned uniform numbers to players based on the position they hit in the batting order. For example, Babe Ruth batted third in the Yankees lineup and was given the number three and Lou Gehrig batted fourth in the lineup, so he was given number four (Gutman 29). All of these early uniforms were made from wool because it was extremely durable. Because the uniforms were so durable, players would only need one or two jerseys throughout the course of a season, meaning that the wool

uniforms were fairly cost effective. The downside of the wool uniforms was they absorbed all of a player's sweat and were extremely heavy by the end of the game (Buckley 16). In the 1970's, synthetic fabrics were used in baseball uniforms, replacing the hot and heavy wool uniforms used until that time (Gutman 30). Uniforms worn by players today are lightweight and breathable because of these synthetic fabrics (Buckley 17).

In conclusion, the technology of baseball has improved significantly since 1884. Baseballs have gone from large, heavy, and mushy to spherical perfection in a cowhide casing. Bats have evolved from hand carved, thick handled heavyweights to lightweight, thin handled war clubs made by machine. Gloves have made the transition from bulky leather pillows with fingers to carefully crafted lightweight hand coverings with pockets perfectly formed for catching a baseball. Catcher's equipment has improved from the early days of heavy leather to lightweight, high impact plastic that provides maximum protection for the most dangerous position on the field today. Batting helmets have evolved to high impact polycarbonate alloy headgear as opposed to Bresnahan's air pillows of 1905. Finally, uniforms today are made of lightweight and breathable synthetic materials as opposed to heavy, hot wool used in the past. Because of all the advancements in the technology of baseball today, one can understand why balls are being hit farther, athletes are safer when they play, offensive and defensive records are being broken, and the game of baseball is more enjoyable to play and to watch.

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