

# Engineer Studies Preventing Stress On Basketball Backboards

By Bob Cairns—  
Over the years, the equipment used to play basketball has grown with the game. Today, a heat-treated, 18-inch metal rim bolted to a thick, shatter-resistant glass backboard stands were Dr. James Naismith's peach basket once hung.

So why are slam dunkers still shattering backboards and bending rims?

That's the problem Sorensen-Christian Industries, the nation's number one supplier of roll-in competition basketball backboards, took to Dr. Frank Hart, a N.C. State University mechanical engineer.

Hart's extensive research on the backboard and rim produced some unprecedented knowledge about dunk stress and how to prevent it from breaking glass boards.

The research also led to development of a new beefed-up basket called the "Gorilla Goal," a rim so resistant to stress that it may prove to be the basket of the future.

Breakaway baskets being used by many National Collegiate Athletic Association teams and the National Basketball Association are the current panacea for stress-related damage to backboards. But even these spring-loaded, hinged, collapsible rims, designed to give when hit with 230 pounds of force from a slam dunk, haven't ended all the devastation.

Most breakaways are constructed of the same metal as traditional baskets, so if players hang from them after the basket collapses, there's no guarantee against bending

or breaking. According to Hart, who is also NCSU's associate dean of engineering, the problems of bending and glass breakage aren't just affecting teams who play competition basketball. The country's public schools, playgrounds and recreation centers spend hundreds of thousands of dollars annually to replace standard metal baskets which have been dunked to death.

It is here that the research which resulted in the "Gorilla Goal" might best apply. Hart said that when high-strength goals are installed, a whole team of kids can hang from hoops and never bend them.

The research at NCSU was done in two phases. In phase one, Hart and his associates studied the metal rim. They tested it for weakness and found its stress level. Using what they learned, they were able to develop a high-strength goal which would perform in the same way as a traditional competition basket.

A computer model developed by NCSU engineers enabled them to simulate the metal rim and observe its reaction to the dynamic force of a slam dunk on a video screen.

"We gathered our data by loading calibrated weights at various positions around an actual competition basket rim.

## Obituaries

Continued From Page 2-A

Surviving are one son Billy Voliva of Miami, Florida, two sisters Mrs. Cassie Martin of Burlington and Mrs. Lina Welch of Edenton, four brothers Cedric Basnight of Fayetteville, Ben Basnight of Edenton, Thomas J. Basnight of Edenton and Bill Basnight of California. She is survived by two grandchildren.

Funeral services were held Friday at the Palms Memorial Park Funeral Home in Naranja, Florida.

## E. W. Downum

Mr. E. W. Downum, 74, of Beaufort, N.C. died on March 20 at Carteret County Hospital in Morehead City, N.C.

He was the retired founder and owner of E. W. Downum Department Store in Beaufort.

He is survived by his wife, Mrs. Nellie Chadwick Downum of Beaufort, two sons; Paul Downum of Raleigh and David Downum of Beaufort; and a daughter, Mrs. Barbara Willis of Beaufort.

He is also survived by two brothers; Dr. A. F. Downum of Edenton and E. R. Downum of Richmond, Va.; a sister Mrs. Lucille DeBerry of Rocky Mount, N.C. and eight grandchildren.

Funeral services were held at Ann Street Methodist Church on Wednesday, March 23. Burial followed in Beaufort Cemetery.

Obituary information provided by Williford-Barham Funeral Home.

## Lucy Hoffer

Mrs. Lucy Byrum Hoffer, 92, of Sunbury died at her home on March after a prolonged illness.

She was a former school teacher at Gates County Schools and also a former Post Mistress at the Sunbury Post Office. She was a member of Damascus Christian Church.

She was the wife of Willie H. Hoffer, deceased and the daughter of Mary Wiggins Byrum and Moses Byrum both also deceased.

She is survived by her two sons; Willie H. Hoffer, Jr., of Williamston and J. Willard Hoffer of Sunbury, three daughters; Miss Marie Hoffer of Sunbury, Miss Nell Hoffer of Sunbury and Mrs. Elizabeth Elmore of Edenton.

She is also survived by a brother, W. Graham Byrum of Sunbury and a sister Mrs. Mattie Roundtree of Suffolk, Va., four grandchildren, 12 great-grandchildren and one great-great-grand child.

Funeral services were held on March 23 at the Damascus Christian Church Cemetery with the Rev. Avery Brown presiding.

Obituary information provided by Twiford's Memorial Chapel of Elizabeth City.

"After removing each load, we measured the rim's ability to snap back to its original position," Hart said. "When a rim can no longer recoil, it is bent and permanently damaged."

When the test results were programmed, the researchers observed the video simulation of the rim, slowing the tape down, running it frame by frame until they discovered the breaking point.

A typical competition rim

(breakaways included) will support only 280 pounds of force. The new high-strength "Gorilla Goal" supports more than 800 pounds of dunkage, and without the hinges and extra hardware found on the breakaways, it looks and reacts like the baskets players have been shooting at for the past 40 years.

"The high-carbon, medium-phosphorous, low-magnesium mixture of metal combined by a special heat treatment gives the "Gorilla" all the right

stuff," says Roald Sorensen, president of Sorensen-Christian Enterprises, the Angier-based company marketing the new goal. "Three Dawkins could chin themselves simultaneously and the rim wouldn't bend."

In a second phase of the research, Hart and the NCSU engineers again employed the computer and video simulations to confirm their suspicions about glass boards and the role misalignment has been playing in their

breakage. "We programmed the video model to display a simulated board by sections, then watched different levels of force from dunk shots as they moved through the glass," Hart said. "When the force became so great that it reached the board's stress level, the glass shattered."

The model was then programmed to test the board while tipped at different angles. "Our suspicions were confirmed. If a glass board is

misaligned (one corner tipped slightly in or out), it is in a pre-stress condition and more likely to break when hit by dunk force," Hart said.

According to Sorensen, misaligned glass boards have even been known to shatter during the night, hours after a game has been played. The crowd leaves the gym, the heat goes down, the building freezes, and the board, still in a pre-stress condition, shatters to smithereens.

Results from the second phase of Harts research allow him to offer some advice on maintaining glass backboards, regardless of gym temperatures or the type of rim.

"When adjusting the bolts on your boards, tight isn't always right," he said. "All you need to do is use a level and make sure the board is perfectly perpendicular."

If it is, even slam dunkers like Dawkins are going to have a tough time breaking your board.

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