A MATTRESS INDUSTRY UPDATE

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Abstract

The invention of the mattress and its evolution has always presented opportunities for those ready to invest the time and resources. We will examine a brief history of the mattress industry, including the changes that caused the major challenges and how those challenges created opportunities. We will also examine the more recent challenges such as the CPSC's federal flammability standard 1633, pressure from increasing raw material prices and consumer desire for more environmental friendly products.

I believe early man was more concerned with survival then a comfortable night's sleep but I am sure sleeping on the cold hard ground soon resulted in creative ideas. Have you ever heard the saying, "adversity is the mother of innovation"? Archeological digs by Texas A & M professors Harry J. Shafer and Vaughn M. Bryant, uncovered one of these early innovations at Hinds Cave in SW Texas along the Pecos Canyon: a pit filled with sticks and grass to help provide warmth and comfort.

During this presentation I will cover the factors that influenced the types of sleeping systems used throughout history. I will discuss some of the mattress industries historical use of cotton, why it is not used as much today and what current factors may bring back a higher demand.

The sleeping pit may have been the beginning of the mattress evolution. To help keep pit filling materials cleaner and contained in one place sleeping pallets, early versions of mattresses, evolved. The pallets were made placing the pit filling materials between animal skins. The animal skins were eventually sewn together to form bags which were stuffed with grass, straw, animal hair, feathers or what ever else was readily available to create sleeping pallets. The skins were replaced by woven cloth, over stuffed and tufted.

The soft overstuffed mattress was fairly easy to make but required constant maintenance by the owner to maintain as the filling materials would pack and become dense and hard. Sanitation was also an issue. Ever heard of the saying "don't let the bed bugs bite"? It was not uncommon for new mattresses to be infested with these unwanted companions. In 1913, states like Indiana and Pennsylvania past sanitary mattress laws to protect public health. Soon most states had similar laws that governed the cleanliness of the mattress factory as well as the filling and upholstery materials that went into the mattress construction.

The inexpensive, sanitary, factory made, mattress was very popular and the industry was riding a bubble. By 1927, bedding shipments had reached $100 million. Boxsprings with ticking covers were still a new concept and only one was sold for every 15 mattresses sold. By 1929, bedding shipments topped $129 million. Business was great, but you know what happened in 1929. By 1935 mattress sales had dropped over 60% to a low of $49.7 million. The bedding industry then as it still is today was very sensitive to economic changes. People can easily delay replacing their bedding a few more years. Even today, on average, people only replace their mattresses every 12.5 years.

In the mid 1800's, the steel spring was developed and patented for use in furniture. The mattress innerspring was patented in 1871 by Heinrich Westphal. Fortunately for cotton industry it did not gain popularity for over 60 years and did not start to displace cotton as a core filling material for almost 80 years. One of the reasons the innerspring took so long to replace the over stuffed mattress was cost. This was the state of the art until the industrial revolution brought an explosion of steel products into most industries.

After WWII a flurry of patents were filed in different mattress designs and the innerspring unit finally started gaining market. Also, during the 1950's mattress manufacturers developed licensing groups like Sealy, Simmons, Spring Air and so on to name a few. In 1958, Simmons introduced the Queen and King sized mattresses to increase profit. These larger sizes had added very little to the raw material cost but allowed a substantial increase in margin. Today the Queen size is the most common size sold. Per ISPA, these two sizes have gained sales volume while the smaller sizes have lost volume over the past 6 years.

As mattresses got bigger they also got thicker. It is not unusual today to see a premium mattress that is over 20" thick. The all fiber filled mattresses lost popularity. They are being replaced by more resilient innerspring cores surrounded by flexible foams which were introduced into the mattress industry around 1958. Even a relatively thin innerspring core mattress today is around 12". The innerspring is around 6" so that the remaining 6" must be filled with something. Today, 80% of this filling is PU foam. The volume of flexible foam used in the United States today is 1.5 billion pounds and the mattress industry uses 1/3 to ½ of that volume. The volume of cotton which had almost 100% of the filling materials market for over thirty years, from the 1920's through the late 1950's, today is very little.

Through the 1960's most mattresses use quilted cotton topper panels, and fiber filling components were polyurethane (PU) foams, invented in the 1930 by Dr. Otto Bayer, began to replace the fiber products. PU foam still dominates the mattress market as a filling material. However, foam is becoming less attractive because of cost, safety and consumer desire for green sustainable products.

Foam prices which have been stable for the last 15 to 20 years have doubled in the last few years. Additionally, regulatory agencies world wide (Reach -European Organization regulating chemicals) are seeking to regulate the PU foam or foam additives such as bans on PBDE's chemical and other FR chemicals. The National Association of State Fire Marshalls (NASFM) requests the US Department of Transportation (DOT) to label foam and any products containing foam as hazardous to transport.

Besides the development of the innerspring and the introduction of flexible PU Foams what else is happening to influence the industry? The Flammable Fabrics Act was passed in 1953 to regulate the manufacture of highly flammable clothing under the authority of the Federal Trade Commission. In 1967, Congress amended the Flammable Fabrics Act (FFA) to expand its coverage to include interior furnishings as well as paper, plastic, foam and other materials used in wearing apparel and interior furnishings. Responsibility for administering the FFA was transferred to the CPSC when it was created in 1972. Under the FFA, CPSC can issue mandatory flammability standards. In 1973, CPSC adopts 16 CFR Part 1632, a federal mattress flammability regulation requiring mattresses made or sold in the United States to resist cigarettes ignition and recently, the State of California adopts TB 117, requiring the filling materials in upholstered furniture, including mattresses, to resist cigarettes and small open flames, such as matches and cigarette lighters. In many mattress designs PU foam preformed better than untreated cotton in these tests.

On July 1, 2007, the federal 16 CFR 1633 Mattress Flammability Act became effective in the United States. Unlike the previously discussed 1632 cigarette smolder test, the open-flame uses an aggressive dual burner flame assault designed to simulate residential fire on bedding set complete with sheets, pillows and comforters. Typical non-modified bedding sets subjected to this test reach flashover in 3 minutes. Flashover is defined as the temperature at which everything in the room spontaneously combusts. Although, there is no single answer to satisfy this test, flame resistant nonwoven barriers have proven effective.

A typical FR batting is 0.6 to 1.3 Oz per Square Foot (150 to 400 G/M^2) with the average being 1.0 OSF (300 G/M^2). As we saw earlier, the most common size of mattress sold in the US is the queen which is 60" wide x 80" long. Using a 1.0 OSF FR barrier applied below the ticking cover would require around 2 pounds for the quilt panels and around 1.5 pounds for the borders. Each foundation will use the same amount of FR barrier for the border as the mattress does.

To understand what this means in volume lets look at how many mattresses are sold in the US every year. According to ISPA, the US mattress industry sold 21.7 million mattresses and 18.5 million foundations. So that means that if each mattress and foundation were to use a 1.0 OSF FR barrier it would require over 100 million pounds to satisfy the need. If all the FR barriers for mattresses were made from cotton batting that could satisfy both mattress manufacturers and consumers for green natural products then that it would increase the demand for cotton in the United States.