Who Essay, Research Paper

LITERATURE OF REVIEW

WHY DO SKATEBOARDERS SHOES WEAR OUT SO FAST?

Through out skateboarding history a sand paper material known as grip tape has been glued to skateboard decks. This material made for gripping onto boards also destroys sneaker soles. Grip tape causes friction between sneakers and itself, while making a grip and facilitating control of the board. Pedaling wears out sneakers like walking, but at more accelerated rates; much higher than walking. Becoming more circwnspect, there is the factor of increased movement on the board such as turning your lead foot (generally for most people the left foot, unless they skate goofy foot) back and forth in between pedaling. With the grip tape being very granular and necessary for skateboarding, it constantly and easily scrapes away at rubber soles, making sneakers wear out faster than in any other sports or hobbies. With this problem of sneakers wearing out fast and being discarded, the skateboarder with limited financial resources suffers additionally from the losses.

WHY IS GRIP TAPE NECESSARY

The grip tape is needed for a skater to maintain control over the board by the means and the uses of friction, Unforttmately grip tape helps wear at the ollie area (an area of the shoe that is just behind a person’s smallest toe on the outer side of the foot) and the sole rapidly. Grip tape is necessary for street skating tricks (examples: ollies, kick flips, nose grinds and nollies) and ramp skating. If there was no grip tape vert skaters (skateboaders who skate on ramps) would lose control over their board easily, there by raising the risk of danger and serious accidents. Vert skating is already rather risky. Who needs more broken bones? Street skaters depend on their grip tape for special moves like rail sliding, when they must maintain a perfect balance and control of their board or they risk falling on their face or sliding down the rest of the rail on their groin area, OUCH!

IS KEVLAR THE ANSWER?

Kevlar, being an aramid fiber that on a weight-by-weight basis proves to be 5 times stronger than steel, makes for a possible answer. All though there are new aramid fibers that are stronger in certain criteria, Kevlar was chosen because of its vast popularity and product knowledge if the sneaker soles were to be marketed. Many snowboarding gloves are covered with Kevlar. This application relates to skateboarders since many of them snowboard in the winters and have product knowledge of the fiber. Other fibers that are also applicable for this situation are Akzo’s Arenka (aramid), Celanese’s Vectra (thermotropic copolyesters), Dart’s Xydar (thermotropic copolyesters), and Allied-Signal’s Spectra 900 (high modulus polyethylene).

HEAVY COMPETITION

A few years ago competition was so high between these companies that Allied-Signal filed a suit against DuPont in 1991, charging them with false advertising and illegally monopolizing the market. The issue was raised since the National Institute of Justice (NIJ), a branch of the Department of Justice raised their standards for bullet proof vests. The NIJ tested their current supplier’s (DuPont) product which was produced from Kevlar and Allied-Signals Spectra Shield which uses Spectra 900, with a nine-millimeter gun on a 30 degree angle, there were astonishing results: Less than 50 percent of the Kevlar vests passed, while 97 percent of the Spectra Shield vests did pass.

WHAT EXACTLY IS KEVLAR?

In the early 70’s DuPont introduced aramids under trade name of Kevlar and Kevlar 49, also fon-nerly known as Fiber B and PDR-49. These fibers and Kevlar 29 do not melt, for all practical purposes, other than at temperatures involving decomposition. They are nearly insoluble. Thus making conventional melt polymerization and melt spinning not feasible. Kevlar is made by the spinning of fibers from liquid crystals in a solution exhibiting a reduced viscosity, with increasing solids content as the solution becomes anisotropic. By drawing the materials at slightly elevated temperatures, the modulus (stiffness) may be increased from 59 to 124 GPA, the values for Kevlar and Kevlar 49. Kevlart melts at over 500 degrees Celsius, is exceptionally high in strength with a tenacity more than twice that of high strength nylon or polyester, and a very high modulus. The structures of these fibers are highly crystalline. Kevlar’s density of 1.44 g/cm cubed is among the highest for organics, while molecular weight of its PPTA (pphenyleneterephthalamide) molecules are considered rather low. Although some details of the crystal structure of Kevlar have been uncovered by x-rays, a comprehensive model does not exist. Recent studies of crystallites in Kevlar show that the crystallites are slightly misaligned due to the fiber axis, but can be oriented by a tensile load. Since Kevlar has low compressive strength, it can knot from compressive failure due to collapsed zones. Because Kevlar has a fibrillar structure, it splits axially over distant lengths, unlike most other high strength fibers that break straight across. To fracture the material, a crack must traverse over different planes. With fibrillar fracture, it makes cutting by machine tools or projectiles difficult. Thus making it excellent material to produce bullet proof vests and helmets. Unfortunately since Kevlar is a polymer held together by an amide bond, it is degraded by UV (ultraviolet) rays.

WHY THE Z PLANE IS THE WAY TO GO?

With an X, Y plane, the strength of the Kevlug relies on the breaking resistance of the fiber. Breaking strength for Kevlar is low because Kevlar filaments are small, thus making the X, Y plane a bad choice. With the Z plane, the polymers that would have been scraped away are left intact, making wear occur at a slower rate. With a Z plane, one wears the fiber out slower (something along the lines of molecule by molecule), like an eraser head would by erasing something, instead of tearing the eraser in half. With the Z plane you are trying to break inner polymer bonds.

WHY DOES KEVLAR ONLY MAKES A SMALL DIFFERENCE

WHEN BONDED TO RUBBER?

First, bonding a matrix fiber to a elastomer is very expensive. The rubber, wearing away faster than the Kevlar, causes filmnents of Kevlar to fall out, allowing the rubber to wear out reasonably fast. Unless the yarn is a continues string, the fibers will fall out. When doing this, each

sole would have to be impregnated separately, making for a much higher price. The impregnation only makes a slight difference in abrasion when compared to rubber alone. Kevlar would be a good choice when used to improve sfiffiess (using a simlar method that is used on tires) After the rubber wears away, one is just left with the cloth that would wear away quickly from abrasion.

PROBLEM STATEMENT

Through out skatboarding history, many skaters have had to throw out a new pair of sneakers within a month’s wear. This rapid disposal is due to abrassion with the grip tape. The grip tape is sand paper like material with an adhisive backing. The grip wears at two specific points rapidly. The two spots being, the ollie area, an area of the shoe that is just behind a person’s smallest toe on the outer side of the foot, and the outer sneaker sole. The ollie area is worn away when you do a basic move known as the ollie. When you ollie, the board will first begin to go verticle, then when you slide your foot up the board to begin to move the board horizontly to set your hieght. During the time when a person begins to move the board horizontally they wear away the leather, nylon, rubber, or cotton away a if they were brushing their shoes with sandpaper. Abrasion on the soles is produced from constant movement of the soles with either grip tape or the ground surface. With grip tape and most surfaces suitable for skateboarding being very granular or rough soles tend to wear like an eraser constantly in use, thus causes loss of rubber fillaments.

HYPOTHESIS

With my general knowledge of skateboarding and my new knowledge of Kevlar and Wearforce I beilieve they will make a suitable product for needs of skateboarding. I strongly believe this because overtime Kevlar has been proven to be a strong and durable material, and I do not believe DuPont would waste so much time on the Wearforce if it fails to do what they designed it for, abbrasion ressitance. With these factors into consideration I believe my experiments will succseed and flourish.

PROCEDURE

For the process of testing the Wearforce, Richard Gould (DuPont representative) and I decided on procedures. We finalized on using a Wyzenbek abrasion test and a Taber abrasion test. To ensure proper results, I planned to test the material in action during a skateboard activity.

During a Wyzenbek test a piece of 40 grit sand paper by motioning back and forth at 90 cycles a minute while the material being tested is pushed into the sandpaper. The sandpaper is pushed down by exactly four pounds of pressure, while six pounds of tension is being applied to the testing material. After every 1,000 cycles, the sandpaper is changed.

A Taber test, being less aggressive, only uses a pass or fail sitituation. If the material passes 5,000 cycles, then it passed, if not it fails. Instead of using sandpaper during the test as an abrasive, an abrasive spinnig wheel is used.

Being most simplistic of all I planned to go skateboarding with the Wearforce on the ollie area of my shoe. Duning my sesion, I performed the following moves, an oille and kickfllp. These tricks were reapeated to ensure satisfaction in the product.

MATERIALS

\* 40 grit sandpaper

\* Wearforce 9

sneaker leather

\* boot leather

Wyzenbek testing mahine

\* Taber testing machine

\* contact cement

\* skate shoes

\* skateboard

RESULTS

When the tests were selected, I had learned that my test planned for the Kevlar had already been performed, and failed, due to the factors of cost and little improvement in durability. Fortunately, my other tests were original. The Wearforce went from 15,000 to 20,000 cycles in the Wyzenbek test compared to sneaker leather’s 1,000 to 1,500 cycles, and boot leathees 2,000 to 5,000 cycles. In the Taber test, Wearforce passed with over 100,000 cycles. Lastly, from skateboarding with the Wearforce on my sneakers, it was learned that Wearforce is much more durable when compared to leather, and does not give off an unwanted grippy feel.

CONCLUSION

With the acquired results of Kevlar’s failure and Wearforce’s success, my hypothesis is simultaneously rejected and supported. Kevlar failed due to high cost and poor performance testing; where as, Wearforce succeeded in protecting the ollie area of a skate-boarding shoe at an economical cost without any drawbacks to the manufacturer.