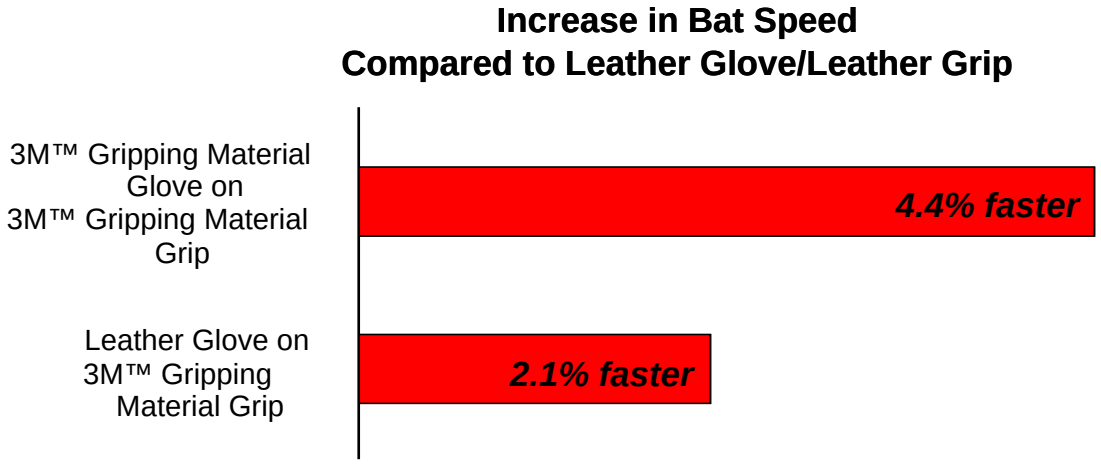
Research Confirms the Performance Benefits of 3M™ Gripping Material

A breakthrough study shows a significant performance improvement by athletes using 3M™ Gripping Material in baseball batting gloves and bat grips.

Until recently, academic research had not studied the effects of gloves and grips on athletic performance. Then in 2002, University of Minnesota Adjunct Professor Paul E. Cassidy, Ph D., led a 3M-sponsored study that looked at the performance of 19 NCAA Division II varsity baseball players at Concordia University in St. Paul, MN. Cassidy and co-author Emilie Carter investigated the impact of various combinations of gloves and grips on bat speed, grip exertion, and perceptions of grip force and grip friction.[1]

The study's authors found that players using batting gloves made with gripping material and a gripping material grip had a 4.4 percent increase in bat speed (compared to leather gloves and leather bat wraps). Using gripping material on a glove and gripping material on a bat grip created the greatest difference in bat speed—3.32 mph, from 75.4 to 78.7 mph—which "translates into a fly ball traveling 16.6 feet farther simply through the use of gripping material on batting gloves." The authors based this estimate on research conducted by Dr. Alan Nathan, PhD., whose work suggests that a 1 mph increase in bat speed can increase ball travel by as much as 5 feet.[2]



In addition, athletes using the gripping material glove perceived significantly better grip friction (compared to a leather glove) and a significant reduction in the grip force necessary to swing an aluminum baseball bat. With the gripping material system, players' perceived that their hand grip force during a swing was 11.1 (light), using the Borg Ratio of Perceived Exertion Scale 1; when they switched to a leather glove on a leather wrap, the perceived hand grip force went up to 13.5 (somewhat hard). Similarly, using the Borg CR10 Scale 2, the perceived degree of grip friction used during a swing was rated as 6.7 (slightly less than very strong) compared to 4.46 (somewhat strong) rating for a leather glove on leather wrap. (The Borg Ratio of Perceived Exertion is a method for measuring

perceived exertion and effort in physical work; the Borg CR10 Scale is a method for measuring most kinds of perceptions and experiences, including pain and also perceived exertion.)

A Better Grip Means a More Powerful Swing

In their interpretation of these results, the authors cited research suggesting that the hands and wrists apply negligible torque during the swing and, therefore, have a minimal effect on bat velocity[3]. However, they theorize, the perception of a firm grip allows an athlete to make "slight overall motor adjustments in speed, force, and temporal sequencing of thigh, trunk, and limb muscles…which lead directly to more efficient, controlled, powerful, and *faster* bat swings."

The study's authors added that the traditional leather glove/leather grip system does little to improve a player's grip. "Common materials, such as leather or synthetic leather used for bat grips and batting gloves, are durable hand protectors, largely aimed at reducing blisters resulting from strong shear forces, but they provide very little gripping advantage."

Other Studies Confirm Performance Benefits, Even Under Slippery Conditions

The Concordia study corroborates research on 3M™ Gripping Material at the University of Wisconsin-Madison[4] and studies conducted by 3M. Those studies focused on the material's performance under dry and slippery conditions.

In the Wisconsin study, subjects were asked to complete several tasks using bare hands on a metal handle and then against gloves made with gripping material with a gripping material covered handle. The tasks required a power grip and were considered to be representative of "numerous industrial and recreational activities." The results showed:

- A dramatic reduction in necessary grip force (compared to bare hands) when the material was used under dry conditions
- No increase in the force necessary to complete a load-transfer task after the gripping material had been saturated in oil
- A 56 percent reduction in average gripping force (compared to bare hands) when the material was used for a twisting task on an oil-saturated surface

The study concluded: "Application of the 3M™ Gripping Material would be a useful ergonomic intervention for reducing grip force in tasks involving frequent, sustained or forceful exertions, particularly when these tasks are performed under slippery conditions."

3M's internal studies show similar benefits under wet and dry conditions. Compared to a leather batting glove/leather grip, a leather glove/gripping material system shows a 43 percent improvement in friction. In fact, the leather glove/gripping material system has better friction under <u>wet</u> conditions than the leather glove/leather grip combination has under <u>dry</u> conditions. Even more impressive is the performance of the gripping material

glove/gripping material system, which shows a 270 percent improvement in friction over the traditional leather glove and leather grip.

References

1. Cassidy, P. E., & Carter, E. (2002). "The Effects of Leather and 3M Greptile[a] Baseball Bat Grips and Batting Gloves Upon Maximum Grip Force Exerted During Batting, Bat Speed, and Physically Perceived Grip Force Exerted and Grip Friction." Research conducted for 3M Corporation at the 3M Human Factors Research Laboratory & 3M Human Performance Research Laboratory.

2. Dr. Alan Nathan, PhD., " The Physics of Baseball" presentation. University of Illinois, 1999. http://www.npl.uiuc.edu/~a-nathan/pob/Parkland/sld001.htm

3. Adair, R.K (1994). The Physics of Baseball (2nd Ed). New York: Harper Collins

Watts, R.G. & Bahill, A.T. (2000). Keep Your Eye on the Ball: Curve Balls, Knuckleballs, and Fallacies of Baseball. New York: W.H. Freeman and Company.

4. Irwin, C., & Radwin, R.G. (2002). Effects of High-Friction Elastomeric Thermoplastic Material on Grip Force. 3M Private Report. Research conducted for 3M Corporation at the University of Wisconsin-Madison Department of Biomedical Engineering.