



## Engineering Students Design Composite Bracing System for the Virginia Tech Athletic Department

Steven Kyriakides, Materials Science and Engineering

Just three weeks after fracturing a bone in his forearm, the Hokies' star tailback, Cedric Humes, was able to return to his starting role with the help of materials science.

In October of 2005, prototype composite braces for ulna fractures were constructed by a unique alliance that included Virginia Tech's Athletics and Training Departments, Virginia Tech's College of Engineering, and the Virginia Tech/Wake Forest University School for Biomedical Engineering and Sciences (SBES). After Humes was injured during a game on October 8, Mike Goforth, team trainer for the VT football team, met several times with the senior-level MSE/ESM Biomaterials class taught through Virginia Tech's College of Engineering and the linked VT/WFU SBES. Dr. Brian Love, professor of Materials Science and Engineering and instructor of the class, challenged the students to design an alternate bracing system that was much stiffer than the current polypropylene-molded structures. Their findings were organized and distributed to the Athletic Department for future evaluations. Among the suggestions was a uniaxial polypropylene/carbon fiber composite sheeting made by the Fillauer Company of Chattanooga, Tennessee. Since this sheet was made from the same matrix as other bracing materials, it was feasible to mold prototypes using existing molding equipment.



Two prototypes were made, one as a bi-directional laminate and one as a uniaxial laminated composite. The resulting stiffness and strength of the laminated structures had not been fully evaluated by game time on October 27, but qualitative testing had shown that these structures were demonstrably stiffer than the current commercial devices already available. By the end of the season, Humes had played five games in six weeks with the brace, performing as though he had never been injured. The students involved were able to see the fruits of their efforts broadcast and recognized across the nation.

With this project being taken up within SBES, the goal is to share the results with trainers and students at Wake Forest. Hopefully, further bracing enhancements will evolve from the efforts of these undergraduate students.

*Special thanks go to Lynn Nystrom for her articles on the subject.*