

The Redesign of a Ski Plate to Reduce Knee Injuries

Team Members

Nikhil Bagadia, Department of Biomedical Engineering: Team Leader and Communications
Jason Berta, Department of Biomedical Engineering: BME Web Implementation Group (BWIG)
James Burke, Department of Mechanical Engineering: Interdepartmental Member, Project Guru
David Manthei, Department of Biomedical Engineering: BME Student Advisory Council, BSAC

Client

Dr. Ray Vanderby, Jr.

Advisors

Dr. Willis Tompkins
Mr. Mitchell Tyler

Reporting Period

Week 9: Thursday, November 1th through Wednesday, November 7th, 2001

Problem Statement

Over the past two decades, a number of advances in ski equipment technology have led to a significant decrease in the incidence of ski-related ankle and foot injuries. Unfortunately, a number of these same advances have led to an increase in the incidence of knee injuries.

The current design project seeks to redesign one of the components of the ski binding, the ski plate, in a manner that should lead to a reduction in ski-related knee injuries. This may be accomplished by designing a ski plate system that allows some degree of rotation, thereby transferring torque that would normally be placed on the knee, to the ski plate.

Restatement of Team Goals

- Work out some design kinks--continue w/ steps we took this week
- Quantify some knee data and start making decisions about limits--start correlating to ski
- Everyone watch safety video

Summary of Accomplishments

- Worked more on design issues
- Collected articles about knees and organizing them
- Started considering and analyzing the forces acting on the knee and how they will affect it

Statement of Team Goals

- Need to quantify knee data--find most important and consistent data and start correlating to binding
- Complete rapid prototyping tutorial
- Construct a crude tutorial to observe practicality of our new design idea for the mesoplate

Project Schedule

Week 3: Thursday, September 20th through Wednesday, September 26th, 2001

Maury Hull's articles, possibly contact; Review Vermont Study, possibly contact authors; Knee articles; Patent search; ME Shop;
Start crude modeling

Week 4: Thursday, September 27th through Wednesday, October 3th, 2001

Read all articles/patents; Contact necessary people; Continue modeling

Week 5: Thursday, October 4th through Wednesday, October 10th, 2001
Read all articles/patents; Continue modeling

Week 6: Thursday, October 11th through Wednesday, October 17th, 2001
Finalize general direction we wish to follow; Analyze mechanical design solutions; Try to start correlating forces that act on knees to ski-release tensions

Week 7: Thursday, October 18th through Wednesday, October 24th, 2001
Finalize general direction we wish to follow; Analyze mechanical design solutions; Continue correlating forces that act on knees to ski-release tensions

Week 8: Thursday, October 25th through Wednesday, October 31th, 2001
Finalize exact design; Start advanced modeling; Start Prototype

Week 9: Thursday, November 1th through Wednesday, November 7th, 2001
Finalize exact design; Continue advanced modeling; Continue Prototype

Week 10: Thursday, November 8th through Wednesday, November 14th, 2001
Continue advanced modeling; Continue Prototype

Week 11: Thursday, November 15th through Wednesday, November 21th, 2001
Continue advanced modeling; Continue Prototype

Week 12: Thursday, November 22th through Wednesday, November 28th, 2001
Eat loads of turkey, watch lots of football

Week 13: Thursday, November 29th through Wednesday, December 5th, 2001
Continue advanced modeling; Continue Prototype

Week 14: Thursday, December 6th through Wednesday, December 12th, 2001
Presentation/Paper/Final touches

Difficulties

Having trouble quantifying knee data and correlating to binding. Hopefully we'll get this down more this week.