

# **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 13:** Thursday, November 29th through Wednesday, December 5th, 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**

- Need to quantify knee data--find most important and consistent data and start correlating to binding
- Construct a crude prototype to observe practicality of a couple of our design ideas for the mesoplate
- Start writing final paper
- Start final presentation
- Schoof's logistics

## **Summary of Accomplishments**

- Met w/ client
- Have pretty much decided on final design
- Gathering more knee-forces data, generating FBDs
- Outlined paper
- Went to ME Shop a couple times to discuss design
- Spoke w/ professors about materials selection

## **Statement of Team Goals**

- End of the semester stuff: paper, presentation, tweak design
- Need to quantify knee data--find most important and consistent data and start correlating to binding
- Construct a crude prototype to observe practicality of a couple of our design ideas 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**

We met w/ Professor Vanderby this morning to discuss the next steps in the process. We may have to focus on just knowing the knee limits based on literature, and then see what forces, etc., applied to the binding will result in those limits being reached. We'd take it one variable at a time.