Talon Tech
White Paper

Innovating a 50-Year-Old Design to Protect Skiers

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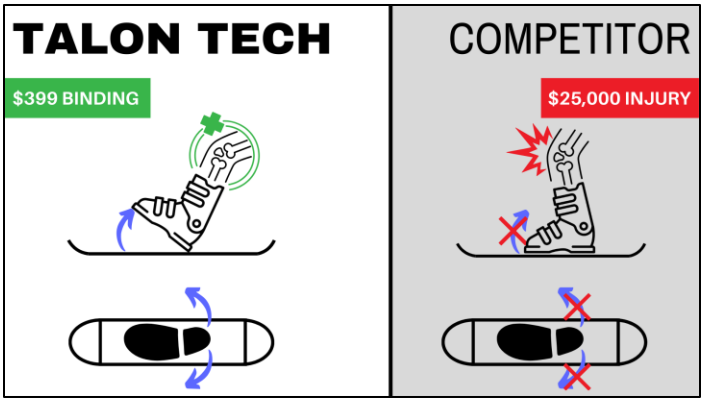
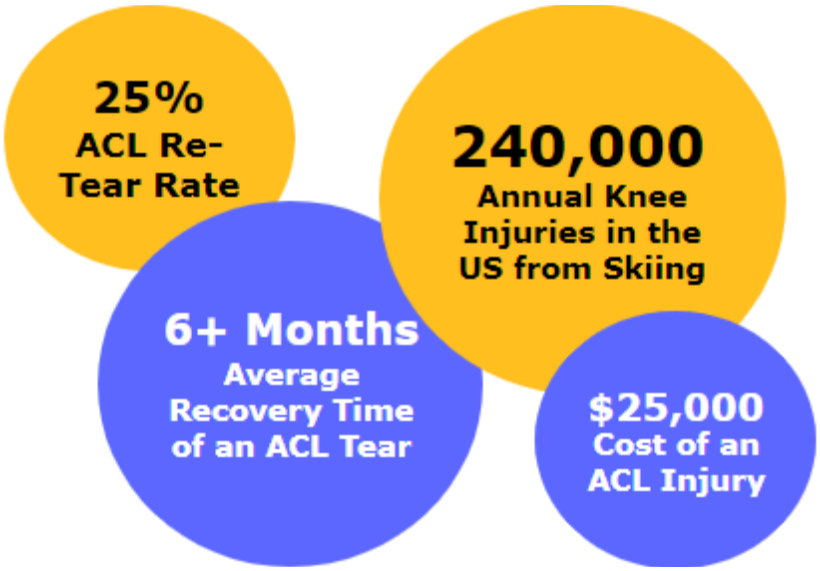
Engineering for Social Innovation - Team 42



Background and Motivation

Talon Techn is addressing a critical need within the alpine ski industry by proposing a paradigm shift in the standard ski binding design. Acknowledging the prevalent issue of knee injuries among skiers, our company has designed a ski binding that prioritizes the protection of skiers' knees. Our innovative approach incorporates horizontal and vertical release mechanisms in both the heel and toe pieces of the bindings.

Our own team member, Graham Miller, thought of this idea after his second time tearing his ACL in a rearward fall. This type of fall, accompanied by the backward twisting fall, claims victims every day of the ski season because industry standard ski bindings simply were not designed to address them. Talon Tech has innovated a solution to these types of falls, in addition to many other types, without losing the capabilities associated with normal ski bindings.



Design Overview

The binding itself is composed of two independently mounted components, including both a heel piece and toe piece, which grip the ski boot on either end, securing it to the ski. Unlike any other ski binding, both heel and toe pieces use two independently adjustable release mechanisms for both vertical and horizontal release directions, allowing the ski boot to be released in any fall direction. Each release mechanism shall have DIN adjustability ranging from a 4-10 rating. DIN ratings are international standards that dictate how hard it is for the boot to come out of the ski binding. The bindings will be manufactured out of forty percent glass filled Nylon six and stainless steel. These materials were chosen for their strength, corrosion resistance, and manufacturability. The parts made from nylon will be injection molded while the steel components will be primarily stamp cut and bent.

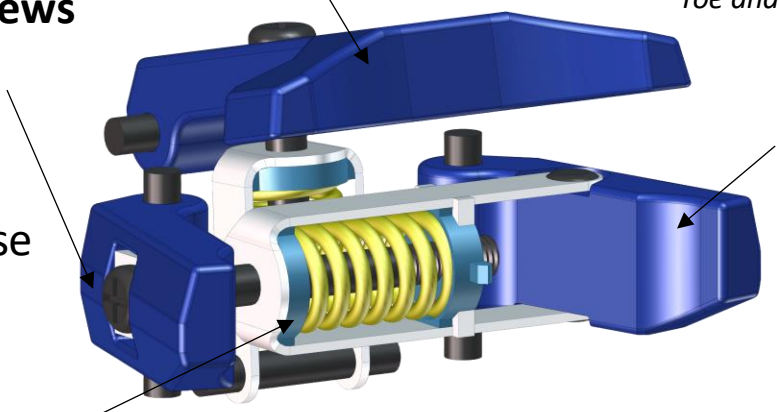
Vertical Release

- Injection Molded PA6 GF40
- Main Innovation
- Grips Top of Ski boot

Toe and Heel Piece Mounted on Skis

DIN Adjustment Screws

- Philips Head for Adjustability
- Hillside Washer Allows the Release to Pivot



Toe Piece Detailed View

Horizontal Releases

- Injection Molded PA6 GF40
- Grips Side of Ski Boot

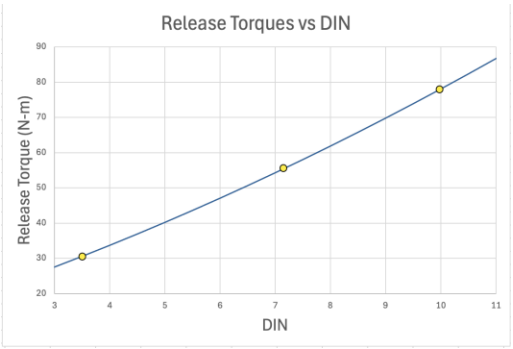
Release Spring Mechanisms

- Die Cast Steel Spring
- Stamped Stainless Steel C-Clamp
- Injection Molded PA6 GF40 Spring Guide and DIN Reader
- Generates the Gripping Force on the Ski Boot

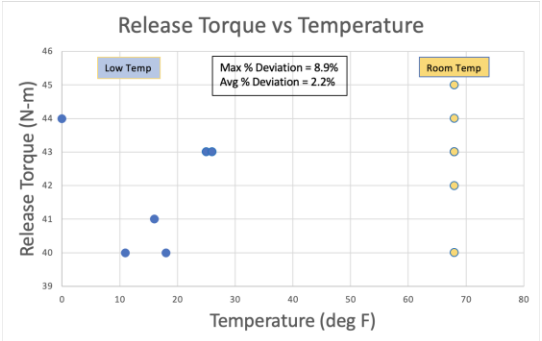
Manufacturing & Testing

Final Prototype

For our test article, we have elected to print our injection molded parts with an SLS printer. This allows us to test the design of the bindings without spending tens of thousands of dollars for molds. We will be using Nylon twelve to accommodate this shift in manufacturing methods. Nylon 12 is approximately three and a half times weaker than glass filled PA6, meaning that the design is viable if the SLS print passes.



Results from Release Torque Testing



Release Torque Testing Apparatus

To test the ski binding against ISO and ASTM standards for ski equipment, the team secured access to industry-standard testing equipment via multiple reputable ski retail and repair companies for confidential use with select staff. This testing ensured the product meets the standard release torques expected in industry per ASTM F-504. The results of this test show that our bindings have a DIN range of 3.5-10, which meets our goal.

Other tests that we performed were fatigue testing to confirm the lifespan of the bindings and temperature testing to ensure the product performance does not deviate more than 15% in cold temperatures. We also performed strength testing on the universal testing machine to ensure the bindings would not break under load.

Business Opportunity

Five Year Projection

Through numerous interviews with representatives from ski resorts and over a hundred and twenty-five surveys, our team has identified widespread interest in our product in various demographics of skiers. In this process, we identified ski resorts as our initial target market to assist them in mitigating patron knee injuries and take advantage of their marketing power.

Upfront investments will include supply chain setup fees and large-scale marketing projects. Our bindings cost $90 to make, and we will sell our bindings wholesale at $300. The retail price will be approximately $400. Our business model focuses on resort adoption and rentals in the first two years, followed by an online direct-to-consumer model in years three and four.

Talon Tech's leading competition do not measure up functionally, but have also struggled to reach the market effectively. The only proven method of introducing a new bending to the market, is through athlete sponsorship. Advanced skiers want to wear what the pros are wearing far more than they care what doctors have recommended it. We plan to take full advantage of this and our connections to the Free Ski World tour.

COMPETITION

	TALON TECH	KNEE BINDING	LOOK PIVOT	STANDARD BINDING
Standard Boot Compatability	✓	✓	✓	✓
Horizontal Heel Release	✓	✓	✓	✗
Full Adjustability	✓	✓	✗	✗
Vertical Toe Release	✓	✗	✗	✗

Competition Matrix

Conclusion

Our team consists of five mechanical engineering students augmented by two industry mentors proficient in injection molding and customer relations as well as several peer mentors from the Leeds School of Business. Over the past year, our team has dedicated countless hours to designing, manufacturing, and testing these bindings and building a robust business plan around them. We have successfully developed a working prototype and commenced rigorous function testing in line with ISO and ASTM industry standards. We are on our way to revolutionizing the skiing industry. Talon Tech invites you to come along for the ride and to ski safe, not slow.

Team

Joshua Beijer - *Logistics Manager*
Jace Aschbrenner - *Financial Manager*
Graham Miller - *CAD & Manufacturing Engineer*
Peter Arnold - *Project Manager*
Michael Dailey - *Systems and Test Engineer*