

**PRODUCT DEVELOPMENT CASE STUDY:
Developing a new product with an outside product development company while continuing
to focus on core competencies and revenue-generating activities**

Leardon Solutions

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Executive Summary

Leardon Solutions used their skills as a product development management and engineering company to develop and manufacture the Fin-Tec Step-In Heel for Bomber Industries (Silverthorne, CO). Leardon's management of off-shore designers and vendors allowed Bomber Industries to enter into this new product segment in under three months with the lowest possible development and tooling costs while keeping the Bomber's team focused on the quality and revenue from their core products.

Background

The Bomber Industries Fin-Tec Step-In Heels are an enclosed mechanism that attach to a standard snow board hard boot and allow the user to easily lock into and release from a snowboard plate binding. Figure 1 shows the Fin-Tec Step-In Heels. Bomber Industries purchased a similar step-in heel from another company in the past but due to the supply-chain lead-time, it became difficult to manage the purchasing and inventory of these products. Bomber's customers were also asking for a step-in heel design that were made specifically for Bomber's plate bindings and could hold up to the extreme use of the Bomber Industries customer.

Bomber Industries' management believed the only way to ensure a supply of step-in heels that met all their customer's demands was to design and fabricate their own unique product. Since their team was extremely small, the team had the task of ensuring that the current revenue stream was not interrupted and the quality of their current products remained high. Bomber Industries also had to ensure that the following product goals were met:

- *Product Features:* The goal was to make improvements over the product currently in the market but keep the same basic functionality. This included an improved cable design, a more rugged case design, and a replaceable heel pad.
- *Schedule and Time-to-Market:* Bomber Industries had to design the product and start production before the peak skiing season which was six months away.
- *Resources and Competencies:* Bomber's design team had limited experience in plastic part design and injection molding tools but had high capabilities in metal CNC machining, extrusions, and fasteners. There was no project funding to hire new engineers.
- *Investment Cost:* The plastic parts for this design required injection molding tools which require significant investment.

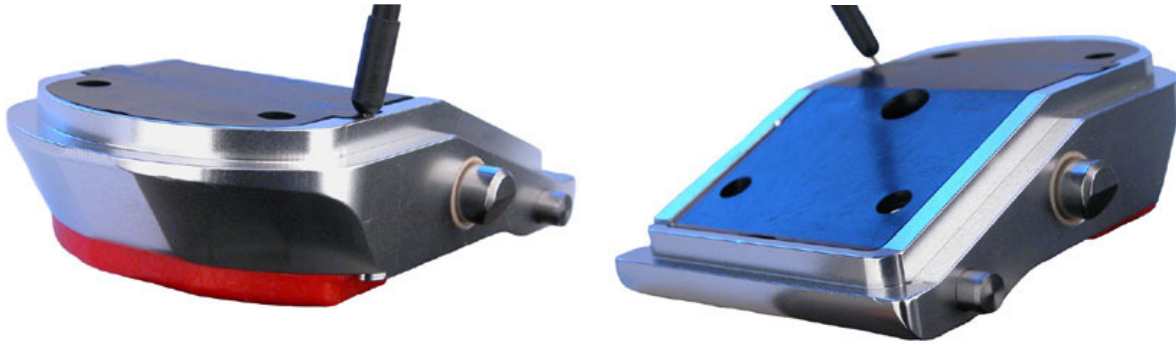


Figure 1: Front and back view of the Bomber Industries Fin-Tec Heel Assembly

Program Success

Bomber Industries began brainstorming with Leardon Solutions about the possibilities of the Step-In Heel after having worked together on three previous parts. The first action taken by Leardon Solutions was to prioritize the objectives of the program. The priorities of the Step-In Heel program were (1) Cost, (2) Schedule, and (3) Product Features with product quality being an all-encompassing objective. The second action taken was to review each of the program goals listed above and determine if there was a feasible path for each of them with respect to the program priorities.

Cost: The first concern and highest priority of the program was the overall cost. These costs included the non-recurring engineering costs (internal and external), the tooling investment costs, as well as the direct materials cost.

- The external non-recurring engineering costs needed to be minimized. Leardon Solutions achieved minimum engineering costs by utilizing their on-shore engineers to architect the product while using lower-cost off-shore engineers to detail out the design, generate solid models of the parts, and make 2D drawings of each part.
- Leardon Solutions and Bomber Industries worked together to keep the tooling investment costs to a minimum. This involved a two-pronged approach. First, Bomber Industries used their skills in metal part design, extrusions, and CNC machining to design an aluminum housing that did not require any injection molding tooling investment. Second, Leardon Solutions minimized the injection molding tooling costs by making multi-cavity family tools where two different parts are burned into the same mold base. These tools were fabricated in Taiwan where tooling is extremely cost competitive and high quality.
- The direct materials cost was kept low by leveraging Leardon Solutions' portfolio of Taiwan plastic, rubber, fastener, cable, and metal pin vendors. These vendors had been part of Leardon Solutions' vendor base for many years and have consistently proven they are capable of providing the highest quality parts at the lowest cost.

Schedule: The second program priority was schedule. It was imperative that Bomber Industries had the product ready for customer shipment in less than six months. Ski customers are unforgiving when it comes to having the product available when the ski season begins. A schedule was drafted to meet the required ship date while keeping the top priority of cost in mind. In the end, the Bomber Industries Step-In Heel was ready for production 10 weeks after the start of design. Some decisions that were made in order to take time out of the schedule included

- producing single-cavity injection molding tools,
- using off-shore engineers that have worked with Leardon Solutions many year in the past to provide around-the-clock engineering,
- using Leardon Solutions' off-shore vendors that have the ability to quickly produce samples and production parts,
- and logistics management of parts from Taiwan to Colorado where the Step-In Heels could be assembled as orders came in.

It took 10 weeks to get parts available for final assembly: 3 weeks of development and design; 4 weeks of plastic injection molding tool fabrication; 1 week to produce the first articles of the plastic parts, metal pins and springs, cables, and screws; 1 day to produce prototype step-in heels; and 1½ weeks to make minor modifications to the parts to meet the design specifications. In parallel with the modification stage, Bomber Industries performed actual performance testing and destructive margin testing. The performance testing occurred on ski slopes in the Southern Hemisphere while the margin testing occurred in the lab back in Colorado. This parallel testing was necessary to verify there were no design issues within the tight schedule deadlines.

Product Features: The final priority of the program was to integrate as many product features that fit within the cost and schedule constraints. Bomber Industries' customers were asking for design improvements over the existing step-in heels currently available. These improvements included an improved release cable design, a more rugged case design, and a replaceable heel pad. The design details are shown in Figure 2.

- The steel release cable on the existing product was slightly undersized which resulted in broken cables when the product was used incorrectly. Bomber Industries felt it was necessary to improve the design to improve the customer satisfaction. The steel cable diameter and bend radius was increased and to prevent breaking and fatigue. Final testing showed that the cable would hold up to large levels of forces and would not be the “weak link” in the design.
- The main case on the existing product was plastic and was perceived by customers as insufficient to keep up with the extreme demands of snow boarding. Leardon and Bomber improved the design by changing it to aluminum and modifying all the surrounding designs so that the plastic and metal parts worked properly with the metal housing and mechanism mounts.
- The heel pad on the bottom of the step-in heel wears over time since it is on the bottom of the boot. The existing product had the heel pad overmolded onto the plastic case which was not only an expensive solution but prevented replacement when the heel pad wore. Leardon and Bomber worked together to design a replaceable heel pad that held up to the customer demands. This required having the right heel hardness that minimized wear and a texture that prevented the customers from slipping on ice. Leardon worked with their off-shore plastics vendor to test many different hardness materials and settled on a Shore 98 thermoplastic polyurethane. Leardon also worked with the vendor to settle on a texture that would prevent the customers from slipping.

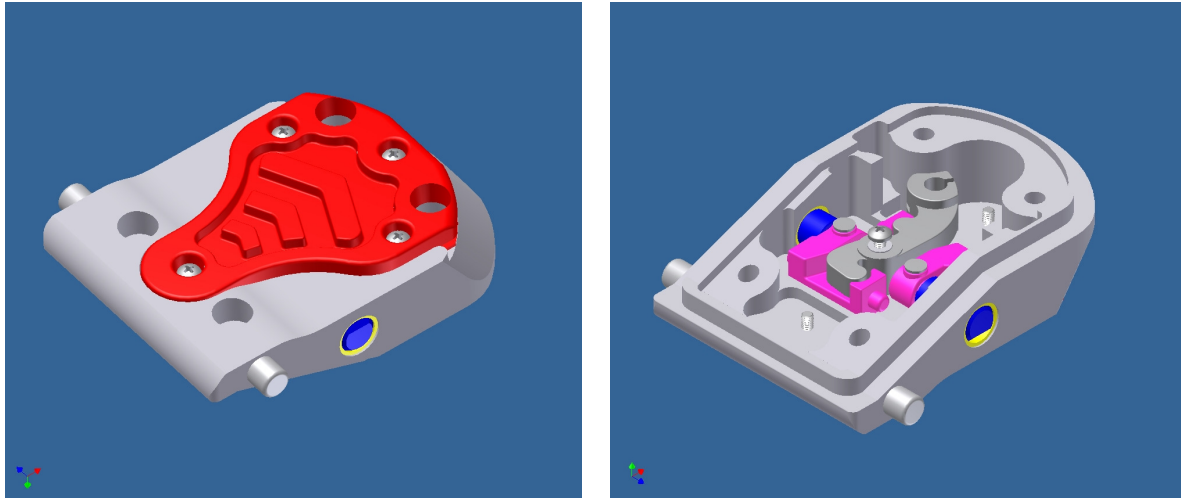


Figure 2: Top and bottom isometric views of the Bomber Industries Fin-Tec Heel

In summary, the benefits of using Leardon Solution included

- (1) No new engineering, manufacturing, or procurement resources were required at Bomber Industries.
- (2) Leardon Solutions' involvement allowed Bomber Industries to focus on their core revenue-generating business.
- (3) Leardon Solutions' program management developed the program priorities with Bomber Industries and always managed the program with these priorities in mind.
- (4) Leardon Solutions provided clear and concise communications throughout the program duration, never leaving Bomber Industries in the dark about the issues.
- (5) Leardon Solutions' U.S.-based team utilized off-shore contract design resources and manufacturing. The resulting engineering team had expertise in material selection, part design, plastic injection molding, tolerance analysis, and kinematic simulation.
- (6) Leardon Solutions managed production across multiple vendors with their Taiwan supply base.