



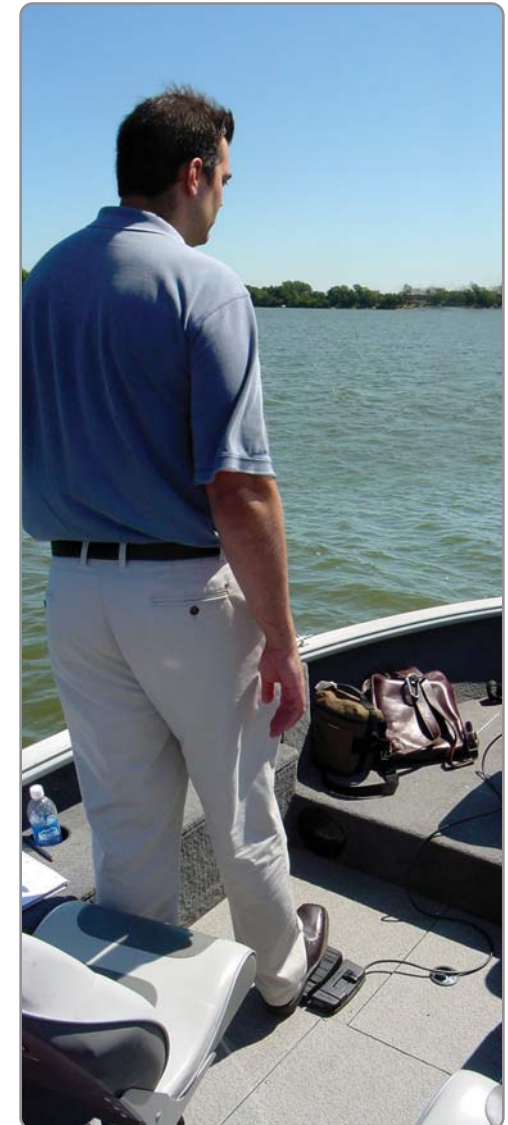
Minn Kota: Riptide SP Foot Pedal System

Minn Kota Foot Pedal - Project Brief

Project Introduction: After releasing their current trolling motor foot pedal, Minn Kota began hearing complaints about the product's design, namely in regards to the ergonomics and issues with dirt collecting inside the electronics areas. To resolve these issues, Minn Kota set out to offer two "sell-up" products to consumers. A new, corded and wireless foot pedal.

Current Product Orientation: Before starting any other phases of this project, it was obviously crucial to become familiar with the current product.

- *steering is controlled by applying pressure to the left or right upper corners of the steering pedal*
- *speed is controlled by moving the speed control switch up (increase speed) or down (decrease speed)*
- *acceleration mode is toggled by flipping the momentary/constant switch on or off*
- *in momentary mode, acceleration is controlled by applying pressure to the momentary pedal*



Minn Kota Foot Pedal - Current Product Research

Observational Research and User Interviews: Once there was a sufficient amount of familiarity with the product, interviews and “ride-alongs” were conducted with a variety of users. To get the best feedback, the volunteers ranged from those who had no experience with the product or boating in general to those who owned the product and had experience using it.

First-Timers and Beginners: By getting feedback from first time users, the initial reaction to the product as well as the beginnings phases of adaptation were observed

- *initial attempts to stand while operating the foot pedal were met with confused and unbalanced movements. complaints were made regarding the difficulty of balancing while standing on one foot while using the footpedal in “rocky” waters*
- *users were unsure how to perform essential maneuvers like turning a boat 180 degrees*
- *moving and turning at the same time while in momentary mode were often too difficult and the user adapted by pressing the controls individually*

Experienced Users: Observing owners and experienced fishermen provided an insight into how users would eventually adapt to the product to meet their needs

- *seated users would often sit on the edge of their seats in an uncomfortable posture to provide enough pressure to operate the controls*
- *smaller controls such as the speed control and momentary/constant switch were often operated by hand because of their size*
- *to enable them to sit comfortably, many users chose to position the pedal in their lap and operate the controls by hand.*
- *none of the experienced users operated the footpedal by “rolling” their foot as the product was intended*

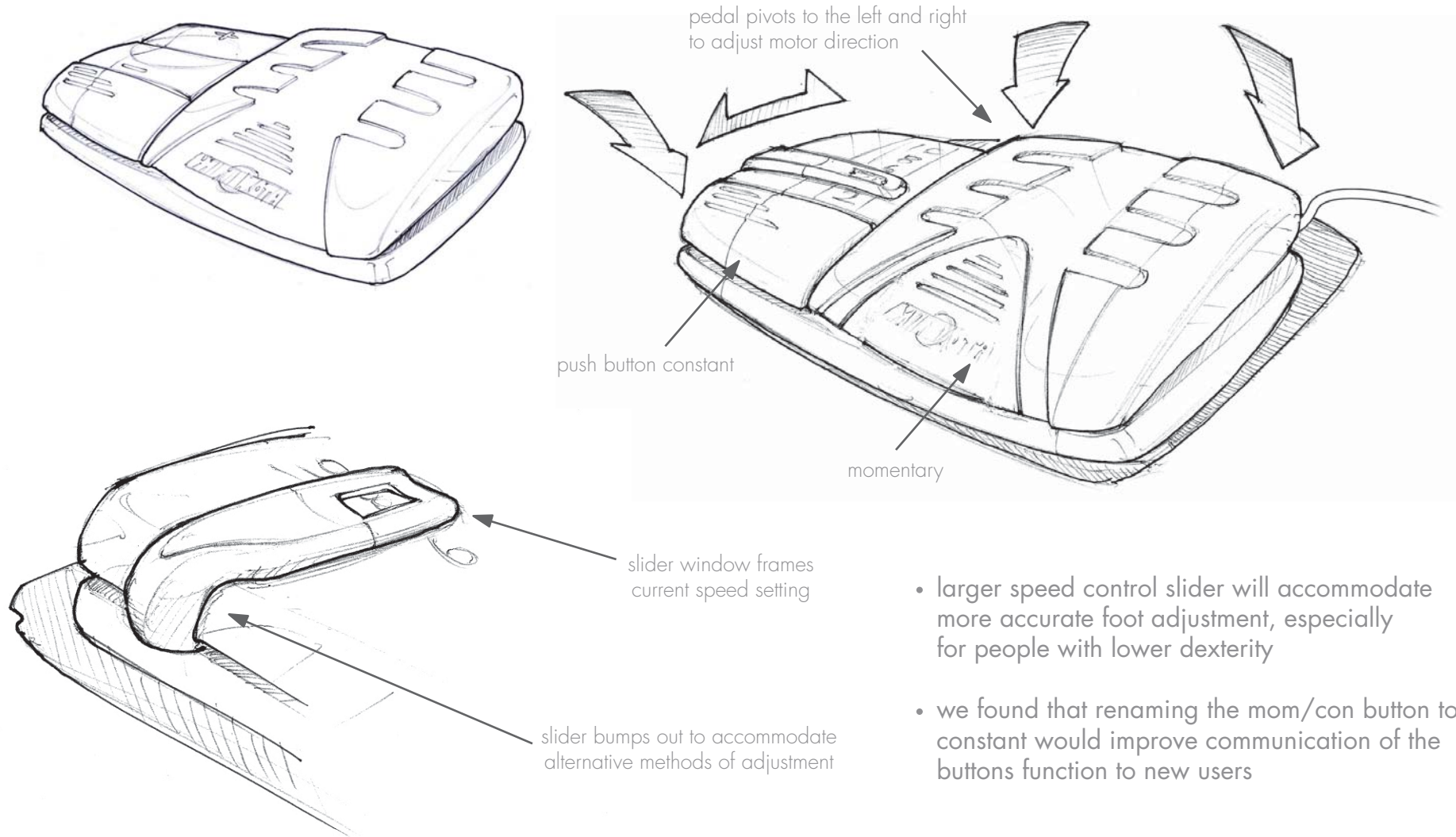


Minn Kota Foot Pedal - Initial Concept Sketches

Concept A: In an effort to offer a solution that coincided with Minn-Kota's current familiarities and manufacturing capabilities, Concept A was provided. Many of the concept's features provide easy solutions to the current models issues without stepping outside of Minn-Kota's current "comfort zone".

wireless version

corded version

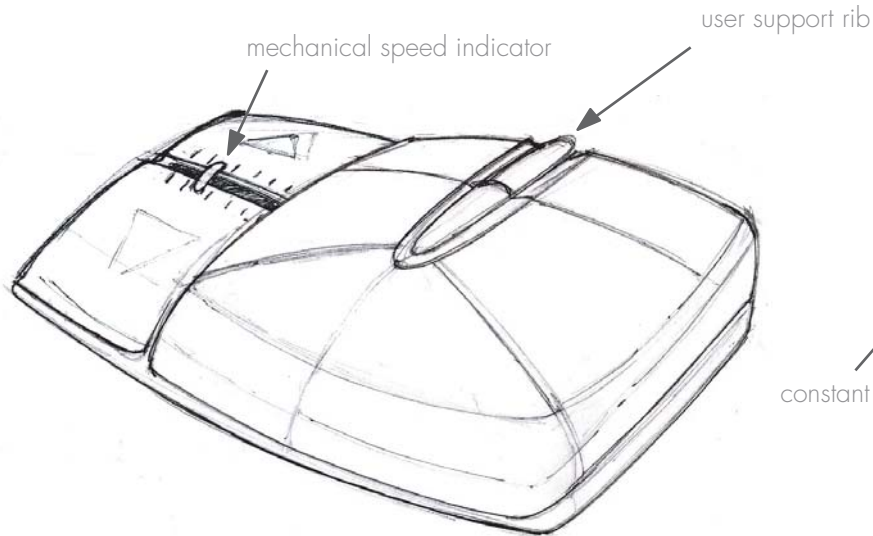


- larger speed control slider will accommodate more accurate foot adjustment, especially for people with lower dexterity
- we found that renaming the mom/con button to constant would improve communication of the buttons function to new users

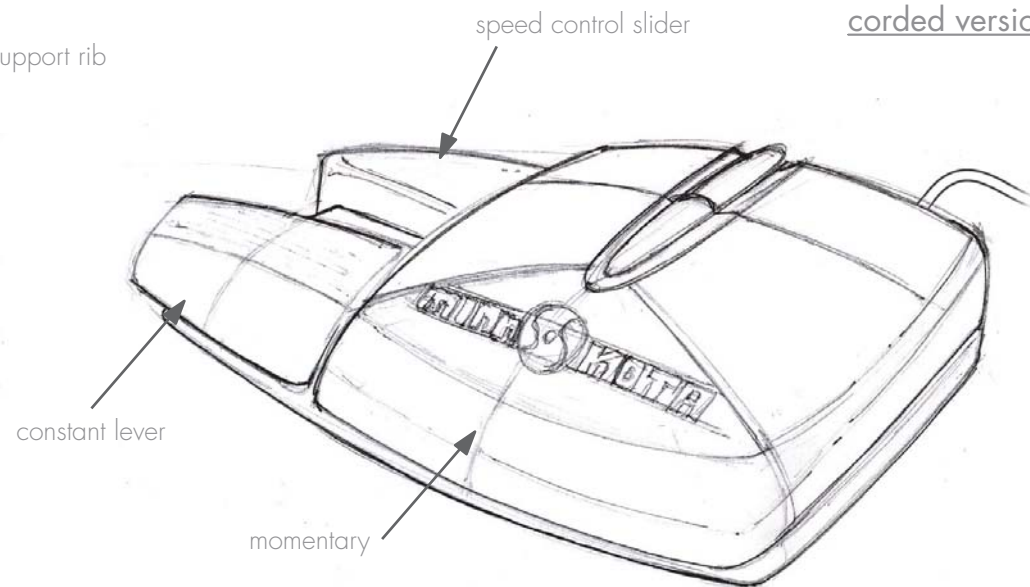
Minn Kota Foot Pedal - Initial Concept Sketches

Concept B: In a similar fashion to Concept A, Concept B aims to offer a solution that coincides with Minn-Kota's current capabilities. Also, building on their current control methods, the concept attempts to be more visually instructive on how to operate the footpedal by integrating a "support rib" that separates the directional controls to left and right.

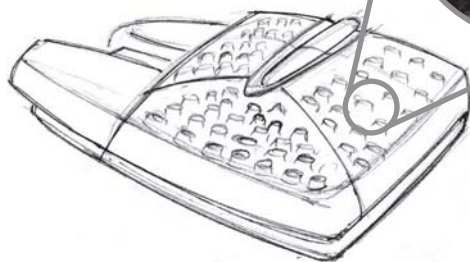
wireless version



corded version



- plastic or rubber fingers could be used to increase foot grip. rubber fingers would conform to individual users feet for added comfort

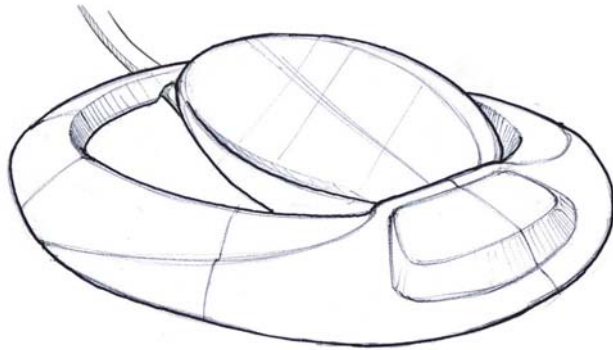


- the users foot could pivot over a fixed position rib to press left/right buttons
- the foot controls could have a rubber coating that would increase friction and help with adjustments when shoes are wet
- all controls could be increased in size and occupy the entire footprint of the product. the product could be made easier to use by raising the controls above all surrounding surfaces
- additional controls not integrated into the pedal could be displayed on the left side to accommodate more right handed users

Minn Kota Foot Pedal - Initial Concept Sketches

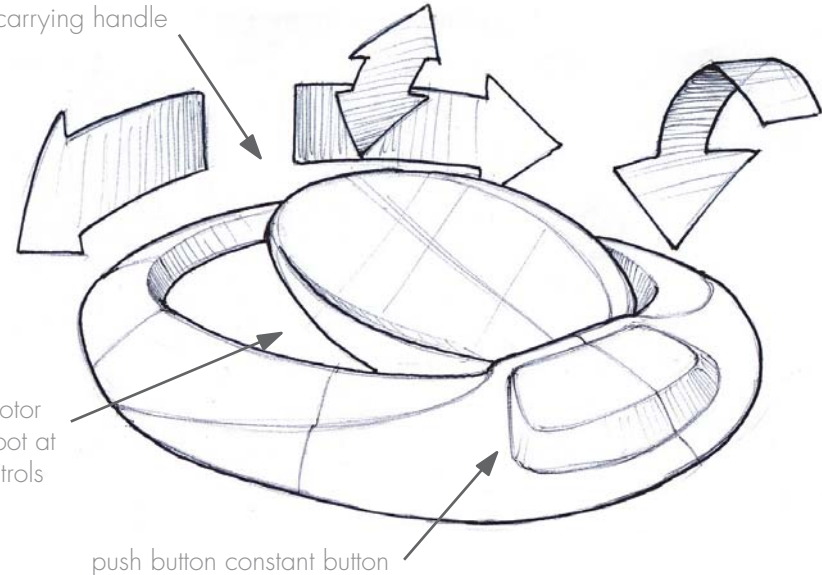
Concept C: The objective for Concept C was to combine findings from the user research sessions with products that consumers would already be familiar with. The concept of pressing down on the pedal to activate power as well as control speed was directly inspired by automotive transmission while the directional controls relate directly with where the user turns and wants to go.

corded version



front of base doubles
as a carrying handle

wireless version



user controls direction of motor
movement by pivoting their foot at
the heel, pushing down controls
the speed of the motor

push button constant button

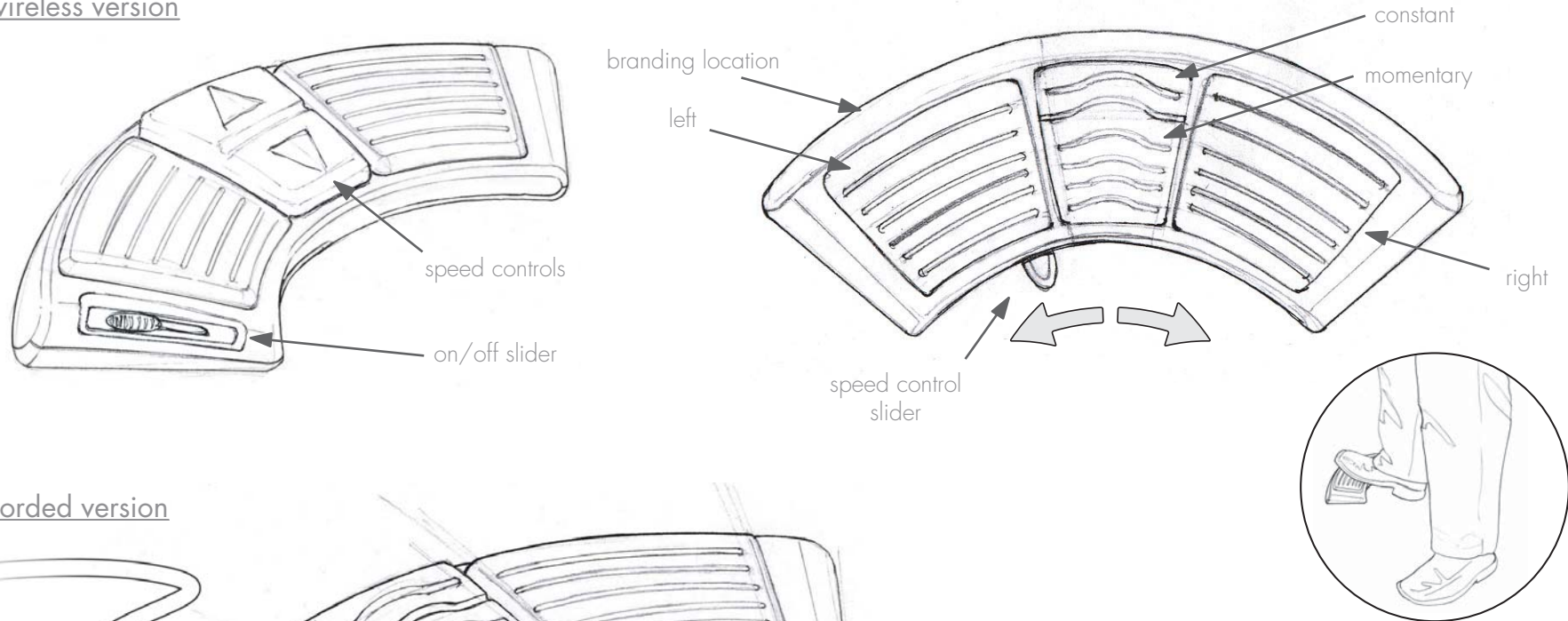


- low profile and easy portability allow for easier storage and more freedom
- visual buttons reduced to two, eliminating the guessing game of which button does what
- natural gas pedal action is more intuitive from the user's standpoint, allowing them to concentrate more on where they're going than on what to do to get there

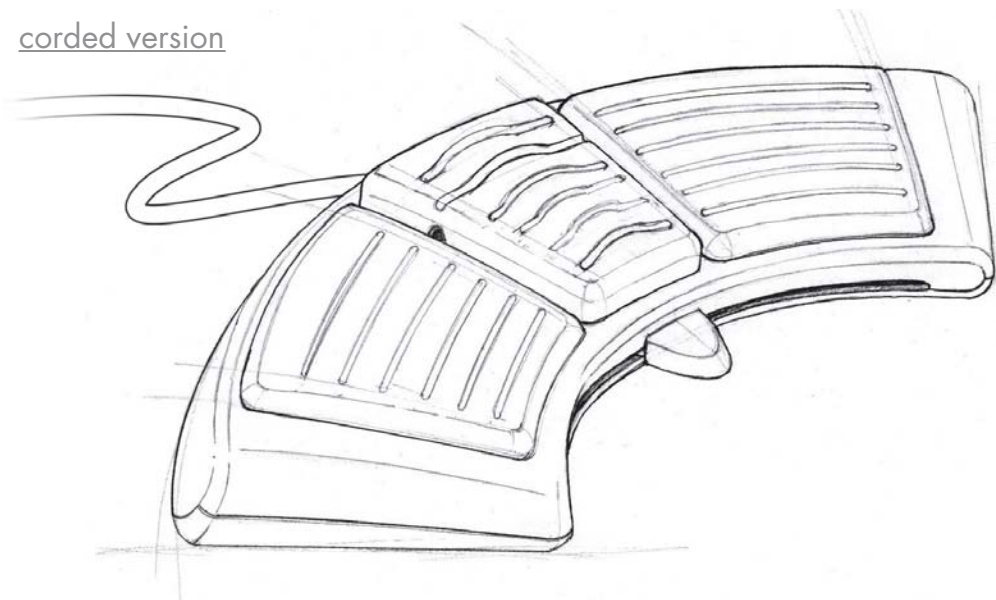
Minn Kota Foot Pedal - Initial Concept Sketches

Concept D: As opposed to the current style of twisting your foot to steer, the directional controls for Concept D take advantage of the observations noted in the research videos by providing directional buttons to apply pressure to. By working with the user's natural instincts this way, the pedal is ideal for novice and experienced users alike.

wireless version



corded version

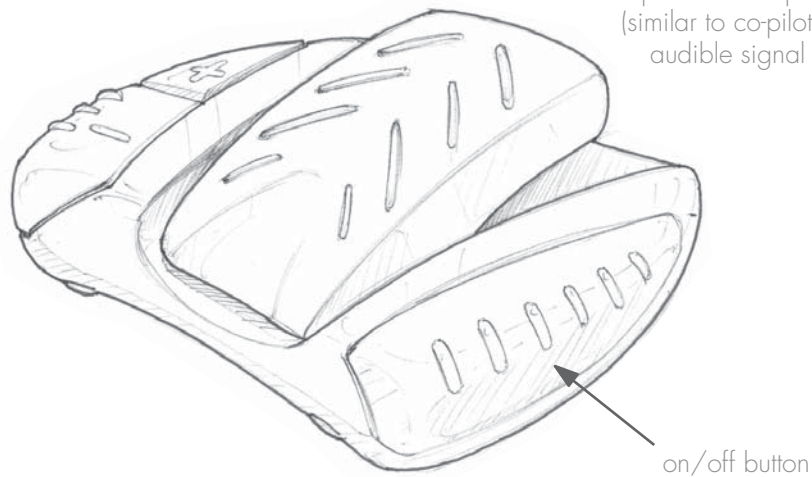


- momentary button is replaced with speed control buttons on the wireless version
- momentary button would be raised in order to help users orient their foot with out looking down
- once in operating stance, the user can easily jump from function to function without looking by pivoting their foot on their heel

Minn Kota Foot Pedal - Initial Concept Sketches

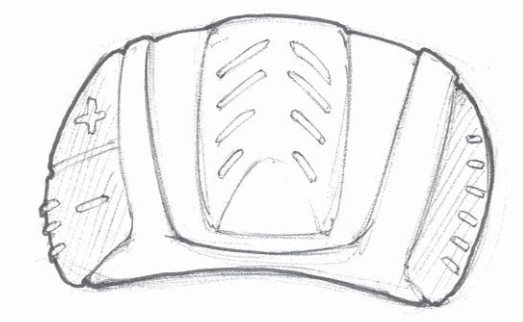
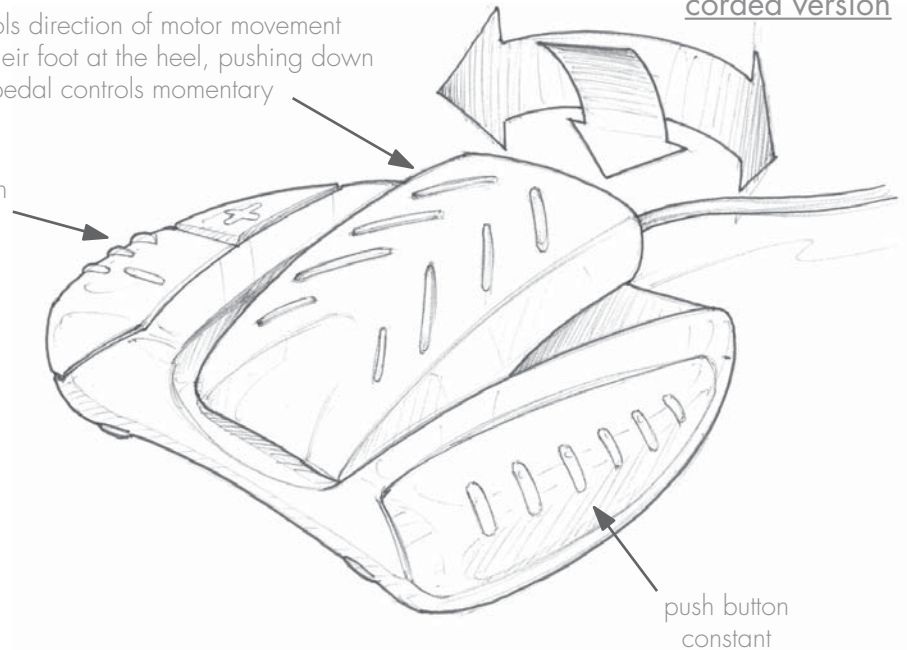
Concept E: In a similar approach as Concept C, Concept E attempts a marriage of the automotive footpedal style with the natural intuition of how users would control their direction by rotating their foot at the heel. Unlike Concept C, the overall aesthetics attempt to maintain the look and feel of the current product to maintain a similar brand DNA.

wireless version



user controls direction of motor movement by pivoting their foot at the heel, pushing down on pedal controls momentary

corded version

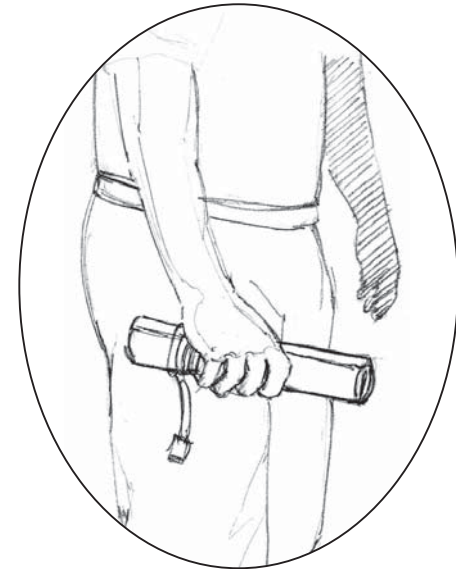
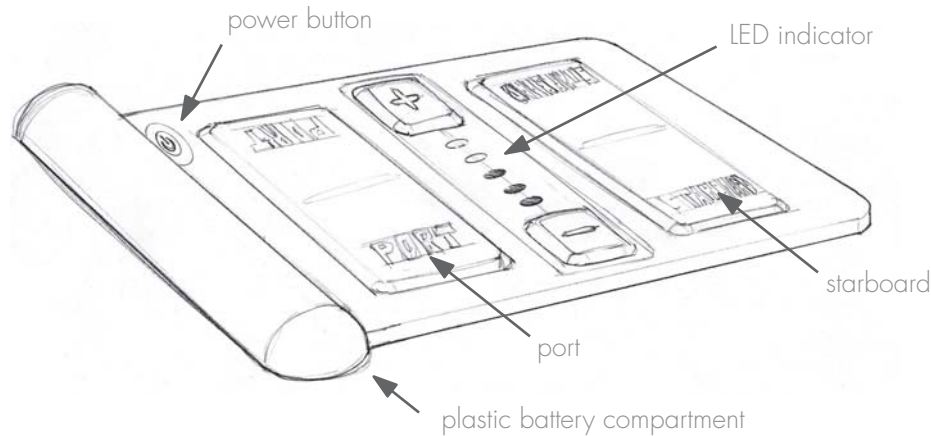


- rugged look and rounded corners improve perceived quality and durability of the product
- foot pedal coincides with natural movement of the body and creates a much more ergonomic solution to the existing problem brought on by the current product

Minn Kota Foot Pedal - Initial Concept Sketches

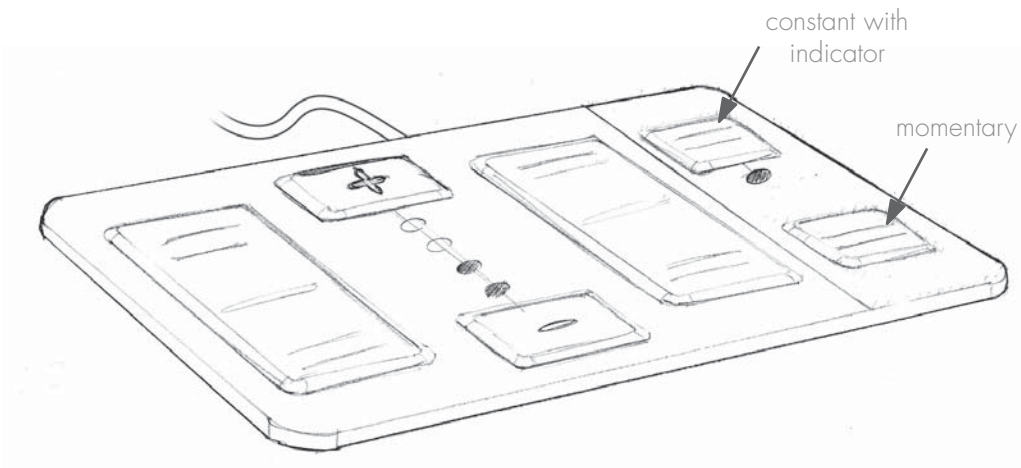
Concept F: As the most "outward-thinking" concept, F offer users a completely flexible, and therefore storage-friendly alternative to the current Minn Kota foot pedal. Being a flexible, water-proof membrane, Concept F eliminates the issues with dirt collection that the current product has while also removing mechanical parts and product cost.

wireless version



a membrane concept could roll up for storage.

corded version



- a membrane could help to satisfy users concerns of boat clutter
- a low profile design allows for the pedal to be approached from both front and back. however, the pedal legends could reference the boat, ex. left could be replaced with port

Minn Kota Foot Pedal - Initial Test Mock-Up

Rough Prototypes: In reaction to the research, rough mock-ups were created to supplement the initial concept sketches. These were used to help prove out certain ideas as well as being useful for understanding how users reacted and adapted to new concepts after having used the current product.

testing in office



user testing in field



user testing in field



Concepts Tested:

- Providing a stepping motion as opposed to a “rolling” motion of steering
- Pivoting the foot on a planted heel
- Overall step-on height and distance and button sizes

Observations and User Feedback:

- Intuitive power and directional controls
- Some users prefer the adjustable speed control lever on the current product as opposed to the proposed touch-sensitive speed controls shown in the concept
- Step-on height was tall for some as noted by their reaction to raise the heel when demonstrating how they thought they would power the motor in the concept

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testing in office



user testing in field



user testing in field



Concepts Tested:

- Power application controlled by providing downward pressure on the footpad
- Pivoting the foot on a pivoting axis point to control direction
- Controlling speed by applying various amounts of downward pressure on the footpad

Observations and User Feedback:

- Intuitive power and directional controls. "Would definitely be easier to swivel it [the footpad] than to push from side to side"
- Most positive reception when compared to all other options
- Able to maintain good balance during operation

Minn Kota Foot Pedal - Initial Test Mock-Up

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testing in office



user testing in field



user testing in field



Concepts Tested:

- Power application controlled by providing downward pressure on the footpad
- Pivoting the foot at the arch on a pivoting axis point
- Controlling speed by applying various amounts of downward pressure on the footpad
- Offering a reverse motion of power

Observations and User Feedback:

- Would like to a spring-loaded option that centers the downward direction of the pedal when force is not applied
- Some users prefer resistance to their downward pressure to provide a more incremental application of pressure
- Overall, users prefer this option to the current product

Minn Kota Foot Pedal - Initial Test Mock-Up

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testing in office



user testing in field



user testing in field



Concepts Tested:

- Providing a "ball-joint" pivot axis at the arch of the foot on a stationary platform
- Free-motion control and overall user interpretation
- Overall step-on height

Observations and User Feedback:

- Controls were "too free"
- Users were unsure how controls would work for momentary/constant
- Balance was difficult to maintain while using this concept
- Overall, this concept was not preferred to the current product

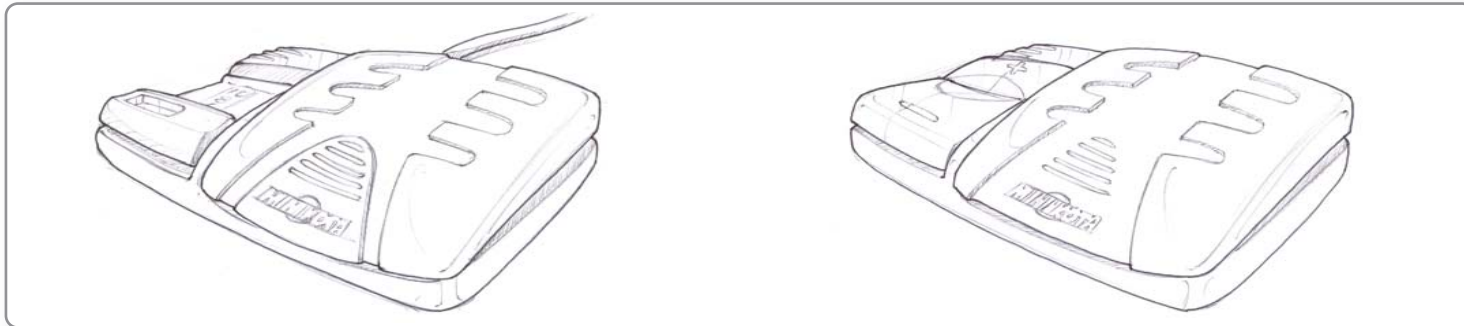
Minn Kota Foot Pedal - Refined Concept Sketches

Concept Refinements: Despite many positive remarks made towards the automotive-type footpedal concepts, decisions were made to adhere closely to Minn Kota's current capabilities. Concept A was chosen as the option that most closely resembled this and the overall aesthetic style that the client wanted to carry through the overall brand.

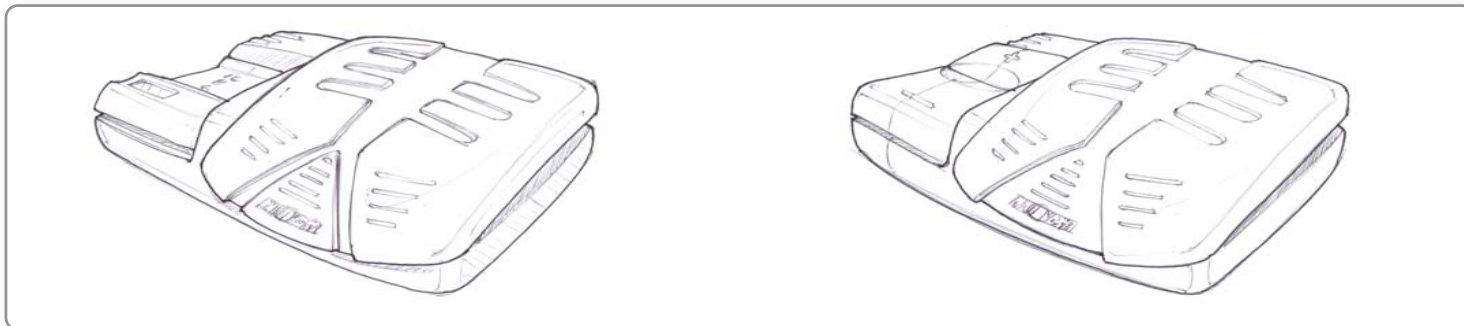
corded version

wireless version

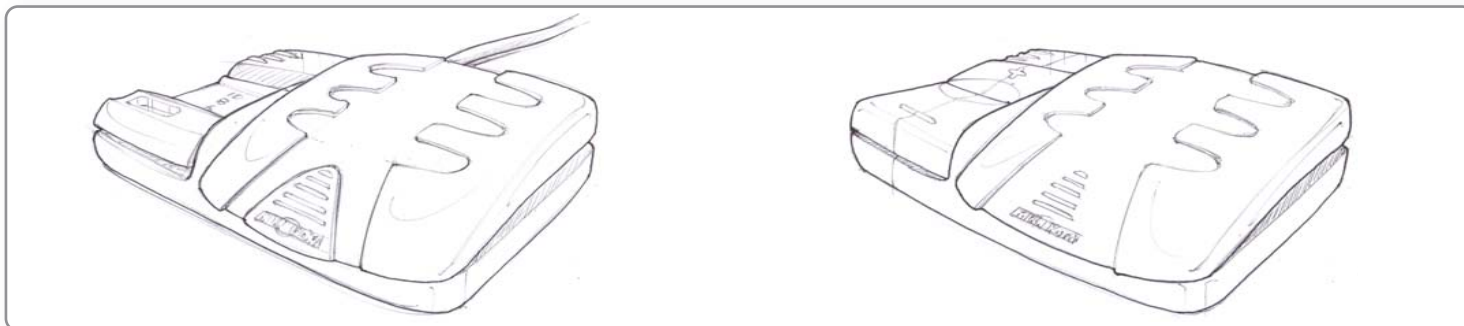
option A



option B

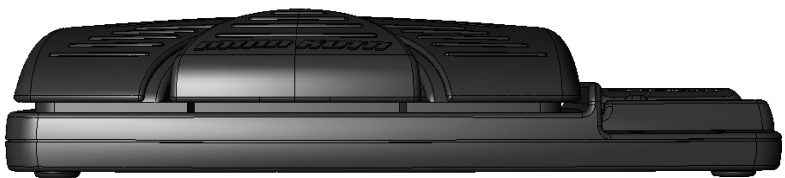


option C



Minn Kota Foot Pedal - Engineering and Surface Verification

CAD refinements: The final CAD work focused on refining smaller details and verifying the fit and finishes of all the necessary components of the product. From this data, SLA prototypes were created and tested to address any potential ergonomic issues before tooling was created.



Minn Kota Foot Pedal - Riptide SP Footpedal

Final Product: Now in the marketplace, the Riptide SP has been a highly successful after-market accessory for owners of current Minn Kota trolling motors who are looking to improve their current fishing experience. As an added bonus, the aggressive styling has helped improve perceived value and brand recognition.

corded version



wireless version



- "wheel assisted" speed control dial provides a larger surface to account for foot control
- smaller, central momentary button allows "step down" method of control in addition to traditional "side to side" methods
- a more aggressive foot pattern provides more traction while asserting a more dynamic brand DNA