ADJUSTABLE OFFSET BICYCLE SEAT ADAPTER & iPAd SCREEN REMOVAL FIXTURE

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ADJUSTABLE BIKE SEAT HISTORY

• Make multiple adjustments.
  • Allows cyclists to maintain their freedom to continue to riding

• Help people who experience discomfort riding a bike
  • Most affected are knee and hip replacements

• Reducing recovery time and continuing necessary rehabilitation
ADJUSTABLE OFFSET BICYCLE SEAT ADAPTER
HOW IT WORKS

Range of Motion

• Seat must slide forwards and backwards 6 inches
• Adapter will have the ability to tilt upwards and downward
• The seat will also be able to tilt upwards and downward
  • Allowing more comfort and seating positions
• Maintain a maximum weight of 300 lbs.
• Accommodate riders of all ages recovering from knee and hip replacements
• Easily attachable to existing seat post or a new seat post can be used with an adapter
GOALS

1) To create a functional prototype that meets proposed requirements.

2) The seat post should be durable and handle additional stresses from riding.

3) Must exceed the expectations for the design and its capabilities.
First draft of Solidworks Model

- Total weight ≈ 3 pounds.
  (If built of 1020 Steel weight ≈ 8 pounds)
- The main assembly consists of 3 parts
  - Main Body
    - Made of 6061 Aluminum
  - Rails
    - Made of 1020 Steel
    - Attach the adapter to the existing seat post
  - Seat Post Mount
    - Made of 6061 Aluminum
    - Attaches the seat post clamp to the body of the adapter.
ADJUSTABLE OFFSET BICYCLE SEAT ADAPTER

Seat Post Clamp

- Consist of 6 parts all made of 1020 steel.
  - Main body of the clamp - clamps to the adapter.
  - 2 inside clamps
  - 2 outside clamps
  - The inner bolt locks the seat to the clamp assembly.
- The seat post adapter uses ¼-20 hex nuts to secure clamps.
- Standard part for traditional pipe seat posts
ADJUSTABLE OFFSET BICYCLE SEAT ADAPTER

Issues

• The seat may be positioned too far in one direction on the adapter
  • If the seat is too far forward it is unbalanced
  • If the seat is too far back then it rubs your legs
• Body of the seat post must allow adequate spacing for the user.
  • Widening the ends and sides allows easy adjustability of the adapter.
• The seat post body must hold the maximum weight without flexure.
Finite Element Analysis
FINAL DESIGN
FINAL FEA ANALYSIS
MODIFICATIONS TO FINAL DESIGN

• Changes made to the adapter
  • Main Body
    • Removed fillets
    • Removed Chamfers
  • Seat Post Mount
    • Added a lip to the seat post mount
    • Shorten mount
    • Removed hole
  • Rails
    • Changed to stainless steel
MANUFACTURING PROCESS

• Body
  • Three step process
  • 90 minute machine time
  • Seat post mount was press fit
• Rails
  • Stainless steel
  • Press fit rods into the main body
Prototype (Final Product)
Bike Seat Adapter Positions
TESTING OF THE BIKE SEAT ADAPTER

• Design
  • Held the weight of the rider
  • Handled the Stresses of riding
  • Was very easy to attach and detach to and from the bike
  • Adjusting the adapter is very easy

• Issues that were resolved
  • The seat is now in the right place
  • The adapter can be flipped around

• Changes that need to be made
  • Rounding the front and back corners
## Timeline for Bike Seat Adapter

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<thead>
<tr>
<th>Task Mode</th>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
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<td>Mon 1/13/14</td>
<td>Fri 1/17/14</td>
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**Start Date:** January 13, 2014  
**End Date:** March 5, 2014
**Cost of Materials**

- **6061 Aluminum**
  - Mounting Block (2.5” x 2.5” x 8”)
  - Seat Post Mount (1/2” Diameter)
  - Cost = $53

- **1018 Steel**
  - Rods (1/4” Diameter)
  - Cost = $2

- **Seat Mount Clamp**
  - Use preassembled clamp

**Total: $55**
iPad Screen Removal Fixture
iPAD FIXTURE HISTORY

• iSurgeon approached NMU to create a better method for opening an iPad
  • Currently a heat gun is used and the process takes around an hour to perform

• Limited heat is required to melt adhesive edges
  • Maximum 250°F

• Spring loaded hinge is attached to suction cups
  • Automatic removal of cover
I Pad Fixture Goals

1) Functionality
   • Works with iSurgeon specifications
   • No internal components damaged

2) Construction Cost
   • Multiple products
   • Resale

3) Ease of use and longevity
   • Does not require training
   • Product lasts longer than the iPad
IPAD SCREEN REMOVAL FIXTURE

• Base
  • Aluminum plate with toggle clamp
• Hinge
  • Spring Hinge
• Cover
  • Aluminum plate with suction cups and heating element (NiChrome wire)
iPAD FIXTURE INITIAL DESIGN WITH FEA MODEL
**iPAD FIXTURE FINAL DESIGN**

- Manual removal of screen necessary due to mounting issues
- Iron type of setup
  - Place fixture on top of iPad and allow heating
- Fixture reaches 250 degrees in under 5 minutes
  - Reduced total application time
    - Total process a little over 6 minutes from one hour
iPAD FIXTURE FINAL DESIGN
## Cost of Materials

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<th>Item</th>
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<tr>
<td>Sheet Aluminum 6061 1/8” Plate 12x18</td>
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**TOTAL: $ 113**
Timeline for iPad Fixture

Start Date: February 3, 2014
End Date: April 4, 2014
SPECIAL THANKS

Bike Seat Adapter

Mr. Jack Gumaer

Mr. Mike Martin

Mr. Cale Polkinghorne

iPad Fixture

Mr. Seth Stephens

Mr. Cale Polkinghorne

Mr. Aron Waystedt
QUESTIONS?
Sources

http://web.resna.org/conference/proceedings/2005/Research/Other/Cooper.html
http://web.resna.org/conference/proceedings/2005/Research/Other/91/Figure4.jpg