One Handed Book Holder
DESIGN RATIONALE

Makers Making Change
A Neil Squire Program

Introduction

The One Handed Book Holder is an inexpensive 3D printed device that makes it easier to hold the pages of a book open with only one hand. Users with limited hand dexterity or use of only one hand my find this device beneficial.

Research

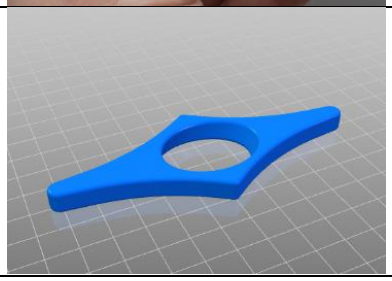
Commercial Designs

Title	Picture	Cost	Notes:
Music Book Clip		$10 - $20	This clip is placed between the pages of a book to keep it open while reading. Typically used for sheet music, cooking books or other books are held on the same page for extended periods of time.
Adjustable Book Holder		~$80	A stand that holds the pages of a book open with clips on either side. Reading height and angle can be adjusted.
Book Page Holder		$10 - $20	This device is placed on the user's thumb to spread apart the pages of a book while actively reading. As it's not fastened to the book, pages can still be turned easily. This is the style that will be investigated for this device.

One Handed Book Holder
DESIGN RATIONALE

Makers Making Change
A Neil Squire Program

DIY Designs

Title	Picture	Designer
One Handed Book Holder (Test 1)		Mathis
Page Holder (Test 2)		Myles Kreling
One Hand Book Holder (Test 3)		Daniel Gross
One Hand Book Holder V2 (Test 4)		Peter Lunk

Requirements

Goals

G01	Must make it easier for users to hold a book open with one hand.
G02	Must work or have options for right- and left-handed users.

Functional Requirements

F01	Must function with any standard sized book.
F02	Must not damage or markup the pages of the book.
F03	Must be comfortable for the user to use.
F04	Must function with hard and soft cover books.

One Handed Book Holder
DESIGN RATIONALE

Non-functional Requirement

NF01	Should not require supports.

Constraints

C01	Must be printable using PLA
C02	Must be printable using standard Maker 3D printers

Existing Device Testing

Test 1 – One Handed Book Holder

License: MyMiniFactory - Credit - Remix - Noncommercial

Mass: 7g

Print Time: 1h

Print Testing

- Must be rotated 90° to print flat.

Initial Print:

- Did not print well:
  - Fileted edges on the “arms” delaminated.
  - Area around the thumb hole didn’t adhere to the print bed.

Second Print:

- Added adhesion brim.
- Printed very well and smooth.
- Fileted edges on the “arms” printed well.

Functional Testing

- Fit nicely on the thumb.
- Good control over its position
- Did not mark the paper.
- Effective at holding the book pages open.

Summary

This device worked very well when the print settings were adjusted. It effectively held the pages open and did not mark up the paper. It was the thickest holder considered which gave additional control over its position on the page.

Test 2 – Page Holder

License: Attribution 4.0 International (CC BY 4.0)

Mass: 4g

Print Time: 30m.

Print Testing

- Printed very well.
- Surfaces are smooth.
- No supports or additional settings.

Functional Testing

- Fit very nicely on the thumb.
- Easy to position.
- Arms were on the short side.
- Left marks on the page.

Summary

This was the only device that had an oval thumb hole, making it fit and feel very nice. This also gave additional control over the positioning of the holder. However, it's arms were quite short and had minimal rounding where they contacted the pages. This caused the device to leave marks on the paper.

Test 3 – One Hand Book Holder

License: Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)

Mass: 5g

Print Time: 38m.

Print Testing

- Printed very well.
- No supports or additional settings.

Functional Testing

- Thumb hole is very small.
- Has long arms allowing It to effectively hold open the pages.
- No rounding making it uncomfortable and left deep marks on the paper.

Summary

The original design was intended to laser cut out of wood. The thumb hole was quite small, and the lack of edge rounding made it uncomfortable and left marks on the pages.

One Handed Book Holder
DESIGN RATIONALE

Test 4 – One Hand Book Holder V2

Mass: 6g

Print Time: 44m.

Print Testing

- Printed very well.
- No supports of additional settings.

Functional Testing

- Angled thumb hole so thumb can rest more naturally while reading.
- Thumb hole too large.
- Very hard to control and position.

Summary

A few commons left on various other designs had requested an angled thumb hole to allow for an alternative grab. However, this large, angled thumb hole along with it being the thinnest considered, made this design very difficult to position on the page.

Design Selection

Of the 4 designs considered, only the first one tested (Test 1 - One Handed Book Holder) met every design requirement. After making some simple adjustments to the print orientation and settings, it effectively printed, felt comfortable to use, successfully held pages open and left no marks on the paper. For these reasons, we will proceed using this design for the final device.

Opportunities for Improvement

- Adjustments to the fillets on the arms to increase the quality of the print.
- Refine the thickness of design to allow for adequate control while not covering too much of the page.