# Introduction

The Milk Carton Opener allows users with limited grip strength to open plastic 2L cartons such as the ones used for milk and juice.

# Research

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Picture | Price | Link |
| Commercial | | | |
| Tip Top Carton Opener |  | $7.99 USD | [Link](https://aidsforarthritis.com/products/tip-top-carton-opener) |
| DIY | | | |
| Milk Carton Opener |  | N/A | [Link](https://www.thingiverse.com/thing:4839483) |
| Milk Carton Opener |  | N/A | [Link](https://www.instructables.com/Milk-Carton-Opener/) |

# Requirements

## Goals

|  |  |
| --- | --- |
| G01 | Allow users with limited grip strength to open plastic milk cartons with twist off lids |

## Functional Requirements

|  |  |
| --- | --- |
| F01 | Work with both styles of plastic carton lids |
| F02 | Allow the lids to be removed with less force |
| F03 | Provide a better grip than the round lids of a carton |

## Constraints

|  |  |
| --- | --- |
| C01 | Must be entirely 3D printed |

# Milk Carton Opener V1.0

## Design

This version of the design consists of a single 3D printed component with an outer handle and two differently sized gripping surfaces. The outside handle portion is cylindrical with two elongated portions to provide a gripping portion for the user’s hands. The inner gripping portions of the aids are slightly conical with rounded ribs around the periphery to provide better engagement with the screw cap.

## Print Testing

This design was test printed on a Prusa MK3S in PLA filament without support. The print was successful, though the inner portion has a bit of an unsupported lip and printed with poorer quality.

## Functional Testing

The device was tested on a Chocolate Silk Almond milk carton, and was easily able to remove the lid of the carton.

## Opportunities for Improvement

* Replace fillets on surface that lies on print bed with chamfer or mixed chamfer-fillet to improve print quality.
* Reconfigure geometry of the inner lip so device prints without support