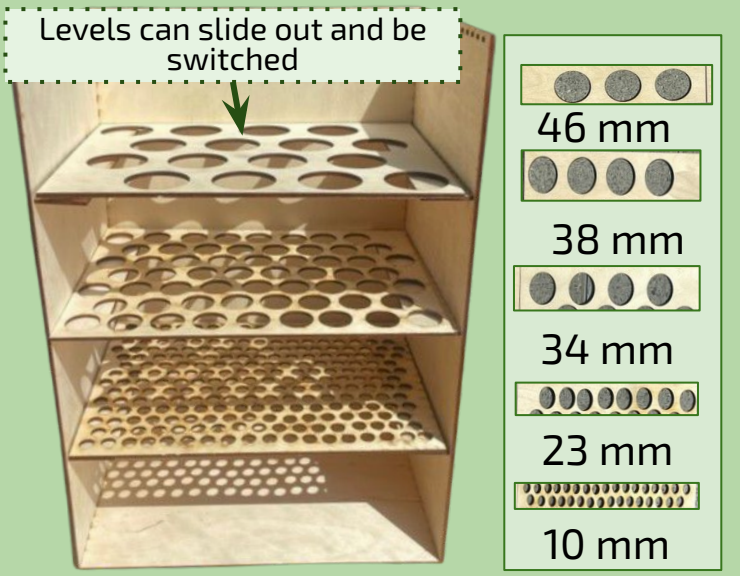
Less Chaos, More Construction

A LEGO Brick Sorting Solution - RFPF: Team 35

The LEGO collections owned by Adults Fans of LEGO (AFOLs) often contains thousands of pieces, making sorting a tedious task. We propose a LEGO sorting solution that can sort by size and colour, achieved through a two-step process. First, the **Level Sorter** sorts bricks by rough size, and then the **Slide and Sort** completes a finer sort by size or colour.

Cycle time (the time taken to sort a single brick) and **accuracy** are our most important requirements for the performance of our designs, as they reflect sorting efficiency. The standard set used for testing is the *LEGO Medium Creative Brick Box (484 pcs)*, representative of typical AFOL collections.

Level Sorter



Modeled after sieve mechanics

Description: Unsorted LEGO poured into the top, and fall through the plates. Bricks are separated by size. This is the **rough sorting** stage.

Design Accuracy: Passes ISO 3310:16, used in sieve verification.

- "Accuracy" is pass/fail in ISO 3310, his sorter meets the *accuracy* requirement for its intended sorting.
- **$\sqrt[4]{2}$ or $\sqrt{2}$** sieve scaling ratios, which match average AFOL brick sizes.

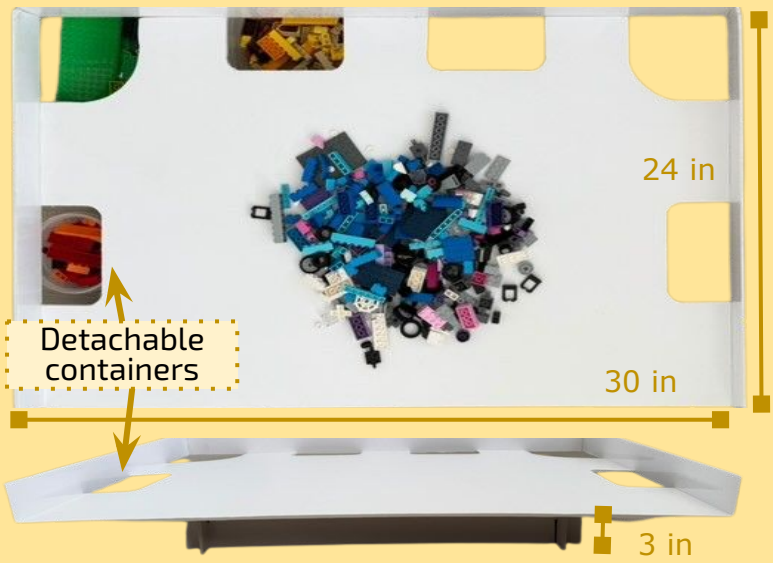
Design Cycle Time: **0.154 seconds/piece**

- Verified through ASTM standard sieving time verification.

Future steps:

1. Reduce friction by adding wheels to the base to decrease effort and cycle time
2. Add more levels between sieves, and test for a faster cycle time.

Slide and Sort



Aided manual sorting

Description: Place LEGOs on surface and slide into categorized holes with detachable collection containers. This is the **fine sorting** stage.

Design Accuracy: 99.1%

- **Containers** hold at least the volume of one level of the Level Sorter (≥4614 cm^3), height based on most ergonomic hand placement on the surface (3 in).
- **Holes** (all 170cm^2) each capable of holding the largest LEGO pieces from the stakeholder set.
- **Surface dimensions:** 24inx30in, determined from stakeholder input.

Design Cycle Time: 45% reduction in cycle time compared to unaided manual sorting.

- **87.25% improvement in musculoskeletal strain;** based on **Design for Ergonomics**.

Future steps:

1. Iterate hole sizes to maximize surface area and minimize cycle time.
2. Determine surface material with least friction against bricks to maximize cycle time.