

DUSS (Doorway Universal Sealing System)

Reusable Dust Barrier

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Motivation, Goal, Impact

- Current products are single use which is wasteful
- Tape style solutions pose a risk of damaging paint, trim, and finishes
- Discrepancy in doorframe sizes can lead to contractors needing to make a unique dust barrier for each situation
- Offer reusable components to reduce waste and downtime
- Offer a product that can fit into many doorframes
- Eliminate the use of tape
- Reduce waste
- Saves money in the long run
- Prevents damage

Requirements

- Reusable
- <5 minute install
- Fully fills and seals doorframes up to 36 inches
- Easy to install and remove
- Packs down to a transportable size
- Transparent barrier
- Method of egress



Final Design

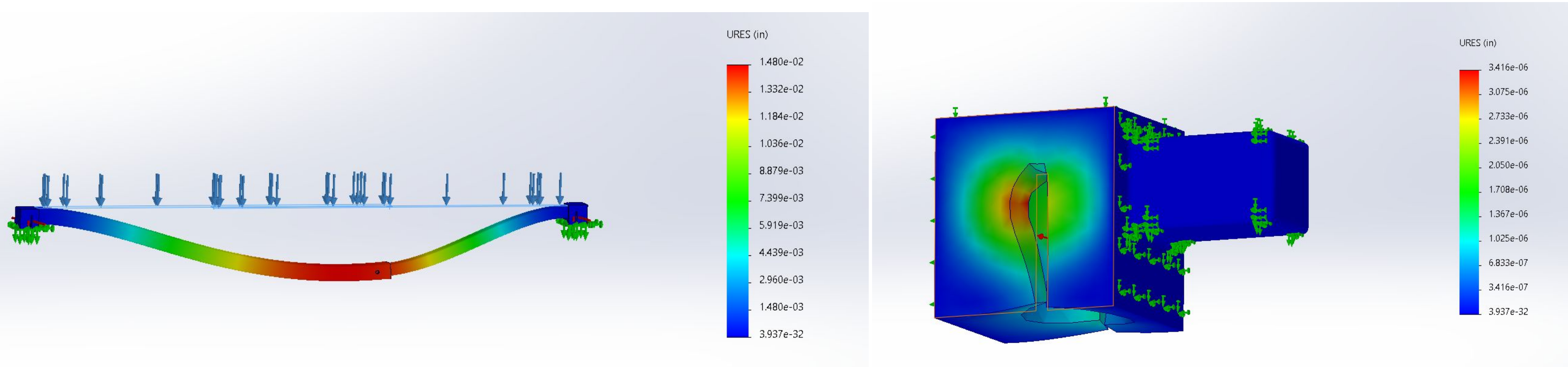
- Ditch the pre-manufactured tension bars and change to square tubing to achieve a better seal with the doorframe.
- Magnets will be sewn into the plastic barrier rather than using adhesive.
- Rubber will replace the weather stripping, so overall, the design will be more durable
- Friction-fit frame adjusts vertically (80-96 inches) and horizontally (28-40 in)
- In the future we would make varying sizes of plastic barrier sheets that include 32 in and 36 in, at various heights from 80 to 96 in.



Design Calculations & Decisions

- Zipper as method of egress - magnets were too weak
- Heat welded plastic - pockets for weighted socks at the base
- Tracked gasket - created continuous seal on frame, regardless of the position of the tension bars
- Knob on telescoping rod - keeps the telescoping rod rigid once it is set to desired length
- Tension bar and telescoping rod - friction-fit frame can be adjusted to account for different width and height between doorframes

$$P_{cr} = \frac{\pi^2 EI}{(KL)^2} \quad P_{cr} = \frac{\pi^2 (30 \cdot 10^6 \text{ psi})(0.01543 \text{ in}^4)}{(1 \cdot 96 \text{ in})^2} = \boxed{495.59 \text{ lb}}$$



Prototype & Test Results

We created a friction-fit frame system that is installed within an individual doorframe. This consists of 2 tension bars, 1 telescoping rod, 2 90-degree brackets, 2 weighted socks, and a plastic barrier with the method of egress installed. The prototype was able to be installed in 2:45 minutes. Through testing, we found that 133 lbf is the force the tension bars apply to the doorframe, which is enough to withstand common workplace forces.

