

Street Blade Assembly

For more information:

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What was the challenge you set out to solve?

The City of Clive replaces 1/10 of its street blades (street signs) annually. The most recent replacement includes 364 street blades. Before our new Assembly process was improved with a custom Rivet Press, an Operations Specialist would hit a drive rivet with a hammer until it was securely seated in the sign blade assembly. One assembly contains 8 rivets.

Using a hammer is suboptimal for the Operations Specialist and those around him for the following reasons, causing the need for improvement:

- Chance for “misses” exists with every hammer strike
- “Misses” can damage a sign’s reflective quality
- “Misses” can injure the Operations Specialist’s hand in short term
- Risk of repetitive hammering motion injuries with 8 rivets per assembly can injure the Operations Specialist in the long term
- Creates a noisy environment for everyone in the area and building
- Potential for hearing damage for Operations Specialist if noise level is at or above 85 decibels without earplugs or earmuffs
- Hammering rivets can sometimes cause situations where an off-set rivet needs removed. Removal requires the use of a drill and other equipment with additional and unique sets of safety issues. See photo collage entitled Issues.

In an effort to have a quiet, hammer-free assembly process, a search was performed to find a ready-made rivet press. All available prospective presses needed major modification to accommodate our signs and the average price was \$1600.

How did you develop and implement your solution?

Because of the necessary modification and price tag, our Operations Specialists collaboratively discussed the idea of fabricating a custom rivet press to accommodate the dimensions of our signs and improve the Street Blade Assembly process with the goal of increasing safety and decreasing environmental noise. After multiple iterations over roughly three weeks, staff arrived upon a satisfactory design. This was possible because of many factors, including highly talented staff with diverse skill sets, and comfort among staff to give immediate feedback, followed by a rapid response during the iterative refining portion of this process.

What did it take to make this solution a reality?

Labor: 34 hours of labor expended for fabrication, not design

Equipment:

- Wire welder
- Plasma cutter
- Grinder
- Band saw

Materials:

- Surface grip 2.5” round adhesive pad
- Magnetic parts tray, 4.25”
- Paint, found
- 1 - 4 x 4x ¼” Flat steel
- 1’ - 1” Round solid stock
- 3’ - 1” round tube
- 12’ - 2 x 2 square tube
- Spring



What was the cost of implementation?

\$126.66

What was the impact and results of your efforts?

- Quiet workplace for co-workers
- 100% preservation of intended standard reflectivity of sign
- Elimination of imprecision and related rivet removal issues
- Quiet working environment for everyone in building and area
- Operations Specialists benefit from increased safety and efficiency
- Decreasing the time spent on each assembly helps prevent mental and physical fatigue
- Once in motion, a hammer is difficult for an Operator to stop. Removing the hammer from the process eliminates the chance of hitting a thumb and having a repetitive motion injury.
- Conversely, our rivet press is under the Operator's control and was designed to stop at any point of its path, therefore no injury would occur with proper use
- The rivet press has a mechanical advantage that requires less force from the Operations Specialist, further reducing risk of injury. The rivet press also increases ergonomics with a lower work surface than the counter that was formerly used.
- Existing impact to unknown degree for noise level. The damage of impulse noise on hearing loss was found to be much more than that of continuous noise according to equal energy rule of dosimeter data according to <https://www.ncbi.nlm.nih.gov/pubmed/16329800> (National Center for Biotechnology Information)
- Counterweighted handle keeps passersby from injury
- **Name of Metric, Before, After**
 - Time spent on process (minutes), 3:04, 2:32 (17% faster)
 - Risk of injury, Possible with every swing of a hammer and also possible with a drill when dealing with mis-hammered rivets, 0% with proper use
 - Noise impact, 119 dB and disruptive to everyone during the process and impact noise damaging to Operations Specialist at or above 85 dB, 6 dB and noise is undetectable against background noise of the shop
 - % Reflectivity lost/damage to sign, Risk with every swing of the hammer, 0%

Video Link:

https://youtu.be/FHa3h_FutLA

Video by City of Clive/Pete DeKock

