2020 INNOVATION CHAMPIONS CONTEST

(formerly You Show Us Contest)

Motor Grader Step

COUNTY: Golden Valley Highway Department

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PROBLEM STATEMENT:
Reaching the motor grader engine from ground level was a challenge for most operators. Not only is the engine compartment on this large equipment quite high above the ground, but the operators have to also reach across the rear fenders, making access even more difficult. The walkway behind the tandem wheels and fenders is narrow and climbing up on it is cumbersome. It is also unsafe when snow and ice builds up in the winter. Consequently, operators cannot easily reach the dip sticks to check fluid levels daily or add fluids.

SOLUTION: Designed and fabricated a motor grader step which gives operators easy access from the ground level to the engine compartment when checking fluid levels or adding fluid. This activity is done, at a minimum, daily. The step not only improves safety for the operators, but it is a very efficient add-on to the motor grader. The step is attached to the channel iron between the tandem axles. A bolt and nut attach the step to the channel iron. This same bolt with round pipe acts as a hinge and enables the step to pivot up and down. The bolt inserted just behind pivot bolt is used as a stop to prevent the step from pivoting under the fender. The expanded metal for the tread plate was used on the step platform to provide better grip for footing. When the operator is finished checking fluid levels or adding fluid, the step can be flipped up, then secured with a tarp strap so that it is out of the way.

LABOR, EQUIPMENT, AND MATERIAL:

Equipment/tools used:
Metal cutting bandsaw
AC arc welder
Drill

Materials:
Salvage material:
1 – 19” x 3/8” x 1-1/2” flat iron
1 – 4” x 2” x 6” box iron
1 – 2-¼” x 3/8” x 1-½” flat iron
1 – 2-1/2” x ½” I.D. schedule 80 round pipe
1 – 4” x 5” ¾” expanded metal for tread plate
2 – ½” x 4” bolts with lock nuts
1 – 12” tarp strap to secure step in place when not in use (optional)

Labor Hours: *(Note: includes time needed for designed and discussion)*
2 persons initially worked on design
1 person - finalized design, fabricated, and installed
Design: 2-3 hours
Fabrication and installation: 2-3 hours
Total: 4-6 hours

COST SUMMARY: (cost of salvage material when initially purchased)
1 – 19” x 3/8” x 1-1/2” flat iron……$2.98
1 – 2-¼” x 3/8” x 1-½” flat iron……$0.39
1 – 4” x 2” x 6” box iron……$4.29
1 – 2-1/2” x ½” I.D. schedule 80 round pipe….$0.41
1 – 4” x 5” ¾” expanded metal for tread plate..$0.48
2 – ½” x 4” bolts with lock nuts……$0.90
Total Cost: $9.45 plus labor

SAVINGS AND BENEFITS:
The motor grader step has provided immeasurable value in terms of safety and the diligence of operators checking fluid levels on a daily basis regardless of weather conditions. The cost of lost time due to an operator getting injured, or the cost of engine failure due to improper fluid levels, can be very significant. The ease of access for the operators is beneficial for their overall attitude toward equipment maintenance and safety. Realizing the great benefit of the steps, we placed them on both sides of all our machines.

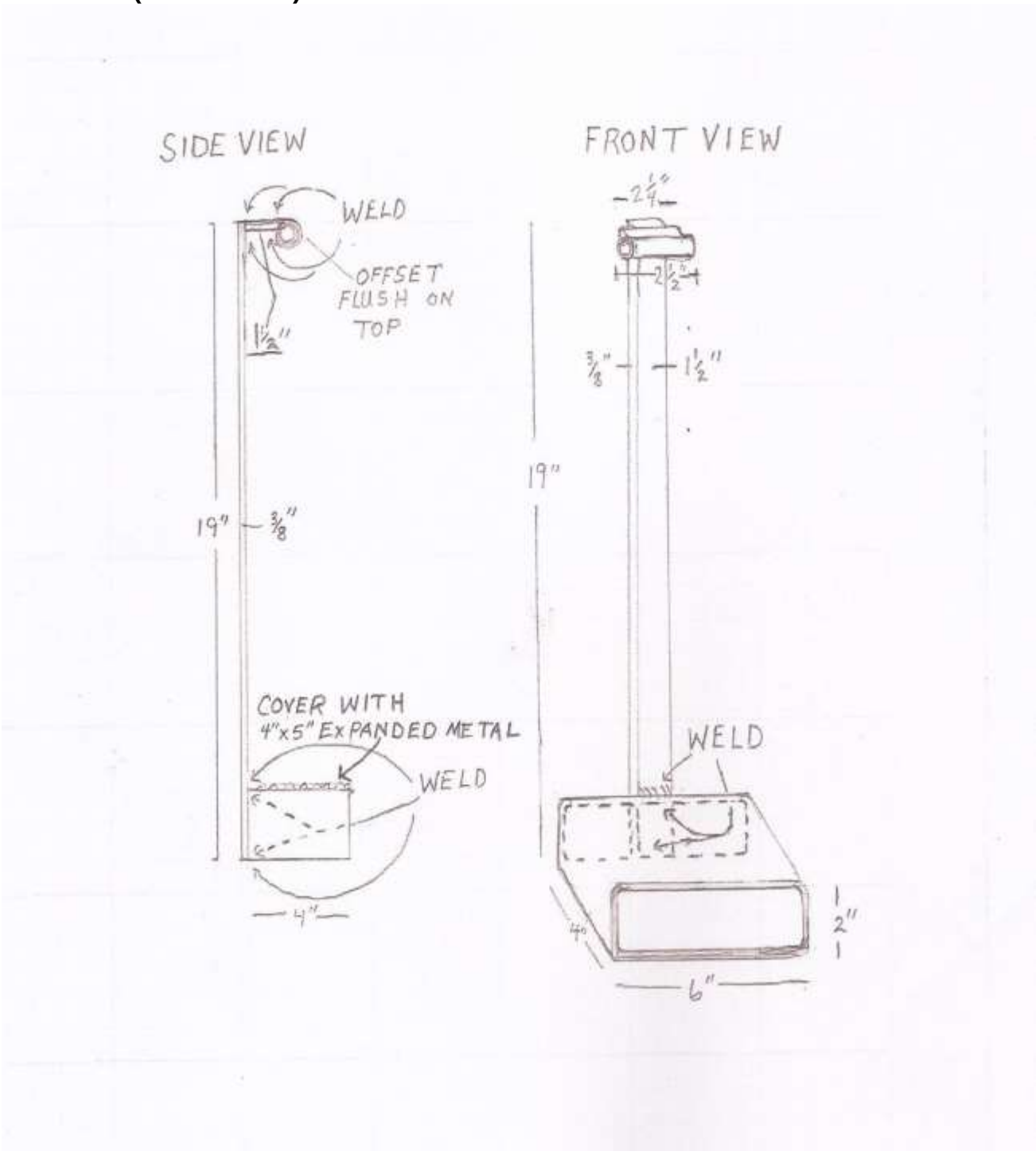
Concerns for safety – protecting our most valuable asset, the employee – are first and foremost.

ANNUAL OPERATING COSTS:

Before using the innovation – Operators had to use the walkway which was cumbersome because it's narrow or would have to reach over the fenders when accessing the motor grader engine compartment. Ensuring that the fluid levels were adequate was a challenge. Employee injuries could be incurred, which resulted in time away from work. The probability of engine failure due to improper fluid levels was more likely.

After using the innovation – There has been no employee time loss as a result of injuries or pulled muscles when climbing up to check engine fluid levels or add more fluid. The step has enabled the operator to complete these tasks more quickly, efficiently and safely. Employee morale improves when safety measures are taken for their best interests.

DRAWING (SCHEMATIC) WITH DETAILS:



Motor Grader step.

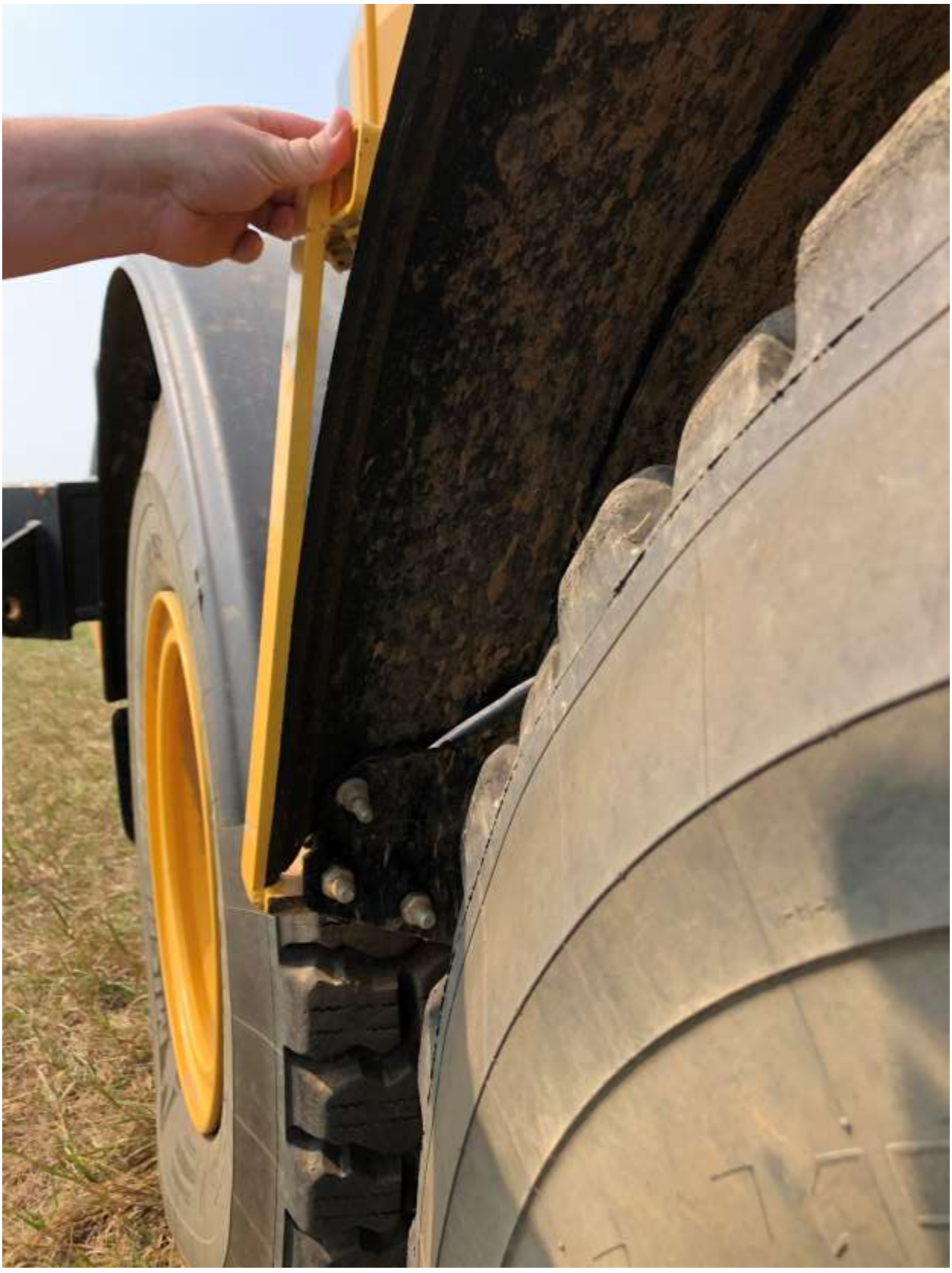
Step attaches to fender bracket between tandem axle.

Close up of fender bracket, bolts and tube.

Tube with inserted bolt act as hinge. 19-inch flat iron.

Expanded metal tread plate on step for safety.

Side view with step up. Front bolt acts in part as hinge, rear bolt is a stop.



When not in use, step is flipped up and secured with tarp strap.

Videos

Video.mov

Video 1.mov