CAPSTONE/SENIOR DESIGN EXPERIENCE 2019

LJ-2 Pup Sprayer Team

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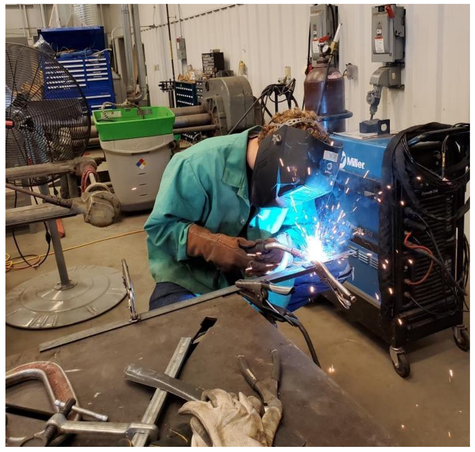
Objective:

With no modernized spraying method being used anywhere in Kenya or Cameroon, our objective was to set out and solve that. With the already implemented Purdue PUP vehicle, our team wanted to utilize this familiar platform to create a more efficient spraying system.

Our goal was to create a system that was easy to learn, within budget constraints, yet far more efficient than spraying manually by hand.

Global Impact:

Our potential Global impact includes our team designing a feasible option for farmers and land tenders to efficiently and safely spray croplands in lower income third world countries.



Constraints:

- Fits within storage compartment of both PUP Chassis
- Powering the pump
- Boom Folding

Criteria:

- Boom Width
- Easy attach and detach
- Cost
- Weight
- Boom Height
- Speed & Pressure

How-It-Works:

- Two point connection connects boom to rear of the PUP vehicle
- The tank is anchored to the bed through 4 bolts
- Wings unfold when ready for field use and fold in when ready for transportation.
- Wings are locked using two bolts located on the outer side of the pivot bolts.

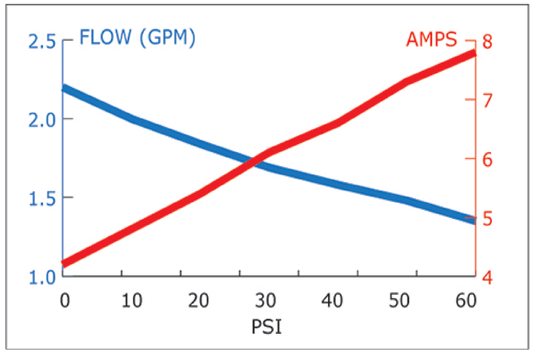
Design Features:

- Hand wand addition for spraying fence rows or tight areas.
- Quick connect nozzle couplers to help ease the changing of nozzle sizes.
- Regulator and pressure gauge allow the operator to monitor and micromanage optimal pressure flow.

Design & Calculations:

- Tank Size- 60 gal
- Hose diameter 3/8”
- Pump- 2.2 gpm
- 12 V/9Amp
- 45 psi
- Self priming up to 8 foot
- 10” Folding Boom

- (10gpa*5mph*20”)/5940 =.17 gpm
- 7 nozzles * .17gpm = 1.19 gpm required
- Flow curve: at 40psi 2.2gpm is required



- Boom Width- 10 Ft
- 5 Ft mid section, 2.5 ft wings
- 7 nozzles @ 20” spacing
- Foldable design for transport and field mode

Sprayer Calculations

PSI	GPM	4 MPH	6 MPH	7 MPH
30	0.17	12.6	8.4	7.2
40	0.2	14.9	9.9	8.5
50	0.22	16.3	10.9	9.3
60	0.24	17.8	11.9	10.2

Summarization:

Our final product was designed and built so that it could be attached and detached from multiple different PUP chassis designs with the use of only one person while staying within the budget constraints. We had multiple designs with different levels of complexity but ultimately decided on the most simple design. The design we decided on was the one that was easiest to construct in a developing country

Sponsor:
PUP Team

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