

Granular Application System For ATV



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User Problem

The Salt Lake City Mosquito Abatement District (SLCMAD) has the need for a specifically designed granular pesticide spreader to mount on the rear-rack of their ATVs. Previous system limitations include:

- Inadequate 9-foot swath
- Heavy, breaks rear mounting rack
- Difficult to spread over natural barriers
- Cannot disperse from one side only
- Granule clumping and clogging due to water entering the hopper

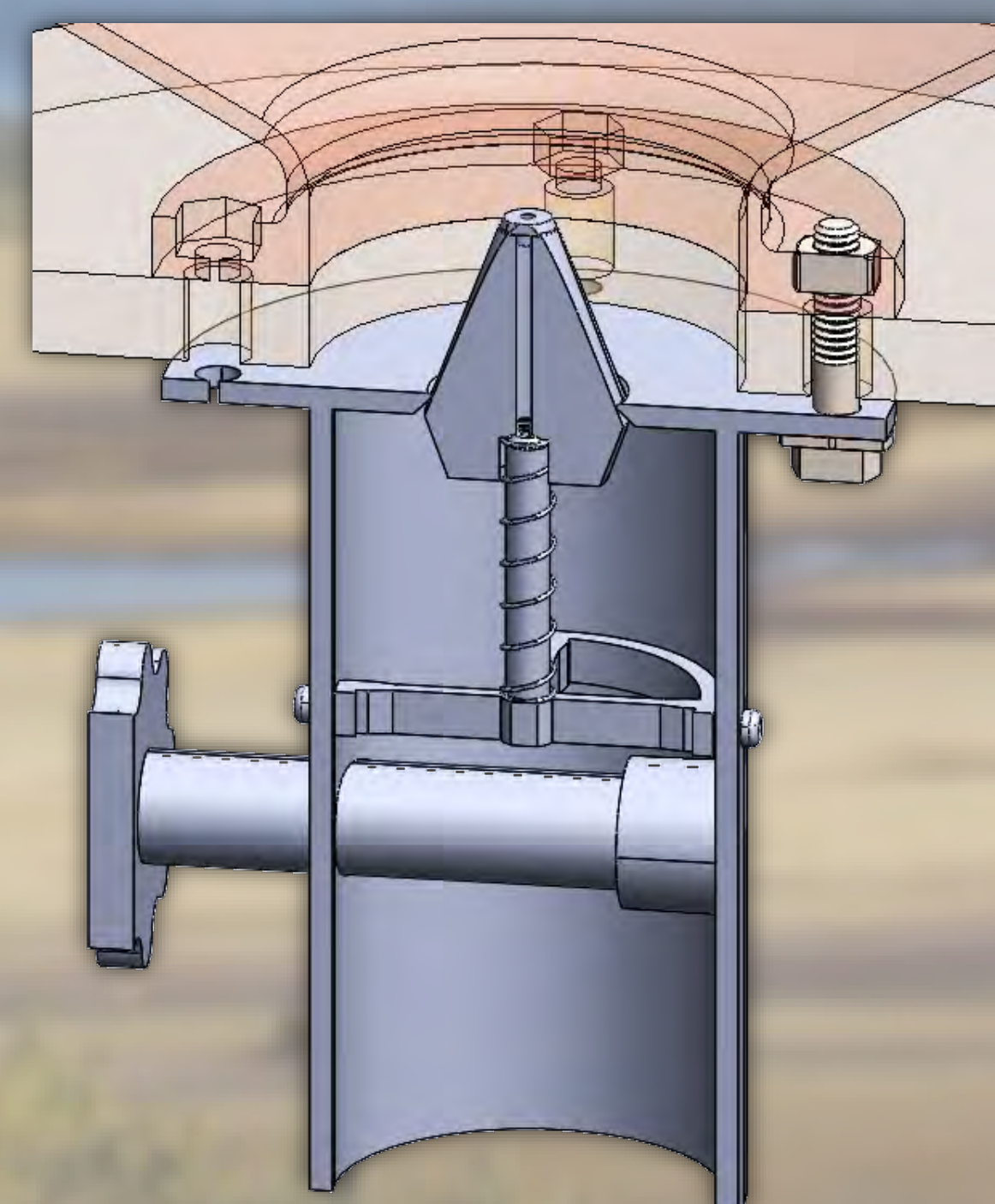
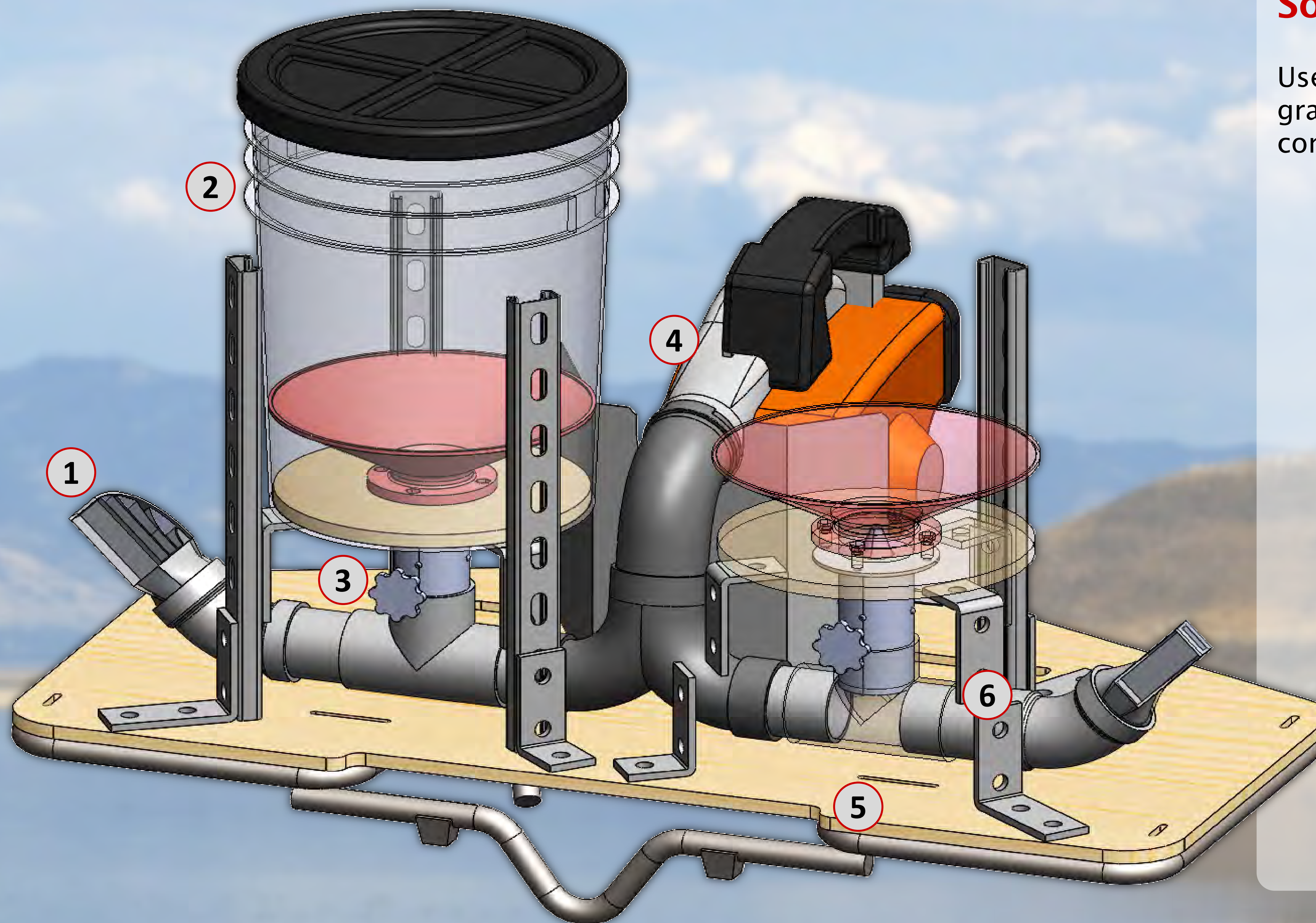
User Needs

- **Increase Swath**
Reach 40-ft total (20-ft per side)
- **Control Granule Flow Rate**
Adjustable gate with preset settings for consistent coverage
- **Directionality**
Can select dispersion side as left, right, or both
- **Water Resistant Hopper**
Seal hopper to avoid water ingress to prevent granule clumping
- **Reduce System Weight**
Lighter system to increase mass of granule carried without exceeding the rear-rack maximum weight capacity (176 lbs.)
- **Off-the-shelf parts**
Use common and easily accessible parts whenever possible

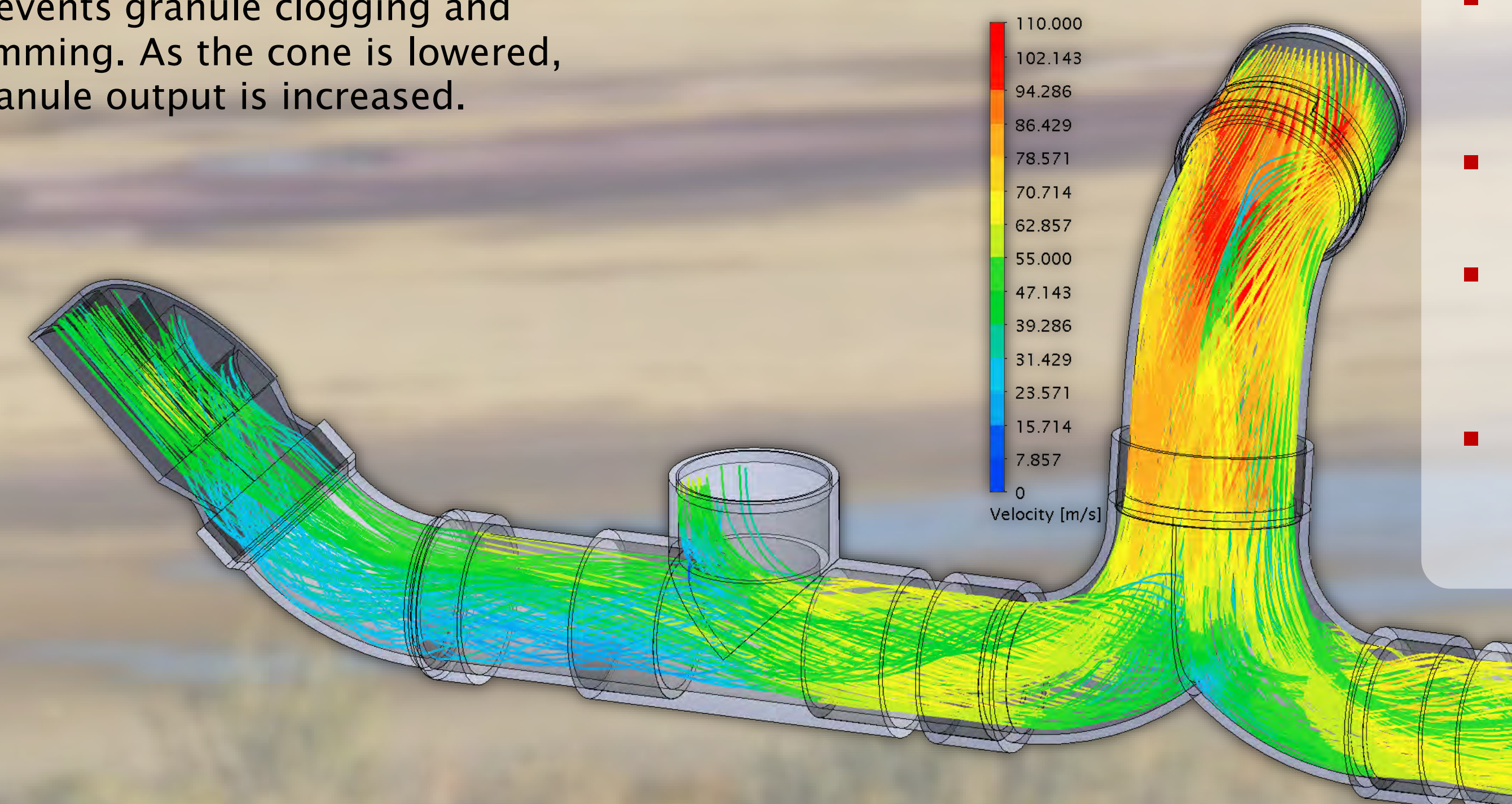
Solution

Use an air system to propel the granules instead of the current, commonplace spinning-disk system.

1. Custom-designed ABS fittings: elbows, "Y" (wye) and multi-vein nozzles
2. Water-proof hopper, with twist on lid
3. Flow regulation gate that uses a spring-loaded, conical plug for flow control
4. 444 CFM commercial-grade leaf blower
5. CNC routed base protected by truck bedliner paint
6. Off-the-shelf parts: PVC piping, Unistrut channel, plywood, hopper, screw-on lid and mounting hardware



Section view of the cable operated flow regulation gate (3). The cone plug prevents granule clogging and jamming. As the cone is lowered, granule output is increased.



Results

- 40-ft swath (20-ft per side)
- Dispersion on each side can be independently controlled
- 180-degree coverage behind ATV
- Reduced system weight to 36 lbs. from 56 lbs.
- Final Prototype delivered to SLCMAD for field testing during mosquito season

CFD velocity analysis improved airflow and reduced stagnation points in the ducting and nozzles.
Inlet Velocity 45 m/s (blower to ducting)
Ambient Pressure 89 kPa (In Salt Lake City)