

SolidWorks Flow Simulation – Operator Checklist

Project: AgriDrone Nozzle Optimization

STEP 1 – Setup Summary

- ✓ Project Type: External Flow
- ✓ Fluid: Air (25°C, 1 atm)
- ✓ Gravity: Enabled (-Y or -Z)
- ✓ Turbulence: k-ε model
- ✓ Wall: Adiabatic, No Slip

STEP 2 – Boundary Conditions

- Inlet: Velocity = 20 m/s or Pressure = 2e5 Pa
- Outlet: Pressure = 0 Pa (Atmospheric)
- Ground Plane: Wall (No Slip)
- Walls: Internal surfaces auto-assigned

STEP 3 – Mesh Setup

- Global Mesh Level = 4
- Local Region: 1 m height × 0.25 m radius
- Local Mesh Level = +2 (≈ 6)
- Min Cell Size: 0.2 mm (for 2 mm nozzle)
- Boundary Layer: 3–5 layers

STEP 4 – Goals & Solver

- Goals: Mass Flow, Avg Velocity, Pressure Drop
- Convergence: residual $< 1e-4$
- Iterations: 100–200 (steady)
- Transient Run: 0.01 s timestep, 3.0 s total

STEP 5 – Particle (Droplet) Setup

- Type: Water Droplet (120 $\mu\text{m} \pm 40 \mu\text{m}$)
- Injection: Nozzle exit, 20 m/s
- Rate: 2000 particles/s
- Gravity: Enabled
- Wall Interaction: Trap (ground), Reflect (nozzle)

STEP 6 – Expected Results

- Mass Flow Rate: 2.5–2.8 L/min
- Exit Velocity: 18–22 m/s
- Spray Radius: 0.5–1.0 m
- Convergence Residuals: $< 1e-4$

Variant: [] 0.5 mm [] 1.5 mm [] 2.13 mm [] 2.5 mm

Operator: _____

Date: _____