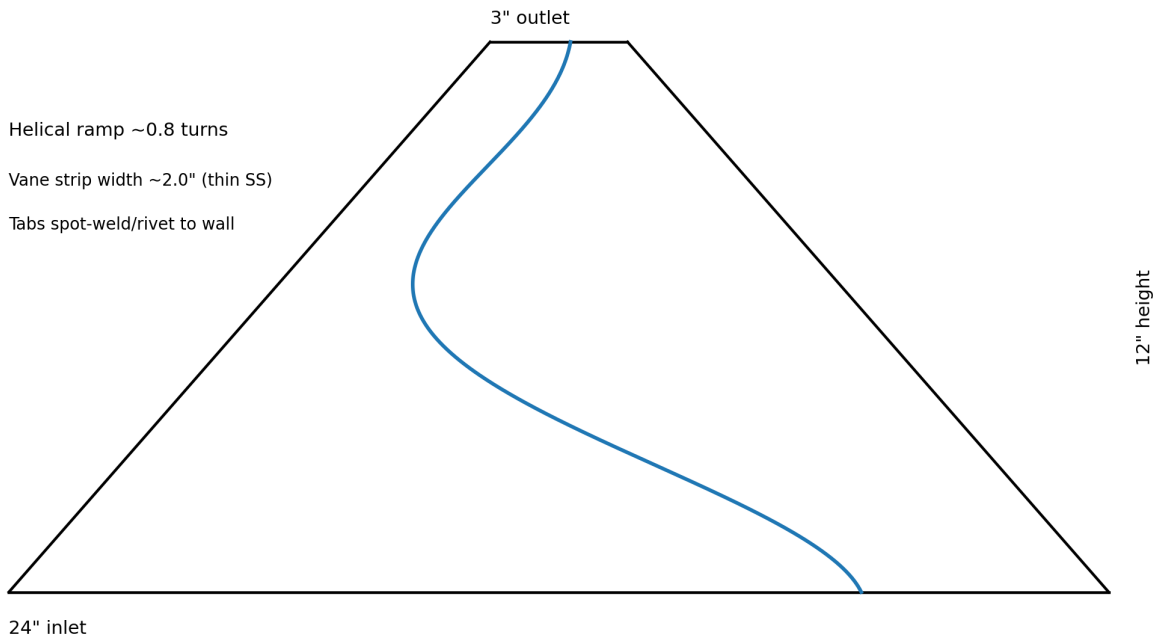
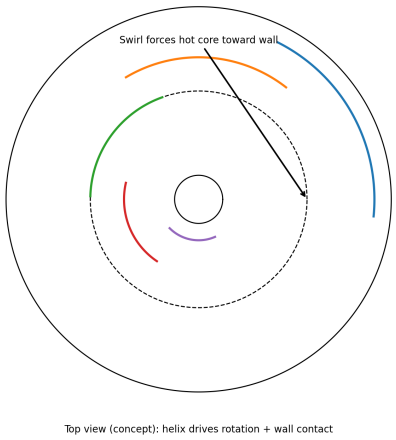
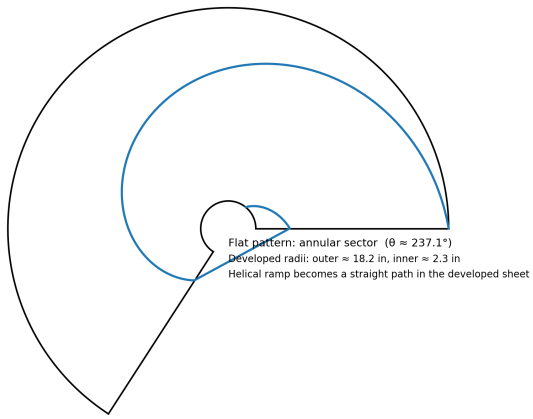
Helical Ramp Inside Funnel Emitter (12-inch tall variant)

Emitter: stainless sheet funnel, black ceramic coating inside/outside. Goal: increase gas-wall contact without choking buoyant fl







Why the helical ramp transfers more plume energy into the walls

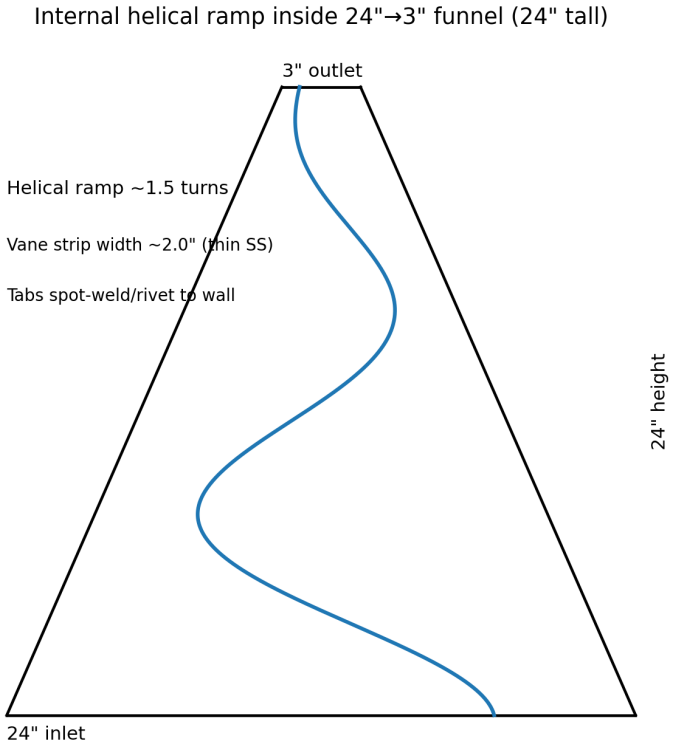
1) Swirl pushes the hot plume core outward (centrifugal pressure gradient), increasing wall wetting.
2) The ramp trips turbulence and repeatedly re-develops the boundary layer → higher internal h_in.
3) Wall contact increases without a tight maze; the open core preserves buoyant flow (low ΔP).
4) With black ceramic outside, more of the absorbed wall heat exits as IR to occupants.

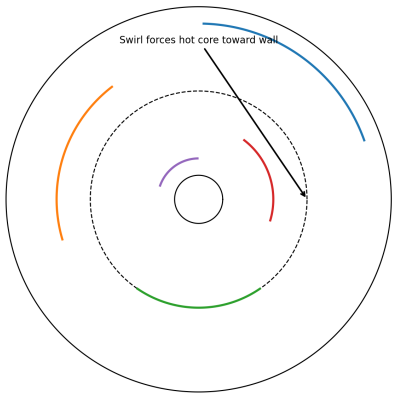
Manufacturing concept (thin stainless)

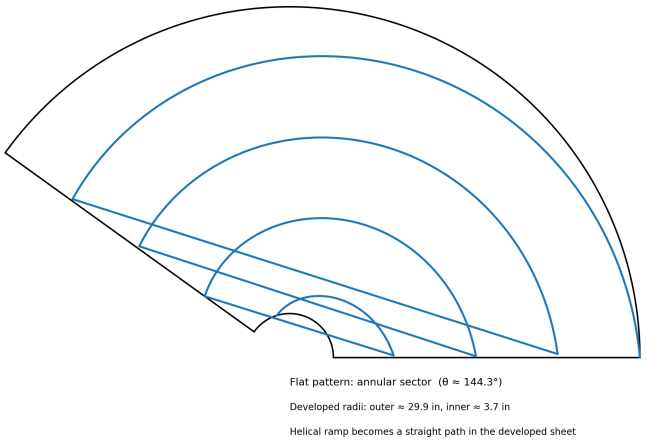
A) Cut the funnel shell as an annular-sector flat pattern; roll and seam-weld (or rivet + seal).
   - 12" tall: slant height s ≈ 15.9"; sector angle θ ≈ 237.1°
   - Developed radii: outer ≈ 18.2", inner ≈ 2.3"
B) Cut a vane strip (≈2" wide) with tabs every ~2–3"; pre-form curvature.
C) Install vane so it makes ~0.8 turns over 12"; attach tabs to wall; keep blockage modest (<~15–20%).
D) Add an adjustable top damper (annular ring) to tune outlet effective area around the 3" target.

Helical Ramp Inside Funnel Emitter (24-inch tall variant)

Emitter: stainless sheet funnel, black ceramic coating inside/outside. Goal: increase gas-wall contact without choking buoyant fl







What the extra height buys you

- More residence time + more wall area: higher extraction potential before exhaust leaves.
- You can run ~1.5 turns (gentle pitch) while keeping passages open.
- Lower risk of a 'hot core' shooting through; more uniform wall temperature.
- Tradeoff: taller emitter is visually larger; must still avoid over-restricting the outlet.

Key design rules to avoid choking

1) Keep a clear axial flow path (open core). Avoid tight 'maze' passages that require a fan.
2) Use gentle vane pitch; target swirl, not blockage. Thin strip, small angle of attack.
3) Provide an adjustable damper with a safe minimum opening to prevent bypass around the emitter.
4) Validate with one measurement: exhaust temperature at the outlet + surface temperature with IR gun/thermocouples.