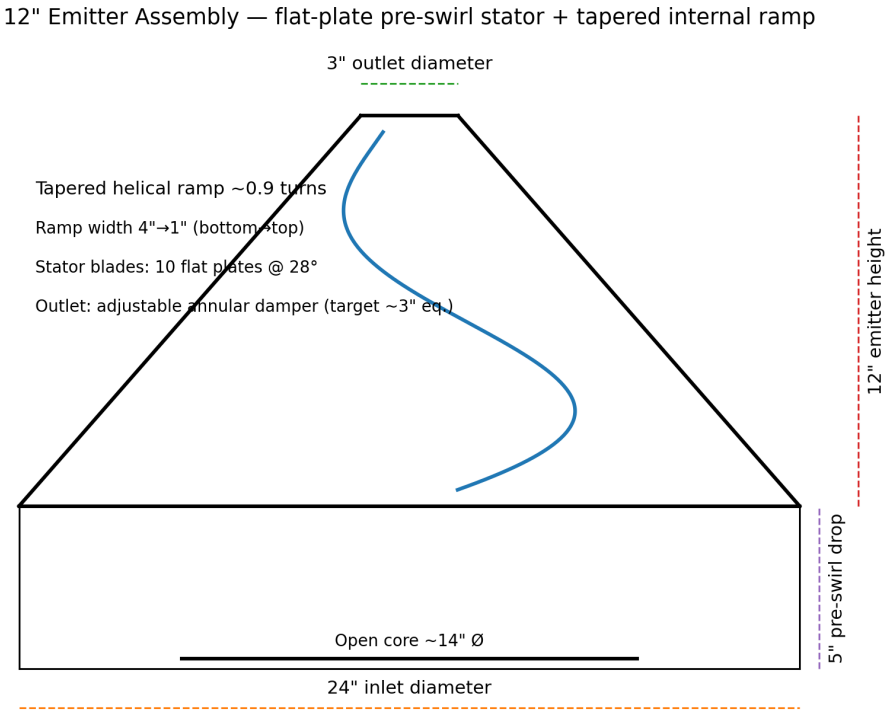
12-inch Emitter: Flat-Plate Pre-Swirl Stator + Tapered Ramp

24" inlet → 3" outlet; 12" tall funnel; 5" pre-swirl drop; parts are laser-cut from thin stainless and assembled with rivets/spot-welc

Assembly section (dimensioned)



Mechanism summary (why this improves heat extraction)

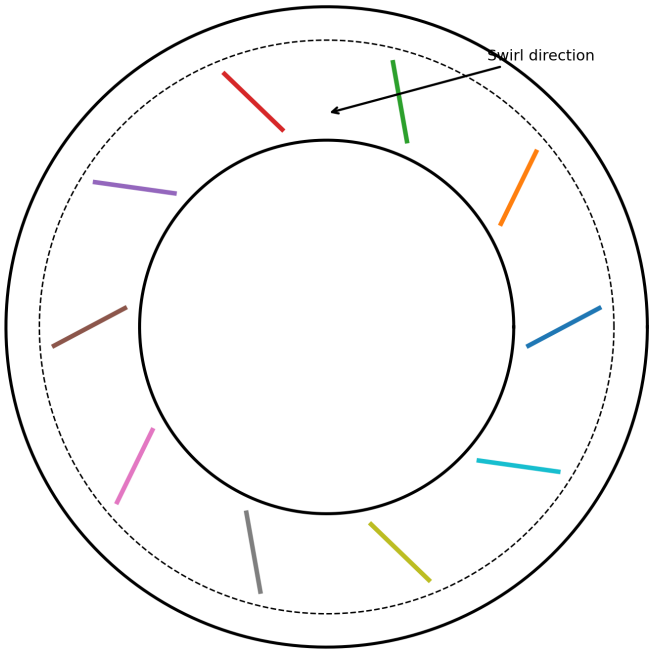
- Stator ring initiates rotation before the flow enters the funnel; it adds tangential velocity with low blockage.
- Tapered helical ramp sustains and strengthens swirl in the confined funnel, pushing the hot core outward (wall wetting).
- Swirl increases turbulence and re-develops the boundary layer → higher internal h_in (more heat into the wall).
- Adjustable outlet damper tunes the trade: too open = hot core escapes; too closed = choking/bypass.

Stator Ring Layout

Flat plates; blade angle defined by slot orientation. Open core keeps buoyant flow strong.

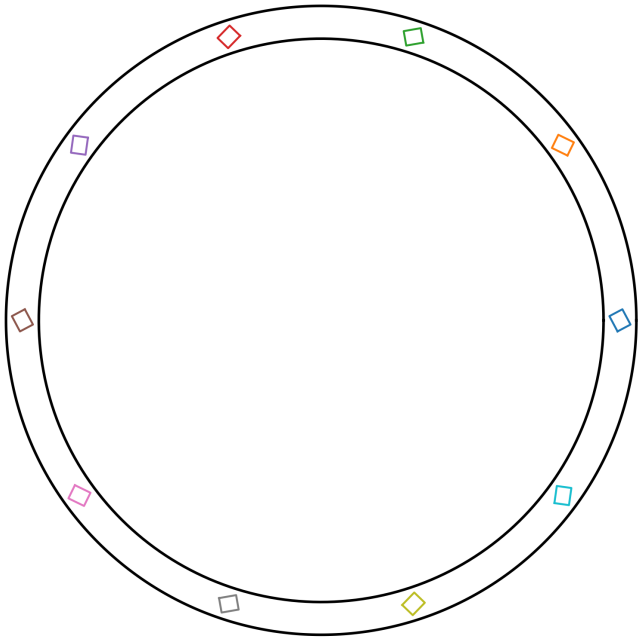
Top view (blade angles)

Pre-swirl stator ring (top view) — flat plates guide plume into rotation



Laser-cut ring flat pattern

Laser-cut stator ring — outer Ø24", ring width 1.25", slots for blade tabs



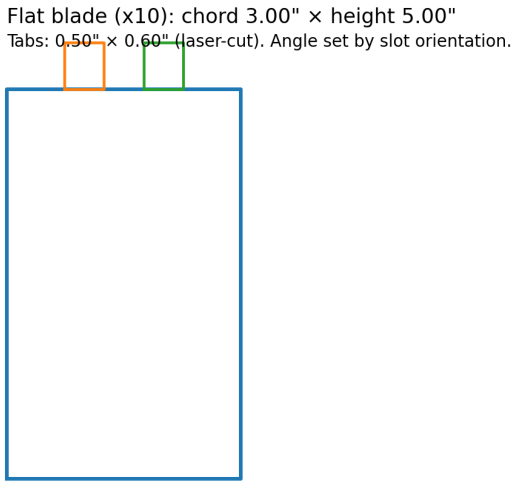
Slots: 0.56" × 0.66" (clearance 0.03")

Suggested: 10 blades @ 28°. Open core 14" Ø. Ring width 1.25".

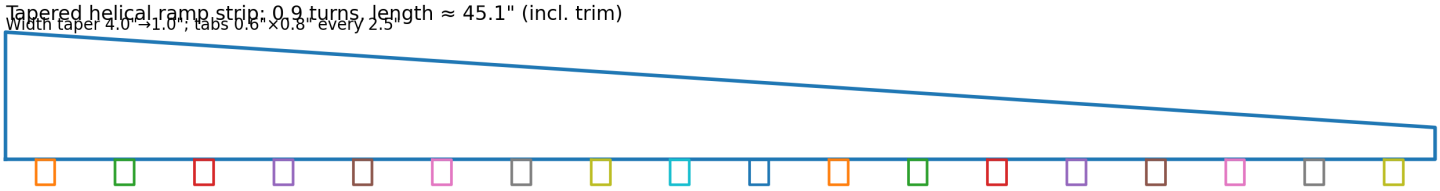
Laser-Cut Parts: Blades + Tapered Ramp

Starting-point cut patterns; adjust tabs/holes to match your fastening method and kerf.

Blade pattern (x10)



Tapered helical ramp strip pattern



Ramp strip length ≈ 45.1" incl. trim. Install as ~0.9 turns; end ~1–2" below outlet collar.