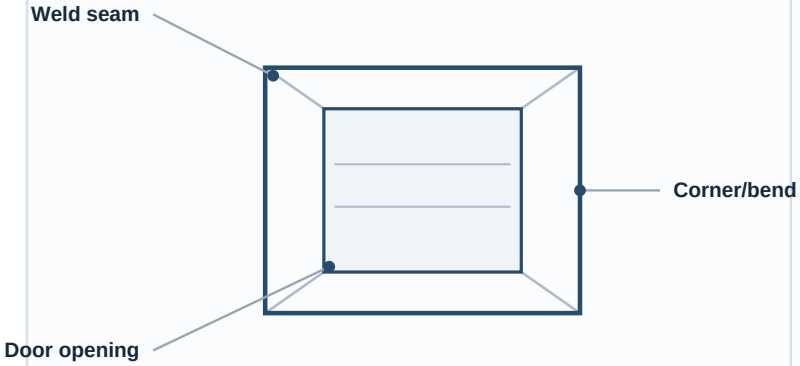
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Stove Combustion Chamber / Inner Firebox (Steel) — Continuous temperatures of 350–500 °C and above in wood/pellet combustion, thermal cycling, fly ash and acidic condensate. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — STOVE COMBUSTION CHAMBER / INNER FIREBOX (STEEL)



COATING CROSS-SECTION



Five questions define a coating system

1 MATERIAL
Low-carbon, decarburised enamelling steel (EN 10209 / DC04EK), 1.5–3 mm. High service temperature and flame contact require low hydrogen content and a surface chemistry suited to enamel adhesion.

2 SURFACE
Mill scale, weld slag and oil must be removed from the welded body; a rough/uniform surface that retains hydrogen must be achieved to reduce the fish-scaling risk.

3 GEOMETRY
Weld seams, contracted inner corners and the loading door opening; besides continuous coverage, they carry a risk of outgassing from weld zones and fish-scaling.

4 SERVICE CONDITIONS
Continuous temperatures of 350–500 °C and above in wood/pellet combustion, thermal cycling, fly ash and acidic condensate

5 PRODUCTION TARGET
Medium-high volume; repeatable single/double-coat enamel without fish-scaling or chipping, and low scrap.

CONCLUSION: For the Stove Combustion Chamber / Inner Firebox, the goal is not just a good-looking finish; it is a pore-free, crack-free, strongly adhering enamel inner surface under high temperature, flame contact and thermal cycling.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Stove Combustion Chamber / Inner Firebox cannot be coated like just any part. A sound process needs measurement, pretreatment, the right coating selection, application and verification to work together.

01 **ANALYSIS** Substrate + surface
02 **PRETREATMENT** Cleaning + surface
03 **ENAMEL** Chemistry + coat
04 **APPLICATION** Electrostatics + flow
05 **FIRING** Time + temperature
06 **VERIFICATION** Test + record

A. Surface Characterisation

The condition of the substrate surface (cleanliness, roughness, oxide/scale and any weld zones) is determined. The right process starts with the right definition of the surface.

MEASURABLE INPUTS
Surface cleanliness • roughness • weld marks

B. Pretreatment Design

Alkaline degreasing, scale/rust removal and rinsing; controlled surface activation on welded steel eases hydrogen release and improves enamel adhesion.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Enamel System Selection

A heat-resistant vitreous enamel chemistry resistant to high service temperature and thermal shock is selected; CTE matching targets compressive stress on cooling, and titania addition a self-cleaning inner surface.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

In electrostatic powder enamel, corona guns give continuous coverage along inner corners and weld seams; current limit, powder output, gun distance and grounding are recipe-set for the Faraday zones, followed by fusion firing at ~800–850 °C.

GEOMETRY EFFECT
Weld seam • Corner/bend • Door opening

Managing the process with data, not by eye

µm
COAT THICKNESS
Enamel coat uniformity

°C
FIRING TEMPERATURE
Actual firing condition

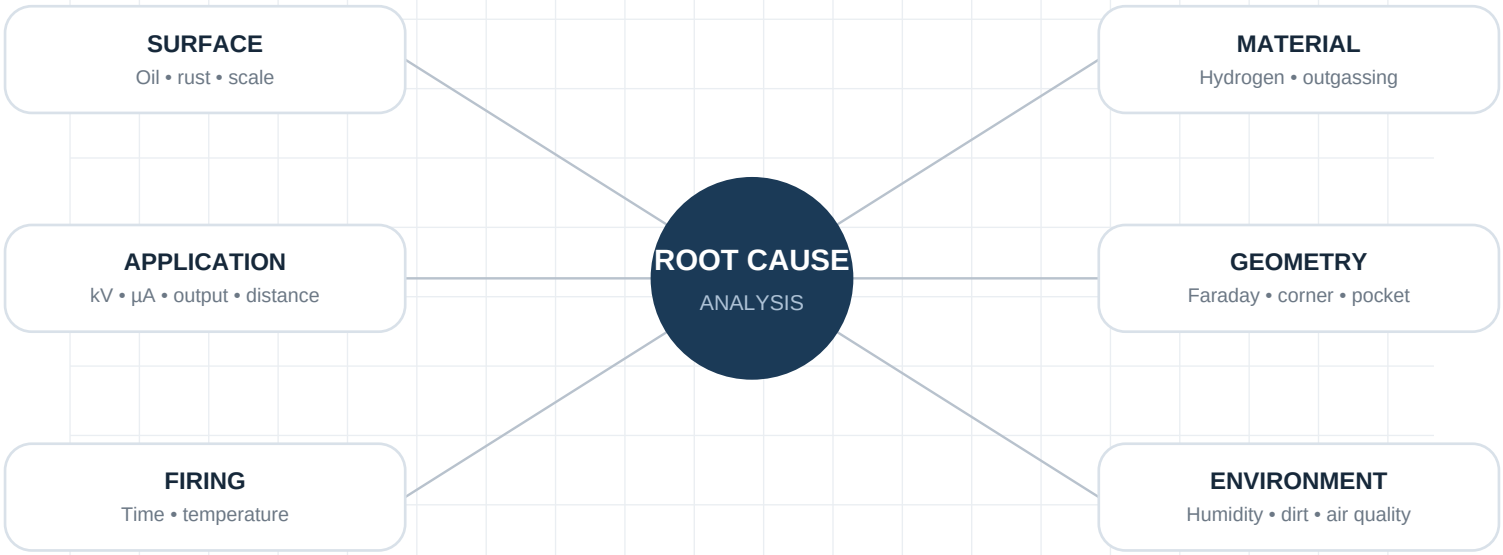
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Stove Combustion Chamber / Inner Firebox process, we define a process window rather than a single parameter. The aim is to reproduce the same surface quality across different shifts and part conditions.

A SURFACE DEFECT IS A SYMPTOM, NOT THE ROOT CAUSE

Enamel defects rarely come from a single setting. The same symptom may stem from surface preparation, the steel structure, electrostatic behaviour, coat thickness or firing.



Common defects and diagnostic approach

POOR ADHESION

The enamel detaches from the substrate or fails the impact test.

CHECK: surface / pretreatment / firing

FISH-SCALING

Scale-shaped enamel spalling appears after firing.

CHECK: steel / hydrogen / firing

PINHOLE / BLISTER

Pinholes or blisters form on the surface.

CHECK: dirt / gas / humidity / oven

FARADAY ZONE

Insufficient penetration in deep corners and pockets.

CHECK: geometry / kV-µA / air

BACK-IONIZATION

Star/blister defects from overcharging.

CHECK: current / distance / thickness

UNEVEN THICKNESS

Thin and thick areas on the same part.

CHECK: position / motion / output

DIAGNOSTIC PROTOCOL

1 Define the symptom → **2** Measure the data → **3** Isolate the cause → **4** Test one variable → **5** Standardise

A GOOD SURFACE PROCESS must be measurable • repeatable • traceable • optimisable. This approach is the basis of part-specific application guides for parts such as the Stove Combustion Chamber / Inner Firebox.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Stove Combustion Chamber / Inner Firebox, production volume drives the equipment choice. At low and medium volume, manual systems give flexibility; in series production, automatic systems apply the same recipe to every part.

LOW / MEDIUM VOLUME

Manual application



Smart (Powder Enamel)
Control unit for powder enamel application.



Powder Enamel Gun
Manual gun suited to enamel powder.



Powder Enamel Injectors
Feeding for abrasive enamel powder.



Powder Enamel Booth
Part-specific manual application booth.



Box Enamel Furnace
Firing in batch production.

SERIES PRODUCTION

Automatic line



Smart Automatic Powder Enamel
Line application with automatic guns.



OWL + Smart AI
Zone-by-zone application on corners, cavities and difficult areas.



Reciprocator
Automates the gun motion.



Automatic Powder Enamel Booth
In-line application and powder recovery.



Ultrasonic Recovery
Sieves recovered powder and separates foreign metal.



Powder Enamel Firing Furnace
Continuous firing, U-type or line-type.

OWL INTEGRATION In difficult areas such as weld seam, corner/bend, door opening, OWL applies targeted, zone-by-zone coating with a Smart AI recipe. For details, see the “OWL — Cavity” application sheet.

PROJECT SUPPORT Share your line, your part and your production target, and we will define the equipment selection and the booth, oven and conveyor layout together. strong3000.com · info@strong3000.com · WhatsApp +90 537 353 54 19