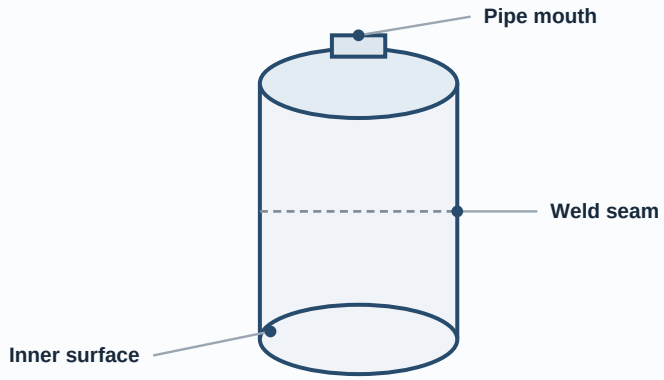
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Flue / Stove Pipe (Steel, Continuous Line) — Flue gas temperature and thermal cycling, acidic condensate (sulphur/chlorine), UV and humidity on the outer surface. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — FLUE / STOVE PIPE (STEEL, CONTINUOUS LINE)



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Aluminised or low-carbon enamelling steel, 0.4–0.8 mm thin sheet; a longitudinally welded cylindrical pipe, 100–150 mm in diameter. The thin section heats up quickly in the furnace.

2. **SURFACE**
   The longitudinal weld seam and rolling residues are cleaned; a uniform, active surface is achieved on both the inside and outside of the thin sheet.

3. **GEOMETRY**
   A thin-walled cylinder; edge coverage at the longitudinal weld seam and the reduced/socket ends, plus Faraday effect and uniform thickness challenges inside the pipe.

4. **SERVICE CONDITIONS**
   Flue gas temperature and thermal cycling, acidic condensate (sulphur/chlorine), UV and humidity on the outer surface

5. **PRODUCTION TARGET**
   High-volume continuous line; automation targeting uniform thickness per pipe, continuous coverage at the weld seam and low scrap.

CONCLUSION: For the Flue / Stove Pipe, the goal is not just a good-looking finish; it is a uniform, pore-free enamel surface along the pipe that withstands flue gas temperature, thermal cycling and acidic condensate.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Flue / Stove Pipe 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

Degreasing, weld zone preparation and rinsing; a fast, uniform pretreatment with controlled drying is designed to prevent distortion of thin sheet.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Enamel System Selection

A heat-resistant vitreous enamel resistant to flue gas temperature, thermal cycling and acidic condensate is selected; inside and outside coverage in gloss/matt black and grey is targeted.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

On a continuous line, the pipe is rotated and the outer surface plus a single-pass inner surface are coated with electrostatic powder enamel; OWL-type long-barrel/axial application and a charge recipe are used inside the pipe and at narrow mouths, followed by fusion firing.

GEOMETRY EFFECT
Weld seam • Pipe mouth • Inner surface

Managing the process with data, not by eye

µm
COAT THICKNESS
Enamel coat uniformity

°C
FIRING TEMPERATURE
Actual firing condition

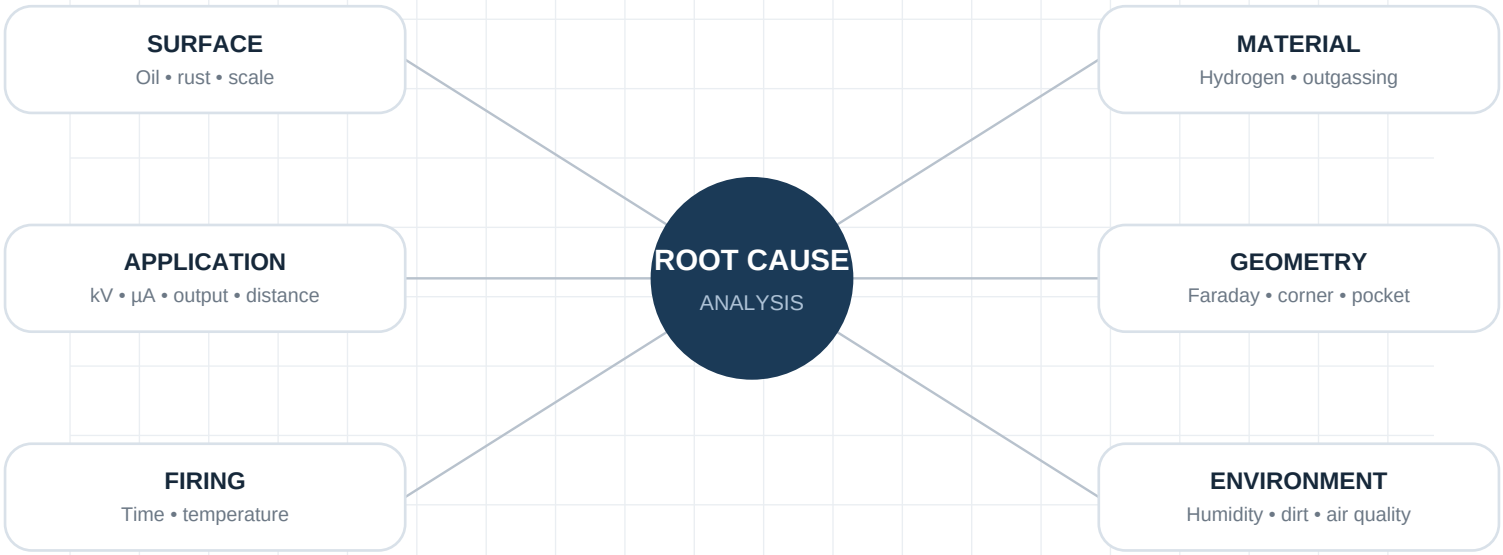
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Flue / Stove Pipe 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 Flue / Stove Pipe.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Flue / Stove Pipe, 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, pipe mouth, inner surface, OWL applies targeted, zone-by-zone coating with a Smart AI recipe. For details, see the “OWL — Profile & Pipe” 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