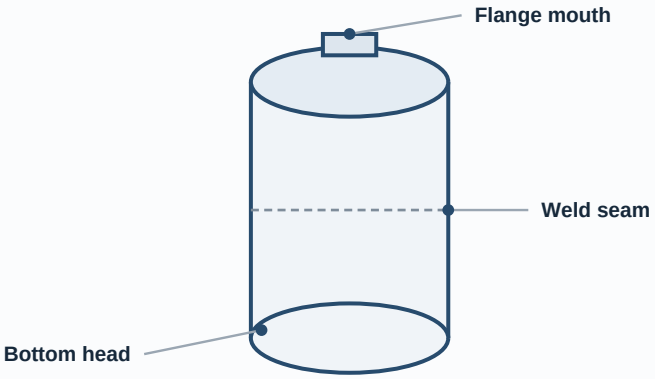
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Water Heater / Boiler Tank (Inner Surface) — Continuous operation under hot water, pressure and variable pH. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — WATER HEATER / BOILER TANK (INNER SURFACE)



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Carbon steel tank, welded body. The inner surface is coated with electrostatic powder enamel.
2. **SURFACE**
   The inner surface is cleaned by degreasing and preparation; weld zones get special attention.
3. **GEOMETRY**
   Inner weld seams and flange mouths; continuous, pore-free coverage and edge coverage are critical.
4. **SERVICE CONDITIONS**
   Continuous operation under hot water, pressure and variable pH
5. **PRODUCTION TARGET**
   High volume; zero porosity verified by holiday testing.

CONCLUSION: For the Water Heater / Boiler Tank, the goal is not just a good-looking finish; it is a pore-free, corrosion-resistant and long-lasting enamel inner surface under hot water and pressure.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Water Heater / Boiler Tank 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 and surface preparation; special preparation for the different microstructure of the weld zone.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Enamel System Selection

A vitreous enamel resistant to hot-water corrosion, pressure and pH changes is selected; long life together with cathodic protection.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

Electrostatic powder enamel is applied to the inner surface; charge and motion recipe are set for continuous coverage along the weld seams.

GEOMETRY EFFECT
Weld seam • Flange mouth • Bottom head

Managing the process with data, not by eye

µm
COAT THICKNESS
Enamel coat uniformity

°C
FIRING TEMPERATURE
Actual firing condition

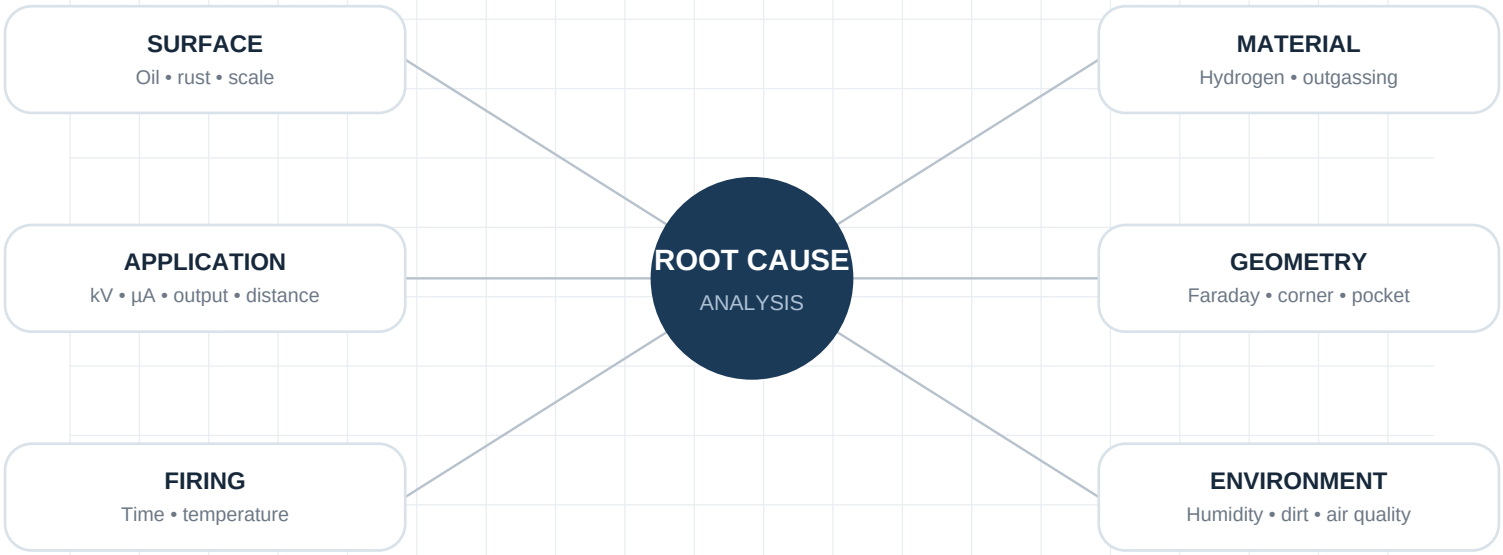
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Water Heater / Boiler Tank 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 Water Heater / Boiler Tank.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Water Heater / Boiler Tank, 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, flange mouth, bottom head, 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