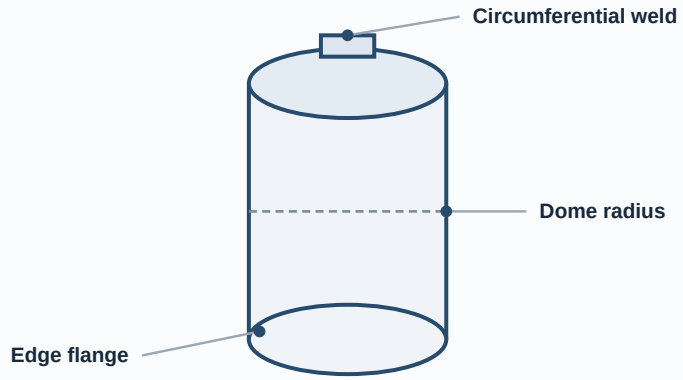
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Tank Bottom & Top Heads (Dished Ends) — The same hot water, pressure and pH environment as the inner tank; hydrostatic and thermal stress concentrated in the heads. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — TANK BOTTOM & TOP HEADS (DISHED ENDS)



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Decarburised enamelling steel (EN 10209 / DC04EK) pressed dished bottoms and top heads, 2.0–3.0 mm; circumferentially welded to the body.

2. **SURFACE**
   Pressing oil, oxide and scale must be removed; an active, uniform surface along the dome radius and circumferential weld seam.

3. **GEOMETRY**
   Deep-drawn dome radii and the circumferential weld joining the body; edge pull-back at radius transitions and difficult internal access in deep domes.

4. **SERVICE CONDITIONS**
   The same hot water, pressure and pH environment as the inner tank; hydrostatic and thermal stress concentrated in the heads

5. **PRODUCTION TARGET**
   Volume in sync with the inner tank line; continuous coverage on the inner dome surface and seamless continuity with the inner tank.

CONCLUSION: For the Tank Bottom & Top Heads, the goal is not just a good-looking finish; it is a pore-free enamel surface, even at dome radii, continuous with the inner tank and resistant to pressure and hot water.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Tank Bottom & Top Heads 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, rinsing and drying; pretreatment designed for the dome geometry and activation before enamelling.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Enamel System Selection

The same acid-resistant vitreous enamel as the inner tank is selected; a single-system approach gives uninterrupted coverage after welding and CTE matching.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

Electrostatic powder enamel; gun distance, current limit and rotation recipe are set for coverage on the deep dome inner surface and radius transitions, with edge pull-back under control.

GEOMETRY EFFECT
Dome radius • Circumferential weld • Edge flange

Managing the process with data, not by eye

µm
COAT THICKNESS
Enamel coat uniformity

°C
FIRING TEMPERATURE
Actual firing condition

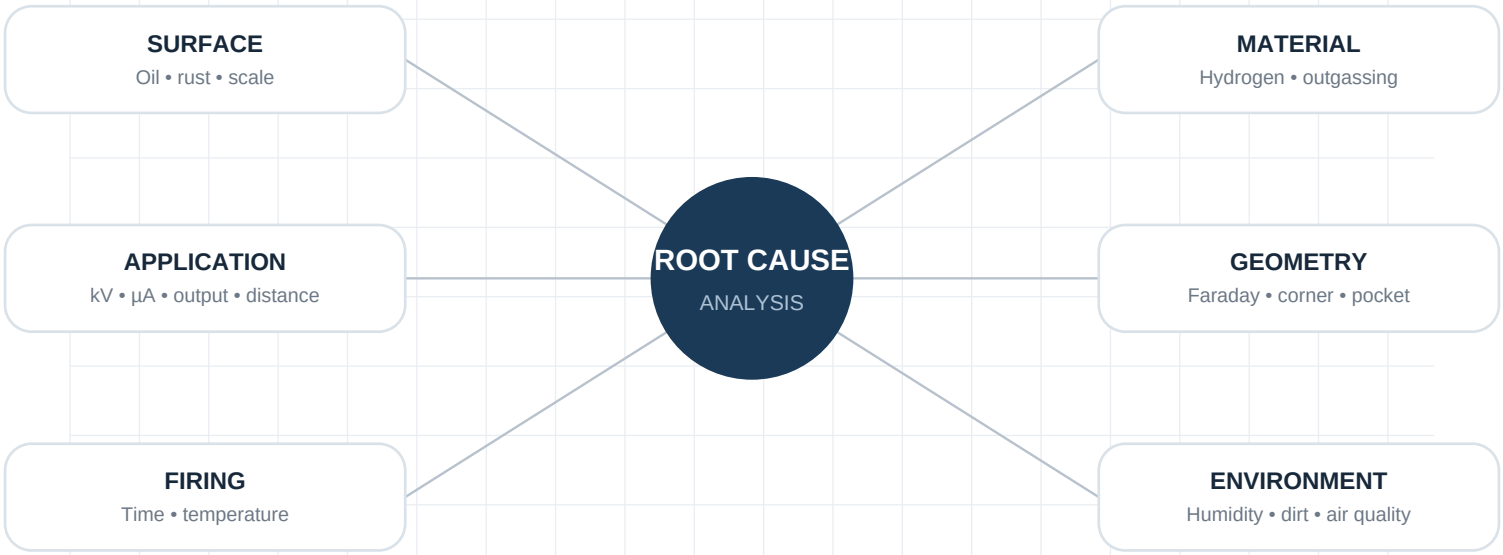
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Tank Bottom & Top Heads 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 Tank Bottom & Top Heads.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Tank Bottom & Top Heads, 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 dome radius, circumferential weld, edge flange, 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