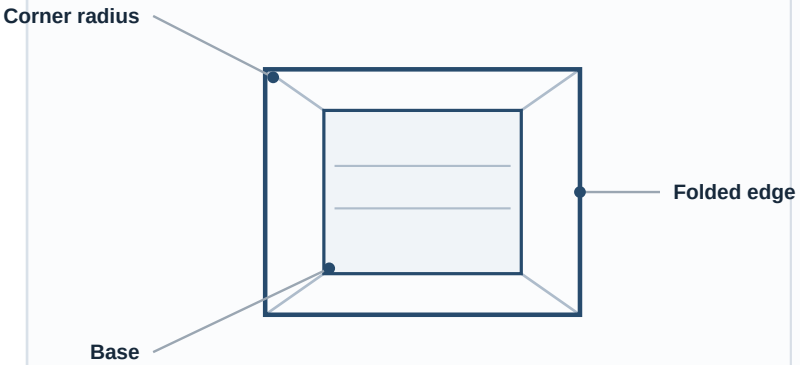
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Steel Serving & Oven Dish (Bakeware) — Oven heat, thermal shock, food contact, acidic food stains and repeated cleaning. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — STEEL SERVING & OVEN DISH (BAKEWARE)



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Decarburised enamelling steel (EN 10209 / DC04EK), 0.5–1.0 mm deep-drawn sheet. The tray/dish form includes corner radii and folded edges.

2. **SURFACE**
   Deep-drawing oils and scale are removed; an active, uniform surface with low gas release is achieved before enamelling.

3. **GEOMETRY**
   Box/tray form; risk of edge pull-back and Faraday zones at corner radii and folded edges, and thickness deviation on the wide base.

4. **SERVICE CONDITIONS**
   Oven heat, thermal shock, food contact, acidic food stains and repeated cleaning

5. **PRODUCTION TARGET**
   High volume; consistent colour and low scrap with two-coat / one-fire (2C1F) powder enamel.

CONCLUSION: For the Steel Serving & Oven Dish, the goal is not just a good-looking finish; it is a pore-free, easy-to-clean enamel surface suitable for food contact that withstands oven heat and thermal shock.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Steel Serving & Oven Dish 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; controlled preheating and surface activation lower gas release in deep-drawn sheet.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Enamel System Selection

A food-contact cover enamel resistant to oven heat, thermal shock and acidic food stains; CTE matching and the ground/cover frits in two-coat / one-fire are optimised together.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

Ground and cover frits are applied by electrostatic powder enamel; voltage, current limit and gun motion recipe are set for uniform thickness at corner radii and folded edges.

GEOMETRY EFFECT
Corner radius • Folded edge • Base

Managing the process with data, not by eye

µm
COAT THICKNESS
Enamel coat uniformity

°C
FIRING TEMPERATURE
Actual firing condition

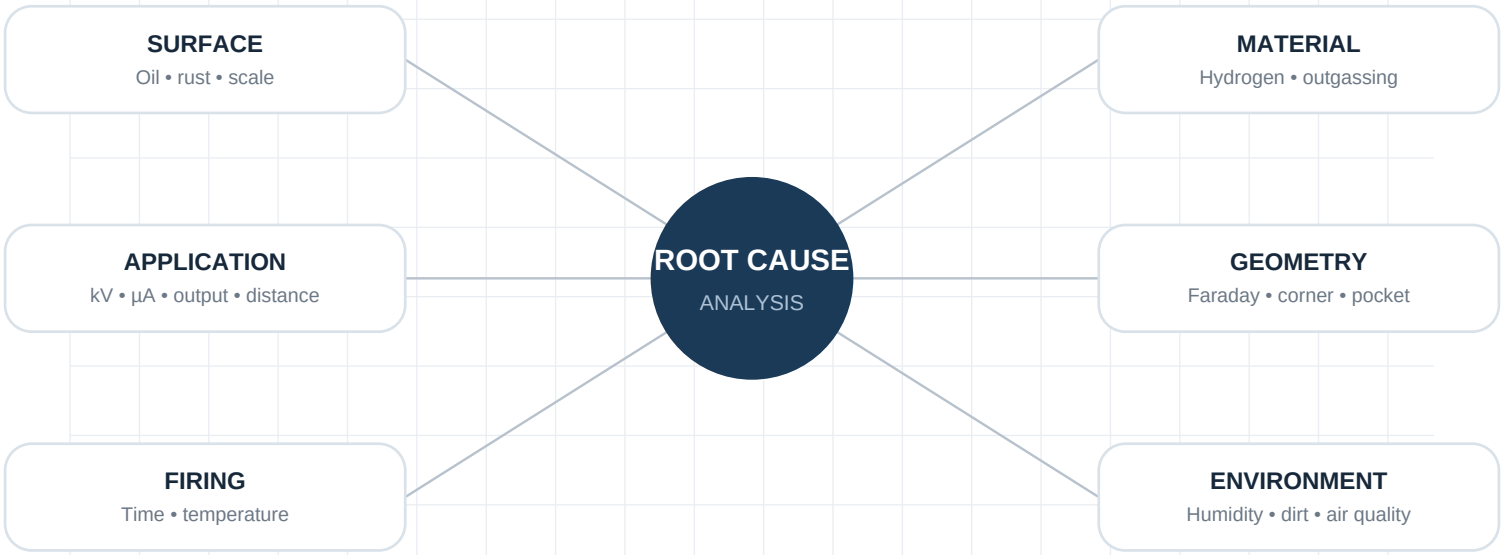
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Steel Serving & Oven Dish 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 Steel Serving & Oven Dish.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Steel Serving & Oven Dish, 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 corner radius, folded edge, base, 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