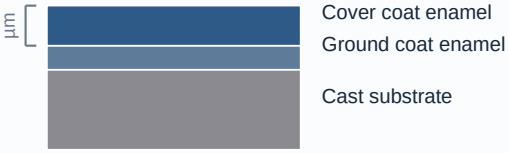
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Cast Iron Casserole / Dutch Oven (Inside & Outside) — Oven and hob heat, long cooking times, food contact, thermal cycling and mechanical impact. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — CAST IRON CASSEROLE / DUTCH OVEN (INSIDE & OUTSIDE)



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Grey cast iron (GJL/GG), heavy-section sand casting. High carbon content and casting pores tend to outgas during firing; inner and outer surfaces are enamelled with separate recipes.

2. **SURFACE**
   The casting surface is opened by grit blasting; sand, casting residues and graphite smut are removed. Annealing/preheating reduces outgassing.

3. **GEOMETRY**
   Heavy section, inner base corner, cast lugs and the lid seating surface; risk of runs/pooling in wet enamel and outgassing (blisters) from casting pores.

4. **SERVICE CONDITIONS**
   Oven and hob heat, long cooking times, food contact, thermal cycling and mechanical impact

5. **PRODUCTION TARGET**
   Medium-high volume; a light-coloured food-contact enamel inside and a coloured, glossy decorative enamel outside with a consistent appearance.

CONCLUSION: For the Cast Iron Casserole / Dutch Oven, the goal is not just a good-looking finish; it is a blister-free, decorative enamel surface suitable for food contact that withstands oven/hob heat and long cooking.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Cast Iron Casserole / Dutch Oven 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** Slip + density
04 **APPLICATION** Dipping / spraying
05 **FIRING** Drying + furnace
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

Grit blasting opens the casting surface; graphite and casting residues are cleaned. Controlled annealing/preheating drives out gas trapped in heavy sections.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Enamel System Selection

A food-contact, acid-resistant, light-coloured cover enamel inside and a coloured, glossy decorative enamel outside. A ground coat provides adhesion to cast iron and tolerance to outgassing; CTE matching is observed.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

Wet (slip) enamel is applied by dipping/flow-coating/spraying; drying after the ground coat and controlled firing prevent blisters in heavy sections. Dip-and-drain geometry and viscosity are set to prevent runs and pooling at lugs and the lid seat.

GEOMETRY EFFECT
Inner base • Handle/lug • Lid seat

Managing the process with data, not by eye

µm
COAT THICKNESS
Enamel coat uniformity

g/cm³
SLIP DENSITY
Coat weight and coverage

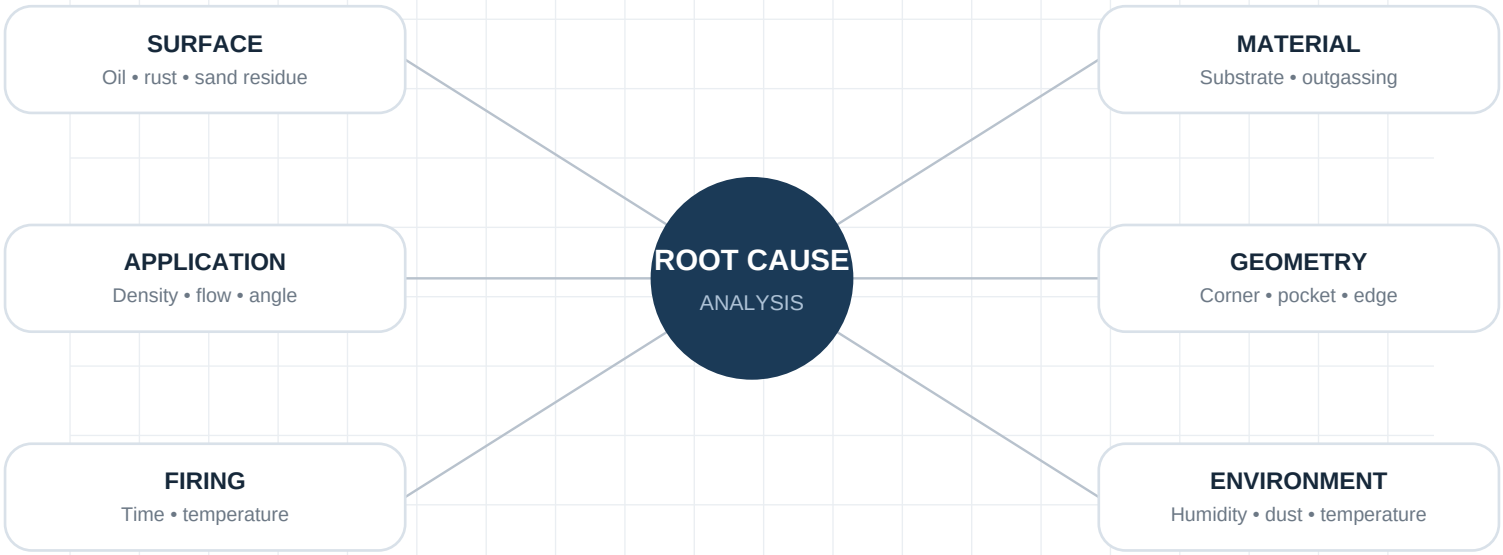
°C
FIRING TEMPERATURE
Actual firing condition

%RH
AMBIENT HUMIDITY
Drying and surface quality

ENGINEERING PRINCIPLE In the Cast Iron Casserole / Dutch Oven 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 substrate, slip density, coat thickness or firing.



Common defects and diagnostic approach

POOR ADHESION

The enamel detaches from the substrate or chips on impact.

CHECK: surface / ground coat / firing

FISH-SCALING

Scale-shaped enamel spalling appears after firing.

CHECK: substrate / hydrogen / firing

PINHOLE / BLISTER

Pinholes or blisters form on the surface.

CHECK: gas / thickness / firing

RUNS & BUILD-UP

Thick build-up forms at edges and lower areas.

CHECK: density / draining / angle

CRACKING

Hairline cracks in thick coats or on rapid cooling.

CHECK: thickness / firing / cooling

UNCOVERED AREA

Thin or bare areas in corners and pockets.

CHECK: geometry / dipping angle

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 Cast Iron Casserole / Dutch Oven.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Cast Iron Casserole / Dutch Oven, production volume drives the equipment choice. At low and medium volume, manual systems give flexibility; in series production, a conveyorised line repeats the same process on every part.

LOW / MEDIUM VOLUME

Manual application



Manual Booth with Turntable

Wet enamel with a manual gun in a dry-filter booth.



Box Enamel Furnace

Firing in batch production.

SERIES PRODUCTION

Automatic line



Conveyorised Line-Type Booth

Automatic wet enamel application on an overhead conveyor.



U-Type Furnace

Firing on a continuous line.



STRONG3000 wet enamel line

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