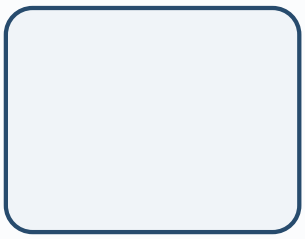
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Railing & Barrier (Welded Construction) — Outdoors; continuous UV, rain, freeze-thaw cycles and wear from hand contact. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — RAILING & BARRIER (WELDED CONSTRUCTION)



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Welded steel railing combining tube and flat bar/profile; a complex geometry where different sections meet, with many weld seams.

2. **SURFACE**
   Weld slag, spatter and sharp burrs must be removed; weld zones are cleaned and an active surface is prepared.

3. **GEOMETRY**
   Many welded joints and bar crossings; Faraday effect in inner corners and a risk of edge pull-back on sharp edges.

4. **SERVICE CONDITIONS**
   Outdoors; continuous UV, rain, freeze-thaw cycles and wear from hand contact

5. **PRODUCTION TARGET**
   Medium volume, high part variety; decorative appearance and outdoor durability.

CONCLUSION: For the Railing & Barrier, the goal is not just a good-looking finish; it is a decorative powder-coated surface that covers every joint of the complex welded geometry and withstands outdoor UV and corrosion.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Railing & Barrier 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 + conversion
03 **COATING** Chemistry + film
04 **APPLICATION** Electrostatics + flow
05 **CURING** 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

Grit blasting or chemical pretreatment + conversion coating; oxide and slag in weld zones are fully removed.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Coating System Selection

Polyester powder for outdoor UV and corrosion resistance; a chemistry with good single-coat coverage on hung parts is preferred.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

Powder coating, 70–100 µm; manual/robotic application to reach all joints in the complex geometry, penetration with a low ramp rate, and extra gun positions for inner corners.

GEOMETRY EFFECT
Welded joint • Bar crossing • Sharp edge

Managing the process with data, not by eye

µm
FILM THICKNESS
Coating uniformity

°C
PART TEMPERATURE
Actual cure condition

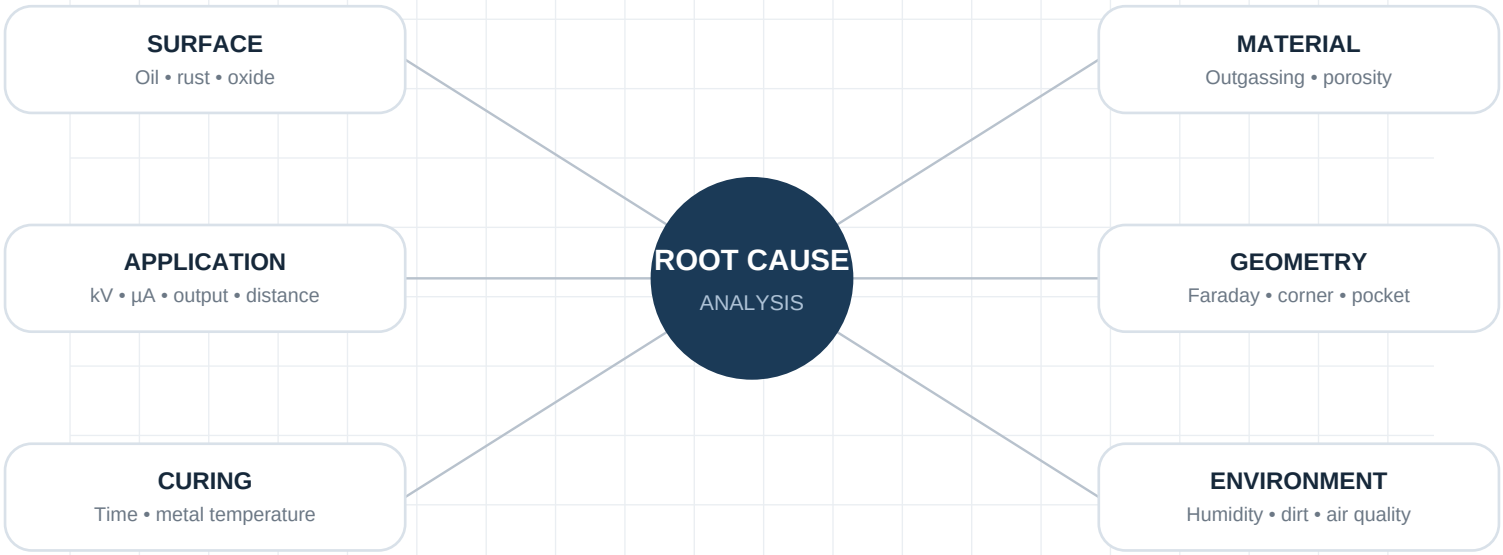
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Railing & Barrier 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

Coating defects rarely come from a single setting. The same symptom may stem from surface preparation, material, electrostatic behaviour, film thickness or curing.



Common defects and diagnostic approach

POOR ADHESION

The coating detaches from the surface or fails in testing.

CHECK: cleaning / pretreatment / cure

ORANGE PEEL

Uneven flow; the surface looks wavy or rough.

CHECK: film / flow / temperature

PINHOLE / CRATER

Pinholes or local craters 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 Railing & Barrier.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Railing & Barrier, 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



Elite / Elite Plus

Manual powder coating units; kV, µA and air settings.



Smart AI

Suggests settings for the part; guides the operator in manual work.



Manual Powder Coating Gun

Light, ergonomic hand gun.



Manual Powder Booth

Manual application and powder recovery.



Box Oven

Curing in batch production.

SERIES PRODUCTION

Automatic line



Automatic Powder Coating Gun

Series application in fixed or moving arrays.



OWL + Smart AI

Recipe-based, zone-by-zone application in difficult areas.



Single / Two-Axis Reciprocator

Automates the gun motion.



PVC Monocyclone Booth

Fast cleaning and powder recovery.



Powder Center

Fast colour change on automatic lines.



Conveyor Oven & Pretreatment

Surface preparation and curing on a continuous line.

OWL INTEGRATION In difficult areas such as welded joint, bar crossing, sharp edge, 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