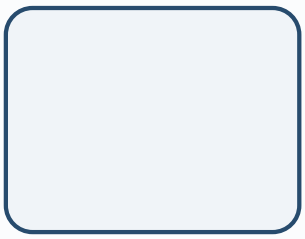
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Structural Steel Profile & Railing — Outdoor/indoor, UV, atmospheric corrosion, mechanical load and long service life. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — STRUCTURAL STEEL PROFILE & RAILING



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Structural steel profile (S235/S355), box/L/U sections and welded railings; heavy sections and high thermal mass.

2. **SURFACE**
   Mill scale, rust, weld spatter and oil must be removed; Sa 2½ grit blasting is preferred on heavy sections.

3. **GEOMETRY**
   Edge pull-back and Faraday effect at weld seams, sharp edges and inner corners; risk of uneven heating due to high thermal mass.

4. **SERVICE CONDITIONS**
   Outdoor/indoor, UV, atmospheric corrosion, mechanical load and long service life

5. **PRODUCTION TARGET**
   Medium volume / project-based; consistent corrosion protection and full coverage on large, heavy parts.

CONCLUSION: For the Structural Steel Profile & Railing, the goal is not just a good-looking finish; it is a powder-coated surface with long-lasting resistance to atmospheric corrosion and UV, covered at sharp edges and weld seams.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Structural Steel Profile & Railing 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

Sa 2½ grit blasting or chemical pretreatment; spatter removal and edge rounding improve edge coverage. In heavy corrosion environments a zinc-based primer powder can be applied.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Coating System Selection

A polyester thermoset powder for atmospheric corrosion and UV; a two-coat (zinc primer + polyester) system where needed; curing at ~180–200 °C.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

Powder coating, 80–120 µm; an oven profile based on part temperature for uniform cure in heavy sections, and a charge/gun recipe for coverage of sharp edges and weld seams.

GEOMETRY EFFECT
Weld seam • Sharp edge • Inner corner

Managing the process with data, not by eye

µm
FILM THICKNESS
Coating uniformity

°C
PART TEMPERATURE
Actual cure condition

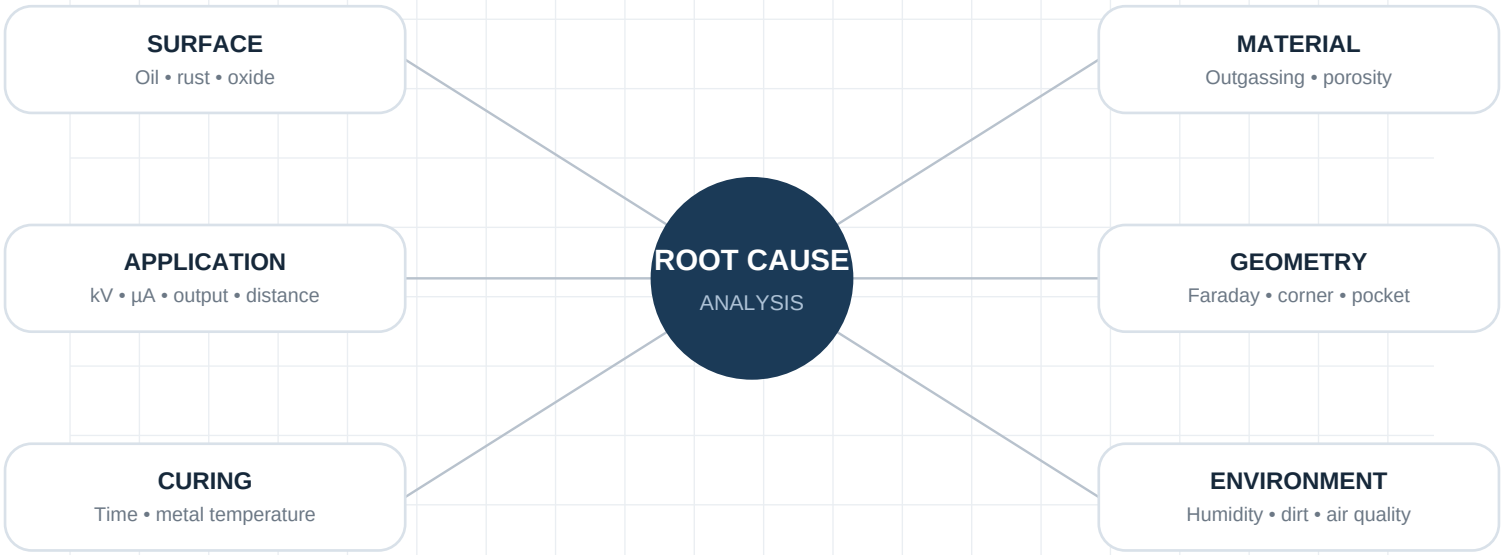
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Structural Steel Profile & Railing 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 Structural Steel Profile & Railing.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Structural Steel Profile & Railing, 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 weld seam, sharp edge, inner corner, 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