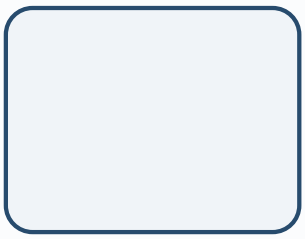
UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Box Profile (Square & Rectangular) — Outdoor/indoor construction; long life under humidity, condensation and mechanical load. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — BOX PROFILE (SQUARE & RECTANGULAR)



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Welded/rolled box profile (hollow section), S235/S355 steel or galvanised, 1.5–5 mm. Includes corner radii and weld seams.

2. **SURFACE**
   Oil, scale and weld slag/spatter must be removed; a clean, active surface on the inside and outside.

3. **GEOMETRY**
   Faraday cage at the corner radii and inner corners of the box profile; edge pull-back at profile ends and difficulty getting powder inside.

4. **SERVICE CONDITIONS**
   Outdoor/indoor construction; long life under humidity, condensation and mechanical load

5. **PRODUCTION TARGET**
   High volume; a consistent film and low scrap despite the variety of sections.

CONCLUSION: For the Box Profile, the goal is not just a good-looking finish; it is a powder-coated surface, fully covered even at corners and edges, that withstands structural conditions and corrosion.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Box Profile 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

Phosphate or nano-ceramic conversion coating; special preparation and good rinsing for adhesion on galvanised profile.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Coating System Selection

Polyester powder for structural durability and outdoor use; high crosslink density targets corrosion and mechanical resistance.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

Powder coating, 60–100 µm; current limit, low powder output and gun angle are set to overcome the Faraday effect at corner radii, with an edge motion recipe at profile ends.

GEOMETRY EFFECT
Corner radius • Weld seam • Profile end

Managing the process with data, not by eye

µm
FILM THICKNESS
Coating uniformity

°C
PART TEMPERATURE
Actual cure condition

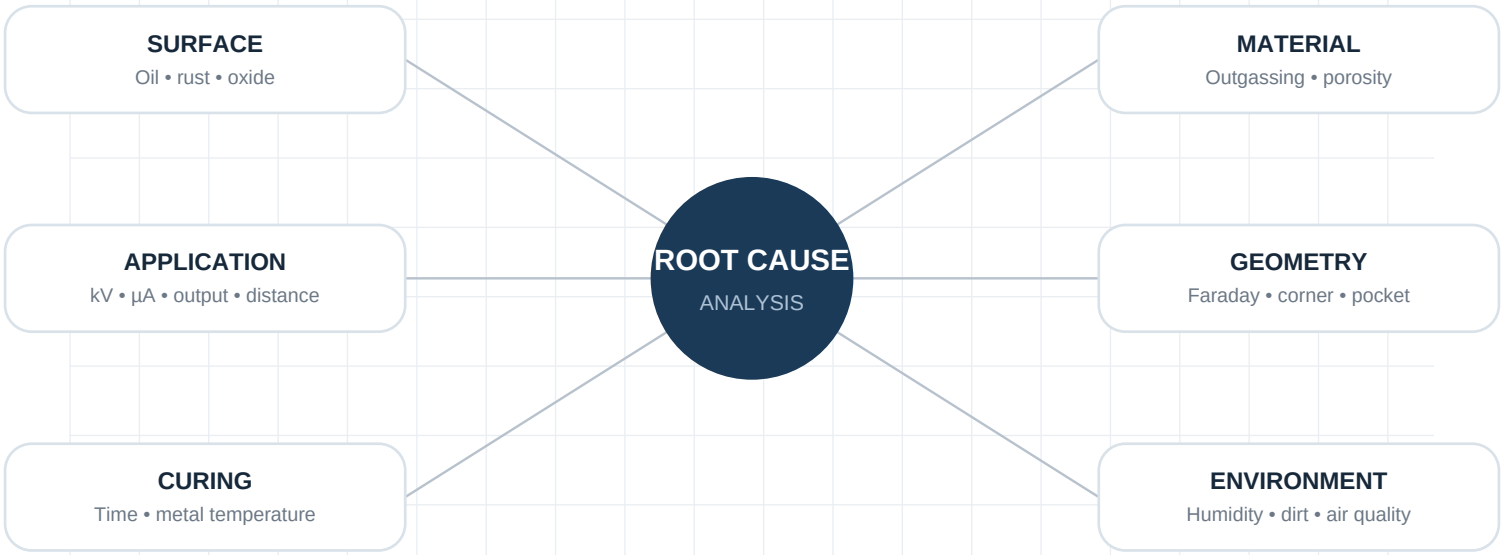
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Box Profile 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 Box Profile.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Box Profile, 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 corner radius, weld seam, profile end, 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