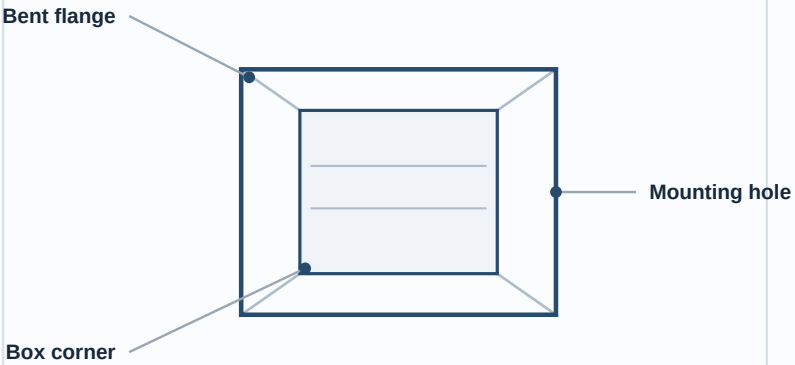
# UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Engine Bay Brackets & Covers — Engine bay heat (~120–180 °C), engine oil and chemicals, vibration and condensation corrosion. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

**PART DIAGRAM — ENGINE BAY BRACKETS & COVERS**




**COATING CROSS-SECTION**




## Five questions define a coating system

1. **MATERIAL**
   Cold-rolled or galvanised steel sheet and bent brackets; perforated, flanged and bent geometry.

2. **SURFACE**
   Oil and machining residues are removed; a uniform, active surface on perforated and bent surfaces.

3. **GEOMETRY**
   Bent flanges, mounting holes and box corners create a Faraday effect; surfaces exposed to engine heat need a stable film.

4. **SERVICE CONDITIONS**
   Engine bay heat (~120–180 °C), engine oil and chemicals, vibration and condensation corrosion

5. **PRODUCTION TARGET**
   High volume; corrosion resistance with consistent film thickness that withstands heat and oil.

**CONCLUSION:** For the Engine Bay Brackets & Covers, the goal is not just a good-looking finish; it is a durable, well-adhering powder-coated surface that withstands engine bay heat, oil and vibration-related corrosion.

# FROM SURFACE TO PROCESS ENGINEERING FLOW

The Engine Bay Brackets & Covers 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; uniform preparation on perforated/bent geometry for corrosion and adhesion.

**CORE TARGET**
Clean, active, uniform, repeatable surface

## C. Coating System Selection

A thermoset powder with high crosslink density that withstands engine bay heat and oil is selected.

**DECISION CRITERIA**
Durability • appearance • service life • cost

## D. Application Engineering

Electrostatic powder coating, 60–90 µm; gun position, current limit and a charge recipe are set to cover the inner faces of bent flanges and box corners.

**GEOMETRY EFFECT**
Bent flange • Mounting hole • Box corner

## Managing the process with data, not by eye

**µm**
**FILM THICKNESS**
Coating uniformity

**°C**
**PART TEMPERATURE**
Actual cure condition

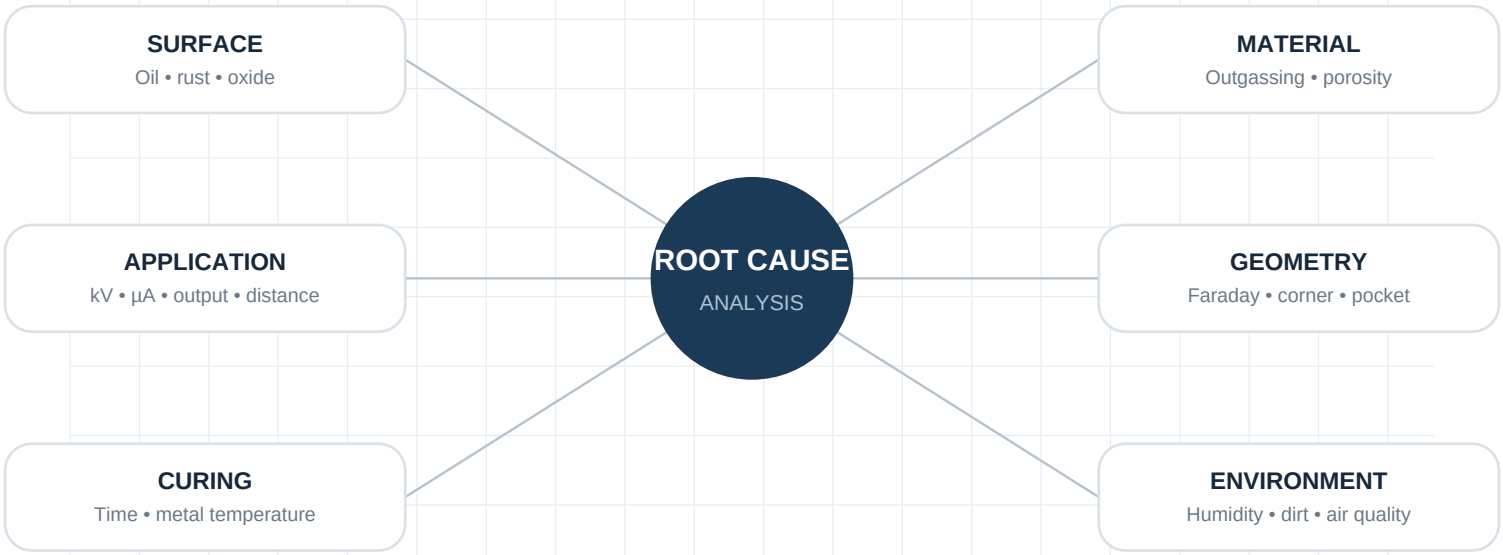
**kV / µA**
**ELECTROSTATIC CHARGE**
Transfer and penetration

**Ω**
**GROUNDING**
Charge dissipation and stability

**ENGINEERING PRINCIPLE** In the Engine Bay Brackets & Covers 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 Engine Bay Brackets & Covers.

# THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Engine Bay Brackets & Covers, 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 bent flange, mounting hole, box corner, 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