UNDERSTAND THE SURFACE BEFORE DESIGNING THE COATING.

Soil Tillage Parts (Harrow Disc, Ploughshare, Chisel) — Continuous soil abrasion, mud/manure chemistry, impact and corrosion during storage. Before designing the right coating, we evaluate the material chemistry, the geometry and the service conditions together.

PART DIAGRAM — SOIL TILLAGE PARTS (HARROW DISC, PLOUGHSHARE, CHISEL)



COATING CROSS-SECTION



Five questions define a coating system

1. **MATERIAL**
   Boron / high-carbon heat-treated, wear-resistant hardened steel; sharp cutting edge and perforated body.

2. **SURFACE**
   Heat-treatment scale, oil and rust are removed; the hardened surface needs mechanical/chemical activation for good adhesion.

3. **GEOMETRY**
   Faraday effect at the cutting edge and mounting holes; risk of film thinning on the concave disc surface and the sharp edge.

4. **SERVICE CONDITIONS**
   Continuous soil abrasion, mud/manure chemistry, impact and corrosion during storage

5. **PRODUCTION TARGET**
   Medium volume; target: corrosion protection (especially in storage and transport) and adhesion on the sharp edge. Note: the coating mainly provides corrosion protection; the cutting zone in contact with soil wears in service.

CONCLUSION: For the Soil Tillage Parts, the goal is not just a good-looking finish; it is a well-adhering powder-coated surface on hardened steel that withstands corrosion in storage and transport, mud-manure chemistry and impact.

FROM SURFACE TO PROCESS ENGINEERING FLOW

The Soil Tillage Parts 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 + phosphate/nano-ceramic conversion coating; an anchor profile and activation are created on the hardened steel surface.

CORE TARGET
Clean, active, uniform, repeatable surface

C. Coating System Selection

For storage/transport corrosion and chemical contact, a hard, high-adhesion epoxy/polyester hybrid powder is selected; edge coverage and impact resistance are targeted.

DECISION CRITERIA
Durability • appearance • service life • cost

D. Application Engineering

Electrostatic powder coating, 60–100 µm; a charge/geometry recipe for coverage at the cutting edge and holes, and robotic/reciprocator application for a uniform film on the concave surface.

GEOMETRY EFFECT
Cutting edge • Mounting hole • Concave surface

Managing the process with data, not by eye

µm
FILM THICKNESS
Coating uniformity

°C
PART TEMPERATURE
Actual cure condition

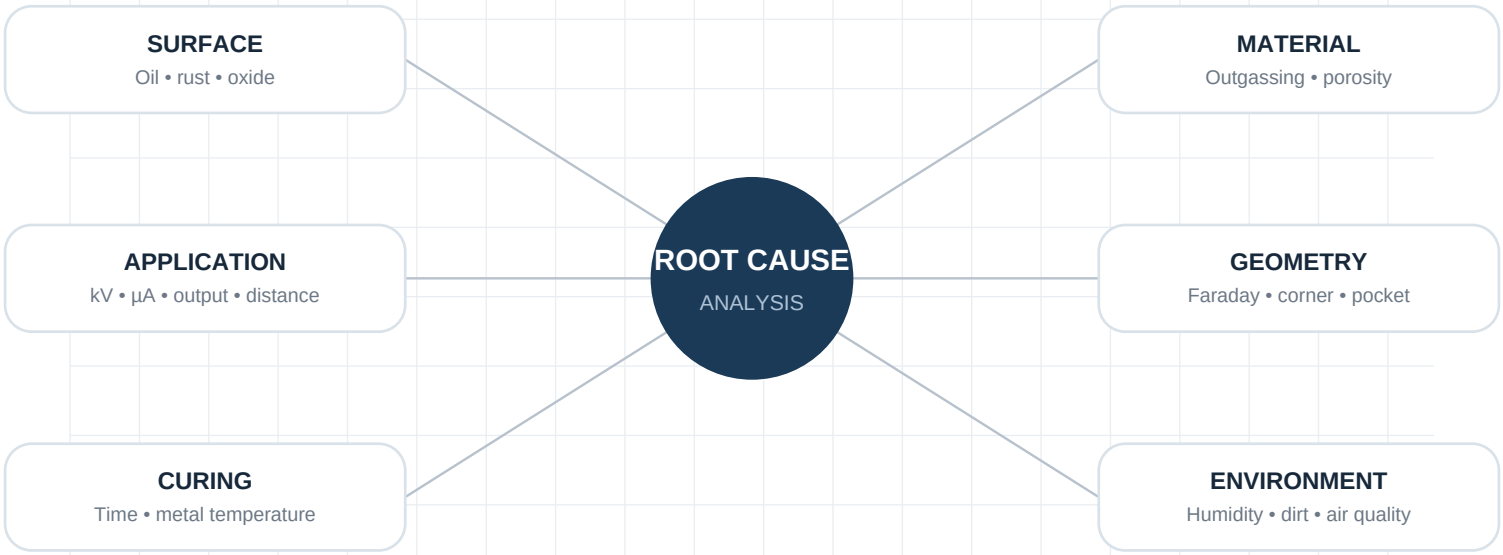
kV / µA
ELECTROSTATIC CHARGE
Transfer and penetration

Ω
GROUNDING
Charge dissipation and stability

ENGINEERING PRINCIPLE In the Soil Tillage Parts 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 Soil Tillage Parts.

THE RIGHT EQUIPMENT, AT THE RIGHT SCALE.

For the Soil Tillage Parts, 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.



Smart AI

The same application on every part, by recipe.



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.

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