
SARCLAD
TECHNOLOGY FOR THE METALS INDUSTRY

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TECHNOLOGY FOR THE METALS INDUSTRY

New Developments in Rolltex and Rollscan

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Sales Engineer

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Overview

- Sarclad Limited
- Rolltex EDT range
- Rolltex Eco EDT
- Rolltex EDC – a new development project to replace chrome plating of textured rolls
- Rollscan roll inspection

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Sarclad Limited

Sarclad Ltd Headquarters, Sheffield UK

- Sales & marketing
- Design & development
- Commissioning & service
- Spare parts

Sarclad NA, Pittsburgh USA

- Sales & marketing
- Commissioning & service
- Spare parts

Sarclad China, Shanghai

Sarclad Limited

Providing Technology Based Equipment to The Metals Industry since 1977

Global supplier to 46 countries

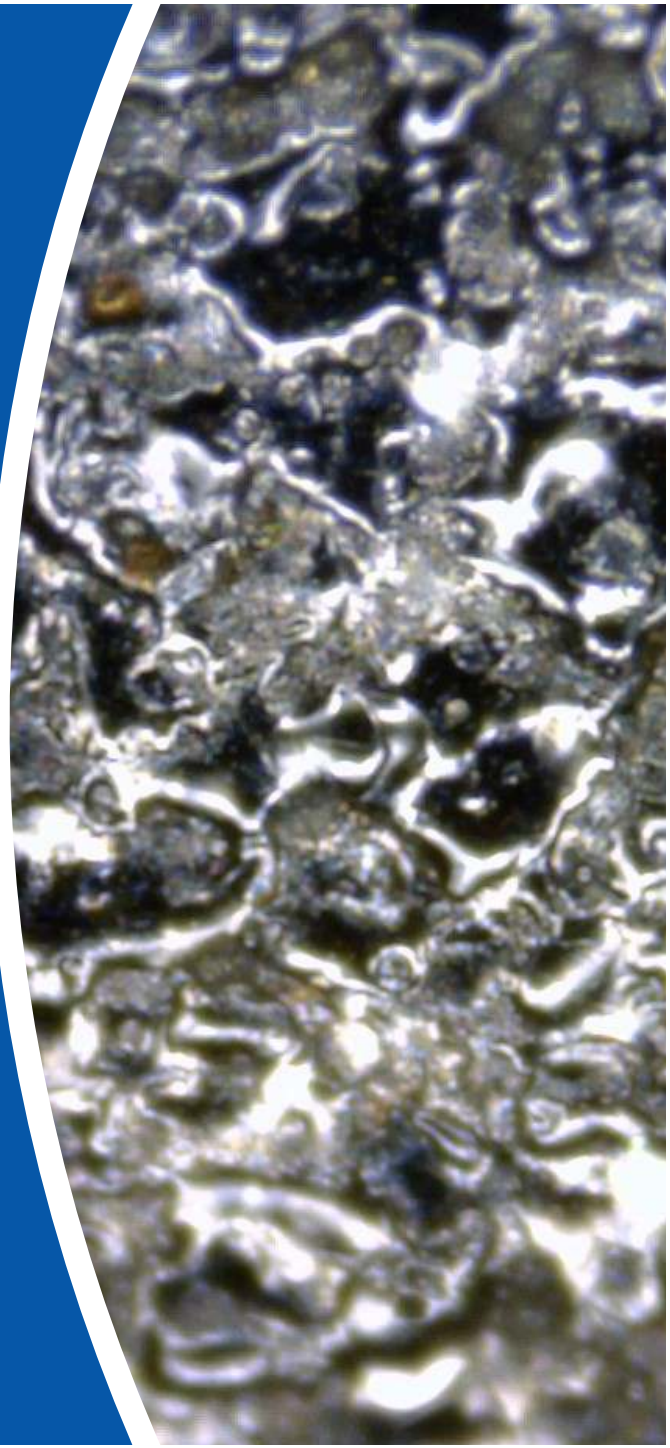
- 3 main products

Strand Condition Monitors for Continuous Casters
> 400 units supplied

Rollscan Inspection for Roll Grinding Shops
> 380 units supplied

Rolltex EDT for Roll Texturing
> 85 units supplied

Rolltex EDT



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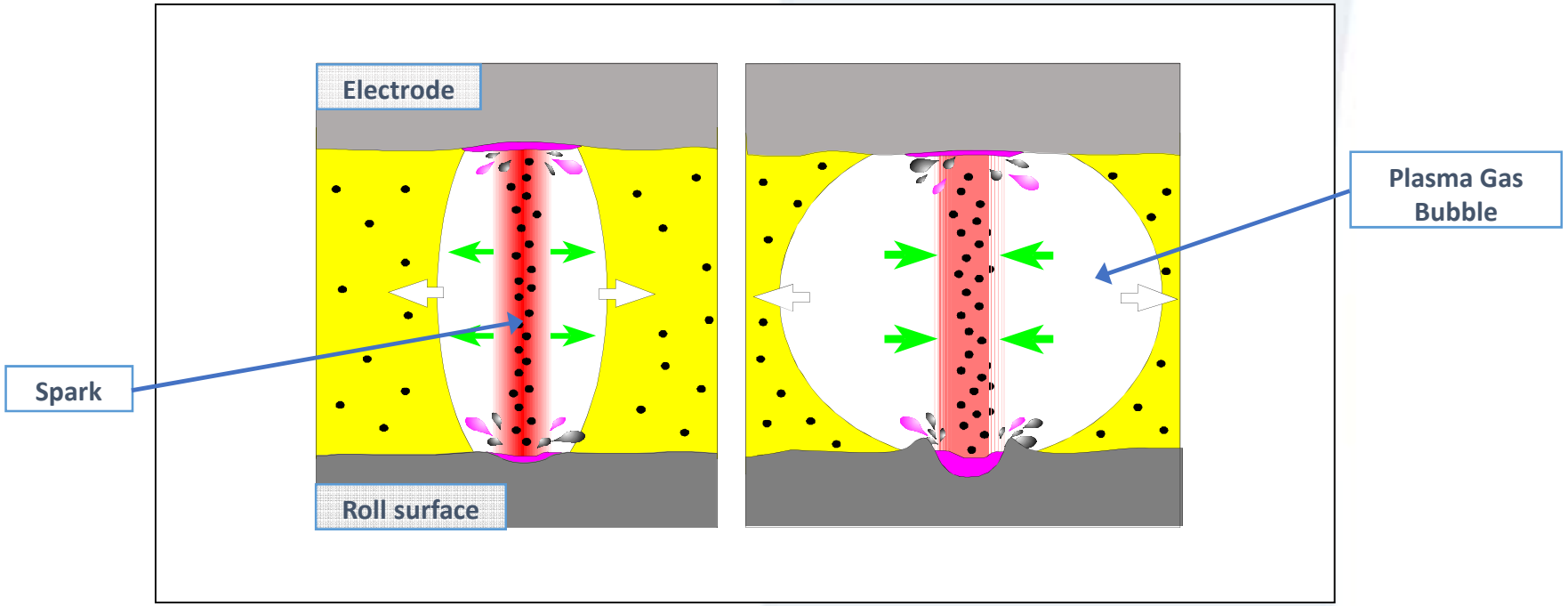
What is EDT?

Principle of EDT process – Single spark



Spark created between electrode and roll

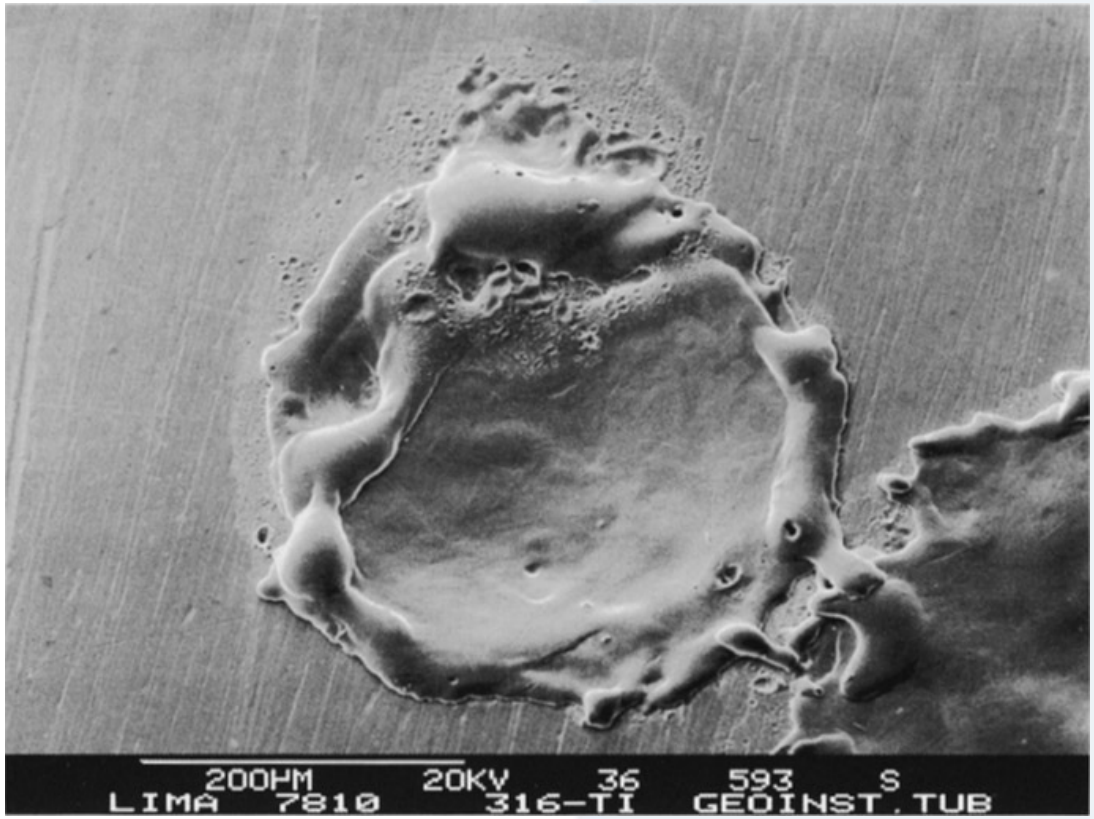
Gas bubble forms

Spark melts roll surface forming a crater

Gas bubble grows

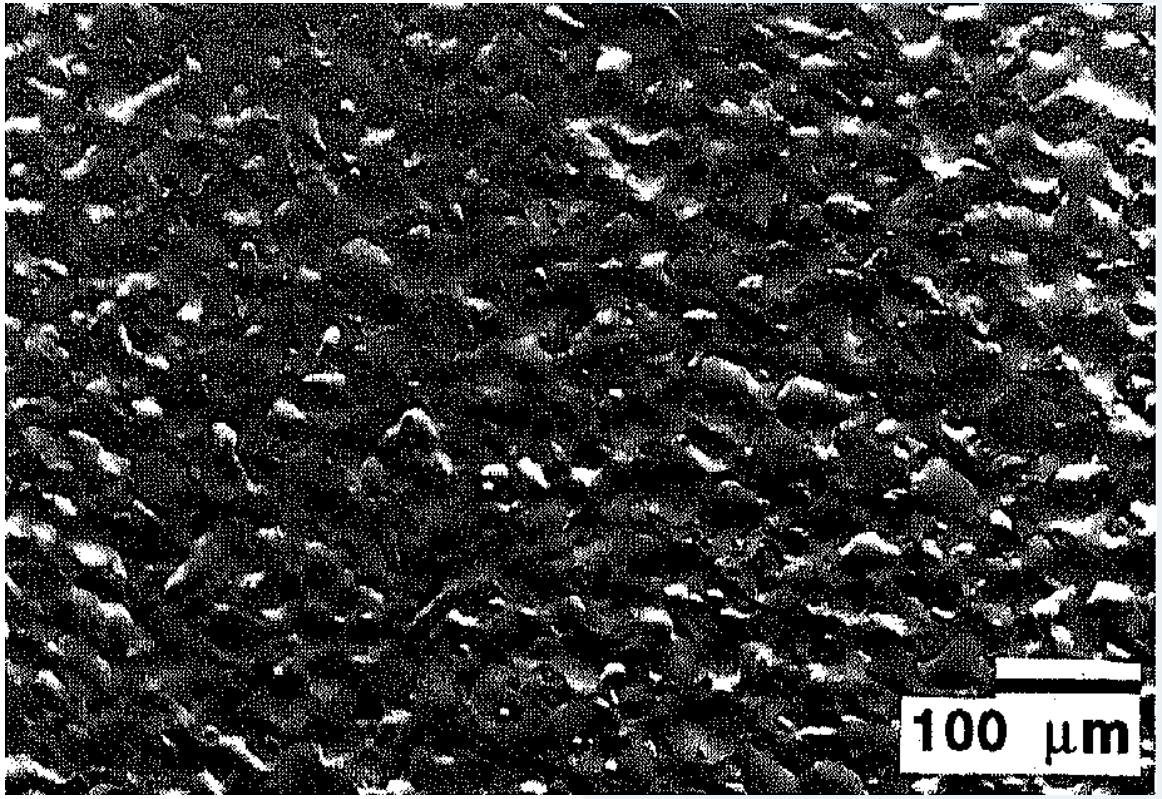
What is EDT?

Principle of EDT process – Single crater



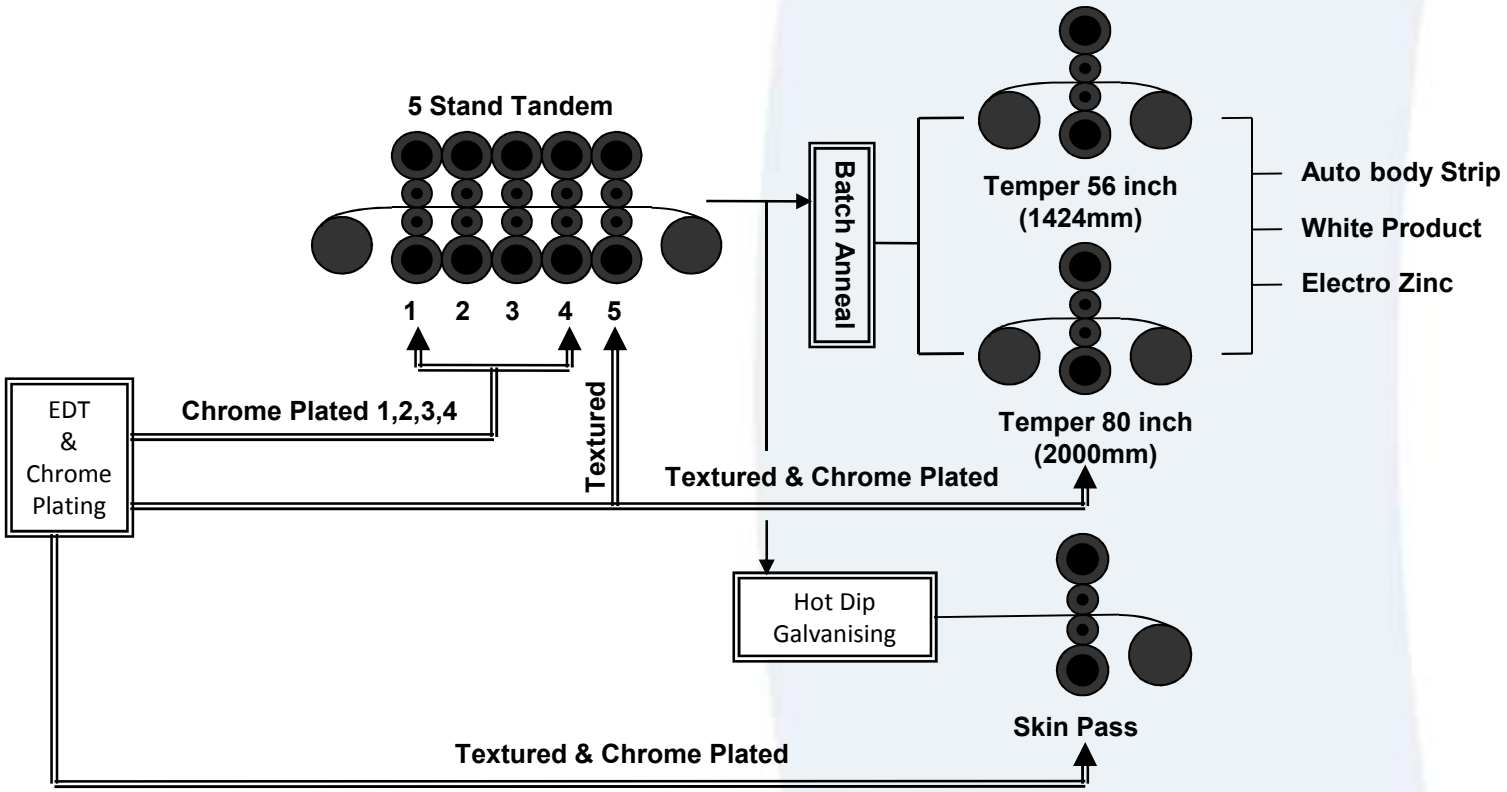
What is EDT?

Principle of EDT process – Textured Surface



What is EDT used for?

EDT in Production of Auto body and strip for domestic white goods



EDT benefits

EDT in Production of Auto body and strip for domestic white goods

Surface Preparation for Coating

- Removes minor defects or imperfections
- Better surface ‘keying’ aiding better bonding of surface coatings
- Industry required flat & even appearance for Automotive applications (stochastic & isotropic)

Improves Formability

- Retains even coating of lubricant for press
- Reduces flow friction in the press
- Retains surface appearance after forming

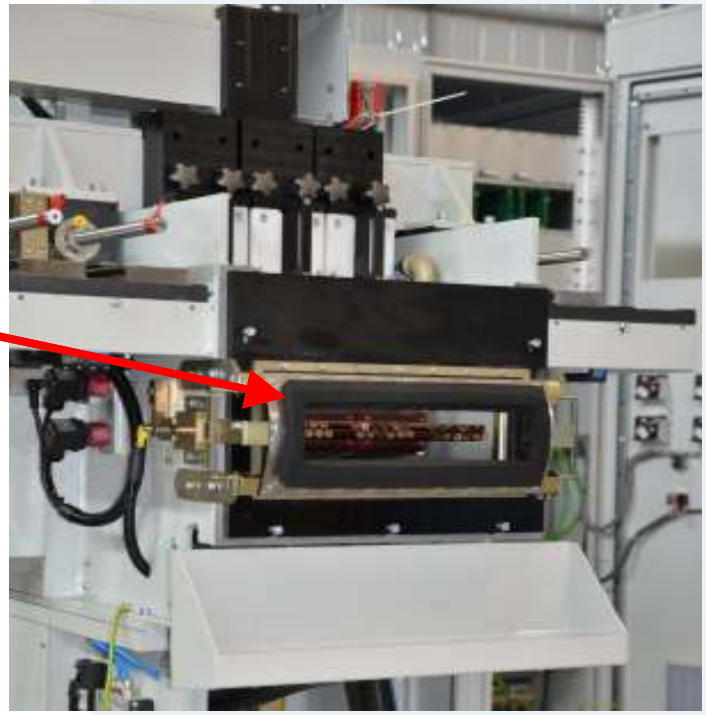
Sarclad Rolltex EDT machine range

- 72 Electrodes for typical production of up to 1000 rolls per month
- 36 Electrodes for typical production of up to 600 rolls per month
- 12 Electrode for narrow strip, Z mills or low roll volume texturing
- Eco EDT for aluminium & low volume steel strip production up to 1000 rolls per year
- PLUS Integrated automatic roll loaders

Sarclad Rolltex EDT machine range
72 Electrodes

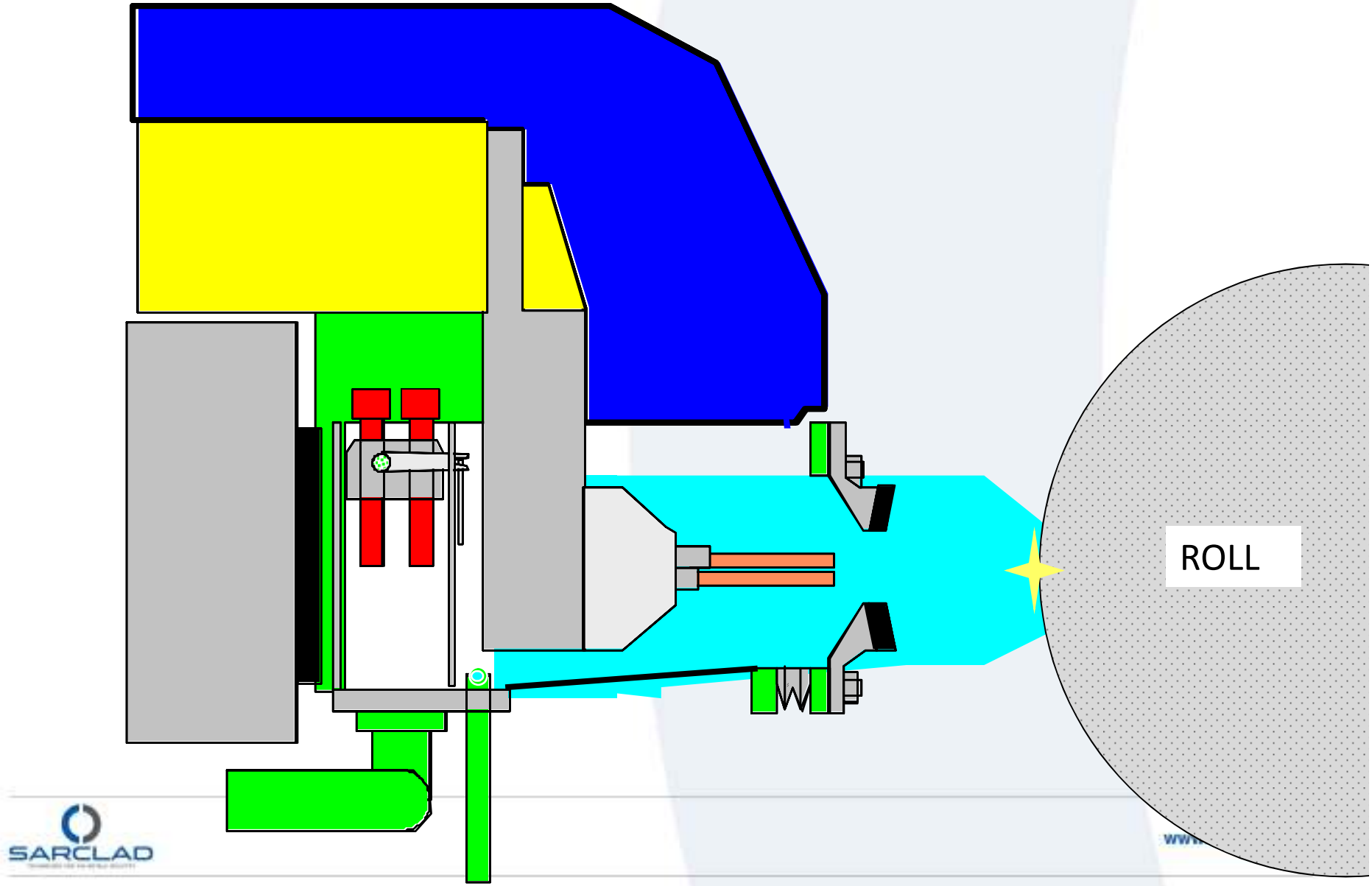
Sarclad Rolltex EDT machine range
12 Electrodes

Sarclad Rolltex EDT machine main components

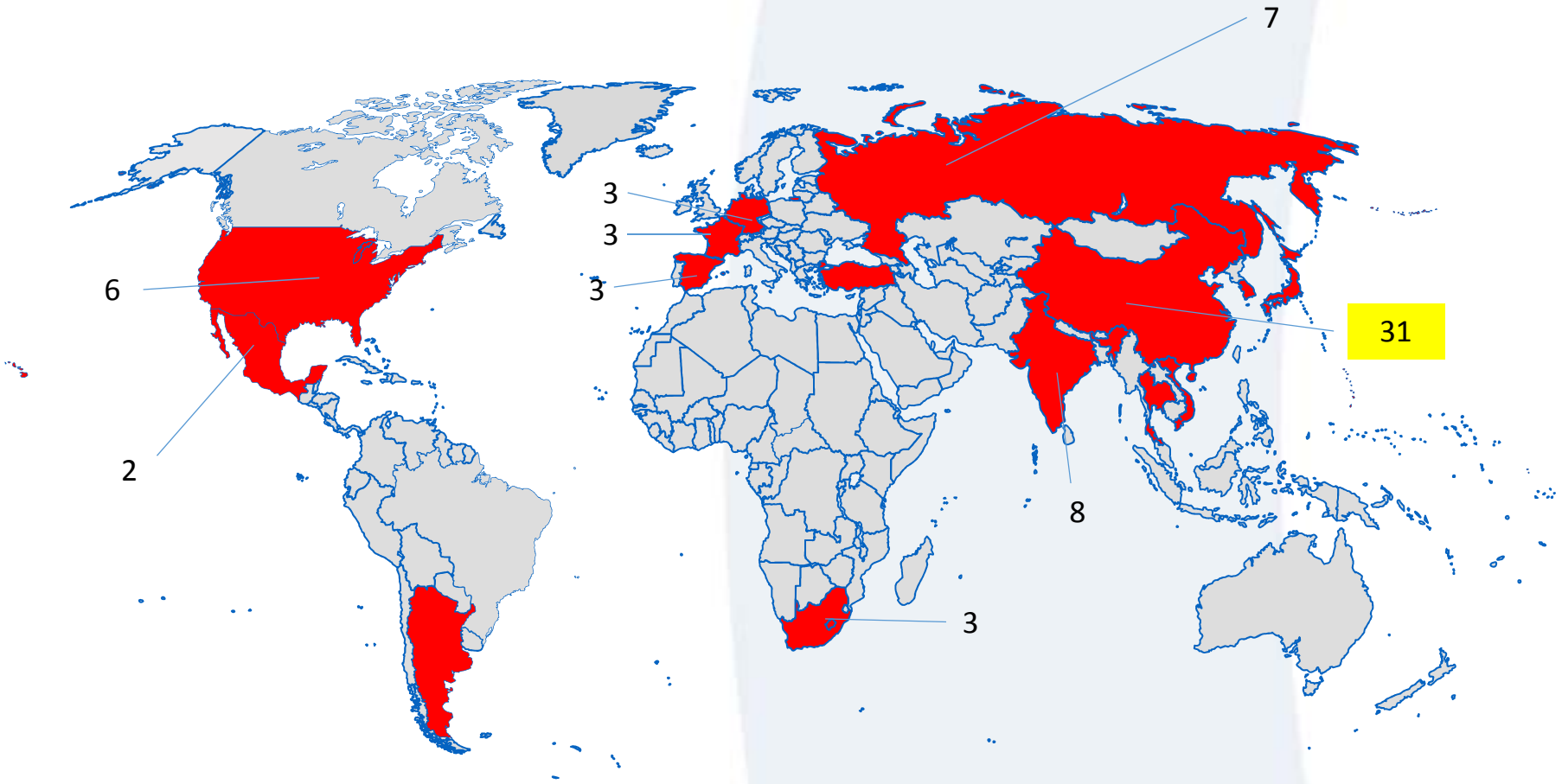


Saddle & texturing head

Sarclad Rolltex EDT machine process simulation

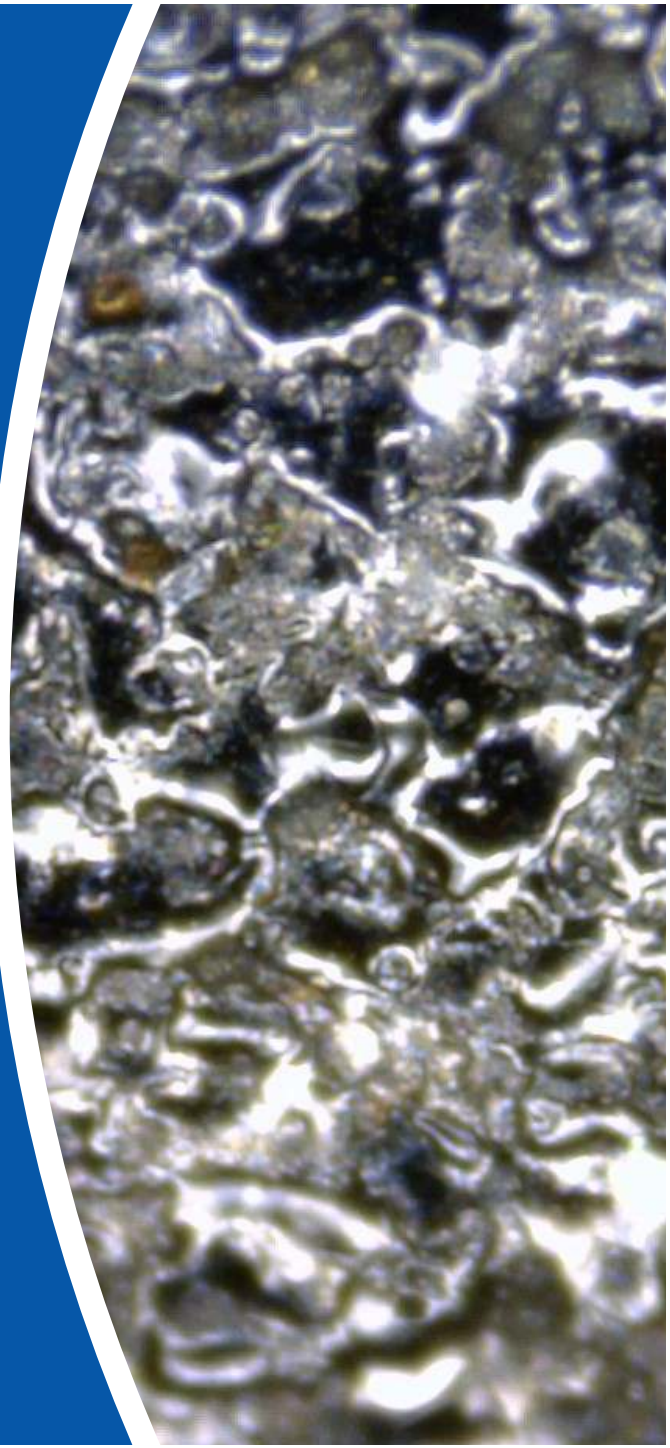


Sarclad Rolltex EDT – Worldwide experience



85 EDT installations

Rolltex ECO



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Rolltex ECO

Market drivers

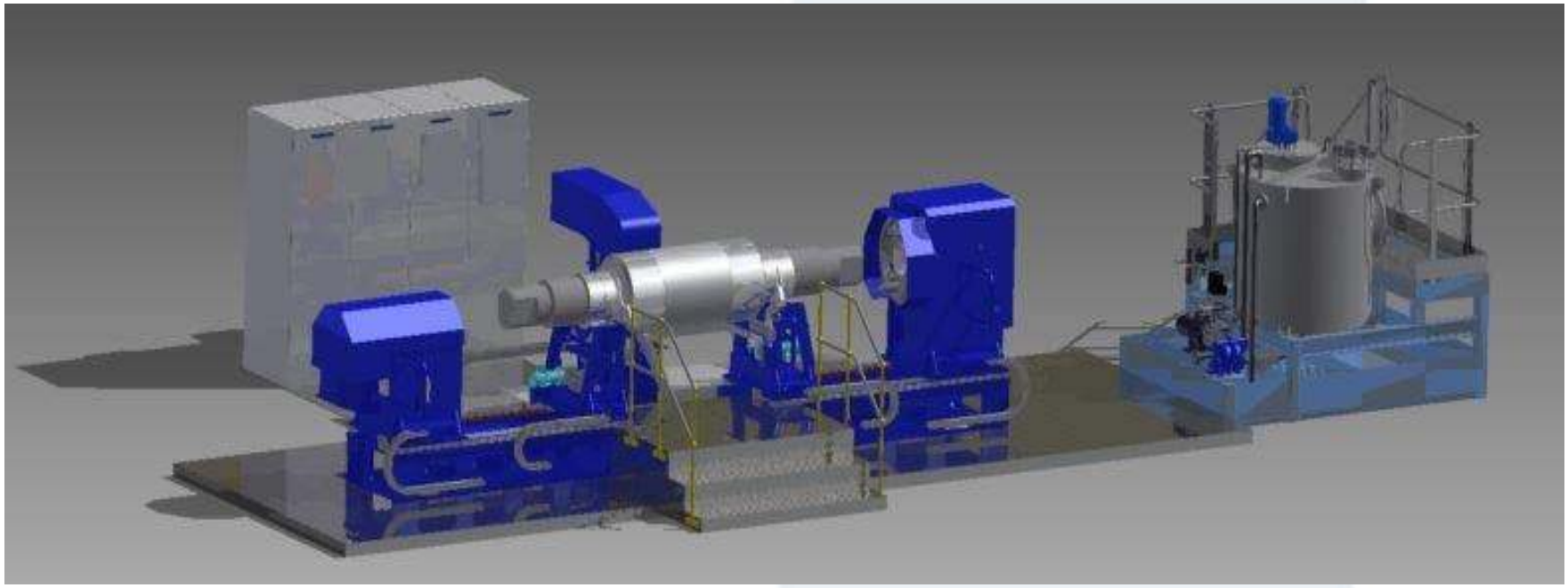
Reduced overall project costs

Wider market – specialist steels, aluminium

Lower capacity requirements

EDT preferred to other technologies e.g. laser

Rolltex ECO



Dedicated texturing for low volume requirements, steel & aluminium

Rolltex ECO

Key aspects of design

Same EDT technology repackaged

Floor mounted – reduced civils

Scalable dielectric plant to suit roll volumes

Reduced automation

Installed to suit roll geometries

750-1000 rolls capacity per year

Rolltex ECO

Key aspects of design

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Scalable dielectric plant to suit roll volumes

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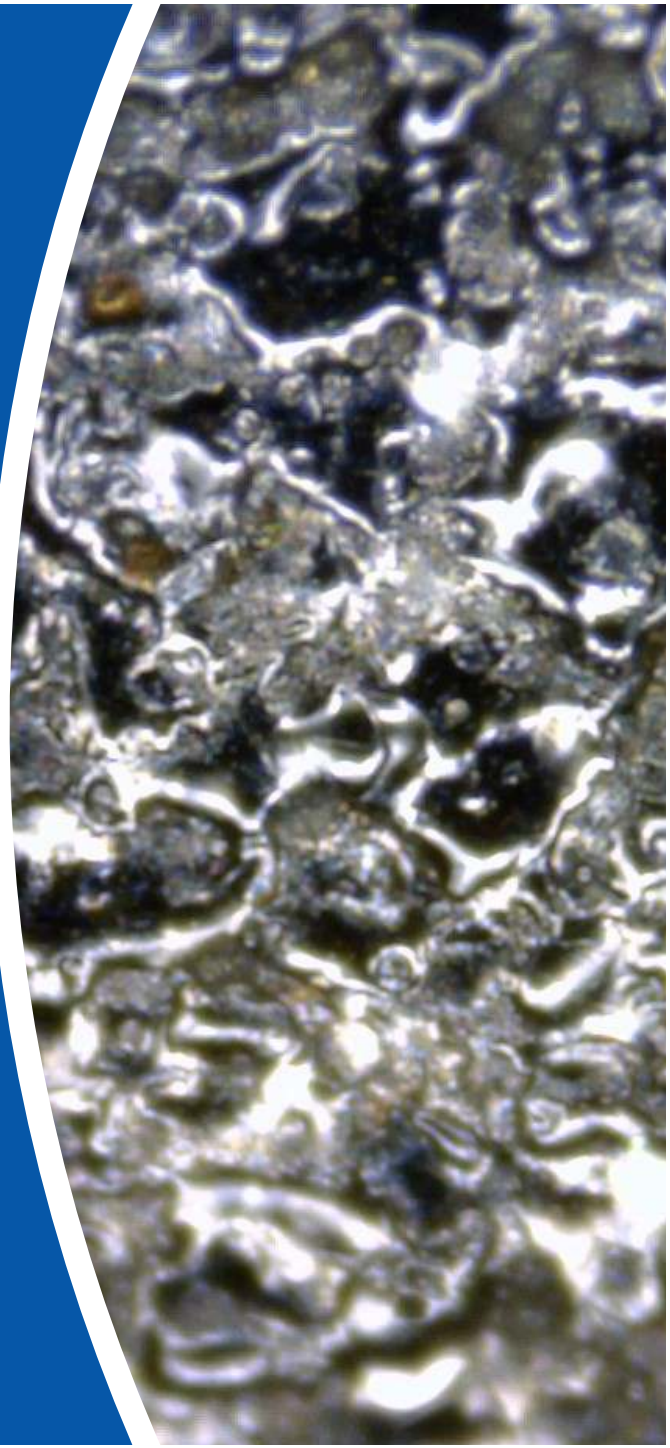
Rolltex ECO – First machine

Rolltex EDC



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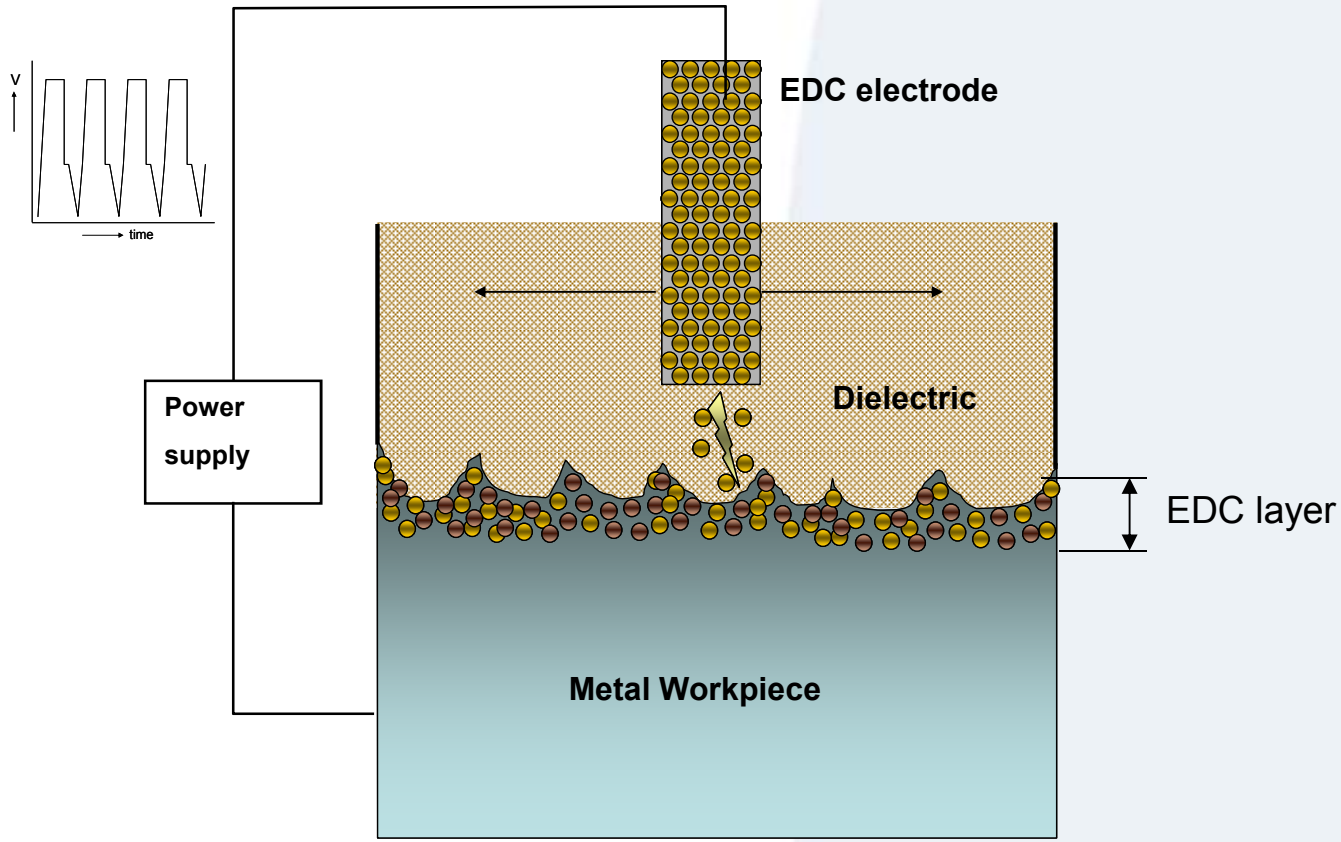
Electrical Discharge Coating (EDC)

- Collaborative project involving Sarclad, Tata NL and CRM

- EU-funded project – CrFreeRolls
- Objective to find replacement for Cr-VI plating of temper mill work rolls
- Several options considered – EDC gave promising results

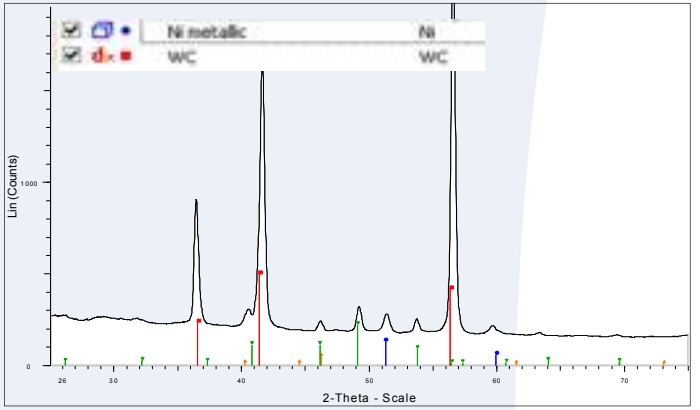
Electrical Discharge Coating (EDC)



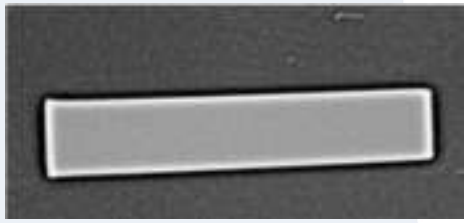
Texturing and surface hardening in one process

EDC Research

Tungsten carbide electrode



XRD analysis



γ ray inspection

Optimised electrode manufacture for stable operation

EDC Research

EDC electrode

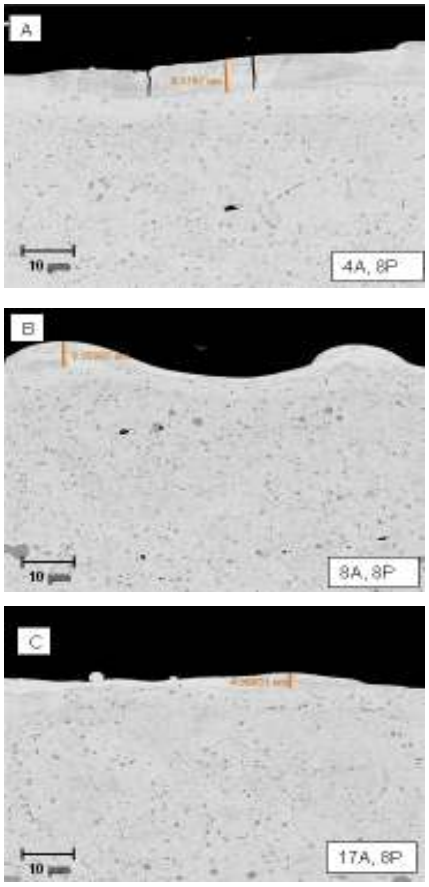
Roll undergoing EDC texturing

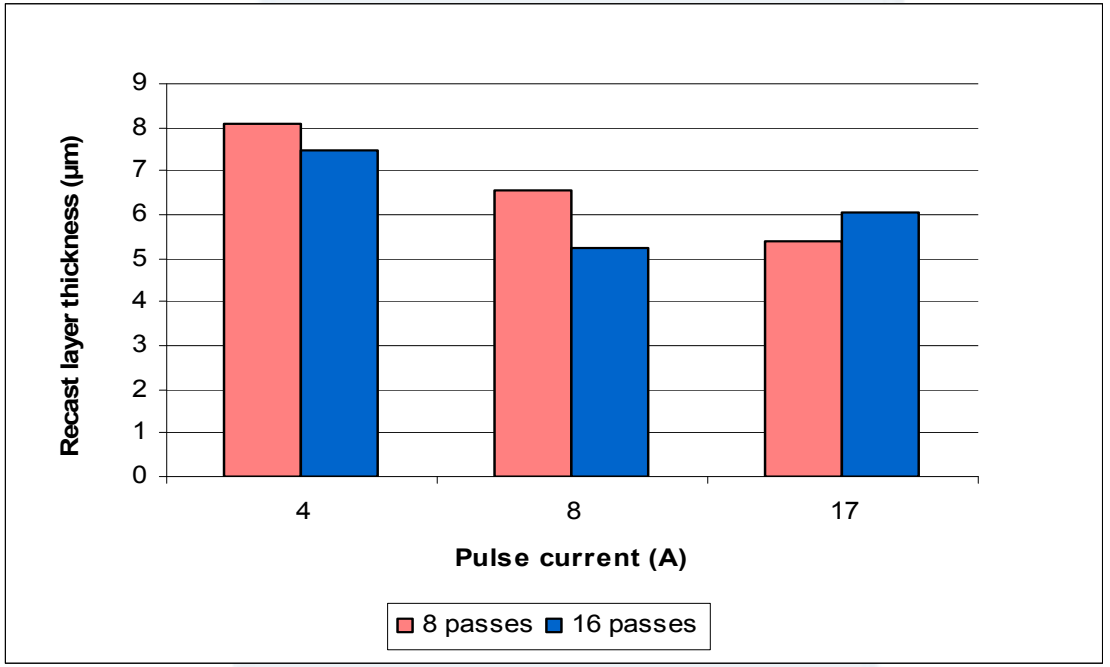
Homogeneous isotropic texture

- Ability to control Ra, Rsk and Rpc
- Electrode wear rate slower than conventional EDT

Optimised texturing parameters for best performance

EDC Research





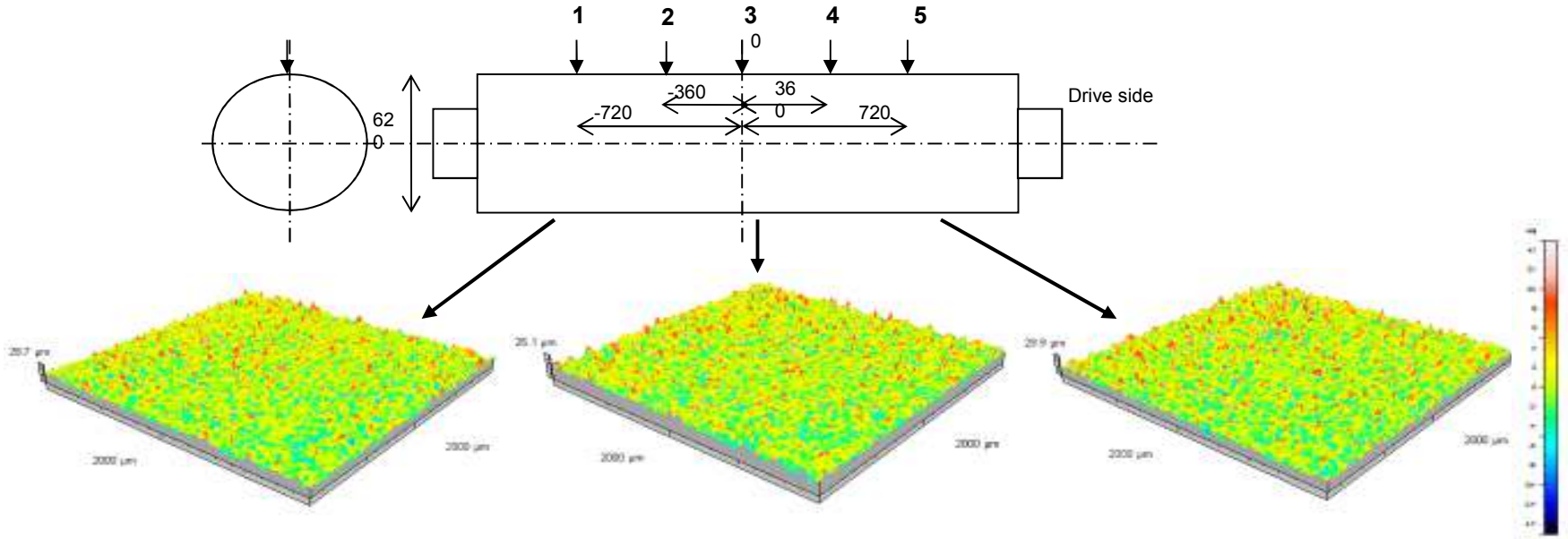
Significant influence of the applied current on the layer thickness

EDC Validation

- 2 pairs of Tata standard work rolls textured with EDC
- Texturing time around twice as long as EDT

EDC of rolls at Sarclad for industrial trials at Tata Steel NL

Sarclad validation – 3D topology of rolls



Sa: 2.44

Sa: 2.45

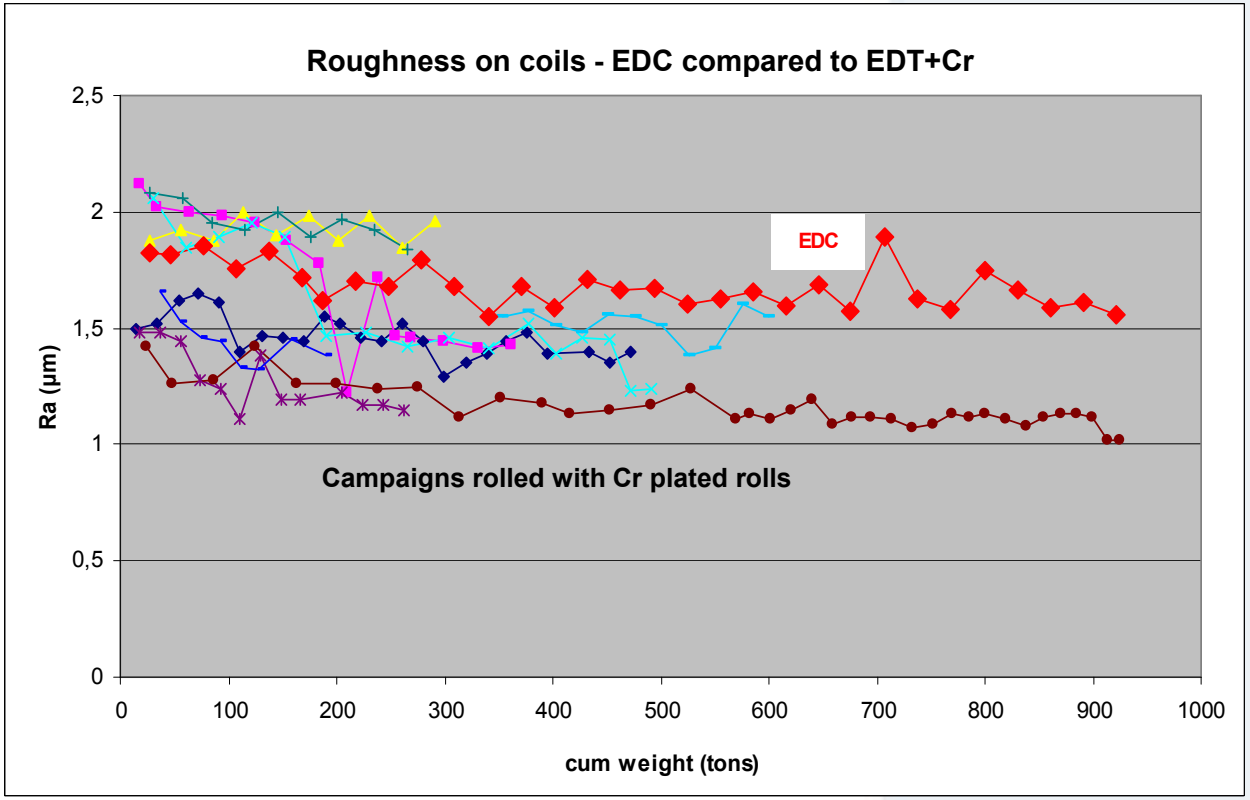
Sa: 2.46

Very homogeneous EDC surface finish across the roll

EDC Validation – Tata NL temper mill 21

EDC rolls ready for industrial trials

EDC Validation – Industrial trials roughness retention



- Ra constant during full-length 900 tons campaign
- Good strip surface quality

Promising results prompting further industrial trials

EDC Summary

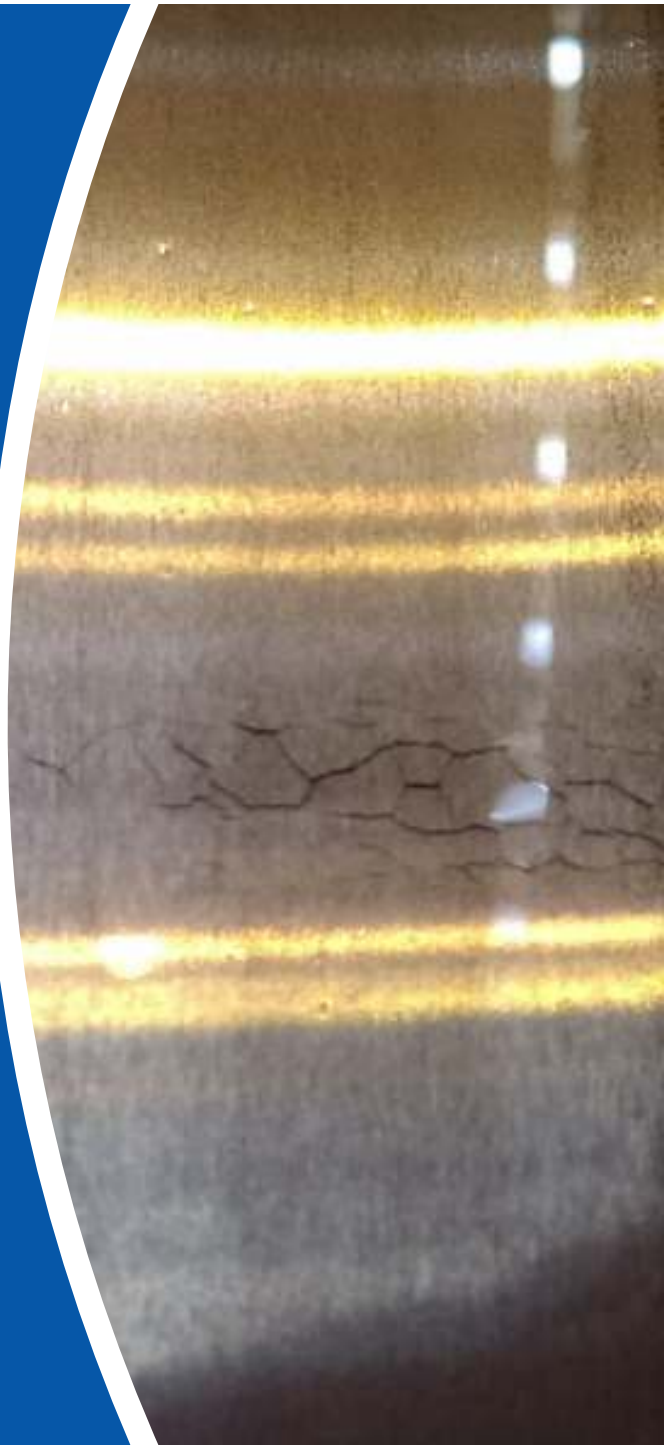
- Electrode manufacture optimised
- Isotropic EDC coated surface produced with hard constituents
- Thickness of recast layer can be controlled
- Laboratory tests – roughness retention of EDC coating comparable to EDT + Cr-plating
- First industrial trials very promising

- **Additional benefit is the potential for cost savings due to the elimination of chrome plating**

EDC Future

- Phase 2 testing – 30 pairs of EDC rolls for Tata
- 6 months further validation and learning
- Commercialisation of EDC
- Available on all new Sarclad Rolltex EDT machines
- Upgrades of existing Sarclad machines
- Patents
  - EDC electrodes
  - EDC coating with carbide electrodes in EDT process
  - EDC coating in EDT process

Rollscan



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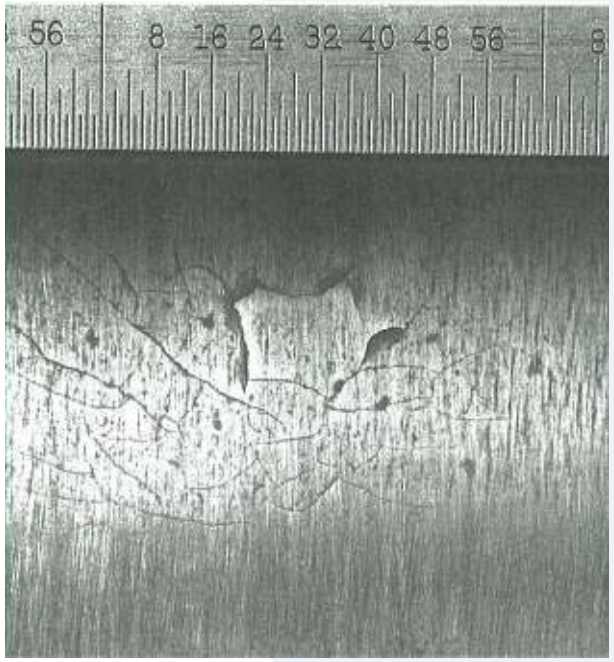
Rollscan

- Surface Inspection - To detect cracks and bruises in hot and cold rolling mill work and back-up rolls
- Sub-surface - To detect cracking, porosity, non metallic inclusions

Rollscan

Surface cracking – Typical examples

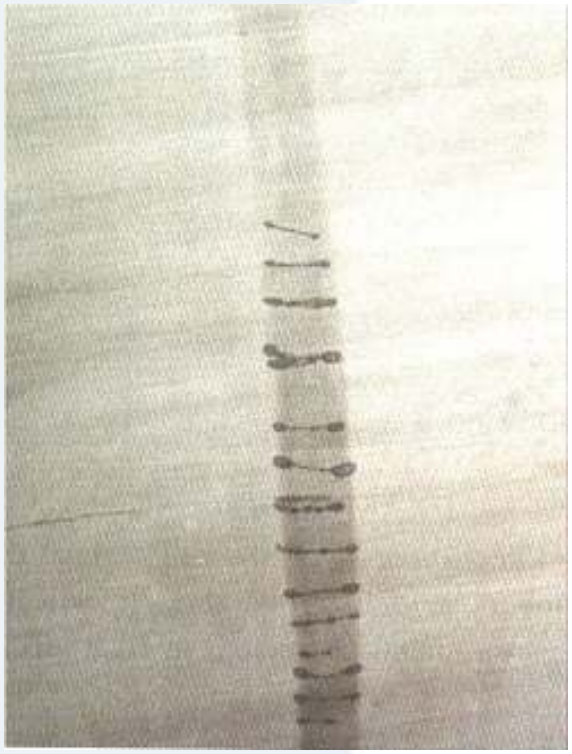
Hot Mill Firecracks



Cold Mill Firecracks

Rollscan

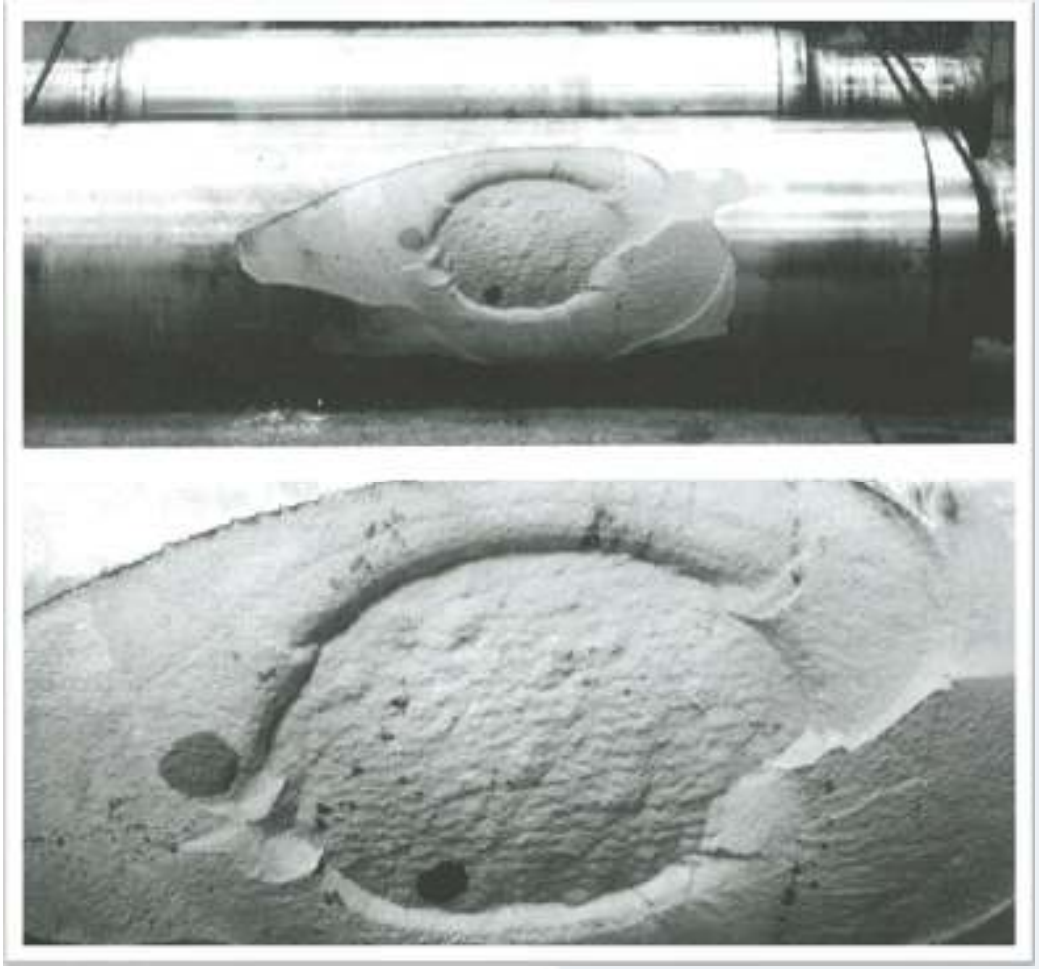
Bruising (Cold Mill Rolls)



Etched roll surfaces reveal Bruising (& Cracks)

Rollscan

Sub surface initiation of spalls



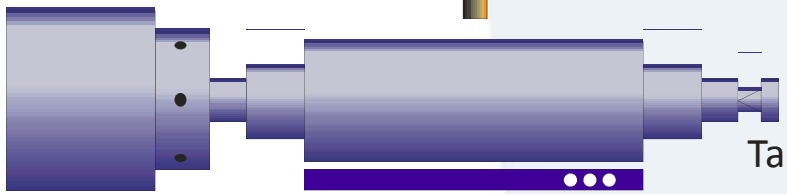
Hot Mill cast roll spall from shell / core interface

Rollscan

VGA Touch Screen Display and Control

Main Processor

Motorised Test Head Eddy Current and Ultrasonic



Headstock

Tailstock

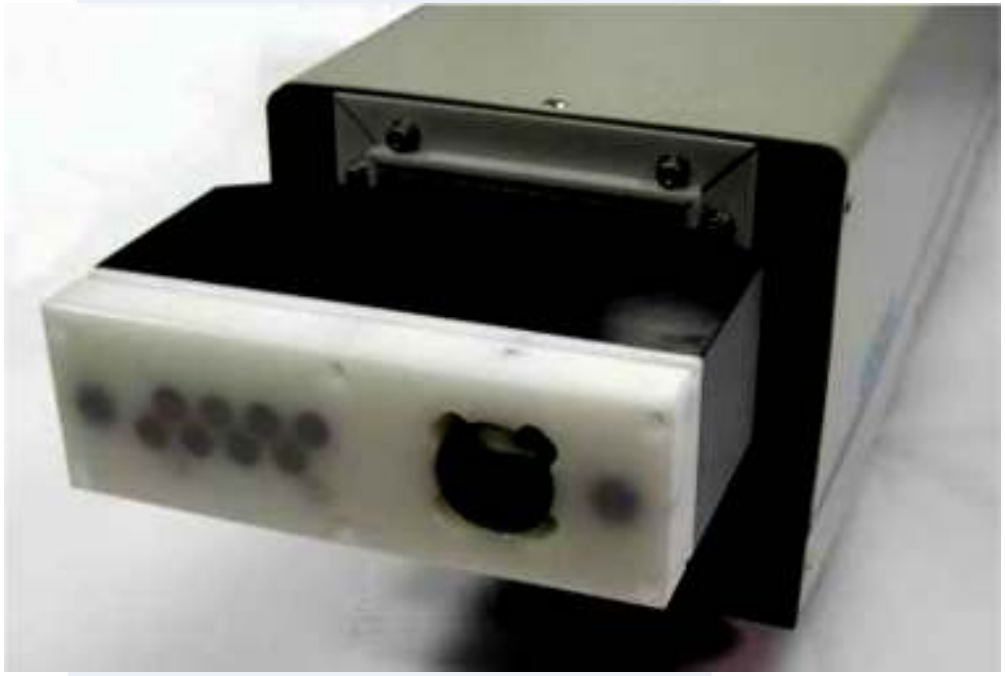
Longitudinal Encoding

Angular Encoding

Test head Auto Retract

Rollscan

Combined eddy current & ultrasound



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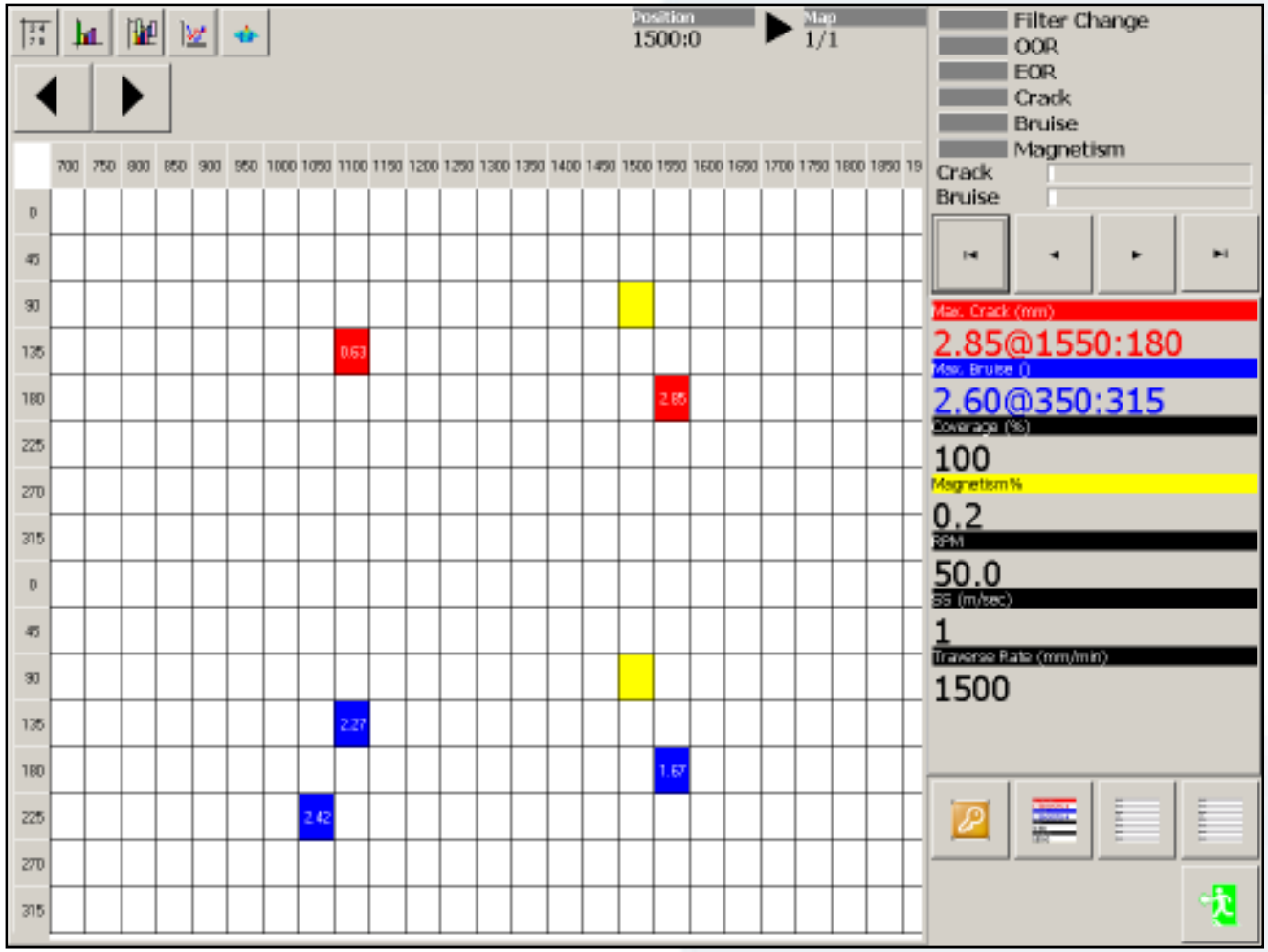
Surface defect map display



Rollscan

Benefits

- Guaranteed roll quality
- Non-contact NDT inspection
- Simple, user-friendly operation
- Accurate control of surface and sub-surface roll integrity
- Increased roll life, decreased roll cost

Experience + Innovation

Over 35 years of experience

Developing new solutions for new roll applications

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