ZINGAMETALL
ZINGA Film Galvanizing System

www.zinga.eu

History

- Created in the late 70’s, family owned Company.
  - Started with ZINGA (Zinganisation)
  - Goal: to combine the benefits of
    HDG and Paints
  - Development in cooperation with:
    - University of Ghent
    - Umicore (Everzinc)

- Applications / References all over the world
- Lots of test Reports and Certificates followed
- Certified ISO 9001:2015 & ISO 14001:2015
- New website (www.zinga.eu) and presence on Social Media :
  Linkedin, Facebook, Twitter, Instagram, YouTube.
- New Owners & Management since February 2014

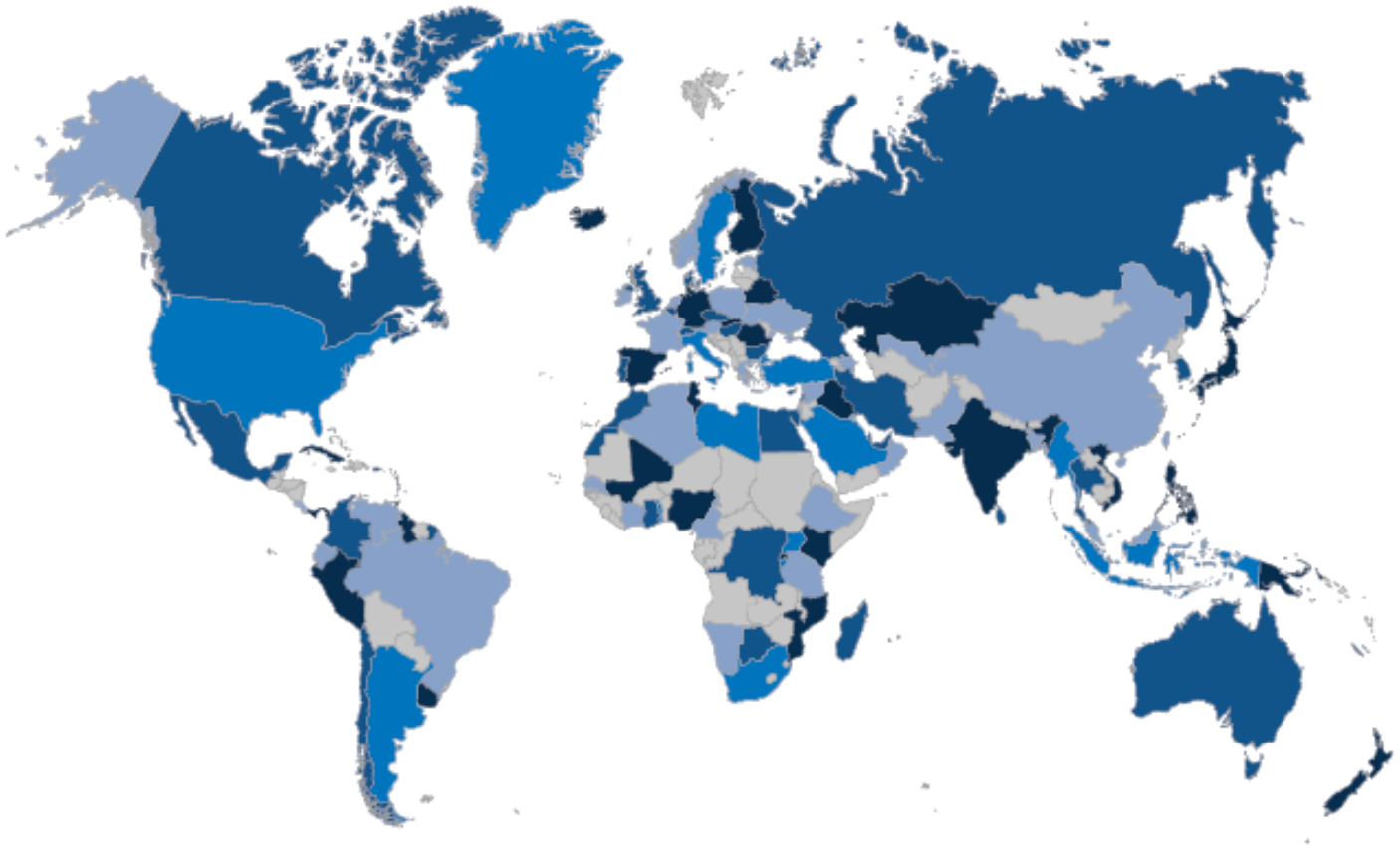
Current activities

- Production and sales of ZINGA range

- Expansion of distributorship
  95 distributors in +100 countries:
  - Africa, Asia, Australia & NZ
  - Europe, Middle East
  - North & South-America

- Expansion of range of products
  - ZINGA as primer or shop-primer
  - ZINGA as stand-alone system
  - Sealers
  - Topcoats

ZINGA®



+100 COUNTRIES and counting …

Antigua
Algeria
Argentina
Australia
Austria
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Botswana
Brazil
Brunei
Bulgaria
Cameroon
Canada
Chile
China
Columbia
Comores
Colombia
Congo Democr.
Congo Republic
Costa Rica
Cuba
Cyprus
Czech Republic
Denmark
Dominican Rep.
Egypt
Ecuador
Estonia
Ethiopia
Finland
France
Fiji Islands
French Polynesia
Germany
Ghana
Greece
Guadeloupe
Hungary
Iceland
India
Iran
Iraq
Ireland
Israel
Italy
Ivory Coast
Indonesia
Japan
Jordan
Kazakhstan
Kenya
Kuwait
La Réunion
Lebanon
Libya
Madagascar
Malaysia
Malta
Martinique
Mexico
Morocco
Mozambique
Myanmar
Namibia
Netherlands
New Caledenia
New Zealand
Nigeria
Norway
Oman
Papua New Guinea
Peru
Philippines
Poland
Portugal
Qatar
Romania
Russia
Rwanda
Saint-Lucie
Saint-Martin
Mauritius
Mayotte
Seychelles
Singapore
Slovakia
Slovenia
Saudi Arabia
Solomon Islands
South Africa
South Korea
Spain
Sri Lanka
Sweden
Tahiti
Taiwan
Tanzania
Thailand
Togo
Tunisia
Turkey
Uganda
Zambia

Ukraine U.A.E. United Kingdom U.S.A. Uruguay Venezuela Yemen

ZINGA Characteristics and Advantages

Main characteristics

- Active, cathodic, galvanic protection
  → Very high zinc content (96%)
  ~ Hot-dip, metallisation

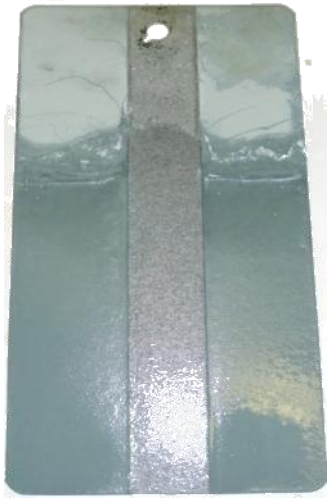
- Passive barrier protection
  → Zinc salts on top of surface
  ~ Protective paints

- One component organic Zinc coating

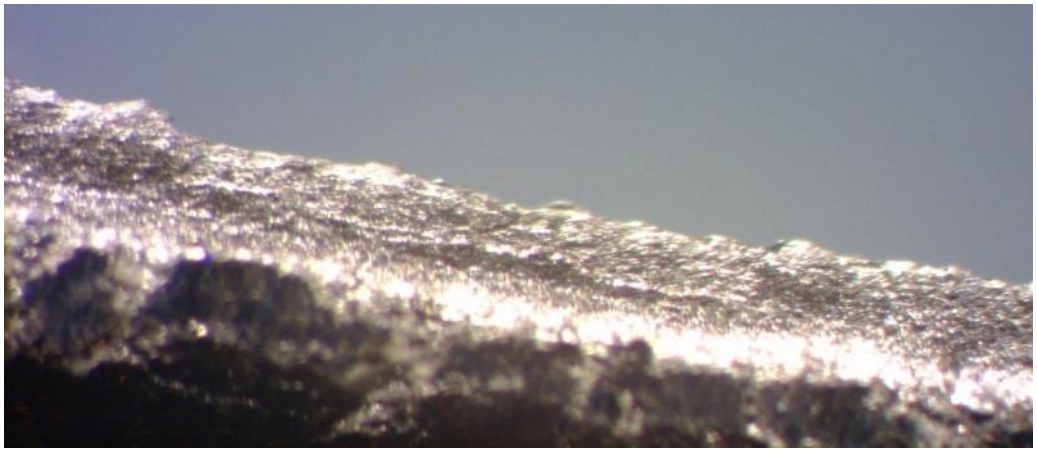
- ZINGA is NOT a paint
  - Does not form a closed film
  - Will not crack

14 days in water immersion

Untreated



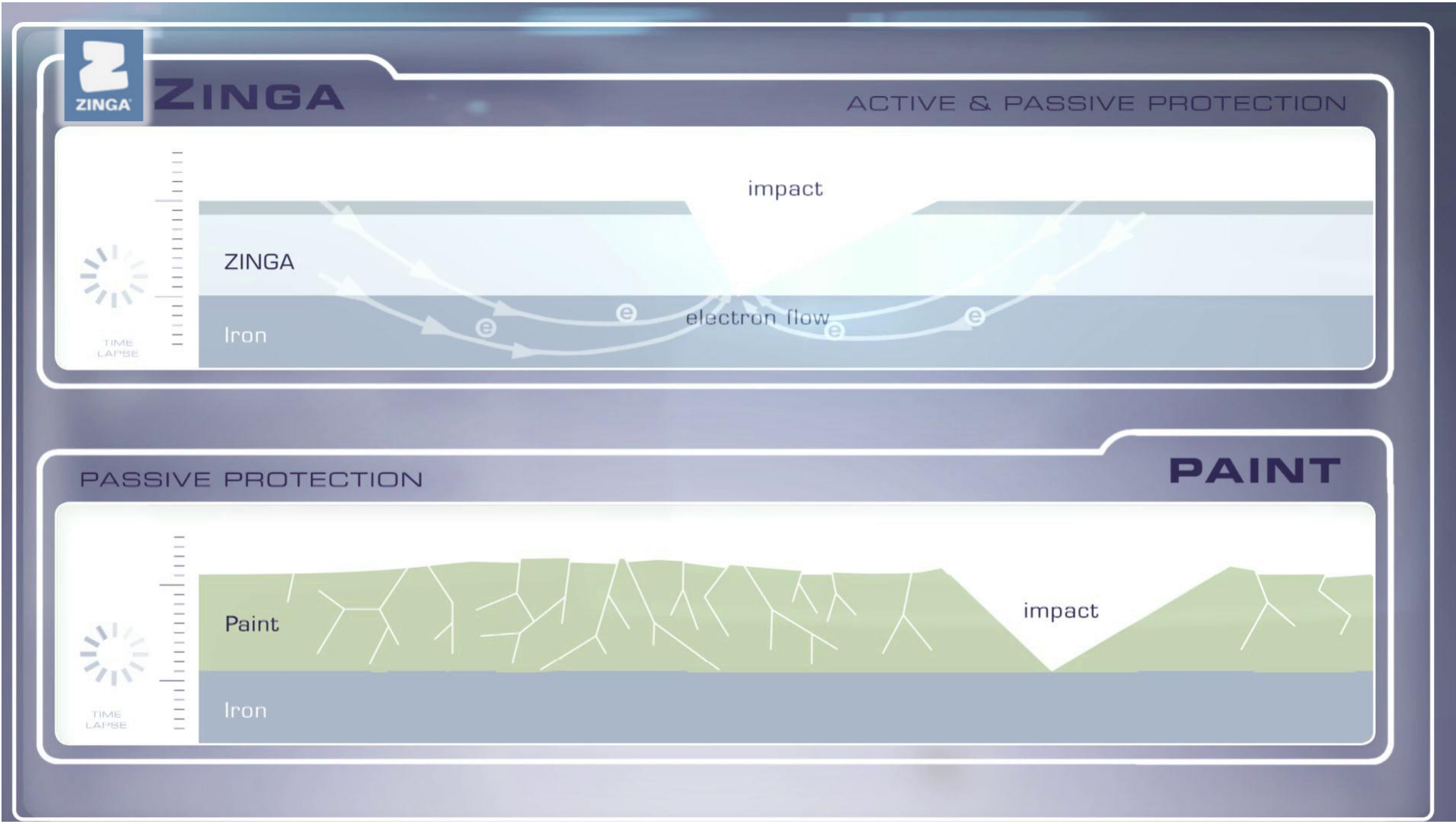
Treated except 2cm strip



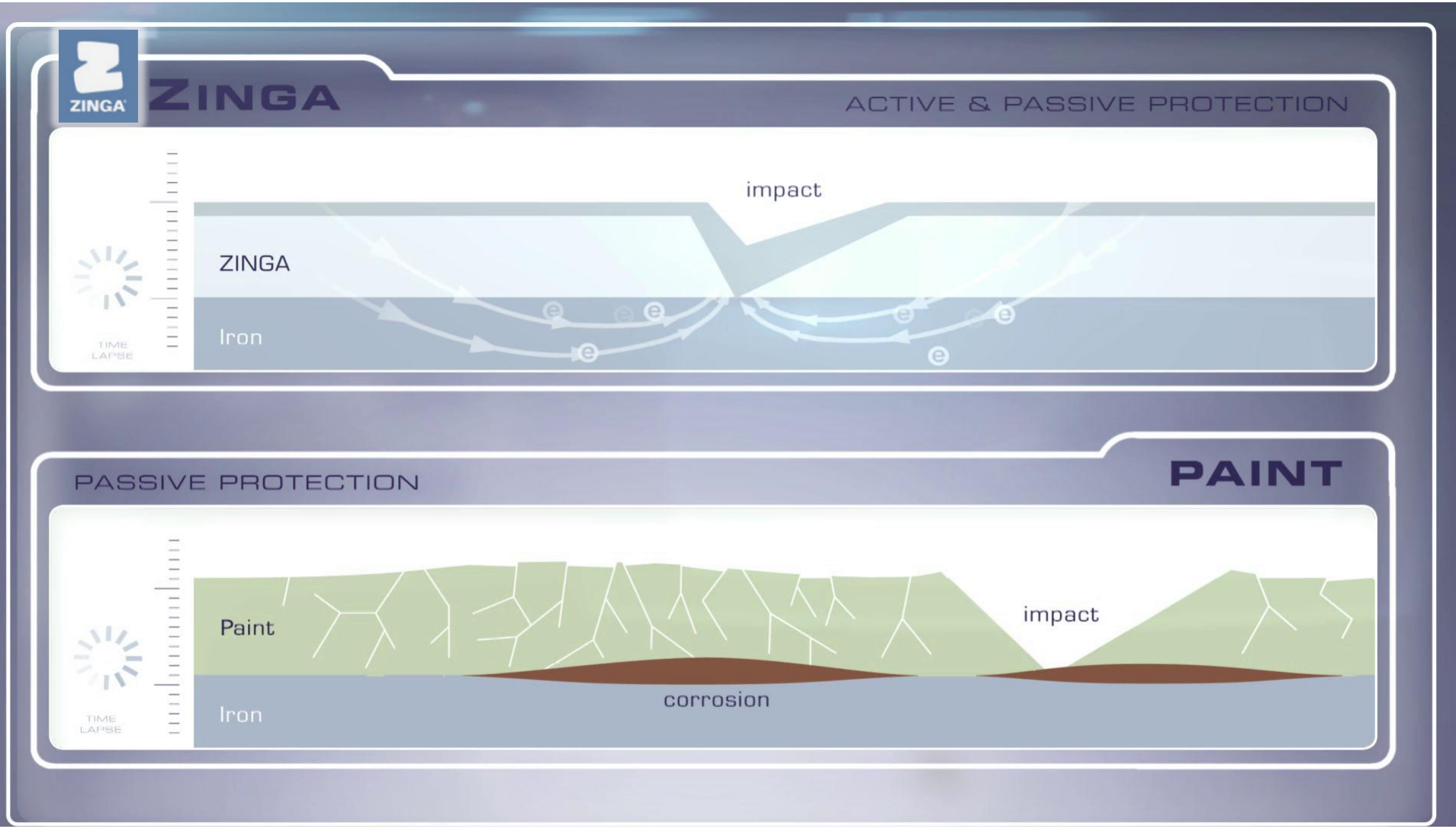
ZINGA layer

Working principle

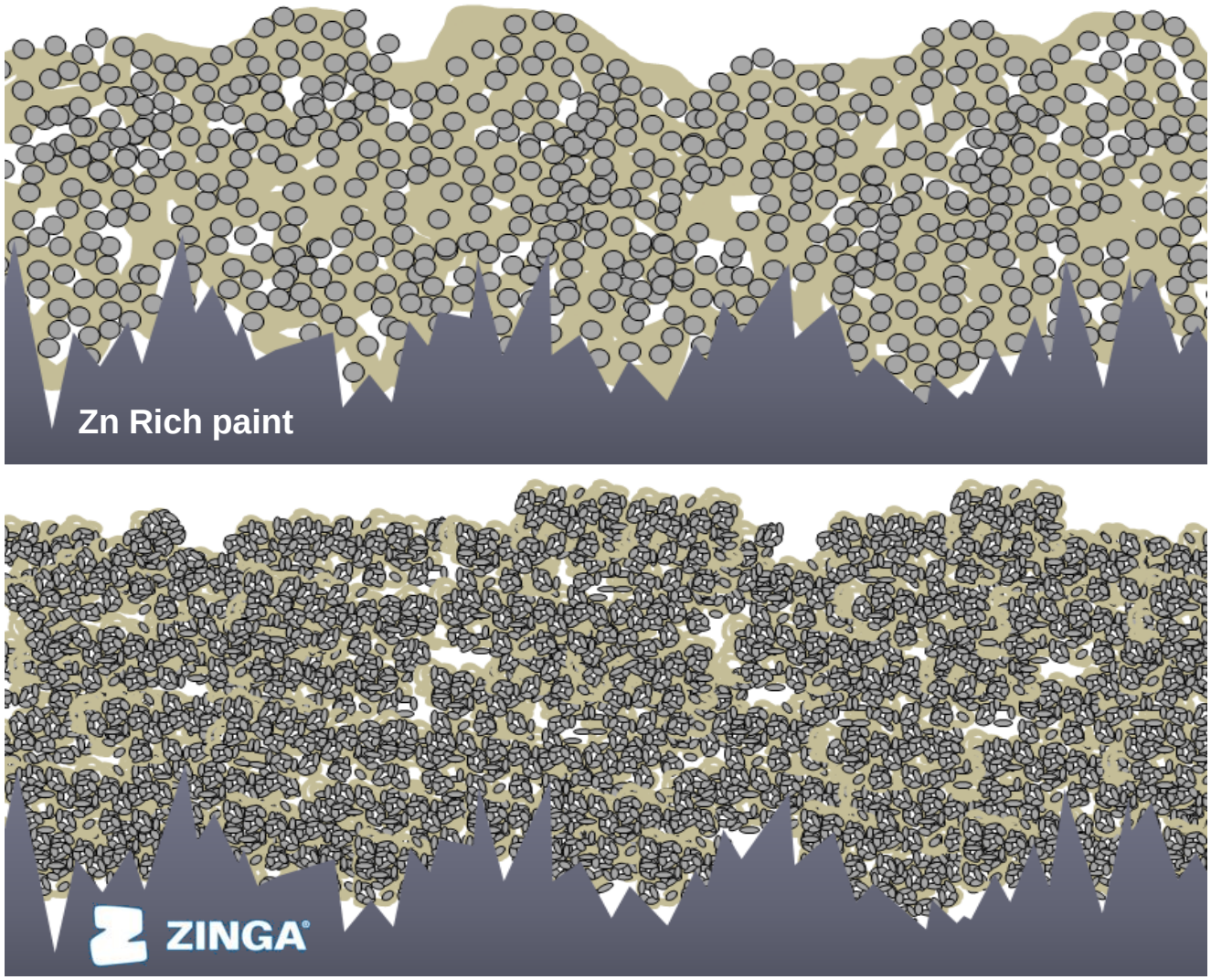
Working principle



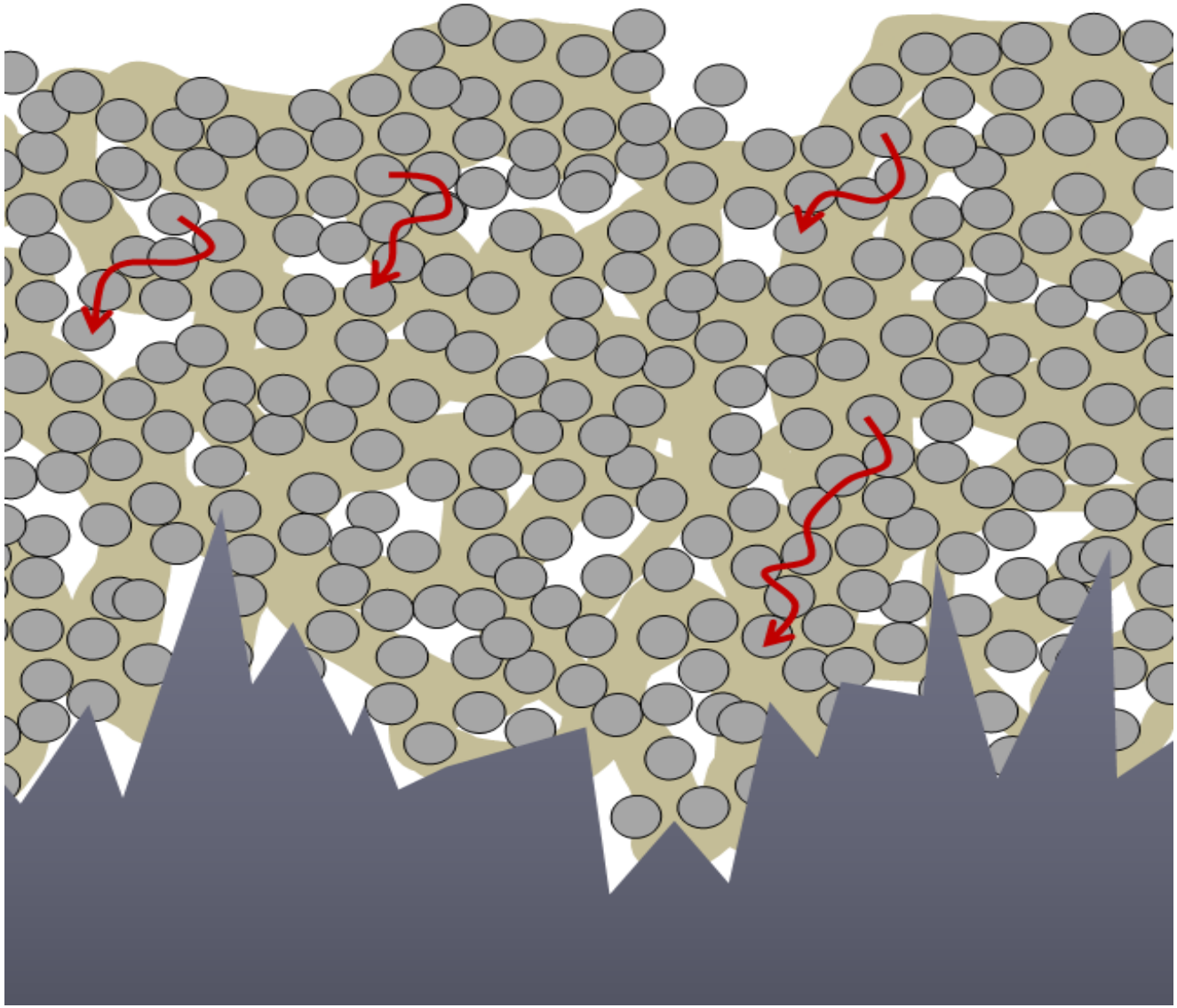
Working principle



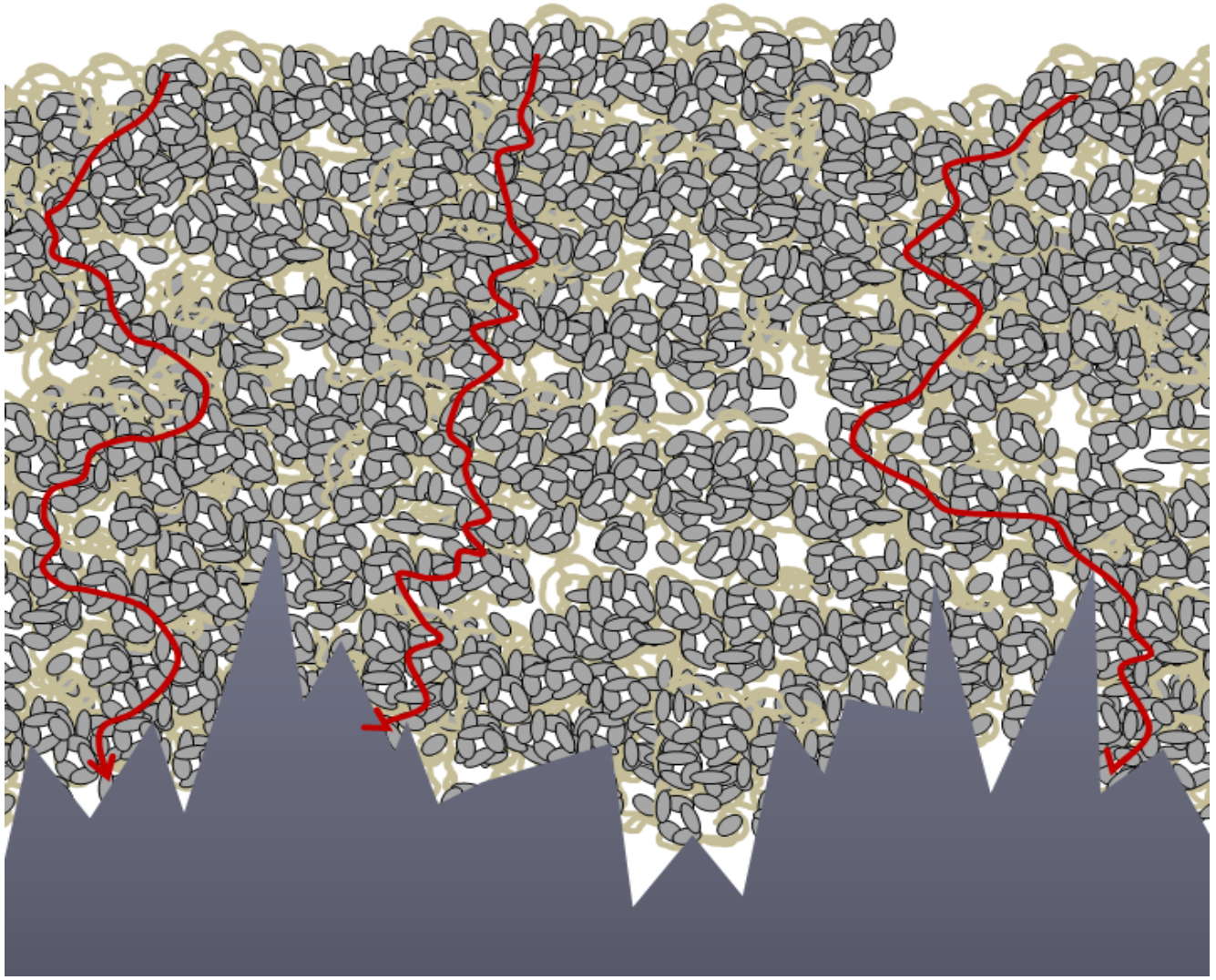
ZINGA vs Zinc rich paint



ZINGA vs Zinc rich paint



ZINGA vs Zinc rich paint



Advantages

- Easy application on site and in workshop
  - By brush, roller, painting gloves, spray-application (conventional or airless)
  - Can be applied on site, even by non-professionals
- Application in a wide range of weather conditions
  - Damp surface (no droplets) (95% R.H.)
  - High or low temperatures (-20° to +45°C)
- Application under ambient temperatures
  - No deformation
  - No energy loss

- ZINGA as NEW system
  ZINGA as REPAIR system

Advantages

- Quick drying time
  - Touch-dry in 10 min (20° C)
  - ZINGA second layer: 1 hour after touch-dry
  - Other paints: after 6 to 24 hours

- Does not peel off and is not brittle
  - Will be compressed or squashed
  - Will not crack thanks to its flexibility

- Local damages can be repaired easily
  (e.g. after transport or heavy mechanical impact)

- Less “burn-back” than with epoxy (2 to 3mm)

- No undercreep when local damages (no flaking)

SAUDI ELECTRICITY COMPANY
INTAKE VALVES AND PIPES

Belgium: Wind mill pile

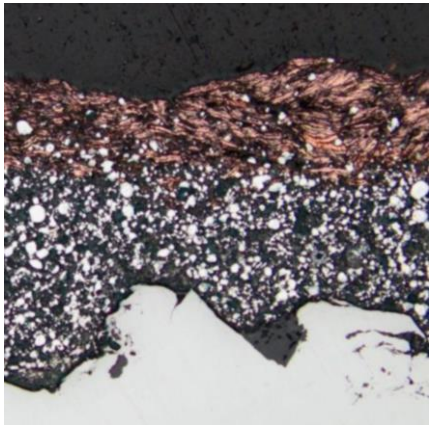
ZINGA

Compressed ZINGA,
exposing the shiny zinc.
(polished by the pressure)

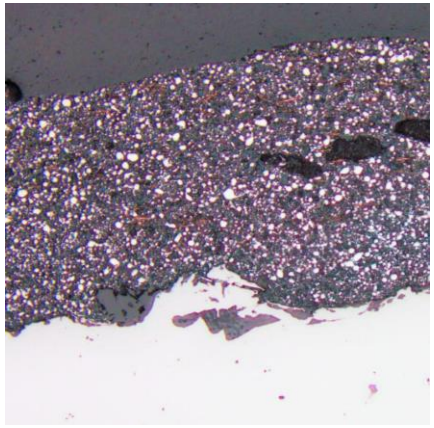
Advantages

- Galvanised structures can be ***recharged or reloaded*** with ZINGA
  - ZINGA on ZINGA
  - ZINGA on Metallised or HDG

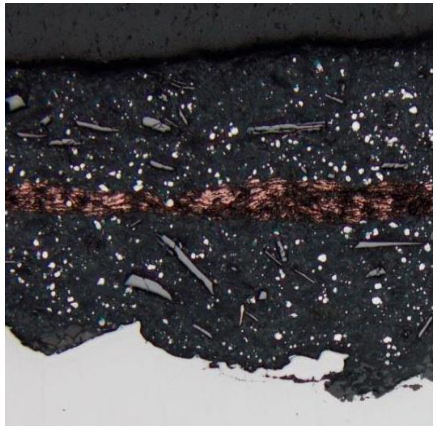
- Each new layer of ZINGA blends perfectly with the previous one.
  Additional layers all blend to **<u>one single, homogeneous ZINGA layer</u>**



Copper particles on top of ZINGA



Application of 2nd pass ZINGA on copper particles ;
The copper particles blend in the two layers of ZINGA



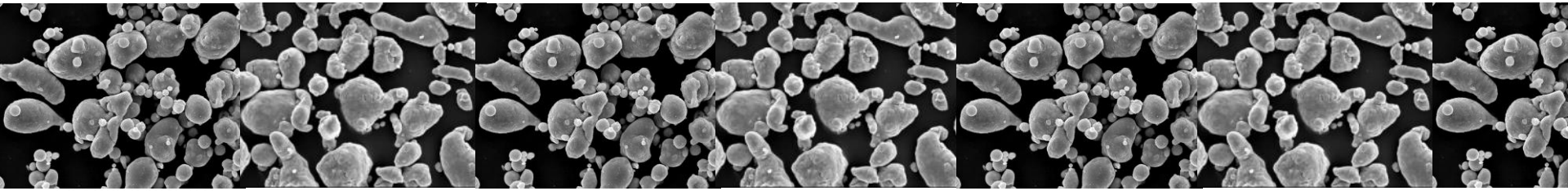
Copper particles in between the two layers of epoxy paint.
Epoxy does not blend together !

Advantages

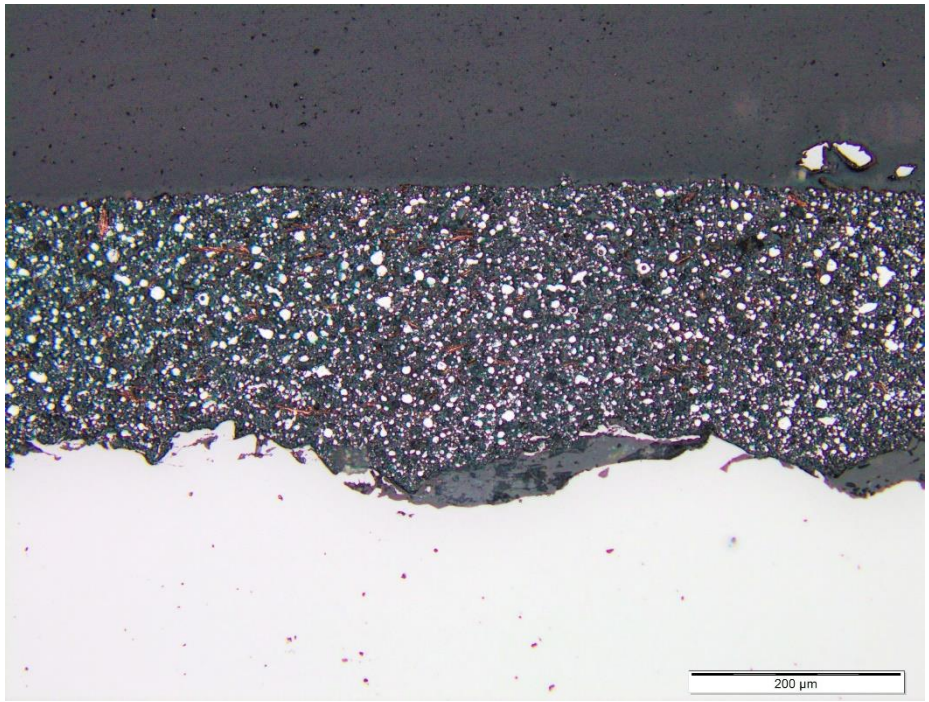
- Based on zinc protected by a special resin
  - Formation of the galvanic couple
  - Additional protection

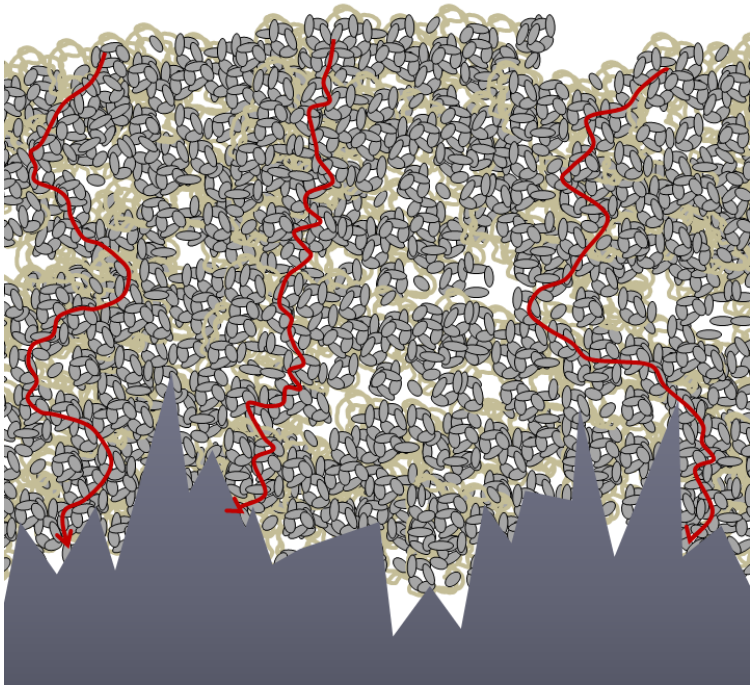
- Specifications
  - 96% zinc in the dry layer of ZINGA
  - Very high amount of metallic zinc (97%)
  - Very high purity of the zinc granules (99,995%)

- Especially shaped zinc granules
  - Bigger contact surface
  - Better attachment to one another



ZINGA LAYER = 96% atomised pure zinc in whole layer !





ZINGA SPRAY vs OTHER ZINC SPRAY

Electrical Potential

Other zinc spray

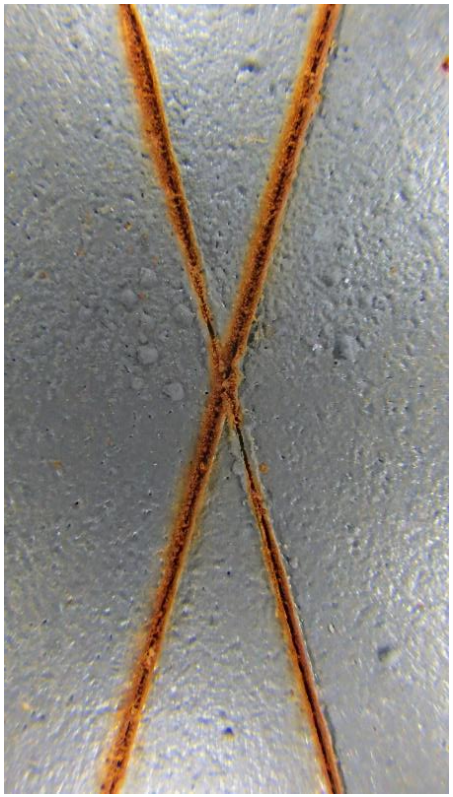
ZINGASPRAY

Voltage measurement in salt water (electrolyte) with an AgCl reference electrode

ZINGA®

ZINGASPRAY vs OTHER ZINC SPRAY

Immersion test



Other zinc spray

ZINGASPRAY

After 7 days exposure
to salt water

Advantages

- Can be topcoated by a large number of compatible paints
  - Same or other supplier
  - Listed systems for different structures/environments

- ZINGA can be applied as :
  - Shop Primer (20 to 40 µm DFT)
  - 1st coat in duplex (60 to 90 µm DFT)
  - Unique 2 layer system (80 – 180 µm DFT)

- Fire retardant properties
  - Will not spread flames
  - Will not spread toxic fumes

Belarus, Minsk, Subway

OMV Rompetrol (Black Sea) : platform substructure

Advantages

- Toxicity
  - Composed of non-toxic elements
    (Green Label from Singapore Environment Council)
  - Can be used in contact with potable water
    -> Tested according AS-NSZ 4020
- Unlimited shelf life
- Almost indefinite pot life (no skin on surface after first use, if can well closed)
- ZINGA has very good UV resistance

Cables of Kalvoya Bridge (Norway)

UK, Braithwaite tanks for potable water

Advantages

- Reduced layer thickness for equal protection = reduced application costs
  - ISO 12944 tested: high resistance in C5 – Very High environment
  - Comparable resistance from traditional systems (acc. ISO 12944-5):

ZINGA system	Metallisation	Hot-dip	Paints
ZINGA	Metallisation (Zn) 100 µm	Hot-dip 80 µm	Zn-Epoxy / PUR
ZINGA	Epoxy tie-coat	Epoxy / PUR	Epoxy / PUR
	Epoxy / PUR	Epoxy / PUR	Epoxy / PUR
	Epoxy / PUR	(Epoxy / PUR)	Epoxy / PUR
120 - 180 µm	**340 µm**	**320 µm**	**360 µm**
< 1 day	**Min. 3 days**	**Min. 4 days**	**Min. 3 days**

- This means that 2 coats of ZINGA with a total of 120-180 µm DFT gives a **performance equivalent to a 320 to 360 µm DFT traditional coating system !**
- **ZINGA can be applied in less than 1 day = less shutdown costs !**

Summary: Snapshot on ZINGA

- One component (1-pack) – no mixing, time saving
- Can be used as stand-alone system or as primer in traditional coating systems
- Unlimited shelf life and almost unlimited pot life (no waste)
- Fast drying (touch dry in 10 min @ 20°C – time saving)
- No toxic or carcinogenic solvents (Green Label in Singapore)
- Can be used under water or in storage tanks
- Will take any impact and never crack or flake off (at right min. DFT)
- Can work down to -40°C and up to 150°C
- Can be painted directly with 2K PU and acrylics
- Can be applied in heavy weather conditions & up to 95% RH
- Up to 20 year performance warranty against corrosion (@ 180µ DFT)
- Can replace, repair & build-up Hot Dip Galvanising and Zinc Thermal Spray
- Is a reversible coating (can be indefinetly recharged / reloaded at low cost)

Tests, certificates and approvals

Test Reports

ZINGA Galvanic Protection

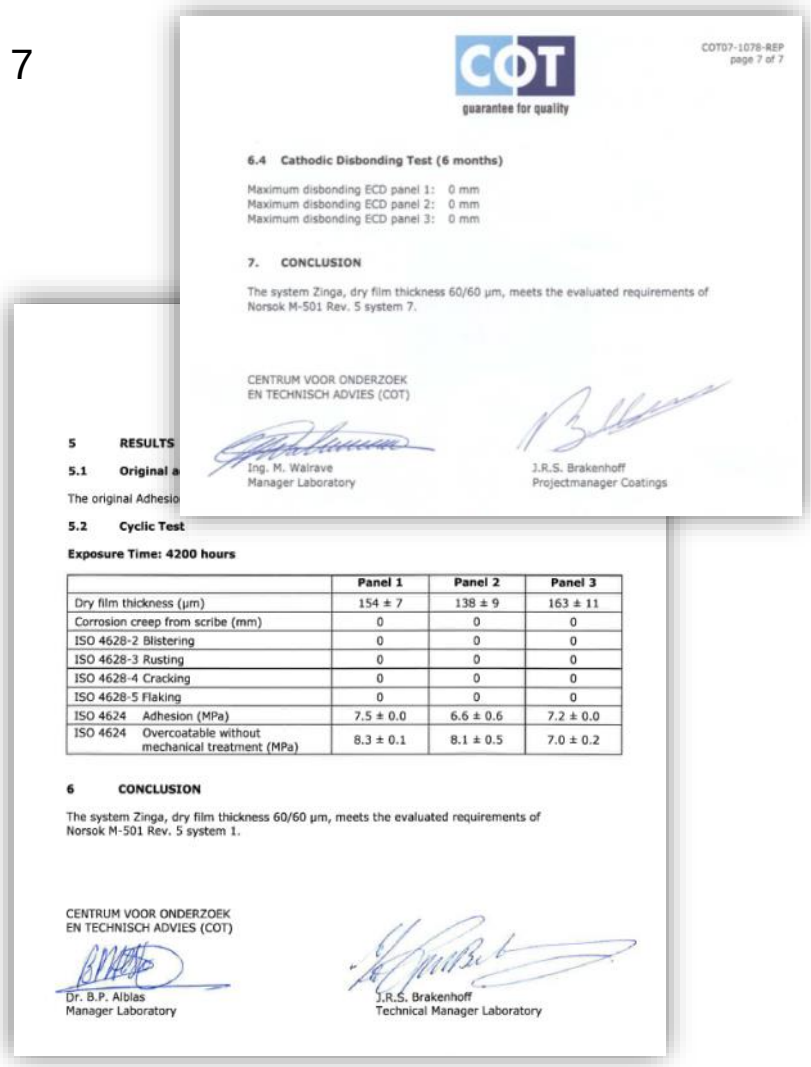
- COT (Netherlands)

  NORSOK M501 System 1 ánd System 7

“The system Zinga, dry film thickness 60/60 µm DFT, meets the evaluated requirements of Norsok M501 Rev. 5 system 7”

“The system Zinga, dry film thickness 60/60 µm DFT, meets the evaluated requirements of Norsok M501 Rev. 5 system 1”

Tests done:
4200 hours immersion in seawater
4200 hours cyclic test
Pull-off (7MPa)
No cathodic disbondment



COT07-1078-REP
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guarantee for quality

6.4 Cathodic Disbonding Test (6 months)

Maximum disbonding ECD panel 1: 0 mm
Maximum disbonding ECD panel 2: 0 mm
Maximum disbonding ECD panel 3: 0 mm

7. CONCLUSION

The system Zinga, dry film thickness 60/60 µm, meets the evaluated requirements of Norsok M-501 Rev. 5 system 7.

CENTRUM VOOR ONDERZOEK
EN TECHNISCH ADVIES (COT)

Ing. M. Walrave
Manager Laboratory

J.R.S. Brakenhoff
Projectmanager Coatings

5 RESULTS

5.1 Original a

The original Adhesio

5.2 Cyclic Test

Exposure Time: 4200 hours

	Panel 1	Panel 2	Panel 3
Dry film thickness (µm)	154 ± 7	138 ± 9	163 ± 11
Corrosion creep from scribe (mm)	0	0	0
ISO 4628-2 Blistering	0	0	0
ISO 4628-3 Rusting	0	0	0
ISO 4628-4 Cracking	0	0	0
ISO 4628-5 Flaking	0	0	0
ISO 4624 Adhesion (MPa)	7.5 ± 0.0	6.6 ± 0.6	7.2 ± 0.0
ISO 4624 Overcoatable without mechanical treatment (MPa)	8.3 ± 0.1	8.1 ± 0.5	7.0 ± 0.2

6 CONCLUSION

The system Zinga, dry film thickness 60/60 µm, meets the evaluated requirements of Norsok M-501 Rev. 5 system 1.

CENTRUM VOOR ONDERZOEK
EN TECHNISCH ADVIES (COT)

Dr. B.P. Alblas
Manager Laboratory

J.R.S. Brakenhoff
Technical Manager Laboratory

ZINGA Galvanic Protection

- COT (Netherlands)

ISO 12944-6 on **ZINGA 80 - 100 µm DFT**

Classification: C4-High & C5I-Medium

ISO 12944-9 on **ZINGA 120 µm DFT**

Classification: CX & Im4 & C5M-Very High

C5I: Industrial zones with high humidity and aggressive environment (continuous condensation and high pollution, chemical factories on sea side)
C5M: Coastal zones and marine zones with high salinity (continuous condensation and high pollution)
Medium: Life expectation between 5 and 15 years
High: Life expectation more than 15 years
CX: Offshore environment with a 15y life expectation according to the standard
Im 4: Offshore immersion with cathodic protection

The phosphate Mine in Togo (Office Togolais des Phosphates)

ZINGALU Galvanic Protection

- COT (Netherlands)

  ISO 12944-6 on **ZINGALU 100-120 µm DFT**

Classification: C5-High

C5M: Coastal zones and marine zones with high salinity (continuous condensation and high pollution)
Medium: Life expectation between 5 and 15 years
High: Life expectation more than 15 years

ZINGA Galvanic Protection

- COT (Netherlands)

ISO 12944 on	**ZINGA 1 x 60-80 µm DFT** **+ Zingalufer 1 x 80 µm DFT**	ZINGA + PU sealer
ISO 12944 on	**ZINGA 1 x 60-80 µm DFT** **+ Zingaceram HS 1 x 120 µm DFT**	ZINGA + Epoxy sealer
ISO 12944 on	**ZINGA 1 x 60-80 µm DFT** **+ Zingaceram HS 1 x 120 µm DFT** **+ Zingaceram PU 1 x 60 µm DFT**	ZINGA with coloured PU finish
ISO 12944 on	**ZINGA 1 x 60-80 µm DFT** **+ Zingaceram HS 1 x 120 µm DFT** **+ Zingaceram EP 1 x 60 µm DFT**	ZINGA with coloured Epoxy finish

Classification: C5I-High

(equals to C5M-High)

ZINGA Galvanic Protection

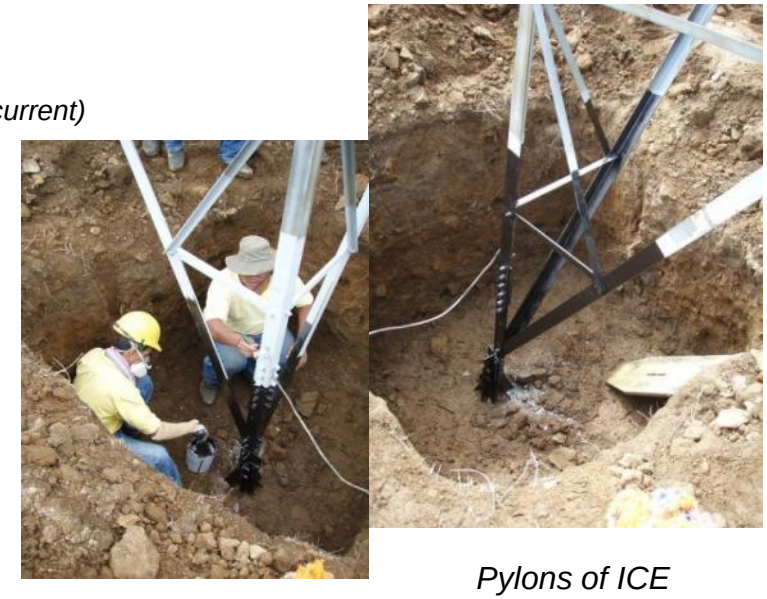
- COT (Netherlands)

  ISO 12944 on **ZINGA 1 x 60-80 µm DFT + Zingatarfree 2 x 100 µm DFT**

  ZINGA + PU black finish for immersion

Classification: Im2 and Im3-High

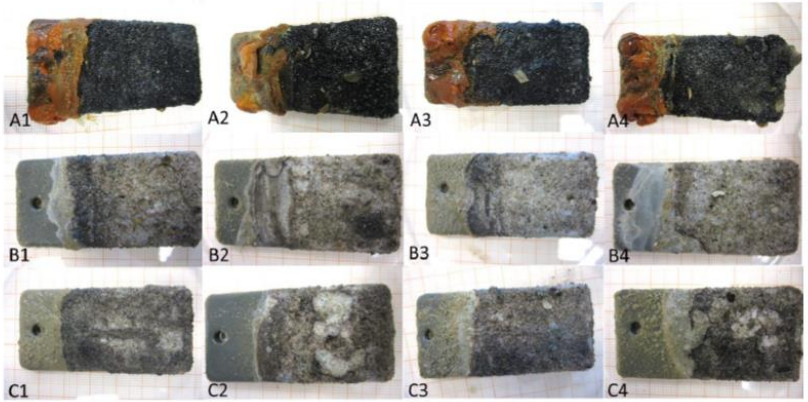
Im2: Sea or brackish water
(harbors with locks, jetties, offshore structures; make sure there is no stray current)
Im3: Soil
(underground storage, iron poles)
High: Life expectation more than 15 years



Pylons of ICE (Costa Rica)

MIC Resistance

- Test setup: 6 months exposure to an enriched culture of MIC relevant micro-organisms
  6 months exposure to sediment and natural seawater from the North Sea



- Conclusion: ZINGA coated coupons showed no presence of MIC relevant micro-organisms and ZINGA coated coupons showed no pits.
  The weight loss for the ZINGA coated coupons was negligible and no corrosion was detected.
  SEM-EDX analysis showed that zinc oxides were formed which protected the coupons especially at the scratched spots.

Reaction to fire

- SGS Yarsley Technical Services (United Kingdom)

  Test on fire propagation on ZINGA (BS 476 part 6 and part 7)

ZINGA obtained best possible result

"In accordance with the Flame Spread Classification given in the Standard and reproduced above, the results show that the material has a Class 0 surface."

- Efectis (The Netherlands)

  Classification of reaction to fire performance on ZINGA (EN 13501-1:2007 + A1:2009)

ZINGA obtained best rating

"The product, ZINGA 2 x 90 µm DFT, coating on steel, in relation to its reaction to fire behaviour is classified:
***Reaction to fire classification: B – s1, d0**"*

efectis nederland
The European experts in fire safety

Friction Coefficient

- KTA TATOR (USA)

  Test on the friction coefficient of ZINGA (ASTM A325)

The slip coefficent of ZINGA is 0.52.
(<> slip coefficient HDG: 0.19)

"The primer exhibited a slip coefficient of 0.52 and passed the 1,000-hour Creep Deformation test. The primer is certified Class B at a maximum thickness of 4 mils."

- RTA Roads & Traffic Authority (New Zealand)

  Test on the friction coefficient of ZINGA (AS4100:1998)

The slip coefficent of ZINGA is 0.53.

Military

- US Army and US NAVY (USA)

  Biggest army force in the world

Zinga conforms to the requirements of CID A-A59745. Additionally, it has successfully undergone additional testing.

- NATO (International)

  Intergovernmental military alliance

In 1989 Zingametall received a Manufacturer's card and a NATO Stock Number for ZINGA. A NATO Stock Number is recognized as a stock number of the armies of the member states. Every product that is accepted by the NATO can be used by all the armies of the NATO member states without the necessity or obligation to test the product again.

NATO Stock Number :		
NATO SUPPLY CLASS:	NATO CODE FOR NCB:	SEQUENCE NUMBER IN THE NATO ITEM IDENTIFICATION NUMBER:
8030	13	1137027

Identification Data -Seg A-

Item Name Code:	16687
Item Identification Guide Number:	T115-E
Item Name:	CORROSION PREVENTIVE COMPOUND
Type of Item Identification Code:	2
Reference or Partial Descriptive Method Reason Code:	9
Nato File Maintenance Sequence Number:	007
NIIN Status Code:	6
Demilitarization Code:	
Date NIIN Assignment:	05/12/89
Modification Date:	13/11/09

Reference Data -Seg C-

NCAGE Code:	Manufacturer Name	Reference Number	RNFC	RNCC	RNVC	RNSC	DAC	RNAAC	RNJC
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	

General Data

NCAGE Code:	B1483	Name:	ZINGAMETALL BVBA
Country:	BELGIUM	Initials:	
		National Identification N°:	BE0421689088
Type of Organisational Entity Code:	E	Non-US manufacturers	
Status:	A	ACTIVE RECORD: The entity is currently active.	
Registration date:	23/10/1989	Modification date:	17/08/2005

Companies

- Approval by CFE - Comisión Federal de Electricidad (Mexico)
- Approval by LAND ROVER (UK)
- Supplier of PETROBRAS (Brazil)
- Supplier of PETRONAS (Malaysia)
- Supplier of SHELL (Brunei)
- Supplier of ExxonMobil (Malaysia)
- Supplier of S.W.C.C. (Saudi Arabia)

المؤسسة العامة لتحلية المياه المالحة
Saline Water Converstion Corporation

AND BY MANY OTHER COMPANIES WORLDWIDE

References ZINGA

Bridges

- Izmit Bay Suspension bridge
  On south approach of the viaduct
  Construction started in 2010 and was finished in 2017
  ZINGA 1 x 60 µm DFT
  Zingalufer 1 x 80 µm DFT
  Zingaceram PU 1 x 60 µm DFT

Bridges

- QR Railways Burdekin river bridge (Australia)

  Since 2001

  Maintenance program (Queensland Rail)

  ZINGA 2 x 60 µm DFT

- Kalvoya bridge (Norway)

  In 1985

  ZINGA 2 x 60 µm DFT

  30 µm DFT ZINGA depletion

  <u>after 25 years</u>

Bridges

Offshore

- Drilling platform (Brazil)

  In 2008

  Polvo

  Different repairs

  ZINGA 2x 60 µm DFT

- Oil platform (Romania)

  In 2013

  OMV Petrom

  Complete protection

  ZINGA 2 x 90 µm DFT

  Or ZINGA 1 x 60-80 µm DFT +

  Zingalufer 1 x 140 µm DFT +

  Zingagloss 1 x 60 µm DFT

Offshore

- Oil platform (Romania)

  In 2013

  OMV Petrom

  Complete protection

  ZINGA 2 x 90 µm DFT

  Or ZINGA 1 x 60-80 µm DFT +

  Zingalufer 1 x 140 µm DFT +

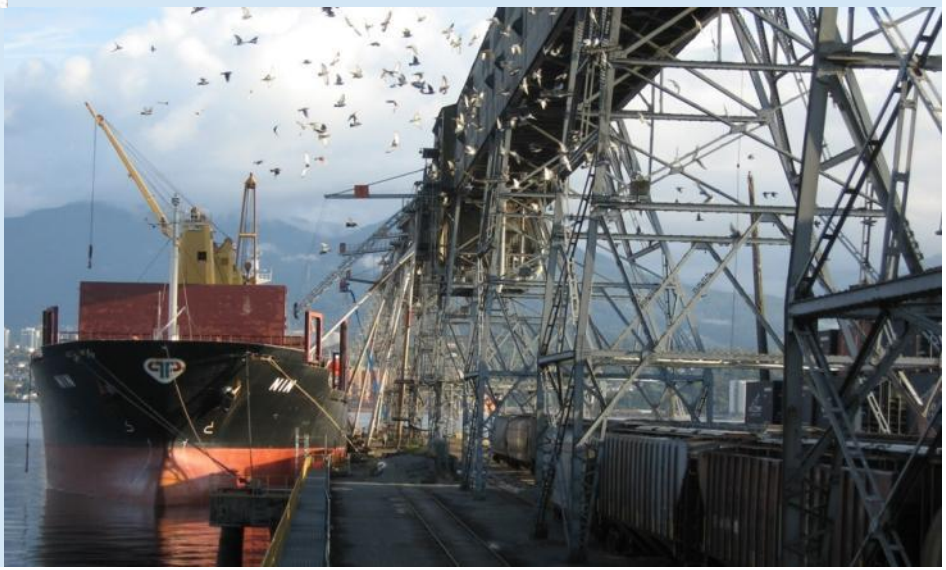
  Zingagloss 1 x 60 µm DFT

Offshore

Marine

- Killybegs pier (Ireland)
  In 2000
  Irish Department of Marine and Natural Resources
  Controls by SGS after 1, 5, 10 and 15 years
  Still in perfect state
  ZINGA 2 x 90 µm DFT

- Grain Elevator (Canada)
  In 1998
  Pacific (Vancouver)
  ZINGA 2 x 60 µm DFT



Marine

Between 2015 & 2016

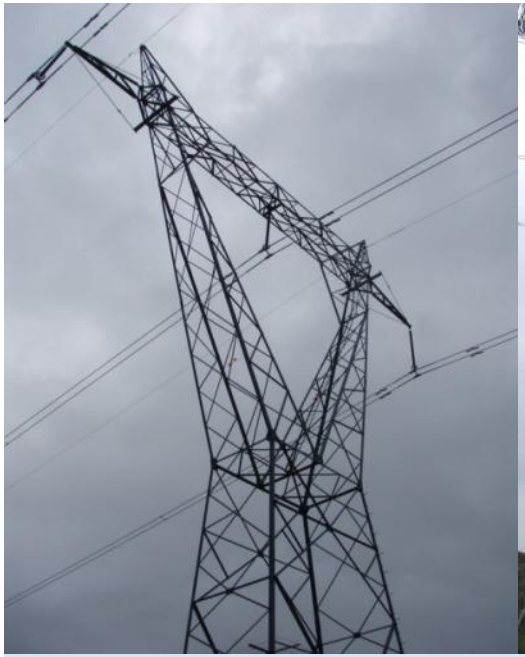
System: ZINGA + Zingatarfree

+ Antifouling

Towers

- Lighting Mast (Singapore)
  Since 2002
  At PSA (Port of Singapore Authority)
  30 lighting masts,45 metres in height
  ZINGA 2 x 60 µm DFT
  Inspection in 2018 : in perfect condition

Pylons



- Transgrid Networks (Australia)
  In 2006
  2 km from the coast line
  On old galvanised pylons
  ZINGA 2 x 60 µm DFT

- EGAT (Thailand)
  Since 2005
  37 high tension pylons in swampy areas
  Above ground: ZINGA 2 x 50 µm DFT
  Under ground: ZINGA 1 x 40 µm DFT
  + Zingatarfree 1 x 100 µm DFT

Power plants

- Kiev Energo (Ukraine)
  In 2003
  Repair of old hot-dipped towers
  (some 45 m high)
  ZINGA 2 x 50 µm DFT

- Akosombo Dam (Ghana)
  In 2013
  10.000 m²
  Recoating of 6 penstocks and 2 cranes
  ZINGA 1 x 60 µm DFT
  Zingaceram ZM EP MIO 1 x 80 µm DFT
  Zingaceram ZM PU 1 x 80 µm DFT

Other structures and equipments

Gugler Water Turbines (Austria)

Since 2012 & ongoing

Different steel structures for water turbines & pipelines

Parts in contact with air:

ZINGA 1 x 60 µm DFT + Zingalufer 1 x 80 µm DFT + Zingafinish 1 x 100 µm DFT

Parts in contact with water:

Aquazinga 1 x 80 µm DFT + Zingaceram HS 2 x 120 µm DFT

Other structures and equipments

Saudi Electricity Company
(Saudi Arabia)
In 2014
Valves and intake pipes next to sea
(next to desalination plants)
ZINGA 2 x 60 µm DFT

Thank you for your attention!
Questions?