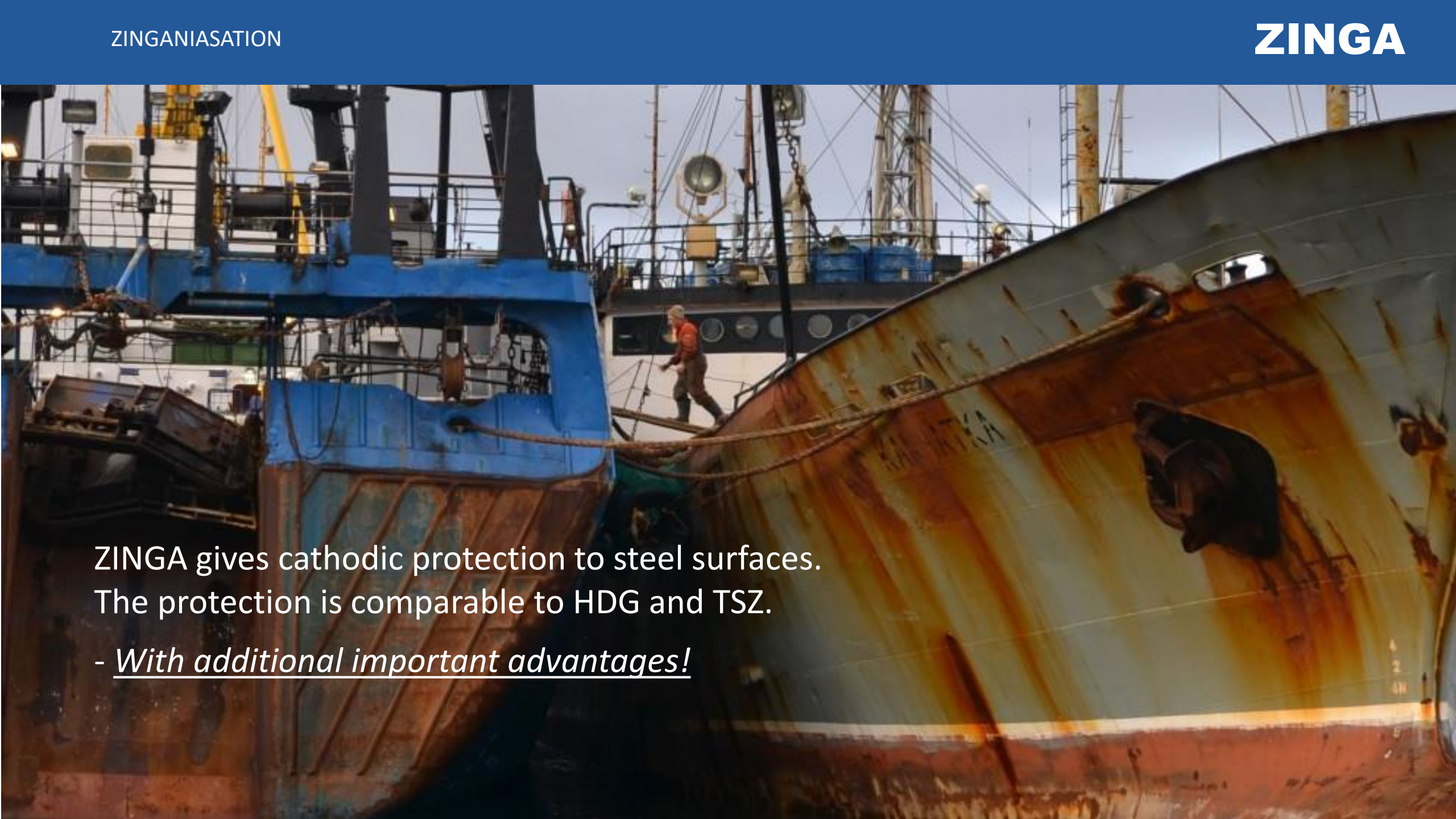




# ZINGA Marine

## CATHODIC COATING SYSTEMS

A large industrial ship, possibly an offshore supply vessel, is shown. The hull is heavily rusted, while the superstructure is painted blue. A worker in an orange safety vest is walking on the deck. The ship is moored, with ropes visible. The background shows other industrial structures and a clear sky.

ZINGA gives cathodic protection to steel surfaces.  
The protection is comparable to HDG and TSZ.  
- With additional important advantages!



# ZINGA

- What is ZINGA?
- How does it work?
- The benefits
- How it is applied
- Triplex systems in general

# What is **ZINGA**?

1-component liquid zinc coating,  
applied as paint!



- Offers very strong galvanic protection
- ZINGA is not a paint, but a pure liquid metal
- Comparable with hot-dip galvanising (HDG) and zinc thermal spray (TSZ)
- Can be used under immersion or atmospherically



# ZINGA

Cathodic Protection on new steel vessels and for refurbishing older boats



- Cleanliness: SA 2.5
- Applied with paint brush, roller and spray gun
- Fast projecting!
- Touch dry in 10 minutes
- Top coat can be applied after 6 hours
- Does not need top coat
- Do not need special equipment or skills
- Cost efficient!



## The structure

- Made from zinc with a purity of 99.995% (medicinal grade)
- Minimum 96% pure zinc content in the dry layer (Hot-dip galvanising normally contains max 93-94%).
- Electrolytic binder maintains the conductance of the electrical potential throughout the dried film



## Certificates

- NORSOK-501, system 1 and 7
- ISO 12944-6 C-5 VH
- ISO 12944-9 CX
- ISO 12944-9 IM4
- Lloyds – Recognised Corrosion Control Coating



# ZINGA Marine

## COATING SYSTEMS

How does it work?



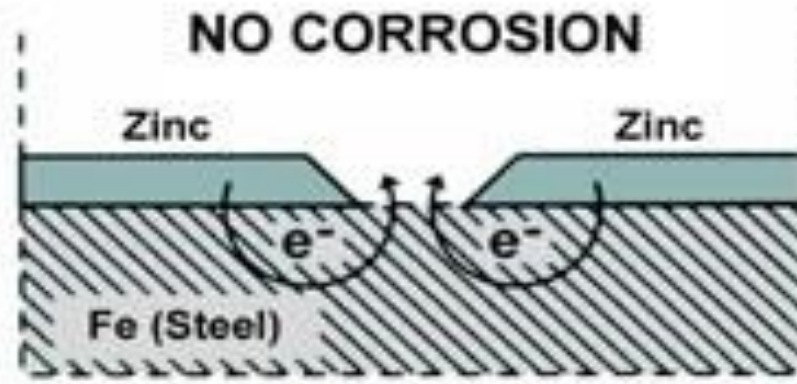
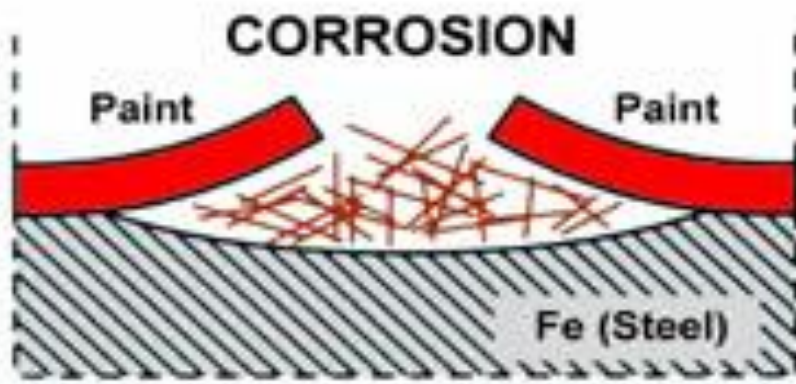
ZINGA Film Galvanizing works 3 ways

- Active Protection
- Passive Protection
- Liquid-applied anode application



## Active cathodic protection

- Forms a galvanic couple
- Sacrificial rate
- 'Throw' of up to 15 mm



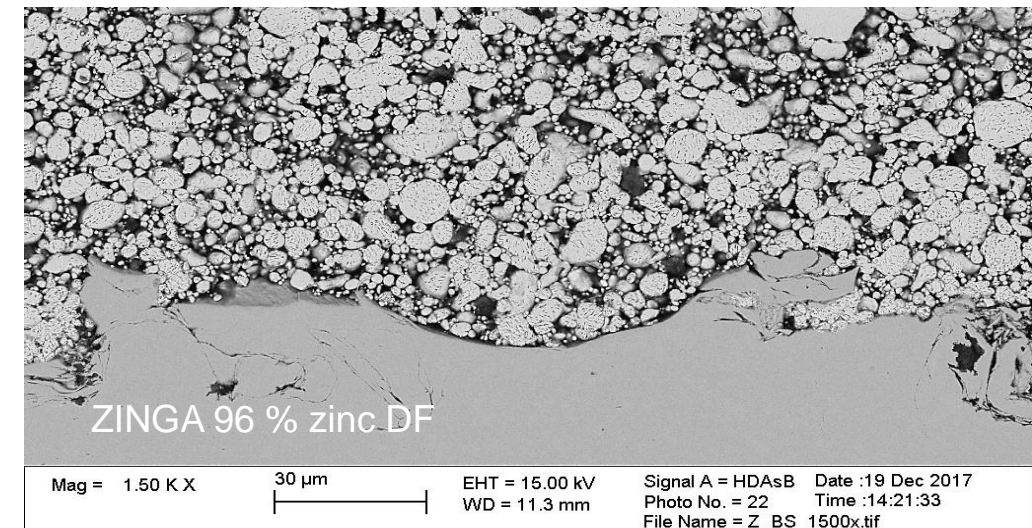
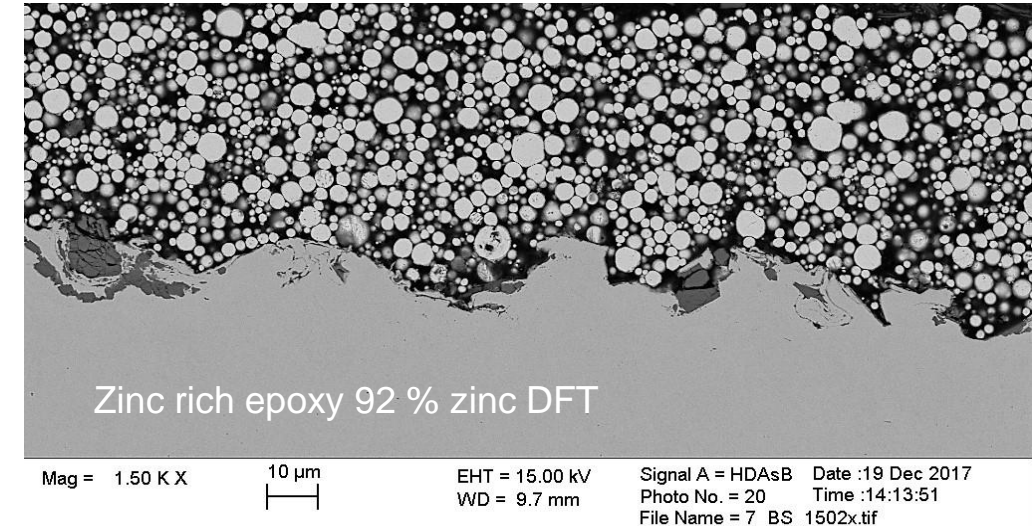
## ZINGA versus zinc rich paints

### Zinc rich paints

- Large particles
- They have very small contact areas
- Electrical contact is intermittent
- Zinc loadings are usually far too low to be effective
- The 'body' of the paint is too rigid
- The high concentration of the resin (binder) in such paints is not permitting a good conductivity between zinc particles.

### ZINGA

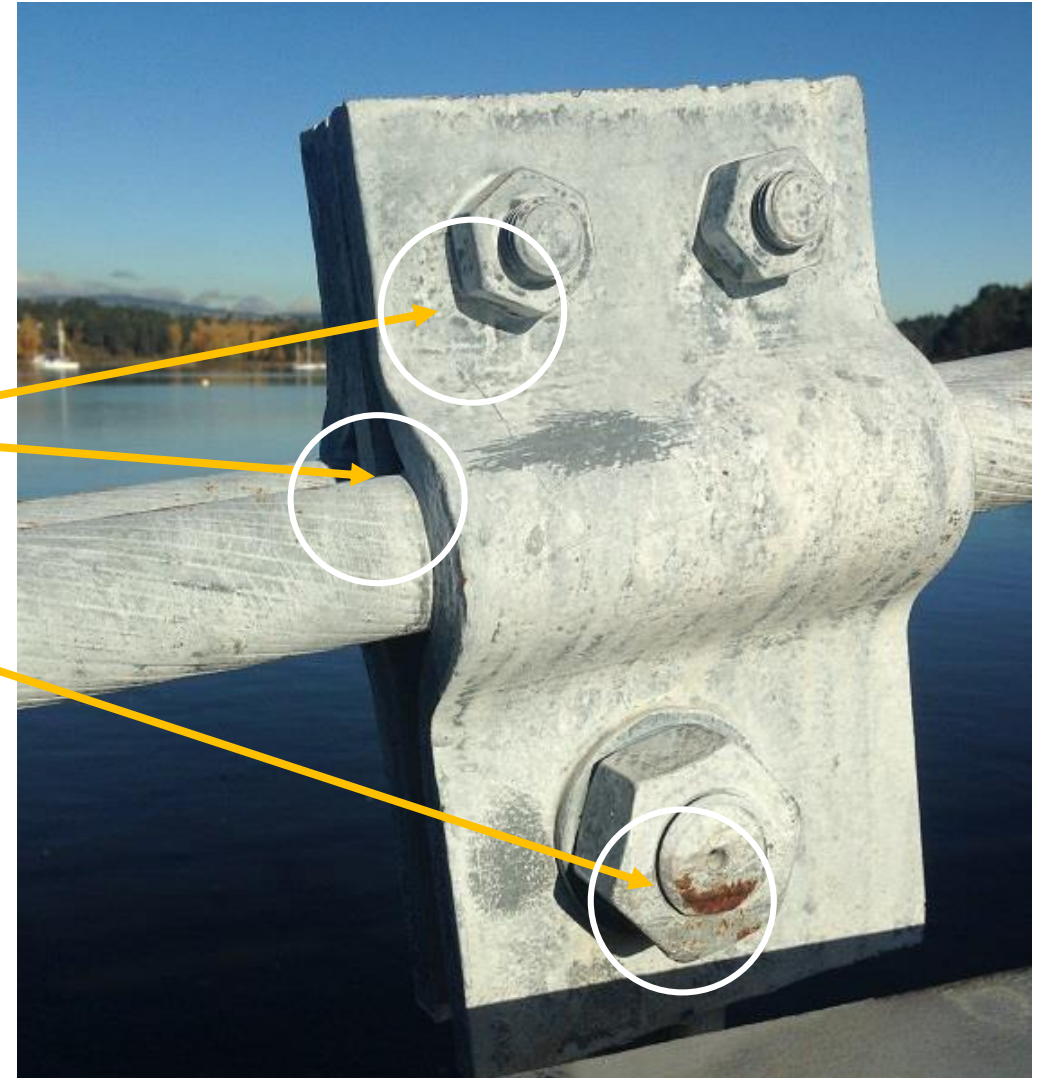
- Small particles
- Results in more zinc being within a given space, and this equates to a much higher density and far better conductivity.
- This subsequently results in higher protective voltages being fed into the steel surface, which in turn provides the excellent cathodic protection required for the rails.



## The effect of Cathodic protection

2 x 60 my after 29 years, exposed over salt sea

- Even in complicated areas there is no corrosion
- After damage: Where there is no more zinc left, there is no heavy corrosion ore under creep
- The Voltage (1.04 Volt) from the zinc in the area around is protecting the steel





# ZINGA

Cathodic Protection by Film  
Galvanisation



## Anodes

Anodes are always required in the stern area around the propeller and prop-shaft, because the paint layers in the triplex 'low-attenuation coating system' are isolating the propeller and prop-shaft from the protection of the ZINGA. Or else the zinc would be working too hard and would deplete faster

On vessels where higher cruising speeds are required, the use of ZINGA on the hull will remove any forms of parasite drag, leaving the hull with a clean form. This has been shown to save up to 25% on fuel costs over a year.

## Passive barrier protection

- Barrier-layer of oxides over the zinc layer
- Self-renewing oxides on the zinc layer
- Secondary top-coat protection
- Gives a factor of synergisation of 1.0 – 1.6
- Sacrificial rate is similar to anodes - constant



## Liquid-applied anode

- Can be used below the water line
- Sacrificial rate like block anodes
- Can be used in tandem with anodes





## ZINGA in salt sea

### Killybegs Fish Factory in Donegal, Ireland

- 312 zinganized pier legs are immersed into the salt seawater off the west coast of Ireland.
- 200 my ZINGA without any top-coats
- The Irish authorities inspected the piers in 2016, after 16 years. It shows that the zinc protection layer was still performing very well and it was then estimated that the ZINGA will last for at least another 10 years



## ZINGA in salt sea

### Killybegs Fish Factory in Donegal, Ireland

- After 16 years of constant exposure in a tidal zone, the zinc layer became encrusted with shell-fish.
- The shell-fish were removed using an ultra-high water pressure lance, revealing the zinc layer underneath.

And still working!





## Film Galvanising versus zinc-rich paints

### Electrical Potentials

- High zinc content (96% in dry layer)
- Specially shaped elliptical lamellar atomised zinc particles as opposed to the distilled and spherical particles used in zinc-rich paint coatings.
- Very high conductivity with the electrical potential exceeding 1100 mV.
- Driving voltage of over 400 mV



ZINGA film galvanising



Zinc-rich paint



# ZINGA

How is it applied?



- ZINGA is applied like a paint.
- No extra or special equipment or skills needed
- Application is always performed at ambient temperatures of -15°C up to 40°C
- ZINGA applications tolerate high humidity (up to 95%)

## Application

- Airless spray-gun: Dilution 5-7%
- After dilution and mixing, the zinc is applied. Fast and simple!
- For small areas and touch-ups: Paint brush and/or ZINGA Aerosol
- For bigger areas: spray-gun/brush/roller
- Repair areas can be done using a bristle-blaster and brush/roller





# Salts?

Salt breaks down any protection (zinc or paint) far too early.  
A clean surfaces will give less maintenance and save big costs!

## CHLOR\*RID

Removes both embedded chloride ions as well as surface chlorides on the steel, and reduces the level of salts down to an extractable and acceptable level (below 20 mg/kvm)

## HOLD\*BLAST

Stops flash rust up to 72 hours. Give the workers enough time to apply the zinc surface-protection onto clean surfaces with a good result



# The benefits

- One component coating
- Unlimited pot-life
- Unlimited shelf life
- Fast drying
- Easy application



# More Benefits

## Easy maintenance

- No corrosion under-creep
- No blast-cleaning on old ZINGA surfaces
- Easy to repair
- Minimum maintenance
- Big savings in labour and cost



## More Benefits

### Temperatures

- Can be applied down to -15°C
- Works up to 120°C constant heat
- Cycling up to 150°C





## Benefits coating onboard fittings



- Can be used as a direct replacement for galvanizing and metallization
- Two layers of only 60-90µm DFT will give a minimum service-life of 15 years on components that have constant exposure to the marine atmosphere.
- It can be coated directly with 2K PU or acrylic paints for color-coding of pipes.

# Welding



## ZINGA-coated steel is fully weldable

- On bimetallic welds (such as carbon/stainless) the ZINGA must be applied across the weld-zone and onto the stainless surfaces by at least 50 - 75mm
- On steel vessels with aluminium superstructures, the ZINGA is applied onto the steel decks, across the bimetallic welds and vertically up the aluminium walls to a height of 150 mm in order to prevent any bimetallic corrosion from initiating.
- The burn-back rate on 40mm steel is a maximum of 4 - 8 mm



## Film galvanizing inside bulk ship

- This ship hold-floor /tank-top had to be coated with two layers of ZINGA
- The job had to be done in three days to stay within the ship's delivery schedule.





## Cathodic zinc protection inside the ship's hold

- 2017: 38.000 sqm of steel surface to be cleaned
- 180 my ZINGA applied
- Inspection is due for August 2019
- After 10 minutes at 30°C, the painters could walk on the zinc
- Iron ore falling 25 meters onto the floor (also roof of ballast tanks)



# ZINGA

Cathodic Protection on new steel vessels  
and for refurbishing older boats



## The Indonesian navy

The maintenance dry-docking cycle was  
increased from every three years to every  
five years



Application of ZINGA



# ZINGA

Cathodic Protection on new steel vessels  
and for refurbishing older boats



ZINGA Duplex applied

## Incheon Coastguard, Korea Refurbishing the deck and exterior

System:

ZINGA

+ Vinyl paint FS-26081(Grey)

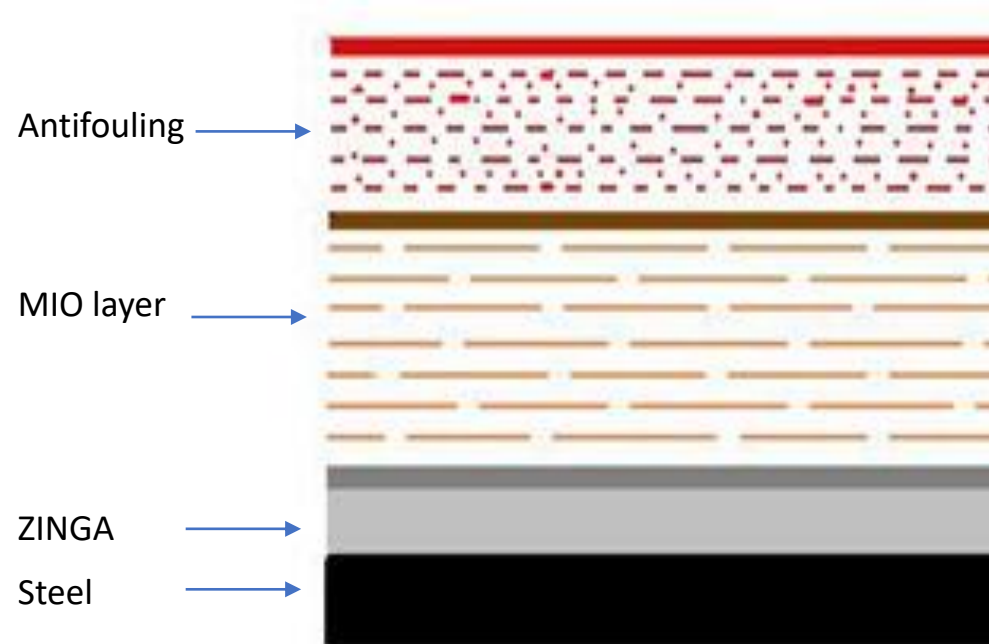
Characteristics ; high weatherability, water resistance,  
alkali resistance, fouling resistance, high color and  
gloss retention



Old coating removed



## ZINGA Triplex hull systems



1. ZINGA acts like an anode, but cannot deplete unless exposed
2. Epoxy MIO is a total vapour and salt barrier
3. Antifouling repels marine growth

## Areas of ships to be coated

1. Hulls
2. Decks
3. Water tanks
4. Ballast tanks
5. Holds
6. Engine rooms
7. Aluminium superstructures
8. Cranes
9. Lifeboat davits etc



## “HMS Illustrious” (flight deck)

Year: 2004

System: ZINGA 2 x 60 my

The Zinga was applied onto the underside of the flight-deck due to the new Eurofighter jet-engines producing temperatures of 750°C on the deck upper surfaces.

The paint on the underside of the deck was being burnt off, putting smoke into the officers cabins.





## Active zinc

- In salt water ZINGA will operate at  $-850 - 900$  mV+ at  $485\text{mA}/\text{hour}/\text{m}^2$
- In salt water ZINGA has a 'throw' of 3 meters, and work-barges require a top-coat to prevent the zinc layer from trying to protect sheet-piling and pier legs!
- This also applies to ships and boats with damaged paintwork under the water-line.





## «MV Copious»

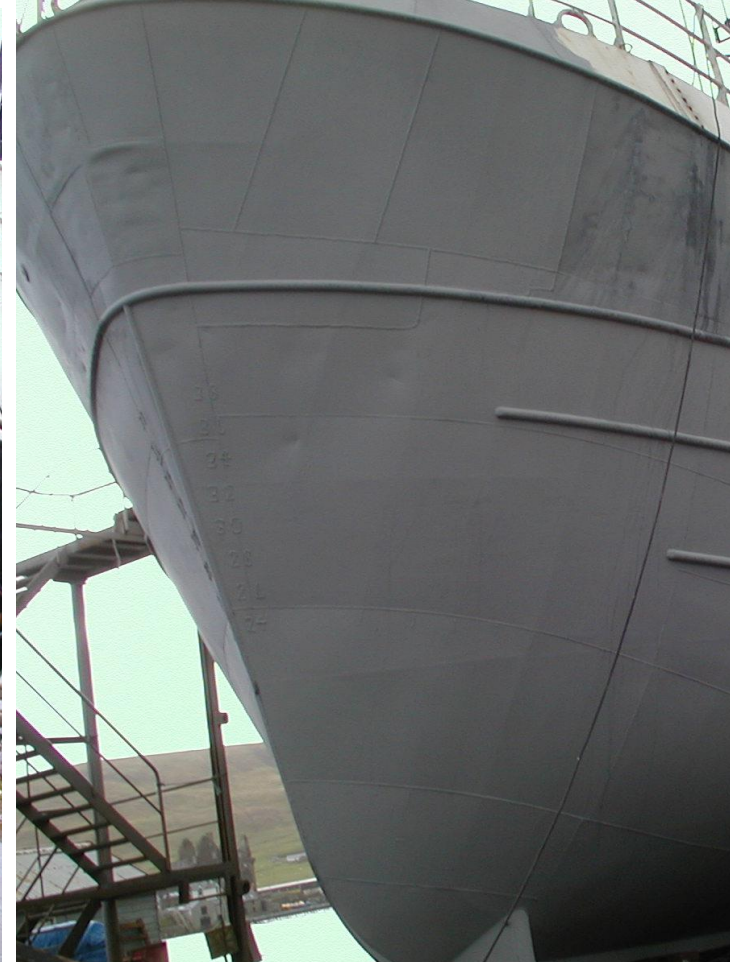
Year: 2002

### System above waterline:

- ZINGA
- Jotun Tie-coat 100
- Jotamastic 87
- Jotun Hardtop AS

### System below waterline:

- Zinga
- Jotun Tie-coat 100
- Jotamastic 87
- Antifouling





«MV Copious»





## “Able One” (new-build)

- Year: 2015 - 2016
- System: Zinga + Zingaceram HS + Hempel
- She has been fitted with aluminium anodes on her skeg keels and in the stern area.
- This is because she sails in warm waters (circa 20°C) and in such waters the Zinga layer will try to protect any zinc anodes, as it is more active than the anodes themselves.
- She is currently sailing in Mediterranean with passengers on a weekly cruising basis



## The 'Westhinder' lighthouse ship, Belgium

- Built in 1950.
- Hull refurbished in 1998.
- Complete system on the outside of the hull

ZINGA 60µm

2K Epoxy MIO Sealer 90µm

Uretex Navy 60µm

The 'Westhinder' is now moored permanently in Zeebrugge, and is believed to be floating museum. Still with the Zinga system working well.





## “Adela” (water tanks) 2006

System: ZINGA 2 x 60 $\mu$ m

Status 2017: Loss of only 5.0  $\mu$ m DFT of zinc over 11 years from internal surfaces of the potable-water tanks.





## MV Copious – Fishing trawler refurbished in Shetland during 2002

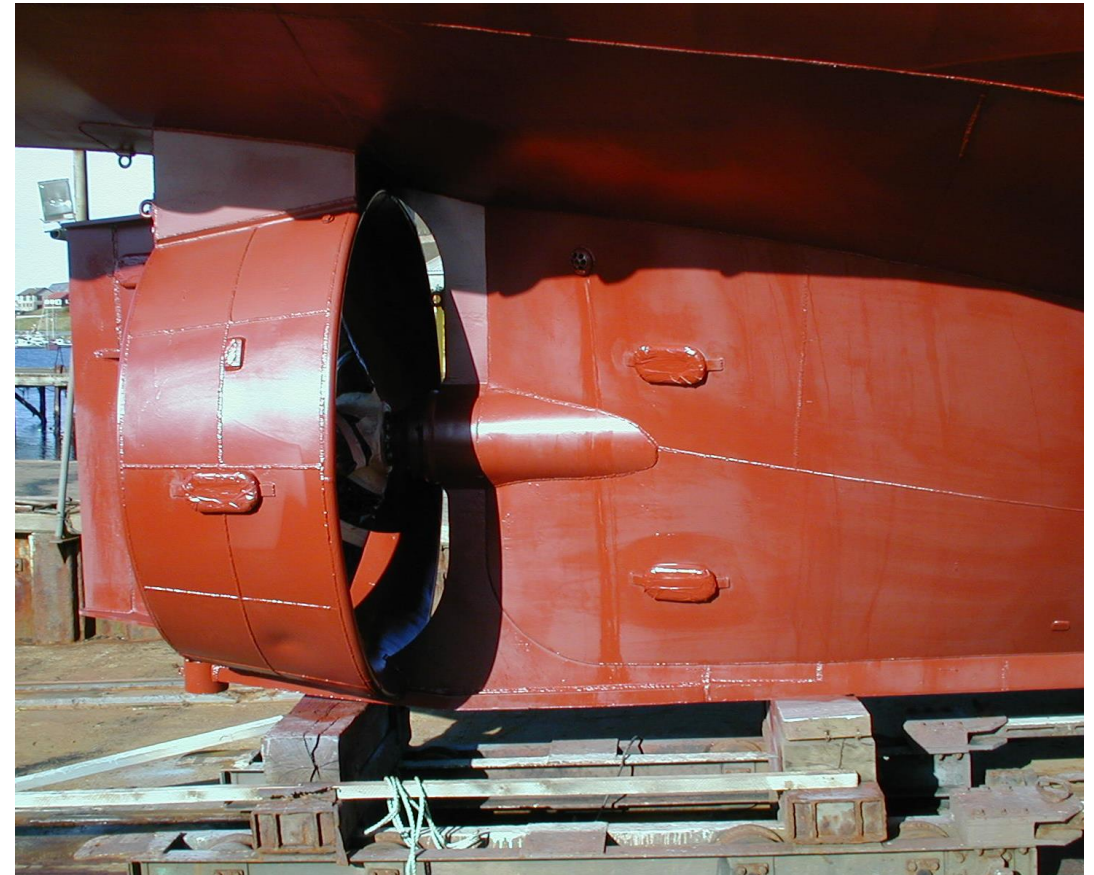


Zinga has been applied, galvanising the hull



Jotun Tie-coat 100 and Jotamstic 87 is applied





The internal face of the thruster-tube on steel boats is blast-cleaned to  $Rz\ 100\text{--}120\ \mu\text{m}$ , to put more zinc inside the steel's surface to ensure solid cathodic-protection at all times. It is normally overcoated with a paint that reduces the sand-abrasion that takes place inside the tube when the boat is operating in shallow harbours.

## Transport vessel

### 2002. Refurbishing of decks and internal hull walls

Internal faces of the hull are often galvanised using ZINGA, because once the internal lining has been fitted onto the walls, these surfaces will often not be inspected again for at least 12 – 15 years.

Where insulation (block or sprayed foam) is used on these walls to keep the cabins etc warm, it is highly recommended to only use 'closed-cell' insulation.

This prevents 'sweating' on the internal surfaces of walls where there is a high temperature differential between outside and internal air temperatures.





## “Wye Push” tug-boat



ZINGA on side deck



Painted with deck paint



Aft-deck sealed with Zingalufer. Ready for deck paint application

## “Oosthinder” Fishing Trawler

Refurbished 1996

System:

- ZINGA
- Zingalufer
- Lippen PU
- Lippens antifouling

This trawler has been sold and re-named as ‘Francine’ and is still fishing daily.







# ZINGA

Protects the steel surface cathodically,  
in the **easier and faster way**, - at a **lower cost!**

Please contact us for more information

[www.zinga.no](http://www.zinga.no)