

MetalTec

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Marine Coatings Problems made Easier with The MCU Solution

METALTEC EUROPE GROUP

Long-Term Corrosion Protection



Typical Problems with Traditional Technology

- Rust bloom on steel
- Humidity restrictions
- Condensing substrate
- Overcoat restrictions
- Amine blush
- Pre-mature failures
- Re-blast required
- Application delay
- Not recommended
- Require re-clean and additional tie coats
- Re-paint
- 2 – 3 X the costs and time or yard loss



Interior tank corner coating crack

- This demonstrates an improper coating chosen for a tank internal that was not able to flex at the same coefficient as the weld seam.
- MCU remains flexible during its long life!

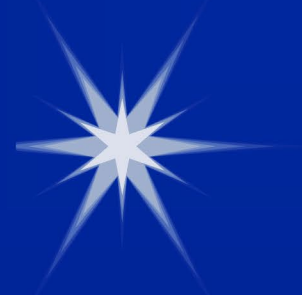


Brittle coating cracking



- Above is inside shell suffering from a reverse impact
- The Brittle Nature of Epoxy coatings not having any flexibility after approx. 12 – 24 months

Touch up adhesion failure



- A touch up of an area not prepared properly and a coating used applied to blooming rust that was not surface tolerant.
- MCU Miozinc and MCU Aluprime are both surface tolerant primers!



Poor adhesion Galvanized surfaces

- galvanizing like many zincs will form zinc salts
- When using epoxy the surface must be well cleaned and should have a wash primer or a profile
- This is usually not done
- Therefore it is a built in failure



Galvanized adhesion problems



Riding/Own crew spot repair

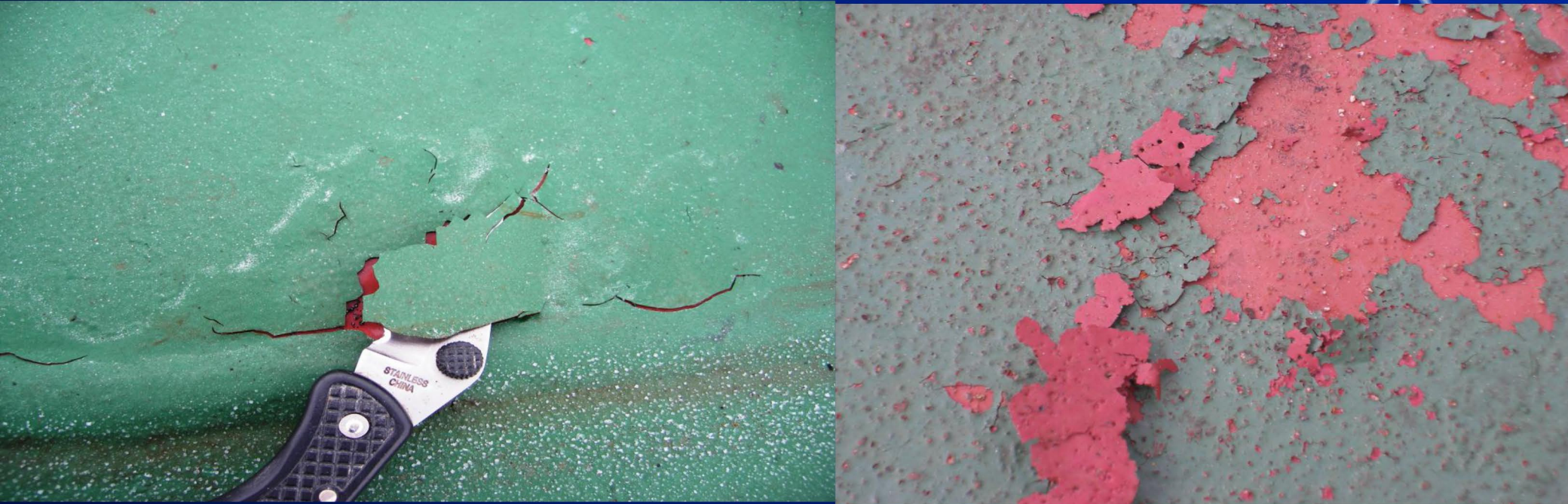


- 3 months after touch up on ST 3 with epoxy mastic
- Application too humid

ST 3 – epoxy mastic spot repair after 2 & 13 months



Example Failure Analysis



- VLCC tanker deck 1 yr after complete repaint.
- Shows brittleness of 2K polyurethane
- Adhesion failure due to over-coating epoxy primer beyond time limit and in too much humidity.



Time Related Problems



- Always looking for the cheapest solution
- Inadequate surface preparation
- ST 2 – ST 3 only possible
- Flash rust – unable or unwilling to re-blast
- Uncured coatings exposed to high humidity/condense
- Wrong mixture A & B, Wrong catalyst, Wrong thinner

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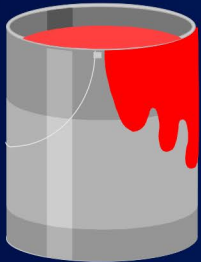
SINGLE COMPONENT MOISTURE CURE POLYUREA

HIGH-TECH COATINGS



What is a Moisture-Cure Urethane?

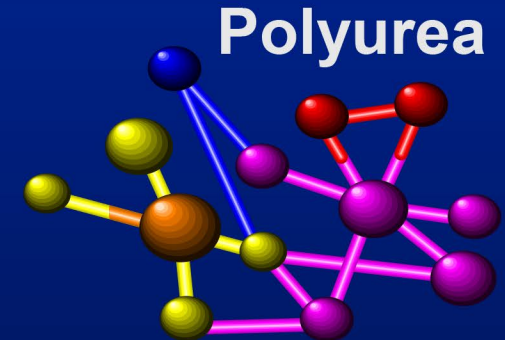
Single-Component
Liquid Coating



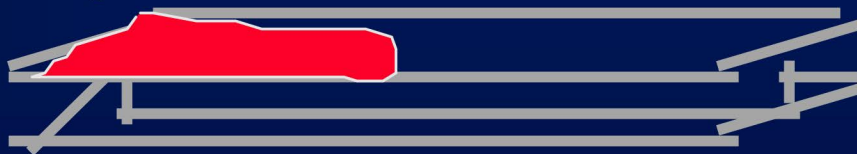
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Dense, pore-free, chemical resistant coating



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SINGLE COMPONENT MOISTURE CURE POLYUREA

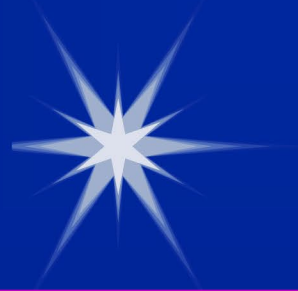


This is why Moisture Cure was developed

JOIN THE REVOLUTION



INNOVATIVE MCU POLYUREA APPLICATION ADVANTAGES



- **1 component No mixing error in ratio or types**
- **No induction time**
- **No pot life limitation**
- **No overcoat time limitation**
- **Surface tolerant to flash rust (even zinc primer)**
- **No dew point limitation / No humidity limitation (6% to 99%), paint 24 hrs / day**
- **No temperature limitation (down to -15°C to +50°C)**
- **Long-term adhesion / long-term flexibility**

Applicable Substrate Materials



- Mild steel / cast iron
- Galvanized / metalized surfaces
- Stainless steel
- Brass / Copper / Aluminium
- GRP – fiberglass / some plastics
- Concrete
- Existing coatings

MCU MIOZINC – Primer



- One component, zinc & mio filled primer
- Extremely tight film matrix will not undercut.
- Only zinc rich - surface tolerant, ST 2 – SA 2.5
- No maximum recoat time
- Only zinc that will adhere to existing coatings
- Recommended DFT 75, 300 acceptable
- Recommended for immersion
- Compatible with zinc anodes
- Recommended for steel, iron, failing galvanizing & metalizing

MCU Miozinc

- Deep omega type pittings after blasting
- Good wetting out properties of MCU Miozinc penetrating onto the pittings



MCU FERROGUARD



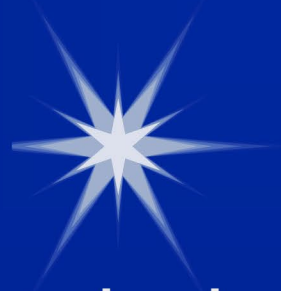
- Replacement for coal tar epoxy, UV stability, 10 X longer life span – will retain flexibility, infinite touch up with itself.
- Manufactured with further refined, coal tar, same as used in shampoo & skin cream
- Will not burn applicators skin under application or blasting – non-carcinogenic
- Over 20 years on piping, waste water treatment facilities, vessels, offshore, & major ports
- Exclusive maintenance for 15 years on Panama Canal
- Passed over 20,000 hrs in a salt spray test.

MCU MASTIC



- Intermediate coat for three coat systems
- Internal coating for tanks – ballast, petroleum products, waste water, drinking water, mud tanks etc.
- No humidity restrictions
- No pot life limitations
- No maximum recoat time limit
- ANSI/NSF approved drinking water coating
- FDA – approved direct food contact

MCU TOPCOAT



- Aliphatic, Excellent UV and atmospheric chemical resistance.
- Excellent resistance to acid and oils and diesel spills
- Does not amine blush with exposure to moisture or condensate prior to curing
- Can receive foot traffic from 4 hrs. to as low as 30 minutes after application in 10 C +
- Indefinitely re-coatable without abrading for easy maintenance

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SINGLE COMPONENT
MOISTURE CURE POLYUREA

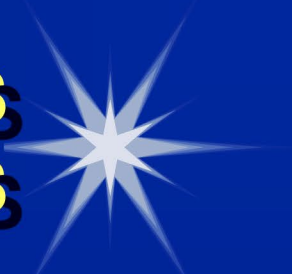
HIGH-TECH COATINGS



PERFORMANCE ADVANTAGES

- **Excellent long-term adhesion Mpa 7.5 – 11.5 – tested over-all best in the industry**
- **No peeling on old coatings when used as an overcoat**
- **Long term flexibility – no cracking!**
- **Extreme abrasion and impact resistant!**
- **Best resin type for atmospheric chemical resistance**
- **Long-term performance – often 2 – 4 of typical epoxy!**

ASTM B117 PASSED **20,680 HRS = 861 DAYS**
NORSOK & DNV NORM is **4,300 HRS = 180 DAYS**



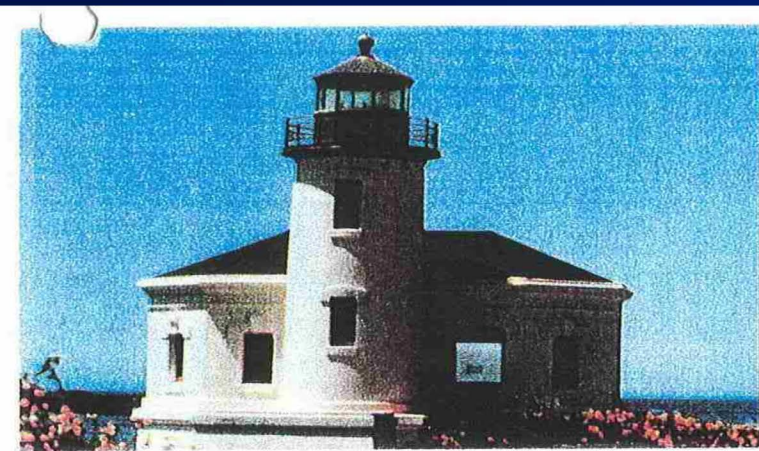
BP Labs Inc.

- ASTM B117 IS A SALT SPRAY/CONDENSE CHAMBER SYSTEM
- MCU MIOZINC 75 my
- MCU FERROGUARD 300 my
- System passed with no creep or blisters at the scribe line.



MCU MIOZINC at 75 microns dft
MCU FERROGUARD AT 2 X 150 microns dft

ASTM B117 10,000 HRS SHOWN, HAS PASSED >20,000 HRS



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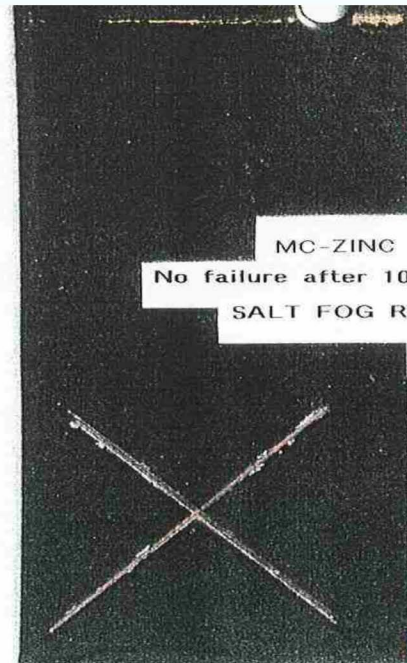
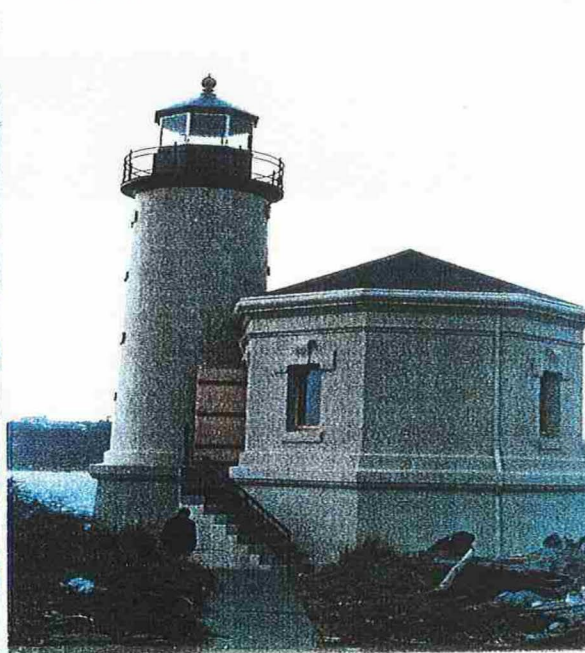
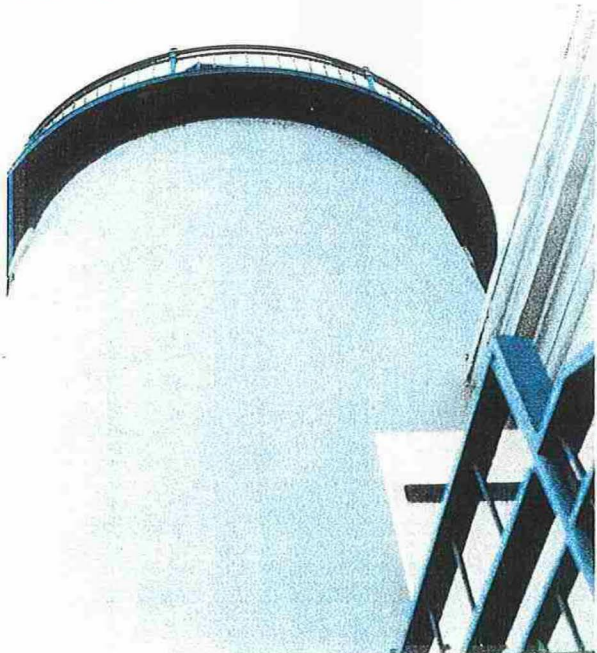
OREGON STATE PARKS

Oldest lighthouse on the northwest coast

MetalTec

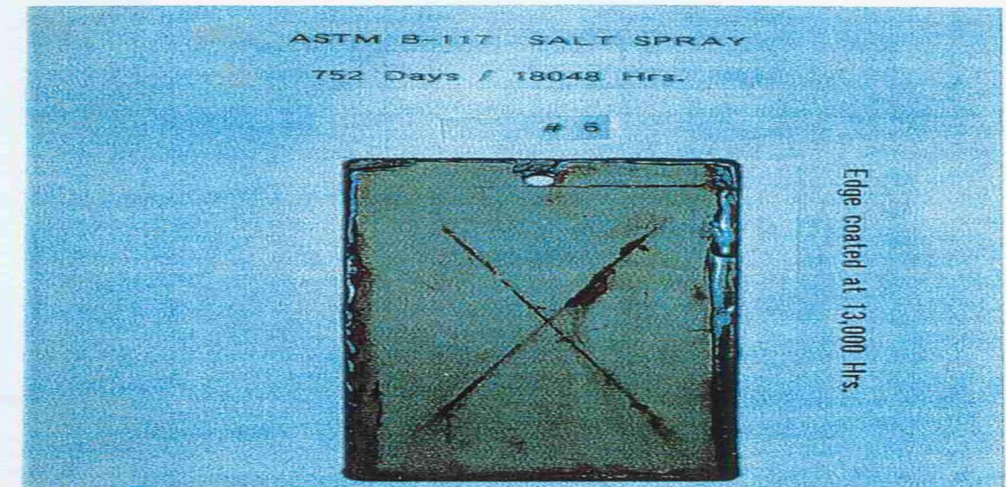
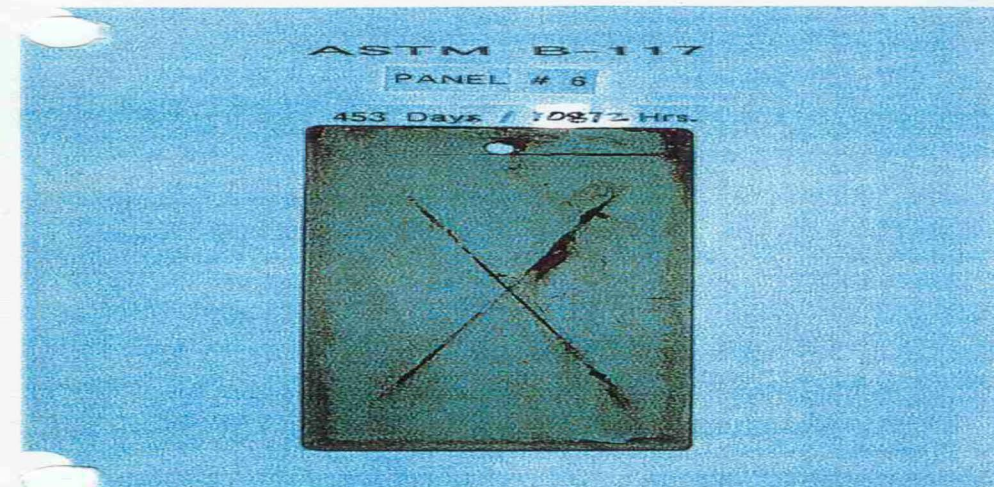
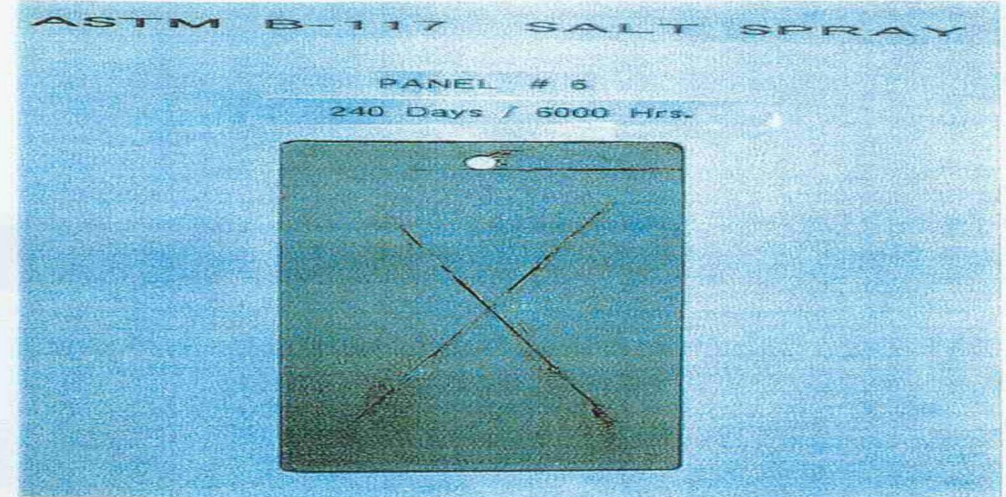
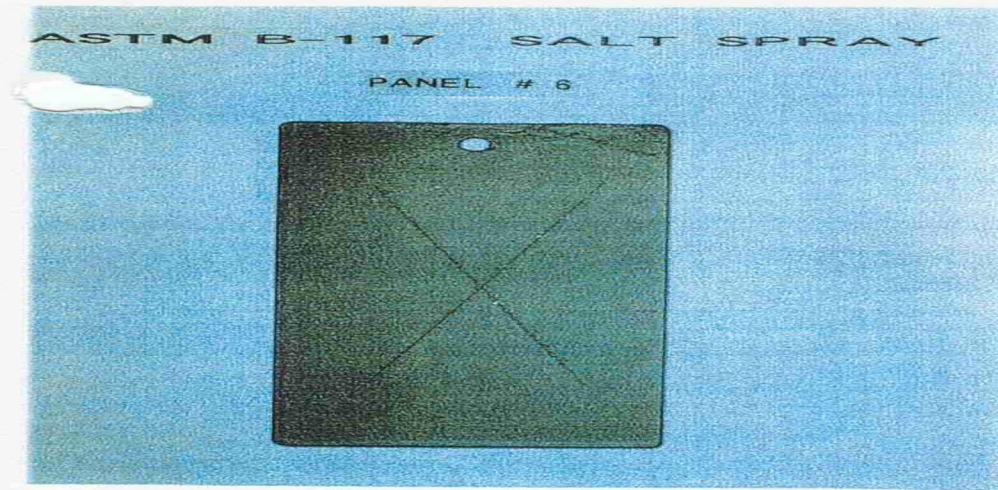
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MC-ZINC / MC-TAR
No failure after 10,000 HOURS
SALT FOG RESISTANCE
ASTM B117

ASTM B117 / 6000 / 10,000 / 18,000 HRS - PASS



Over-Coating



- These products and systems offer excellent adhesion to old existing coatings.
- Existing coatings are required to be weathered.
- Projects will require existing systems to be degreased and cleaned for atmospheric contamination.
- When over-coating; remove all loose and scaling rust, and poorly adhered coatings; spot prime and overcoat.

Stripe coating

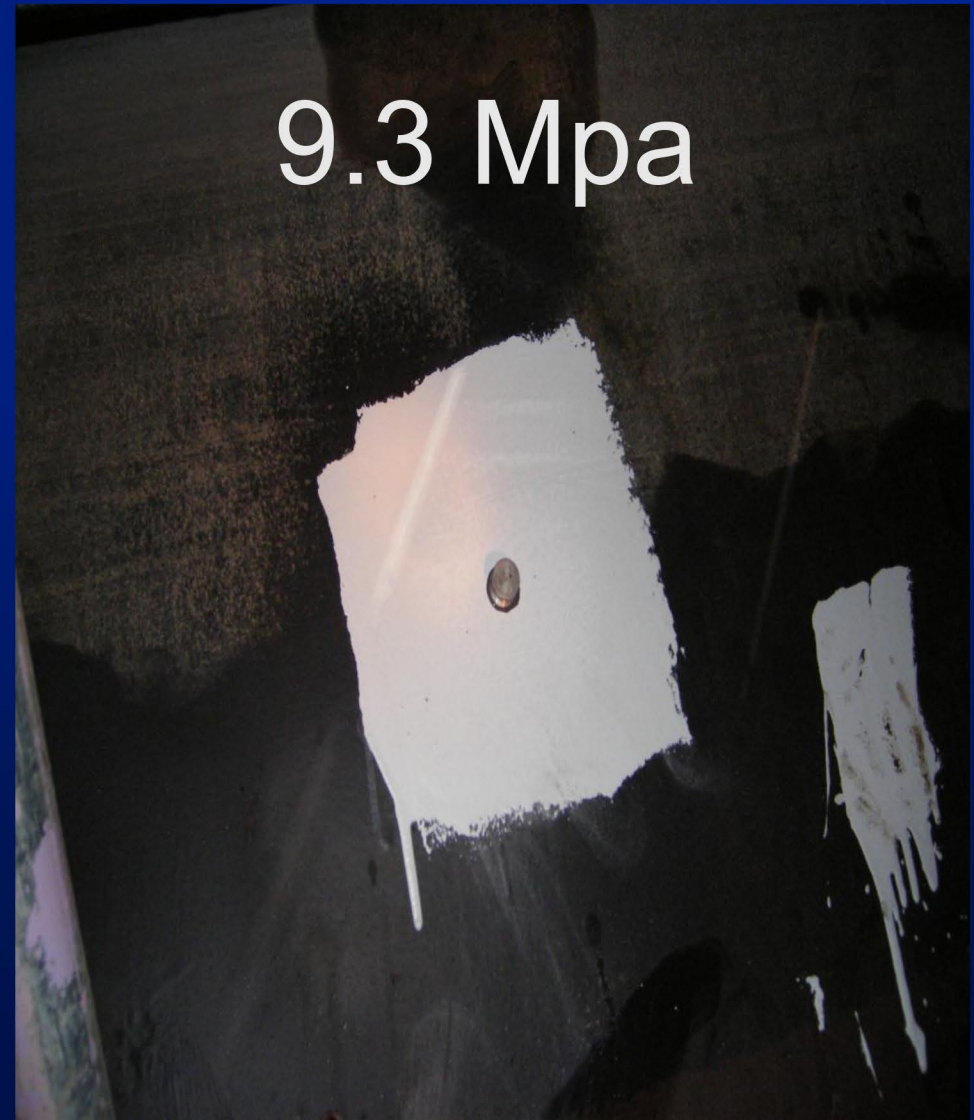


- Stripe coats with Aluprime over Miozinc for contrast
- Miozinc is now available in 2 colours
- However another MCU benefit – all coatings are compatible

Test patch on coal tar epoxy



- If system is mostly sound why remove good paint?
- IMO requires light tanks coatings
- MCU's can be applied over clean coal tar and other epoxies
- Simple adhesion tests for coal tar's are recommended



Surface Tolerance



- Some jobs will require coatings to be applied in less than ideal surface preparation standards.
- For ST 2 & ST 3 a surface tolerant coating is required.
- MCU Miozinc and MCU Aluprime are both surface tolerant primers.

JAPAN NATIONAL STANDARDS
(JNS) TESTING LAB

Comparison of Anticorrosion Properties.

Surface Preparation:SSPC SP-2 (Keren Class 3)



Before Surface Preparation.



After Surface Preparation.

SP-2 HAND TOOL

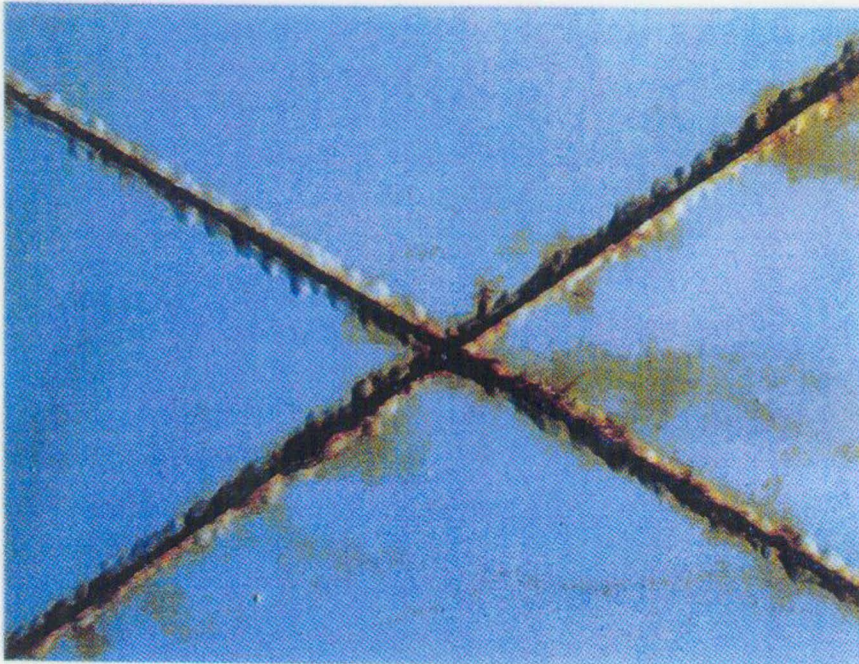
TYPICAL EPOXY MASTIC SYSTEM



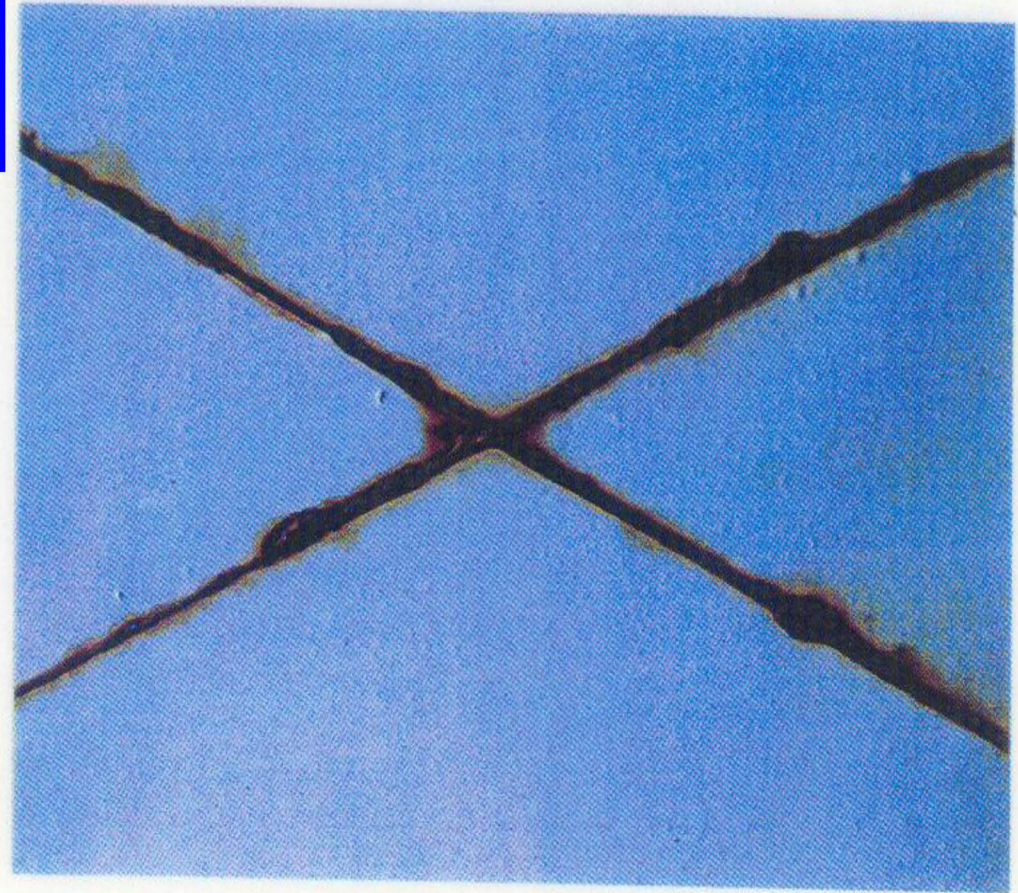
Combined Cycle Test 30 cycles / Corrosion Salt Spray 1,000 hrs

3 COATS

125 + 75 + 75 = 275 DFT



Combined Cycle Test:At 30 Cycles.

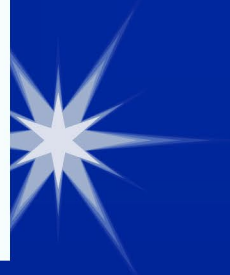


Salt Spray Test:At 1000 hrs.

MCU 3 coat system

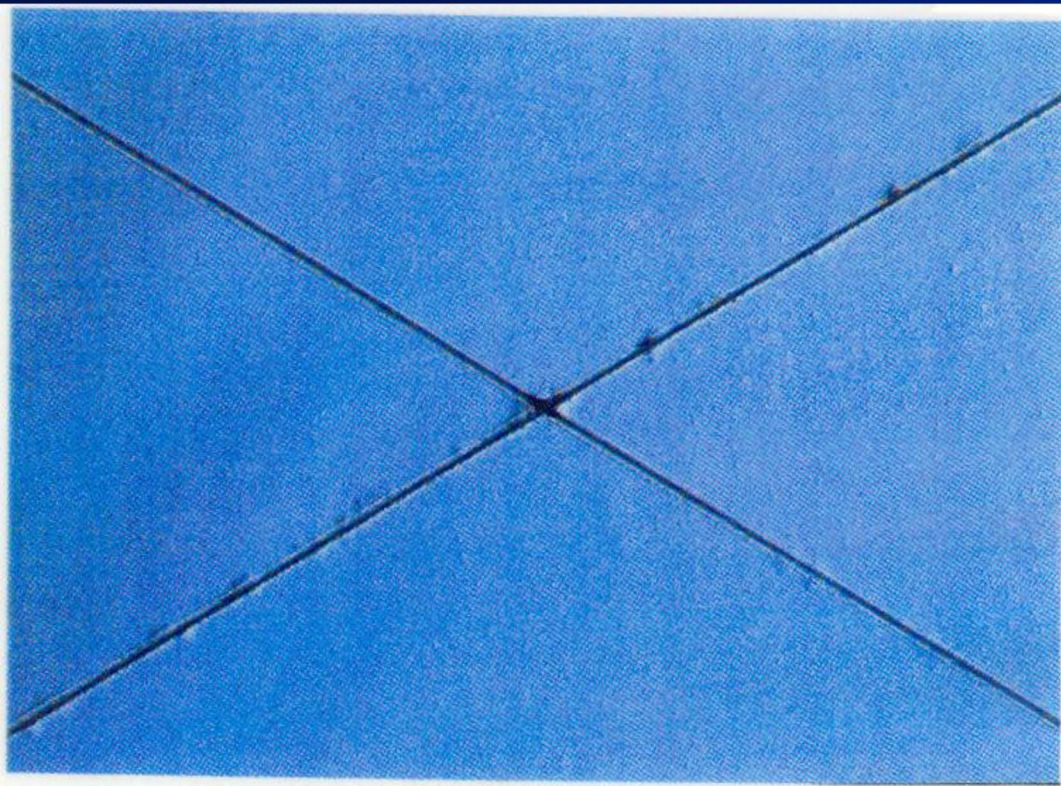
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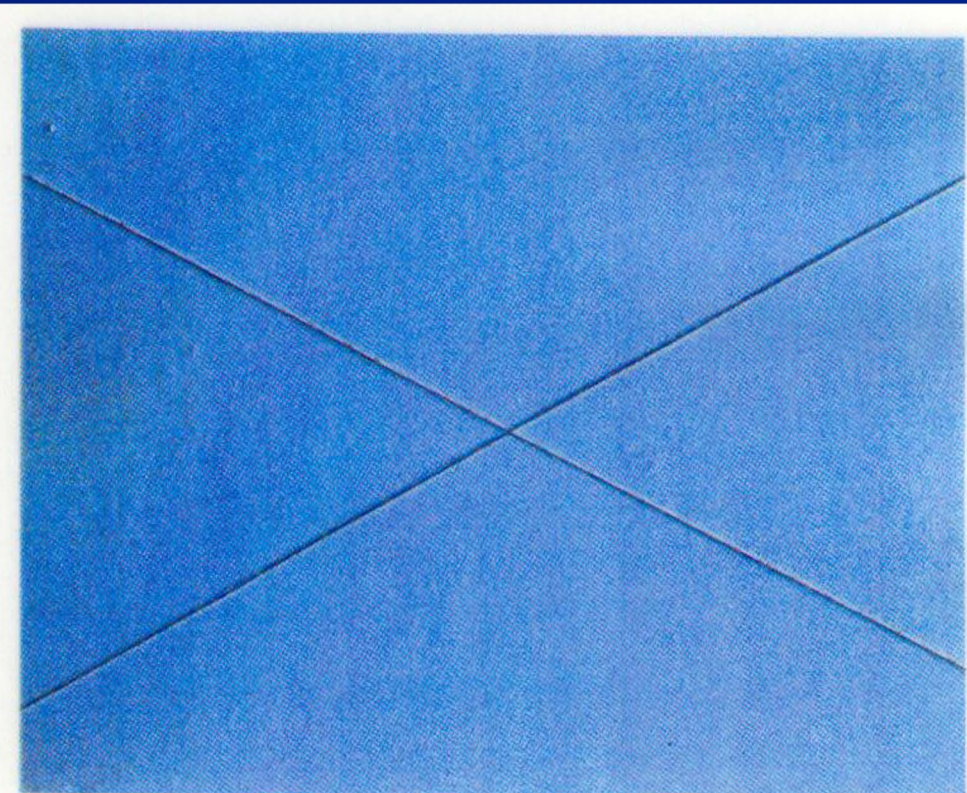


$75 + 75 + 75 = 225$ DFT

Combined Cycle Test 30 cycles / Corrosion Salt Spray 1,000 hrs



Combined Cycle Test:At 30 Cycles.



Salt Spray Test:At 1000 hrs.

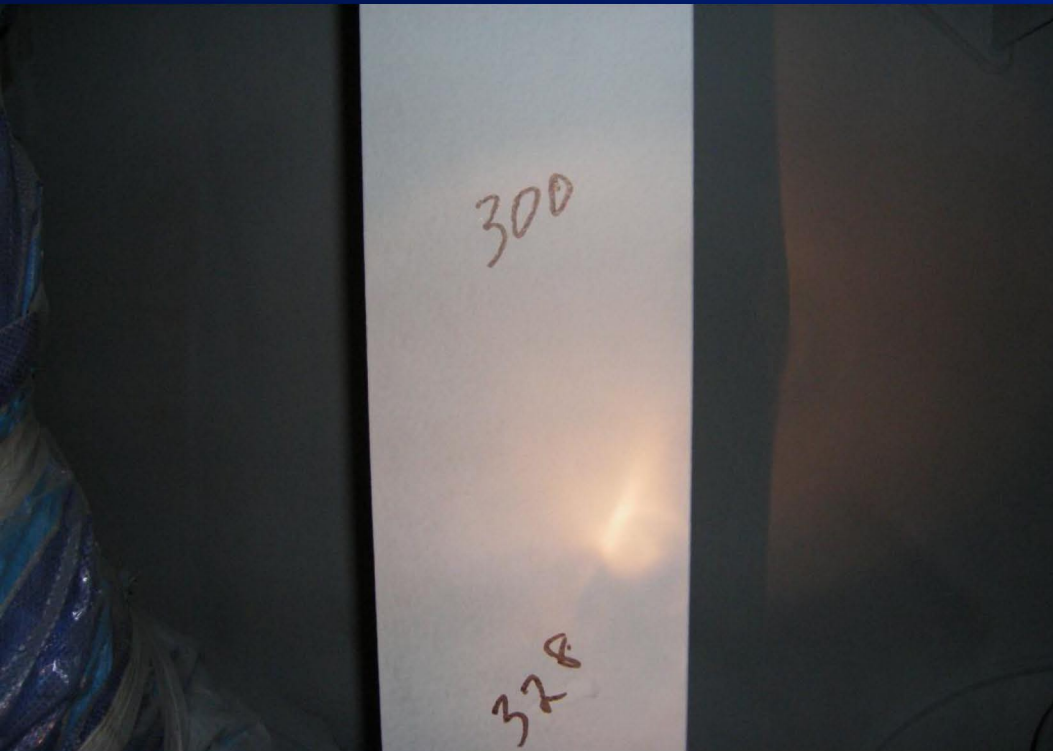
Surface tolerant – MCU MIOZINC

MV Spaarneborg, Wagenborg Shipping, NL

Surface preparation UHP, flash rust prior to prime coat



Surface tolerant zinc on tight rust FPSO BW Enterprise



- After 6 yrs of evaluation BWO rates MCT best in protection
- When long-term is required MCT has been utilized
- Miozinc applications of 300 – 400 um without mud-cracking

These projects (in Singapore), need products that are both surface tolerant and have a wide climate condition acceptability

- Ballast tank in FPSO
Peace UHP surface
 - prep & flash rust
unable to control
- RH 98%, temp 38C



Surface tolerant – Tight vs loose rust



- Tight flash rust will not leave rub marks
- Loose rust is corrosion that has not been removed or severe flash rust
- Severe loose rust or scale will serve as a barrier for coatings

Hual Fleet, Ballast Tanks, Hoegh Fleet Services AS



- Trubador completed by riding crew in 2000, water jetting surface prep.
- Insp. after 4 years, the coating is in 100%, with no coating breakdown
- No signs of corrosion



FPSO BW Peace



- The decision to use MCT coatings on the current project due to short time frame & long-term protection required
- The vessel's deck, superstructure, piping & modules have aged inorganic zinc – largely failing and balance with covered in Zinc salts
- Miozinc is used as the universal primer over UHP & slurry preparation

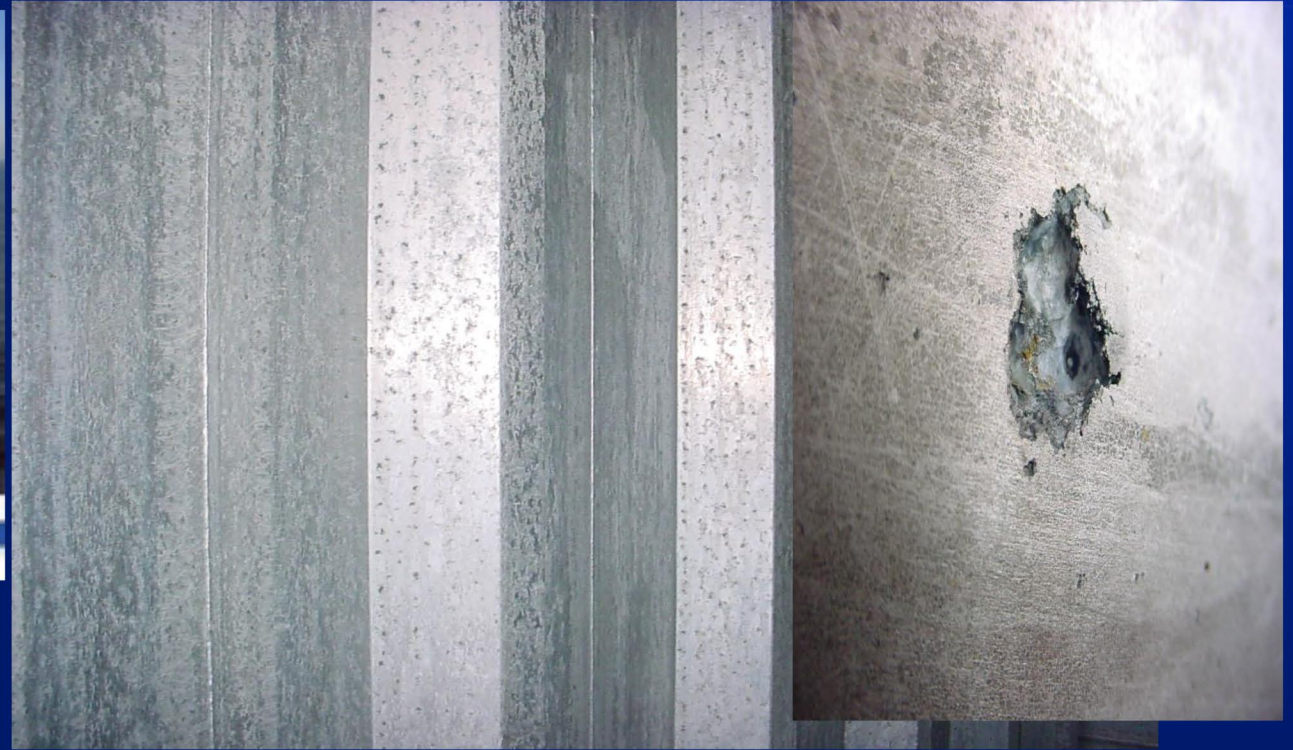


Sea stock

- VLCC w over 23 types of paint – 46 cans (2 part) + 8 thinners - much past due date.
- MCU would have 3 – 4 paints and 1 thinner period.



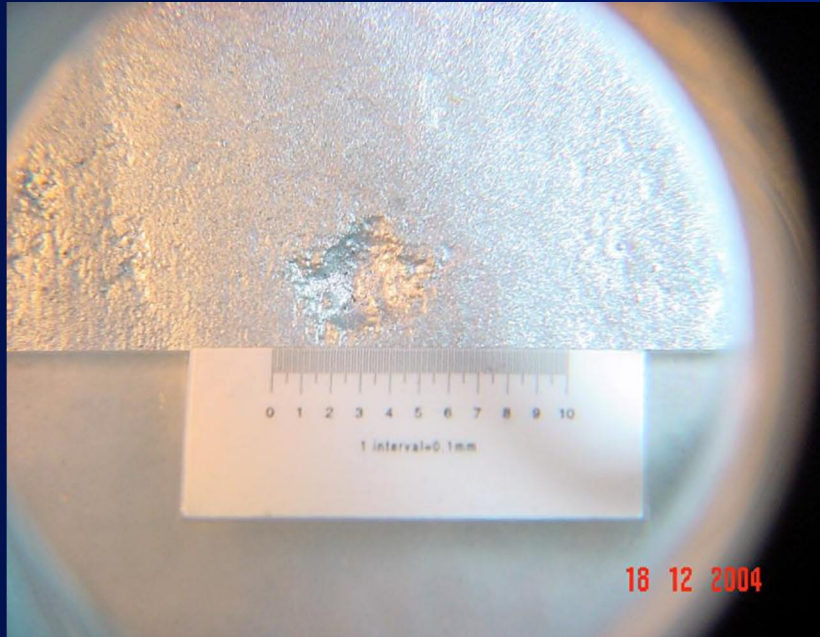
Best Adhesion on Aluminium – Stena Discovery



This fast going aluminium catamaran ferry developed pittings some severe, in the untreated areas, specifically in the turbine intake rooms.

- Epoxy coatings were not able to penetrate into the pittings and offered unsuitable adhesion.**
- See the story highlighted in the March Issue of RINA's Ship Repair and Conversion Technology magazine.**

MV Discovery – Test Application

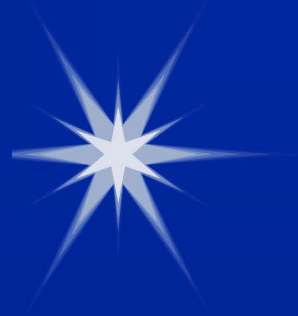


- A test was carried out on a hatch plate from the air intake room. The plate was prepared 50% with a chloride remover, then entirely blasted with 3000 bar.
- MCU Aluprime was applied with 2 coats of 50 microns.
- After 2 months in service evaluation tests were completed, by Stena

MV Discovery – upon completion - and after 12 months



Wagonborg Shipping Test 2004

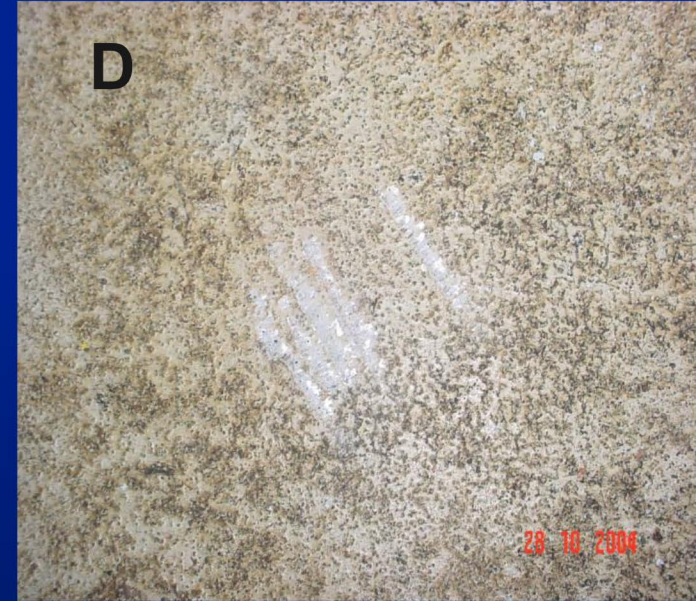
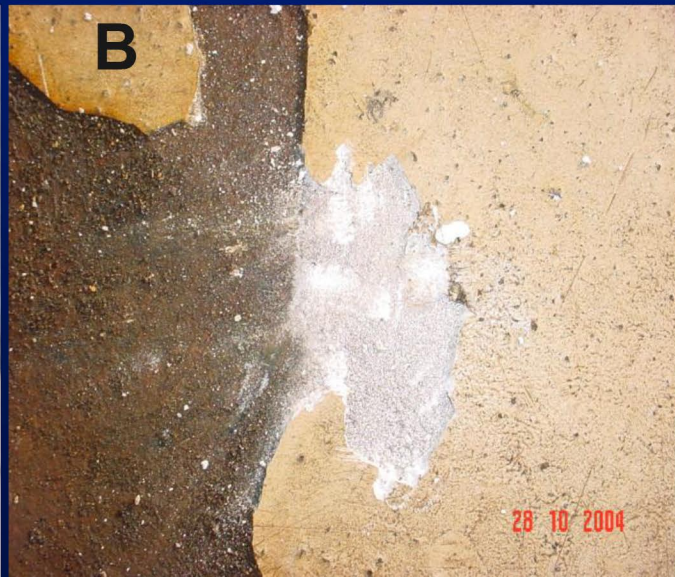
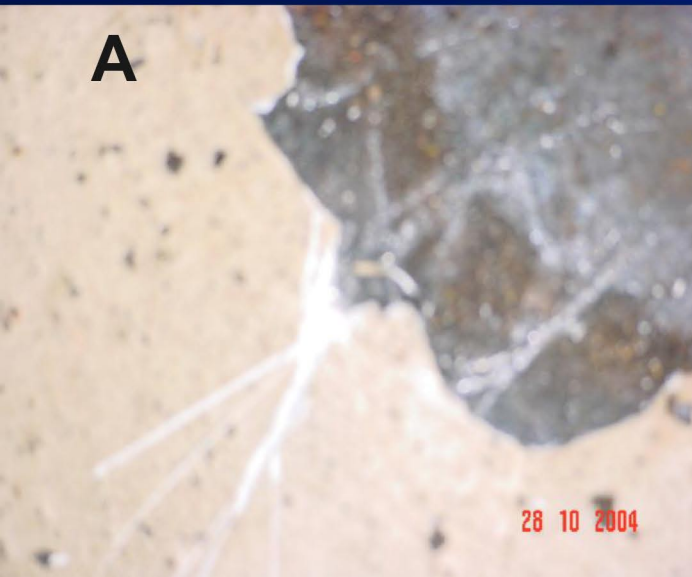


- Due to premature failures within 3 – 6 months of full blast and recoat and within 12 – 18 months of new build, a comparative test of 4 systems was conducted.
- Systems tested on abrasive blasted SA 2.5, included:
- A/ Glass flake pigmented solvent free epoxy
- B/ Ceramic pigmented solvent free epoxy
- C/ Anti-abrasive formulated solvent free epoxy
- Solvent was added to the epoxies in order to get better flow and adhesion
- D/ MCT single pack MCU, MC Miozinc & MC Aluprime
- All systems had Aluminium Oxide for non-skid due to heavy loads required.



Wagenborg Abrasion Comparison Test

- A – glass flake epoxy 1000 // Eu 21.70 / m²
- B – Ceramic epoxy 1000+ // Eu 27.90 / m²
- C – HS epoxy 700-1000 // Eu 13.01 / m²
- D – MC Technology MCU // Eu 6.70 / m²
 - MCU Miozinc 75 – 100 my + MCU Aluprime 200 with aluminium oxide non-skid

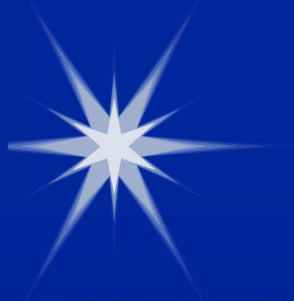


Wagenborg – Spaarneborg Rehabilitation



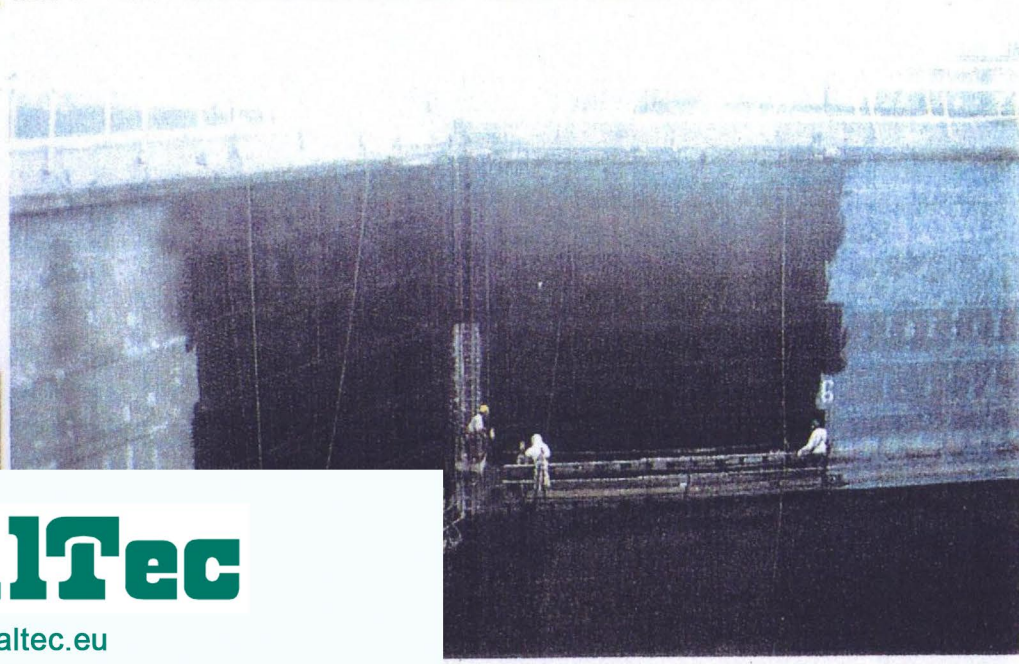
- In 2005 12 RoRo vessel decks were rehabilitated with the MCU system. One vessel had a 60+ ton container fall gauging the deck system topcoat – but without going down to the bare steel. Owners are now specifying MCU on new builds, 5 were delivered in 2006, 4 scheduled in 2007, 4 in 2008.

PANAMA CANAL – Exclusive supply over 20 yrs.



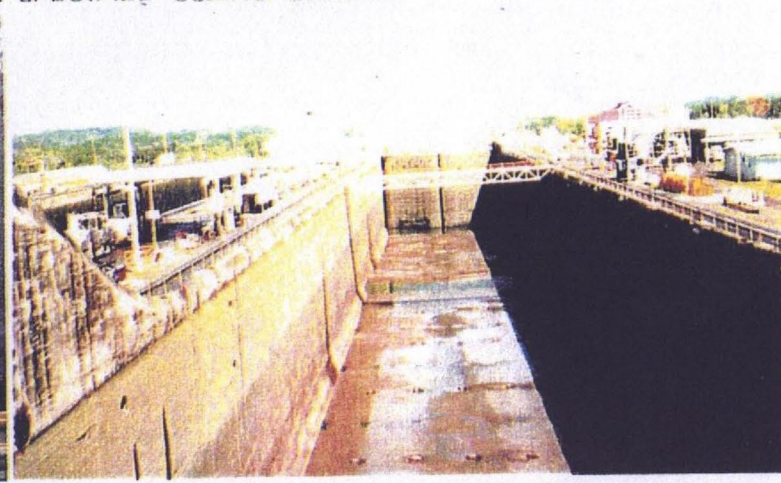
PANAMA CANAL

MC-ZINC MC-TAR
APPROVED AFTER 6 YEARS OF TESTING



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ALL CANAL MAINTENANCE PROJECT NOW ARE SPECIFIED USING WASSER



ENSCO INT. DRILL PLATFORMS

- All internals for rigs can be coated with one system
- Incl: tanks – ballast, grey water, black water, drinking water, mud tanks, engine room, battery room, chain locker etc.



ENSCO Int. DRILL PLATFORMS

MAINTENANCE OF PLATFORMS AT SEA
HYDRO BLASTING & MCU COATING EVEN AT NIGHT



FPSO BW Nisa – May Singapore



- Deck patch demo – prep – ST3
- Primer – intermediate & top-coat, all received rain upon fresh paint within 10 – 15 minutes.



US Navy



Trident Class Submarines

- High abrasive areas, ie Torpedo Tubes & Missile launch hatches
- Interior bilges



MCU not only saves time and money, but by using more friendly prep i.e. UHP and using a coating that lasts 2 – 3 X longer – Helps Safeguard our Environment

HOW MUCH COULD YOU
SAVE PAINTING IN DAMP
CONDITIONS?

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