



MGP-*i* APPLICATION ON JETTY PILES

CAPABILITIES STATEMENT





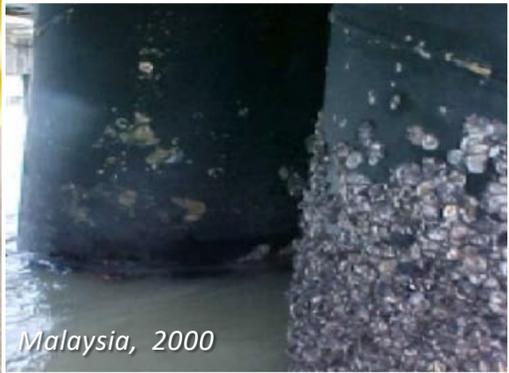
Malaysia, 1996



Malaysia, 2013



China, 2013



Malaysia, 2000



Malaysia, 2019



Malaysia, 2003

32

CELEBRATING YEARS WITH THE INDUSTRY



WHY PREVENTION OF MARINE GROWTH MATTERS ?

WHAT IS MARINE GROWTH?

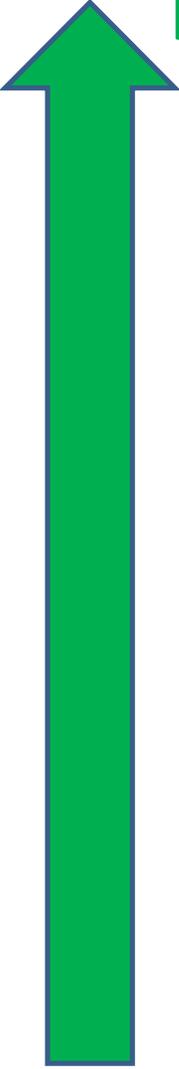
Unwanted settlement and growth of marine organisms, including micro-organisms, algae and animals, on underwater surfaces of ships, buoys, piers, offshore platforms, marine jetties, wharves, etc.



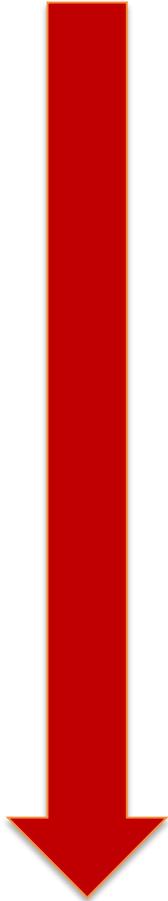
DOWNSIDERS OF MARINE GROWTH



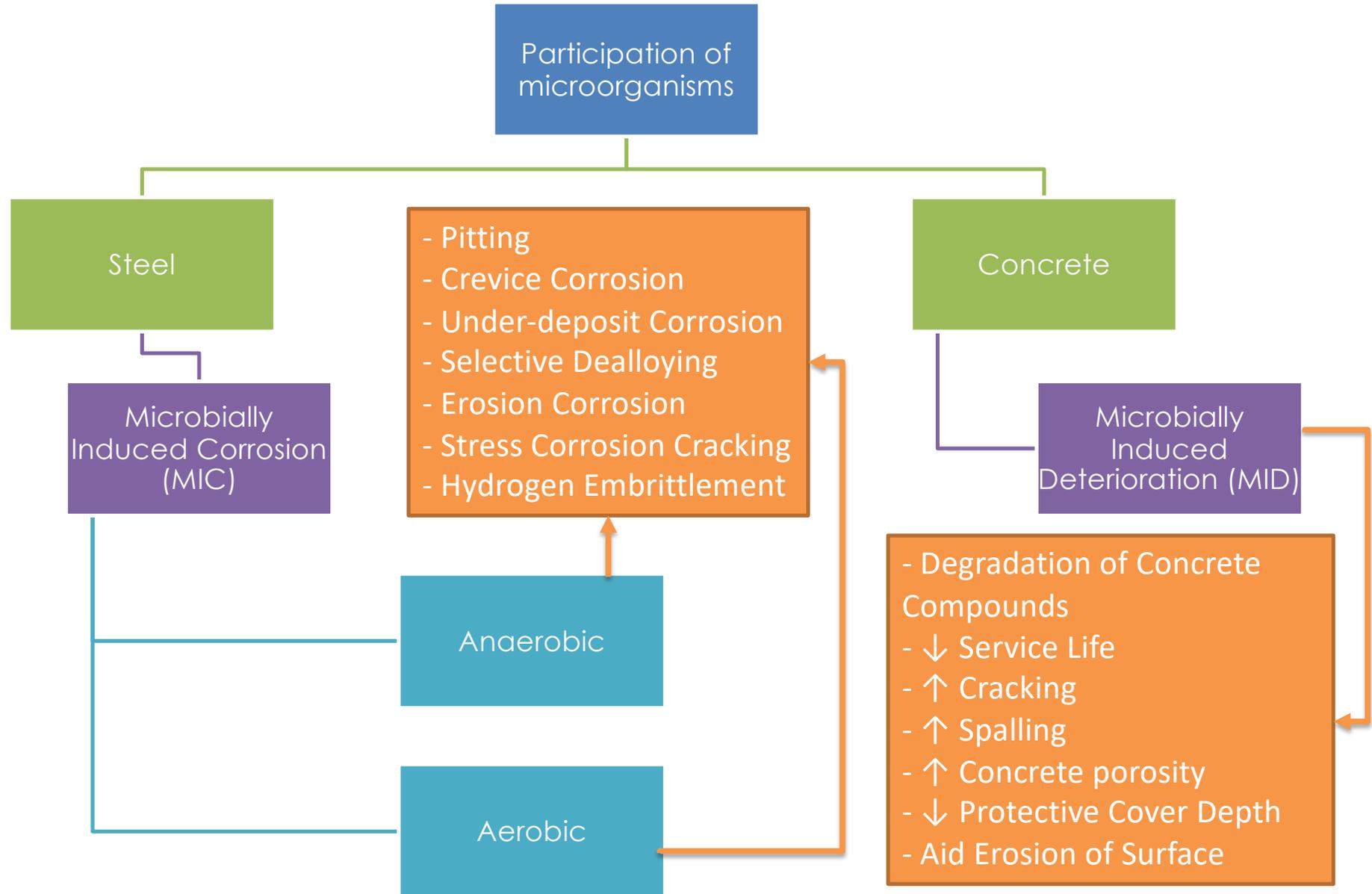
INCREASES

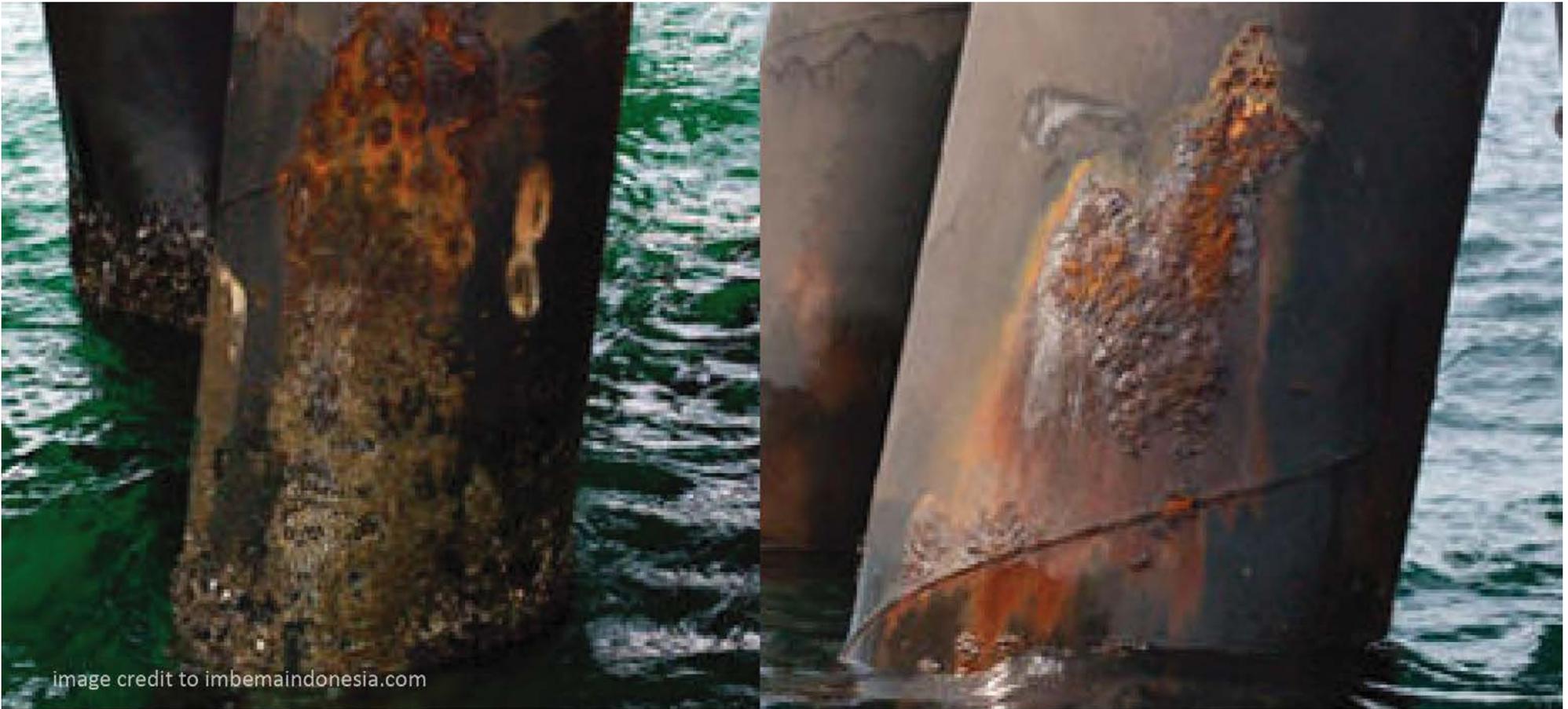
- 
- Effective member diameter
 - Surface Roughness
 - Hydrodynamic Forces
 - Non-Structural Mass
 - Microbially Induced Corrosion (MIC)
 - Microbially Induced Deterioration (MID)

DECREASES

- 
- Structural Support Capacity
 - Ability to carry out visual inspection
 - Fatigue Life
 - Service life of assets due to corrosion

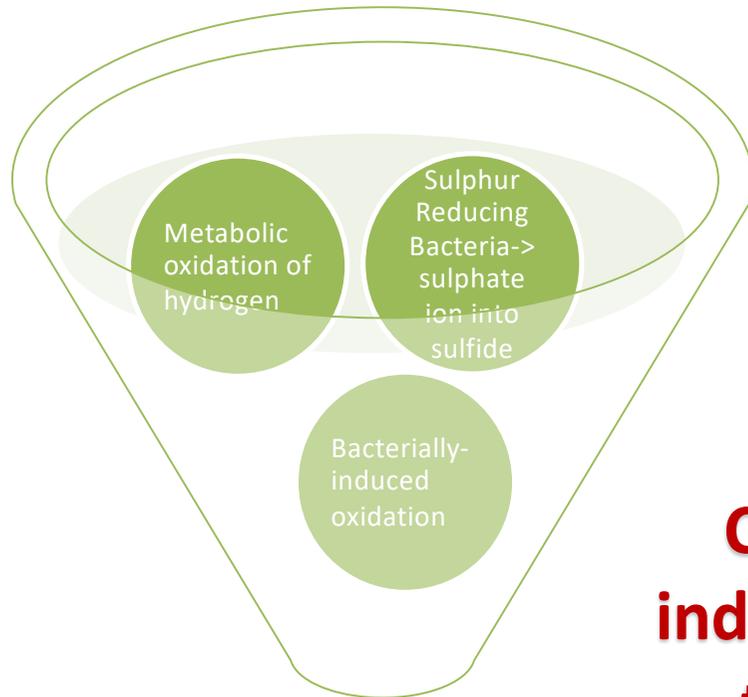
MICROBIAL/MICROBIOLOGICALLY INDUCED CORROSION (MIC)





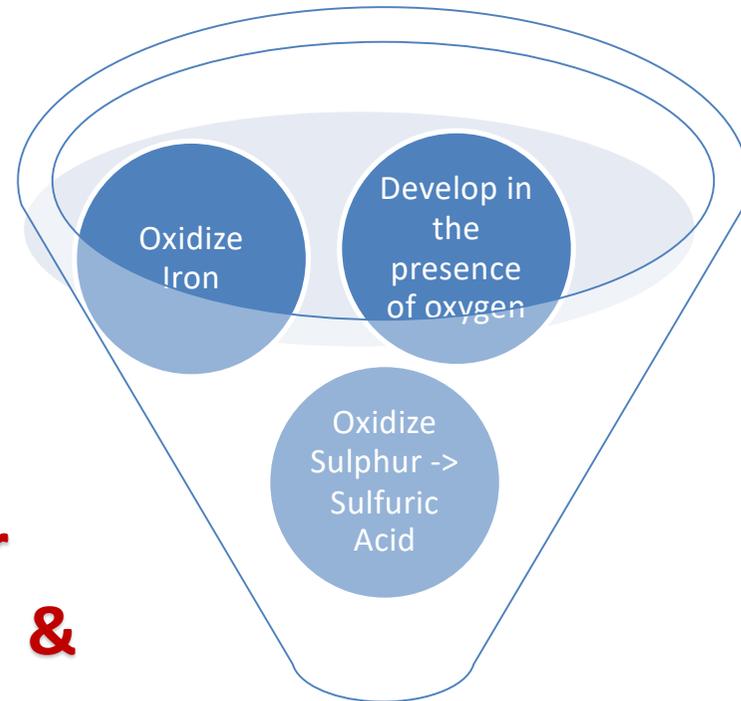
DAMAGE CAUSED BY MARINE ORGANISMS ON STEEL AND CONCRETE STRUCTURES

Anaerobic



- > Depolarize Cathodes
- > Pitting corrosion
- > Crevice Corrosion
- > Hydrogen embrittlement

Aerobic



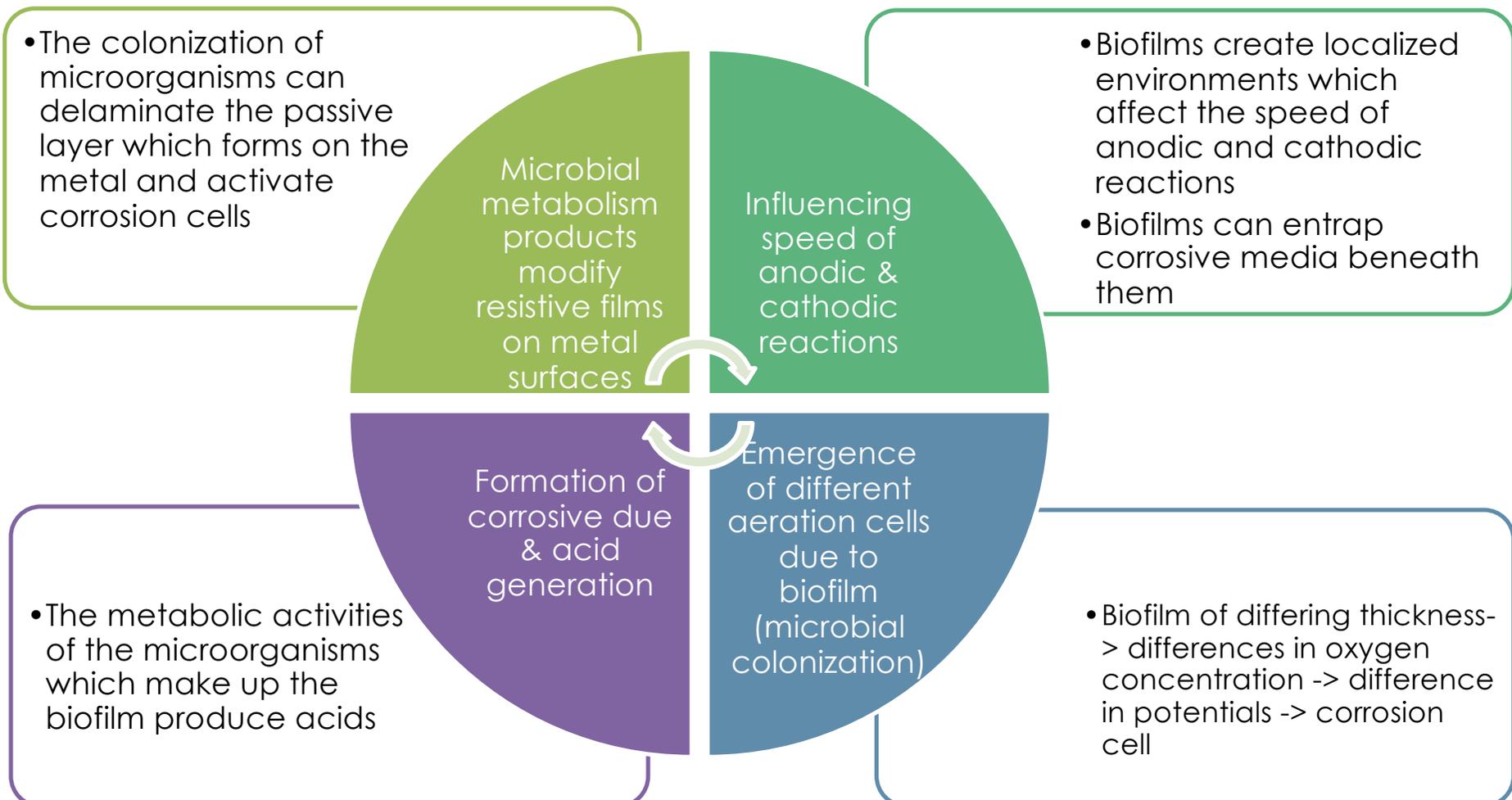
- > Pitting corrosion
- > Crevice corrosion
- > Metal dissolution
- > Acid producing bacteria

Can occur individually & together

MIC: IMPACT ON STEEL & STAINLESS STEEL



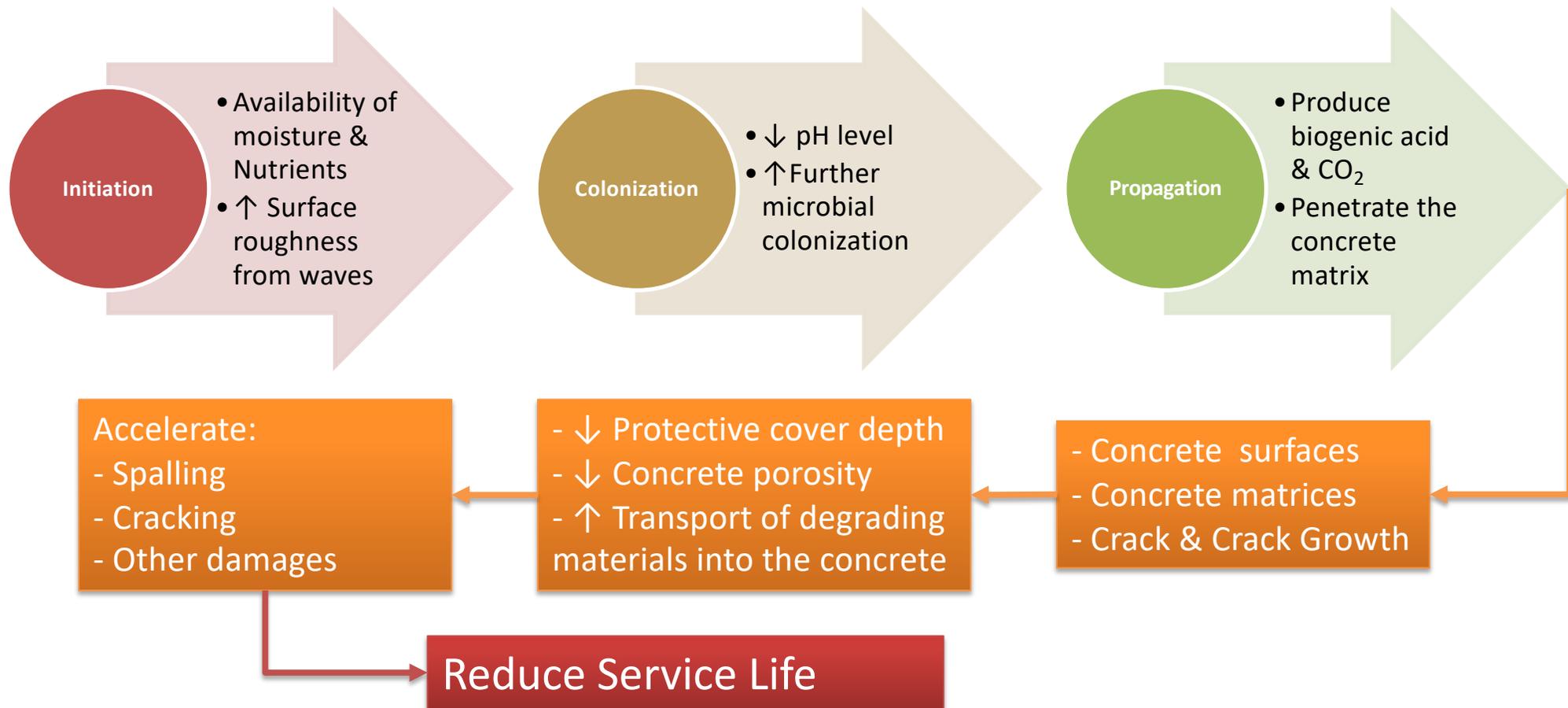
“Microbiologically Induced corrosion (MIC) refers to the influence of microorganisms on the kinetics of corrosion processes of metals and nonmetallic materials, caused by adhering to the interfaces (usually referred to as biofilms)”



MID: CONCRETE



“Biodeterioration has been defined in literature as any undesirable change in properties of a material caused by the vital activities of organisms and the process by which biological agents are the cause of the structural lowering in quality and value”



MIC & MID: PREVENTION BETTER THAN CURE



- Microorganisms do not induce a unique form of corrosion
- Mitigation process can be complicated and require diagnosis, assessment and monitoring making it
 - > expensive
 - > time consuming
 - > environmentally harmful (biocides)

By removing and then preventing marine growth from recurring the MGP removes the source of MIC



OUR SOLUTION TO THE MARINE GROWTH CHALLENGE ON JETTY PILES

HOW DO WE SOLVE THE MARINE GROWTH PROBLEM ?



- IEV's MGP **breaks down** the marine growth colonisation process by **preventing the formation** of microbial slime, the very first colonisers.
- MGP is **powered solely by ocean energy** – waves, currents, swells and tidal fluctuation
- The method of cleaning by IEV's MGP was **recognised** in API RP 2SIM Recommended Practice for Structural Integrity Management of Fixed Offshore Structures, as a measure to reduce hydrodynamic loads

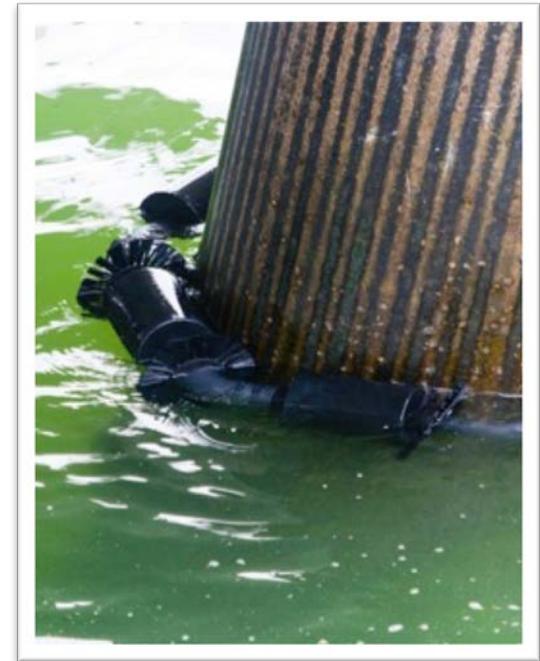
“ Such measures may include installation of sliding marine growth preventers and/or adding periodical removal to the SIM program for the platform”.

(Section 13.3.4.2.3, pg 53, API RP 2SIM, First Edition of November 2014 publication)

MGP HISTORY – YESTERDAY & TODAY



- Our history started since **1987**
- Our first customer was Woodside Offshore Petroleum Pty Ltd. Ever since, IEV's products have been adopted by O&G companies and several port operators globally
- In 1995, the MGPs were first installed on a jetty in the Gulf of Thailand
- The design of MGPs has evolved over many generations, from HDPE roller and roller brush to rubber roller, from light to heavy duty connectors, from flexible connectors to rigid connectors and from products coated with anti-fouling to self cleaning...
- **To date, we have supplied 33,700 products to 497 platforms worldwide including over 8,000 products on jetties and terminals in Asia Pacific region**





THE TECHNICAL BREAKTHROUGH

THE TECHNICAL BREAKTHROUGH – REINVENTION OF MGP



- We needed to design a MGP that can **survive icy ocean conditions** of Bohai waters in the winter
- The new MGP needs to be **totally protected** by rotating rubber components **to avoid damage** by ice sheets.
- This led to the design of the **one-piece rigid connector protected by rubber rings for anti-impact purpose**
- The new design also brings about a very important technical feature: “**self-cleaning**”
- The self-cleaning and anti-impact features are now novel features of our **patent pending** technology.



LAUNCHING THE MGP-*i* CONCEPT



MGP-*i* is IEV's very own **self-cleaning and anti-impact single-ring MGP**, that is **installed from above water** in a **single deployment** to both **remove** existing marine organisms and **prevent** their regrowth in the wave zone.



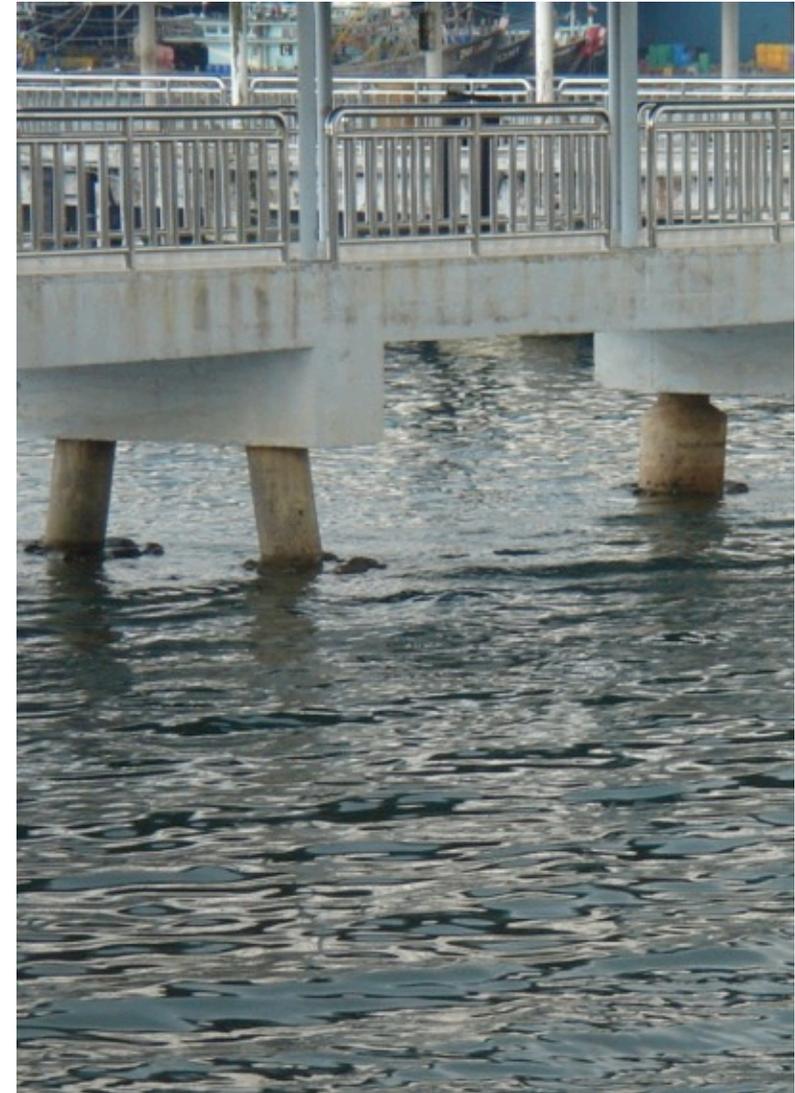
What is “ **i** ” in MGP-**i** ?

It is an **innovative** technology that has been engineered to be **impact resistant** and therefore, increasing its durability and, complimented with **improved technical specifications**.

THE MGP-*i*



- **MGP-*i*** is by far the most cost effective and simplest marine growth removal and permanent prevention method - one single deployment to provide a **permanent marine growth control solution in the most critical zone of marine structures.**
- The **MGP-*i*** was engineered especially for the rough environment of the **splash zone only.**
- It is driven by a combination of wave, swell, current and tidal fluctuation.
- The **MGP-*i*** incorporates **self-cleaning** feature that eliminates the need for anti-fouling coating on any component and thus, has an expected **service life of up to 20 years.**
- The “**one-shot**” **solution** performs both cleaning and prevention of marine organisms.



MGP ASSEMBLY AT SITE



INSTALLATION ON A JETTY PILE



MGP-*i* : In Action (photo)



MGP-*i* : In Action (photo)





TRACK RECORD & CASE STUDIES

TRACK RECORD (JETTIES)



Year	End User	Country	Location	Project Description	Quantity
2019	Sabah Port Sdn Bhd	Malaysia	Sabah	Jetty - Sepanggar Bay Oil Terminal	178
2019	Petronas (KPSB)	Malaysia	Terengganu	Jetty - Kertih Port	60
2019	Kertih Port Sdn Bhd	Malaysia	Terengganu	Jetty - Kertih Port	50
2019	Bintulu Port Sdn Bhd	Malaysia	Sabah	Jetty - Bintulu Port	2
2017	Royal Malaysian Navy	Malaysia	Klang	Jetty - Pusat Hidrografi Nasional	2
2017	Asian Supply Base Sdn Bhd	Malaysia	Labuan	Jetty - Labuan Asian Supply Base	38
2015	Asian Supply Base	Malaysia	Offshore Labuan	Jetty - Labuan Asian Supply Base	38
2014	Zhuhai LNG Terminal	China	South China Sea	Jetty - Zhuhai LNG Terminal	48
2014	CNOOC	China	South China Sea	Jetty - CNOOC Hainan LNG Terminal	393
2013	Starcruise Langkawi	Malaysia	Langkawi	Jetty - Star Cruise Jetty Langkawi	4
2013	Zhuhai LNG Terminal	China	South China Sea	Jetty - Zhuhai LNG Terminal	200
2012	JKR	Malaysia	Johor	Jetty - Tanjung Pelepas Jetty	147
2011	Thai Oil	Thailand	Gulf of Thailand	Jetty -Thai Oil Terminal Jetty	8
2010	JKR	Malaysia		Jetty - Muara Tebas Police	165
2008	PT Badak NGL	Indonesia	East Kalimantan	Jetty - Bontang Loading Dock 1 (Phase 2), Bridge & Pipeways	225
2007	JLM	Malaysia	Kelantan	Jetty, Kuala Besar	84
2006	JKR	Malaysia	Port Klang	Jetty - Marine Police Penang	234
2006	PPMSB	Malaysia	Melaka	Jetty - Refinery	1944
2005	JLM	Malaysia	Lumut	Jetty - Lumut, Sg. Pinang & Tg. Pelepas	168
2004	JKR	Malaysia	Penang	Jetty - Marine Police Penang	130
2003	JKR	Malaysia	Tg Gemuk	Jetty - Tg. Gemuk	82
2003	JKR	Malaysia	Tioman	Jetty - Kg. Tekek, Mukut & Asah	190
2002	PPMSB	Malaysia	Melaka	Terminal Jetty	1944
2002	Star Cruises Terminal	Malaysia	West Port Klang	Jetty	2
2001	JKR	Malaysia	Tioman Island	Jetty - Tioman Island	28
2001	JKR	Malaysia	Tioman Island	Jetty - Kg Salang	32

TRACK RECORD (JETTIES)



Year	End User	Country	Location	Project Description	Quantity
2000	JKR	Malaysia	Tioman island	Jetty - Tioman Island	28
1997	PPMSB	Malaysia	Melaka	Jetty - Melaka Refinery Marine Facilities	2215
1996	P.T. Badak NGL	Indonesia	East Kalimantan	Jetty - Bontang LPG Facility	20
1996	Star Cruises Terminal	Malaysia	West Port Klang	Jetty - Port klang	513
1995	P.T.T. Thailand	Thailand	Gulf of Thailand	Jetty - Sri-Racha	20

PPMSB MALACCA REFINERY MARINE FACILITIES MALACCA, MALAYSIA



Market : Brownfield
Year : 2000
No. of Structure : 1944 piles
No. of Products : 1944 units
Installation : Onshore
Client : Petronas
End User : Petronas Penapisan



**Creating
Value
with ocean
energy**

ASIAN SUPPLY BASE JETTY

Asian Supply Base Sdn Bhd, Labuan, MALAYSIA



Market Segment : Brown Field - Jetty
Year : 2015
No. of Structure : 1
Structure Name : Asian Supply Base Jetty
Coverage : Splash Zone
No. of Products : 38
Installation : Offshore



Creating
Value
with ocean
energy

ZHUHAI LNG TERMINAL PROJECT

Guangdong Zhuhai Golden Bay LNG LTD, CHINA



Market Segment : Green Field - Jetty
Year : 2013
No. of Structure : 1
Structure Name : Zhuhai LNG Jetty
Coverage : Splash Zone
No. of Products : 200
Installation : Onshore
Contract Value : Approx. USD 170k

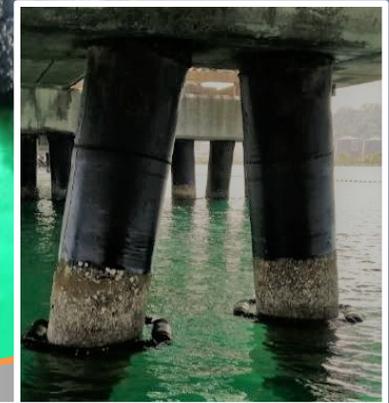


**Creating
Value
with ocean
energy**

SEPANGGAR BAY OIL TERMINAL PROJECT SABAH PORT SDN BHD, MALAYSIA



Market Segment : Brown Field - Jetty
Year : 2019
No. of Structure : 1
Structure Name : Sepanggar Bay Oil Terminal
Coverage : Splash Zone
No. of Products : 178
Contract Value : Approx. USD 198k



**Creating
Value
with ocean
energy**

KERTIH PORT PROJECT PETRONAS (KPSB), MALAYSIA



Market Segment : Brown Field - Jetty
Year : 2019
No. of Structure : 1
Structure Name : Kertih Port Jetty
Coverage : Splash Zone
No. of Products : 50 (Ph1) and 60 (Ph2)
Contract Value : Approx. USD 124k



**Creating
Value
with ocean
energy**



OUR VALUE PROPOSITION

MGP-*i* – VALUE PROPOSITION



Most cost-effective solution to add life and strength to jetty piles

Removes and prevents marine growth in a single deployment

Powered solely by ocean energy & designed for all ocean conditions

Easy to install

Applicable to all structures and appurtenances in the wave zone

Reduces dynamic and hydrodynamic loading on the jetty piles

Extremely durable and supplied with a 10-year warranty

Prevents Microbial Induced Corrosion (MIC) attack on steel & concrete piles



**ADD SIGNIFICANT LIFE AND STRENGTH
& REDUCE INSPECTION FREQUENCY OF JETTIES
BY PREVENTING MARINE GROWTH IN THE WAVE ZONE
WITH IEV'S MGP-*i* SOLUTION**

“COMBINING DISRUPTIVE TECHNOLOGIES AND PROVEN ENGINEERING CAPABILITIES”

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