

Offshore Wind Turbine Protection

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4 phases of protection

1.Shipping

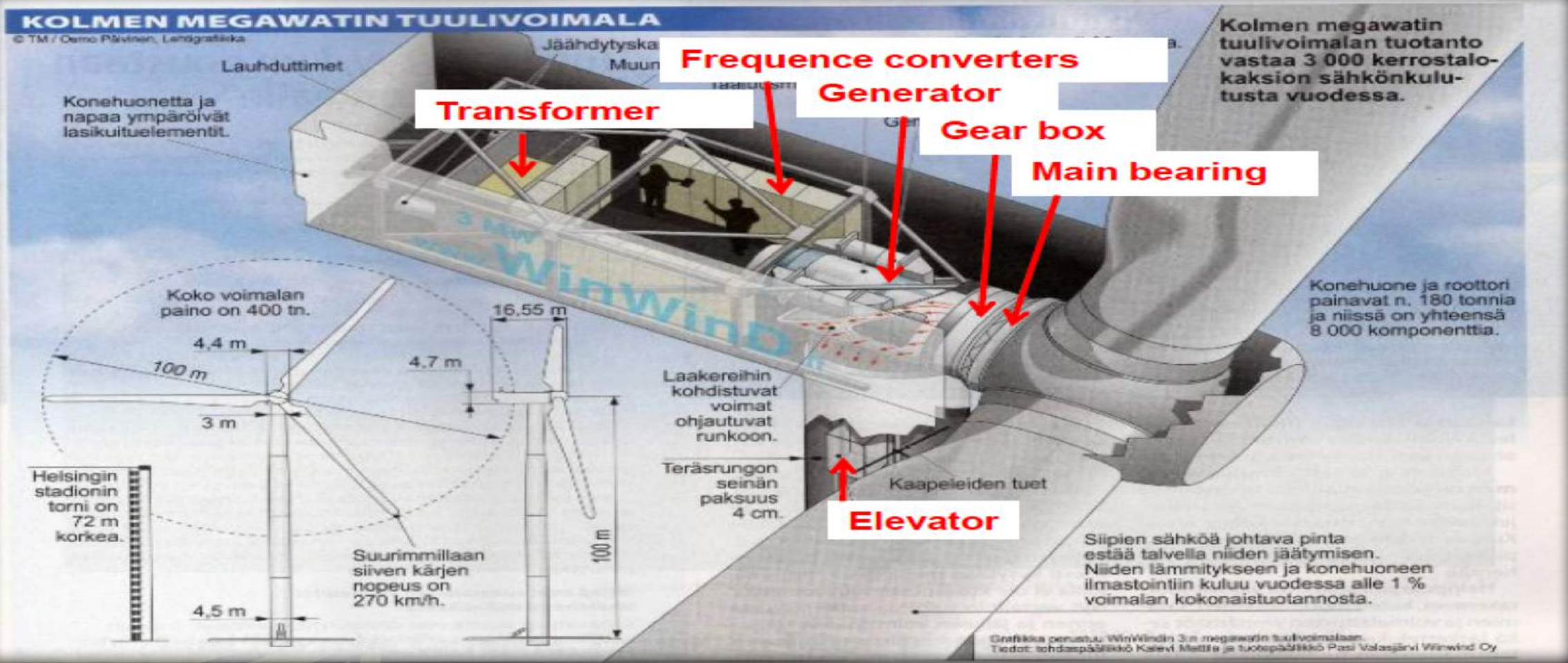
2.Storage

3.During Operation

4.Long term protection of spare parts/mothballing



3 megawatt turbine



1.Shipping

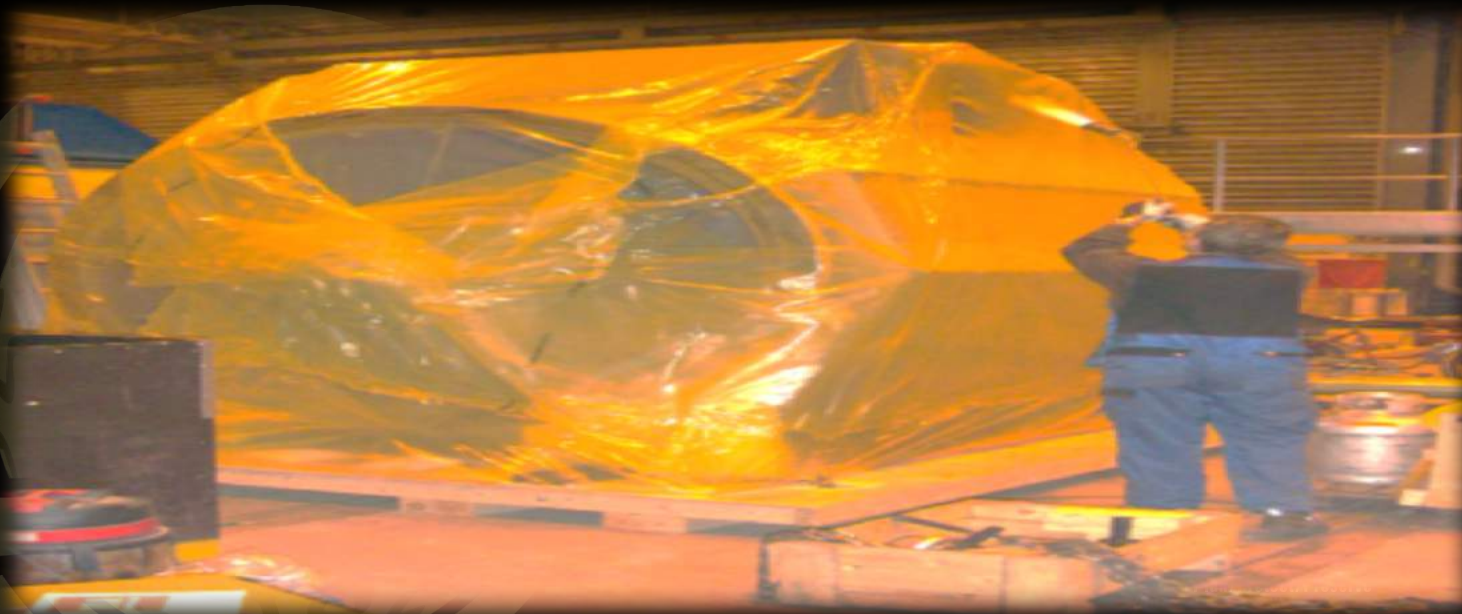
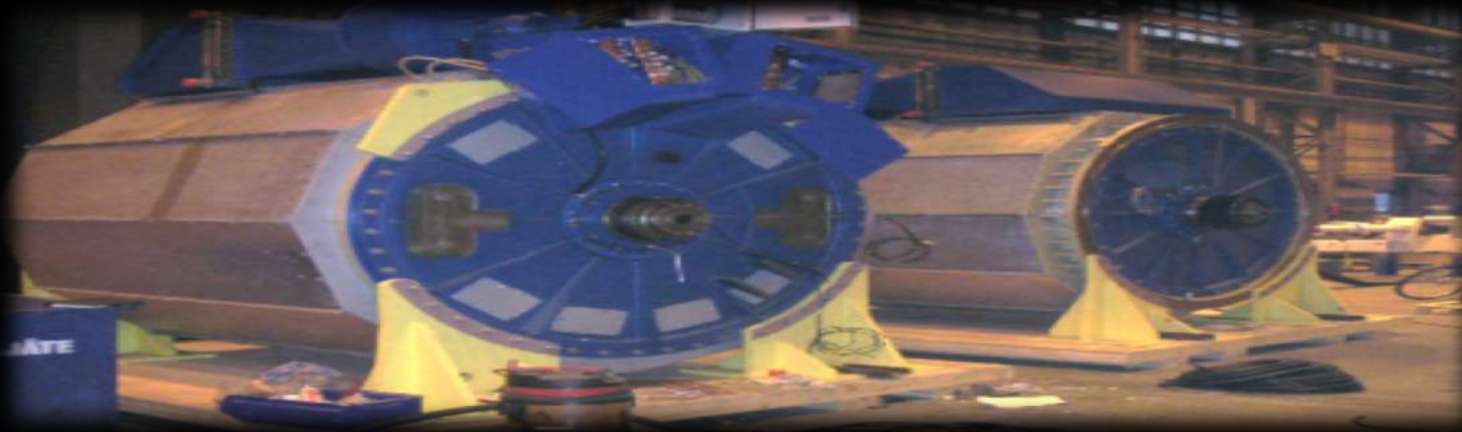


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Protection of generator outer surfaces



2.Storage



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Protection of converters and transformers



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Outdoor protection of elevator engines



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Gear Parts



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3. During Operation

Nacelle

The turbine nacelle is designed to Inhibit the Ingress of water. However due to the harsh marine environment of high velocity winds containing salts/chlorides alternative measure of protection are required to protect the electrical and Instrument control panels.

Corrosion Protection of Wind Turbine Electrical System

Power Generation Units

Electrical Distribution panel, Instrument Electrical Isolation and Junction Boxes

Hydraulic Pump Drive Motors



Power Generation Units

This should be protected from condensation and dampness by the fitting of anti-condensation heaters. These use little power and have been proven to work in the offshore oil and gas installations.

The use of VCI such as Capsules and other emitters have been used for over 20 years in the offshore oil and gas industry and have proven their effectiveness.

They emit a vapour which forms a microscopic layer of anticorrosion protection.



Electrical & Instrument Distribution Panels

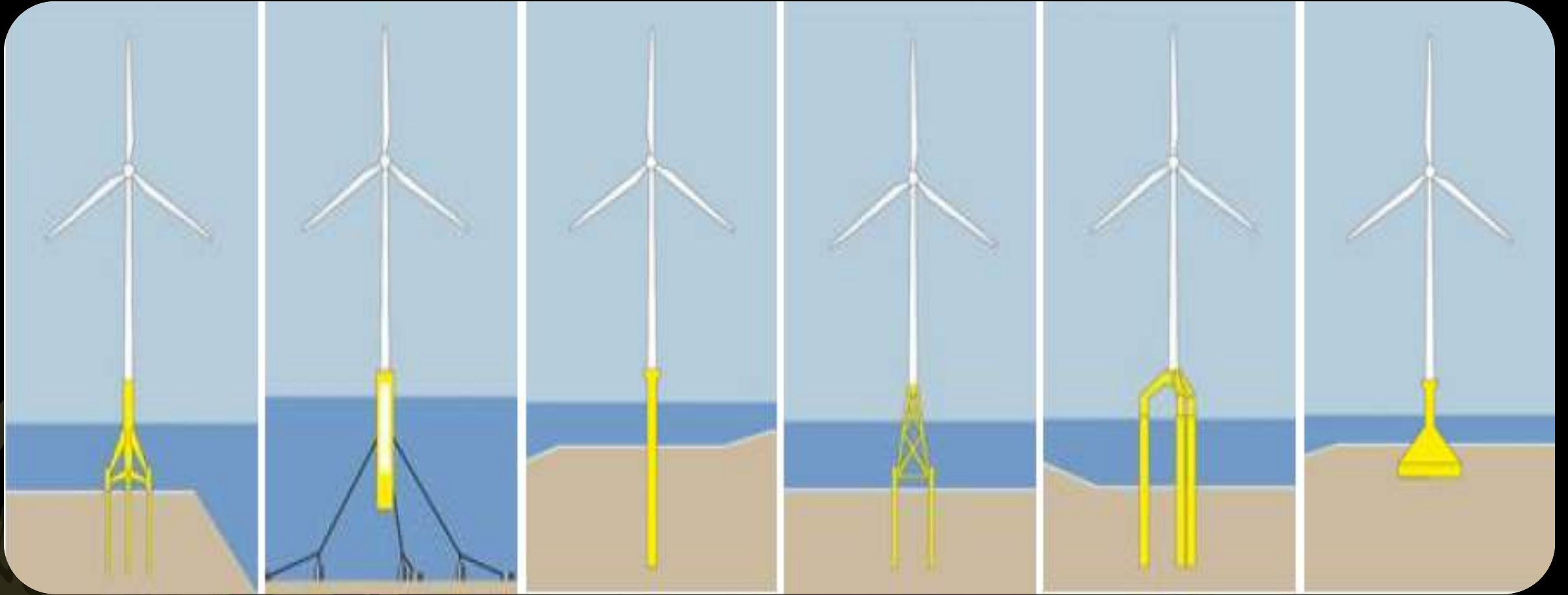
These should be protected by fixing a strip of VCI tape Inside the enclosures, this will protect the contacts and connections as well as the Internal surfaces from corrosion. Sealing around the box lid with Viscotaq will add to the enclosures protection against any Ingress of moisture.

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6 possible constructions for tower & foundations

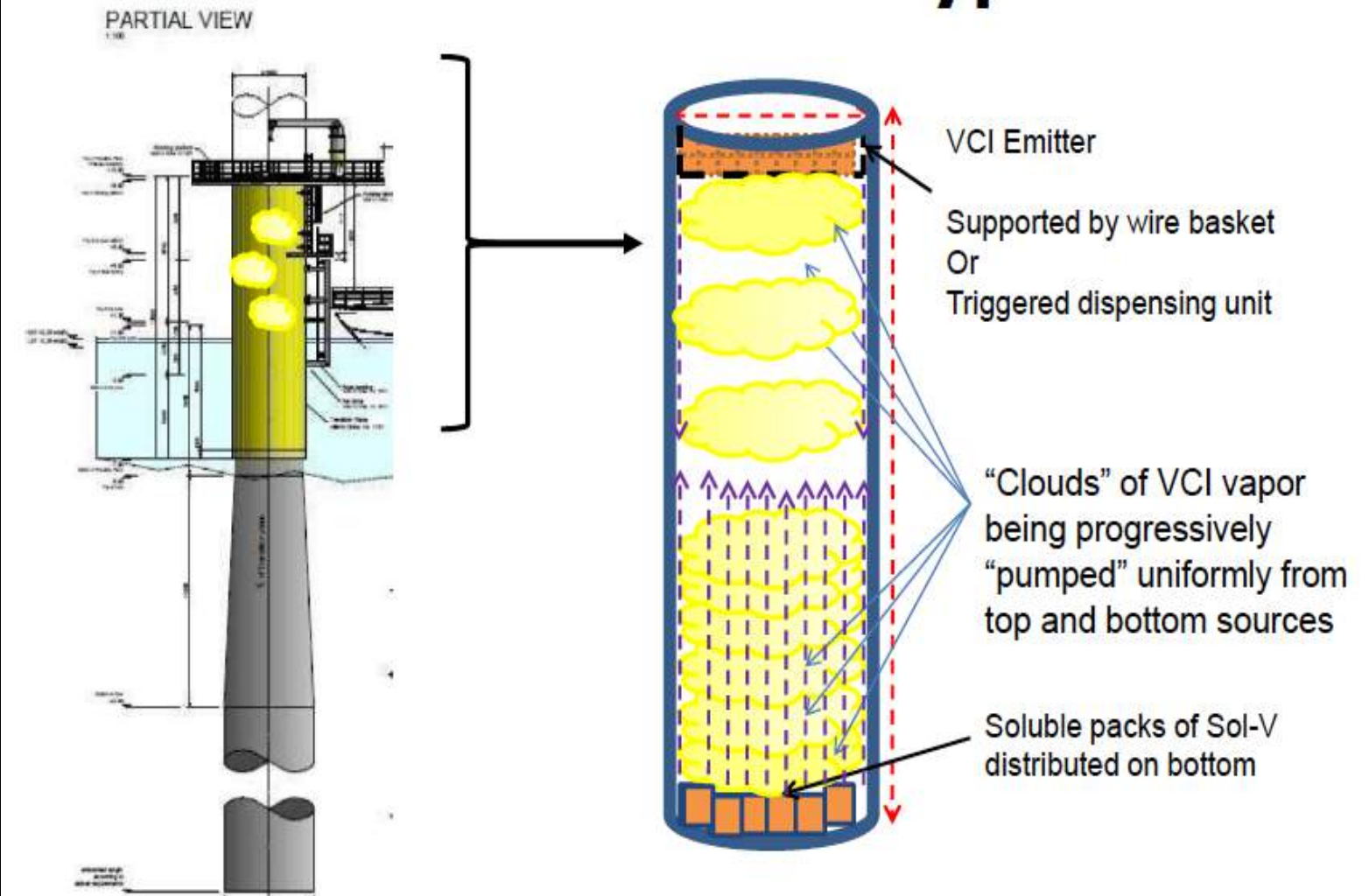


Challenges

- 4 Different critical Zones in a WT – related solution
 - Water Zone (max and min)
 - Splash Zone
 - Air Zone
 - Mud Zone
- Biggest constructions issues to address
 - not hermetically sealed WT
 - Seawater ingress/ flexible J-Tube
 - Tidal pressure
- Microbiological induced/influenced corrosion (MIC)
- Ecological/Environmental Concerns
 - Leaching
 - Osmotic Diffusion



Reference Type



Solutions

Interior electrical devices can be protected by air conditioning (which often provides de-salting and dehumidification of the compartment) with the addition of VCI emitters

Some of the nacelles are air tight and can easily be protected by VCI solutions. Note air tight nacelles require higher depositions of VCIs



Caisson Leg Corrosion

Solution to chlorides and other corrosive anions is:

- to buffer and maintain the pH in a much higher range whilst “deactivating” the corrosive anions
- Emitting VCI into other segments of the tower
- In the event that the caisson legs are not hermetically sealed, stop sea water ingress into the leg.
- Solution is resistant to degradation by the sea water
- Solution continues to protect exposed metal surfaces in the presence of sea water



So why Z-Rust ?

1. Protection in three (3) phases using four (4) mechanisms
2. Packed in breathable, soluble packaging
3. Self-fogging Flash Corrosion Inhibitor (FCI™) technology
 - High vapor pressure, low vapor density
 - Fast acting flash corrosion inhibitor
 - Fills vapor spaces immediately
 - Highest volume of protection per weight of active ingredient
 - Navigates complex systems
4. Long-term Vapor Corrosion Inhibitor (VCI) protection
 - Slower evolving, long-term vapor corrosion inhibitor
5. Long-term Soluble Corrosion Inhibitor (SCI) protection
 - Contact corrosion inhibitors activated when water present
 - Chloride “neutralizer”
6. Microbiological Induced Corrosion (MIC) Inhibitor
 - Controls aerobic and anaerobic (SRB) microorganisms



4. Longterm Protection of spare parts/mothballing

3 Solutions

- Liquid or drying polymer VCI coatings + packaging film
- Al and VCI-Pe film combined with a desiccant
- High Performance 7 layer VCI film



Any Questions ?

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