ARC
DIVISION OF CHESTERTON®

شركة علي العبدالله التميمي التجارية
ALI A. TAMIMI TRADING CO.

TAMIMI GROUP

- **TAMIMI GROUP was established in 1953, by the late founder Chairman, Sheikh** Ali A. Tamimi, to carry out Pipeline Construction, General Construction and related works.

- In 1986 the Group reorganized

Tamimi Group Activities

Pipeline & Electro-Mechanical Construction

- Power Generation Manufacturing
- Thrust boring Construction
- Technical and Logistical Support Services
- Transportation
- Electrical Transmission Line Construction
- Catering & Life Support Services
- Corrosion Inhibition
- Operations & Maintenance
- Tape Manufacturing
- Supermarkets
- Hotel Operations
- Real Estate
- Integrated Unified Instrumentation & Safety Control Systems
- Commercial and Industrial Trading
- Oilfield Chemicals Blending & Supply
- Chemical and Oilfield Chemicals Manufacturing

TAMIMI GROUP

TAMIMI
TAMIMI MARKETS
TASECO-T.M.S.
TAMIMI COMMERCIAL
TAMIMI REAL ESTATE
TCC
SESCO
TAMIMI GLOBAL
MEELSA
Middle East Engineering Limited Saudi Arabia
MEPCO
Middle East Power Co. Ltd.
SSC
CHESTERTON
Global Solutions, Local Service.
Silvertech
Systems Designers - Control Engineers
RED WING SHOES
FANUC
GE Industrial Sensing
ENERCO
Energy Equipment Rental Co.Ltd.
Clariant
BCI
TASECO
Xpress Lube
Firestone
MEPCO
Havoline
HALLIBURTON
EXIDE TECHNOLOGIES
WAPTCO

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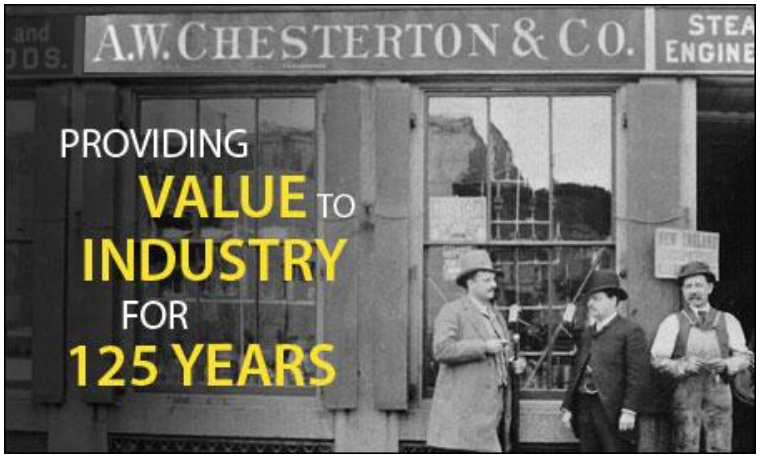
ALI A. TAMIMI TRADING CO.

A.W. Chesterton Company

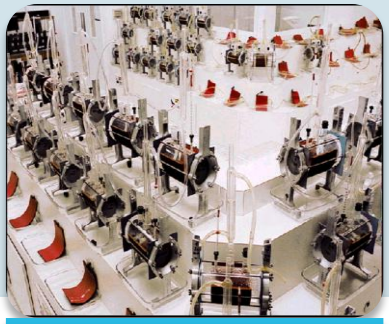
- ARC Composite Technology
- Mechanical Seals
- Mechanical Packing & Gasketing
- Hydraulic/Pneumatic Seals
- Technical Products



Technical Capabilities

Physical/Chemical Test

Physical/Chemical Test



Corrosion Test Laboratory

Corrosion Test Laboratory

Desirable Properties of a Coating

- Adhesion
- Chemical Resistance
- Water Resistance
  - Low Moisture Absorption
  - Low Moisture Vapor Transmission
- Surface tolerant
- Easy to apply
- Elongation to resist cracking
- Impact Resistance
- Abrasion Resistance
- Temperature Resistance
- Dielectric Strength

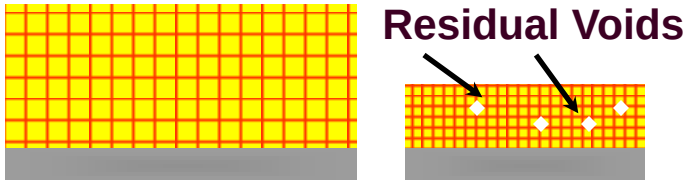
High Performance Coatings

Film Formation – Curing Characteristics

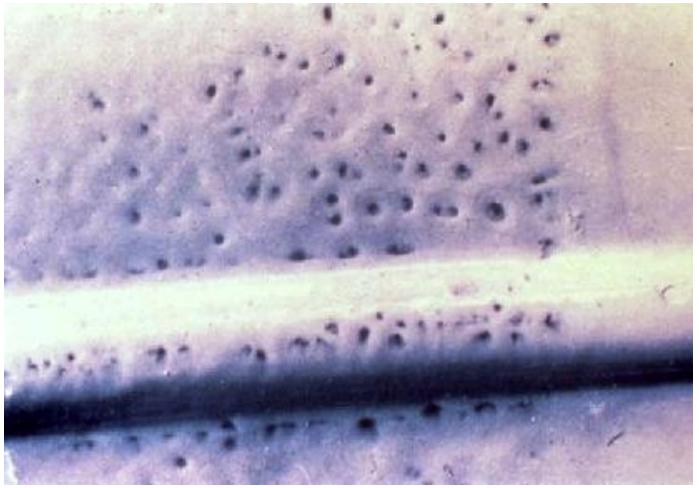
* Solvent evaporation - Lacquers
* Change of phase - Thermoplastic
* Oxidation - Alkyds
* Crosslinking Polymerization - Epoxies
* Heat condensing – Phenolics
* Inorganic

Solvent Based Coatings

- **Solvent Containing Barrier Coatings**
  - Requires active solvents, latent solvents, and diluents.
  - As solvent evaporates thermoplastic resin molecules are drawn together. Co-reactive systems require two stage cure
  - Films will be plasticized if solvent does not evaporate
  - When solvent evaporates volume of film shrinks and stresses are created.
  - Voids created by solvent evaporation increase film porosity.



Effective cure shrinkage with 50% solids film



Desired Characteristics of Composite Coatings

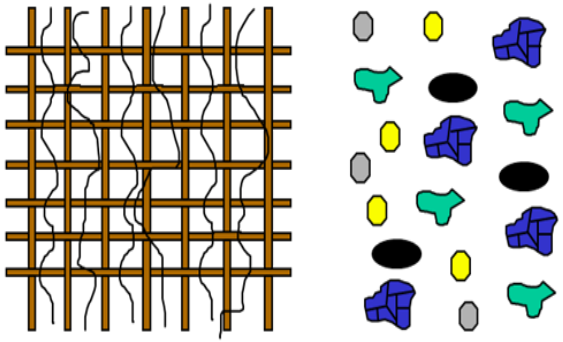
- Good Mechanical Properties
  - Adhesion
  - Flexible
- High Permeation Resistance (Low WVT)
  - Long-term protection against penetration
- Functional Reinforcements
  - Ceramic and mineral reinforcements chemically bonded with coupling agents for maximum bonding
- Chemical Resistant Matrix
  - Multi-functional resins systems yield high molecular weight films

Surface Composite Technology

- Consistent, High Performance Requires
- Chemistry of Matrix
  - 100% solids
  - No Diluents
- Reinforcement
  - Type
  - Size, Shape, Surface Profile
  - Surface Treatment
- Manufacturing
  - High Shear
  - Vacuum

COMPOSITE: A Substance Made of Two or More Materials in *Separate* Phases

Reinforcement Phase

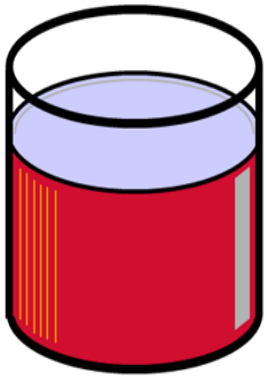


Reinforcements

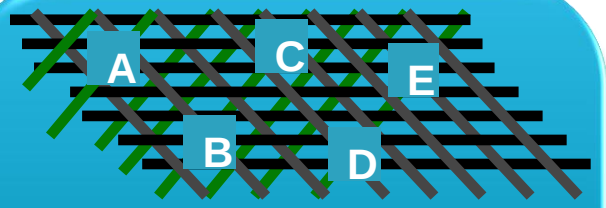
Fibers
- Aramid
- Graphite
- Glass
- Nylon

Particles
- Ceramic
- Mineral
- Metals
- Quartz

Matrix Phase

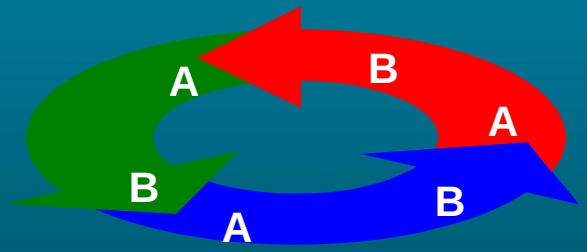


Polymers
- Epoxy
- Phenolic
- Polyester



Multi-functional Resin
Cross Linkage Sites

Composite Chemistry Technology

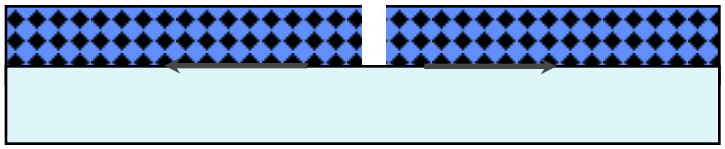


Di-functional Resin
Cross Linkage Sites

- There are di-functional and multi-functional resins and curing agents
  - Functionality defines available sites for cross linking during polymerization.
- The higher the functionality and cross link density the more resistance to stress: (mechanical, thermal, chemical).

High Performance Coatings Technology

Goal is to Get 100% Contact with the Surface



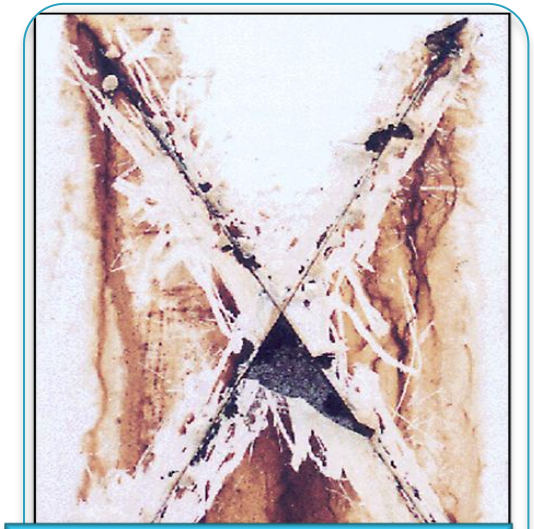
Real World is That a Film Break Will Eventually Occur

No Underfilm Corrosion

High tensile adhesion sufficient to overcome underfilm corrosion preventing delamination

Scored Salt Fog Panels (3000 hrs.)

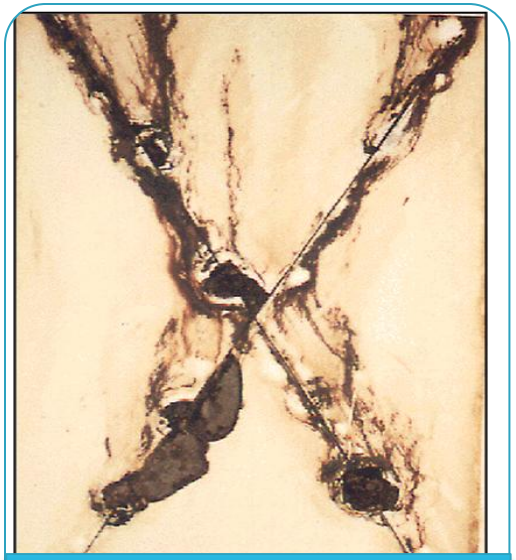
SC Epoxy - Two Coats
(56% solids by volume)



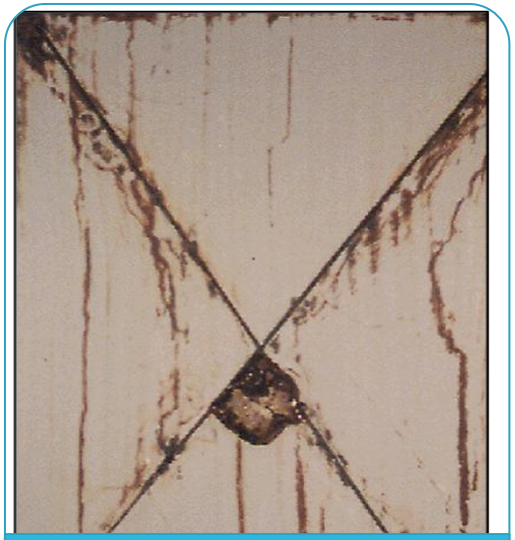
SC Epoxy with Zinc Rich Primer
(common industrial system)

Coal Tar Epoxy
(74%)

Scored Salt Fog Panels (6000 hrs.)



Ind. Epoxy
(100% solids)

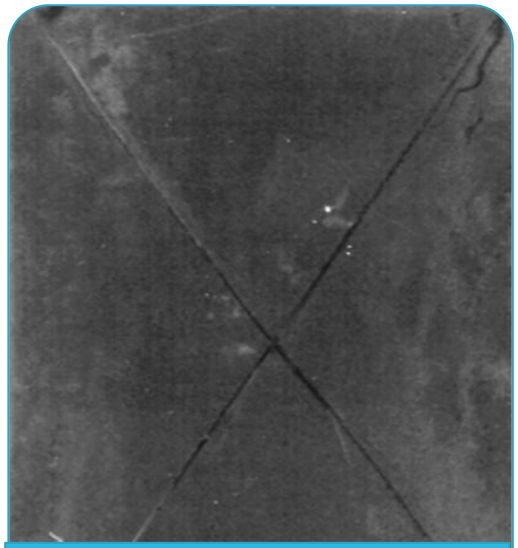


SC Epoxy
(83%)

SC Epoxy with
Zinc Rich Primer

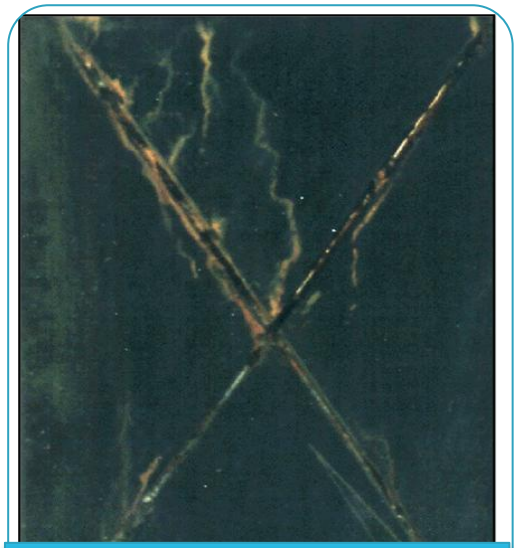
Scored Salt Fog Panels ARC Composites

10,000 hrs.



ARC® S1 One Coat

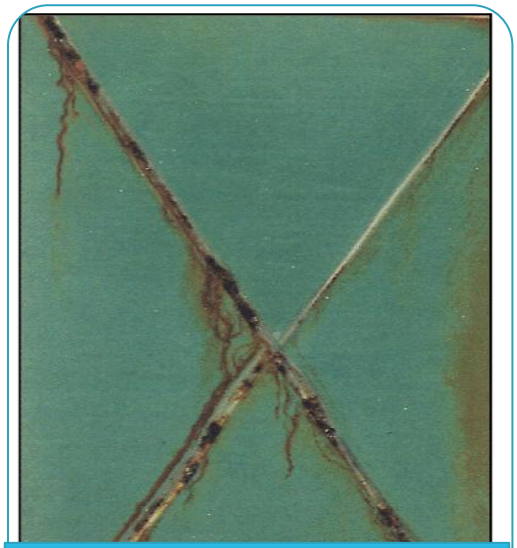
(100% solids)



ARC 855 Two Coats

(100%)

17,000 hrs.



ARC S2 Two Coats

(100%)

No Underfilm Corrosion , only surface stains.

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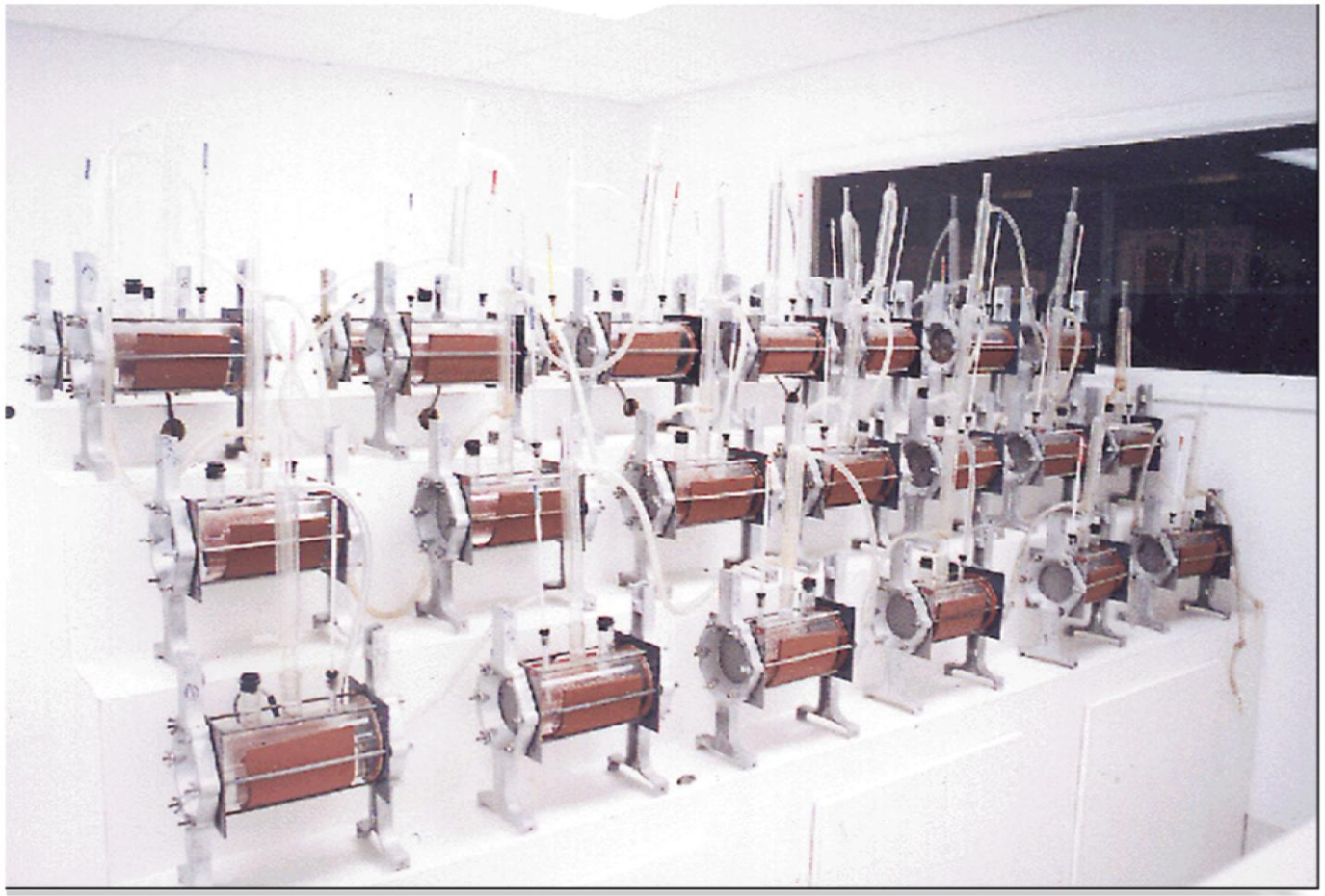
Corrocells in Corrosion Laboratory

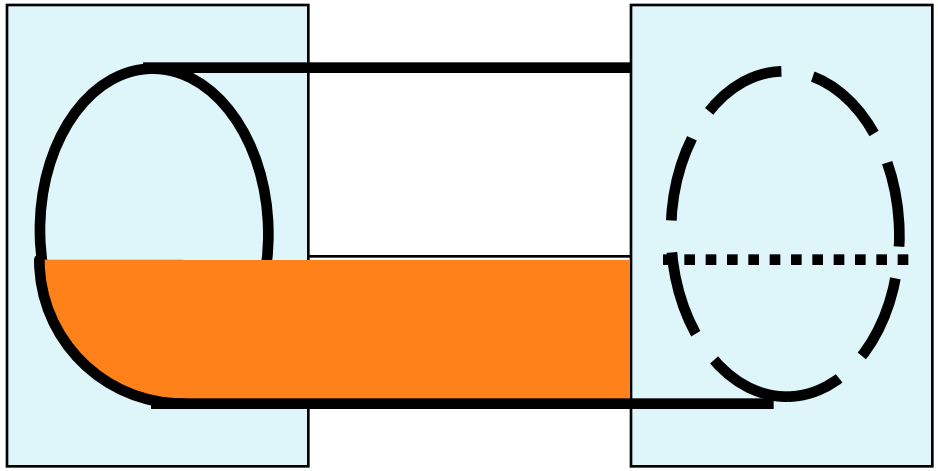


ASTM C 868 Chemical Resistance of Protective Linings

Corrocell Test

Tests Material's Resistance to Both Liquid and Vapor

Coated Test Panels →



Can Control and Test Variables:

1. Temperature
2. "Cold Wall Effect"
3. Chemical

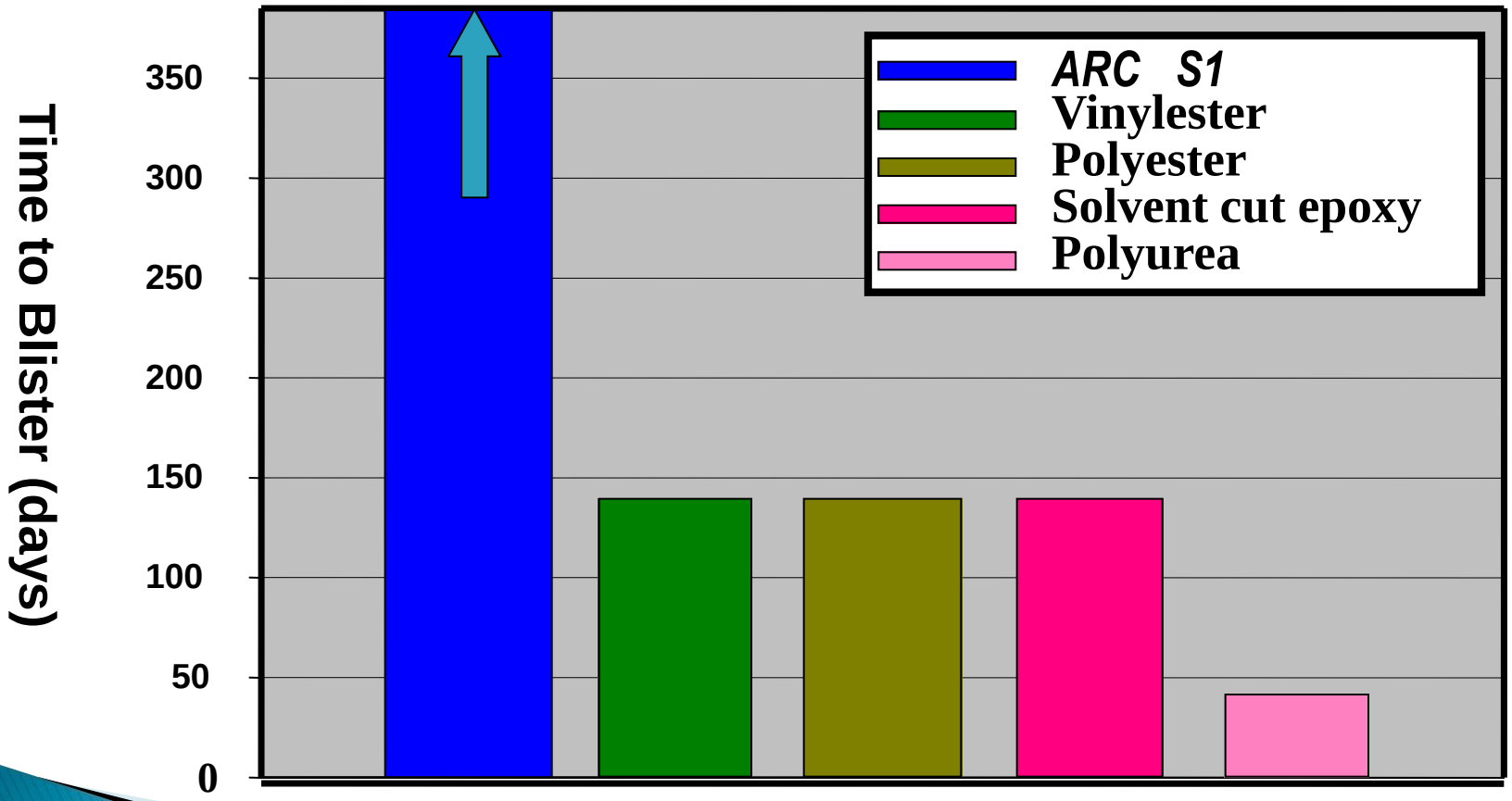
Meets:

ASTM D 4398

NACE TM-01-74

ANSI/ASTM C 868

Corrocell Test Results
10% H2SO4 at 50°C (122°F)



Reinforcements Define Function

Fiber Reinforced

"Structural Composites"

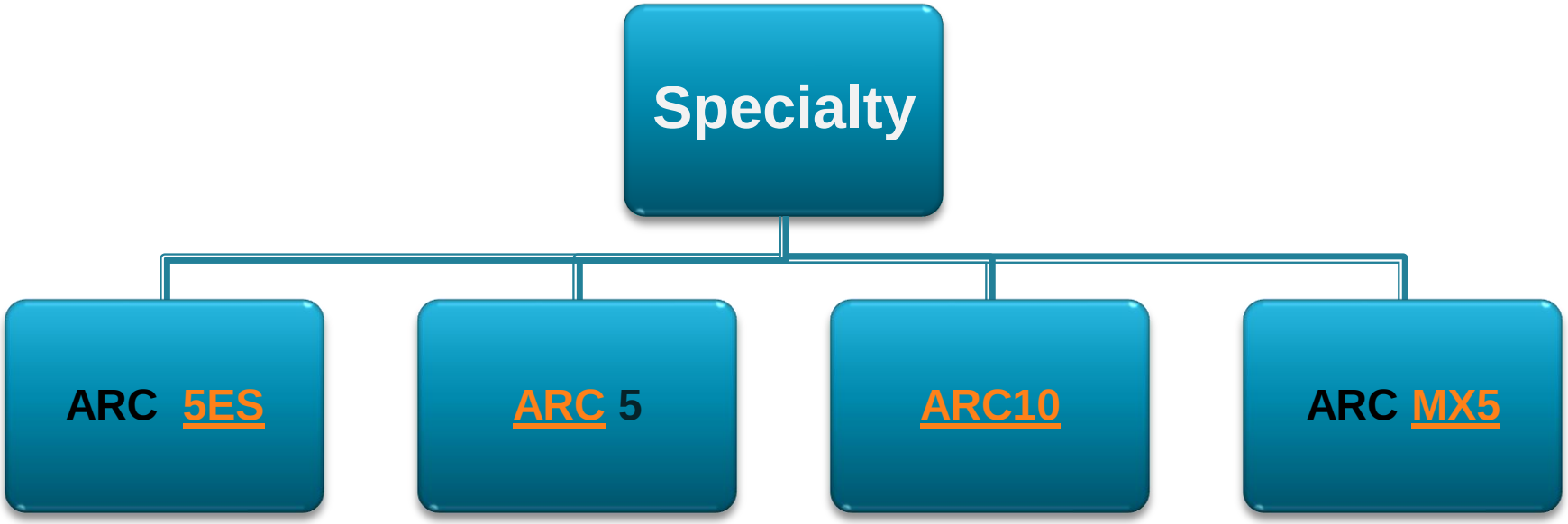
- Goal – Improve Physical Properties
  - Strength and Stiffness
  - Reduces Stress Cracking
  - Light Weight
- Poor Resistance to Permeation

Particle Reinforced

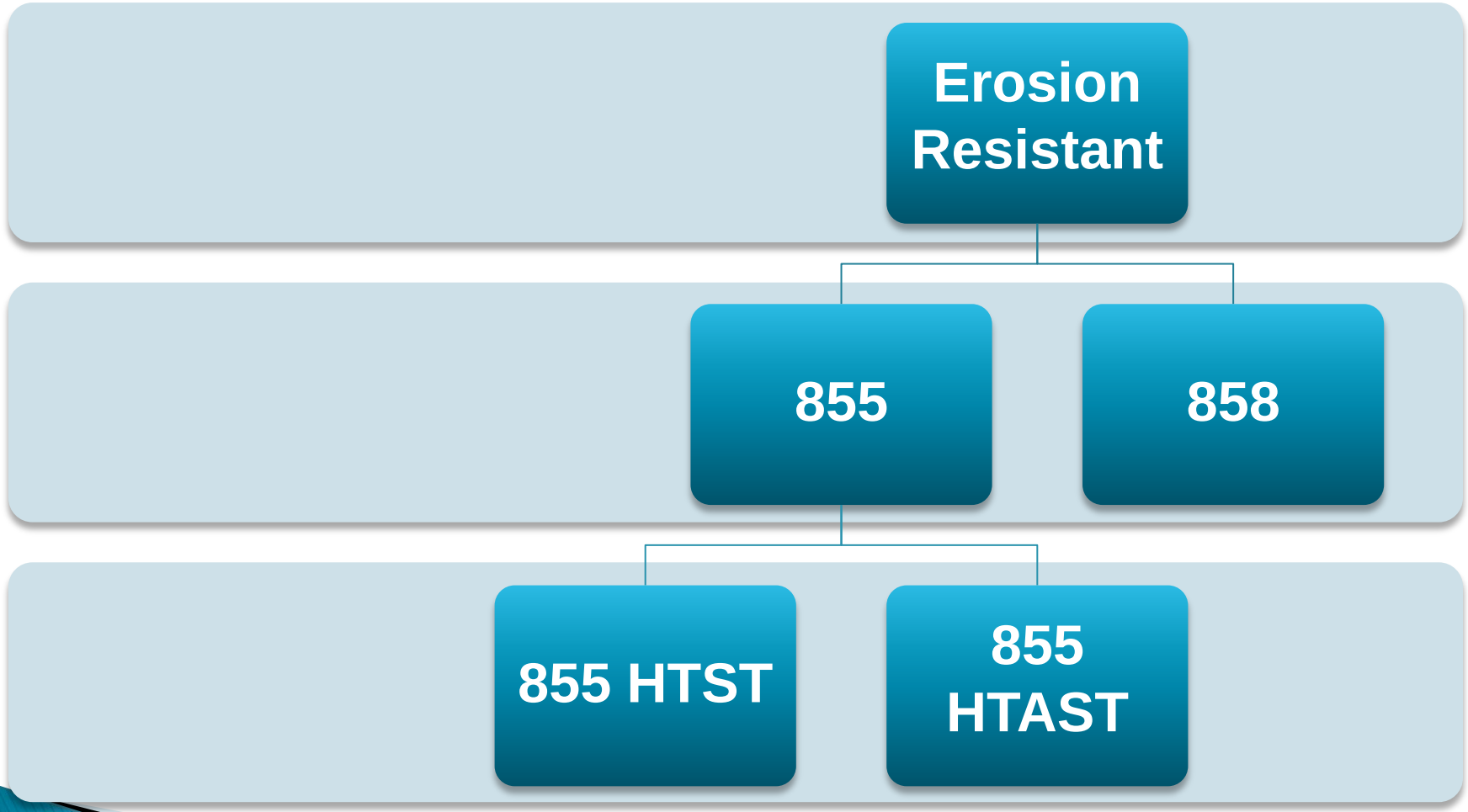
"Surface Composites"

- Goal – Improve Surface Performance
  - Abrasion
  - Corrosion/Erosion
  - Chemical Attack
- Limited Structural Benefits

Emergency Repair and Rebuilding



Flow Induced Corrosion



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How do Coatings Impact Efficiency & Reliability

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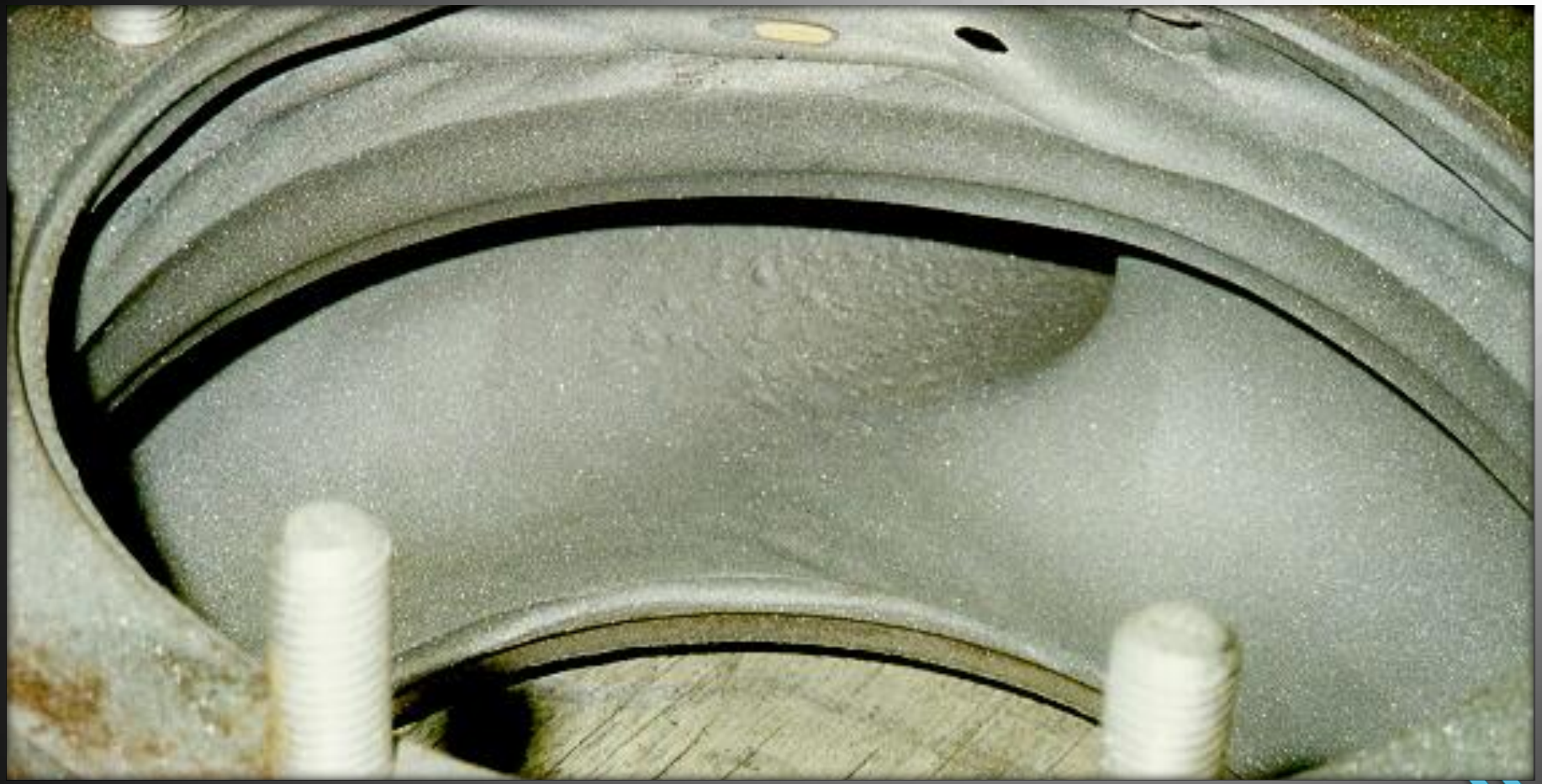
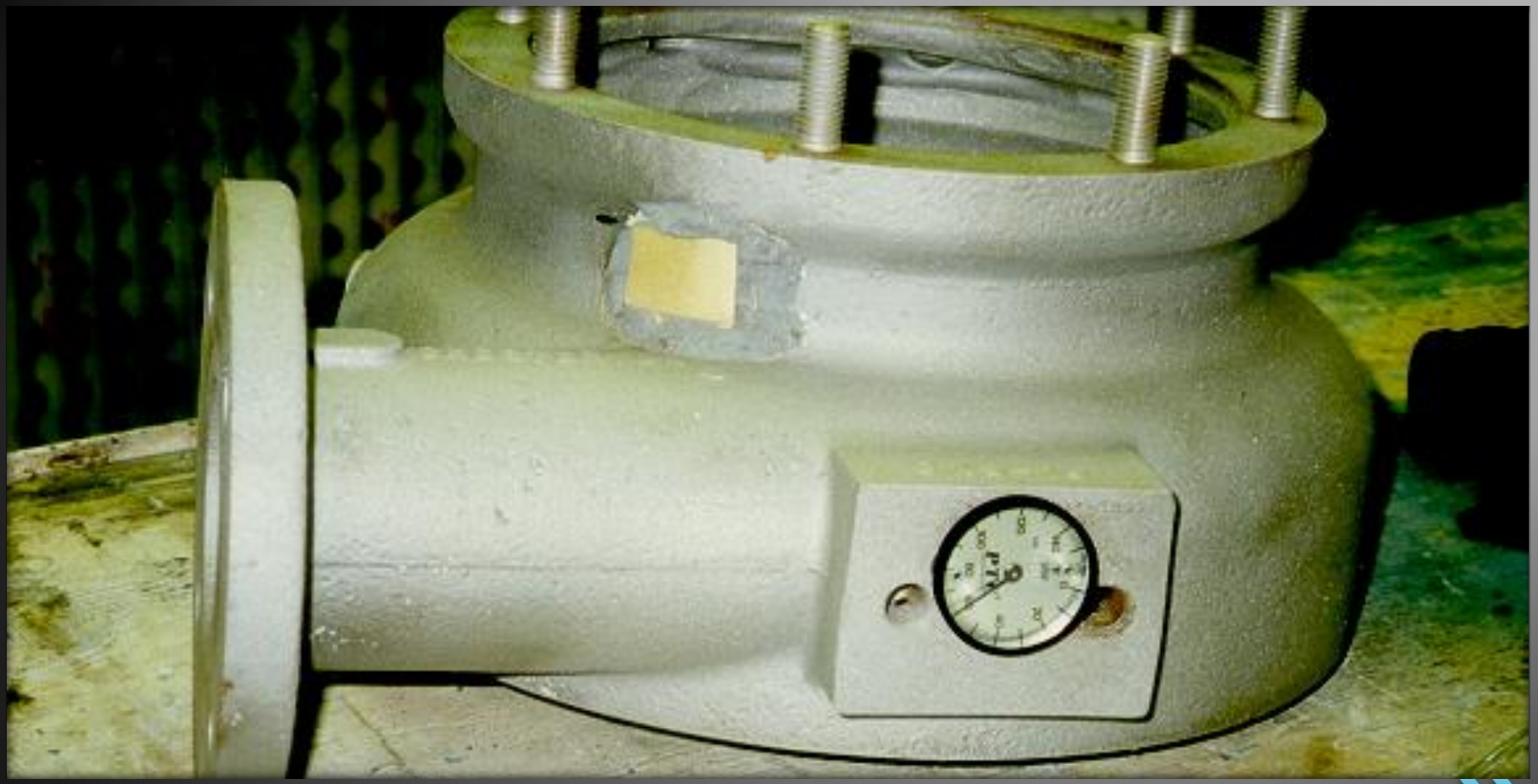
How do Coatings Optimize a Pump?

- **Reliability Improvement**
  - **Corrosion Reduction**
    - The polymer content of the coating provides both corrosion protection as well as decreases the surface roughness of the wet-end material.
  - **Wear Reduction**
    - The reinforcement system utilized in coatings enhances the overall wear resistance of the wet-end components maintaining tolerances longer and reducing the “wear eddies”.
- **Energy Efficiency**
  - **Friction Reduction**
    - The polymer coating when brushed or spray applied will significantly reduce surface roughness which directly impacts the amount of energy transferred to the fluid by the impeller.
    - Surface Energy of Coating is significantly less than that of the base metal.



Severe abrasion wears a hole in the pump casing after just 4 months of operation.



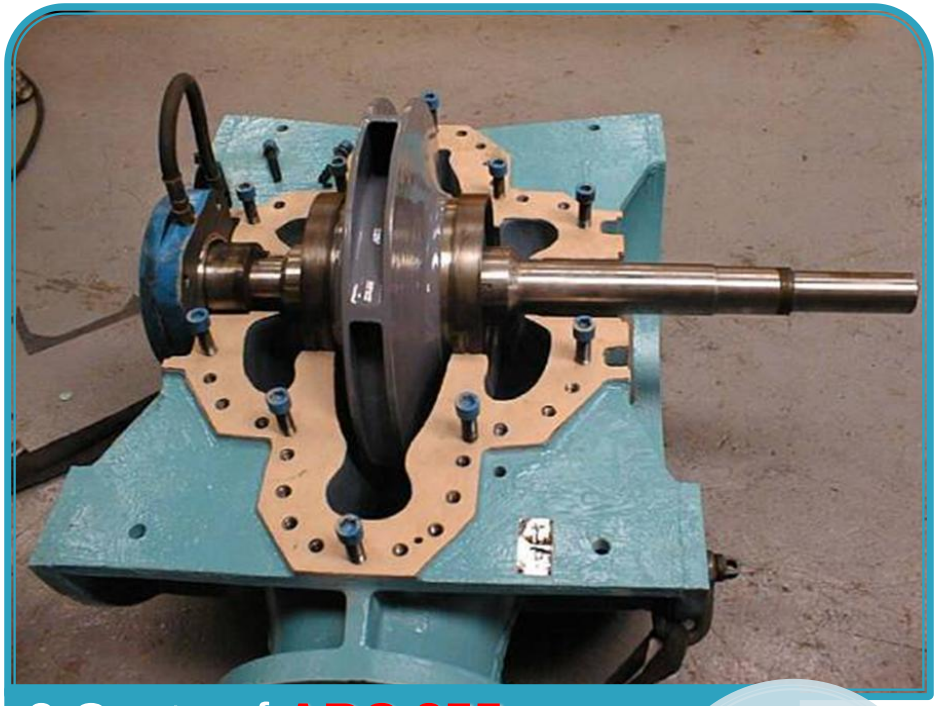
ARC 5ES is applied to the outside of the hole as an emergency repair. After abrasive blasting the ARC 5ES patch is still adhered to the surface.

Sewage Pump rebuilt with ARC composites.

Cleeve Pumping Station
Thames Water

- **Problem**
- 4 Pumps, supplying Drinking Water to the Oxford area, were all running continuously to meet the demand. Test showed that since installed the average performance of these pumps was down by 10% and some were no longer capable of pumping at their duty point. Energy efficiency was also down by an average of 8%.
- **Solution**
- An uninstalled spare pump was dismantled and inspected. All tolerances were still within manufacturers limits, but the inside surfaces were corroded.
- All wetted areas were rebuilt, where worn, using ARC 858 and finished with ARC S2. The spare was then exchanged for a running pump and the procedure repeated.
- **Results and Savings**
- ***All the pumps are now running in the middle of the Duty Point. Efficiency has now risen to an average of 104% of as new. Power consumption has dropped by an average of 9% giving a saving in electrical consumption in excess of £20,000 per annum.***
- ***The return on investment for this work was 9 months***

Vertical Split Case Water Pump



2 Coats of **ARC 855** Composite applied to both the impeller and casing

Result - 9% energy reduction.

Cooling Water Pump Impellor

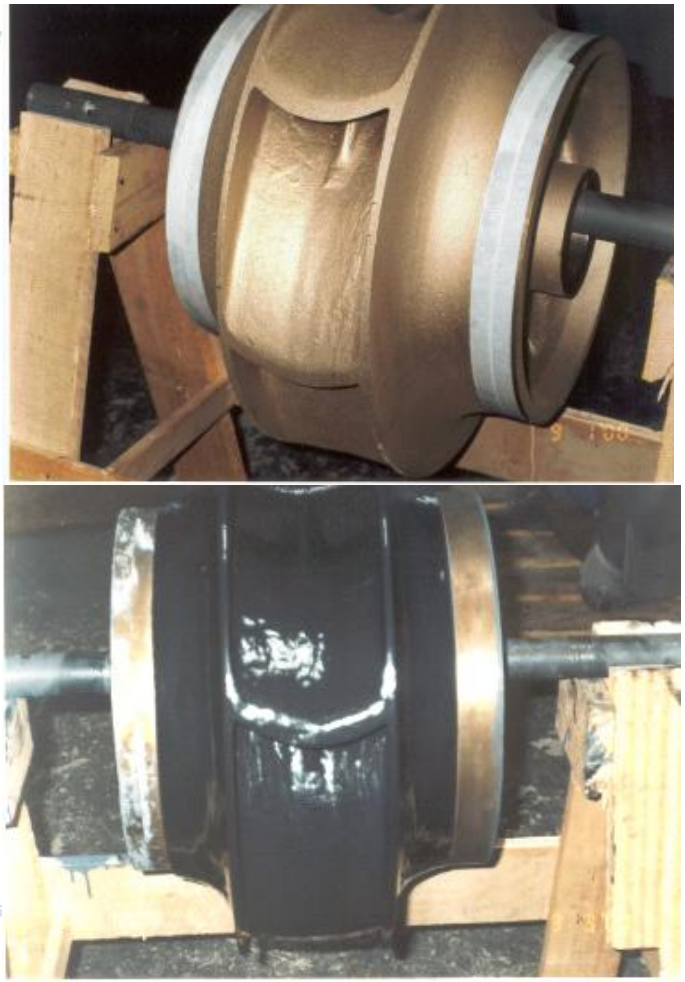
Petrobras – Brazil

Corroded and eroded 3 year old bronze service water pump impellor.

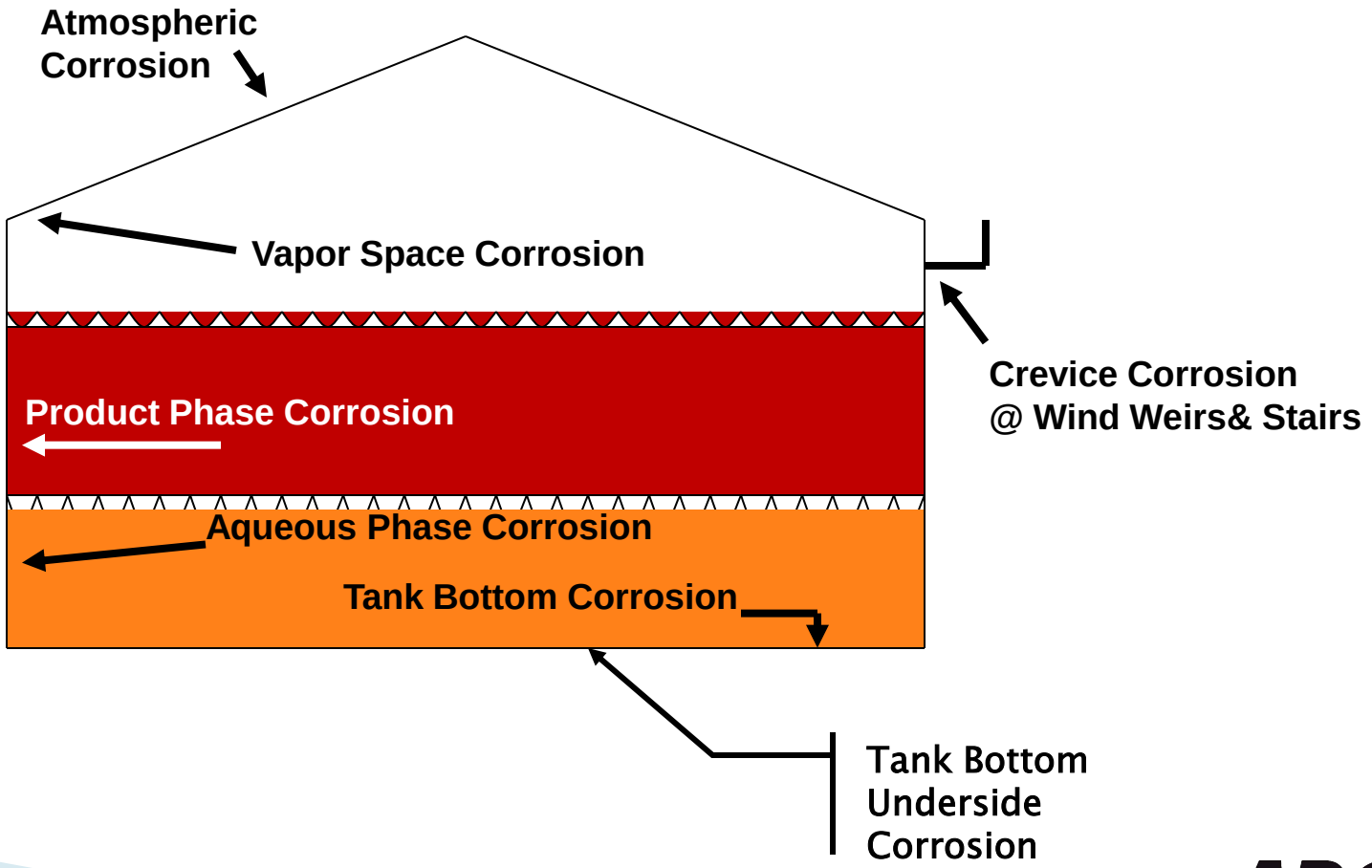
Replacement of impellor was $11,500.00

ARC Composite repair cost $1,500.00.

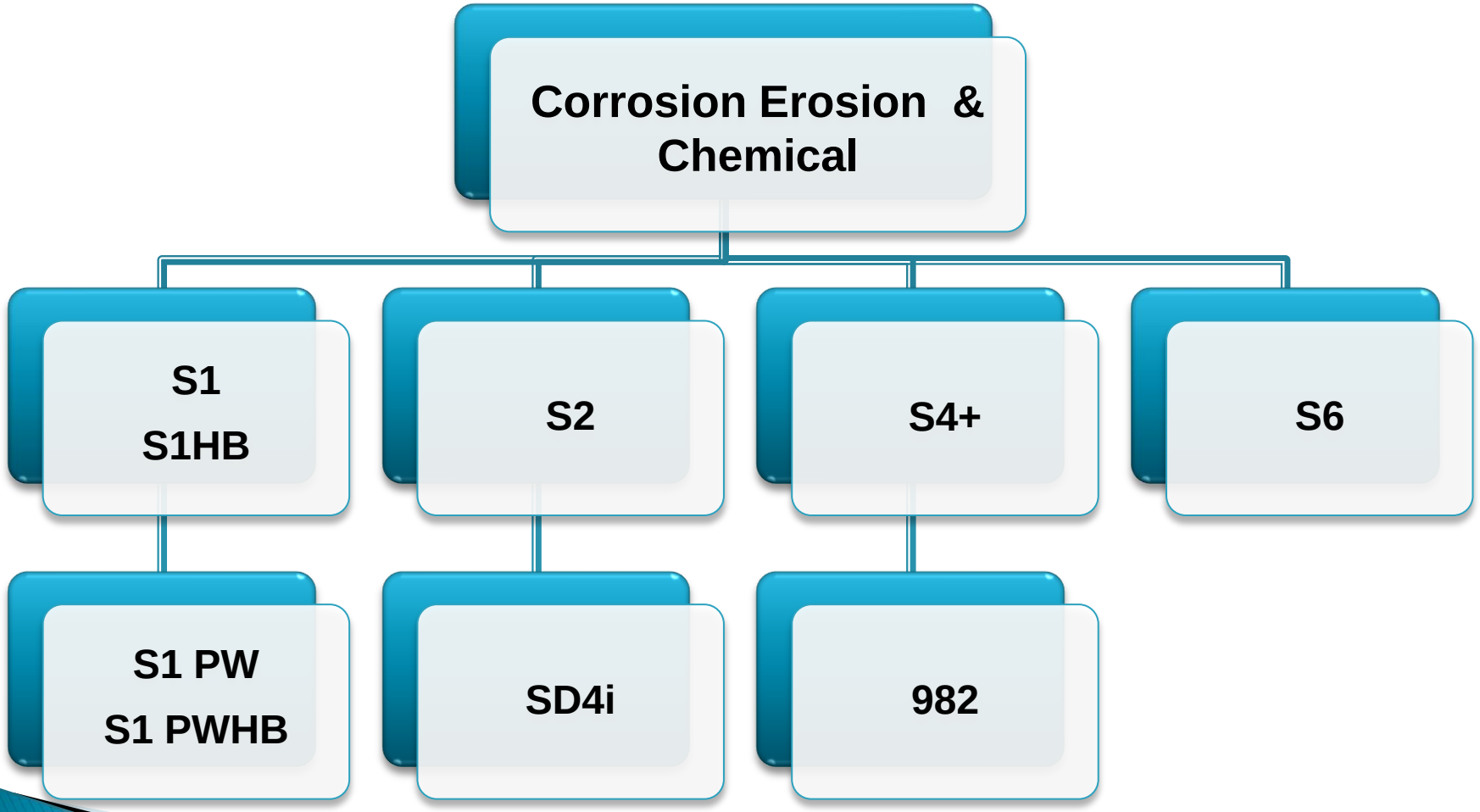
Impellor in service for 2 years with no sign of failure



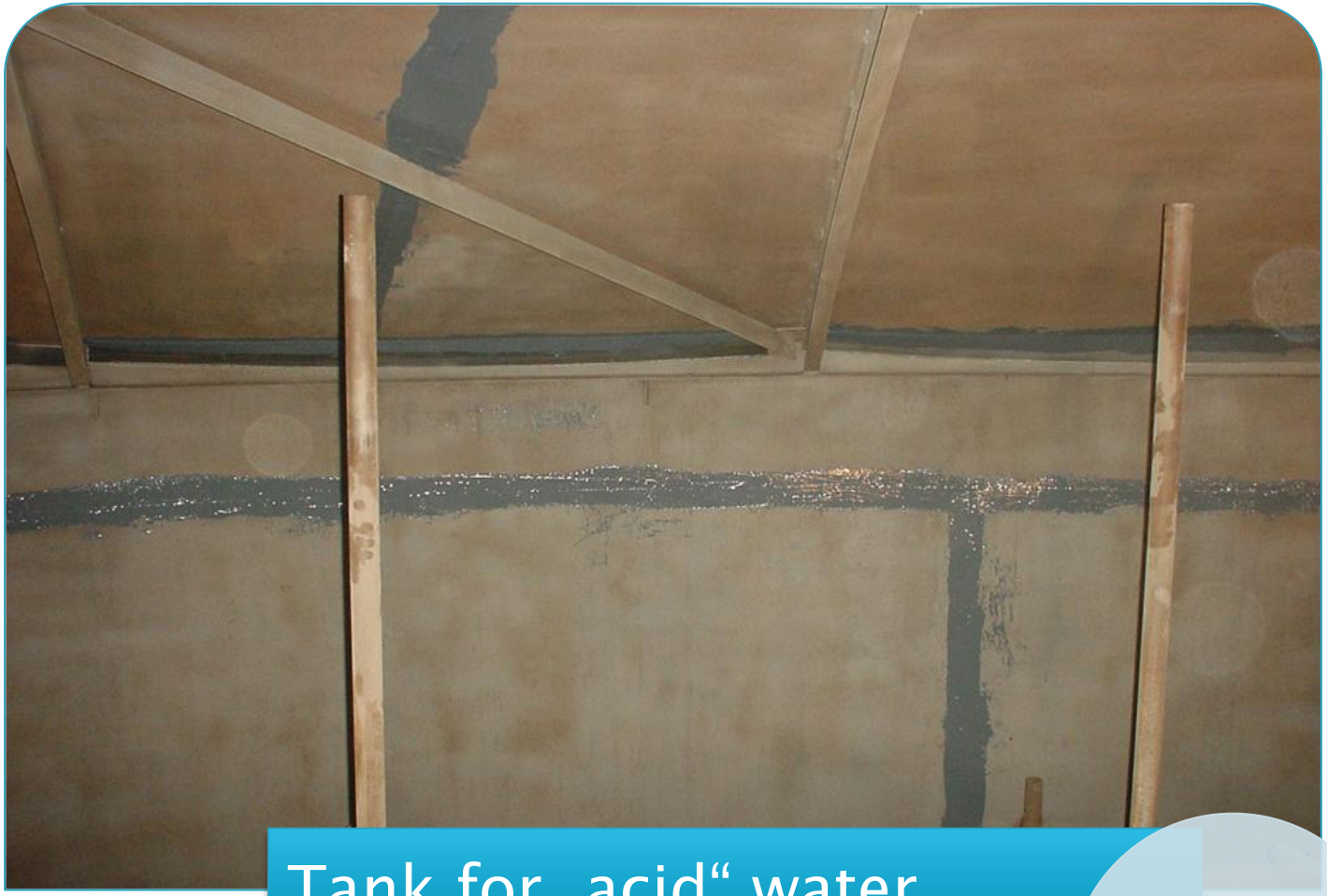
AST Tank Lining – Why Coat?



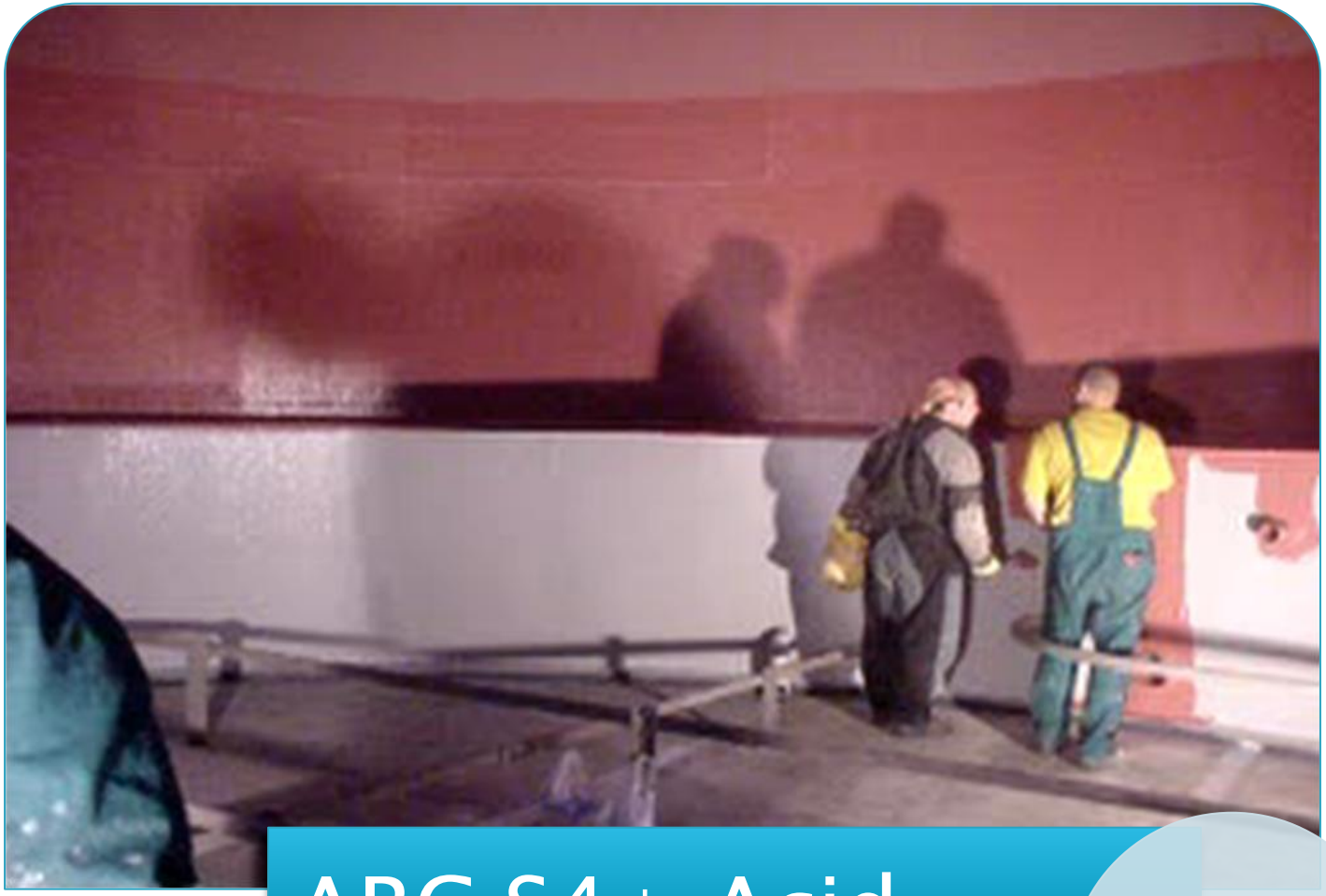
Aggressive Chemical and Corrosives



ARC S4+ – Neutralization tank

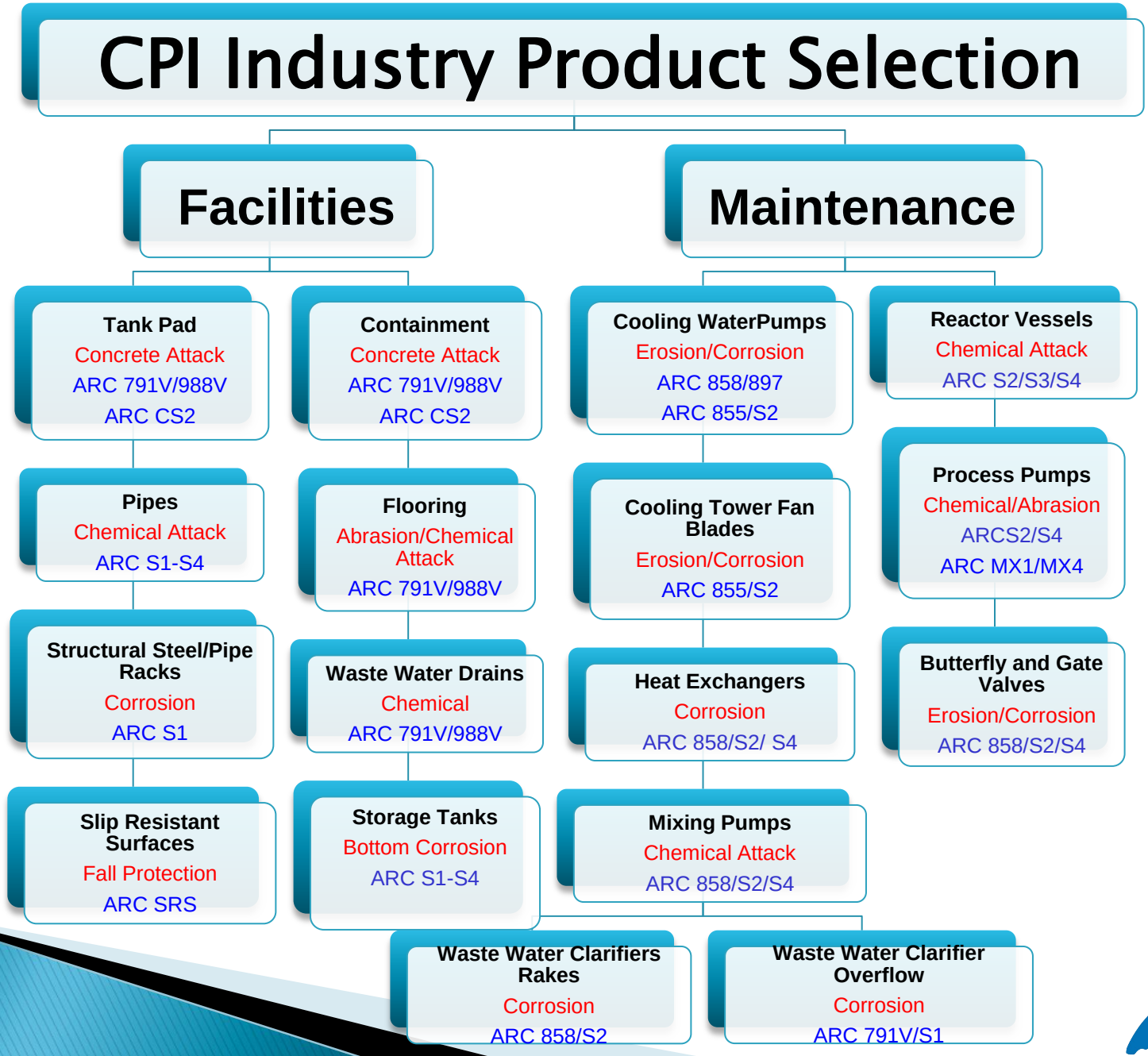


Tank for „acid“ water
– ARC 858 applied
to all weld seams



ARC S4+ Acid Water

CPI Industry Product Selection



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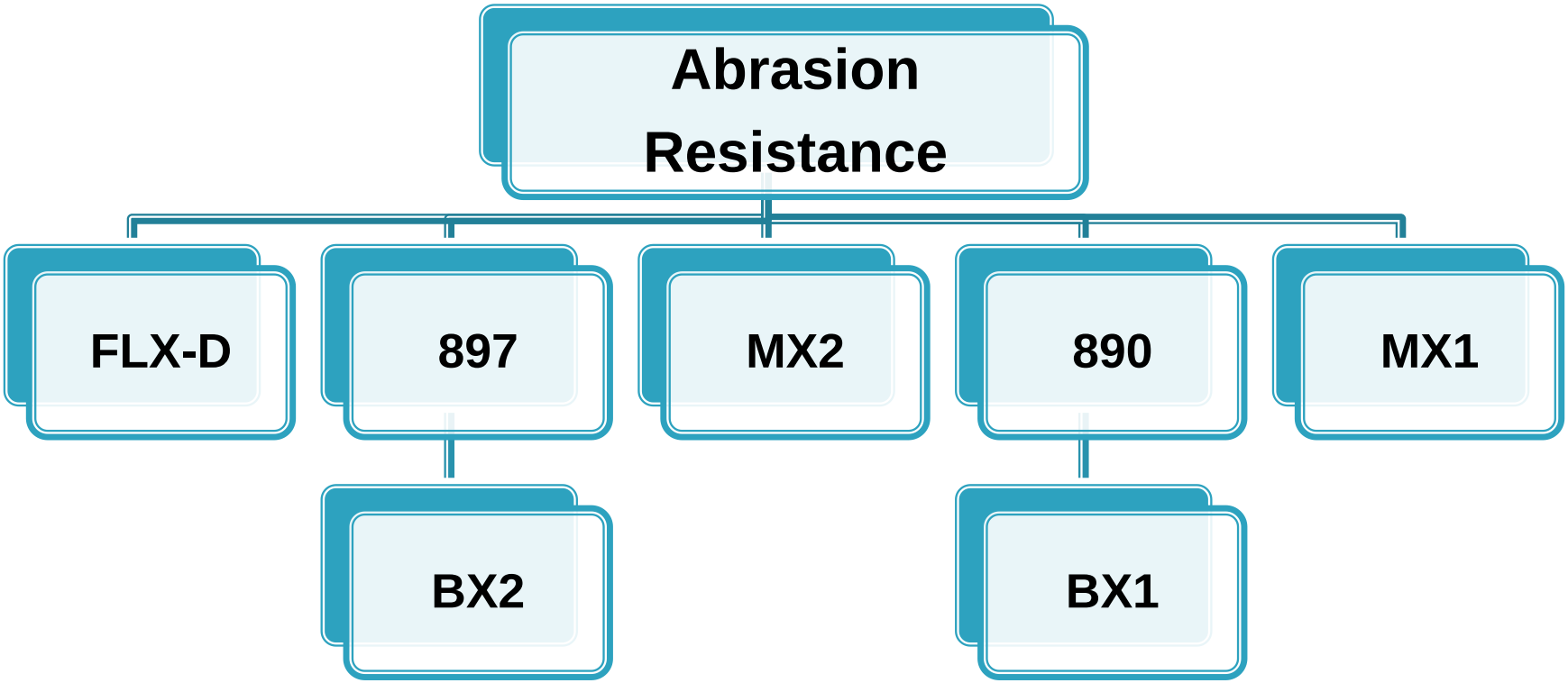
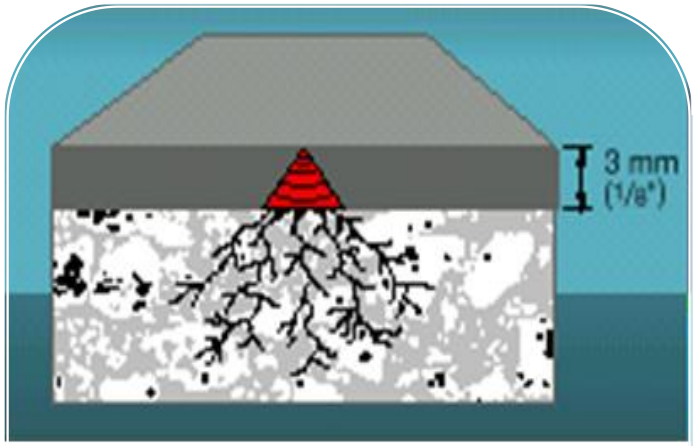
High Impact and Sliding Abrasion



IDEAL PROPERTIES OF A FLOORING SYSTEMS



- High Adhesion to Damp Surfaces
- Chemically Compatible with the Intended Service
- Monolithic – No Seams, No Joints
- Matched to Thermal Expansion of Concrete
- No Shrinkage
- Nonporous
- Easy to Install
- Resistant to Impact and Cracking
- Minimum 6mm (1/4") Thick

Primary Coating Properties

- **Adhesion:**
  > 2,75 MPa (400 psi – 28 kg/cm^2)

  TIP: All concrete coatings should have at least 400 psi tensile adhesion strength (28 kg/cm2)

  Alkali Resistant:
- · Due to concrete alkalinity, the coating must not be affected

  Permeation Resistance:
- · Lowest possible water vapor transmission (WVT) rate (grams of water/M2/hour)

  Flexibility:
- · Desirable for coatings to have maximum flexibility

  Coefficient of Linear Thermal Expansion:
- · Concrete is 9-11 x 10-6/C° (5-6 x 10-6/F°). Select as close as possible for varying thermal conditions

  Chemical Resistance:
- · Maximum functionality and cross link density yields best capability

  Physical Strength:
- · Impact, abrasion, resistance to flexural strains and compressive loads

  Thermal Resistance:
- · Maximum functionality and cross link density yields best capability

  Moisture Tolerance:
- · Ability to bond and cure on moist surfaces

Grades of Floor Coatings

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Application	Film Thickness	Purpose
Sealers	25–100 microns (1–4 mils)	· Penetrating low viscosity system · Prevent/decrease penetration of media · Example – Keep oil off floor
Thin Film	< 500 microns (20 mils)	· Film forming systems · Applied by roller, spray or brush · Chemical barrier film · Aesthetic
Thick Film	> 500 microns (> 20 mils)	· Film forming systems · Applied by roller, spray or brush · Chemical barrier film · Aesthetic
High Build	0,5 – 6+mm (20–250+ mils)	· High Build · Heavily reinforced · Trowel applied · Traffic capable coatings

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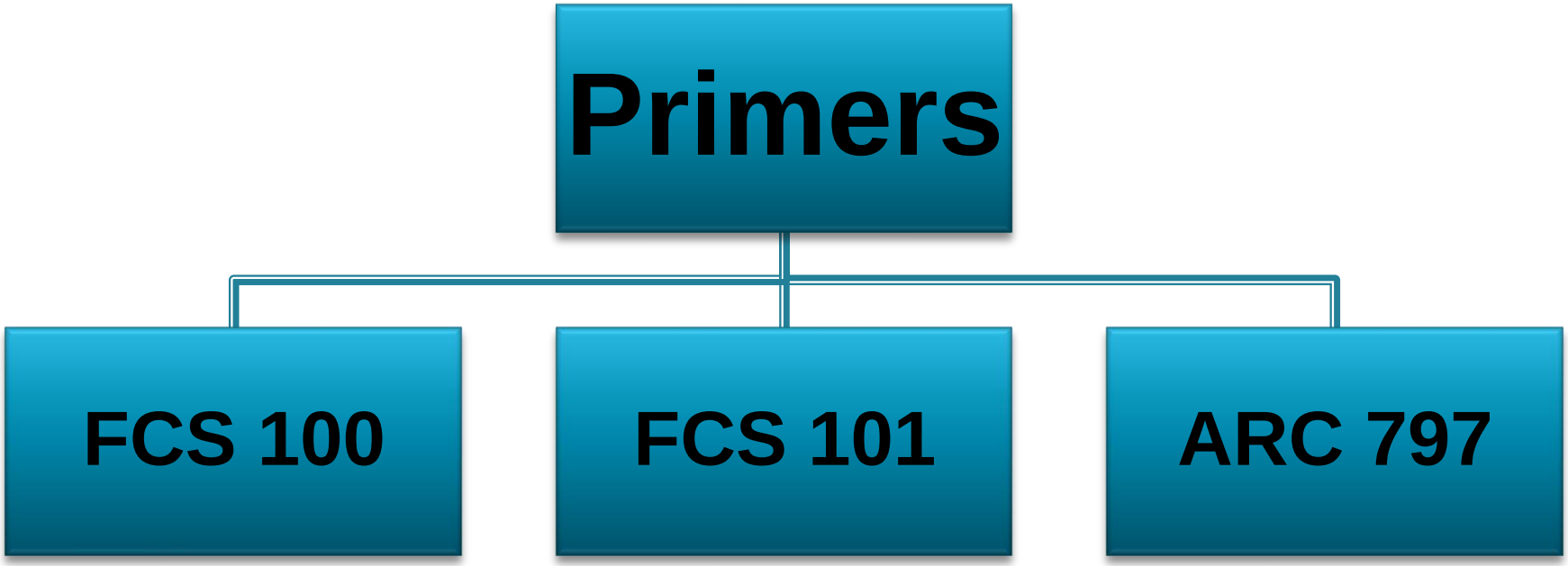
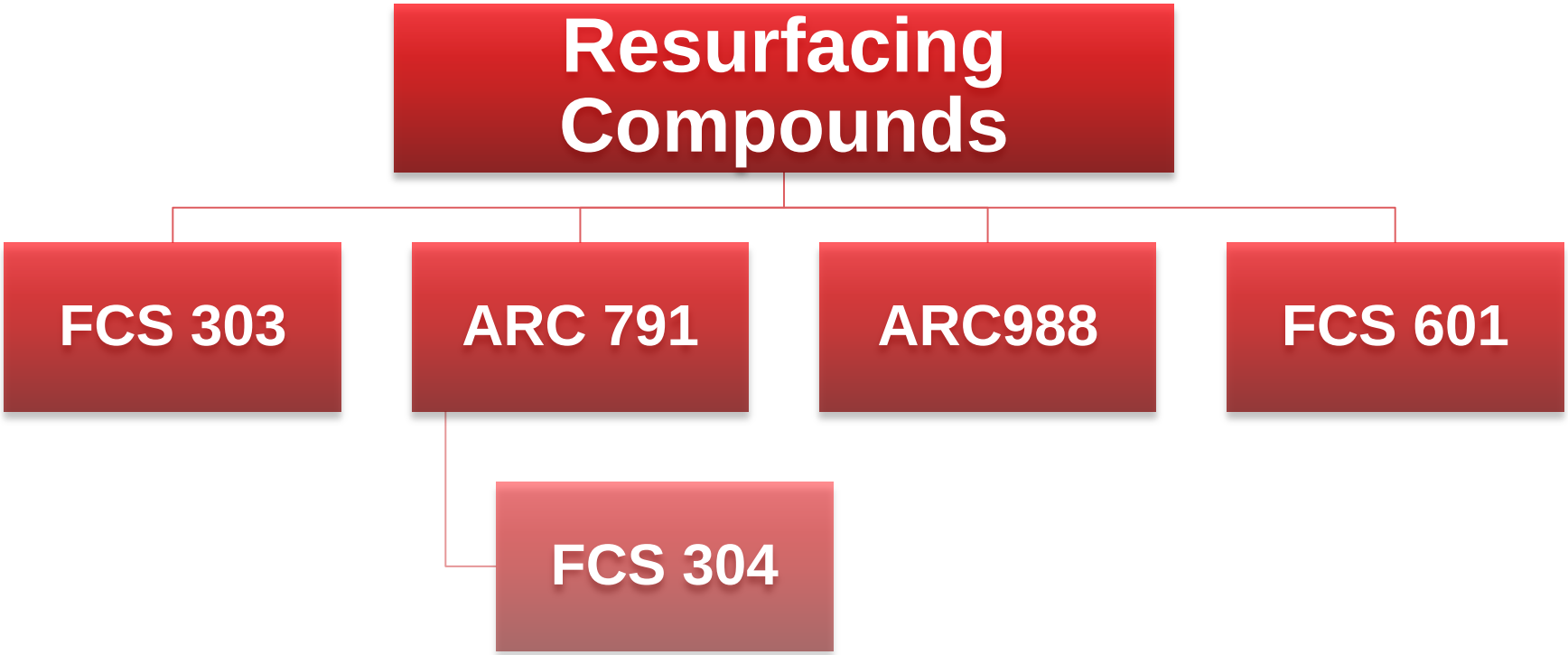
Moisture Sealing & Adhesion Promotion



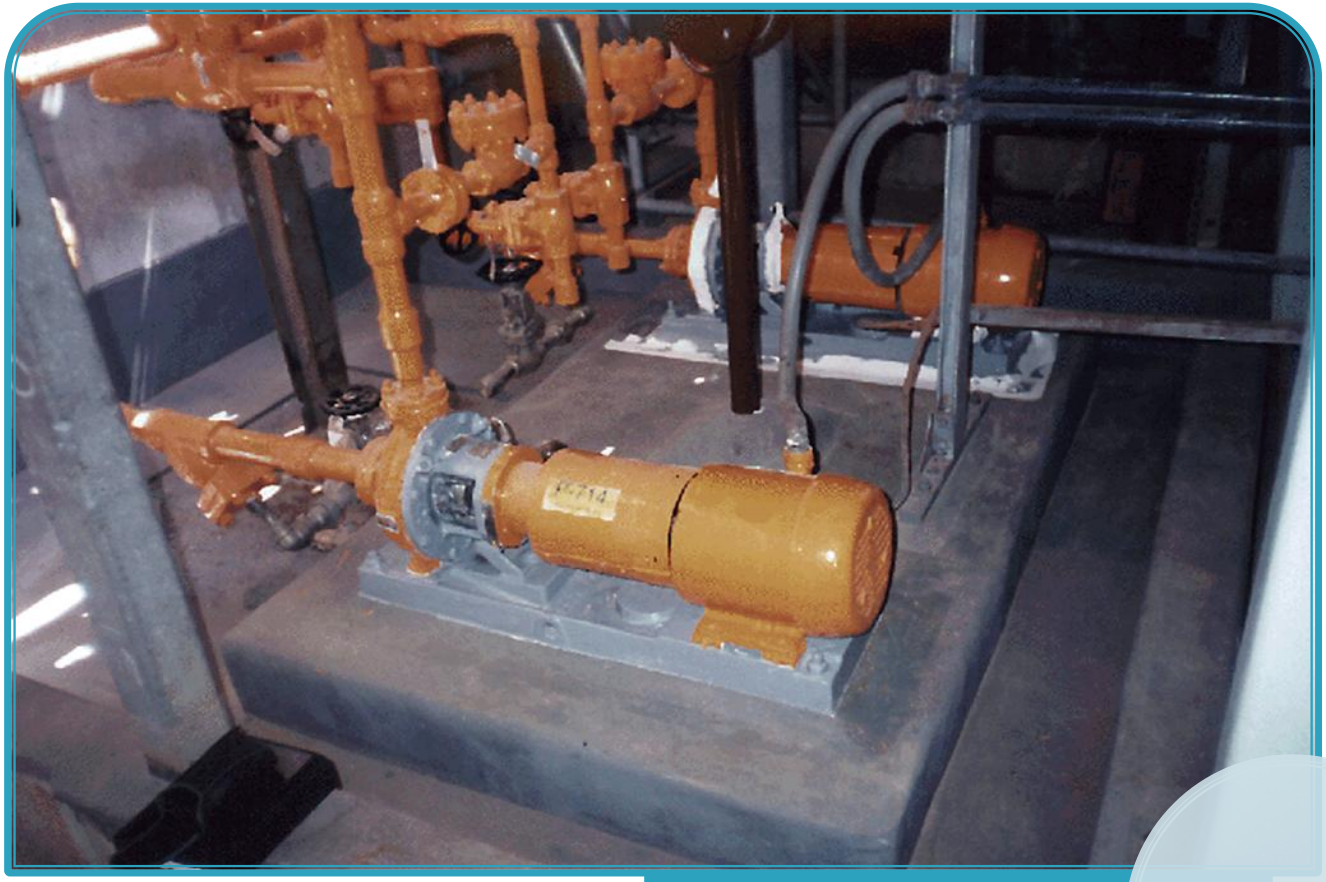
Grouts for Patching, Pitching and Forming

Composites for Chemical Protection

Resurfacing Composites for Mechanical and Chemical



ARC CS2 Ensures Positive Containment in Case of Jet Fuel Leaks or Spills



98% H_2SO_4 Pump
Base & Sump

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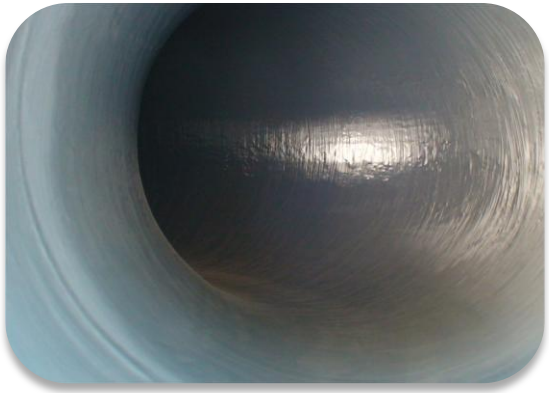
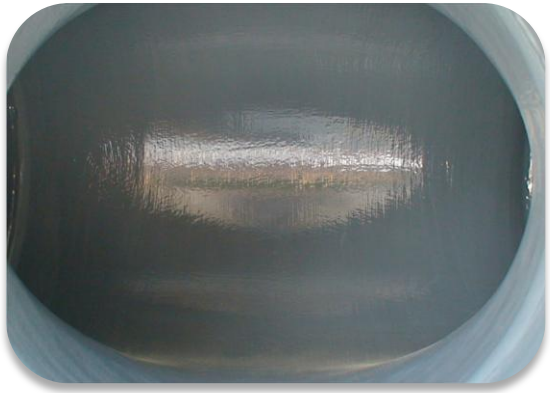
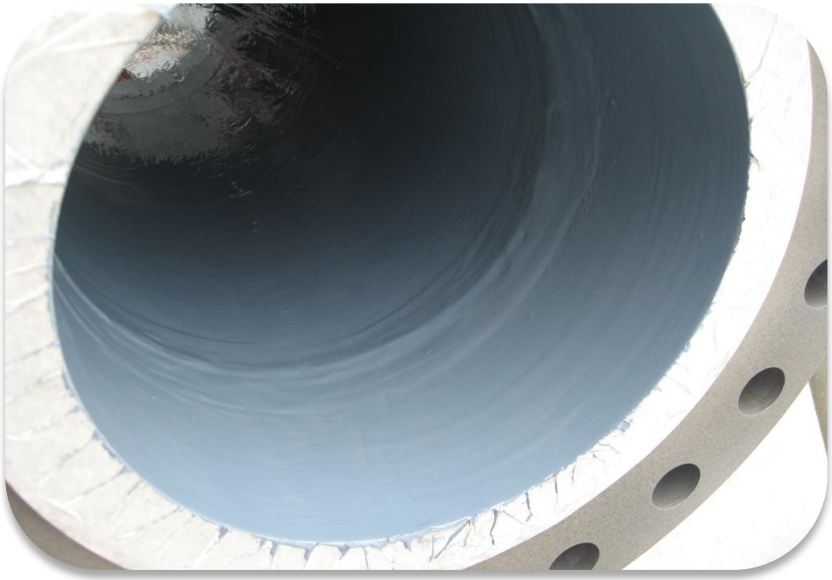
ENBBI, SAFANIYA
WATER DISPSAL
SYSTEM UPGRADE

Surface protective
coating against
Erosion& Corrosion
Pipes for Sea Water

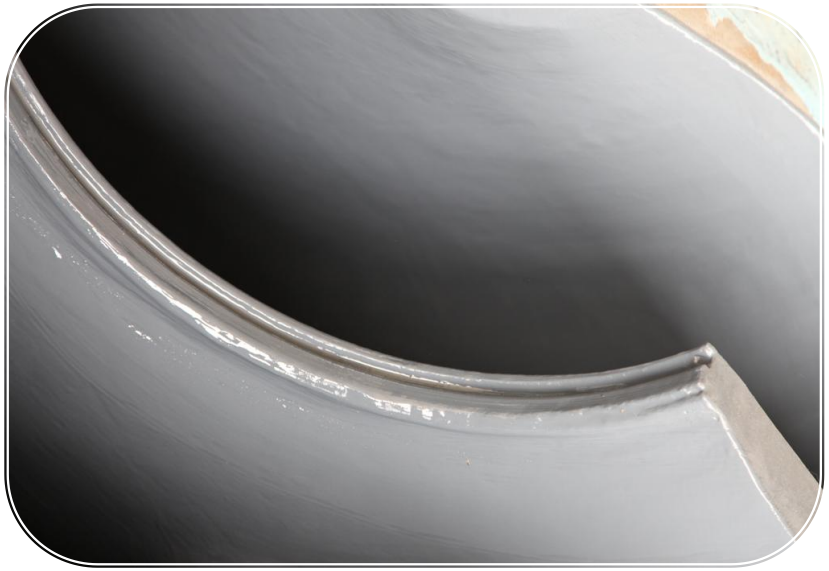




ENBBI, SAFANIYA
WATER DISPSAL
SYSTEM UPGRADE.

MUBARAZ , Saudi Aramco



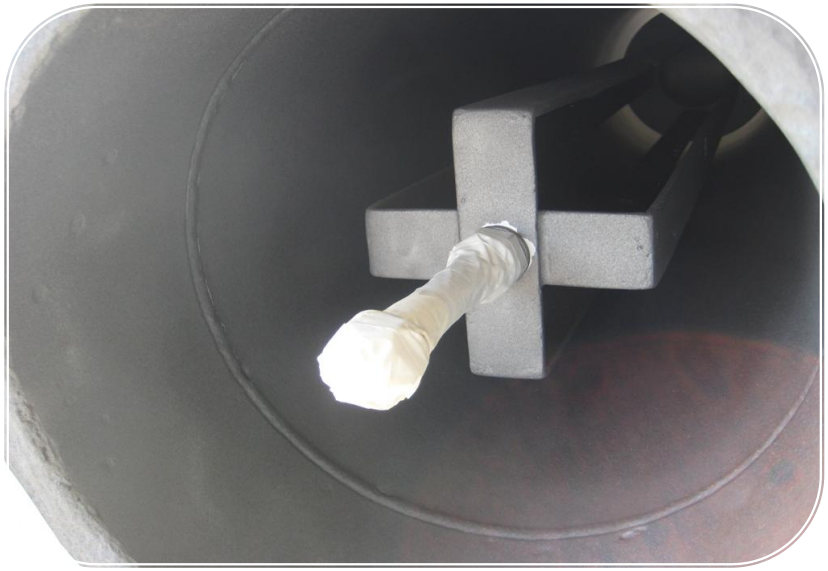
MMG SHOP



PETROCHMIA

SECEO PP9

AL ZAMIL VALVE



Drum filter ,GOSP II
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