

The background of the cover is a high-contrast, black and white photograph of a heavily corroded metal surface. The surface is covered in deep, vertical ridges and grooves, creating a textured, almost sculptural appearance. The lighting highlights the ridges, while the grooves are in deep shadow.

CORROSION & SURFACE PREPARATION

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FOREWORD
Mr. Mitch Nobles
M.D. ICO Group

"What's in a Name"

Many people have asked me what does ICO stand for; you can say it stands for:

Integrity
Conscientious
Organized

When we started ICO we wanted our Customers and Employees to know that: We have the **Integrity** to do the right thing even when we don't have to; We are **Conscientious** in the quality of our work; and we are **Organized** well enough to ensure that we do provide the highest level of Integrity and Conscientiousness in every thing we do.

The name ICO is to be pronounced as a word, like Echo except with an I.

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WHAT TO EXPECT OUT OF THE NEW NEWSLETTER EDITION!

FOREWORD
Dr. Santosh Gupte
Director - Quality

The making of a concise Newsletter requires a precise blend of knowledge, determination, vision and imagination. Through this quarterly e-newsletter, we would like to put forth key information for all Oil & Gas aspirants, and updates on what ICO Asiapacific Group is striving for. ICO Asiapacific Group is not just aiming to provide the best services to their customers, but also value addition for its employees, by highlighting engineering excellence and solutions for problems in this Industry.

This broadcast shall provide ample information to its readers and also will guide them to work towards good engineering practices.

The editorial team shall strive to make this a quarterly success by involving you in its making. My greetings to all its readers and I hope we enjoy the newsletter and gain knowledge in the process.



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NEWS FROM THE CORPORATE OFFICE

- ICO became the only corporate member of API in South East Asia
- ICO receives Quality Excellence award at Quality Summit, New York, May 2012
- ICO Group participated in the review of DS-1 Edition 4, all four volumes
- ICO Group was accredited with API Q1 certification with excellent results
- NATA Audit for ISO/IEC 17025 was carried out at ICO Perth, Australia with satisfactory results
- ISO certifications were revised at various countries
- Baker Hughes awarded “BHI Connection T2 Global Trainer” status to Dr. Santosh Gupte, the only trainer outside Baker Hughes
- ICO Corp. Office has incorporated a new Finance and Accounting software, soon to be implemented in all ICO offices.



Corrosion

is defined as the

deterioration or oxidation of a metal due to its reaction with the environment. In the Oil and Gas industry, total losses due to Corrosion and Erosion can be estimated to be as high as US\$ 500 billion. With appropriate care and preventive measures, these losses can be reduced by up to 50%

Types of Corrosion in Oil and Gas industry:

H₂S Corrosion – Metal Loss

Sulphide Stress Cracking

CO₂ Corrosion

High Temperature Corrosion

Chemical Corrosion

Pitting

Erosion

Corrosion Prevention and Control

Material selection or the applied protection system should theoretically reduce the rate of corrosion to zero, but this is not technologically or financially possible. It is therefore necessary to achieve a tolerable rate and form of corrosion that will not be detrimental to the properties of the material during service.

Protection methods can be divided into the following categories:

- Controlling anode potential by applying cathodic/ anodic potential.
- Addition of corrosion inhibitors to the environment
- Application of organic or inorganic protection coatings
- Inorganic/ metal coatings or organic/ paint systems
- Sacrificial metal coatings (cathodic protection) like Al, Mg and their alloys are expensively used

Protection Methods

Design Stage:

- Reduce edges and corners to minimize entrapment of moisture and dirt
- Provision of vent/ drain holes for items to be hot dip galvanized
- Provision of adequate access for metal/ paint spraying
- Flat surfaces provide for ease of maintenance



Material Selection:

- Weather resistant steel rusts at a much lower rate than plain carbon steels
- Under favorable conditions it develops an impervious adherent layer of rust which over a period of 2 -3 years causes corrosion to reduce to a terminal level
- Paint systems suitable for conventional structural steel are equally applicable for weather resistant steel



Surface Preparation is a set of previous operations that are performed on the substrates, in order to improve wetting and adhesion properties of adhesive materials on substrates to be bonded. It is one of the most vital elements in achieving a high bond strength and optimizing durability and lifespan of bonded joints. Different substrate materials will require different types of adhesives for bonding and different methods of surface preparation and protective coating schemes.

Important Surface Protection Methods:

Phosphating: of metals is one of the most important of surface treatment methods and a number of modern metal finishing procedures would not be possible without it. The main areas of application of Phosphating are;

- Corrosion protection in conjunction with organic coatings, e.g., paints and polymer films
- Facilitation of cold-forming processes, e.g., wire drawing and tube drawing, deep drawing
- Corrosion protection in conjunction with oils and waxes
- Corrosion protection with no subsequent treatment

Phosphating can be executed using a variety of sequential processes. The list of these and whether they are in fact called for or not, depends on many factors of which the most important are;

- Nature of the metal to be coated
- Shape and surface condition of the metal
- Number of parts and uniformity of their surface state
- Anticipated service duty of the phosphate coating
- Organizational factors, e.g., limit on number of processing lines

The Phosphating sequence is normally broken down into the following stages ;

1. Degreasing and cleaning
2. Derusting and descaling
3. Activation
4. Phosphating
5. Post-treatment



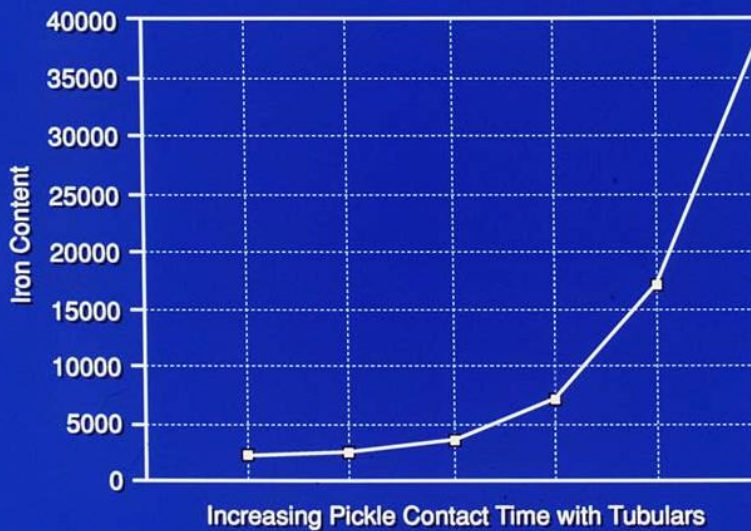
Pickling: is a metal surface treatment used to remove impurities, such as stains, inorganic contaminants, rust or scale from ferrous metals, copper, and aluminum alloys. A solution called pickle liquor, which contains strong acids, is used to remove the surface impurities. It is commonly used to descale or clean steel in various steelmaking processes.

It Removes mud, rust, scale, and pipe dope from the ID of the tubing and casing below tubing and displaces it from the tubing, not into the formation.



The pumping of acid and/or proppant will loosen debris from walls of pipe, and will sweep the materials into the perforations, creating severe damage.

Reactivity of Steel Pipe with HCl During Pickle Job



Other Methods Include:

Plating, Painting, Active/ Passive Corrosion protection etc.

HSE

When we feel stressed, our difficulty tends to be reflected in certain physiological and psychological symptoms, whose importance we may not fully understand. These symptoms tell us that we should re-check our priorities – our body, or our state of mind, something in our lives needs to change.

Some of the common signs of stress are:

Restlessness
Impatience And Short-temperedness
Obsessive Working
Loss Of Appetite
Fear Of Silence



Why Allopathic Medicines and Stimulants are not good for managing Stress?

Allopathic medicines directly add chemicals to the body and interfere with the internal chemical factories. E.g. Anti-depressants suppress the ability of brain cells to generate electric impulses. People taking such drugs for prolonged time become dull. Stimulants like Tobacco, Coffee, Tea, and Coco etc. temporarily trigger higher activities; subsequently body craves for more & more stimulants.

How to manage stress?

Some amount of Stress is healthy; it triggers and energizes the system Managing Stress. Positive Thinking and Attitude, Meditation builds the capability of the mind to face stressful situations, Yoga, Healthy lifestyle and food habits, Hobbies etc. all help to ease the mind and reduce stress.

ITS ALL ABOUT YOU!

From the Editing Team

We, at ICO's Singapore Corp. Office believe that knowledge grows by sharing and we stand by it in our attempt to make this newsletter a regular occurrence. With your support and feedback, we would like to add to the quality and quantity of information we provide in each new issue, opening up the vast and varied dimensions of NDT, Engineering, Drilling and Exploration. Your queries and suggestions are welcome, please feel free to get in touch with us.

We wish you a pleasant read!

Chris Nobles
Aadit Shroff

