Abstracts

INDUSTRIAL FINISHING

Vol. 28, No. 339, October 1976

Pretreatment for Powder Coating by P. Morris.

Texture effects with Powder Coatings by Ron Stanfield.

Curing Powder Finishes with Radiant Heat by D. Elderfield.

Required Coating thickness for External Protection of Burried pipeline with Polyethylene by V. Hauk and W. Mayer and W. Schwenk - Plastics are now holding their own as a means of protecting steel pipe from corrosion. The results of numerous tests and the experience gained in actual operating practice have shown major technical advantages and economical use.

The mill coating of steel pipe with polyethylene applied by the extrusion oblique-head or extrusion wrapping process is illustrated Requirements of minimum coating thickness regarding corrosion resistance are load to be expected in transport, storage and laying are explained.

Results of damage resistance test and practical experiences lead to the requirement of a minimum thickness of 1.8 mm and more depending on pipe diameter.

Vol. 28, No. 340, November 1976

Automotive Topcoats by D. J. Wigglesworth.

Construction of a Car plant for the 1980's–The 1976 Viscount Nuffield Memorial Paper presented to the Royal Society by A. J. Sanders.

Phosphating as a pretreatment for Electropainting by D. James.

Prediction of Carbonic Acid corrosion in natural Gas Pipelines by C. de Waard and D. E. Williams of Koninklijke/Shell Laboratorium, The Netherlands, for the BHRA Conference at the University of Durham.

GALVANOTECHNIK

Vol. 67, No. 12, Dec. 1976

Separation with Synthetic Membranes by Ultra and Hyperfiltration by W. Pusch-Ultrafiltration and hyperfiltration promise to be the methods of the future for the treatment of effluents. Methods are available which are simple, and enable water which is suitable for re-use to be obtained. The substances present in the effluent are filtered off. The processes involved are described. In a review, the fields of application of various types of membrane modules are illustrated. Ultra-filtration can be described as a type of sieving effect in which the membrane holds back the substances which are unwanted.

Problems of Anodising of foamed ISO Insulating sections by R. Stuckart - Many design guide - lines have been laid down for heat - insulating aluminium sections Anodising presents certain difficulties. Recommendations and practical suggestions are given for the control of the sealing of each batch by means of test pieces.

Vol. 68, No. 1, January 1977

Copper-Nickel-Chromium coatings by W. Metzger, H. P. Sisse, and R. Ott. By the improvement of industrial processes, combined with recent developments in the combination of several production operations, good corrosion resistance can be obtained under severe conditions of exposure. By making use of decorative effects, attractiveness to the consumer can also be increased. Examples : matt nickel, black chromium. Functional electrolytically applied coatings meet the requirements of industry in the technical field. Some examples of practical applications are described with the aid of illustrations.

Chromium plating today by R. Brugger – As early as 1909 a German patent was granted for the use of chromium sulphate as the most suitable chromium salt for plating. The 1920's saw the break–through of the chromic-sulphuric acid bath. More recently, chromium deposits have been divided into micro-cracked, crack-free (and pore-free), and microporous types. A later development is single stage micro-cracked chromium deposition. Hard chromium planting is increasingly oriented in the direction of the properties of the deposit, and is considered suitable where the corrosion resistance of the deposit is also of importance.

Status of Electrodeposition of Zinc Acid-Cyanide-Cyanide-free by G. Senge — The importance of the electrodeposition of zinc has increased considerably in recent years. The following are the principal objectives of further developments of the electrolytes employed : (a) Reduction of elimination of the cyanide content, (b) Reduction of the metal content, in parallel with the total salt content. The characteristics, properties and liminations of the applications of the various types of electrolytes used in zinc plating, and some results obtained in practice are reported.

Electrodeposited noble metal coatings from the present day point of view by H. Grossmann — The electrodeposition of silver and gold is one of the oldest processes, dating back more than 130 years. The employment of platinum metal solutions came comparatively late. The current status of the technology and applications of the plating of the noble metals for decorative purposes is reviewed.

Quality testing of Anodic Oxide coatings on aluminium by C. A. Witt — The methods at present used for for testing the quality, of anodically formed coatings on aluminium have certain limitations, which are discussed. A newly available testing unit enables the resistance to exposure of oxide films to be determined, Long term weathering is currently being investigated, and a further testing apparatus is in course of development, together with curves to correlate the test results with practice.

Possibilities of treating Electroplating effluents without the formation of residues metal recovery in place of sludge disposal. by R. Mammel and H. W. Lieber— The formation and setting of electroplating sludges can only be regarded as a policy of necessity. Future developments lie in the direction of preventing the occurrence of such sludges, and the recovery of the metals and materials present.

Since December 1975, a programme has been instituted under the direction of the Federal Ministry for Research and Technology which covers effluent problems. The objective is to develop effluent-free electroplating. The series commencing with this article deals with the means by which effluent problems can be resolved by avoiding the production of sludges, with particular emphasis on the recovery of materials.

Manufacture of printed circuits at WMF - Report – The profusely illustrated report describes the production of printed circuits at the Wortemberg Metal Works in Gelslingen/Stelge. This division of WMF has been extended since it commenced operations in 1968, and now employs modern machinery and equipment.

ANTI-CORROSION METHODS & MATERIALS

Vol. 23, No. 10, Oct. 1976

Surface preparation as applied in the process of refurbishing containers: The selection and use of abrasive blast cleaning equipment by A. E. Howl.

The trend towards 'Press Button' blasting by I. R. Mac Gregor.

Shotblasting: A look at the future by Richard J. Singer.

Vol. 23, No. 11, November 1976

Pipes and Pipeline protection by Harry Goukling.

Pipeline protection coatings: Their development, manufacture and application by L. Woolf.

AUSTRALASIAN CORROSION ENGINEERING

Vol. 20, October 1976

NDT "knowledge and compromise by T.M. Miller.

Control of plumatella by Joan Powling.

Vol. 20, Nov.-Dec. 1976

Strain gauging of Aluminium Hopper wagons by D. Schonfeld — The development of quite serious and unexpected fatigue cracks in a number of aluminium hopper wagons, hauling coal in Central Queensland, led the Queensland Railways to a programme of investigation in an attempt to define the operating stresses which were affecting the structural integrity of the vehicle. The vehicle is of a complex design and difficult to analyse on paper, and it appeared that the stresses may have been higher in some regions than would be predicted. The most feasible approach appeared to be a practical stress analysis using strain gauging to define the service stresses imposed on the vehicle. Experience in this field was limited, but since the programme commenced some considerable expertise has been built up.

KORROZIOS FIGYELO

Vol. XVI, No. 1 1976

The aspects of corrosion prevention in the design of Chemical plants by Mrs. Wiekiera, M. — The corrosion protection aspects of chemical plants are reviewed, with special regard to organic chemical plants. The corrosion effect of organic chemical is for less known than that of the inorganic materials Some cases of corrosion due to the most frequent errors in design are described. These indicate that without proper knowledge of the process of technology and of the corresponding corrosion phenomena even such changes in in technology are prohibited which would seem favourable from the point of view of protection against corrosion. The task of the designers is to secure the optimum conditions both for the yield of the process and for the service life of the apparatus used.

The inhibiting effect of 2-mercaptobenzimidazole towards 63/37 brass in acid media by N. K. Patel — The Inhibitor efficiency of 2-mercaptobenzimidazole has been studied in acid, basic and neutral media. It was found to be a specific corrosion inhibitor for 63-37 brass. The corrosion product was studied by taking its IR spectra.

A discussion of the theory of inhibition. 2-mercapto-benzimidazole forms a chelate compound with copper and zinc ions. The protective power of 2-mercapto-benzamidazole is mainly due to the formation of a thin adherent film of a complex on the metal surface.

NaDDC and EDTA as corrosion inhibitors of brass in $K_2S_2O_8$ by R. S. Shah — NaDDC (= sodium — diethyl — dithio — carbamate) is found to be a very efficient inhibitor in the corrosion of brass in $K_2S_2O_8$ solutions. The inhibitive power of NaDDC is due to the formation of a stable and adherent film of the complexes of copper and zinc. On the other hand, inhibition of EDTA is comparatively poor, as the film formed is less adhesive.

Vol. XVI, No. 5, 1976

An analysis by microsonide of corrosion products produced by CASS-test on the surface of a chemical nickel coating by Kovecses J-Pocsaji, L.- Ni, P coatings were deposited on nickel from solutions containing no iron and 5 mg iron per litre and then CASS-tests were made with these samples. After the CASS-test the corrosion products formed on the surface were studied by scanning electron microscope; the composition or the distribution of characteristic elements were studied by microsonde. It was found that a Ni, P coating containing iron impurity is deposited from a nickel plating bath containing iron and the coating obtained is less resistant to corrosion than the Ni, P coating containing no iron.

AUSTRALIAN CHEMICAL ENGINEERING

Vol. 7, No. 10, Oct. 1976

Non-destructive testing in the sugar industry by J. A. McGinn and R. N. Cullen.

Vol. 17, Nov-Dec 1976

Eddy current inspection of heat exchanger tubes by G R. McCasland.

MINERALS SCIENCE AND ENGINEERING

Vol. 8, No. 4, Oct. 1976

The nature and significance of mineral inclusions in natural diamond : A review by Henry O. A. Meyer and Hsiao-Ming TSAI-Several minerals occur as inclusions in natural diamond The historical identification and significance of inclusions in diamond are discussed as well as the detailed mineralogy and major element chemistry. The separation of inclusions into primary (pre-or syngenetic) and secondary (epigenetic) is considered, as well as the subdivision of primary inclusions into ultramafic and ecologitic suites. The relation of diamond inclusion research to understanding the genesis of diamond and the formation of kimberlite and associated xenoliths, and to the mineralogy of the upper mantle, is reviewed.

Fluorspar and fluorine compounds in high temperature smelting and refining of metals by J. B. See. — Fluorspar and other fluorine compounds are used extensively in high temperature smelting and refining processes for the production of metals. The physical chemistry, phase equilibria, and physical properties of the appropriate fluorine-containing systems are discussed for the processes of steelmaking, electroslag refining, and aluminium production. The emission of fluoride by these processes is described. Other uses of fluorine compounds in high temperature metallurgical systems are summarized.

METALS ENGINEERING

Vol. 16, No. 4, Nov. 1976

Series of articles on Progress in welding testing steel weldments, Composite steel weldments. Stress corrosion in weldments, Spot-welded type 316, Fatigue resistance of spotwelds, Aluminium P/M products, Properties of beryllium and Carburized hardenability.

TIN AND ITS USES

No. 110, 1976

Selective electrodeposition of tin in industry by P. M. Dinsdale.

Centrifugal Casting : A versatile tool for the pewter industry–Casting is one of the oldest methods of making pewterware and the relatively low melting point, high fluidity when molten and freedom from toxicity problems in handling, make pewter a very suitable material to cost. The basic techniques of gravity casting in two part moulds have not changed greatly over the centuries; however newer techniques have supplemented older casting methods and one of these is centrifugal casting in rubber moulds.

Centrifugal casting offers the possibility of producing small items quickly and reproducibly, in small or large quantities, even when the parts are of complex shape. Some of the outlets for centrifugally cast items are described in order to show the scope of the technique for the modern pewter industry.

Lead Calcium-Tin alloys for the lead acid battery Part I by P. M. Dinsdale.— Storage batteries have been used since the earliest days of electrical power for lighting and power requirements especially for portable equipment and stand-by applications in times of power failure and have proved to be reliable under adverse operating conditions and with a minimum of maintenance. Developments in battery technology over the last ten to fifteen years have made possible large increases in their efficiency. In lead-acid batteries in particular, the use of lead-calcium-tin alloys for electrodes have enables new and interesting properties to be attained.

ELECTROPLATING & METAL FINISHING

Vol. 29, No. 10, Oct 1976

Corrosion in the offshore environment by C. V. Chisholm — The discovery of oil in the North Sea has led to the development of a large number of new designs for offshore structures such as drilling platforms, production platforms, subsea systems and piplines for oil transportation.

The complex mixture of physical, biological and chemical factors make the marine environment of the North Sea one of the most hazardous to be exploited. The main parameters which contribute to this environment are temperature, oxygen contents, conductivity, current velocity, pressure and the sea states.

Offshore st.uctures must be designed to withstand the severe erosion and corrosive conditions generated in the North Sea and similar environments.

Ion implantation of metals, Part IV by G. Dearnaley.

The anodic oxidation of aluminium in phosphoric, sulphuric and tartaric acids Part I — Aluminium was anodized in various concentrations of sulphuric, phosphoric end tartaric acids. Analogue techniques were used to follow the barrier layer growth. Evidence is presented which suggests that species peculiar to the anodising medium have some role to play in the formation of the barrier oxide. A theory is proposed showing how porous layer growth is influenced by the barrier layer formation.

Vol. 29, No. 11, Nov. 1976

The anodic oxidation of aluminium in phosphoric, sulphuric and tartaric acids, Part II by Dr. House. — It seems possible that anodisation in sulphuric acid occurs by a different process from that in phosphoric and tartaric acids. Evidence is presented which suggests that some species peculiar to the anodising medium has a role to play in the barrier layer formation.

It is suggested that the capacitance values recorded during the anodisation may be a measure of the capacitance barrier oxide which subtends the pores.

A necessary pre-requisite is that the barrier layer be composed of oxide regions which are more conducive to current flow than others. If this is correct, then the capacitance data could be indicative of a mechanism of pore formation, or alternatively to what extent the barrier layer influences porous layer formation.

A theory of pore formation is proposed. Instead of considering the pores as being created by the current, or alternatively as being paths of current flow, it is suggested taht the pores are created because no current (or very little) flows through the barriet layer at the pore sites and therefore further oxide growth, caused, by ion transport, is prevented.

Bright Zinc plating by I. W. Rose — Bright zinc plating has now developed to a stage of considerable importance both for purely protective applications and also for producing a decorative coating to enhance consumer appeal for products. The improvements in zinc planting have largely been made possible by improvemet in zinc brighteners in conventional cyanide systems but advances have also been made in non-cyanide systems.

Zinc plating is now commercially deposited both from the well proven cyanide baths and also from low cyanide, non-cyanide alkaline (zincate), acid sulphate, acid chloride and neutral chloride solutions. These various types are discussed with emphasis on their particular faeatures, applications and limitations.

Practical control procedures are explained with particular reference to the effects and removal of common contaminants. The effectiveness of recognised purification procedures such as sinc dust treatments are studied with different types of additive systems in alkaline baths.

The important environmental matters relating to treatment of effluents are discussed for the various types of zinc solutions. Influence of types of formulation and types of additives on the effectiveness of removal of zinc from effluent are discussed.

NML TECHNICAL JOURNAL

Vol. 18, No. 3, Aug. 1976

Recovery of elemental sulphur and copper values

from chalcopyrite concentrates by direct leaching in ferric chloride solution by G. Basu, P. K. Sinha, S. C. Aush, N. Dhananjayan and V. A. Altekar — The influence of different variables on the recovery of copper and sulphur from chalcopyrite concentrates by direct leaching in ferric chloride solution has been studied. It is found that the finer the grind of the concentrate and the higher the strength of ferric chloride in the solution, the higher is the recovery of copper and sulphur. The amount of ferric chloride for maximum recovery is found to be 3.5% more than the stoichiometric equivalent to form respective chlorides of the sulphides present in the concentrate other than the pyrite. With increase in concentration of the HCl in the leach upto 100 g/l, the recovery of copper and sulphur increased but with further increase no perceptible influence on recovery is observed. A recovery of more than 99% copper and 92% chalcopyritic sulphur is obtained on leaching a low grade copper concentrate for 2 hr in a solution containing 520 gm/l $FeCl_3$ and 100 g/l HCl with a ratio of $FeCl_3 : CuFeS_2 = 2.78 : 1$ at a temperature of 105 ± 1:C.

Integral colour anodizing of aluminium and aluminium alloys by T. I. Sharma and Y.N. Trehan - Integral colour anodizing process parameters, such as current density, voltage, bath temperature and time, for anodizing of super pure and commercial grade aluminium and aluminium alloys in anodizing baths of different compositions and concentrations have been studied in detail. Optimum conditions for obtaining integrally coloured, fault free, corrosion resistant coatings, on aluminium and aluminium alloy samples have been obtained under different conditions of anodizing.

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