



NATIONAL METALLURGICAL LABORATORY
(COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH)
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Fax No. 6853-20004

D.O.No.NML/CRP/SKN/NSCPP-99/3

Dated:: November 4, 1999

Dear Mr. Vyas,

Sub: National Seminar on coating..... Paints (NSCPP-99)

Kindly refer to our fax dated 18.10.1999, and your letter No.NSCPP-99/TECH dated 21.10.1999, on the above subject.

As desired, I am sending you my paper by fax. Kindly register my name as a DELEGATE for NSCPP-99 and arrange for my transport and accommodation. I have yet to know from you if I can stay on 15.11.1999 to have closer interaction with your organization. Kindly confirm so that I can have my program accordingly. I will send you Rs.1000/- by post or bring it along with me.

Looking forward to an early response from you and thanking you,

Sincerely yours,


(S.K.NARANG) 4/11/99

Sh. D.N.Vyas,
Convener, NSCPP-99, HAL(Koraput),
SUNABEDA-763002

Encl: as stated

COATING, PLATING AND PAINTS DEVELOPED IN NML

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ABSTRACT

A short overview of the developments in the field of coating, plating and paints in the National metallurgical Laboratory has been given. The aim is to focus the capabilities of our research and development scientists to the customers.

INTRODUCTION

The National Metallurgical Laboratory (NML) at Jamshedpur, one of the oldest constituent laboratories of the Council of Scientific and Industrial Research (CSIR), has been actively engaged in basic and applied research in Metallurgy and Material Science since its inception in 1950. Through patents, publications, lectures, seminars, workshops, technology transfers and technical consultancy for industrial problems and testing, it has come to be recognised in the area of coatings, plating and paints or surface engineering of metals and materials. The aim has been to provide quality, excellence and service to industry and society, including the rural masses.

ELECTROPLATING AND METAL FINISHING

All aspects of electroplating and metal finishing have been covered. Eco-friendly non-cyanide processes have been developed for plating brass, copper, silver, zinc etc., as also non-cyanide chemical stripper for defective nickel-plated parts. NML has got expertise of electroplating of all metals and alloys, including hard chrome plating, stainless steel plating. Bright nickel plating process was transferred to M/s Dunlop India, Calcutta, while electroless plating, including that for plating on plastics and wood was patented quite early. Technical consultancy was provided for rhodium plating to a party in Calcutta. A process for continuous high speed plating of wires was also developed at NML. Recently, improved electroless nickel plating, with hypophosphite as the reducing agent from acid baths, was patented, which could be operated even at room temperature instead of 80-95°C. The process has been transferred to M/s Saptharishi, Chennai. Electroless nickel finds major applications for plating electronic, industrial automobile and

aerospace components where high corrosion resistance, hardness and other special properties are desired. Similarly a number of processes for pre-treatment have been developed at NML, including a process for room temperature cleaning of stubborn scales deposits from turbines of boilers/heat exchangers etc. The process is useful for cleaning of scales/deposits from boiler/heat exchangers at room temperature. A number of processes have been developed for making electrolytic powders of iron, zinc, silver etc. using waste materials like iron scrap, sponge iron fines, zinc dross, silver alloys etc. Similarly a unique process to make stainless steel powders of ASTM 304 and 316 grade from stainless steel scrap through a simple chemical route with no equals in the market has been successfully developed and licensed to two parties in India.. A special paint grade stainless steel powder has been developed and licensed to a party at their own instance. Conversion coatings like chromate passivation and phosphating- cold, hot and non-sludge(anodic) as well as tricationic – have been patented. Also a process for passivation of galvanised surface (NML-GALVASAVE) has been developed for giving Eco-friendly and long-life process for passivation of galvanised tubes and sheets to prevent white rust. The process is being used commercially by M/s Tata Steel (Tube Division) Jamshedpur.

Research work on Anodizing and Colouring of aluminium and its alloys has been going on for about 30 years and a good number of corrosion resistant and energy efficient processes including room temperature sealing of anodized aluminium, stick resistant aluminium utensils and solar selective black anodized aluminium have been developed. Chemical and electropolishing of aluminium and stainless steels as well as colouring of metals, especially stainless steel has also been done extensively in the laboratory.

Electroforming work done in NML warrants special mention. While a technical consultancy has been successfully given to M/s Holoflex Ltd. Calcutta, on electroforming of nickel, a lot of research work has gone into Iron Electroforming, using sponge iron fines as the anodic material.

COATINGS

NML has pioneered, in India, hot dip aluminizing up to a pilot plant to produce 60 kg/day of steel wire. Aluminized steel shows superior corrosion resistance and heat resistance and is used in automobile exhausts, furnace parts/ancillaries, high voltage line hardware, overhead telecommunication lines and steel core wire of ACSR conductors. Improved galvanised and Al-Zn coatings for steels have also been developed. A process for preparation of

galvanizing flux based on triple salts, useful for prefluxing in dry galvanizing of iron and steels, has also been patented and commercially used.

A unique process to make calorised tubes, through pack cementation process, also known as 'Alonising' has been developed for corrosion resistance even at high temperatures and in sulphur dioxide atmosphere. Diffusion coatings of aluminium are thus possible on mild steel, low alloy steel, super alloys and stainless steels. Calorised steel tubes find use in fertilizer plants, petroleum refineries, coal gassification and liquefaction plants, exhaust systems of cars/automobiles, heat treating fixtures, lancing tubes, furnace curtains etc. The process has been licensed to M/s Tube Products of India, Chennai. Chromising and chromium-aluminium alloy coatings have also been developed in NML. Different heat-treatments, nitriding, carburizing, boriding as well as hard surfacing with Fe-Cr alloys for ploughs for farmers have been optimised. Considerable work on cladding of copper and stainless steel on mild steel has been done in NML. Materials like aluminium nitride, titanium nitride, and nano-crystalline alumina suitable for special coatings by sol-gel and plasma have been prepared and tested. Even liquid gold and silver paste for glass and metallic surfaces have been developed and operated commercially.

PAINTS

A lot of work on the development of paints and testing has been undertaken in the laboratory. Unique processes for making post cure as well as self cured zinc rich silicate primer based on enriched sodium silicate and partially hydrolysed ethyl silicate, have been developed and evaluated extensively. These are maintenance free primers and offer cathodic protection to the steel structures. These primers are used for the protection of storage tanks and reservoirs for petroleum products, nuclear plants, offshore structures, under carriage of automobiles, railway wagons and bridges etc. Similarly a process for preparation of Vinyl Coated Steel and Aluminium, useful for buses, coaches, electrical ducting, electronic equipment etc. has been patented. Chrom-T, a pigment prepared from the pickle liquor (chromate) effluent, and widely used in Paint industries, has been produced (about 400 kgms), successfully tried at Tata Steel and its process patented.

With its latest equipment like TEM, SEM, X-ray Diffraction. PARC, AAS , INSTRON etc. for analysis, microstructure, characterisation and creep testing, as well as the quality of its experienced R &D professionals, NML offers excellent research and development support in coatings, plating and paints for industry. It is hoped that this paper will minimize gap between the industry and our R & D scientists and focus attention on indigenously

developed technologies. National Metallurgical Laboratory has got ISO-9001 certificate and is committed to the implementation of Total Quality concepts in developing globally competitive and Eco friendly technologies.

CONCLUSIONS

Coating, plating and paints are surface treatments to perform functions that are distinct from the bulk of the material. It is resorted to make it more economical or absolutely necessary to select a material to have the required bulk properties and specifically engineered or tailor-made surfaces to have the desired properties so that it can withstand working conditions much better than the bulk material or surface film independently. The cost of these surface treatments normally ranges from 5 to 10% only. National Metallurgical Laboratory, an ISO-9001 certified laboratory, has developed several unique processes in the area of coating, plating and paints for the use of the customers.

ACKNOWLEDGEMENT

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