



NML news



A MONTHLY HOUSE BULLETIN OF
NATIONAL METALLURGICAL LABORATORY JAMSHEDPUR, INDIA

Vol. 2

30 JANUARY 1988

No. 1

UTILIZATION OF 'METASAVE' CORROSION INHIBITOR IN SHEET MILLS. MOU SIGNED BETWEEN NML AND TATA STEEL

An agreement was signed between NML and Tata Steel on 14th December, 1987 for utilisation of 'METASAVE' a Corrosion Inhibitor, developed by the Laboratory. This material was jointly evaluated by NML and Tata Steel in the galvanizing plant of the Sheet Mill, and will now be available as a NML/Tata Steel joint technology for utilisation in large integrated as well as mini steel plants and also in plants engaged in the production of down stream products.

What is METASAVE ?

Metasave is a remarkable corrosion inhibitor which is non-ionic in character and is effective in reducing

the corrosion rate of a number of metals and alloys in different acidic environments under varying parameters. It is a very high molecular weight compound ($>10,000$) and requires multistep synthesis under controlled parameters for its preparation. Addition of this compound during the pickling operation drastically reduces the corrosion rate as well as hydrogen absorption and retains the mechanical strength of the material exposed to aggressive environment.

Novelty

The novel feature of METASAVE is that it is a highly versatile product and can function efficiently even under the fluctuations of plant parameters. The existing inhibitors fail to provide protection against the corrosion of the metals especially when they are in galvanic contact or in contact with different electrolytes which result in a double layer, either positively or negatively charged. METASAVE owing to its specific molecular structure protects the metals/electrolyte interface whether they bear a positive or negative charged double layer.

INDUSTRIAL EVALUATION AND IMPLEMENTATION

Laboratory scale evaluation of METASAVE was earlier done jointly at R & D Lab of Tata Steel and the results were very encouraging. This evaluation was followed by a full scale round-the-clock plant trials, which were conducted at the Galvanising section of the Sheet Mill of Tata Steel. Over 20,000 tonnes of different grades of steel sheets were pickled. The comparative data and observations on Acid consumption, Metal dissolution, Productivity, Percent rejection, Sulphuric acid discharged and Fumes generation were made. The use of NML-



Dr. S. Banerjee & Dr. J. J. Irani signing the MOU on the use of METASAVE. Scientist behind METASAVE (L-R) Dr. D. D. N. Singh & Shri K. P. Mukherjee.

6005
0204

METASAVE in the plant, showed the following improvements :

Acid consumption	—	50% less
Metal dissolution	—	50% less
Sulphuric acid discharged	—	50% less
Fumes generation	—	80% less

Based on the plant trials the Tata Steel introduced the use of NML-METASAVE both in the Sheet Mill and Tube Mill.

A rough estimate, based on the pickling capacity of the SAIL Plants, Tata Steel, Nagarjun Steel, on economical aspects has also been attempted. It has been revealed that the total savings by the use of this product would exceed several crores of rupees per annum. This gives an impetus for similar trials with NML-METASAVE in the other plants. Currently a proposal for the use of this product at Rourkela Steel Plant on trial basis has been proposed and approved.

SEMINAR ON CONTINUOUS CASTING

Since its advent in the early fifties, continuous casting has made tremendous progress on its own merits both in the production of ferrous and non-ferrous metals and alloys. Because of its many pronged advantages of energy, economy, reduced process steps, labour and space savings, continuous casting has scored over the counterpart conventional ingot route and occupies a unique position in the present day context. This can easily be gauged from the

fact that the world average production of steel alone through continuous route is nearly 45% and in some advanced countries it has even touched 75–80%.

Concept of continuous casting is now making inroads in the production of near net shape castings which is a virgin area having a great potential of exploitation.

In the above context, a seminar on 'Continuous casting' was organised jointly by the National Metallurgical Laboratory; Institution of Engineers (India), Jamshedpur Chapter; and the Indian Institute of Metals, Jamshedpur Chapter, on 4th and 5th December, 1987. It was inaugurated by Dr. J. J. Irani, President, Tata Steel. Prof. S. Banerjee Director, NML delivered the Presidential address. The key-note addresses were delivered by Dr. R. S. Scheidl, Voest-Alpine, Austria, Mr. N. Islam, and Dr. A. Liberman, Davy Distington, U. K.

The seminar was conducted in 6 technical sessions covering all aspects of continuous casting, such as machine design, ladle metallurgy, heat transfer in mould, solidification aspects, modelling and simulation, defects and remedies and research and development work. Twenty four papers were presented. 140 delegates from 32 different organisations participated in the seminar.

A film on continuous casting was shown to the delegates. Visits to the plants were arranged on this occasion.



Seminar on Continuous Casting (L-R) Shri D. D. Akerkar, Prof. S. Banerjee and Dr. J. J. Irani



Prof. S. Banerjee, delivering the Presidential address



(L-R) Dr. J. J. Irani delivering the Inaugural address →

Prof. S. Banerjee chaired the Validictory Session and Mr. D. D. Akerkar, Deputy Director, NML and President, Jamshedpur Chapter of IIM, proposed a vote of thanks.

FOREIGN VISITORS

1. Prof. A. Riesenkauf, Head, Hydro and Electromet Laboratory, Aleksander Krupkowski Institute for Metal Research, Polish Academy of Science, Cracow, Poland; and Dr. (Ms) Ewa Beltowska-Lehman, Senior Research Officer, from the same institution, on 9th and 10th November, 1987, under the Exchange Programme between the two countries.
2. Dr. Ivan Enchev, Dy. Director, and Dr. Nikolaj Nikovsky, Scientist Secretary, Institute for Non-Ferrous Metallurgy, Polvdiv, Bulgaria, on 25th to 27th November, 1987, on exchange programme.
3. Dr. Nugzar Akakierich Zoidze, Scientist, Tbilissi, Georgian SSR, USSR, on 16th to 20th November, 1987 under the exchange programme.

VISITS ABROAD

Shri Swatantra Prakash, Scientist, was deputed to visit Netherland to attend an International Conference on Coal Science held at Amsterdam, The Netherland. He presented a paper entitled 'A novel approach to determination of coal reactivity employing moving bed technique'. He also visited premier Institutions of Sweden, such as Royal Institute of Technology, Stockholm; Max Plant Institute, Dussel-

dorf, West Germany, and presented some of his results on non-isothermal kinetics at these institutes.

RADIO TALK

A Radio talk on National Metallurgical Laboratory and its activities was broadcast from the All India Radio, Ranchi, on 3rd November, 1987. The talk was delivered by Dr. L. P. Pandey, Head, Analytical Chemistry, in Hindi.

TRANSFER OF TECHNOLOGY

Production of Aluminium Powder

The know-how for the production of Aluminium Powder was successfully demonstrated to the Kerala State Industrial Development Corporation in the presence of a team consisting of :

Mr. S. K. K. Nair, Chief Engineer,
Mr. V. D. Nadkarni, Consulting Engineer,
Mr. P. K. Ramanujam, Promoter, and
Mr. S. C. Misra, from N. R. D. C., New Delhi.

The 1000 Mt/year plant will be set up near Trichur in the joint Sector with an outlay of almost Rs. 2 crores with an annual turnover exceeding Rs. 3.5 crores.

The demonstration was undertaken by the NML team consisting of Mr. R. G. Ganguly, Scientist, assisted by Sarvashri B. Basak, S. C. Banerjee, P. C. Paul, A. C. Dandapat, B. N. Mahakur, and co-ordinated by Mr. M. J. Shahani, Dy. Director.

Life extension study of Boiler Component at Bhilai Steel Plant

A team of scientists visited Bhilai Steel Plant for carrying out on the spot study of the boiler No. 3 of Bhilai Steel Plant including insitu-metallography to assist M/s DCPL, Calcutta. The study was imperative as the boiler has been in service for 27 years against the designed life of 12 years. The team consisted of Mr. Raghbir Singh, Mr. B. N. Halder, Mr. Niranjan Das, Mr. Kari Das and Mr. S. B. Singh.

NEW EQUIPMENT COMMISSIONED

Melt Spinner

The Melt Spinner (Marko-Material, USA) is an equipment for producing continuous ribbons of metals at fast rates of cooling. The cooling rate achieved here is of the order of about a million degrees per second. At such high rates of cooling several unique features could be introduced in the materials.

The work carried out in this laboratory and elsewhere has shown that extension of solid solubility, development of unique crystal structures and highly improved thermal and mechanical, corrosion resistant properties are achieved in rapidly solidified alloys.



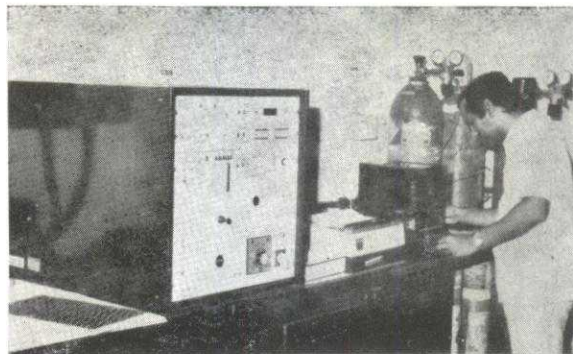
Dr. V. S. Arunachalam observing the Melt Spinner.

The applications of this unit will be helpful in :

- i) Development of amorphous material,
- ii) Bulk-microcrystalline materials for magnetic and electronic applications,
- iii) Rapidly solidified aluminium alloys with unique strength, thermal stability, and wear resistance.

Hymat 200

Hymat 200 is a high speed automatic hydrogen analyser, procured from M/s Strohlein GmbH and Co., West Germany. This instrument can determine hydrogen in steel, ferrous and non-ferrous metals and alloys speedily. Accuracy and resolution of the instrument are ± 0.1 ppm and 0.01 ppm respectively. This instrument will be extensively used for product development.



Shri N. B. Singh working on Hymat 200.

Since its installation, this equipment has been put into good use in various inhouse and exploratory R&D projects and in the investigations on metallurgical failures particularly those in chemical and petrochemical industries.

TECHNICAL LECTURES

1. Dr. S. K. Gupta, RDCIS, Steel Authority of India Limited, Ranchi. 'Technology and work Culture' on 2nd November, 1987.
2. Dr. P. Sen, Ex. Prof. and Head, Department of Chemical Engineering, I. I. T., Kharagpur. 'Separation of fine particles' on 19th November, 1987.
3. Prof. B. Nag, Director, I. I. T. Bombay, 'The new alliance' (Research Institutions, Educational and Industry) on 17th December, 1987.

The following lectures were jointly organised by NML and Indian Institute of Metals, Jamshedpur Chapter.

4. Prof. A. Riesenkauf. Head, Hydro & Electromet Lab. Aleksander Krupkowski Inst for Metal Research, Polish Academy of Science, Cracow, Poland. 'Development of Hydrometallurgy of Zinc in Poland' on 9th Nov. 1987.

5. Dr. (Ms) Ewa Beltowska-Lehman, Senior Research Officer, Polish Academy of Science, Poland. 'Electro Deposition of zinc on RDE in chloride electrolyte'.
6. Shri Samar N. Mukherjee, Programme Advisor, Quality Control Assurance, Indian Vocational Technical Cell, USA. 'Statistical design of experiment' on 11th Dec. 1987.
7. Prof. M. Brian Ives, McMaster University, Canada. 'Nature of pitting corrosion in austenitic stainless steel' on 17th November, 1987.
8. Dr. Santosh K. Das, Manager, Alloys Research Allied Signal Inc. Morristown, USA. 'High performance material by rapid-solidification route' on 31st Dec. 1987.
9. Dr. P. Mazumdar, U. G. C. Research Scientist, Jadavpur University, Calcutta. 'Stress corrosion cracking of off-shore grade steel' on 8th January, 1988.
10. Dr. Nugzar Akakievich Ziodze. Scientist, Tbilisi Georgian SSR, USSR. 'Computer aided modelling of phase transformation in steel' on 15th January, 1988.

SPONSORED INVESTIGATIONS COMPLETED

- i) Bench scale beneficiation studies of low grade kyanite—M/s Sirboj, Singhbhum.
- ii) Beneficiation of coal — M/s Sponge Iron India Ltd. Paloncha.
- iii) Studies on scheelite sample-Jaketa for UPSMDC
- iv) Stress tests on laminated specimens—M/s Dytron (I) Ltd.

PATENTS (Accepted)

1. Indian Pat. 160149 (683/Del/83) : Process for the preparation of aluminium base of galvanic anode alloy.
Inventors—Shri A. N. Mukherjee, Shri K. P. Mukherjee and Dr. V. A. Altekhar.
2. Indian Pat. 160355 (794/Del 83) : An improved process for the preparation of aluminium or aluminium alloys
Inventors—Dr. R. Kumar, Dr. C. S. Sivaramakrishnan, Shri N. K. Das, Shri R. K. Mahanti.

3. Indian Pat. 160908 (572/Del/84) : A process for the preparation of an inhibitor suitable for batch and continuous pickling of steels in sulphuric acid solutions at high temperature.
Inventors — Dr. V. A. Altekhar, Dr. Inder Singh, Dr. D. D. N. Singh, Dr. M. K. Banerjee

PATENTS (Filed)

A process for the preparation of an inhibitor for multipurpose application for corrosion inhibition, pickling and cleaning of metal and alloys. (730/Del/87)
Inventors — Dr. D. D. N. Singh, Shri K. P. Mukherjee

PUBLICATIONS

1. 'Comparative assessment of energy consumption and throughput using kinetic plots' — Swatantra Prakash, H. S. Ray and K. N. Gupta. Presented in the 41st Annual Technical Meeting, Indian Institute of Metals, held on 12-14 November, 1987.
2. 'A novel approach to determination of coal reactivity employing moving bed technique'— Swatantra Prakash, H. S. Ray and K. N. Gupta. Proc. Conference on Coal Science, Amsterdam, 1987.
3. 'Production of Cr-Mn-N-C-W heat resistant austenitic steel by induction melting process for high temperature applications'— K. Prasad and R. Singh. Presented in the National Symposium on Induction Melting System for Ferrous Alloys' organised by IIM, Delhi Chapter on 25-26 September 1987.
4. 'Fire side environmental damage by heating surfaces in steam boilers'—R. Singh. Presented in All India Seminar on Metallurgical Problems in Power Projects, organised by Institution of Engineers (India), Lucknow.

WE WELCOME THEM AND WISH THEM A FRUITFUL STAY AT NML . . .

Dr. Ajoy Kumar Roy, Scientist C; Dr. Phul Chand Ghosh, Pool Officer as Scientist B; Shri A. Seshu Kumar, Scientist B.

Shri Om Prakash Verma, Sr. Hindi Translator; Shri Anil Kumar Sharma, LDC (Hindi); Shri Sarathi, Sweeper.

Sarvashri V. R. Ranganath, Projjal Basu and Ms. Sharbari Banerjee as CSIR Fellows.

Shri A. Mazumdar, joined as Finance & Accounts Officer on transfer from RRL, Jorhat.

WE CONGRATULATE THEM ON THEIR PROMOTIONS . . .

Dr. R. N. Ghosh, Scientists EII;

Sarvashri P. K. Som, S. K. Biswas, and Gurdial Singh, Scientist EI.

Sarvashri P. K. Bagchi, Gurdev Jaura, Arjun Dev, and K. R. K. Rao, Scientist CI.

Shri A. K. Bhattamishra, Scientist B; Shri Arun Kumar, Scientist BI; Shri A. K. Sinha Mahapatra, Scientist B.

Sarvashri S. P. Tandon, H. C. Das and V. K. Sinha, Technical Officer A.

Sarvashri R. Rama Rao, Harbhajan Singh, L. M. Roy and G. P. Mallick, Technical Officer A.

Shri Y. Tulsi Rao, Assistant; Shri I. A. Quadri, UDC.

RESIGNATION

Shri Yogendra Kumar, Scientist C

WE WISH THEM A HAPPY RETIRED LIFE . . . (Joining date in parenthesis)

Sarvashri A. C. Biswas, Scientist EI (12-2-1951); B. K. Guha, Scientist C (10-1-1955); S. K. Banerjee Scientist EI (14-3-1951); Dr. S. S. Bhatnagar Scientist EI (8-2-1948); and Shri G. Appa Rao, Assistant (29-4-1957).

OBITUARY

We deeply regret the sudden demise of Shri B. L. Sengupta, Scientist C, of Mineral Processing Division, on 4th January, 1988. Mr. Sengupta made valuable contributions in the area of ore dressing and beneficiation, since 1960. We pray for the peace of the departed soul.

SOCIO CULTURAL FRONT

NML Staff Club organised an elocution contest to celebrate the birthday of Pandit Jawaharlal Nehru, former President of CSIR on 14th November, 1987 at the NML Flats, Agrico. The topics chosen were varied, touching the sociopolitical, scientific, sports, education, industrial and cultural fronts. A total of 21 participants were there and the following won prizes :

Junior Group (Hindi)—Ms. M. Sarita, 1st; Mr. Ram Kumar, 2nd; Ms. D. Padma, 3rd; Mr. D. Buchhi Babu, consolation prize.

Senior Group (Hindi)—Mr. Babulal, 1st; Mr. S. S. Mishra, 2nd; Mr. D. Prasad, 3rd; Mr. D. P. Rao, consolation prize.

Junior Group (English)—Ms. S. Sunita, 1st; Mr. Surjeet Kumar Singh and Mr. S. Ravi, 2nd; Mr. Jitendra Kumar, 3rd.

Republic Day Celebrations

The laboratory celebrated the Republic Day on the 26th of January with great enthusiasm. Mrs. Shahani hoisted the National Flag at the Club Houses at Agrico Flats and NML Colony and distributed sweets to the children. Prof. S. Banerjee, the Director, unfurled the National Flag in the presence of a large number of employees and their children. In his speech, Prof. Banerjee reminded the gathering, of the difficult period that the country had gone through in 1987 owing to unprecedented drought and called upon everyone in the laboratory to work in unison and devotion so that the losses could be made good and the country would attain greater heights.

On this occasion NML Club organised sports for children and also put up a very enjoyable entertainment programme of dance and music. An inter-college cultural festival was organised by the NML Club which was inaugurated by Prof. S. Banerjee, amidst large gathering of residents at NML Flats, Agrico. Competitions in Music, Folk dances, Mono-acting, Painting, Debate, Quiz and Fancy dress were part of the festival that spread between 29th January to 1st February, 1988.