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MICROPROCESSOR APPLICATION ENGINEERING PROGRAMME

DP/IND/84/030

INDIA

Technical report: Automation and control methods for steel industry*

Prepared for the Government of India
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Eric J. Wightman, expert in microprocessor hardware and software development

Backstopping officer: V. Smirnov, Engineering Industries Branch

United Nations Industrial Development Organization
Vienna

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ABSTRACT

This report describes a threefold programme of training lectures, project evaluation and proposals for future work.

The itinerary included visits to M.A.E.P Centres in Pune, Ranchi and Delhi and to a steel mill in Rourkela. In addition to the main objective of the mission primarily in relation to the Steel Industry, secondary tasks were undertaken in respect of bio-medical projects at Pune and a lecture programme on the application of sensors and microprocessors to water treatment plant, at the request of the Chief Project Co-ordinator, Delhi.

The main conclusions reached from this mission are that the infrastructure at M.A.E.P Centre Ranchi is now sufficiently advanced to enable major automation system projects to be undertaken. Potential areas for future UNIDO/UNDP assistance are indentified.

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V National Workshop on Water Treatment and Sewage Disposal.

1. INTRODUCTION:

The objectives of the mission as detailed in Job Description DP/IND/84/030/11-03/J13315 included the following tasks for the Expert:

1.1 Advise on the use of modern automation and control methods in industrial control.

1.2 Review the progress of the design and development work of the process control computer and suggest means for improvement, if any, in the existing design.

1.3 Suggest appropriate approach in implementing the various promotional activities.

1.4 Deliver lectures on the state-of-the-art of Microprocessor based control systems with reference to specific examples of application in related industries, as well as lectures on experience existing in England in automation of steel mills. Compile a manuscript describing end users and manufacturers approach to the equipment for automation of steel mills.

The expert will furthermore be expected to prepare a final report, setting out the findings of his mission and recommendations to the Government on further actions which might be required.

The programme of work was to be carried out during the period from 12th August 1st October 1987 of which the first eight working days were to be spent at home base, visiting India from 23rd August 1987. The relevant activities are detailed in Appendix I "Itinery" including two days debriefing in Vienna and associated travel time to India.

This report is divided primarily into sections to include a review of project activities at Pune, Ranchi and Delhi at the request of the Chief Project Co-ordinator, M.A.E.P. In addition, the Chief Project Co-ordinator requested the Expert to extend the mission by eight days, to the 9th of October, in order to present lectures on sensor technology and applications of Microprocessors to water treatment and sewage disposal plant during a National Workshop held 6 - 8 October 1987 at the M.A.E.P. Centre New Delhi.

Conclusions relating to the activities for each Centre are included at the end of each section.

2. RECOMMENDATIONS.

The M.A.E.P. activities reviewed during this particuler mission were intended to be very much of a follow on nature to preparatory work started in May/June and reported in DP/IND/84/030/11-05-July 1987, consequently there are few changes in the status of projects which warrant major recommendations for future work at this stage.

The salient items requiring follow up action are:-

2.1. Further to noting problems of implementing bio-medical projects at Pune centre because of the lack of suitable sensors, two actions are now proposed, short term and long term.

- To purchase imported samples of suitable pressure and temperature sensors to enable system engineering of projects to be implemented. UNDP assistance may be required to expedite these.

- To carry out a feasibility study in the application of advanced solid state sensors which may be manufactured indigenously.

2.2. Major system projects undertaken by Ranchi Centre, in particuler the proposed automations of a five stand cold strip mill at Rourkela, require UNIDO/UNDP assistance, initially during the system specification stage, then for implementing the supply of specialised hardware which may not be obtainable locally. System integration is also seen to be an area of costly implemention because of the multi-discipline activities involved and the need to interface with an on-going productive plant without prejudicing the output.

3. ACTIVITIES OF THE EXPERT DURING THIS MISSION.

Following an itinery prepared by the Chief Project Co-ordinator, Dr. Krishna Kant, the programme included a preliminary review of activities at the Regional Centre Pune, prior to implementing the main objectives of the mission at Ranchi, to be followed by a lecture programme in New-Delhi.

Four main fields of activity required inputs from the Expert:

3.1. Training lectures : (Reference Appendix - II " Summary of Lectures"-four in number)

3.2. M.A.E.P. Project reviews :

- Interim review of project work at Pune Centre, to be followed by a detailed review of activities at Ranchi Centre.

3.3. Project Supervision :

- Development programme for instrumentation and control system for Screw Down process at the blooming mill, Bhilai Steel Plant.
- Requirements for supervisory system and automation for Five Stand Tandem Mill at Rourkela Plant.

3.4. Future Work :

- Proposals for continuation, extention and/or modification of the ongoing activities at Pune and Ranchi, with particular reference to the Bhilai Steel Mill and Rourkela Tandem Mill automation projects For the Steel Authority of India.

4. REGIONAL CENTRE PUNE :

4.1. General.

From the previous visit from 11th to 16th May and reported under DP/ind/84/030/11-05 July 1987, the main highlights of project development under the four main areas of :

- Automatic Test Equipment
- Biomedical projects
- General Purpose Gas Measurement
- Expert Systems

were studied and the main issues which have recently emerged are noted below.

4.2 Project Reviews.

4.2.1 A.T.E. Projects.

- Relay Parameter Testing.

Breadboard evaluation is complete and a fully engineered production packaged unit is at the completion stage.

- Turbine Slip Monitoring and Annunciator System.

This is a newly started project in colaboration with MELTRON Company specialising as a Government Test House for calibration of instruments. The project comprises hardware and software for monitoring marine turbines. Simulation is at an advanced stage and hardware has been designed.

4.2.2. Biomedical Projects.

Patient Monitoring Unit.

Although system work on data sampling is at an advanced stage, progress is delayed because of lack of suitable surface mounted sensors. The author has supplied details of potentially suitable pressure and temperature sensors but costs are high, thus emphasising the need for indigenous sensor development. The scope of this project may be extended to include monitoring and/or control of a patient support system.

Ultrasound Image Processing.

A recently recruited engineer is now progressing with this project and algorithms for analysis are being defined.

4.2.3. General Purpose Gas Polution Measurment.

This project has been temporarily suspended because of lack of sensors and shortage of staff. The author has obtained details of a gas measuring system which is available in U.K. Details of a low cost unit commercially available in Bombay are to be investigated.

4.2.4. Expert Systems.

E.C.G.

The first phase of this project is on programme and under evaluation with the end user under field operating condition.

P.C.B. Analysis.

It is proposed to develop a hardware and software based system on IBM PC cards for use at volume manufacturing QC level and fault diagnosis by means of a special purpose "Expert system " aimed at "Reasoning from first principles". Colaboration with Laval Automation is under consideration.

4.3. Notes on Instrument Industry in Pune.

The author visited Meltron test centre and Laval Automation. Future Colaboration with these companies is under review in the fields of A.T.E and Expert Systems.

4.4. Main Findings.

4.4.1. Overview.

Since last visiting Pune Centre, several developments in the three main activities of project development, training courses and building up infrastrucural facilities have occured.

Staff recruitment is proceeding with the addition of higher calibre engineers. Training courses have been conducted in :

- Digital System Design.
- Microprocessor System Design
- Microprocessor Interfacing

These include both lectures and laboratory experiments. Response from Industry has been good. Arising from these industrial contacts, there are good prospect of M.A.E.P. negotiating industrial projects. It has previously been recommended by the author that because the complex nature of microprocessor based systems, joint collaboration ventures should be encouraged. This has now been actually pursued as a strategy and examples of such ventures are under negotiation with Meltron and Laval Automation.

4.4.2. Component and Sensor Stages.

Further experiences since noting this problem in May confirm this area of weakness. The author has tabled examples of possible pressure, temperature and strain transducers, together with a new versatile piezo - plastic film material from which various types of sensors may be

developed indigenously. Following discussions with the Chief Project Co-ordinator Dr. Krishna Kant this proposal is now to become the subject of a feasibility study.

4.4.3. Future developments.

Arising from a study of potential application for A.T.E., particularly Expert Systems, together with plans proposed for testing IBM PC cards, it has now appeared to be logical to include programmable logic Controllers (PLC'S) in the family of related products. As a first application, at the suggestion of the author, discussions are to commence with HMT for testing PLS'S used for CNC machine tool controllers, currently made by HMT under license from a European Supplier.

4.5. Conclusions and Recomendations for Activities at Pune.

4.5.1. In general progress is steady not withstanding problems of staffing. There is an increased awareness in local industry of the benefits of the M.A.E.P. Centre and an increase in the number of joint venture projects is expected.

4.5.2. In the short term it is recomended that efforts on new project development should now be directed towards PLC testing and evaluation, together with studies on advanced sensor design, particular for bio-medical application.

These products are seen to provide the backbone of systems which are currently most widely required as part of the work programme planned for Pune Centre.

5. REGIONAL CENTRE RANCHI

5.1 General

From previous visits made by the Expert during 4th to 9th May and 18th to 20th June, the activities covered during this mission include three main subjects :

- Training Lecture
- Automation of Screw Down Mechanism at Bhilai
- Proposals for Automating a Five Stand Tandem Mill at Rourkela.

5.2 Training Lecture.

Preparation of a manuscript describing progress in automation of steel mills in U.K., to provide the basis of a lecture to be presented at Ranchi during the week begining Monday 31st August (Copies of the manuscript (57 pages) were made available to the Chief Project Co-ordinator Dr. Krishna Kant and Backstopping Officer Mr. V. Smirnov Engineering Industrial Branch, Vienna.)

Presentation of the report "Development in Steel Mill Automation - A review of state-of-the-art Developments in the automation of strip, plate and billet mills at British Steel Corporation, U.K. " is summarised in Appendix - II. The lecture was one of many papers to be presented at a National Seminar on Microprocessors in Steel Industries held betwwen 3rd and 5th of September 1987 at R and D Centre, SAIL, RANCHI. The programme is appended in Appendix -III. Approximately sixty delegates attended from public and private sectors.

5.3 Automation of Screw Down Mechanism .(Bhilai)

As reported previously, the project comprised two main phases of activities :

- Installation and Commissioning of data acquisition system
- Automation of Screw Down Mechanism.

The data acquisition system has been commissioned and work is now directed towards the implementation of the programme prepared during the last visit by the Expert. Prior to automating the system, an interim "Supervisory mode" is planned whereby the necessary commands for screwdown are first displayed to the operator in an interactive mode for confirmation by the computer. Following a review of the results obtained from the data acquisition system a programme for software development was compiled as shown in Appendix IV "Interactive Adaptive Control of Pass To Pass Screw Down Processs - Software Requirements for supervisory Modes".

This programme lists the detailed steps necessary to implement the events culminating in completion of this phase by December 1987. Following satisfactory commissioning of this will inevitably incur a delay of several months. This period will be used for gaining experience of the computer supervisory system to instill confidence in the mill operational staff. A total of four engineers specialising in hardware and software, have now been allocated to this project and no major problems are foreseen which may prejudice this phase of the programme.

5.4 Automation of Five Stand Tandem Mill(Rourkela)

The Expert was invited to contribute towards a proposed new project for automating a cold strip mill at Rourkela. The plant is some 250KM from Ranchi and the journey by road takes six hours, access by air travel being somewhat problematical.

Initially it was proposed to instrument the plant by means of a computer based data aquisition system to be installed during 1988. Facilities for limited automation of one of the stands were to be included. However, following discussions with the team headed by Dr. B. Puthal under Dr. J. Bhattacharya, Project Co-ordinator M.A.E.P. Ranchi, together with discussions held with representatives of supervision, electrical and intrumentation departments at Rourkela mill, the following strategy was recommended:

-Phase-I Managment Supervisory system.
Collection of data from each stand including torgue, screw down and roll force, together with time for loading.

-Phase-II Automation Project.
To commence with a feasibility study for fully automating the mill and to include such features as automatic tension control and automatic gauge control.

Further UNIDO/UNDP assistance may be required for Phase-II of the project. In order to implement Phase-I it was agreed that RDCIS, Ranchi would compile a proposed system specification including computing equipment and installation requirments, cabling etc., by October 15.

The proposed approach was based on the use of duplicated P.C.'s sharing a common data highway with interface modules for input sensos and output actuators. (Automation Phase-II). Thus future automation needs would be catered for largely by software additions, the basic computing system having sufficient power and redundency to handle the automation functions from the outset. Following discussions with mill managment, suitable rooms were

earmarked for conversion to house the computing and printout equipment. A detailed programme for implementation is to be the subject of joint action between RDCIS and mill management, from which budget costs will be compiled.

5.5 Conclusions and Recommendations for Activities at Ranchi.

As a conclusion to this visit to Ranchi, the following observations are relevant.

5.5.1. The infrastructure comprising laboratories, computing equipment, hardware and software developing facilities is largely complete. Sufficient staff, competent to handle complex projects enumerated above, been allocated to handle the proposed development programmes.

5.5.2 The role of UNIDO experts is seen to be largely that of catalysts in assisting the integration of multi-discipline projects. This point has already been made as a result of the last visit where technology may be updated as required by personal involvement of practising experts.

5.5.3 The two projects reviewed in this report are good examples of the applications of microprocessors at system level. In addition to the technical requirements which have to be satisfied, engineers participating in such multi-discipline tasks will have the opportunity to develop project management skills which can not be acquired by laboratory and/or college training courses.

6. REGIONAL CENTRE, DELHI

6.1. General

Activities at DELHI were focussed on the preparation and presentations of lectures at a National Workshop on Water Treatment and Sewage Disposal held on 6th - 8th October. The programme included :

- Microprocessor Introduction and Advancements
- Sensor Technology - Present and Future
- Personal Computer
- Application of Microprocessor in Water Treatmentn Plant
- Application of Microprocessor in Sewage Disposal Plant

The Expert was requested to present papers on :

- Sensor Technology - Present and Future (lectures I and II)
- General Automation Techniques.

These lectures are summarised in Appendix II. The lecture programme is included in Appendix V. The Workshop was attended by approximately thirty participants from public and private sectors.

6.2 Conclusions

This Workshop was a session in a series organised by M.A.E.P. Centre, based on experience already gained on similar workshop sessions. It illustrates the proficiency of the staff who organised the programme, together with those from M.A.E.P. who presented much of the lecture material. The workshop combined lectures with practical examples of microprocessor and interface hardware.

APPENDIX I
ITINERY - E,J,Wightman
23rd August - 9th October 1987

Date	Time	Activity
Sun 23/8/87	7.a.m.	Depart U.K.
Mon 24/8/87	00.50.a.m.	Arrive Bombay
	06.30.a.m.	Depart Bombay
	07.05.a.m.	Arrive Pune.
	10.30.a.m.	M.A.E.P.-Prof.A.M. Dhake,Project Co-ordiantor Mr. Dixit -Project reviews.
Tue 25/8/87		Statutary day.
Wed 26/8/87	9.15.a.m.	M.A.E.P.-Tranducer developments
Thu 27/8/87	11.00.a.m.	Laval Automation Pune. G.S. Kelkar - Managing Director P.K. Ratnaparkhi - Director N. Pradhan - Marketing Manager Mr. Mankikar - Chief Engr.Hardware Mr. Phadake - Manager Software
	2.30.p.m.	Meltron Rear Admiral Mudholkar Director Rand D.
	4.00.p.m.	M.A.E.P. Prof. A.M. Dhake.
Fri 28/8/87		Compile draft report
Sat 29/8/87	9.00.a.m.	M.A.E.P. Prof. A.M. Dhake. Mr. Dixit Mr. Pathak PLC and sensor development strategy.
	7.00.p.m.	Depart for Airport.
	10.25.p.m.	Arrive N. Delhi.
Mon 31/8/87	9.00.a.m.	UNDP Dr.K. Hussein, SIDFA Briefing.
	10.00.a.m.	M.A.E.P. Dr.Krishna Kant Chief Project Co-ordinator. Review of Itinery. Project reviews (Pune)
Tue 01/9/87	4.30.a.m.	Depart for Ranchi
	9.30.a.m.	Arrive Ranchi
	10.30.a.m.	M.A.E.P. SAIL. Dr.Battacharya Project Co-ordinator.Dr.B.Puthal Deputy Head of SAIL R&D.Briefing for National Seminor on Micro-processors in steel Industries 3-5 September.
Wed 02/9/87	9.00.a.m.	M.A.E.P. Preparation for lecture "Developments in steel Mill Automation".
Thu 03/9/87	9.30.a.m.	Seminar Programe.
Fri 04/9/87		(Appendix III)
Sat 05/9/87		
Mon 07/9/87	10.00.a.m.	M.A.E.P. R&D SAIL Mr. Neogi Compile development programme for

		Interactive Adaptive Control of Screw Down Process-Software (Appendix IV).
Tue 08/9/87	10.00.a.m.	R&D SAIL-system design Mr. Neogi. Mr.S.Sen. Presentation of proposed development programme- Dr. Battacharya,Dr.Puthal
Wed 09/9/87	9.30.a.m.	Mr.Neogi:RDCIS,System Engineering Screw Down supervisiory Mode development.
Thu		
Fri 11/9/87		
Mon 14/9/87	10.00.a.m.	Draft Report Screw Down implementation proposals.
Tue 15/9/87	2.30.a.m.	Dr.Battacharya-Dr.Puthal-Five Stand Tandem mill data acquisition system.
Wed 16/9/87	10.15.a.m.	Screw Down Project Progress Review Dr.Battacharya -Dr.Puthal-Mr.Neogi
Thu 17/9/87		Evaluation of Screw Down mechanism.
Fri 18/9/87	6.45.a.m.	Depart for Rourkela Steel Plant.
	1.00.p.m.	Arrive Rourkela.
Sat 19/9/87	8.30.a.m.	Tour of Five Stand Mill.Finalise requireency for supervisory system and automation project.
	2.00.p.m.	Depart. for Ranchi
	8.00.p.m.	Arrive Ranchi
Mon 21/9/87		Compile evaluation report "Notes on Screw Down Automation Project"
Tue 22/9/87	9.00.a.m.	Dr.Sinha, Tata Iron and Steel Introduction with Dr.Puthal for future colaboration.
	4.00.p.m.	Compile draft UNIDO report.
Wed 23/9/87	10.00.a.m.	Rourkela strip mill project Dr.Battacharya
Thu 24/9/87	10.30.a.m.	Final project review Dr.Battacharya Dr.Puthal.
	2.30.a.m.	Dr.Gupta-Director RDCIS-Progress meeting.
Fri 25/9/87	6.00.a.m.	Depart for Delhi
	10.35.a.m.	Arrive Delhi
	11.30.a.m.	U.N.D.P.
	2.00.p.m.	M.A.E.P. Briefing for lectures.
Mon 28/9/87		Prepare lectures for workshop
Tue 29/9/87		water and sevage treatment.
Wed 30/9/87		
Thu 01/10/87		Compile draft Technical Report.
Fri 02/10/87		
Mon 05/10/87	9.00.a.m	Lecture completion
Tue 06/10/87	9.00.a.m.	Present lectures
Wed 07/10/87		reference Appendix II
Thu 08/10/87		
Fri 09/10.87	12.30.a.m.	Depart for airport.
	03.15 a.m.	Depart for Vienna.

APPENDIX-II

Summary of Lectures

1. DEVELOPMENTS IN STEEL MILL AUTOMATION

ABSTRACT

This paper presents an overview of "State-of-the-Art" development in the automation of strip, plate and billet mills during the last few years in British Steel Corporation, U.K., with particular reference to rolling programme calculation and mill set up.

The importance of computer modelling as the basis of adaptive control is discussed against practical constraints of the process and the resultant trade off between physical and emperical models used in practice problesm of temperature measurement, crucial to reliable control of the rolling process, are examined.

Reference is made to practical case histories of automation systems applied to both new and retrofit installations.

APPENDIX-II (Continued)

2. SENSOR TECHNOLOGY (PART-I)

ABSTRACT

This paper discusses funcamental principles of sensor technology and their application to measuring the most common physical variable of pressure, temperature and flow in the handling of bulk liquids. Problems of applying corrections to sensor outputs in terms of scaling, temperature, compensation linearisation, offsets, conversion to engineering units, high and low limits (alarm levels) and data communications are examined in the light of advances made in the application of microprocessors for data acquisition.

APPENDIX-II (Continued)

3. SENSOR TECHNOLOGY (PART-II)

ABSTRACT

This paper continues from Part-I fundamentals of Sensor Technology and reviews developments in sensor developments which herald a new range of transducers for the future:

The review includes three main specialist areas of sensor technology,

- Microelectronic Sensors.
- Optical Sensors.
- Resonator Sensors

With appropriate evaluation of the advantages and disadvantages of each approach.

In conclusion, the evaluation of "smart" sensors is discussed in which the application of microprocessors is crucial to overcoming the problems associated with non-linearity, temperature compensation and communicating to a remote controller enumerated in Part-I.

APPENDIX-II (Continued)

4. GENERAL AUTOMATION TECHNIQUES.

ABSTRACT

This paper discusses the techniques commonly used in the automation of process control systems. It commences with an explanation of the fundamental requirements for achieving the steady state control of any Process, followed by examples of control systems for handling bulk liquids and solids. The benefits of digital techniques in such systems are examined.

The role of the microprocessor is seen to be a key factor in the evolution of modern automation systems and the paper concludes with a review of system engineering concepts and the influence of microprocessors on their designs.

APPENDIX III

NATIONAL SEMINAR ON MICROPROCESSORS IN STEEL INDUSTRIES
(September 3 - 5, 1987)

P R O G R A M E

September 3, 1987

9.30 - 10.45	:	Registration Venue : Auditorium
11.00 - 12.00	:	Inaugural Session Venue : Auditorium 11.00 - 11.10 : Welcome Address 11.10 - 11.25 : Inaugural Address 11.25 - 11.50 : Keynote Address 11.50 - 12.00 : Vote of Thanks
12.00 - 12.30	:	T E A B R E A K
12.30 - 13.30		TECHNICAL SESSION-I Venue : Lecture Hall, Lab.Building, 1st Floor.
12.30 - 13.00	:	Intelligent Weighing Controller for Charging Coke to Blast Furnace. MR Panda, RVS Lakshman, B Puthal & J Bhattacharya(RDCIS - SAIL)
13.00 - 13.30	:	Automation of Blast Furnace - 7 of Bhilai Steel Plant. A Balasubramanian, Vijay Mairal & A Narayanan(BSP - SAIL)
13.30 - 14.30	:	L U N C H B R E A K
14.30 - 16.30		TECHNICAL SESSION-II Venue : Lecture Hall, Lab. Building, 1st floor.
14.30 - 15.00	:	Application of Microprocessors towards Energy Conservation. J Bhattacharya (RDCIS - SAIL)

15.00 - 15.30	:	Microprocessor based energy management system. SK Roy (DoE)
15.30 - 16.00	:	Modernisation of fuel control in an old Integrated Steel Plant with special reference to Indian Iron & Steel Company Ltd.,Burnpur Works. S Banerjee (IISCO - SAIL)
16.00 - 16.30	:	Microprocessor based intelligent process control for optimum energy utilisation the crying need of today. S Sen, S Dutta(Bells Control Ltd.)
16.30 - 17.00	:	T E A

September 4, 1987

9.00 - 11.00 : TECHNICAL SESSION-III

Venue : Lecture Hall, Lab. Building, 1st Floor.

9.00 - 9.30	:	Experimental Multiprocessor Systems : Design & Performance Evaluation Issues. LM Patnaik, R Govindarajan (IISC - Bangalore)
9.30 - 10.00	:	Some application of FORTH in Automation. SI Ahson (IIT - Delhi)
10.00 - 10.30	:	Microprocessor based FEC coded for low speed satellite data communication. A Chockalingam, P Ullagaddi (MAEP - Bangalore)
10.30 - 11.00	:	Development in steel mill automation. EJ Wightman (UNDP Expert)

11.00 - 11.30 : T E A B R E A K

11.30 - 13.00 TECHNICAL SESSION-IV

Venue : Lecture Hall, Lab. Building, 1st Floor

11.30 - 12.00 : Microprocessor based instrumentation system in Blast Furnace-III of RSP.

JC Mitra (RSP - SAIL)

12.00 - 12.30 : Microprocessor based programmable control (PLC) for variable throat Armour Control of Blast Furnace.

AD Panemangalore (L&T)

12.30 - 13.00 : Optimised combusion control in soaking pit using microprossor based controllers to reduce the specific heat consumption.

SD Gupta (BSP - SAIL)

13.00 - 14.00 : L U N C H B R E A K

14.00 - 16.00 TECHNICAL SESSION-V

Venue : Lecture Hall, Lab. Building, 1st floor.

14.00 - 14.30 : Micro for steel making process, modelling and simulation - Tata Steel's experience

AS Rao, R Battich, B Roychoudhury, SK Singh, Naresh Bahadur & A Pandey (TISCO)

14.30 - 15.00 : Dedicated applications of micro - processors in steel plants.

AK Singh, DP Sharma, PC Chaturv li (BSL - SAIL)

15.00 - 15.30	:	Microprocessor based cumbusion control of Soaking Pits at BSP. ML Puri, R Chari (BSP - SAIL)
15.30 - 16.00	:	Microprocessor based instruments in Soaking Pits for RSP. K Krishnaswamy (RSP - SAIL)
16.00 - 16.30	:	T E A

September 5, 1987

9.00 - 11.00		**TECHNICAL SESSION-VI** Venue : Lecture Hall, Lab. Building, 1st floor
9.00 - 9.30	:	Simulation and Modelling as applicable to steel industry. D Popovic(Univ. of Bremen-West Germany)
9.30 - 10.00	:	On-line process monitoring of a Blooming Mill using a multi-processor system. B Puthal, M Satyaranjan, S Sen, N Neogi, J Bhattacharya (RDCIS - SAIL)
10.00 - 10.30	:	Programmable control for chop shear of Wire Rod Mill. AD Panemangalore (L&T)
10.30 - 11.00	:	Microprocessor based control for thyristor DC drive system. H Chand, R Raghavan & M Mahadev (BHEL - Bangalore)
11.00 - 11.30	:	T E A B R E A K

11.30 - 13.00 **TECHNICAL SESSION-VII**

Venue : Lecture Hall, Lab. Building, 1st floor.

11.30 - 11.45	:	An approach towards maintenance of microprocessor based equipment in an integrated steel plant. CD Sinha, Sudhan K De (TISCO)
11.45 - 12.00	:	Dedicated applications of microprocessor Prashant Kumar (RDSO - Lucknow)
12.00 - 12.15	:	Dedicated applications of microprocessor in steel industry. TS Sreenivasan, DBV Sharma, RK Pandey (Visakhapatnam Steel Projects)
12.15 - 12.30	:	Dedicated applications of microprocessor in steel industry. RN Chakraborty, L Mishra (RSP - SAIL)
12.30 - 12.45	:	Smart Transmitter - New approach to reduce maintenance cost & enhance personal safety. DS Gandikota (USHA Computers)
13.00 - 14.00	:	L U N C H B R E A K
14.00 - 15.30	:	CLOSING SESSION Venue : Lecture Hall, Lab. Building, 1st floor.
15.30 - 16.00	:	T E A

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APPENDIX - IV 07-09-1987

INTERACTIVE ADAPTIVE CONTROL OF PASS TO PASS SCREW DOWN PROCESS-SOFTWARE REQUIREMENTS FOR SUPERVISORY MODES.

Stage - 1 (Analytical mode)

(a) Confirmation of " clean " pass.
(b) Identification of " skidding ".
(c) Signals to operator for confirmation of each pass.
(d) Signal to operator for identification of skidding e.g. message or warning light.
(e) Engineer operated "abort" button if operator reverses pass part way through.
(f) Separate data acquisition system for storing pass data.
(g) V.D.U. in operator pulpit for messages.

Stage - 2 (Supervisory mode)

(a) Computer listing of screw down values as an operator aid, based on analysis of past records.
(b) Present screw down settings to operator for each pass. (list on VDU from stored values in computer)
(c) Record actual value set by the operator and the recommended value listed by the computer to arrive at best average or "normal" values for future passes.

Stage - 3 (Adaptive supervisory mode)

On-line analysis of data on each pass :-

(a) To confirm optimum setting for screw down on subsequent passes.
(b) To select course of action e.g. modify screw down in the event of skidding.
(c) Effect of rollability.Modify screw down setting.
(d) Record all values for historical analysis.

Stage - 4 (Supervisory mode with adaptive data)

Integration of stages 1,2,3 for completely automated system.

Hardware requirements :

(1) VDU in no.2 pulpit.
Interface with data acquisition system.
(2) Printer for plotting values for each pass on command. Suggest messages are stored in VDU and commanded by single word from data acquisition interface prompted from Stage-1 software.

Stage - 5

Automation of screw down control.
To be reviewed on completion of Stage-4.

APPENDIX - V

Workshop on Microprocessor and its Applications in Water Treatment and Sewage Disposal Plants

(6, 7 and 8 October,1987)

PROGRAMME SCHEDULE

ORGANISED BY :

Microprocessor Application Engineering Programme

Department of Electronics (CCI Wing)

New Delhi

in Association with

Indian Water Works Association, New Delhi

and

Institution of Engineers, New Delhi Centre

Date : 6th October,1987

9.00 a.m - 9.30 a.m	Registration
9.30 a.m - 10.30 a.m	Inauguration
10.30a.m - 11.00 a.m	Tea
11.00 a.m - 12.00 p.m.	Overview of semi-conductor technology
12.00 p.m - 1.00 p.m	Introduction to Computers
1.00 p.m - 2.00 p.m	Lunch
2.00 p.m - 3.00 p.m	Introduction to Microprocessor
3.00 p.m - 3.15 p.m	Tea
3.15 p.m - 5.30 p.m	Demonstration: Microprocessor kit software and hardware.

Date : 7th October,1987

9.00 a.m - 10.00 a.m	Sensors-1
10.00 a.m - 11.00 a.m	Introduction to Microprocessor Interfacing.
11.00 a.m - 11.15 a.m	Tea
11.15 a.m - 1.00 p.m	Demonstration: Microprocessor interfacing
1.00 p.m - 2.00 p.m	Lunch
2.00 p.m - 3.00 p.m	Sensors-II
3.00 p.m - 4.00 p.m	Personal Computers
4.00 p.m.-4.15 p.m.	Tea
4.15 p.m - 5.30 p.m	Demonstration: Microprocessor Interfacing.

Date: 8th October,1987

9.00 a.m. - 10.00 a.m.	General automation techniques
10.00 a.m. -11.00a.m.	Microprocessor application-I
11.00 a.m.-11.15 a.m.	Tea
11.15 a.m.-12.15 p.m.	PC in control environment
12.15 p.m. -1.00 p.m.	Demonstration: Personal Computer
1.00 p.m. -2.00 p.m.	Lunch
2.00 p.m. - 3.00 p.m	Demonstration: Personal Computer
3.00 p.m. - 4.00 p.m.	Microprocessor application-II
4.00 p.m. - 5.00 p.m	Concluding session.