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ESTABLISHMENT OF PREVENTIVE MAINTENANCE SYSTEMS TO INCREASE
PRODUCTIVITY OF PHILIPPINE INDUSTRIES

DP/PHI/87/008

PHILIPPINES

Technical report: Instrumentation and control in relation
to preventive maintenance*

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

Based on the work of Jan L. Peters,
expert in industrial instrumentation and control

Backstopping officer: A. Assabine,
Industrial Management and Rehabilitation Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

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SUMMARY

The expert was on mission in the Philippines from 15 August 1990 to 30 November 1990 as a consultant in Industrial Instrumentation and Control for the Preventive Maintenance Project DP/PHI/87/008.

He visited a representative member of Philippine Process Industries to appraise himself of the condition of Instrumentation and Control in these industries and the interaction between these and maintenance.

He found that the main problems were lack of and difficult procurement of spare parts for Instrumentation and Control and further a lack of possibilities to obtain information about possibilities for application and system engineering of instrumentation and control.

The awareness of the possibilities of instrumentation for process condition monitoring to enable more efficient preventive maintenance was not widespread.

In consequence he produced a general manual for Instrumentation and Control for Process Industries as a guideline for this field and possible seminars covering the specific needs of Philippine Industries as far as possible.

The main conclusion of the expert is that a project for technical support of Instrumentation and Control for Philippine Industry alongside the PM Project is needed.

A draft project proposal is added for consideration.

I. INTRODUCTION

The expert was on a mission in the Philippines as Expert in Industrial Instrumentation and Control from 15 August 1990 to 15 November 1990:

To assist the Government of the Philippines in establishing an institutionalized Preventive Maintenance System to increase industrial productivity. (Project DP/PHI/87/008)

Duties: The expert will be attached to the National Engineering Center (NEC) at the University of the Philippines. He will specifically be expected to:

1. Develop a manual of guidelines for evaluating and improving instrumentation and control in local industries and facilities.
2. Develop or provide manuals and procedures in instrumentation and control which are specifically suitable to Philippine industries.
3. Submit a training programme in industrial instrumentation and control and conduct this training for project staff and related participants.
4. Carry out actual plant consultancy/technical service work, at the same time providing on-the-job training of project staff.
5. Submit a list of technical literature, information materials, tools and instruments on industrial instrumentation and control, indicating priority of usefulness, sources and approximate cost.

The expert will also serve as resource person on instrumentation and control in other project activities and will also be expected to prepare a final report to the Government setting out his findings and recommendations on further action which might have to be taken.

On arrival the expert was presented and excellent prepared detailed list of proposed activities and planning, based on the above described duties (see Annex I).

After having made a time budget of all possible activities, the following priority - list was conceived:

1. The expert would visit a representative number of Philippine industries to get acquainted with the factual condition of Instrumentation and Control in these industries, in the mean time carrying out actual plant consultancy work as on the job training of project staff (item 4 of duties).
2. Produce a general manual for Industrial Instrumentation and Control, based upon the observations during the industries-visits, to serve as guidelines and basis for a training program in this field (item 1 and 2 of duties).
3. Present lectures to project staff and related participants on basis of the general manual to inform about the scope of industrial instrumentation and control, its basics, the aspects of engineering, installation, commissioning, tuning, construction, and system engineering (item 3 of duties).
4. If and as far as possible (in terms of time), submit a list of technical literature, magazines, suppliers documentation, equipment sources and such (item 5 of duties).

The activities 1, 2 and 3 have been executed during the experts stay in the National Engineering Center in Manila.

The main product of his activities, the general manual has also been used as written material for the lectures.

The manual is added to this report as separate annex.

In connection with these activities the expert attended:

- a) A workshop on Preventive Maintenance, organized by NEC
- b) A workshop on Instrumentation and Control for Medium and Small Scale Industries

and conducted for the Maintenance Association of the Philippines (MAPHIL) a:

- c) Seminar on Instrumentation and Control in Process Industries.

The expert visited the following industrial plants.

1. Solid Cement Corporation, Antipolo, Rizal (twice)
2. Philippine Polyphosphates Inc., Taguig, Metro Manila
3. Resins Inc., Pasig, Metro Manila
4. Bataan Refinery, Limay, Bataan,
5. National Power Corporation, Power Plant Calaca, Batangas
6. Manila Water Supply Systems Plant, Diliman, Quezon City
7. Reynolds Philippines Corporation,

The expert also visited the:

Rizal Technical College to appraise himself of the possibilities of education in Industrial Instrumentation and Control.

Separate reports and details about these visits and participations are added to this report in Annex 2.

II OBSERVATIONS

A. Preventive Maintenance/Instrumentation and Control

One of the first activities of the expert was to find out in which way to fit his know-how into the need of the NEC-PM Project.

Basically two fields are there:

1. The (preventive) maintenance of equipment for Industrial Instrumentation and Control.
2. The Instrumentation (and Control) as sensors in the industrial processes to provide the necessary information to decide about (preventive) maintenance.

Re: (1), during the visits to industry the expert found, that nearly all complaints about maintenance of instrumentation were of 2 kinds:

- 1a. Availability of spare parts.
Many Philippine industries don't seem to believe in investment in spare parts for instrumentation. As often the existent equipment is not really young, spare parts have to come out of the deeper stocks of mostly far away suppliers and thus have a long delivery time, if even still available.
- 1b. Accessibility to know-how.
Instrumentation and Control engineers complain about the possibilities to obtain good training in this field. Reasonable argumentation, as know-how about well-functioning should proceed that of malfunctioning and the prediction thereof for preventive maintenance.

The experts opinion is, that this complaint is correct, the available educational services seem to concentrate on equipment as such and only up to the level of technician.

The actual need is for know-how of application, appraisal, engineering, installation, commissioning and instrumentation and control system engineering, especially in the process industries.

Re (2), as for the instrumentation as sensor-system in industrial processes to assist not only operators but also maintenance, the following explanation could be useful:

In modern industrial instrumentation a base-line of equipment, consisting of sensors and transmitters, act as "feelers" on the process, monitoring temperatures, pressures, flows, levels, and all kinds of available values.

Such primary element provide the necessary information for the steady state control as an assistance for the operators. Other such elements provide alarms in case of abnormal conditions. Both types of instrumentation also serves as a part of the necessary information for maintenance.

A next higher level of interpretation of the sensed values is the calculation of efficiency of process and process parts. The outcomes of these calculations then can be used to:

- a) Optimize production
- b) Monitor condition

It is in this condition monitoring that the linkage, between (Preventive) Maintenance and Instrumentation is clear.

No maintenance on heat exchangers, pumps, etc. can be predictable without such condition monitoring.

Moving (rotating) equipment can also be monitored with "Look, Feel, and Listen" equipment such as vibration measurements, but in general only combinations of process condition monitoring and (rotating) equipment monitoring will be adequate for good preventive or condition based maintenance.

As in many other cases, in the Philippine process industries the first priority in instrumentation is for operations with condition monitoring for maintenance as a take along feature, as long as the costs are not too high. Knowledge about the possibilities of cost effective applications of this condition monitored maintenance is not widespread.

The common use of process alarms to indicate abnormal conditions, often leading to necessary intervening of the maintenance service, is of course habitual, but is surely not to be classified as preventive maintenance.

B. The National Engineering Center

The National Engineering Center is attached to the University of the Philippines and located at its campus next to the Engineering Department.

In its conception the National Engineering Center is an excellent institution as to provide the Philippine industry with know-how and assistance for improvements, modernization, innovation and other means to improve efficiency and product quality.

The linkage with the University of the Philippines could lead to a tendency to work on a more scientific than result oriented basis, however, the expert has the impression, that the management of the NEC and its Executive Director, Dr. Francisco L. Viray are aware of this and direct in the right sense.

The NEC implements a number of projects of the same kind as that of the Preventive Maintenance Project PHI/87/008, although these other projects are oriented to a more specific purpose.

The NEC regularly conducts seminars, courses, and workshops on different subjects, often in cooperation with other institutions, thus bringing specialist of different industries together, a basic good approach to creating know-how associations in the local industry.

The general atmosphere in the NEC is that of an active and especially enthusiastic and devoted group of young engineers with good basic education. Often such engineers for the cause of their projects work evenings, weekends and sleep overnight at the center to achieve their goals on schedule.

It is the experts opinion that the NEC is an institution, that is doing utmost to fulfill the expectations under and excellent management.

Some external influences do still have negative effect and need attention:

1. The possibilities for communications to the outside world are severely restricted: no fax, no telex and only a few telephone lines.
If the NEC is to serve as a source of information for the Philippine industry, it should at least be accessible.

2. The salaries of the employees are on government scales basis. These are as in many other countries not the highest.
Experienced engineers can earn 200 - 300% more in industries, this being a potential danger for know-how drainage out of the NEC.

C. The PM (Preventive Maintenance) Project

This UNDP sponsored project is manned by a dozen devoted young engineers. The management is done by the NEC Executive Director, Dr. Francisco L. Viray, and Dr. Edwin Quiros as Assistant Project Director.

The project tries to cover a wide range of aspects of the preventive maintenance, varying from Management of Maintenance to salvaging and reconditioning of spare parts.

The engineers are specializing in certain aspects at the same time as to develop into experts with basic knowledge of the whole field of preventive maintenance.

As not to rely on single know-how sourcing specialized fields are backed up in second engineers. This leads to certain restraints, as the available manpower is limited. As a consequence also strange combinations of specialization have come up such as instrumentation and maintenance management and condition monitoring + reconditioning. This however does not have any negative influence on the enthusiasm of the engineering manpower.

The engineering team is mostly active in assisting industry using the available special apparatus for equipment monitoring. The equipment monitoring of rotating equipment therefore seems to be the most developed field of knowhow.

Process condition monitoring is done on single items as combustion using fuel gas analysis.

The project has not had a very successful start. Change of Management in an early stage, changes of manpower during the whole period and different approaches as for development of the project in management and technical adviser have not added positively to this development. The expert backs up the point of view of the management, that first functional

knowhow has to be absorbed before attempts are made to carry out actual plant consultancy and technical services work.

As to the status of the project, the actual situation is that the influx of knowhow from Chief Technical Adviser and foreign (UNIDO) experts is coming to its end.

If compared to development of such technical expertise in developed countries this is not a favorable situation. In the experts experience such development of "raw" young engineers takes two years phases. The first two years, one experienced engineer works together with 2 - 4 assistants thus guiding them through all the tricks of the trade. After about two years such an assistant has developed into a cost-efficient engineer and can start to run projects as the project engineer with backing up from the experienced engineer. This configuration thereafter another 2 - 3 years fades away as the younger person will become capable of fully independent activities.

The NEC engineers have not had such guidance, not in quality nor in quantity. They have been eager to absorb the maximum possible information from passing by experts, but this does not compensate for a well organised tutoring and guidance as described above.

Beyond that, the possibilities for further development in industrial environment as self made experts are not as good as in developed countries.

It is the experts opinion that it would be a pity to leave the situation as it is on hoping that further development will be possible without further assistance in the guidance of the available good engineering manpower.

III. CONCLUSIONS AND RECOMMENDATIONS

1. The NEC is an excellent breeding place for result oriented know how for Philippine Industry - Provisions should be made for the better communications as telex, telephone lines and fax, and stopping of futurous know how drainage.
2. The PM project is a well manned project but has had a certain amount of starting problems. The project should have an extension in support with especially a project manager with extensive industrial experience to guide the available good manpower into able independent maintenance experts.
3. Instrumentation and Control should not be considered as a part of (Preventive) Maintenance, but as a neighboring field of activities, that goes hand in hand with maintenance.
It is the experts opinion, that technical support for the development of modern Instrumentation and Control for Philippine Industry is needed as much as, if not even more than for Preventive Maintenance.
The expert therefore has added to this report a tentative proposal for a project "Instrumentation and Control for Philippine Industry" for evaluation and recommends a feasibility study of such a project.

**PROPOSED ACTIVITIES FOR THE INSTRUMENTATION AND CONTROL
EXPERT**

NAME : Jan Lukas Peters

TITLE : Expert in Industrial Instrumentation and Control

1. Develop a manual on instrumentation and control for the PM Project which will serve as guidelines for the project engineers in evaluating, improving and effectively implementing instrumentation and control in Philippine industries.

The manual includes the following:

- 1.1 Selection and operation of process and object instrumentation and control systems
 - 1.2 Control system design and installation guidelines
 - 1.3 Procedures in servicing and calibrating instruments and controllers
 - 1.4 Preventive Maintenance in instrumentation and control
 - 1.5 Organizing instrumentation department in the industrial plants
 - 1.6 Training of personnel for instrumentation and control
 - 1.7 Guidelines and strategies in encouraging and implementing instrumentation and control in the Philippine industries
2. Develop a training program in industrial instrumentation and control for the following personnel and conduct training for project staff and/or selected participants from the industry.
 - 2.1 I & C Technicians
 - 2.2 I & C Department Supervisors and Managers
 - 2.3 I & C System Designers
3. Carry out actual plant consultancy/technical service work, at the same time providing on-the-job training of project staff.
 - 3.1 The expert is expected to assist industries on improvements and problems related to instrumentation and control and prepare reports on the findings with the assistance of the PM engineers.
 - 3.2 Project engineers will accompany the expert during plant visits in order to be trained effectively, and they are expected to absorb the technology from the expert by actually doing the technical service works with his guidance.

4. Serve as resource person on instrumentation and control seminar to be conducted at the National Engineering Center on September 10-15, 1990. *
5. Submit a list of technical literature, information materials, tools and instruments on industrial instrumentation and control, indicating priority of usefulness, sources and approximate cost.
6. Conduct lectures on instrumentation and control to PM engineers.

Specific topics:

- Fundamentals of instrumentation and control
 - Basic industrial process measurements & control
 - Preventive Maintenance in instrumentation and control
 - Calibration and safety in instrumentation and control
 - Selection and operation of process control system
 - System design techniques
 - Automatic control technology
 - Distributed control systems
 - Programmable logic controllers
 - Microprocessor control
 - Interconnections of various brands
7. Present state-of-the-art practices and advances in instrumentation and control.
 8. Present case studies on instrumentation and control problems based on actual experience.
 9. Other Activities.
 - 9.1 contribute articles and papers for the PM Project's safety and maintenance digest and other NEC publications.
 - 9.2 prepare list of international agencies and firms conducting training on instrumentation and control.
 - 9.3 prepare a recommendation report on how can the project meet the vital needs of the industries in the Philippines in so far as instrumentation and control is concerned.
 - 9.4 perform other tasks which are deemed necessary for the success of the PM project.

TENTATIVE SCHEDULE

August 20-24

1. Meeting with Project Director and staff
2. Orientation
3. Finalization of program
4. Familiarization with NEC equipment and facilities
5. Development of training program in industrial instrumentation and control
6. Presentation and discussion of training program to PH engineers
7. Faculty meeting (Instrumentation & Control seminar) *

August 27-31

- Plant Visit (see list)
 1. Plant survey
 2. Observation of potential improvements in instrumentation and control
 - o Discussion
 - o Strategies
 - o Recommendation
 3. Preliminary report
- Lecture materials and course notes (Instrumentation and Control) *
- Lecture to PH engineers

September 3-7

- Plant Visits (For 2 industries. See list)
 1. Plant survey
 2. Observation of potential improvements in instrumentation and control
 - o Discussion
 - o Strategies
 - o Recommendation
 3. Preliminary report
- Lecture to PH engineers

September 10-14

1. Lecture in Instrumentation and Control for Industrial Applications *
2. Review - First draft of manuals
3. Lecture to PH engineers

September 17-21

- Plant Visits (For 2 industries. See list)
 1. Plant survey
 2. Observation of potential improvements in instrumentation and control
 - o Discussion
 - o Strategies
 - o Recommendation
 3. Preliminary report
- Lecture to PM engineers

September 24-28

- Plant Visits (For 2 industries. See list)
- Lecture to PM engineers

October 1-5

- Plant Visit (see list)
 1. Plant survey
 2. Observation of potential improvements in instrumentation and control
 - o Discussion
 - o Strategies
 - o Recommendation
 3. Preliminary report
- Review of recommended list of training materials, technical literature, tools and instruments
- Lecture to PM engineers

October 8-12

1. Review of outputs
2. Presentation of recommended list of materials, references and other sources of information
3. Finalization of manuals

October 15-19

1. Completion of all required outputs
2. Final report

NOTE : * To be finalized

PROSPECTED INDUSTRIAL COMPANIES TO BE VISITED

1. Calaca Coal Thermal Plant
2. LRTA
3. Solid Cement Corporation
4. Polyphosphates, Inc.
5. Resins, Inc.
6. Colgate-Palmolive Phils., Inc.
7. Magnolia Dairy Products Plant
8. Reynolds Philippines Inc.
9. Lucky Textile
10. JP Coats Manila Bay Hosiery

PLANT VISIT REPORT

26 Oct. 1990

1. Name and Address of Company Visited:
Reynolds Philippines Corporation
2. Visiting Party:
Together with NEC engineer Federico Soriano
3. Name and Position of Personnel Visited:

4. Observations made:

This aluminum plates and profiles produces imports raw aluminum ingot and remelts used aluminum.

Processing is solely mechanical, all processing starts with preheating of the materials and in some case also heating (altering) after mechanical processing has to be done.

Instrumentation hence is mostly temperature controls on melting ovens and preheating furnaces. Most controls are done electronic with medium aged equipment of good origin. Usual problems with spare parts supplies.

Instrumentation staff is good. Documentation is readily available and well known, good interest in developments, good attitude towards innovation for the sake of quality improvement.

Hard-measurements for plate thickness measuring are on a one-on-one bases replaced by radiation - based continuous thickness measurements.

Control of the available speed variable roller press is to be replaced by solid state equipment for speed control and sequence control.

In general the condition of I & C in this plant can be considered as one of the better ones in the Philippines.

PLANT VISIT REPORT

25 Oct. 1990

1. Name and Address of Company Visited:
Manila Water Supply System (MWSS)
Balara, Diliman
Quezon City, Metro Manila
2. Visiting Party;
Together with NEC Engineer Federico Soriano
3. Name and Position of Personnel Visited:
4. Observations made:
MWSS has two large water purification plants with clariflocculation and rapid sand bed filters, all including raw water and product transport by way of gravity. A third plant is under construction.

In flow and out flow measurements were out of order because they were struck by lightning, which burned the power supply units.

Filter control was by way of master level control and multiple slave filter flow controls. As the units were operating above the original planned maximum load, the flow measurements were having a slight partial vacuum on the minus input, causing the instrument service people to think, that thus the measurements were malfunctioning.

In that same measurement faulty engineering (not enough straight piping around the venturi) might however cause errors.

Instrumentation equipment itself was in reasonable condition, complaints as usual in the Philippines were about availability and delivery times of spare parts.

PLANT VISIT REPORT

22 Sept. 1990

1. Name and Address of Company Visited:
Naciona Power Corporation
Calaca, Batangas
2. Visiting Party:
Together with NEC-PM Engineers Renato B. Golecruz,
Evangeline O. de Guzman, Federico P. Soriano, and UNIDO
Expert Michael Neale.
3. Name and Position of Personnel Visited:
Mr. Henry V. Alcalde
Instrumentation and Control Engineer

4. Observations made:
The coal fired power plant was commissioned in 1984
with computer based monitoring and redundant monitors,
but with independent split controller control loops and
still some conventional back up in monitoring and alarm
system: Fully and extensive automated burner operation.

Special problems due to the firing of a low grade, much
polluted gravel type coal from a nearby surface-coal
field.

Too much boiler sooting, sooth blowing is inadequate
to blow off such sooth.

Problems are in clogging air flow and furnace pressure
measurement taps, strange errors in coal-flow
measurement arises.

Meeting with chief instrument engineer initiated discussions
around these problems Primare Airflow balancing and
automatic sooth-blow initiation.

Recommendations:

- a) Replace intermittent tap cleaning by continuous airflow
tap cleaning for air flow and furnace pressure taps.
- b) Clukc bach with coal-flow balance type measurement
supplier about systematic error in measurement, as
dynamic pressure of coal falling on the balance system
might cause the error.

PLANT VISIT REPORT

19 Sept. 1990

1. Name and Address of Company Visited:
Bataan Refinery
Limay, Bataan
2. Visiting Party:
Together with NEC-PM Engineers Ramon S. Publico, Moses B. Mabute Jr., Federico P. Soriano and UNIDO Expert Vasile Berinde.
3. Name and Position of Personnel Visited:
Mr. Edgar T. Jocson
Refinery Manager
4. Observations made:
Interesting visit as this refinery is, as far as can be judged by an Instrumentation and Control expert, on a level comparable to that of developed countries.

Operational Engineering was conducted in good cooperation between Process operations, Maintenance and Innovating Engineering Departments.

Plant is innovated part by part, half of the plants instrumentation was already revamped by installing Yokogawa distributed, microprocessor based control systems with coffee resistant keyboard-call command centers and 200m in/ 200m out monitor presentation of process variables. Negotiation for second half were in final stage.

Problems/Needs is only in education of instrumentation engineers, at site construction for operators with simulators, but for I. & C. Engineers, lack of basic education in process dynamics, sensor technology and such, were their main concerned.

PLANT VISIT REPORT

18 Sept. 1990

1. Name and Address of Company Visited:
Resins, Inc.
E. Rodriguez Jr. Avenue
Bagong Ilog, Pasig
Metro Manila
2. Visiting Party:
Mr. Jan L. Peters, Federico P. Soriano
3. Name and Position of Personnel Visited:
Mr. Remy R. Lastrollo, Plant Manager and former
President of the Philippine Association of Instrument
and Control Engineers.
4. Observations made:
Plant Instrumentation, as to be expected under such
manage-ment conditions was good although not at the
most modern equipment and level Instrument workshop as
it should be

Maintenance problems as usual in the Philippines, is in
spare parts supplies due to long distance to suppliers,
older types of equipment and financial restraints.

Main topic of discussion: needs in the field of
instrumen-tation and control in process industry.

Outcome - Lack of money to invest in innovation of
plants instrumentation and lack of possibilites in the
Philippines for training Pr I-engineers.

Specific estimation from Mr. Lastrello: 400 hours of
such training for chief Pr I-engineer college or
university level on basic sensing techniques, applied
control engineering and control system engineering for
process industries.

PLANT VISIT REPORT

14 Sept. 1990

1. Name and Address of Company Visited:
2nd Visit to Solid Cement - Antipolo
2. Visiting Party:
Together with NEC-PM Engineers Ramon S. Publico, Edward R. Bondoc, Renato B. Golecruz, Federico P. Soriano, and UNIDO Expert Vasile Berinde.
3. Name and Position of Personnel Visited:
Mr. Pat Abarry
Chief Instrumentation Engineer
4. Observations made:
Main objective of visit was discussions with Chief Instrumentation Engineer about developments in instrumentation and control in a new production unit to be installed elsewhere in the country.

Some general control problems were discussed as humidity control of process input flow and transfer of temperature measurement from rolling kiln.

Recommendation were given for:

- 1) Configuration of master slave control of humidity for process input flow with custom built sensing of humidity by way of conductivity.
- 2) Improving temperature measurement at mid-kiln by installing 2-wire TT between thermocouples and rolling take-off.
- 3) Improving life span of panel instruments by using panels with vibration-damping.

Agreed upon was a further meeting later in October 1990 for a well prepared discussion about complete Pr I's for new production unit.

PLANT VISIT REPORT

4 Sept. 1990

1. Name and Address of Company Visited:
PPI (Phil. Polyphosphates Inc.)
Elisco Road, Ibayo, Tipas
Taguig, Metro Manila
2. Visiting Party:
Together with NEC-PM Engineers Edward R. Bondoc,
Federico P. Soriano, Moses B. Mabute
3. Name and Position of Personnel Visited:
4. Observations made:
Chemical plant transferred from Mexico to Philippines
and reinstalled with all original equipment.

Control equipment of older type, but reliable origin.

Documentation equipment incomplete or missing.

Attitude of Plant management and personnel towards
technical problems straight positive.

Maintenance problems on spare parts, funding of
necessary innovations and especially for
instrumentation and control, possibilities for hands-on
educational services.

Specific problems, discussed with Maintenance Manager
and Instrumentation Engineer: A furnace pressure
measurement, that refused to function and all oxygen
measurement on the same furnace.

Recommendations:

- a) Purge the tapping point of the furnace pressure
measurement with a low volume air flow and home build a
simple U-type manometer with inclined leg for more
accurate reading.
- b) Also purge tap for transmitter and recommission furnace
pressure control. evaporation.
- c) Fing or recommission gas cooling/cleaning system if
oxygen meter still reconditionable. Consider
application and installment of :
 - arconium oxide cell based
 - oxygen meter for direct installment in gas channel

PLANT VISIT REPORT

August 30, 1990

1. Name & Address of Company Visited:
Solid Cement Corporation
Antipolo, Rizal
2. Visiting Party:
Mr. Jan L. Peters, Edward Bondoc, Federico Soriano, and
Ms. Lilian Lasmarias.
3. Name & Position of Personnel Visited:
4. Observation Made

As a sideline on measurements at site vibration and process - units - temperatures, the instrumentation and control of the plant was visited and discussed with the Assistant of the Chief Instrumentation and the Manager of the Maintenance Department.

Instrumentation was basically and in version ranging from old to up to date, knowledge about essentials seemed to be adequate, attitude to maintenance and innovation was good.

Possibilities for good maintenance however were poor, no really good dust free workshop and organised space for spares and equipment.

Outlook for improvement of process availability and quality - improvement seems to be good, especially as the attitude of the engineers at site toward these is positive.

First recommendations:

- 1) Improve Instrumentation - repair and maintenance facilities at site.
- 2) Inform Solid Cement Engineers about developments in Instrumentation and Control by attending comprehensive courses with "hands-on" training.
- 3) Study possibilities of cost-effective innovation of existing instrumentation.
- 4) Reducing the number of suppliers to a smaller number (2 or 3), as to reduce the number of necessary spares and necessary "fast" knowhow of equipment.

WORKSHOP ON PREVENTIVE MAINTENANCE

By National Engineering Centre on August 29, 1990 offered under the Training Services Program of the UNDP/UNIDO supported Project.

After the ceremonial introduction, two papers were presented by local experts on Industrial Maintenance, handling mainly the internal relations between maintenance department and other sections of production handling organisations in process industries.

The following part of the workshop organised a list of possible topics for discussion in workshop groups, the list was quite long and ranged from social relations and appreciation of maintenance to modern advances in technical equipment.

In most workshop groups discussions centered around maintenance appreciation and its role in the possibilities to achieve optimal results.

Most results of the discussion were presented as case histories.

In the final discussions it became clear, that most maintenance managers are not yet used to present their needs for manpower and materials in terms of cost-effectiveness.

It was good, that some of the local experts were aware of this and stressed the need for a change of attitude toward this management-oriented thinking.

DRAFT PROJECT PROPOSAL

**ESTABLISHMENT OF A CENTER FOR
INDUSTRIAL INSTRUMENTATION AND CONTROL
IN THE PHILIPPINES**

A. Development Objective

The development objective of the project is enhanced efficiency and quality of products of Philippine Process Industry. This is to be achieved through institutionalization of Industrial Instrumentation and control, which would lead to better process monitoring, lower fractional dead times in production, and better product quality control.

B. Immediate Objective

1. To create a center of know how of Industrial Instrumentation and Control within the National Engineering Center.
2. To distribute this know how to the Philippine Industry by means of seminars on Control System Engineering for technicians, college and university educated control and control system engineers and managers in process industries.
3. To furnish consultancy and special services to industry from within a central laboratory for Industrial Instrumentation and Control, the last also serving for the seminars as under (2).

C. Considerations

Many Philippine process industry plants are of a considerable age and often not up to date. With adequate maintenance these plants can at best be kept up to the present state, but to compete on the international market upgrading of the availability of the plants and quality of the products is necessary. The first step to such upgrading is an improvement of the instrumentation to enable better condition

monitoring and efficiency calculations. Next to that partial innovations and advanced control systems can implement the desired improvement of efficiency and qualities.

To realize this it is necessary to upgrade the knowhow of instrumentation and control in the Philippine industries.

In the Philippines only a "First study in Measurement and Automatic Control" in the Rizal Technological Colleges is institutionalized in this field. This study is on technician level. On college and University level such educational services are not available. Knowhow of instrumentation and control system equipment has to be acquired mainly by attending suppliers courses in other countries, educational services on control system engineering without commercial side effects are very difficult to obtain for Philippine engineers of higher level. This last is a common complaint often ventilated by these engineers themselves.

The general desire is to have access to a good and supplier independent source of knowhow with the possibility of a result oriented course with "hands-on" training included.

D. Outputs

To achieve the objectives of the project, the following outputs should be produced:

- a) Establish a Central Laboratory for Industrial Instrumentation and Control within the National Engineering Center to serve as:
 - a1) Equipment and systems application educational service for training of technicians, control system engineers and managers;
 - a2) Calibration and testing service center for standard and special equipment adapted to the needs of Philippine Industry.
 - a3) Development Center for equipment needed by specific Philippine Industries in cases where such equipment is not elsewhere available because of the special Philippine Industrial application or conditions.

- b) A technical library on Industrial Instrumentation and Control, with operating linkages established with other libraries and technical information centers.
- c) A core of specialists trained to provide training, calibration, testing and development services and consultancy to the Philippine Process Industries in the field of Industrial Instrumentation and Control.

E. Activities

The following should be undertaken to achieve the expected output of the project:

1. Establishment of the Central Laboratory for Industrial Instrumentation and Control.
 - a) Engineering of the necessary systems for educational services, calibration and testing services and development services of the laboratory.
 - b) Specification of the necessary equipment and acquisition of that equipment for the laboratory.
 - c) Setting up the laboratory and building the systems as engineered in a).
 - d) Training of technicians to operate the laboratory.
2. Training of the NEC Technical Staff of the Center for Industrial Instrumentation and Control.
 - a) Training in the central laboratory as to master all aspects of the local possibilities.
 - b) Training in industrial plant abroad to complement the knowhow of possibilities for applications.
 - c) Training in training centers abroad to allow wider insight in possibilities for improvement.

3. Preparing and starting the educational services of the Center.
 - a) Conceiving result oriented training programs for theoretical and "hands-on" training for:
 - a1) Technicians
 - a2) College and Universities educated Engineers
 - a3) Industrial Managers
 - b) Production of manuals and other educational aids for use in training programmes.
 - c) Training of NEC Technical Staff to prepare them for conducting the training programs as proposed under a).
4. Training of NEC Technical Staff for calibration, testing, and development + services.
 - a) Production of manuals for the possible services of the center in this field.'
 - b) Training of the Technical Staff in this possibilities.
 - c) Training of the Technical Staff in equivalent laboratories abroad to increase their knowhow about other uses of the available equipment.
5. Training of NEC Technical Staff for consultancy services:
 - a) Establishment of working arrangements with certain process industries.
 - b) Set up pilot projects and introduce established working methods for improvement of instrumentation and control systems.
 - c) Extend working arrangements with other process industries.

Inputs:

1. Accomodations, office equipment, etc.
2. Laboratory equipment
3. Technical and other staff of Center
4. Technical Advisers and Experts (Foreign)
5. National Professionals
6. Fellowships for Technical Staff
7. Miscellaneous

Indicative List of Costs:

1. 1000 m² floorspace
Office equipment
2. Laboratory Equipment \$350,000.
3. Staff 12 Technical + 8 Aux. (4 yrs.)
4. Technical Adviser + Expert 48 m/m \$400,000.
5. National Professionals
6. Fellowships (12 x 3) m/m
7. Miscellaneous