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Agenda item 9

THE DEVELOPMENT OF PERSONNEL TRAINING
FOR THE START-UP OF PROPULSORA SIDERURGICA ✓

by

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SUMMARY

The recent training experience performed by PROPULSORA SIDERURGICA in Argentina shows the possibility to start a large iron and steel plant beginning with inexperienced personnel, selected with modern evaluation tests and adequately trained.

This Company, at present engaging 1,400 employees, in the first three years of operation processed one million tons of hot coils, thus proving the excellent result of its training.

The key personnel training, both at technical managing level and at worker level, was carried out abroad in a similar plant for a sufficient period of time. Other personnel training was carried out in Argentina through specialized courses and in co-operation with official bodies.

Finally, reference is made to the continuation and expansion of this program with the participation and integration of educational and research institutes and with past or future initiatives inside the plant.

The efficient personnel training of a new iron and steel plant is essential for the success of the enterprise. Propulsora Siderurgica in Argentina was a very positive experience of personnel training as it was scientifically studied and carried out.

Propulsora Siderurgica plant, completed in 1969, includes a harbour, a strip cold rolling complex and support facilities for an initial capacity of 350,000 net tons annually.

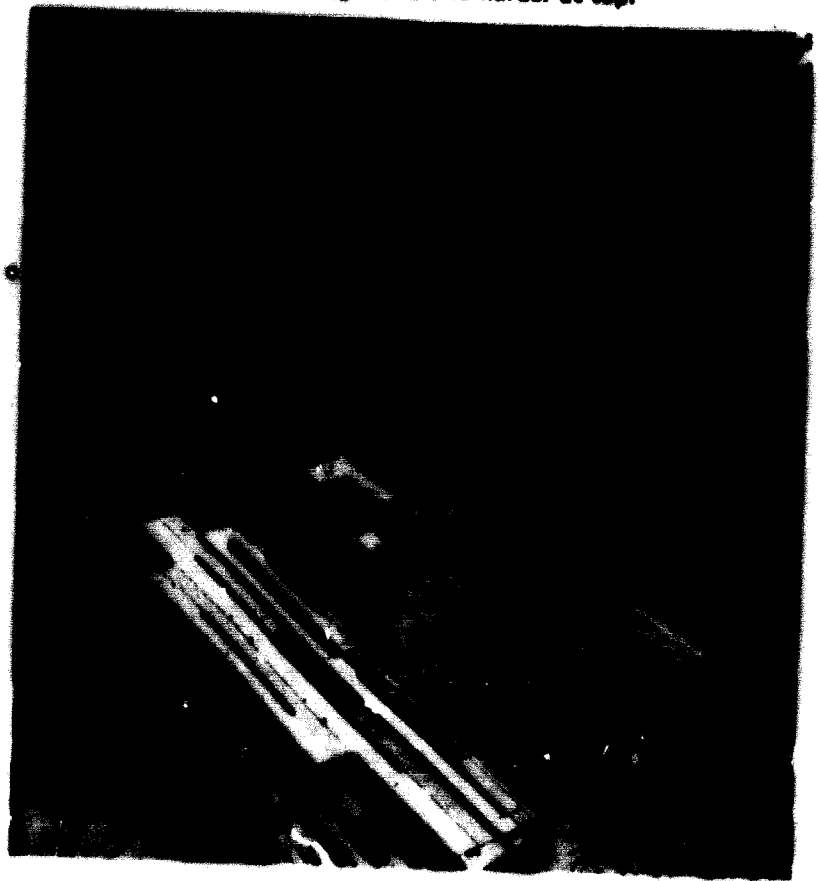
The plant (Figure 1) will eventually be fully integrated. The completed facilities will include a sinter plant, raw materials storage and handling facilities, coke ovens, two blast furnaces, 3-vessel BOF shop, slabbing mill (or slab caster), hot strip mill and the cold rolling facilities.

- 1 -

Ensenada, where the plant is located, is 60 km away from Buenos Aires. This location enables the plant to serve easily the bulk of the Argentine steel market (70 percent of which is within the Buenos Aires area), and permits receiving up to 30,000 dwt ships, the maximum tonnage acceptable by the channels of the La Plata River (Figure 2).

Nearby is La Plata, a city with a population of 400,000, well equipped with the basic facilities: electric power, roads and railways, as well as large harbour force.

Figure 1 — Aerial view of initial construction stage shows cold rolling facilities in foreground and harbor at top.



Techint Engineering Company was entrusted with the engineering and construction of Propulsora Siderurgica on the base of a turn-key contract.

The plant was engineered and built on a very tight schedule. The first purchase orders were issued at the end of September 1967 and erection of main buildings began in December 1968.

Operation of the various production units began in November and December 1969. Simultaneously the organization facilities were created and the necessary personnel were trained.

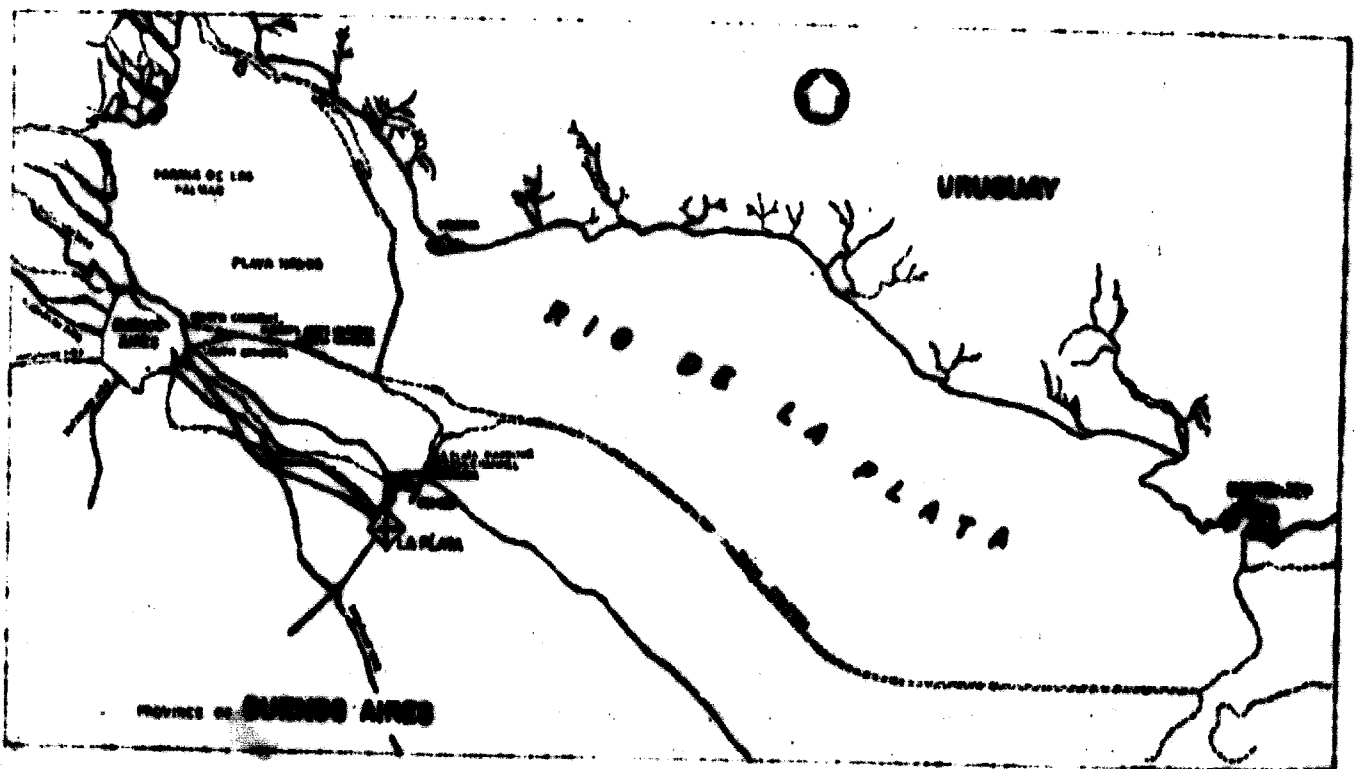


Figure 1 -- The plant is situated on the La Plata harbor access channel, about 40 miles southeast of Buenos Aires.

BASIC OBJECTIVES

Techint Management conceived the creation of Propulsora Siderurgica with the main aim of producing at the lowest costs consistent with the national economic requirements but at an internationally acceptable level of quality and price, allowing the company to reach economical and financing equilibrium.

Techint Management was well aware that its objectives had to be reached through its personnel, techniques, and organization and therefore it clearly determined the qualifications of those who would become the managers and staff of Propulsora Siderurgica.

Two alternatives were possible:

- To appoint very experienced men for the key places as well as for the intermediate levels and under the guide of Propulsora top management to establish a model that would be formed by the individual contributions of the staff members;
- To engage young men with little experience but with excellent capacities and prepare a model that, suitably fitted, would be the base of the plant construction.

As executive Vice President and General Manager, two persons were appointed with wide managerial experience. Then the second alternative was adopted, stipulating at the same time a contract of technical assistance with Italsider, which is an iron and steel company known all over the world for its efficiency and advanced know-how.

This solution allowed the use only of Argentinian personnel without poaching from the sole Argentinian company operating similar plants.

Due to the decision taken, it was necessary to define the training policy within the company to develop the potential of the personnel in order to compensate for their lack of experience of carrying out in an integrated and permanent training program.

TRAINING PROGRAMS
CARRIED OUT FOR PLANT START-UP

The task of organizing the company and its staff so as to count on an efficient structure from the beginning of the activities and start-up was faced at the same time as Propulsora's construction.

For that reason, all staff levels were covered by personnel selected and trained for the start-up both in the country and abroad.

The training programs abroad concerned the management personnel, employees of the production and technical services, commercial and administrative personnel, including a certain number of workers and foremen, whilst the local training programs concerned maintenance workers, supervisors, operatives, etc.

PROGRAM OF TRAINING ABROAD

As previously said, Propulsora Siderurgica appointed a consultant for the operation problems, that is Italsider, which is an iron and steel company with a broad specific know-how and wide experience in training unskilled people in its factory in Taranto. Therefore Italsider's assistance included not only operating know-how but also the training of personnel selected for key positions.

Italsider's assistance was concerned in the first stage with the training of personnel at the plant of Novi Ligure in Italy. This program included different responsibility levels (from head of department to specialized workers) and work sections (technical, commercial, and administrative).

Training of the Production and Technical Services Personnel

Personnel participating in the training abroad belonged mostly to the production sections in charge of the operation of machinery and technical services such as maintenance, quality control, production planning, projects, standardization and technical inventory, and time and methods study.

This personnel totalled 59, with 16 engineers, 11 technicians, 32 workers, who remained in Italy for periods ranging from 30 to 48 weeks: a total of 72,000 man-hours of training.

The training objective at the production workers' level was ability to handle the plant units in accordance with the current operation procedures.

At the maintenance workers' level, people were trained to carry out the operations necessary for the maintenance and repair of machinery for which high diagnostic capability, organizational ability, and power of decision must be achieved.

Chiefs and supervisors were trained to gain knowledge of the problems related to their specific work areas. Their ability to lead and train their subordinates and development of a team-work approach were also objectives of their training.

The training procedures generally envisaged one short period of 8 days for adjustment and one long period of approximately 30 weeks for training. The "settling in" to the company took place during the first period. Italian language courses and a set of psychotechnic tests were carried out as well, in order to match the individual with the task that best suited his abilities.

At shift foremen and workers' level the essential training period included three stages:

- Test period on the different equipment assigned to the trainee
- Training period on the job (23 to 36 weeks), working with a team
- Individual and team evaluation with the trainees in charge of the whole operation of machinery.

During the whole training period the personnel attended courses on Safety and Quality. Those appointed as shift foremen also attended courses on Supervision and Standard Costing.

During the training final stage the personnel appointed as Shift Foremen participated, together with the heads of sections, in the formulation of operation procedures for each section, re-elaborating and adjusting the procedures at Novi Ligure.

The basic criterion for training at the level of departmental head and supervisors of sections or departments was to put the trainees in contact with Italsider's personnel working at the appropriate level.

The trainees had to survey on the spot the different problems of each section and propose solutions for the technical and/or organization aspects.

The "esprit de corps" was developed through the participation in weekly or monthly meetings held by each hierarchical level of the plant.

The co-operation between the operating personnel (workers and shift foremen) and the trainees was achieved through the joint elaboration of operation procedures and by means of the trainee's participation in their group and individual evaluation.

As complementary training activities, courses or supervision, costing, and quality were held, thus covering the three basic fields: personnel, administration, and technical subjects.

Monthly reports were issued so as to evaluate on the one hand the training as such and on the other hand the progress of the trainees.

Two types of reports were drawn, one on activities, made by each trainee, with the object of assessing his progress and allowing Propulsora's management to evaluate the training itself, the other one was essentially a monthly evaluation of personnel. Its frequency assured a close follow-up of each trainee's progress by Italsider and Propulsora.

Training of Administrative and Commercial Personnel

The training of personnel in these areas concerned a group of six people, two of which concentrated on the study of the technical assistance to customers (within the business policy of Propulsora Siderurgica); another two persons were appointed to the investigation of the systems existing in Italsider and to the study of their implementation.

Eventually the follow-up and organization of the training process required the previous training of two persons.

Integration of Trained Personnel on their Return

A working program with three main objectives was planned, to be carried out on the return of trained personnel to allow their adjustment to the reality taking shape in Argentina during the plant erection and the assembly of the company.

The three main objectives were:

- To provide information on the environment in which the company was developing and would be integrated within a short term;
- To allow the chiefs and supervisors to get acquainted and imbibe the policies and general organization pattern and so becoming involved in their development;
- To provide the instruments for the managerial organization necessary for the projected labour situation in any of its three levels: work, personnel and administration.

By means of this program the supervision personnel were prepared to occupy their posts from start-up with a comprehensive view of the company and specific knowledge of their individual responsibilities.

TRAINING OF LOCAL PERSONNEL

Within the framework of the complex training plan developed for the training of the remaining personnel and the adjustment of those sent abroad, we can discuss:

- The maintenance workers' training program (electricians and mechanics) (specialized labour);
- Supervisor training;
- Orientation given to the training of workers in general.

Maintenance Workers' Training Program

The training of the maintenance basic team carried out with the external help of Italsider and that of CIFAP (Centri IRI Formazione Addestramento Professionale) and the domestic assistance of CONET (Consejo Nacional de Educación Técnica Argentina).

CIFAP is a body for the technical training of personnel, associated to IRI, the holding company of the Italian Government Industry. Due to its complexity the training of maintenance workers had priority over the training of production workers.

The program was structured as follows:

Technical personnel of 24-30 years age were engaged following the policy already mentioned, and as there was, in general, a lack of experience in the zone, previous experience was not required.

Subsequently training was performed, in conformance with the advanced techniques of professional training, in an integrated range of experiences. In the first stage the training was directed towards the specific field (such as mechanical or electrical) of the training assignment; in the second stage the training included instructions and experience in other fields not directly concerning the trainee. This policy resulted in a greater efficiency of the maintenance workers as it became evident later on, since they possessed a wider range of knowledge and interests.

F. P. A. (Accelerated Professional Training Method) of CONET was selected as the most adequate. It is a method similar to the one used by CIFAP and based on that of AFPA (Association for the Accelerated Professional Training of France). The method consists in the elaboration of a professional description of the jobs to be covered by trainees. The essential part of this monography is the selection of the specific "Operative Procedures" each worker must follow. Courses are then held for the active learning of certain tasks which imply knowledge of these operating procedures and their usage.

Simultaneously with the classroom training there was practice on each line during its assembly (5 hours in the classroom and 5 hours of practice on the line).

There was a total of 75 attendants, consisting of 25 electricians and 50 mechanics. The training took 32,000 man hours.

As CIFAP did not have instructors available for the courses, two CONET instructors were sent to Italsider to develop the program and the materials for the basic courses on mechanical and electrical maintenance. CIFAP sent, at the middle of the courses, two instructors for the specialized subjects to evaluate the courses.

The courses lasted six months, ending in November 1969. The final evaluation showed highly satisfactory results, as 75 attendants passed the exam taken on the line. These results

were the most important argument in favour of the methodology adopted (F. P. A.) and the development of permanent training courses in this and other specialties within the basic framework of necessary versatility.

Training of Supervisors

The training of supervisors, especially for the higher levels, was planned with a double indirect and direct training purpose.

For the indirect training purpose an efficient supervision team, highly skilled in its tasks, could be achieved making the trainees take part in the organization of the same. For that purpose also at the lower levels responsibility was assigned (decentralization). This assignment of responsibility was extended to the whole procedure (technical, administrative, and personnel aspects) as a well coordinated scheme.

In this way planning and control were concentrated and execution decentralized, which is one of the main points in the development of active supervision.

Furthermore, a group of 29 professionals, with no previous experience and high capacities, was engaged to design the company's systems (60 were initially planned). These, as a staff, drafted the systems, joining the lines as the systems were implemented. Thus the following was achieved:

- Facilitation of the implementation of the systems
- Operation of systems they themselves had designed
- Provision of an integral view of the company before assignation to one of its sections.

In order to facilitate the coordination of the professionals acting previously as staff with the line, they were held responsible for the approval of the design and direction of each system implementation. In this way they were cooperating in the creation of the system, thus avoiding resistance to change and achieving a thorough knowledge of the system.

For the direct training purpose a work seminar was programmed to make the personnel policy more uniform, with the participation of the company's high level supervisors. It was held during August and September 1969 with the attendance of 62 officials. Its agenda included:

- Management behaviour
- Location of Propulsora in the national and international framework
- Management policy
- Systems to be implemented.

Following the same lines mentioned above, the decentralization of organization resulted in a management policy according to objectives as a general supervision rule.

Training of Workers in General

The training of production workers (responsible for the operation of machinery) was carried out in a decentralized way under the responsibility of the general and immediate supervisor (shift foremen, heads of sections).

On December 29th, 1969, 600 people started Propulsora Siderrurgica's operation in its first stage of cold rolling. The training carried out helped to achieve what had hitherto been only a project.

PARTICIPATION AND INTEGRATION WITH THE
EDUCATIONAL AND RESEARCH INSTITUTES

The integration with the educational and research institutes was included within the framework of the above-mentioned policies for personnel training. This policy emphasized the company's medium and long-term objectives which were vital for these institutes.

Apart from its relation with CONET in the training of specialized labour, Propulsora Siderurgica could not abstain from the technical long-term training programs, which would result in important social contribution to the community. The possibility of a school inside the works was discarded and instead a new building for an industrial school in Ensenada was donated to CONET, and the expansion of another industrial school in the area was financed. In 1969 classes were already being held in the new classrooms.

In order to establish a real connection between academic study and company's requirements, a scholarship program for university and technical school students was established. This plan consisted basically of a learning period, work in the company with the object of assessing the graduates' level and at the same time allowing schools to equate their teaching to company's requirements. It was therefore preferred to grant scholarships to suitable students in their last years of high school so that they could receive their teaching during the holiday period and upon returning to their schools share the experience they had acquired.

During the first three years of operation of the plant (1969-1972), 140 scholarships with an average duration of 4 months were awarded.

Since 1970, metallurgic research programs have been carried out in conjunction with the National University of La Plata. These were based on the above mentioned commercial policy which led the company to improve its technical level so as to satisfy as much as possible customer requirements. Eight research works were carried out in total. The first of them, published as "Desarrollo 2 : Consideraciones generales sobre la chapa de hierro para estampado" aroused remarkable interest in other companies, customers, and research institutes.

Through the U. N. L. P. the research programs were extended to other research centers and universities of the country, and at present 20 professionals of different centers are taking part in them.

**TRAINING PROGRAMS TO BE
CARRIED OUT AFTER START-UP**

The development of training during the years after the start-up was, as foreseen, a permanent necessity.

Company Instructors Policy

In accordance with the experience acquired during the start-up period it, appeared necessary and convenient replacing the assistance of engaged instructors by that of the company's personnel, trained as instructors.

On the other hand, contrary to the common practice in this field (engaging instructors for the training section), workers of the different sections were trained as instructors, whilst continuing to work in their sections. Their technical knowledge and acquaintance with the plant needs helped them in carrying out the courses with a really adequate procedure. A continuous adjustment to the needs and training activities was achieved as a result of the instructors in their work except when they were leading courses.

CONET's F.P.A. methodology was adopted for the training of the instructors and during 1971 and 1972 16 instructors were trained. In this way all specialties justifying a teacher because of the number of people involved were covered.

As it can be noted from the following reports, the number of courses led by personnel not belonging to the company was significantly reduced from 1970 to 1972.

Organization of the Training

The second point to be underlined is the organization of the training which was mainly devoted to specialized maintenance labour. Training schedules were drawn on the base of the aforementioned polyvalent policy. Suitably organized with the promotion plan they constitute a real "Career Plan".

Thus, the following advantages were achieved: for the company the certainty that highly skilled labour would be available for highly specialized jobs, thus overcoming the initial lack of experience. The careers for electricians and mechanics (both ending with a qualification in electro-mechanics) were organized, as well as careers for welders, automation technicians, boiler experts, and machine tools operators (see Annex I).

The courses were compulsory as they were indispensable for the employee's promotion. Two years after start-up the first graduation of electromechanicians took place, with a highly satisfactory level. The courses were held after working hours and they lasted approximately three months each. The plan foresaw that three courses must be passed before a promotion.

The maximum number of courses to be taken was nine in some careers (there are 4 categories for workers) and 6 in others (3 categories).

These categories are indicated in letters A, B, and C. Letter A is the highest category and letter C the lowest. The electro-mechanicians category is not indicated in letters as they are above category A (see Annex I).

Except for specialized labour, where training is planned on the basis of the above-mentioned careers, training in the other sections of the company was planned continuing on two basic elements:

- Description of the tasks that each position involves
- Annual evaluation of personnel.

With these two basic approaches, training was planned through interviews with the supervisors to be held after the evaluation period. Training was also integrated with the process of engagement of personnel, so that new personnel could be adjusted to its section.

Within the staff position of the training section, the basic responsibility for the training of personnel lies on the line itself, where its own needs can be solved in a decentralized manner inasmuch as possible, but centrally coordinated by the aforementioned section.

Agenda of Activities carried out during the 1970/72 Period

As a statistical datum, we are showing in Annex II the total amount of training hours in the company courses for the first three years of the company's development. As a reference, we wish to point out that the number of employees ranged between 1000 (1970) and 1400 (1972).

Due to the aforementioned policy of counting on company's teachers, we can note the progressive decrease from 1970 to 1972 of engaged instructors. At present they are only required for very specialized cases.

It has to be noted that the company instructors were always employed within the supervisors training area. Company instructors (line personnel temporarily occupied in training activity) allowed the company to cover the majority of training courses without building a training structure with a lot of personnel.

ANALYSIS OF THE RESULTS

It is too early to evaluate the results of the training process objectively. We can however evaluate certain aspects or approaches to the training process which have proved highly satisfactory.

The task of company's instructors, especially in the field of specialized labour training, resulted in an adjustment to the training requirements. Furthermore, it left an open door for permanent training through the updating of instructors on returning to their work and taking note of new requirements.

In spite of the difficulties and requirements of many different kinds of equipment, the training of maintenance workers, as described, resulted in an organized and integrated training.

The shift workers of the plant start-up were, in general, inexperienced graduates with all the deficiencies of a purely theoretical technical training. After their work in the company they achieved a high technical and practical proficiency.

Training was supported by the evaluation of personnel. The relation of the training planning with the annual evaluation of personnel resulted, on the one hand, its adjustment to actual requirements and on the other concerning the line with the development of activities.

It was evident that the engagement policy described above was rather risky because it implied employing inexperienced personnel. Therefore, after the first three years, once the basic mechanism in the company structure had started working, it was necessary to improve certain aspects.

At the supervisor's training level the lack of initial experience can have greater weight; therefore it is necessary to satisfy the elemental technical training necessities, concentrating all efforts on the training of supervisors at all levels. For this purpose this year supervisors' and pre-supervisors' training courses will be implemented to allow for the adequate development of present supervisors and their successors.

Due to the natural rotation which takes place in every company after an initial start-up period, it is necessary to foresee the training of replacement personnel.

Within the policy of development of the individual within the company and due to the fact that after the start-up certain non-qualified levels become naturally "topped", it was chosen to train the substitutes for specialized workers starting from those levels, thus making it possible :

- To motivate the personnel who had little prospects due to lack of technical understanding;
- To create substitutes personnel who could join the maintenance section and continue there for the rest of their respective careers with the advantage of previous knowledge of the facets of the plant.

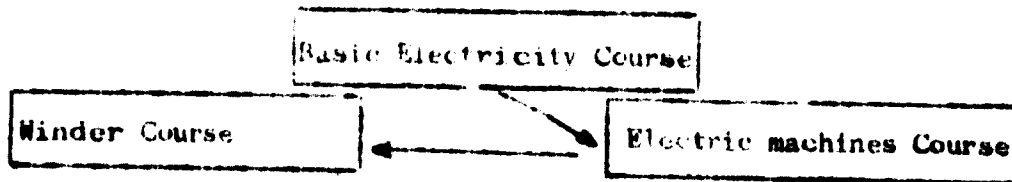
At the end of 1972 and therefore of the third operation year, Propulsora Siderurgica had processed 1,000,000 tons of sheet and coils, that is evident proof of the successful preparation of the whole company staff.

To date Propulsora Siderurgica is carrying out its planned production as it was foreseen and finding wide acceptance in the market. We believe this is the most important consideration and proof that the training program carried out has been adequate for the situation and the necessities of the company.

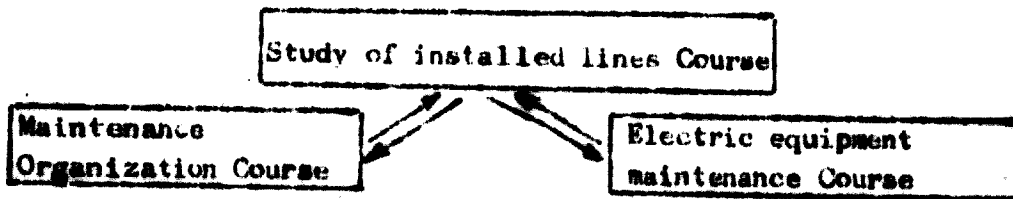
ACKNOWLEDGEMENT

The writers thank Propulsora Siderurgica Management and Techint Engineering Company Management who gave them permission for writing and issuing of this paper.

COURSES FOR INSPECTION AND MAINTENANCE ELECTRICIANS

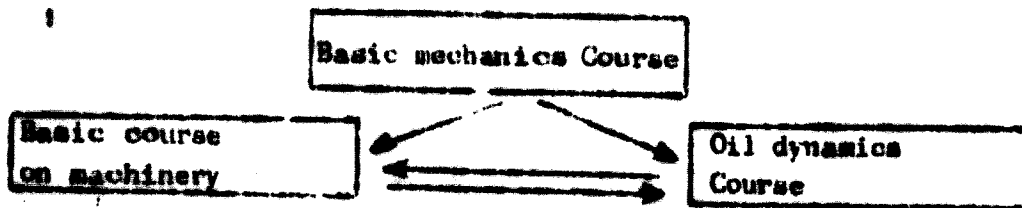


Courses to be taken by people belonging to Category "C" to be promoted to Category "B".

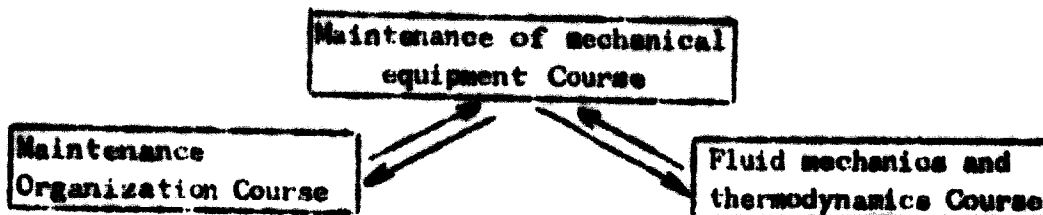


Courses to be taken by people belonging to Category "B" to be promoted to Category "A".

COURSES FOR INSPECTION AND MAINTENANCE MECHANICS



Courses to be taken by people belonging to Category "C" to be promoted to Category "B".



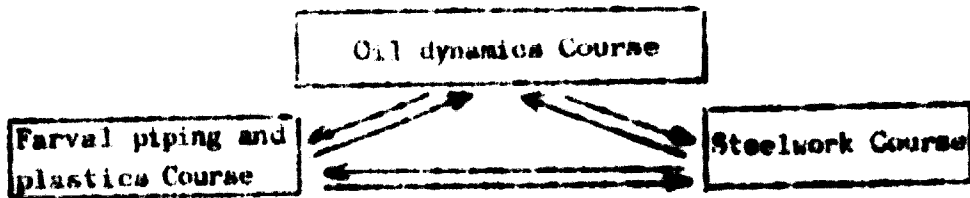
Courses to be taken by people belonging to Category "B" to be promoted to Category "A".

Arrows indicate the sequence of courses

COURSE FOR PIPE FITTER AND STEELWORK

Work on plates and pipes

Course to be taken by people belonging to Category "C" to be promoted to Category "B".



Course to be taken by people belonging to Category "B" to be promoted to Category "A".

COURSE FOR WELDER

Electric and
oxyacetylene
weld Course

Welding of nonferrous metals
Stainless steel - Cast iron
Course

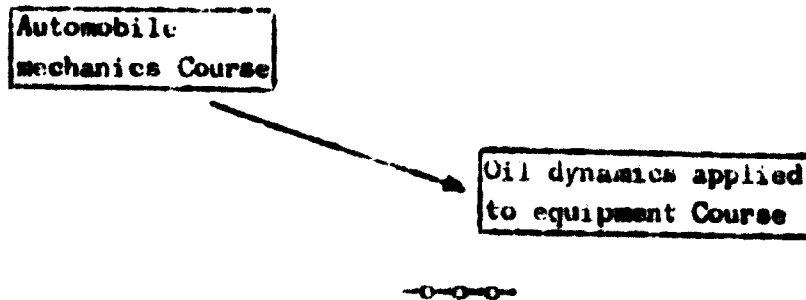
Course to be taken by people belonging to Category "C" to be promoted to Category "B".

Welding of high
pressure elements
and plastics Course

Metallurgy and Special Weld-
ing equipment Course

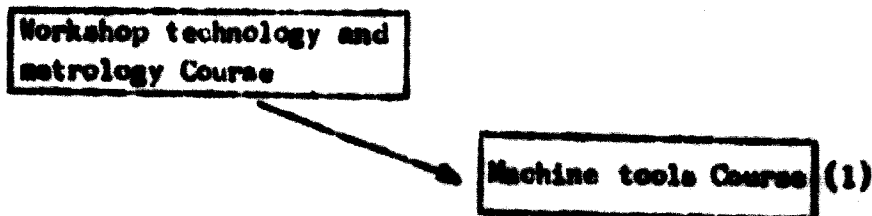
Course to be taken by people belonging to Category "B" to be promoted to Category "A".

COURSE FOR CONVEYORS REPAIR MECHANIC

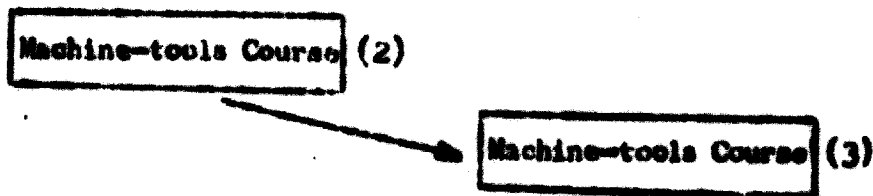


APPENDIX I

COURSE FOR MACHINE-TOOL OPERATORS



Courses to be taken by people belonging to Category "C" to be promoted to Category "B".



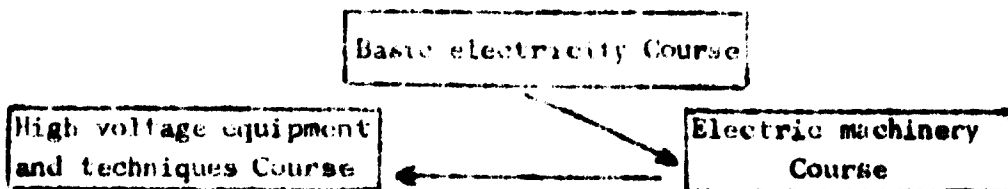
Courses to be taken by people belonging to Category "B" to be promoted to Category "A".

(1)(2)(3) Study of the following machine tools

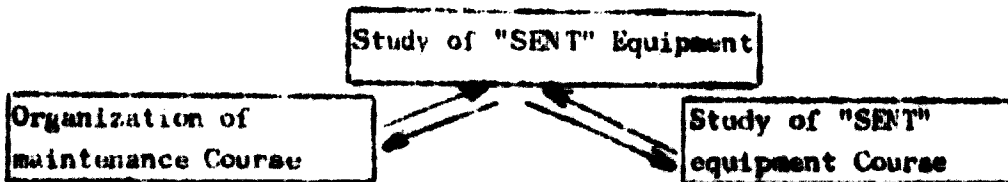
- Drilling machine
- Milling cutter
- Lathe
- Planer

The course on the machine in which the trainee has specialized initially shall be considered approved.

COURSE FOR MAINTENANCE AND INSPECTION ELECTRICIANS FOR PERSONNEL BELONGING TO THE ENERGY AND TRANSPORTATION SECTION ("SENT")



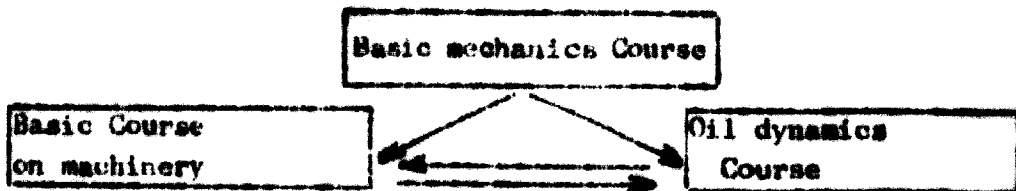
Courses to be taken by people belonging to Category "C" to be promoted to Category "B".



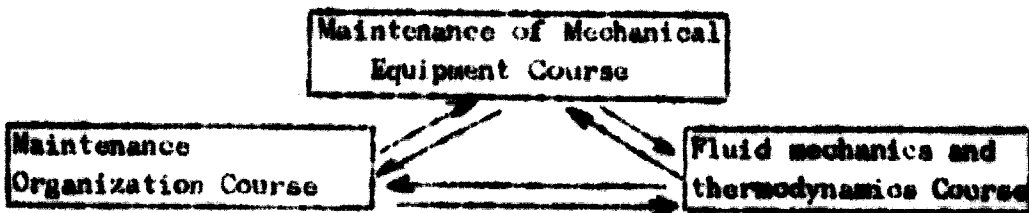
Courses to be taken by people belonging to Category "B" to be promoted to Category "A".



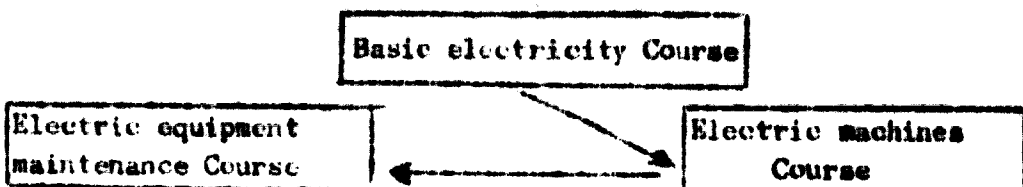
COURSE FOR MAINTENANCE AND INSPECTION MECHANICS FOR PERSONNEL BELONGING TO THE ASSIGNED MAINTENANCE SECTION ("SMAS")



Courses to be taken by people belonging to Category "C" to be promoted to Category "B".



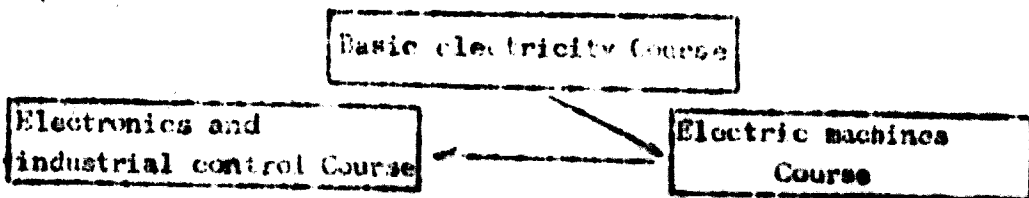
Courses to be taken by people belonging to Category "B" to be promoted to Category "A".



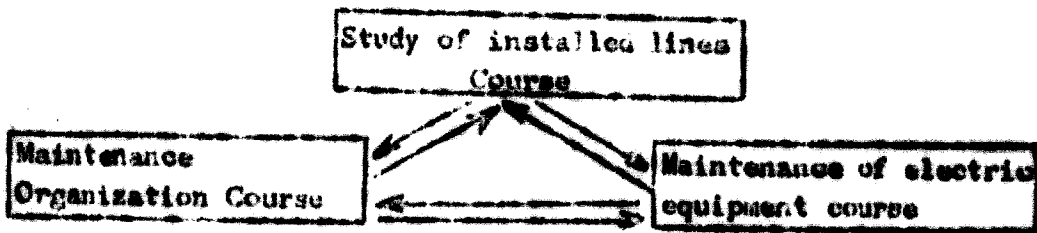
Courses to be taken by people belonging to Category "A" to be promoted.

APPENDIX I/O

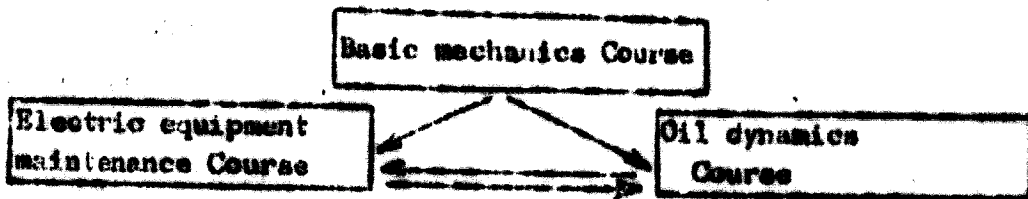
COURSE FOR "MAS" MAINTENANCE AND REPAIRMENT ELECTRICIANS



Courses to be taken by people belonging to Category "C" to be promoted to Category "B".



Courses to be taken by people belonging to Category "B" to be promoted to Category "A".



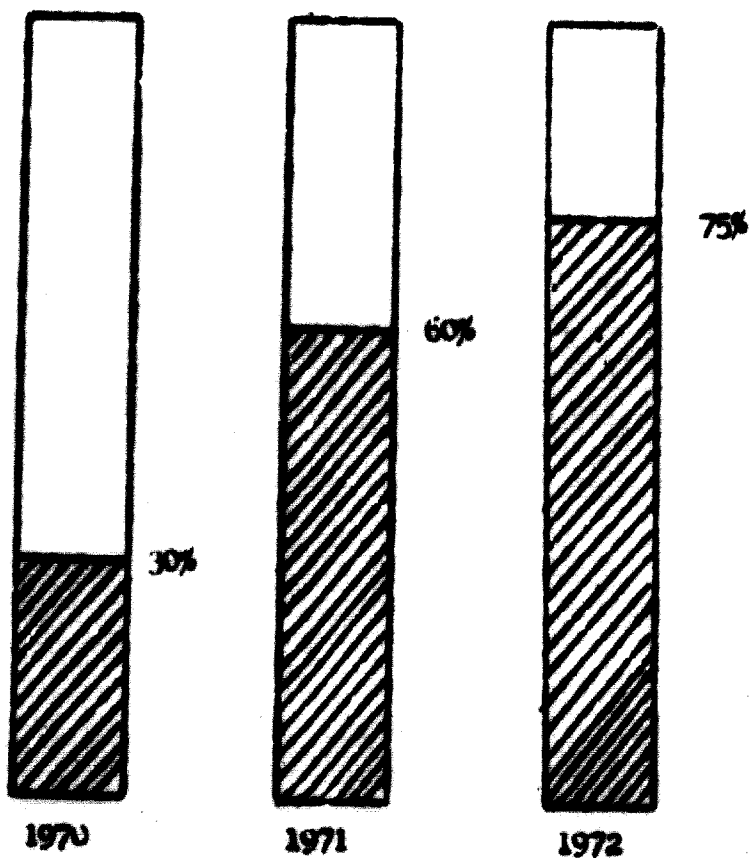
Courses to be taken by people belonging to Category "A" to be promoted.

APPENDIX II

<u>AREA</u>	<u>YEAR</u>	<u>ATTENDANTS</u>	<u>COURSE HOURS</u>	<u>ATTENDANCE Man - hours</u>	<u>SUBJECT</u>	
I. Training of skilled labor	1970	265	1200	26.200	Maintenance Careers Crane operator Port operations	
	1971	155	1100	21.000	Maintenance Careers Crane operators	
	1972	286	2500	21.130	Maintenance Careers Crane operator Quality control	
	II. Training of supervisors	1970	20	30	400	In-field training
		1971	380	60	3.500	Labour matters Personnel management
		1972	250	112	3.900	Metallurgy - Quality Personnel Management
	III. Technical and administrative courses and other	1970	-	-	-	-
		1971	82	108	1.600	Lubricants Metallurgy
		1972	661	1.050	10.600	Quality Languages Safety

APPENDIX III

COMPARATIVE CHART OF COURSES DELIVERED BY ENGAGED AND COMPANY INSTRUCTORS
(during the company's first three years)

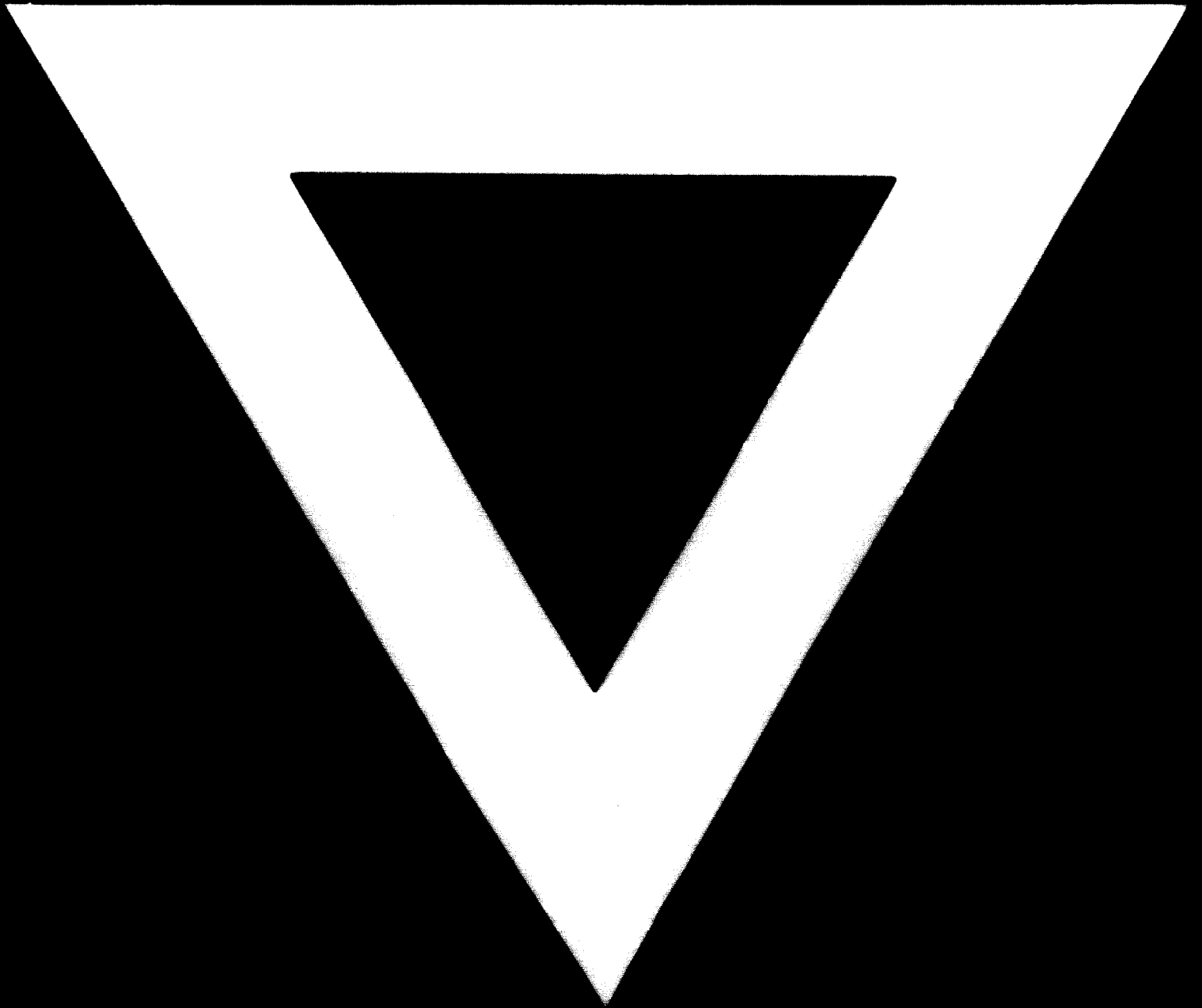


Company instructors



Engaged instructors





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