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APPLICATION OF MODERN PRODUCTION MANAGEMENT

TECHNIQUES TO MAINTENANCE FROM THE

DEVELOPING COUNTRIES POINT OF VIEW

by

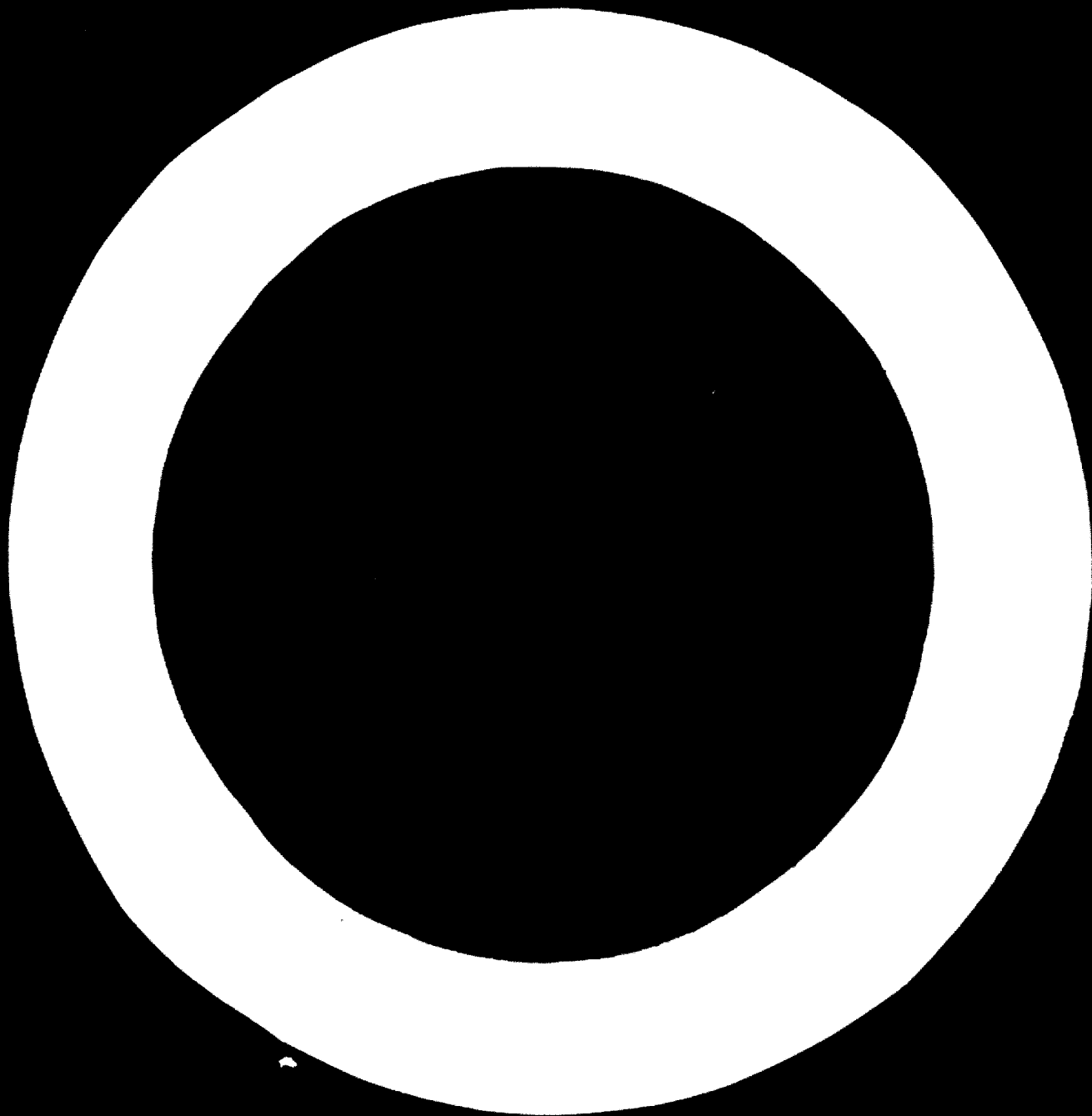
Seiichi Sakakibara

Organized in co-operation with the Government of Japan and the Japan
Management Association (JMA).

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1. Outline of Overseas KD Activities

Nissan Motor Co., Ltd started its KD exports on a full scale about 10 years ago, and the number of vehicles shipped knock-down has recently passed the 350,000 mark. Nissan's engineers are helping local workers manufacture Datsun cars and vehicles at 27 plants in 22 countries, mostly developing nations.

Allow me to give you a brief outline of Nissan's KD export operations revolving around local government policy.

Nissan's KD export destinations can be broken down into five groups. Far East, Latin America, Oceania, Africa and Middle East. Car exports to these destinations began in completely built-up form. Even today, many countries import fully assembled vehicles. But, a number of nations are now adopting increasingly rigid import quota systems and some of them have even placed a ban on fully assembled vehicles. These measures are aimed at promoting of industries, increasing employment, reducing foreign exchange drain, and expanding the national economy. In certain countries, governmental regulations provide for a percentage of domestic content and also prescribe that a part of vehicles and parts thus manufactured be shipped abroad to earn foreign currency. Several countries such as those of LAFTA (Latin America Free Trade Association) and the Andes Group are now trying to secure closer regional economic co-operation, by supplying each other with necessary automotive parts.

Thus, it is absolutely necessary to continue our export activities with every regard to the respective country's automotive policy, actual over-all situation and national interest, based on the true spirit of international cooperation.

Over-Sea Plant Assembly Plants

NISSAN MOTOR CO. LTD
EXPORT ENGINEERING DEPT.

Destination	P.O. Address	Year of Inception	Capital		Employees	Assembly Car Model	Monthly Production (Units)	Remarks	
			US\$	(10,000)					
F. A. S. E. A. S. T.	Taiwan	YUE LUNG MOTOR CO. LTD.	1953	275	1,740	510, 210, 330, T20	1,500	Body Assembly only.	
		THE CHINESE AUTOMOBILE T. CO. LTD.	1959	155	800	620	1,000		
		FRANCE MOTOR CO. LTD.	1967	26	270	720	150		
	Thailand	SIAM MOTORS & STEEL	1962	5	100	0110, 010, 020, 750	350	Nissan Sumitomo Show Local	
		PRINCE MOTOR (THAILAND) LTD.	1965	7	50	010, 0110, 750	100		
	Philippines	UNIVERSAL MOTOR CO. LTD.	1952	6	200	200, 010	300		
	India	GOV. OF INDIA MIN. OF DEFENSE	1941	1	1,000	507, 100	500		
	Indonesia	P. T. INDOKAYA TRADING CO. LTD.	1960	7	21	150	010, 020, 270	150	Assembly Plant # INHER MOTOR & NATIONAL MOTOR # SWEDISH MOTOR ASSOCIATION
	M. Layala	TAN CHONG & SONS MOTOR CO.	1965	5	52	800	0110, 010, 630	500	
Singapore	SINGAPORE NISSAN MOTOR CO.	1968	2	68	40	630	120		
MIDDLE EAST.	Iran	ZAMAD CO. LTD.	1963	7	21	800	110	100	Nissan & Local
AUSTRALASIA	Australia	NISSAN MOTOR CO. AUSTRALIA PTY. LTD.	1960	9	97	1,000	0110, 630	2,000	*Nissan # MOTOR PRODUCER
	New Zealand	NISSAN MOTOR (N.Z.) LTD.	1962	12	85	—	0110, 630, 270	400	# NEW ZEALAND MOTOR BODY
AFRICA	South Africa	DAISUN MOTOR VEHICLE DIST.	1958	6	740	1,000	0110, 500, 230, 630, 020, 700, 0110	1,000	
	Ghana	JAPAN MOTOR TRADING CO. LTD. AUTO PARTS LTD.	1960	12	39	60	0110, 630	80	
EUROPE	Portugal	ENTREPÓSITO COMERCIAL DE AUTOMÓVEIS	1968	1	100	(500)	0110, 500, 230, 630, 020, 630	700	# MOVAUTO
	Ireland	THE BRITAIN GROUP	1971	1	192	800	010, 0110	250	
CENTRAL & SOUTH AMERICA	Mexico	NISSAN MEXICANA S.A. de C.V.	1961	10	1,207	1,500	010, 630	2,000	Nissan Marubeni Iida
	Peru	NISSAN MOTOR DEL PERU S.A.	1960	6	11	380	010, 630	600	
	Chile	INDUSTRIAS NISSAN MOTOR CHILE S.A.	1962	10	62	200	010	200	Nissan Marubeni Iida Local
	Venezuela	ENSAMBLADORA CARABOBO C.A.	1965	4	110	150	60	150	
	Bolivia	DISTRIBUIDORA NISSAN (BOLIVIA) S.A.	1968	11	20	50	700	30	Nissan Itoh Chuu
	Costa Rica	AGENCIA DATSUN CIA COMERCIAL ATZENMAN LTDA. MOTOR CENTRA S.A.	1960	10	0	—	0110, 270	50	
	Trinidad & Tobago	NEAL & NASSY INDUSTRIES LTD.	1976	1	7	—	010, 630	60	
	Nicaragua	DISTRIBUIDORA DATSUN S.A.	1960	1	35	60	700	150	# COUPESA

Note: 1) Capital with * is owned by the firms listed in the "Remarks" column. Unless otherwise indicated, it is locally subscribed. In the "Remarks" column, the firm with # is actually in charge of production.

(1) Car Model:

- 230 ... Nissan Cedric
- 530 ... Datsun Blue Bird
- 630 ... Datsun Blue Bird
- 0110 ... Datsun Sunny
- 0110 ... Datsun Sunny Coupe
- 030 ... Nissan Cherry
- 700 ... Nissan Truck
- 020 ... Datsun Truck
- T20 ... Nissan Humber
- 0260 ... Nissan Caball
- 1140 ... Nissan Junior
- 0120 ... Datsun Sunny Truck
- 007 ... Nissan Carrier
- 00 ... Nissan Patrol

2. The System of Engineering Maintenance at Nissan Mexicana

2-1. General View of Nissan Mexicana

2-1-1. Land and Building

Nissan Mexicana S. A. de C. V. has its head office in Manacar, Insurgentes Streets, Mexico City where their personnel, accounting, purchasing and liaison departments are located. The Service Center is in Churubusco and the assembly plants in Cuernavaca city, State of Morelos, about 100 km south of Mexico City. The plants, standing 1,500 m above sea-level, occupy a total land area of 400,000 square meters, the largest Industrial Park in Cuernavaca. One third of the site, approximately 160,000 square meters, is actually utilized.

Main Plant		25,100 sq. mtrs.
CKD Parts Depot	3 Buildings	10,400
Local Parts Depot		4,250
Export Parts Depot		2,750
Subsidiary Material Depot	2 Buildings	2,000
Service Parts Depot		3,000
Experimental Plant		350
Cafeteria		1,200
Office		2,700
Total		51,860 sq. mtrs.

The building of plants and depots were entirely designed and constructed by the Mexican company.

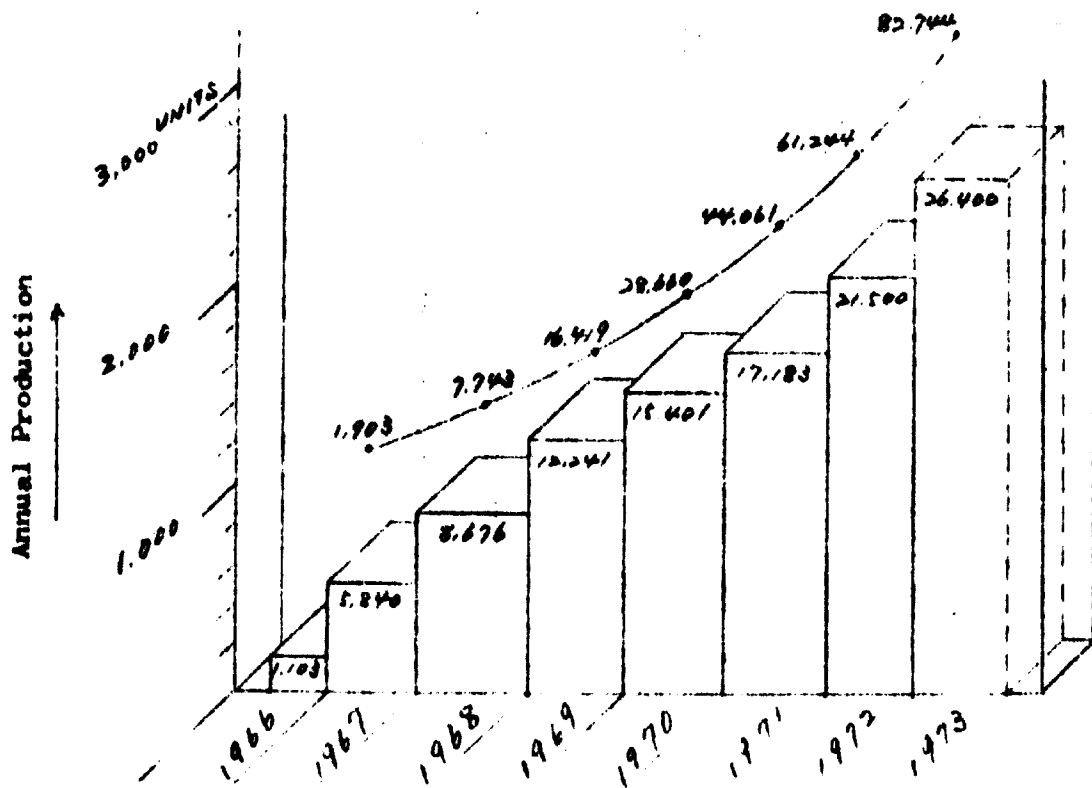
2-1-2. Facilities

The machine tools were all imported from Japan. The welding machines were mostly made in Japan, but in recent years more and more Mexican-made machines, such as transformers and timers have been utilized. All assembly facilities are Mexican-made except the tester line.

2-1-3. Growth of Production

Since July 25, 1966 when the first Datsun car rolled off the line of our plant in Mexico, the production has shown a steady growth and reached 2,000 cars a month in May 1972.

Date	Accumulative production	10,000 units
Feb. 9, 1968	"	"
April 26, 1969	"	20,000 "
Jan. 30, 1970	"	30,000 "
Sept. 13, 1970	"	40,000 "
March 22, 1971	"	50,000 "
Sept. 20, 1971	"	60,000 "
April 9, 1972	"	70,000 "
Aug. 25, 1972	"	80,000 "



2-1-5. Number of Employees

Cuernavaca Plant approximately 1,400 persons

Technical Service Dept.

Sales Dept.

Accounting & Finance Dept. } approximately 200 persons

Design Dept., etc. }

Total work Force approximately 1,600 persons

Of these, permanent labours number approximately 900 persons

All inspectors, materials handlers, maintenance people, and warehouse keepers are retained on a contract basis.

Average age of plant employees: 23.5 years old

Average length of service: 2.8 years

20% more than 5 years

40% more than 3 years

40% less than 2 years

Their educational levels are equivalent to second-year junior high school on the average.

Most of them live around Cuernavaca. However, some of them commute as far as 30 km to work.

The Japanese staff at the plant usually consists of 3 managers, 4 interpreters and from 3 to 5 technical instructors.

2-2. Facilities Maintenance Section

2-2-1. Job description

- 1) Purchasing arrangement, repair and maintenance of production facilities and machines.
- 2) Purchasing arrangement, repair and maintenance of assembly machines.
- 3) Arrangement of repair, maintenance service and spare parts.
- 4) Operation and maintenance of compressor room.
- 5) Supply and control of electricity.
- 6) Operation of water supply, water pumps and well pumps.
- 7) Equipping of paint shop facilities.
- 8) Purchase and maintenance of welding machines, gun timers and etc.

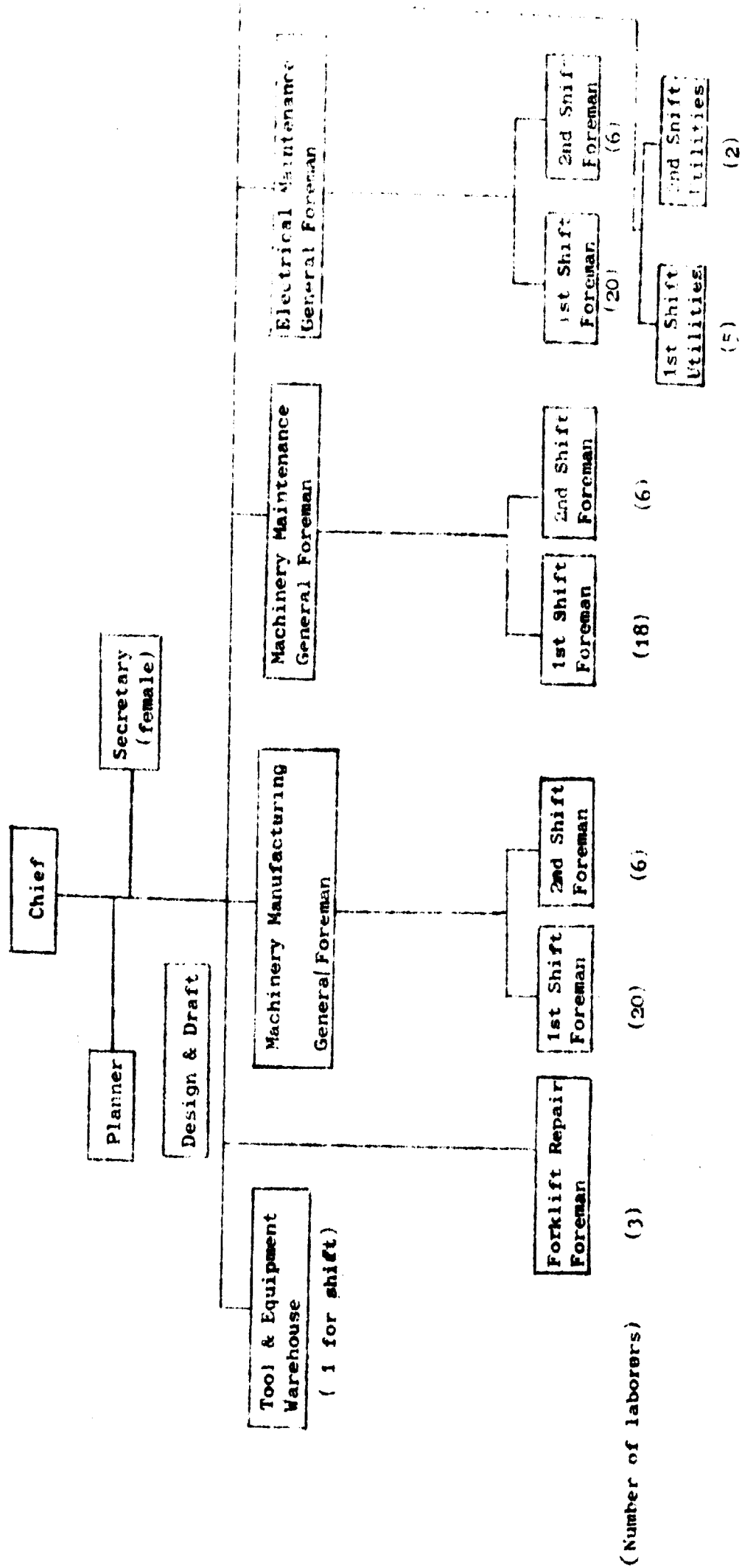
2-2-2. Number of employees (As of the end of 1972)

Laborers: 86

In the following organizational chart, general foremen of Machinery Maintenance and Electric Maintenance are college graduate engineers.

More than 80 % of the reconstruction, wiring, plumbing and other work in the plant is done by the following organization and personnel.

Organization of Facilities Maintenance Section



2-2-3. Labor Relations

a) General Conditions

- a-1. All workers including foremen are members of the Union by contract.
- a-2. There are five wage levels divided according to function: Level 1 is the highest and 5 is the lowest.
- a-3. The level of wages is decided according to the function and the job.

Example of job level "5a" (in case of apprentice)

class	function	requirement for qualification
Machine Maintenance apprentice	-to repair elements of all machines.	<u>School career</u>
	(bearing, joints, rotating parts.etc.)	Finish junior high school
5a	-ability with all kinds of manual tools	<u>Knowledge</u>
	-to assist all workers belonging to the 2nd, 3rd and 4th class.	All kinds of welding, manual tooling and lubricating.
	<u>Responsibilities</u>	<u>Experience</u>
	-to accomplish assigned work exactly, promptly and completely.	Similar work over one year.
	-to be careful not to damage tools and machines.	<u>Job Record</u>
		Good attendance and no record of accidents.

b) Promotion

Promotion does not depend entirely on seniority.

c) Wages

Wages are decided on the basis of the level of work (Grade 1 through Grade 5), class of work (e.g. electricity, machine) etc.

Incompetent employees find it difficult to get higher salaries or promotions even though they have long experience.

Employees are requested to develop themselves to meet requirements for their respective qualifications. The qualifications they obtain after joining the company are evaluated as important.

d) EXAMPLES OF JOP LEVER (ORIGINAL IN SPANISH)

DEPARTAMENTO DE INGENIERIA DE PLANTA

EXAMEN PARA PASAR A LA SIGUIENTE CLASE.

REQUISITOS
CUBRIR REQUISITOS DE 4a.

REQUISITOS

FUNCIONES

CLASE PUESTO

AUXILIAR

- REPARAR TODA CLASE DE PARTES MECANICAS ELEMENTALES (CONEXIONES, CHUMACERAS, RODAJES).
- MANEJAR TODO TIPO DE HERRAMIENTAS DE MANO.
- AYUDAR EN TODO TIPO DE TRABAJOS A LOS OPERADORES DE 3a. Y 2a. CLASE. ASI COMO A LOS AUXILIARES DE 4a.

MECANICO

- RESPONSABILIDADES
- EJECUTAR CON EXACTITUD, PRONTITUD Y LIMPIEZA TODOS LOS TRABAJOS QUE SE LE ENCOMIENDE.
- CUIDAR QUE TODAS LAS HERRAMIENTAS QUE MANEJEN NO SUFRAN DANOS NI PERDIDAS.

ESCOLARIDAD:

- SECUNDARIA.
- CONOCIMIENTOS ELEMENTALES:
- DE TODA CLASE DE SOLDADURA.
- DE TODO TIPO DE HERRAMIENTAS.
- DE LUBRICATION EN GENERAL.

EXPERIENCIA:

- MINIMO 1 (UN) AÑO EN TRABAJOS SIMILARES.

CAPACITACION:

- 1 (UN) AÑO MINIMO EN ESTE PUESTO.
- ANTECEDENTES DENTRO DE PLANTA (EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA:

- ASISTENCIA Y PUNTUALIDAD BUENAS.
- NO TENER INCAPACIDADES POR ACCIDENTES DE TRABAJO.

5a AUXILIAR

MANTENIMIENTO

ELECTRICO

- REPARACIONES ELEMENTALES DE CIRCUITOS ELECTRICOS EN MAQUINAS HERRAMIENTAS.
- MANEJAR TODO TIPO DE HERRAMIENTAS DE MANO NECESARIAS.
- CAMBIAR FUSIBLES Y LAMPARAS EN CASO DE CESARRO.
- MANEJAR TODO TIPO DE HERRAMIENTAS DE MANO QUE SE UTILIZAN EN LA REPARACION DE CIRCUITOS ELECTRICOS.
- AYUDAR EN TODOS LOS TRABAJOS A LOS ELECTRICISTAS DE 3a. Y 2a. CLASE. ASI COMO A LOS AUXILIARES DE 4a.
- SABER MANEJAR EL ANALIZADOR DE CIRCUITOS.

ESCOLARIDAD

- SECUNDARIA.
- CONOCIMIENTOS ELEMENTALES:
- DE ELECTRICIDAD.
- DE TODO TIPO DE HERRAMIENTAS.
- DE SOLDADURA.

EXPERIENCIA:

- MINIMO 1 (UN) AÑO EN TRABAJOS SIMILARES.

CAPACITACION:

- 1 (UN) AÑO MINIMO EN ESTE PUESTO.
- ANTECEDENTES DENTRO DE PLANTA (EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA:

- ASISTENCIA Y PUNTUALIDAD BUENAS.

CUBRIR REQUISITOS

DE 4a.

NO TENER INCAPACIDADES POR ACCIDENTES DE TRABAJO.

RESPONSABILIDADES:
 - EFECTUAR TODOS LOS TRABAJOS ENCOMENDADOS CON EXACTITUD, LIMPIEZA Y HERMETICIDAD.
 - CUIDAR QUE TODAS LAS HERRAMIENTAS Y APARATOS QUE SE MANEJAN NO SUFRAN PERDIDAS NI DAÑOS.

CUBRIR REQUISITOS DE 4a.

- ESCOLARIDAD:
- SECUNDARIA.
- CONOCIMIENTOS ELEMENTALES:
- TODA CLASE DE SOLDADURA.
- DE TODO TIPO DE HERRAMIENTAS.
- DE PLANOS MECANICOS.
- EXPERIENCIA:
- MINIMO 1 (UN) AÑO EN TRABAJOS SIMILARES.
- CAPACITACION:
- 1 (UN) AÑO MINIMO EN ESTE PUESTO.
- ANTECEDENTES DENTRO DE PLANTA (EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA:
- ASISTENCIA Y PUNTUALIDAD BUENAS.
- NO TENER INCAPACIDADES POR ACCIDENTES DE TRABAJO.

- EJECUTAR ORDENES DE TRABAJO SENCILLAS-
- AYUDAR A LOS MECANICOS, RECTIFICADORES
- FRESADORES, TORNEROS Y A LOS AUXILIA
- PFS DE 4a. EN TODAS LAS LABORES PROPIAS
- DE ESTA SECCION.
- MANEJAR TODO TIPO DE HERRAMIENTAS NECESARIAS.
- RESPONSABILIDADES:
- REALIZAR TODOS LOS TRABAJOS ENCOMENDADOS CON EXACTITUD, LIMPIEZA Y PRONTITUD.
- CUIDAR QUE TODAS LAS HERRAMIENTAS QUE SE MANEJAN NO SUFRAN DAÑOS NI PERDIDAS

5a. AUXILIAR
 MANTENIMIENTO
 HERRAMIENTAL

CUBRIR REQUISITOS DE 3a.

- ESCOLARIDAD:
- MINIMA SECUNDARIA TERMINADA.
- CONOCIMIENTOS:
- SOLDADURA AUTOGENA Y ELECTRICA.
- AJUSTES SOBRE MAQUINAS Y HERRAMIENTAS.
- ELEMENTALES DE CALCULO DE TUBERIA.
- ELEMENTALES DE DIBUJO TECNICO LINEAL.

- REPARAR TODA CLASE DE PARTES MECANICAS
- EFECTUAR INSTALACIONES DE AIRE Y AGUA.
- MANEJAR CORRECTAMENTE TODO TIPO DE HERRAMIENTAS DE MANO.
- MANEJAR NIVEL DE BURBUJA CON APROXIMACION DE 0.05 MM/MTS.
- CONOCER Y MANEJAR EL MANOMETRO, VER --

4a. AUXILIAR
 MANTENIMIENTO
 MECANICO

- LUBRICACION EN GENERAL Y SU CORRECTA APLICACION.
- INSTALACIONES NEUMATICAS E HIDRAULICAS.
- HERRAMIENTAS ADECUADAS Y SU APLICACION CORRECTA.
- EXPERIENCIA EN TRABAJOS SIMILARES A LOS DE 5a. CLASE.
- 1 (UN) AÑO DE SOLDADURA EN FIERRO NEGRO.
- CAPACITACIONES:
- POR LO MENOS 3 (TRES) AÑOS EN ESTE PUESTO.
- ANTECEDENTES DENTRO DE PLANTA (EN CASO DE QUE LAS VACANTES SEAN DE PADRE POR FALLECIMIENTO DE LA MISMA.
- ASISTENCIA Y PUNTUALIDAD ININTERRUMPIDA.
- NO TENER INCAPACIDADES POR ACCIDENTES DE TRABAJO.

CUBRIR REQUISITOS DE 5a.

- AYUDAR EN TODO TIPO DE TRABAJOS A LOS MECANICOS DE 1a. Y 2a. CLASE.
- RESPONSABILIDADES:
- EFECTUAR TODOS LOS TRABAJOS ENCOMENDADOS CON EXACTITUD, LIMPIEZA Y BUENA FINICION.
- CUIDAR QUE TODAS LAS HERRAMIENTAS QUE SE MANEJEN NO SUFRAN DAÑOS NI PERDIDAS.

- ESCOLARIDAD:
- NIVEL SECUNDARIA TERMINADA.
- CONOCIMIENTOS:
- POR LO MENOS EQUIVALENTES A UN AÑO DE EDUCACION INDUSTRIAL.
- NOCIONES DE CALCULO, CARLES, TUBERTAS E INTERRUPTORES.
- EN UNIDADES DE MEDICION Y CONVERSION DEL SISTEMA INGLES AL METRICO.
- EXPERIENCIA:
- MINIMO 1 (UN) AÑO EN TRABAJOS SIMILARES A LOS AUXILIARES DE 5a.
- (DOS) AÑOS EN EL MANEJO DE TODA CLASE DE HERRAMIENTAS.

- EJECUTAR TODO TIPO DE INSTALACIONES INDUSTRIALES.
- REPARAR CIRCUITOS ELECTRICOS EN MAQUINAS HERRAMIENTAS.
- SOLDAR CUANDO SEA NECESARIO EN INSTALACIONES ELECTRICAS.
- MANEJAR TODO TIPO DE HERRAMIENTAS DE MANO ASI COMO EL ANALIZADOR DE CIRCUITOS; VOLMETRO; TACOMETRO; MEGGER; NIVEL DE BUBBLA CON APROXIMACION DE 0.05 MM/MTS.; PIE DE REY; MICROMETRO; TERMOMETRO DE CONTACTO; AMPERMETRO; SECUENCIOMETRO.
- EFECTUAR CONEXIONES EN BAJA TENSION.

Cargos	RESPONSABILIDADES:	CAPACITACION:	CUBRIR REQUISITOS DE
AUXILIAR	<ul style="list-style-type: none"> - EJECUTAR CON EXACTITUD, PRONTITUD Y LIMPIEZA TODOS LOS TRABAJOS QUE SE LE ENCOMIENDE. - CUIDAR QUE TODAS LAS HERRAMIENTAS QUE SE MANEJEN AL IGUAL QUE LOS APARATOS, NO SUFRAN DAÑOS NI PERDIDAS. 	<ul style="list-style-type: none"> - POR LO MENOS 3 (TRES) AÑOS EN ESTE PUESTO. - ANTECEDENTES DENTRO DE PLANTA EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA: - ASISTENCIA Y PUNTUALIDAD EXCELENTES. - NO TENER INCAPACIDADES POR ACCIDENTES DE TRABAJO. 	<ul style="list-style-type: none"> - ESCOLARIDAD: MINIMA SECUNDARIA TERMINADA. - CONOCIMIENTOS: <ul style="list-style-type: none"> - SOLDADURA ELECTRICA Y AUTOGENA. - INSTRUMENTACION REFERENTE A MEDICION, CALIBRACION, Y TOLERANCIAS PARA CONSTRUCCION DE JIGS Y ACCESORIOS DE MAQUINAS Y HERRAMIENTAS. - DE DIBUJO TECNICO LINEAL (GEOMETRIA Y TRIGONOMETRIA). - EN LECTURA DE PLANOS MECANICOS Y EN UNIDADES PARA CONVERSION. - EXPERIENCIA: <ul style="list-style-type: none"> - EN LECTURA DE PLANOS MECANICOS PARA CONSTRUCCION DE PIEZAS. - MINIMA EN DISEÑO PARA CONSTRUCCION DE PIEZAS - 1 (UN) AÑO COMO SOLDADOR EN FIERRO NEGRO. - ANTECEDENTES DENTRO DE PLANTA EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA: - ASISTENCIA Y PUNTUALIDAD INTACHABLES. - NO INCAPACIDADES POR ACCIDENTES DE TRABAJO.
MANTENIMIENTO	<ul style="list-style-type: none"> - EJECUTAR TODAS LAS ORDENES DE TRABAJO SENCILLAS. 	<ul style="list-style-type: none"> - ESCOLARIDAD: MINIMA SECUNDARIA TERMINADA. 	
HERRAMIENTAL	<ul style="list-style-type: none"> - AYUDAR A LOS MECANICOS, RECTIFICADORES, FRESADORES, TURNEROS DE 3a. Y 2a. CLASE EN TODAS LAS LABORES PROPIAS DE ESTA SECCION, (CORTES DE MATERIAL). - MANEJAR TODO TIPO DE HERRAMIENTAS DE MANO ADECUADAMENTE. - EFECTUAR TRAZOS DE CONSTRUCCION DE PIEZAS SENCILLAS. - MANEJAR CORRECTAMENTE EL VERNIER, MICROMETRO, PARCINMETRO, E INDICADORES DE CARATULA. - SOLDAR EN FIERRO NEGRO. 	<ul style="list-style-type: none"> - CONOCIMIENTOS: <ul style="list-style-type: none"> - SOLDADURA ELECTRICA Y AUTOGENA. - INSTRUMENTACION REFERENTE A MEDICION, CALIBRACION, Y TOLERANCIAS PARA CONSTRUCCION DE JIGS Y ACCESORIOS DE MAQUINAS Y HERRAMIENTAS. - DE DIBUJO TECNICO LINEAL (GEOMETRIA Y TRIGONOMETRIA). - EN LECTURA DE PLANOS MECANICOS Y EN UNIDADES PARA CONVERSION. - EXPERIENCIA: <ul style="list-style-type: none"> - EN LECTURA DE PLANOS MECANICOS PARA CONSTRUCCION DE PIEZAS. - MINIMA EN DISEÑO PARA CONSTRUCCION DE PIEZAS - 1 (UN) AÑO COMO SOLDADOR EN FIERRO NEGRO. - ANTECEDENTES DENTRO DE PLANTA EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA: - ASISTENCIA Y PUNTUALIDAD INTACHABLES. - NO INCAPACIDADES POR ACCIDENTES DE TRABAJO. 	<ul style="list-style-type: none"> - ESCOLARIDAD: MINIMA SECUNDARIA TERMINADA. - CONOCIMIENTOS: <ul style="list-style-type: none"> - SOLDADURA ELECTRICA Y AUTOGENA. - INSTRUMENTACION REFERENTE A MEDICION, CALIBRACION, Y TOLERANCIAS PARA CONSTRUCCION DE JIGS Y ACCESORIOS DE MAQUINAS Y HERRAMIENTAS. - DE DIBUJO TECNICO LINEAL (GEOMETRIA Y TRIGONOMETRIA). - EN LECTURA DE PLANOS MECANICOS Y EN UNIDADES PARA CONVERSION. - EXPERIENCIA: <ul style="list-style-type: none"> - EN LECTURA DE PLANOS MECANICOS PARA CONSTRUCCION DE PIEZAS. - MINIMA EN DISEÑO PARA CONSTRUCCION DE PIEZAS - 1 (UN) AÑO COMO SOLDADOR EN FIERRO NEGRO. - ANTECEDENTES DENTRO DE PLANTA EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA: - ASISTENCIA Y PUNTUALIDAD INTACHABLES. - NO INCAPACIDADES POR ACCIDENTES DE TRABAJO.

TORNERO	<ul style="list-style-type: none"> - MANEJAR PERFECTAMENTE EL VERNIER, MI CROMETRO, PARCIMEIRO E INDICADOR DE CA RATULA. - EJECUTAR TODAS LAS ORDENES DE REPARACION DE MAQUINAS DE HERRAMIENTAS. - CONSTRUCCION DE PIEZAS CON TOLERANCIA MAXIMA DE 0.64 MM. - MANEJO DE CEPILLO, TURNO Y FRESA PARA CONSTRUCCION DE CUERDAS, ENGRANES Y PIEZAS EN GENERAL CON PLANO O SIN PLANO. 	<ul style="list-style-type: none"> - <u>ESCOLARIDAD:</u> - SECUNDARIA TERMINADA Y/O ESTUDIOS TECNICOS CONOCIMIENTOS: - DIBUJO TECNICO INDUSTRIAL. - ELEMENTOS DE MAZUINAS. - INSTRUMENTOS DE MEDICION. - LECTURA DE PLANOS MECANICOS.
MANTENIMIENTO	<ul style="list-style-type: none"> - CALCULAR ENGRANES.. - TEMPLAR PIEZAS. - EMPLEO DE RECTIFICADORA CON APROXIMACION DE 0.01 MM. - RESPONSABILIDADES: - CUIDAR QUE TODOS LOS APARATOS Y HERRAMIENTAS QUE SE MANEJAN NO SUFRAN DAÑOS NI PERDIDAS. - EJECUTAR TODOS LOS TRABAJOS ENCOMENDADOS CON EXACTITUD, LIMPIEZA Y BUEN FUNCIONAMIENTO. 	<ul style="list-style-type: none"> - EXPERIENCIA: - MINIMA 3 (TRES) AÑOS EN TRABAJOS SIMILARES - AL AUXILIAR DE 4a. CLASE. - EN EL MANEJO DE CEPILLO, Y FRESADORA POR LO MENOS 3 AÑOS. - <u>CAPACITACION:</u> - 3 (TRES) AÑOS EN ESTE PUESTO. - ANTECEDENTES DENTRO DE PLANTA (EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA. - ASISTENCIA Y PUNTUALIDAD INTACHABLES. - NO INCAPACIDADES POR ACCIDENTES DE TRABAJO
ELECTRICISTA	<ul style="list-style-type: none"> - INSTALACIONES INDUSTRIALES (ALUMBRADO, MAQUINAS, HERRAMIENTAS ETC.). 	<ul style="list-style-type: none"> - <u>ESCOLARIDAD:</u> - PREPARATORIA O VOCACIONAL O SECUNDARIA Y ESCUELA TECNICA.
MANTENIMIENTO	<ul style="list-style-type: none"> - LECTURA DE PLANOS DE INSTALACIONES ELECTRICAS. - MANTENIMIENTO DE TODO EL EQUIPO DE PUNTEADORAS. - REPARACION DE CIRCUITOS ELECTRICOS DE MAQUINAS E INSTALACIONES. 	<ul style="list-style-type: none"> - ESTUDIOS ESPECIALES SOBRE ELECTRICIDAD INDUSTRIAL (MOTORES, TRANSFORMADORES, CIRCUITOS DE CONTROL, BAJA Y ALTA TENSION, PROTECCION SUBESTACIONES.). - SOBREENBOBINADO DE MOTORES.

- EMBOBINADO DE MOTORES HASTA 60 H.P. Y TRANSFORMADORES.
- LECTURA DE CIRCUITOS ELECTRICOS DE MAQUINAS.
- REPARACION PLANTAS PARA SOLDAR.
- CIRCUITOS ELECTRONICOS ELEMENTALES.
- MANEJAR CORRECTAMENTE EL ANALIZADOR DE CIRCUITOS, NEGER, AMPERMETRO, VOLMETRO, WATTMETRO, SECUENCIOMETRO, WATTHORSTRO, TACOMETRO, NIVEL DE BURBUJA, PIE DE REY, MICROMETRO, TERMOMETRO.
- RESPONSABILIDADES:
- MANTENER EN BUEN ESTADO DE FUNCIONAMIENTO SEGURIDAD Y LIMPIEZA EL EQUIPO EXCOMENDADO.
- LOGRAR EL MAXIMO DE EFICIENCIA DE LAS MAQUINAS.
- EVITAR AL MAXIMO DESPERDICIO DE MATERIAL. Y COADYUVAR A LA OBTENSION MAXIMA DE UTILIDADES PARA BIENESTAR PROPIO Y DE LA EMPRESA.

- EXPERIENCIA:
- MINIMA 5 (CINCO) AÑOS EN TRABAJOS SIMILARES.
- ANTECEDENTES DENTRO DE PLANTA (EV CASO DE QUE LAS VACANTES SEAN DE PALAS POR PERSONAL DE LA MISMA).
- PUNTUALIDAD Y ASISTENCIA EXCELENTE.
- INCAPACIDADES POR ACCIDENTE NULAS.
- HABER OCUPADO PUESTO DE NIVEL INFERIOR EN MANTENIMIENTO.

RECTIFICADOR
MANTENIMIENTO

- TORNEAR CEPILLAR, FRESAR, MANDRILAR, RECTIFICAR, CON TOLERANCIA DESDE 0.04 MM. HASTA 0.004 MM.
- TEMPLE DE TODO TIPO DE ACEROS.
- DISEÑO Y FABRICACION DE PIEZAS.
- LECTURA DE PLANOS MECANICOS.
- AJUSTE DE TODA CLASE DE PIEZAS.
- MANEJAR CORRECTAMENTE EL VERNIER, MICROMETRO, CALIBRADOR DE ALTURAS, INDICADORES DE CARATULA DE 0.1, 0.01, 0.001 MM. PASIMETROS.

CUBRIR REQUISITOS
DE LA CASO DE VACANTE

- ESCOLARIDAD:
- PREPARATORIA O VOCACIONAL
- SECUNDARIA Y ESCUELA TECNICA.
- TECNOLÓGICO REGIONAL.
- ESTUDIOS ESPECIALES DE DIBUJO TECNICO LINEAL DE DISEÑO DE ELEMENTOS DE MAQUINAS. DE AJUSTES Y TOLERANCIAS DE LAS MISMAS Y DE INGLES-TECNICO ELEMENTAL.
- CAPACITACION:
- 5 (CINCO) AÑOS MINIMO EN ESTE PUESTO.

NOTA: EN EL CASO DE TENER EXPERIENCIAS ANTE-

RESPONSABILIDADES:

- FABRICACION DE PIEZAS EN EL TIEMPO Y EXACTITUD DE PIEZAS REQUERIDAS POR PLANO.
- DISTRIBUCION DE TRABAJOS.
- ADMINISTRACION DE TIEMPOS Y MATERIALES EMPLEADOS.
- OBTENCION MAXIMA DE LOS RENDIMIENTOS DE LOS SUBORDINADOS.

IONES SE TRATARA CADA CASO DE ACUERDO A LAS APTITUDES DE LA PERSONA.

- EXPERIENCIA:
- MINIMO 5 (CINCO) AÑOS EN TRABAJOS SIMILARES POR LO MENOS 3 (TRES) AÑOS EN MANEJO DE PERSONAL Y CONTROL DE LAS ORDENES DE TRABAJO.
- ANTECEDENTES DENTRO DE PLANTA (EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA).
- RELACIONES CORDIALES CON LOS COMPARTEROS DE TRABAJO.
- MORALIDAD Y CONDUCTA EXCELENTE.
- PUNTUALIDAD Y ASISTENCIA INTACHABLES.

ELECTRICISTA
MANTENIMIENTO

- INSTALACIONES INDUSTRIALES (CALENTADORES, MAQUINAS, HERRAMIENTAS ETC.).
- LECTURA DE PLANOS DE INSTALACIONES ELECTRICAS.
- MANTENIMIENTO DE EQUIPO PUNTEADORAS.
- REPARACION DE CIRCUITOS ELECTRICOS EN MAQUINAS E INSTALACIONES.
- EMBOBINADO DE MOTORES HASTA 60 H.P. Y TRANSFORMADORES.
- LECTURA DE CIRCUITOS ELECTRICOS DE MAQUINAS.
- REPARACION PLANTAS PARA SOLDAR.
- CIRCUITOS ELECTRONICOS ELEMENTALES.
- MODIFICACION DE CIRCUITOS SEGUN NECESIDADES.
- ADAPTACION DE EQUIPOS AUXILIARES PARA MAYOR EFICIENCIA.
- CALCULO DE CONDUCTORES, TUBERIAS E INTERRUPTORES.

ESCOLARIDAD:

- PREPARATORIA O VOCACIONAL.
- SECUNDARIA Y ESCUELA TECNICA.
- ESTUDIOS ESPECIALES DE ELECTRICIDAD INDUSTRIAL Y MOTORES, TRANSFORMADORES, CIRCUITOS DE CONTROL, BAJA Y ALTA TENSION, PROTECCION SUPERSTACIONES.
- EMBOBINADO DE MOTORES.
- DE COSTOS DE MANTENIMIENTO.
- CONTROL DE MANTENIMIENTO (PREVENTIVO).
- CAPACITACION.
- 1 (UNO) AÑOS POR LO MENOS EN ESTE PUESTO.
- EXPERIENCIA:
- 5 (CINCO) AÑOS EN TRABAJOS SIMILARES.
- ANTECEDENTES DENTRO DE PLANTA (EN CASO DE QUE LAS VACANTES SEAN OCUPADAS POR PERSONAL DE LA MISMA).
- PUNTUALIDAD Y ASISTENCIA EXCELENTE.
- INCAPACIDADES NULAS.

CUMPLE REQUISITOS

DE UN CASO DE VACANTE

- TRABAJOS EN ALTA TENSION.
- CONTROL DE PERSONAL TIEMPOS Y MATERIALES.
- AUXILIAR AL PERSONAL DE MANTENIMIENTO MECANICO.

- HABER OCUPADO PUESTO DE NIVEL INFERIOR EN MANTENIMIENTO.

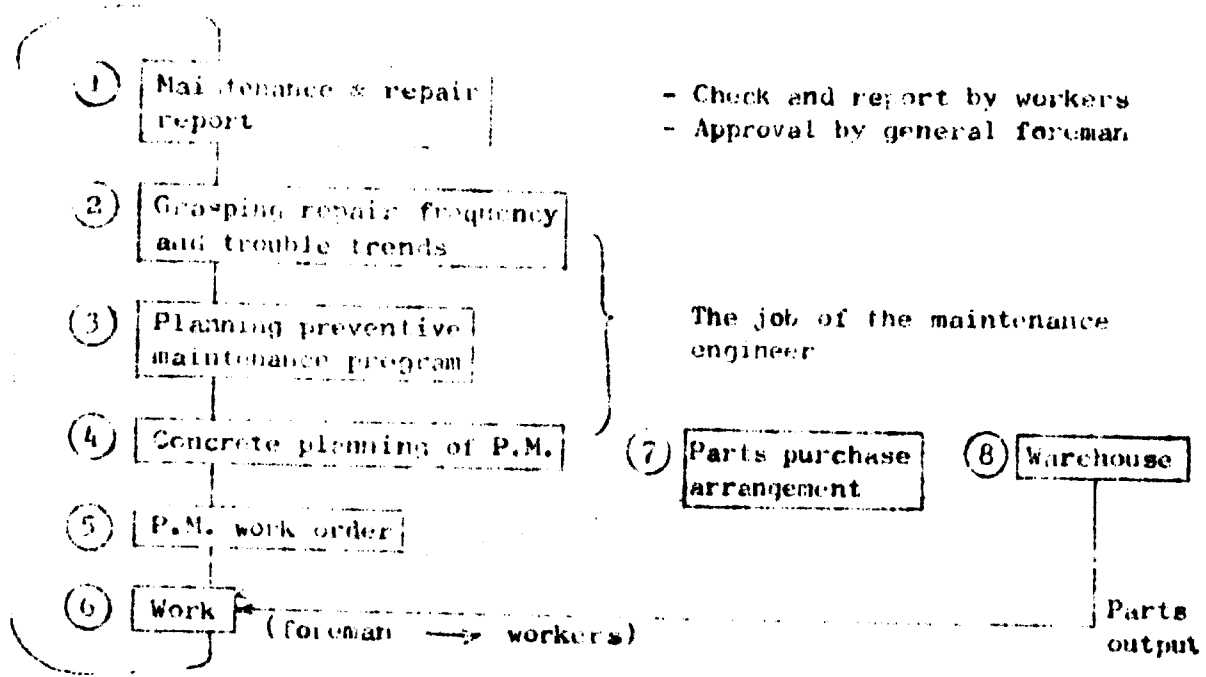
2a. (CONT.)

ELÉCTRICISTA

MANTENIMIENTO

- CONOCIMIENTO PLENO DEL FUNCIONAMIENTO DEL EQUIPO EXISTENTE EN LA PLANTA DE MANUFACTURA.
- MANEJAR CORRECTAMENTE EL ANALIZADOR DE CIRCUITOS, WEGGER, AMPERMETRO, VOLTMETRO, WATTMETRO, SECUENCIOMETRO, WATTTHORIMETRO, CACOMETRO, NIVEL DE BURBUJA, PIE DE REY, MICROMETRO, TERMOMETRO. RESPONSABILIDADES:
- MANTENER EN BUEN ESTADO DE FUNCIONAMIENTO, SEGURIDAD Y LIMPIEZA AL EQUIPO ENCOMENDADO.
- LOGRAR EL MAXIMO DE EFICIENCIA DE LAS MAQUINAS.
- EVITAR AL MAXIMO EL DESPERDICIO DE MATERIALES.
- COADYUVAR A LA OBTENCION DE UTILIDADES PARA BIENESTAR PROPIO Y DE LA EMPRESA.
- ADMINISTRACION DE ORDENES DE TRABAJO Y DISTRIBUCION DEL MISMO.
- APROVECHAMIENTO MAXIMO DE LA FUERZA DE TRABAJO ENCOMENDADO.

2-2-4. Maintenance Control



2-2-5. Control of Maintenance Expenses

The budget for all maintenance material and parts is drawn up each 6 months on the basis of the results in the past. Although the budget is controlled directly by the chief, it is under control of the manager in the form of maintenance fees per complete car unit.

The Facilities Maintenance Section has its warehouse to control maintenance parts and at the same time has an inventory control mechanism.

b) REPORT OF MECHANICAL REPAIR

機械修理記録

MANTENIMIENTO MECANICO DE EMERGENCIA EMERGENCY MAINTENANCE (MACHINE) 非常機械保全		No. 2801
FECHA DATE	HORA DE AVISO TROUBLE TIME	
MAQUINA NO. MACHINE NO.	TIEMPO EN REPARACION HOURS REQUIRED FOR REPAIR	
AREA	HORA DE ENTREGA OPERATION STARTING TIME	
MOTIVO DE LA DESCOMPOSTURA CAUSE OF TROUBLE		
PIEZAS DAÑADAS DAMAGED PARTS	OBSERVACIONES REMARKS	
PIEZAS REPUESTAS CHANGED PARTS	EJECUTO 228 PERSON ON DUTY	
COD. 4300-31001		CHECO CHECK
		CONTROLADO APPROVED

本機械修理記録は、修理の完了後、修理責任者が記入し係長に報告

c) REPORT OF EACH MACHINE'S REPAIR
各機械別修理作業之記錄

DATOS DE MANTENIMIENTO Y REPARACION
MAINTENANCE AND REPAIR DATA

SISTEMA KARDEX NO. 85.25°

FECHA DATE 日期	MECANICO MECHANIC 技師名	REPARACIONES Y SUBSTITUCIONES REPAIRS AND SUBSTITUTIONS 修理之種類	HORAS EMP. TIME REQUIRED 作業時間	COSTO COST 費用	COPY AMOUNT 張數

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
 DEPTO. DEPART. 部門
 EDIFICIO BUILDING 廠房
 NUMERON NO. 號碼

NOTE: THESE DATA ARE FILLED IN THIS RECORD FROM "THE MAINTENANCE OPERATION REPORT", EVERY MACHINE HAS THIS RECORD.

d) MAINTENANCE PLAN

1-3-51-00

NO. DE MAQUINA / MACHINE NO. **4446** NO. DE CATALOGO / CATALOG NO. **45** NO. DE SERIE / SERIES NO. **503102**
 NOMBRE / NAME **4446** FECHA DE COMPRA: / DATE OF PURCHASE **45** FECHA DE INSTALADA: / DATE OF INSTALLATION **48**
 PROVEEDOR / MAKER: **4-8-**

INSPECCION MECANICA Y ELECTRICA		MACHINE INSPECTION	
SEMANA / WEEK	1 2 3 4 5 6 7 8 9 10	45	46 47 48
SEMANA / WEEK	1 2 3 4 5 6 7 8 9 10	45	46 47 48

CEDULA DE LUBRICACION Y CAMBIO DE ACEITE / LUBRICATION PLAN **45 46 47 48**

EQUIPOS MECANICOS		EQUIPOS ELECTRICOS	
MECHANICAL EQUIPMENT		ELECTRICAL EQUIPMENT	
TIPO DE ARMADURA / ARMATURE TYPE 4446	EQUIP. EQUIPMENT 4446	MARCA / MAKER 4-8-	
IMPULSION INST. / INST. MAX CURRENT 4446	NO. DE SERIE / SERIES NO. 4446	VOLTAJE / VOLTAGE 4446	
FECHA INST. / DATE OF INST. 4446		FASE / PHASE 4446	
		AMPERES / AMPERE 4446	
		H.P. 4446	
		R.P.M. 4446	
		CIRCUITO / CIRCUIT 4446	

NISSAN MEXICANA, S.A. DE C.V.

SISTEMA KANDEX NO. 6605

e) REPORT OF MAINTENANCE
 保全記録

MODELO MODEL 1511		DESCRIPCION DESCRIPTION 1111		DEPARTAMENTO DEPT. NO. 1111		NUMERO NO. 1111	
FABRICANTE MAKER 1111		OBSERVACIONES DESCRIPTION 1111		TRABAJO A REALIZAR OPERATION 1111		SERIE NO. 1111	
FECHA DATE 11/11		OBSERVACIONES DESCRIPTION 1111		TRABAJO A REALIZAR OPERATION 1111		SERIE NO. 1111	
INSPECCIONADO POR MECANICO 検査員 1111		OBSERVACIONES DESCRIPTION 1111		TRABAJO A REALIZAR OPERATION 1111		SERIE NO. 1111	
APROBADO POR (CAPATAZ) APPROVE 1111		OBSERVACIONES DESCRIPTION 1111		TRABAJO A REALIZAR OPERATION 1111		SERIE NO. 1111	
FECHA DE LA PROXIMA INSPECCION DATE OF FINAL INSPECTION 11/11		OBSERVACIONES DESCRIPTION 1111		TRABAJO A REALIZAR OPERATION 1111		SERIE NO. 1111	

DATOS DE INSPECCION SISTEMA KARDEX NO. 85-25.B
 検査記録

2-2-7. Control of Line Idle Time

Especially important production lines such as the body paint, trim, chassis and car erection line have their idle time strictly controlled. These maintenance activities in Industrial Engineering are closely related to efficiency control. This is because the waiting time loss due to damage of facilities is critical. So, here I will explain the Relationship between maintenance and performance control in Nissan Mexicana.

a) Significance of the Performance Control

Performance control means the all-round controlling activity to insure progress production efficiency and to keep it at a reasonable level. The efficiency used in the performance control means the index value that shows the effectiveness of the production and is shown as the rate of the working time against the standard time which is established correctly and impartially.

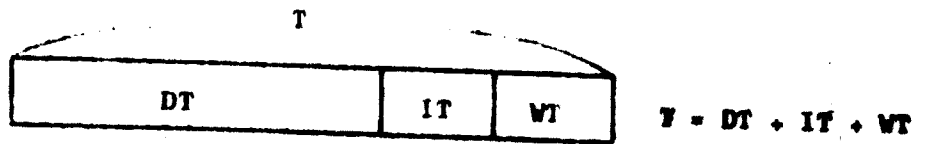
$$\text{Efficiency} = \frac{\text{Standard time}}{\text{Working time}} \times 100 (\%)$$

b) Establishment of Standard Time

Standard time should be established through work-improvement. The various inefficient conditions existing should be improved by regulating standard time. This provides better and more efficient work conditions.

c) Breakdown of Working Time

Practical working time can be divided into three parts, according to the following classifications



T: Total Working Time

This is the time which the worker must stay at his place of work a day.

DT: Direct Working Time

This is the time which is spent in the performance of actually productive work. (direct work)

IT: In-direct Working Time

This is the time which is spent doing in-direct work.

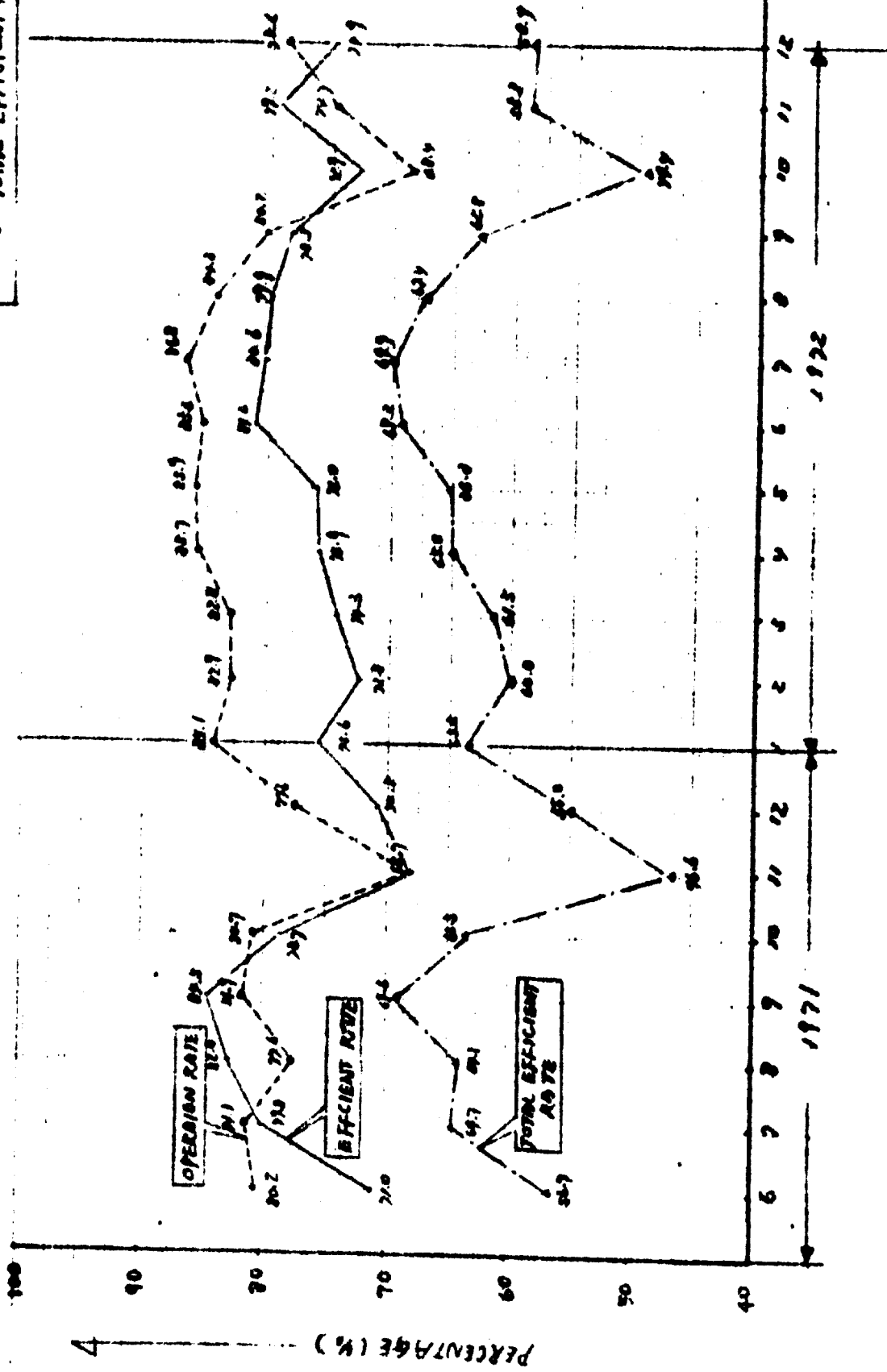
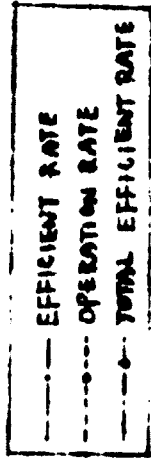
WT: Waiting Time (Idle Time)

This is the time which is spent doing nothing productive.

The waiting caused by equipment breakdowns are a very important factor in Waiting Time. According to the analysis of Waiting Time, we can divide maintenance activities into the following categories: Preventive maintenance, improving maintenance, etc. Therefore, Performance control is "a pilot" that guides us in the maintenance of equipment.

Example of Nissan Mexicana

d) TRENDS OF EFFICIENCY



ote: Three indices which we showed, have the following meaning.
Also, the formulae for calculation are shown.

1) (Efficient Rate) $ER = \frac{\sum St_i \times q_i}{DT}$

2) (Operation Rate) $OR = \frac{DT}{T}$

3) (Total Efficient Rate) $TER = \frac{\sum St_i \times q_i}{T} = ER \times OR$

Note: ST: Standard Time q: Quantity Performed
DT: Direct Working Time T: Total Working Time

The efficient rate shows the level of working speed and effort compared with the standard.

The operation rate is the rate of direct working time spent against the total working time. Poor maintenance has a direct influence on this rate.

Total efficient rate is given by multiplying the efficient rate and the operation rate.

Example Data of
Nissan Mexicana S.A.

e) ANALYSIS OF WORKING TIME

(BY WORK SAMPLING METHOD)

PRINCIPAL WORK INSPECTION
 MATERIAL HANDLING REST
 PREPARATION OF MATERIALS IDLING TIME

DATE	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
MAR 17 - '71														10	10	10	10	10	10	10	10	10
MAY 17 - '71 (10)																						
JUNE 17 - '71 (10)																						
AUGUST - '72																						

THE FOLLOWING FACTORS ARE INCLUDED IN THIS IDLE TIME

ANALYSIS OF IDLE TIME	(MEETING ETC) 18%	(SHORTAGE OF PARTS) 18%	(BREAKDOWN) 14%
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2-2-8. Training

a) Schedule and Curriculum

Training for factory workers is conducted in principle on Saturday with foremen or section chiefs as the instructors.

Schedule: 7:00 - 11:00 Tool and Rig
 11:00 - 14:00 Electricity
 14:00 - 16:00 Machine Repair

Curriculum Included:

1. Fractions, Division, Algebra, Geometry, Introduction of a trigonometrical function
2. Drafting
3. Structure of Machines
4. Hand Tools and Their Use
5. Welding
6. General Principles of Electricity
7. Electrical Circuit
8. Measurement and Precision
9. Lubrication, etc.

In addition, a training center is to be established on the basis of agreements with the labour union coupled with the renewal of the contract for temporary workers made on October 20, 1972. Especially, practice through training machines is being pushed as one form of off-the-job training for regular workers. This is complementing the initial training for newly employed workers.

b) Facilities

Machine tools, welders, engine cut model and cut chassis, etc. are set in an instruction room with an area of about 150 square meters. As for machine tools and welders, which are operational, trainees are required to actually handle them.

3. The System of Equipment Maintenance at Peru Nissan

Note: Refer for Nissan Motor del Peru S. A. to as Peru Nissan.

3-1. General View of Peru Nissan (As of the end of 1972)

Date of Establishment: July, 1966

Capital: S/ 13,508,000 (US\$ 310,000)

Land: 22,600 sq. mtr

Building Area; 6,000 sq. mtr

Person Engaged: 380

Products: Passenger Car (Model 510)

Station Wagon (" V510)

Commercial Truck (" 620)

3-2. Movement of Production

Model	'67	'68	'69	'70	'71	'72
(V)510	570	400	459	424	1,157	2,243
620	180	156	408	347	649	1,468
60	0	54	48	10	-	-
TTL	750	610	915	789	1,806	3,711

Note: Model 60 ... Nissan Patrol

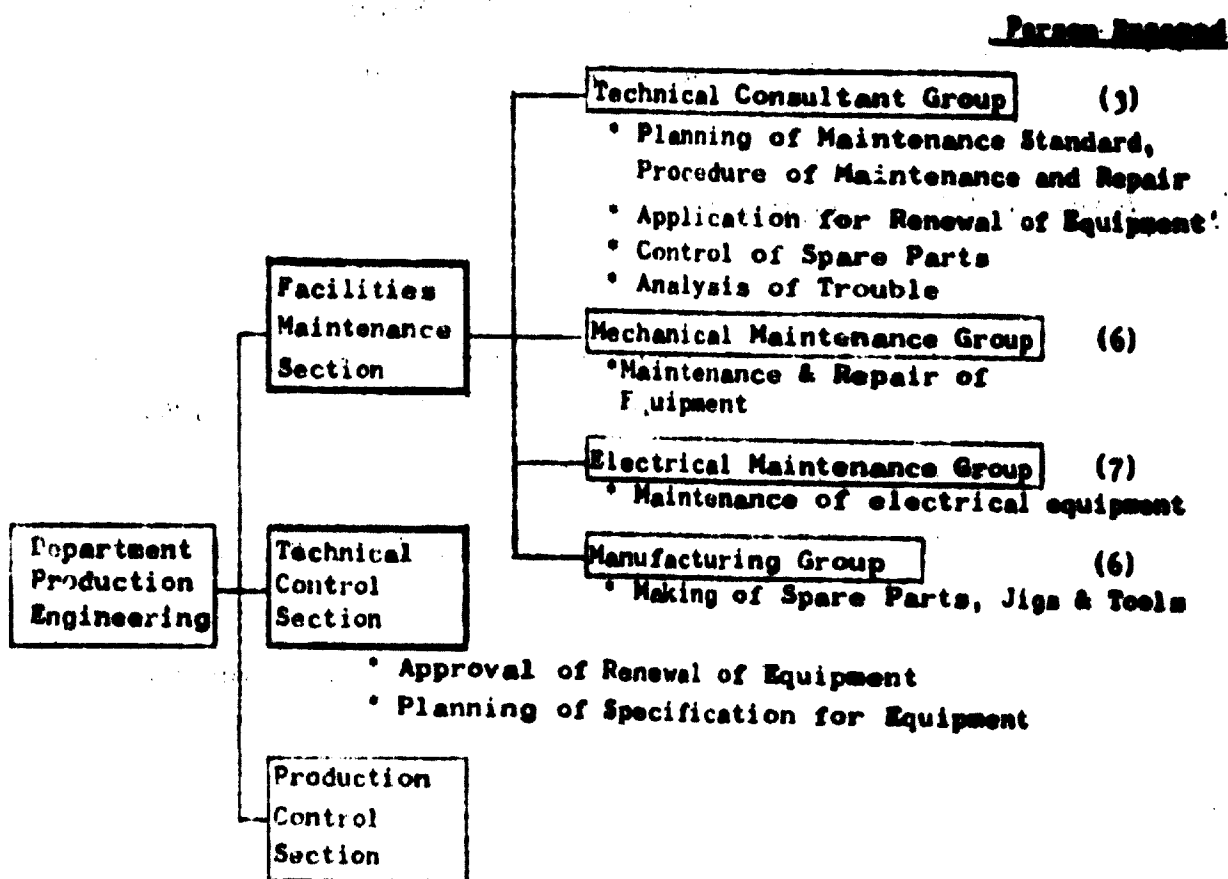
3-3. Classification of Production

Peru Nissan is primarily an Assembly Industry, not a Fabrication Industry.

3-4. Principal Equipment

- 1) Portable Spot Welders
- 2) Stationary Spot Welders
- 3) Paint Booth & Ovens
- 4) Pretreatment Equipment for Painting
- 5) Inspection Equipment for Vehicles
- 6) Power Station
- 7) Air Compressors
- 8) Draining Treatment Equipment

3-5. Organization



Note : Related to Equipment Maintenance

3-6. Maintenance of Equipment

As the production by Peru Nissan thru 1970, was kept at the average monthly production of 60-70 units, they had not performed preventive maintenance (P. M.) on the equipment satisfactorily.

In 1971, however, they had to start P. M., using special technical consultants, because production advanced remarkably.

Special Features of Peru Nissan's Equipment

- 1) Equipment needed to perform P. M. ~~is~~ is limited because Peru Nissan's operation is primarily assembly, not fabrication.
- 2) The equipment can be kept in good condition without much trouble because the major equipment is relatively new.
- 3) It is possible, without difficulty, to procure equipment in exchange for that in use ~~because~~ because the equipment for assembly is not so expensive.

In view of the above features, Peru Nissan actually gives priority to P. M. of the following two pieces of equipment.

- 1) Pretreatment Equipment for Painting
- 2) Paint Booth and Ovens

As for all other equipment, Peru Nissan is now taking P. M. into consideration, though actual conditions will have to be studied from the viewpoint of cost.

4. Conclusion

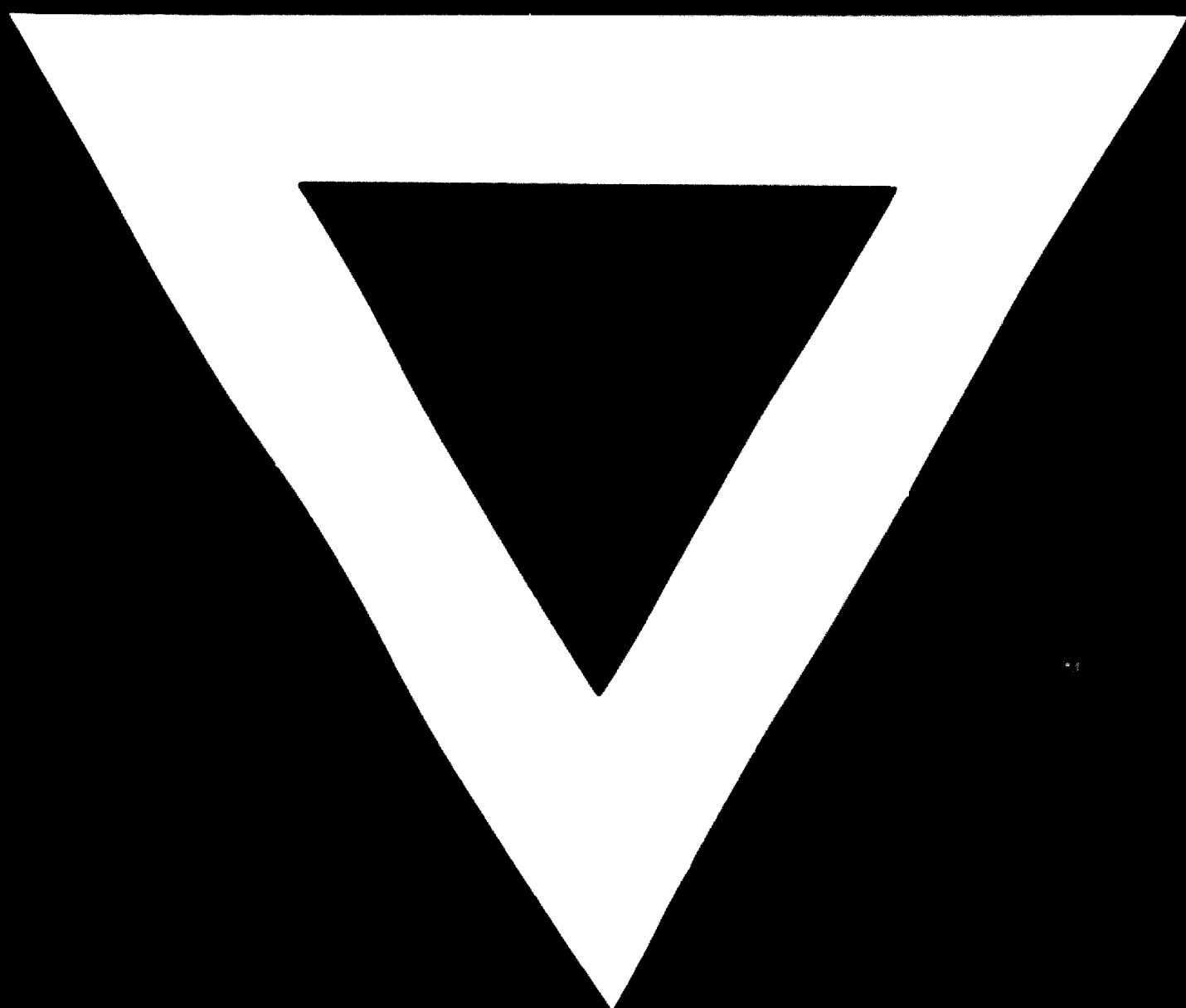
As it is assumed that raising the total profits by effective utilization of company owned facilities is one of the corporate objectives, preventive maintenance should be taken as one factor of productive maintenance. At the same time, a satisfactory production can be realized only by a good balance of technical skills, maintenance, operation, and control techniques.

In the case of preventive maintenance, every trouble must be considered as an economical phenomenon from the standpoint of efficiency control. Moreover, in order to achieve a high level of productivity from limited man-power, important facilities and key items must be especially reviewed from a standpoint of production control, quality control, cost control, delivery control and environmental safety and sanitation aspects.

The key items should be sufficiently examined on the basis of trouble history, their structures, and performances.

In Mexico Nissan, there has also been a trend where only so-called breakdown maintenance is taken into account, due to the tight production schedule. These days, however, productive maintenance is thought much of and a wide range of improvements can now be seen in the training of maintenance personnel, study time devoted to their work, and the establishment of a special staff for safety and sanitary problems.

By the way, it should be noted that henceforth the productive maintenance is to be taken into consideration by all personnel as well as only those who belong to the facilities maintenance department.



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