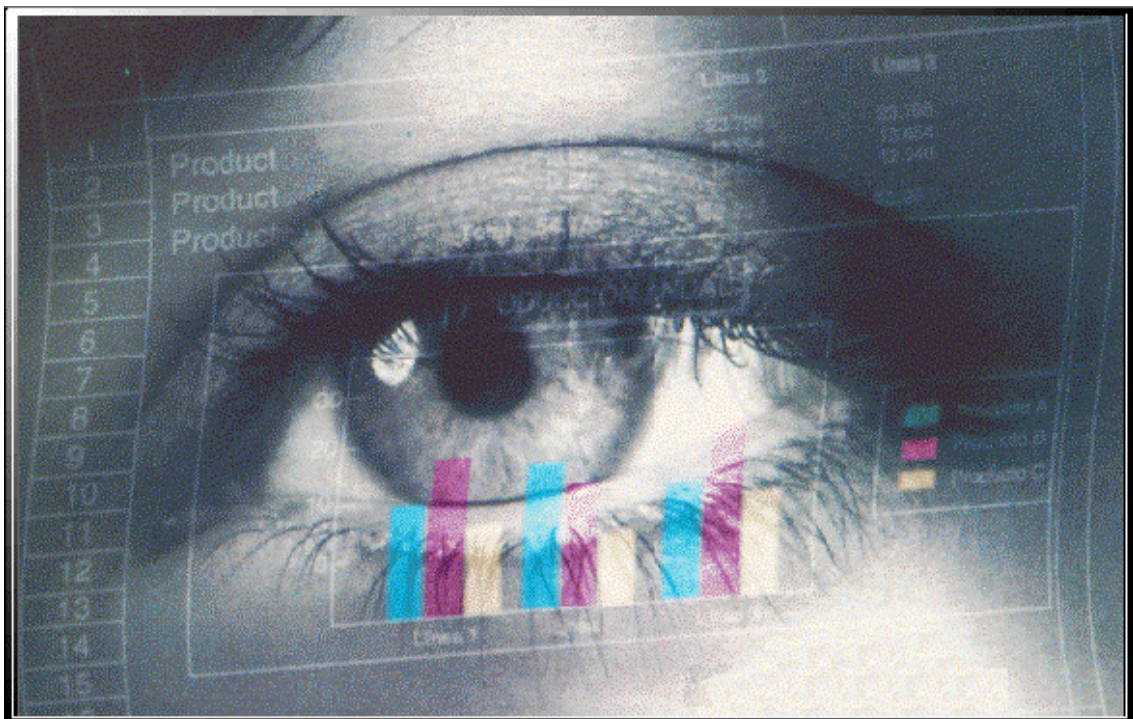


# PYMAN NT

Microsoft®  
**WindowsNT**

**PRODUCTION CONTROL, DIAGNOSE AND  
MONITORING**



## PYSSA

**PROYECTOS Y SOFT. S.A.**

# **I N D E X**

- 1.- INTRODUCTION**
- 2.- PROGRAM MODULS**
- 3.- PERFORMANCE**
- 4.- TECHNICAL CONSIDERATIONS OF  
MODULES.**
- 5.- DETAILS ABOUT THE MODULE  
APPLICATIONS**
- 6.- ADDITIONAL PERFORMANCES**
- 7.- EXPERT SYSTEM**
- 8.- INTERCHANGE OF DATA**
- 9.- NECESSARY HARDWARE**
- 10.- SUMMARY OF SYSTEM FEATURES**

# 1.- Introduction

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## **Objective**

The objective of this software is the diagnostic of important incidents occurring in the installations, regardless of the kind of installation, the type of fabrication system or the applied technique; monitorize the variable states of a process; dispose of a correct production control and/or be able to connect with managing systems such as SAP and Baan.

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This analysis is based on the data recorded by the SPS, which controls the installation. By means of a skillful treatment of these data, the failures and other incidents can be analyzed, and the type of incident, its location and causes can be determined.

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## **Other important skills**

Apart from the diagnostic skills, the logistic parameters can be calculated and visualized in real time (on-line). It is also possible and easy to record the data concerning failures.

Moreover, the analogue values can be processed and their trends can be graphically analysed, such as: speed, temperature, times, production quantities.

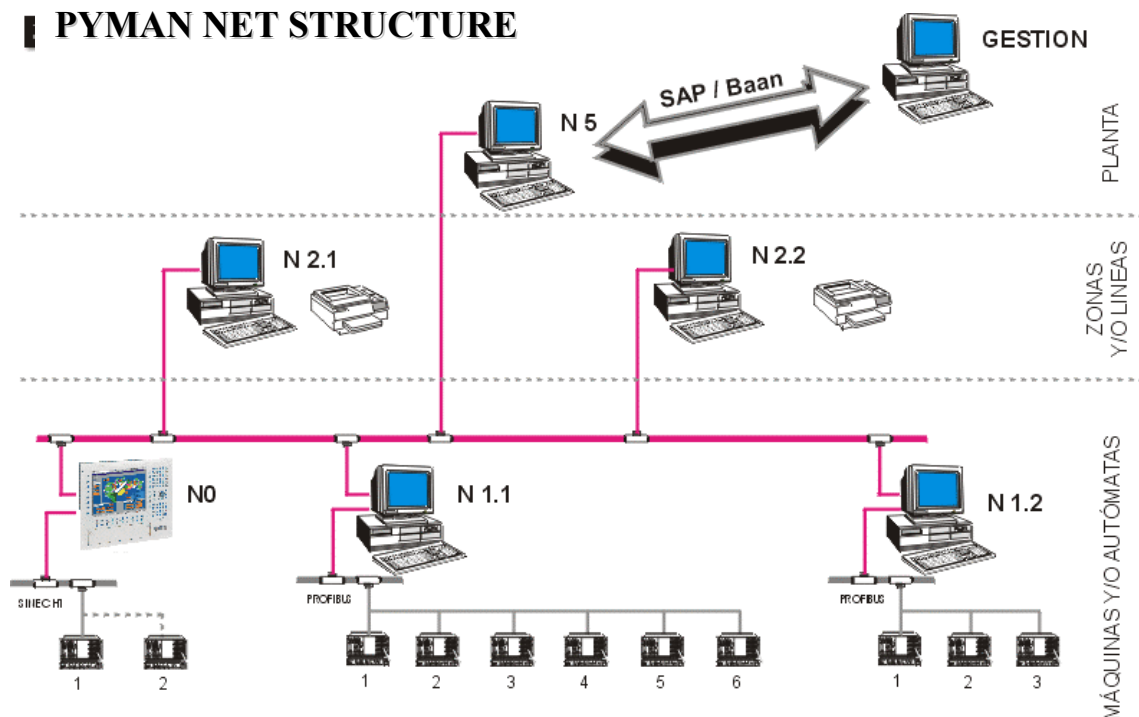
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## General Characteristics

PYMAN can be configured in four levels, following a pyramidal structure:

- **Level 0:** It is able to control 1 or 2 PLC (created basically for controlling one machine).
- **Level 1:** It controls maximum up to 6 PLC's, but depending on the number of variables of PLC to control.
- **Level 2:** It makes a wider control, it has several levels 0 or 1 at his charge. It can exchange data with SAP and Baan systems, having connectivity with them.
- **Level 5:** It makes a general control of installations, receiving data from Levels 2 who depends on it. It can exchange data with SAP and Baan systems.

### ■ PYMAN NET STRUCTURE



The program pick data up from the SPS (PLC's) without interfering in its working, for which thing it does not occasion any risk for its installations, whereas in other trade mark softwares it does not occur. Moreover, during its installation or putting into operation it does not requires the production stop.

Following you will find the basic technical skills of this software:

**- Analysis and failure records:**

- Representation of trends, duration, gravity, performances, real-time when it occurred.
- Definition and failure recording.
- Trees decision and determination of failure causes.
- Historical records and events.

**- Powerful graphics manager:**

- Trends graphics throughout configurable.
- Easy layouts design.
- Dynamic representation states of variables.

**- Reports and summaries:**

- Report and summaries generation.
- Exchange and data export to upper levels and other programs.
- Easy Configurable production reports by means of graphic editor.

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## Advantatges

The operative system used is WINDOWS NT, therefore our system takes advantage of its features:

- ☞ **It is a multitasking system**, that permits execute several programs at the same time.
  
- ☞ **It is powerful**, permits working and adressing 32 bits instructions.
  
- ☞ **It is economic**, does not need any hardware support that makes the product more expensive.

The peripherals, either ones of communication or ones of internal order, are more economic than other systems.

## 2.- Programs of application.

The PYMAN system is composed of several moduls, that permit generating and monitoring powerful applications.

These moduls are :

### **PYMAN:**

It is the responsible of monitoring and managing the aplication once it has been developed, as well as communicating with PLC's and perifericals, such as the screen and the printing machine.

### **PYCAD:**

It is the modul that permits generate the drawings and layouts of installations easily, with the aim of being these last ones, used by the personnel of maintenance of factories, without being trained for its handling.

It is possible to import files type "BITMAP" generated by other programs.

### **PYEDIT:**

It is the edition modul for creating all variables that define the events (variables type bit), analogics, PLC's, users of system, etc. It permits use booleans formules and decision

trees, as well as associating miscellaneous diagnose trees, associating failures and incidencies to drawings, documents, and direct inquiries of variables, that are affected in the moment of being produced.

## **3.- Performance works.**

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### **Experience**

Its purpose is stocking the documentations or informative inquiries either type document or type graphics.

All experiences, will be returned by the system when the event correlation, the “failure or incidence”, it requires.

Moreover, it will be possible to consult to user requirement, some “helps” for the control or handling of installations.

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### **Reports**

The main aim of this work is creating reports with the productive logistic data and failures of automatic adquisition, adding other complementary data introduced by the operator, with the aim of making later on analysis of fiabilization and statistics for previsions of productive maintenance.

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### **Preventive Ranges.**

Work destined to create preventive and predictive maintenance records of events in installations, by means of control records of different concepts that interfere in productive systems. Moreover you will receive information on the time to work out the preventive maintenances.

## 4.- Technical considerations of works

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### Report and presentation of failures and incidencies

The events that occur, either failures or incidencies, will be presented to operator in the way that permits to relate the procedure and cause of the same easily.

#### For each advise, we will dispose of information about:

- PLC associated
- Nr. of failure
- Record of failure related Ficha de avería relacionada
- Priority of failure
- Time when it was produced
- Duration of the same
- Boolean equation of launching of event.
- Minimum integrating time being the failure produced.
- The diagnose and graphic tree associated to the failure.
- Variables associated
- Comentarries associated

#### Additional information of inquiry per event:

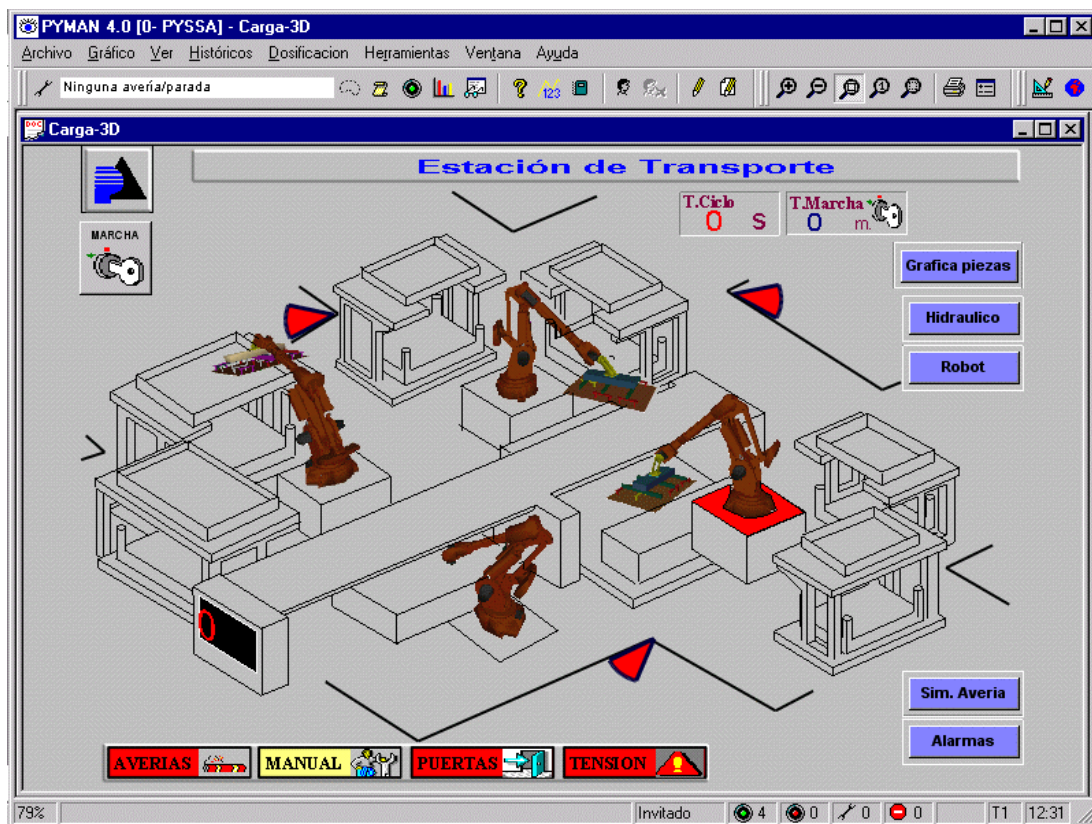
- General or main graphic.
- Failure of graphic.
- Associated graphic type zoom.
- Associated library.
- Associated image.
- Instantaneous values of inner variables of PLC.
- Trends with values in relation with time.

# 5.- Functions using details

## PYMAN

The main screen shows us the layout of installation and in second plane a list of records of messages that have been produced in the application.

In the upper part it is configured the monitoring of tools bar, icons bar or nothing.



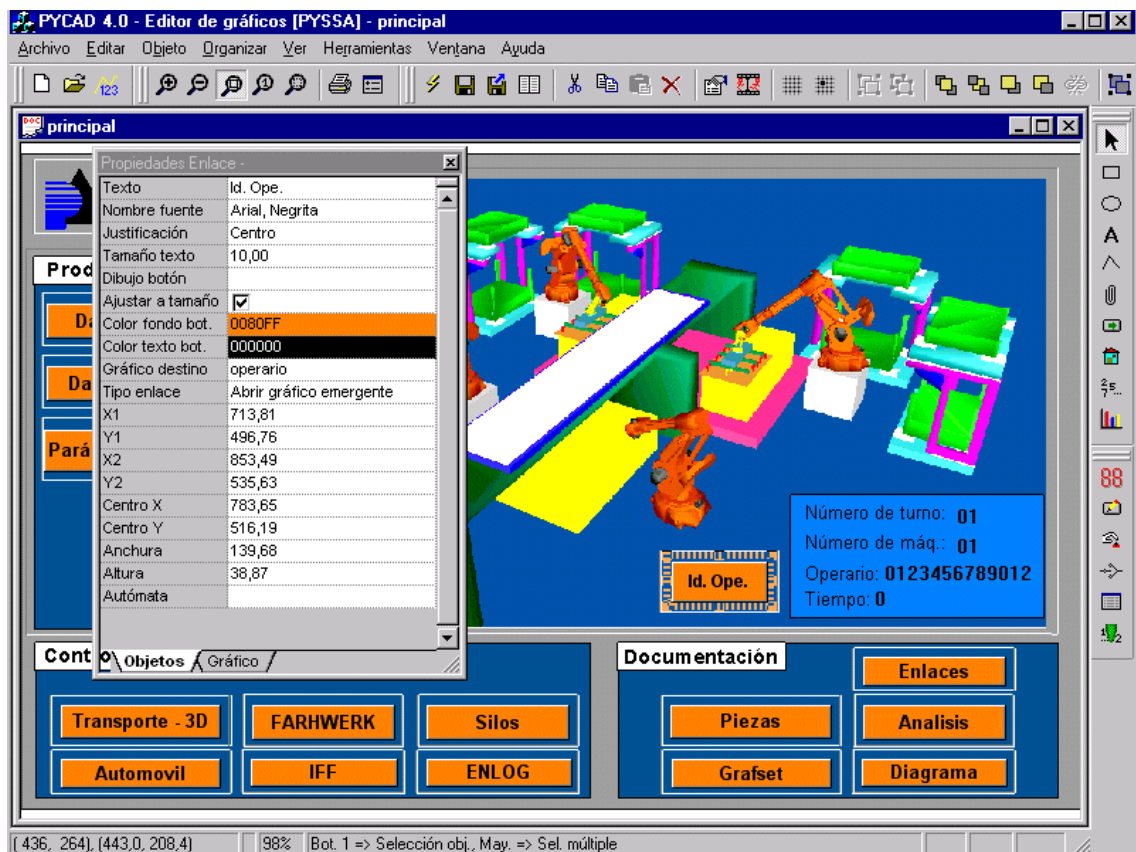
In the below state bar, it is showed different information such as: usuary's name of aplicacion, number of automates

communicating or not, number of failures, number of stops, in current time. This information will be monitored always from any screen of this application.

## PYCAD (graphics editor)

For the realization of graphics by means of PYCAD, it exist several tools that permit us to create 'macros' (general graphics composed of small graphics already made), to insert bitmaps, to draw elements, to insert graphics, etc.

There exists graphics library at user disposal, easy to



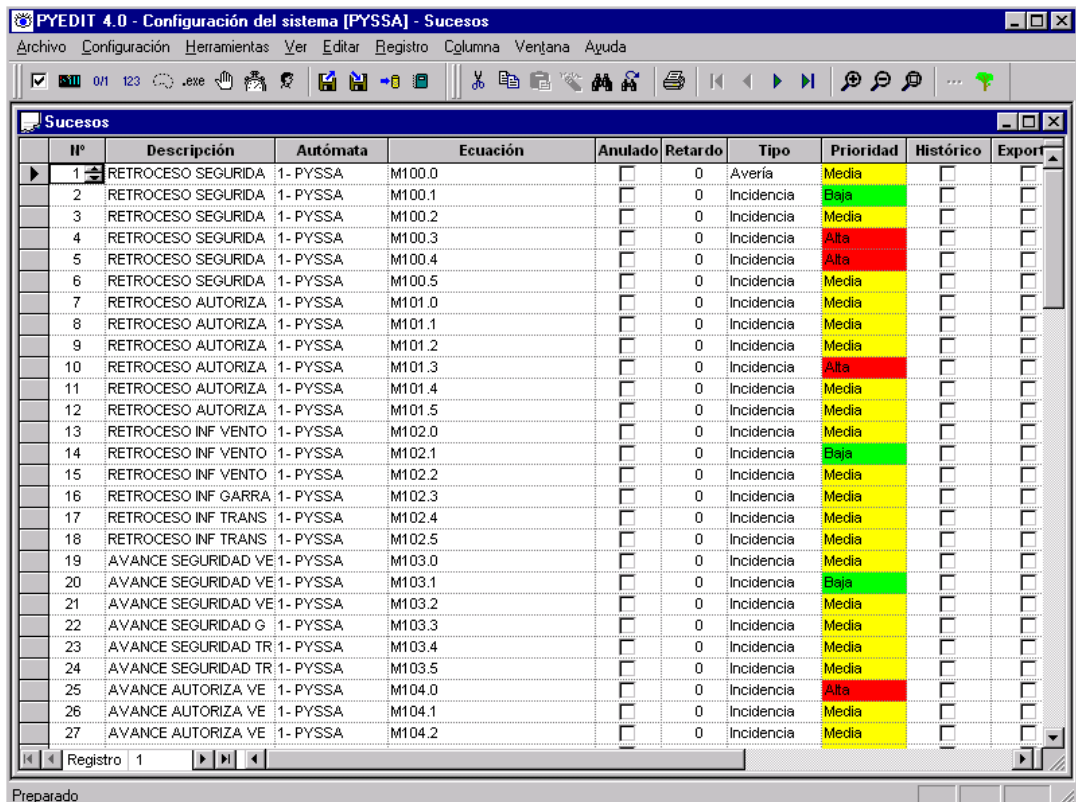
locate and use, permitting as well, enlarging them.

Following you will find detailed some tools considered interesting for the user of this system:

- 'Macros' library creation.
- After making this partial or whole drawing, it exists the possibility of renaming it as macro-graphic.
- Creation of animated graphycs under position and value control.
- Creation of graphycs that can change the colour in function of value or state.
- Eddition systems that permit to copy, delete partial or totally, and reload from what was deleted.
- Enlarging or reduction graphyc size.
- Association of graphyc to graphyc chains for zoom effects.
- Edition and modification of graphics during the diagnose working.
- Helps in each one of design or edition operations.
- Import of photographies.
- Image treatment.

## PYEDIT (Event registers)

It can be defined up to 12000 events in which is possible to configure the following characteristics.



ID	Descripción	Autómata	Ecuación	Anulado	Retardo	Tipo	Prioridad	Histórico	Export
1	RETROCESO SEGURIDA	1- PYSSA	M100.0	<input type="checkbox"/>	0	Avería	Media	<input type="checkbox"/>	<input type="checkbox"/>
2	RETROCESO SEGURIDA	1- PYSSA	M100.1	<input type="checkbox"/>	0	Incidencia	Baja	<input type="checkbox"/>	<input type="checkbox"/>
3	RETROCESO SEGURIDA	1- PYSSA	M100.2	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
4	RETROCESO SEGURIDA	1- PYSSA	M100.3	<input type="checkbox"/>	0	Incidencia	Alta	<input type="checkbox"/>	<input type="checkbox"/>
5	RETROCESO SEGURIDA	1- PYSSA	M100.4	<input type="checkbox"/>	0	Incidencia	Alta	<input type="checkbox"/>	<input type="checkbox"/>
6	RETROCESO SEGURIDA	1- PYSSA	M100.5	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
7	RETROCESO AUTORIZA	1- PYSSA	M101.0	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
8	RETROCESO AUTORIZA	1- PYSSA	M101.1	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
9	RETROCESO AUTORIZA	1- PYSSA	M101.2	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
10	RETROCESO AUTORIZA	1- PYSSA	M101.3	<input type="checkbox"/>	0	Incidencia	Alta	<input type="checkbox"/>	<input type="checkbox"/>
11	RETROCESO AUTORIZA	1- PYSSA	M101.4	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
12	RETROCESO AUTORIZA	1- PYSSA	M101.5	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
13	RETROCESO INF VENTO	1- PYSSA	M102.0	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
14	RETROCESO INF VENTO	1- PYSSA	M102.1	<input type="checkbox"/>	0	Incidencia	Baja	<input type="checkbox"/>	<input type="checkbox"/>
15	RETROCESO INF VENTO	1- PYSSA	M102.2	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
16	RETROCESO INF GARRA	1- PYSSA	M102.3	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
17	RETROCESO INF TRANS	1- PYSSA	M102.4	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
18	RETROCESO INF TRANS	1- PYSSA	M102.5	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
19	AVANCE SEGURIDAD VE	1- PYSSA	M103.0	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
20	AVANCE SEGURIDAD VE	1- PYSSA	M103.1	<input type="checkbox"/>	0	Incidencia	Baja	<input type="checkbox"/>	<input type="checkbox"/>
21	AVANCE SEGURIDAD VE	1- PYSSA	M103.2	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
22	AVANCE SEGURIDAD G	1- PYSSA	M103.3	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
23	AVANCE SEGURIDAD TR	1- PYSSA	M103.4	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
24	AVANCE SEGURIDAD TR	1- PYSSA	M103.5	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
25	AVANCE AUTORIZA VE	1- PYSSA	M104.0	<input type="checkbox"/>	0	Incidencia	Alta	<input type="checkbox"/>	<input type="checkbox"/>
26	AVANCE AUTORIZA VE	1- PYSSA	M104.1	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>
27	AVANCE AUTORIZA VE	1- PYSSA	M104.2	<input type="checkbox"/>	0	Incidencia	Media	<input type="checkbox"/>	<input type="checkbox"/>

There are defined:

1. The PLC or Automate related.
2. There will be associated an event number.
3. There will be associated the main description of failure.
4. The booleane equation of failure detection.
5. Whether it is failure or incidence.
6. The integrating time of failure.
7. The priority type.
8. The direction of graphic associated.
9. Decision tree associated.

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## **PYEDIT (Edition of diagnose trees)**

One of the advantages of PYMAN is the creation of trees of comparative detection, being able to relate the cause that produced the failure.

Each failure can be associated to the edition of a tree, for which thing we will have some consults as the result of detection of a failure in the execution process of the program in a installation.

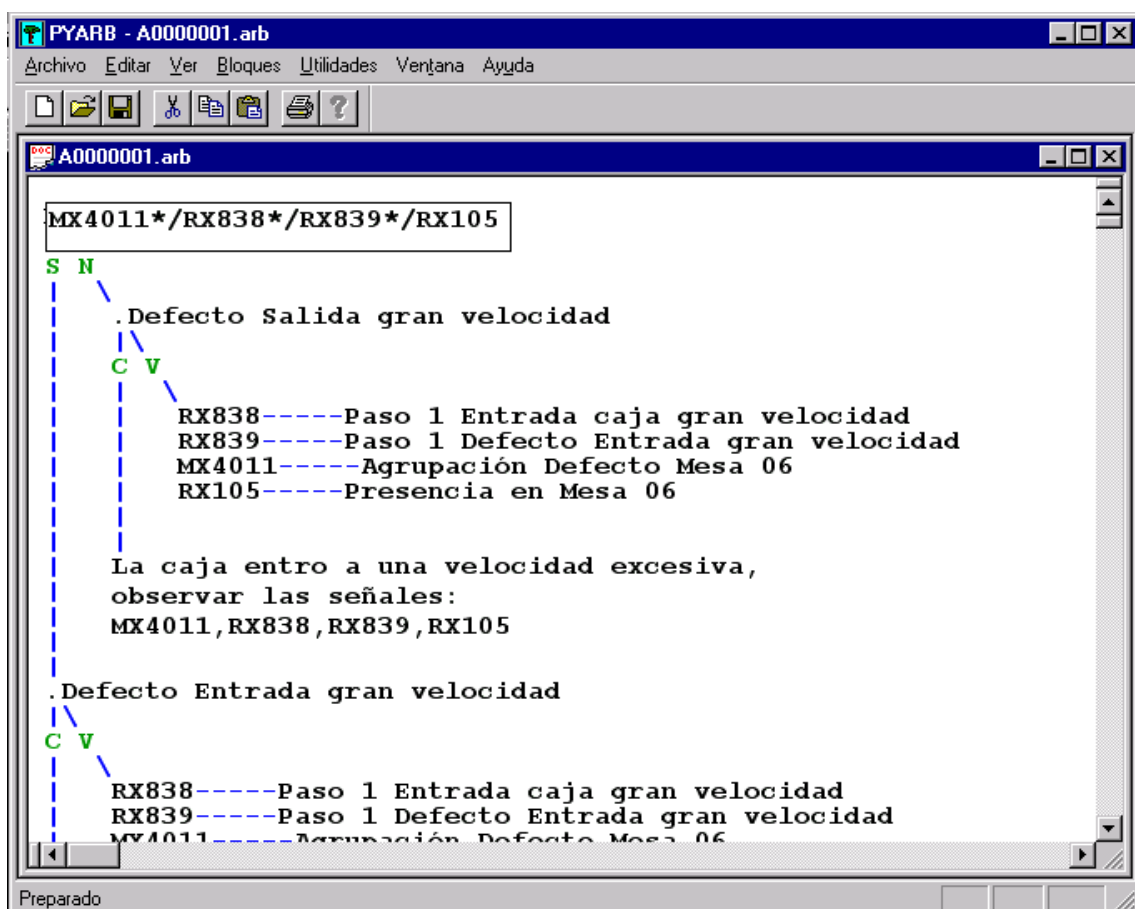
The communications system that is described as following, permit us to obtain at real time the instantaneous values of several variables, in the moment that failure was detected.

In the comparisons of condition are present the equality or comparison major menor either of bits or words.

In each one of branches of final decision will be associated a text or a call to a graphic, also it will be incorporated at will, the variables of inquiry in the moment in which the failure is produced as well as the text or commentary of the same one.

The system of detection of trees will have several tools who permit the following:

- To Create 'macros' trees with the aim of being patrons and avoid in this way, the repetition of works.
- That some trees can call to other ones in the way, that a tree can be the result of a formation of others.
- To Make a library of patron trees, with the aim of changing only the absolute addresses.
- To Personify easily the installations by means of the system of research and replacement.

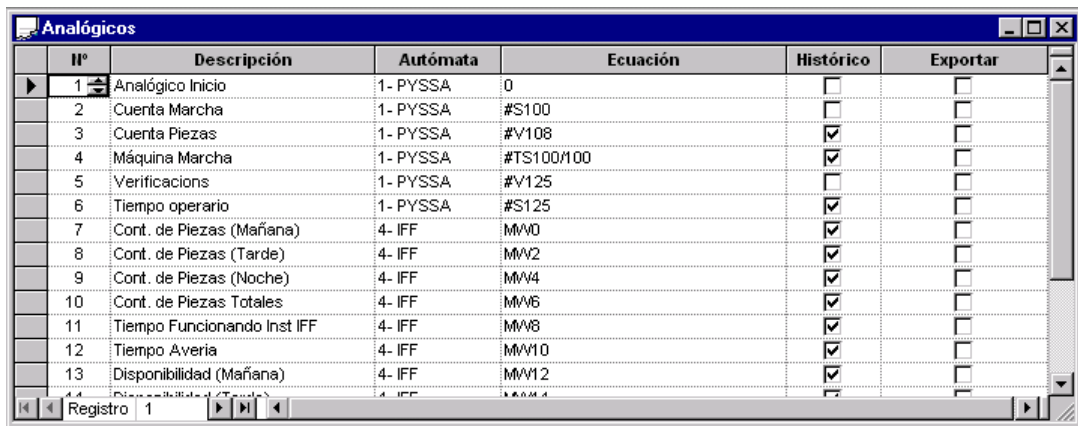


## 6.- Other features

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### Analogic values

The values of variables of automate can be analyzed and treated, monitoring its value in real time.



Nº	Descripción	Autómata	Ecuación	Histórico	Exportar
1	Analógico Inicio	1- PYSSA	0	<input type="checkbox"/>	<input type="checkbox"/>
2	Cuenta Marcha	1- PYSSA	#S100	<input type="checkbox"/>	<input type="checkbox"/>
3	Cuenta Piezas	1- PYSSA	#V108	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Máquina Marcha	1- PYSSA	#TS100/100	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Verificaciones	1- PYSSA	#V125	<input type="checkbox"/>	<input type="checkbox"/>
6	Tiempo operario	1- PYSSA	#S125	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Cont. de Piezas (Mañana)	4- IFF	MW0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Cont. de Piezas (Tarde)	4- IFF	MW2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Cont. de Piezas (Noche)	4- IFF	MW4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Cont. de Piezas Totales	4- IFF	MW6	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11	Tiempo Funcionando Inst IFF	4- IFF	MW8	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	Tiempo Avería	4- IFF	MW10	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	Disponibilidad (Mañana)	4- IFF	MW12	<input checked="" type="checkbox"/>	<input type="checkbox"/>

At user disposal we offer 2.000 addresses destined to be treated with booleans operations, and being monitored by screen.

The bars graphics can be coloured, with many animations, changing colours depending on the value.

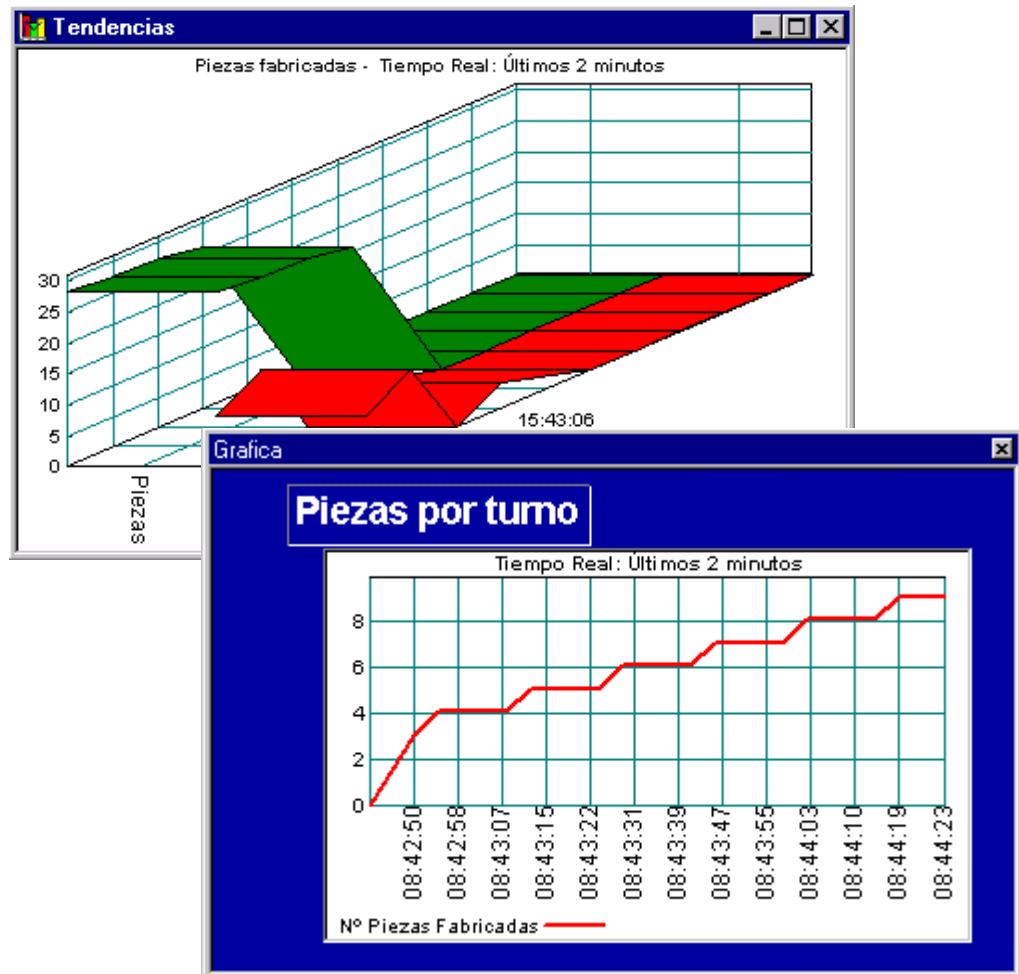
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### Trends

The graphics of evolution of analogic values are showed in function of real time. These values can be relative to the production or any other value.

For instance:

Times of stops in production, productive times, temperature values, speed, etc.

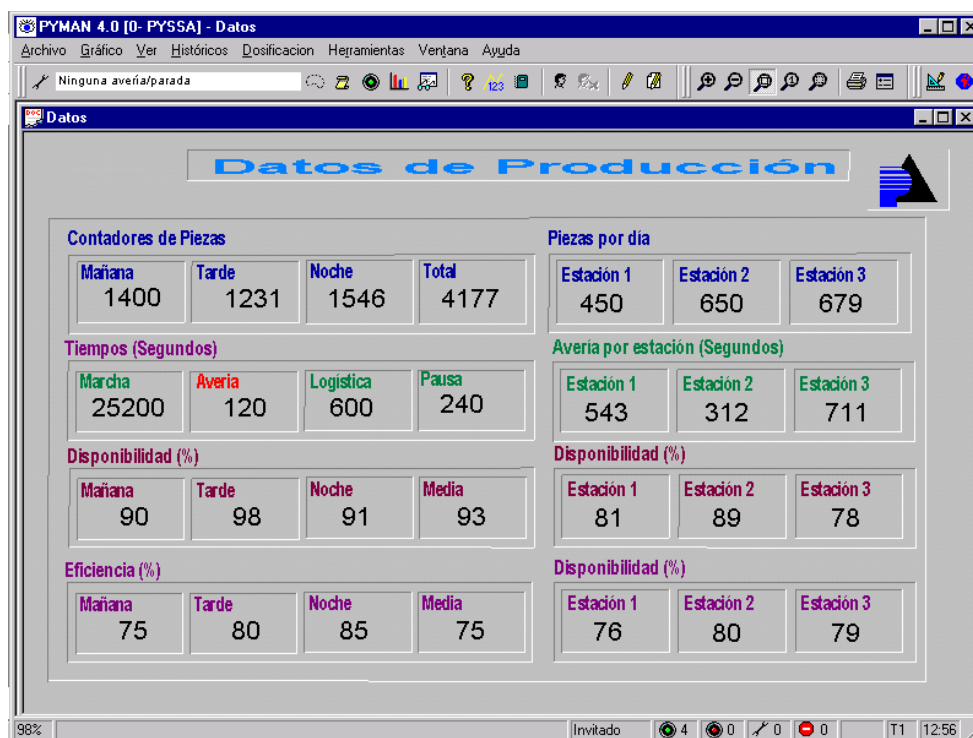


## Logistics

For the logistics data treatment it can be employed the design of graphic screens with data acquisition, being able to obtain directly the value of times and number of times that event has been produced, either failure or incidence.

The system provide directly some macros of utility for informing about how much time the installation has been in failure, number of times that it has been produced, etc.

The analysis times can be obtained directly from the acumulative values, as well as the medium duration, current



active time and the accumulated one.

## Operativity and calcule

Each one of the 2000 available analogic records, can call to any value of any other record defined.

The calcule in each record will be the one that permits the booleans equations, reaching several records agruped, we

establish calculates of proportional mediums and values relationables at will.

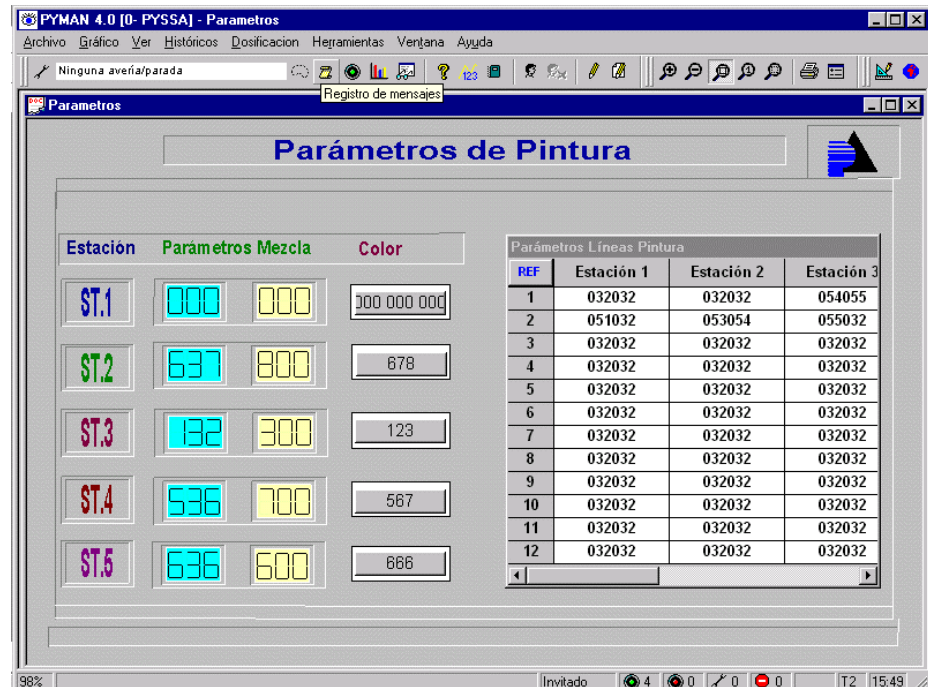
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## Production Lists

The analogic values can be listed by printer according to one base model.

The user can define the format to use and which the listed values will be.

The format will be designed by the graphic editor PYCAD.



The data is filled in the squares as the model shows by means of PYEDIT.

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## Parameters

PYMAN can make the modification fast and interactively of tables recorded in the automate (PLC) memory.

The variables of PLC that have to be modified will have to be defined as parameters.

For each parameter corresponds a record in which it is defined:

1. The PLC that controls “x” variable.
2. The maximum and minimum values associated to the variable.
3. The graphic from which the parameter will be called.

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## Menus

The user can design its own Menus and link them.

Once defined, they permit us to move ourselves into the screens of parameters in a fast and easy way.

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## Links

In order to navigate easily across the different graphics, we use the links.

One link consists of one button situated in the origin place whose activation will situate us directly in the destiny graphic.

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## **Technical records of maintenance**

For the making of maintenance **Predictive and Preventive**, we will create some records where we will locate the element to diagnose according to different concepts:

### **Working hours**

### **Execution maniobres**

### **Technical ranges**

Executing Times in control

Intensity and/or tension

Caudal, pression

Temperature

PH

Vibrations

**The type of control will be analogyc or digital.**

The tolerances will be defined with maximums or minimums.

**The notices are showed by screen or printer:**

Standar or conditional notice.

Notice and stop by maximum value.

## Failures record filling

For filling failure records and by means of the same programme, there will be filled automatically the following data:

This data is:

1. Machine or line address.
2. Element address.
3. Start hour of failure
4. Accumulated time
5. Affected time of stop.
6. Final hour of failure.
7. PLC concerning.
8. Direct cause.
9. Failure number.

The screenshot displays a software interface with two windows. The background window, titled "Lista Averías/Paradas", contains a table with the following data:

Estado	Descripción	Inicio	Zona	Autómata
	121- Averia Robot 1	12:13:11	0- Zona por defe	1- PYSSA

The foreground window, titled "Cumplimentación de Avería - Averia Robot 1", is a form for editing the selected record. It contains the following fields:

- Afectaciones de Elementos:**
  - Campos: Robots
  - Elementos: Averiado
- Elementos Implicados:** Carga
- Acciones:** Modificar
- Áreas:** Mantenimiento
- Preventivo:** Cambiar Pieza
- Causa:** Rotura por desgaste
- Comentario:** La rotura se ha producido por 4cuarta vez en 2 meses, seria interesante hacer un preventivo

At the bottom of the dialog box are two buttons: "Aceptar" (Accept) and "Cancelar" (Cancel).

The additional data is completed manually with the help of descriptive screens, in which only with a click of mouse, the corresponding code of type of cause and complement will be attached.

Being these ones:

- Field of implication of failure:  
Mechanic, Electric, Pneumatic, Electronic,...
- Element: Sensor, end of stroke, rele, lightguard,....
- Defined action: Reglage, wearing out, breakage,.....
- Needs Preventive: No, Yes, Fast
- Involved elements: transport, welding, robots, .....

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## **Manual control**

It exists the possibility of using the manual control version for the handing in installations.

The computer, screen, control and communication, are placed in one cupboard protection IP55. You can address up to 16 screens of 16+16 commands each one, 512 command inputs in total.

The operativity with these controls is easy and powerful.

The movement of cursor will be done with the frontal controls of displacement, information and execution.

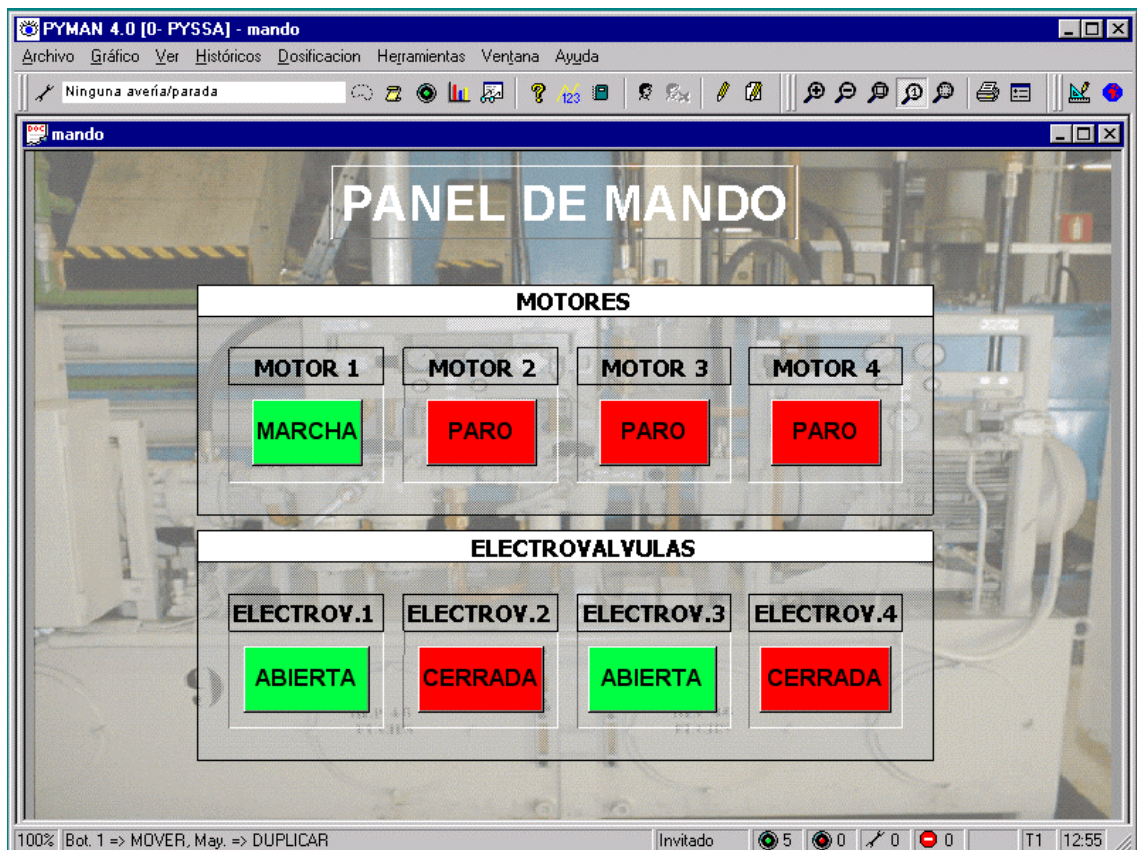
Each one of functions to control and manage, will be personified with the following characteristics:

1. The PLC involved.
2. The address of input or bit PLC.
3. Security of working in the performance.
4. Control in active position.
5. Control y standing position.

6. Signal of fix colour of complied movement.

7. Signal of colour with blinking being in movement.

When it is desired to make personifications of diagnose, or use the rest of features of this system, there will have to



open the frontal door and use the inner keyboard where a roller is incorporated with the functions of keys of displacement.

## 7.- WISE SYSTEM

The characteristics for which we consider that this is an wise system are:

- ✓ The technician that 'build' the machine or line of production, introduce data that will come back to the user when they are precised in the moment of producing an event or failure.
- ✓ The knowledge of working either initial or final are stored in records, being come back to the user at his will or when some event takes place.

The screenshot shows a software window titled "Editar actuación". It features a list of movements on the left, a central area for editing actuation details, and a bottom section for configuring active and rest states. The active state configuration includes fields for signal (E0.0), value (1), and movement completion (E0.4). The rest state configuration includes fields for signal (E0.2), value (0), and movement completion (E0.5). Buttons for "Aceptar" and "Cancelar" are located in the top right corner.

- ✓ In the machines or installations it is common that exists one technician who knows them perfectly, and even better than that one who has created them, for which thing, this persone will be able to apply his experience to each situation by reflecting its

comments, in fact, it will be very useful for the knowledge of rest of users who will be able to follow his comments and advices.

## 8.- COMMUNICATIONS

The most common communications are as follows:

- RS 232 o RS 422 o RS 485
- JBUS
- ETHERNET

**Automates or PLC** with whom the system works:

- IPC-620 HONEYWELL
- SERIE S5 DE SIEMENS H1, L1, L2
- SERIE S7 DE SIEMENS
- TELEMECANIQUE
- SMC 600
- APRIL 1000, 5000,
- MITSUBITSHI
- HITACHI
- ALLEN BRADLEY Serie 5

(\*) – Currently PYSSA is developing more drivers and they can also be developed according to customer's needs.

## 9.- NECESSARY HARDWARE

For the application of described software, it is necessary a PC that complies with the minimum features of power and execution speed, as well as enough storing capacity.

- PC CPU PENTIUM
- 64 MB RAM
- 2.1 GB of Hard/disk
- 1,4 MB de Flopy/disk 3,5"
- CD Rom
- 17" VGA or bigger screen.
- 4 Slots minimum expansion.
- 1 Mouse.
- 1 Keyboard 102 keys.

# 10.- SYSTEM FEATURES SUMMARY

Inputs/Outputs	<b>ALL</b>
Inner Bits	<b>ALL</b>
System Bits	<b>THE AVAILABLE ONES</b>
Words	<b>256 per each</b>
Depending replying time	<b>Nr. of sendings</b>
Characters per equation	<b>256</b>
Events (Failures/incidences)	<b>6.000</b>
Temporizations from 0 to 999sec.	<b>6.000</b>
Decision trees	<b>6.000</b>
Analogiques	<b>2.000</b>
Graphics	<b>Without limit</b>
Graphics compatibility	<b>BMP</b>
Drawing Macros	<b>Without limit</b>
Text	<b>6.000 pages</b>
Failure data- exterior	<b>Reset manual/autom.</b>
Production data - exterior	<b>Reset manual/autom.</b>
Ethernet communications	<b>2</b>
Lower communications	<b>8</b>
Screens command	<b>16</b>
Command level	<b>16 + 16</b>
Logistic information	<b>6.000</b>