italtec

UNI EN ISO 9001

CIM-3000

EDUCATIONAL FLEXIBLE MANUFACTURING SYSTEM

(CIM & FMS Educational Solution)

CIM-3000 is a group of machineryes and devices which, connected by a local field network, allows the study of all aspects of an automatic production system including the programing and handling of each machine devices which makes up the CIM-3000 Flexible Manufacturing Unit.

CIM-3000 consists of:

- 1 **CNC-CL-100** CNC machining center with FAGOR CNC
- 1 **CNC-T –100** CNC lathe with FAGOR CNC
- 1 **CATALYST**: five axes robot with a jointed arm,
- 1 **SRP-100:** slide for Robot positioning
- 1 **C4L-100:** conveyor of 4 mt. length
- 1 **LFN-100:** local field network
- 1 **PMS-100:** PLC management system
- 1 **SCM-100:** software for control and management of the Flexible Unit.

Accessories included:

- 1 set of tools for CNC lathe
- 1 set of tools for CNC milling machines
- 1 support table for the CNC milling machines .

- 1 support table for the CNC lathe.
- 1 support table for the PC's.
- 1 set of parts for fastening and connection (mechanical and electrical) .
- 1 compressor muffler.
- 1 set of working spare pieces.

The user's manuals and exercises are provided only in English.

EDUCATIONAL TARGETS

italtec's solution to configure the educational Flexible Manufacturing Unit is oriented towards the processes of mechanization by CNC machines working to the point of giving a larger amount of formative values, thus returning the investment. These added formative values are summarized in the following knowledge areas:

- Processes of mechanization with milling machines.
- Processes of mechanization with lathes.
- Use and programming of Numerical Controls (CNC).
- Use and programming of Industrial robot .
- Use and programming of positioners .
- Robot manipulation processes.
- Use and application of dedicate station with pneumatic technologies
- Supervision and monitoring software

The **CIM-3000** educational Flexible Manufacturing Unit of italtec meets, in addition to the machines and devices, a great amount of technologies which allows to approach formative aspects toward to the LEVEL 0 of the automation " pyramid ":

- Control in closed loop.
- Power electronic: regulation of speed and position.
- Automations with motors.
- Sensors and activation.
- Electrical actions.
- Pneumatic and hydraulic actions.
- Microelectronic.
- Local networks.
- Application software .

TECHNICAL DESCRIPTION

CIM-3000 is a group of CNC machines, devices and other equipment which allow to perform a complete manufacturing process through updated technologies and methods.
It consists of:

CNC MACHINING CENTER CNC-CL 100 equipped with:

- automatic cooling system
- lubrication system
- manual clamp
- total safety protection
- support table
- tool kit
- training and technical manuals

Its main technical characteristics are:

- Electrically welded steel plate frame with cast iron saddle
- Rolled balls re-circling threads
- CNC control unit: FAGOR 8040 or latest
- DC motor drives with closed loop speed control
- Digital feedback DC motors, with encoder position control
- Dc Axis motors: 0.17N/m permanent
- magnets DC
- with 1:5 reduction gear
- Axis strokes: X=160, Y=100, Z=120mm
- Repetitivity: 0.03 mm
- Precision: 0.03 mm
- Spindle nose/board surface distance: 180mm
- Board size: 380 x 130mm
- Tool holders: ISO 30
- Max. tool diameter: 20 mm
- Spindle motor power: 1HP AC
- Axis fast displacement speed: 2500mm/1'
- Spindle rotation speed: 5600 RPM
- Cooling and lubrication included
- Power supply: two-phase 220V
- Size: 1300 x 700 x 980 (h) mm
- Weight: about 250 Kg.

CNC EDUCATIONAL LATHE MOD. CNC- T-100 equipped with:

- tool holder turret with easy manual tool changement
- automatic cooling system
- lubrication system
- manual clamp
- total safety protection
- support table
- tool kit
- training and technical manuals
- all the accessories required for immediate machine starting.

Its technical characteristics are:

- 45° slanting electrically welded steel plate bed with cast iron saddle
- Rolled balls re-circling threads
- CNC control unit: FAGOR 8040 with CAD-CAM connection
- DC motor drives with closed loop speed control through encoder
- 0.17N/m DC axis motors with 1:5 reduction gear
- Axis strokes: X=100, Z=220mm
- Height of centers: 260mm
- Turned maximum diameter: 160mm

- Cross slide turned maximum diameter: 160mm
- Repetitivity: 0.03 mm
- Precision: 0.03 mm
- Spindle motor power: 1HP AC
- Axis fast displacement speed: mm/1' 2500
- Spindle rotation speed: 5600 RPM
- Manual spindle external diameter: 100mm
- Toolholder turret with easy manual tool replacement: 2 10X10mm section tools
- Cooling and lubrication included
- Tool kit included
- Power supply: two-phase 230V
- Size: 1200 x 700 x 620 (h) mm ca.
- Weight: 200Kg ca.

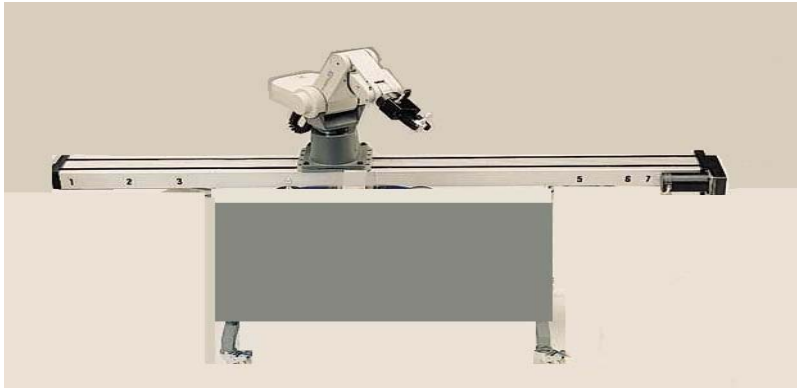
ROBOT WITH A JOINTED ARM, MOD. CATALYST , equipped with:

- Servomotors for DC along its five axes.
- Position detectors by end of run and encoders.
- Column base with four fastening holes.
- Serial communication: RS-232C.
- Control panel with many functions.
- Parallel closed tweezers with DC motor.
- Emergency push-button for stopping.

Its main technical characteristics are:

- Degree of leeway: 5
- Precision: 0,3 mm
- Weight: 19 Kg
- Speed: 5,1 m/S
- Teach pendant included
- J1 360° 210°/second
- J2 110° 210°/second
- J3 125° 210°/second
- J4 220° 551°/second
- J5 roll 360° 1102°/second

SRP-100 Slide for Robot positioning
It allows the robot to operate inside the working area, by moving freely among the working stations, to move the pieces from the conveyor to the CNC machines.



CONVEYOR UNIT mod. C4L-100 manufactured in aluminium and steel for to transport the machined pieces to the different process stations.

Main technical characteristics:

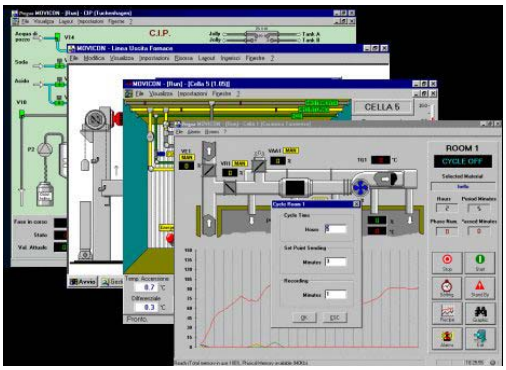
- Length: 4 mt.
- AC motor drive
- Magnetic sensors for positioning
- PLC Management
- Total follow-up link to CIM–3000 control

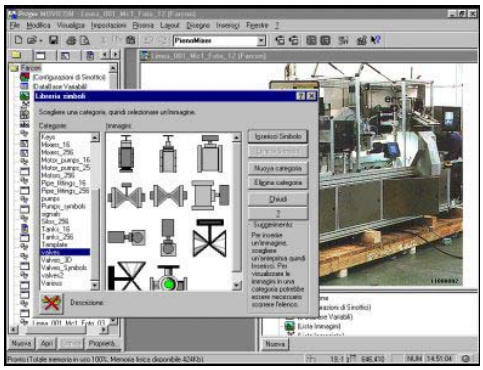
PLC MANAGEMENT SYSTEM MOD. PMS-100

It is mainly composed by an electrical cupboard fitted with a powerful PLC which manages some functions of control of the different auxiliary components included in the **CIM-3000** flexible manufacturing system.

- 1 local field network including wiring and managing software.
  The local network allows the various machines, accessories and devices to communicate up to the pre-set standards belonging to the most popular industrial protocols.

- 1 software to control and management of the Flexible Unit **MOVICON**
  The software allows to manage the working cycles and to give commands to the different peripherals included in the **CIM-3000.** On the screen, it will be possible to follow the graphical real-time process evolution with indications of the operational status of the different machines.





To install the unit, the following accessories are required:

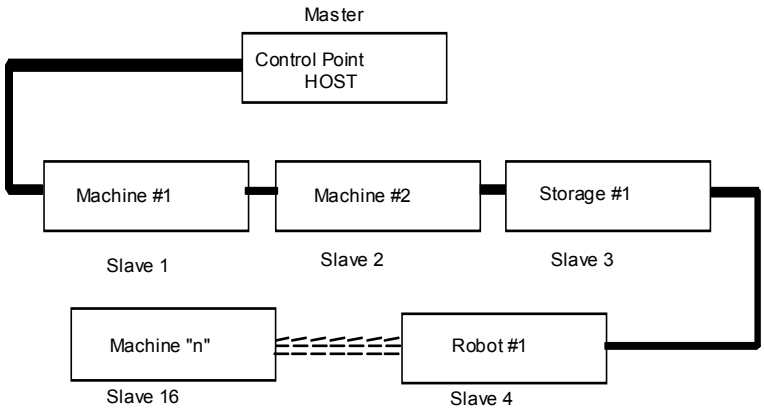
- Outlets with 220/380 Volts single/three-phase, 50/60 Hz.
- Air outlets at the pressure of 6-8 bar. The unit consumes about 500 cm^3 for each tool-change operation, 300 cm^3 for each tightening of the part in the hydraulic clamps of mechanization center, 500 cm^3 for each tightening of the part in the lathe and 100 cm^3 for each loading/unloading of cutting tools in the storage.
- System for lifting and transport when unloading the machines from the truck, moving them through the client's installations and installing them in their definite location.
- Computer with:

  - PC with Processor Pentium .
  - Operating system Windows 98/2000/NT/XP.
  - SVGA colour monitor.
  - 120 Mbytes hard disk capacity .
  - 512 Mbytes RAM memory.
  - Two free expansion standard slot.

OPERATIONAL DESCRIPTION

The **CIM-3000** Flexible Manufacturing Unit from italtec provides a perfect balance for the educational centers, which train productive system specialists since it brings together educational solutions with technical solutions taken from the industrial reality. The following are the main aspects:

- The relation between the control point (Host) and the integrated devices in the CIM is done through **local field network** with its industrial architecture based on up to date standard protocols. A slave is assigned to each machine or device which will allow:



Local Field Network

1) Work in real time since the control point (Host) discharges on the slaves the management of the information from and to the machines controller. In this way the control point can scan quickly all the connected slaves in the network, send commands and get information on the handling and monitoring of the machines on the screen.

2) Various machine programs are used in the same process. In this way it is possible to send machine programs corresponding to each machine from the control point (Host), if there in a group exists various types of mechanization which are not common to all the sections, or otherwise if the program is already loaded into the memory of the machine's controller the order to start will be sent.

   Other systems of the CIM require that the program which is going to be executed by the machine is previously loaded and activated in the machine's controller, thereby enormously reducing its flexibility.

4) Communication from the control point (Host), individually with each machine, with the purpose of getting information as to:

   - Whether it is executing or is waiting for an order.
   - The state of its various devices as for example: an open door or location of the tool or closed clamps or the program number being executed, etc.

   and also with the purpose of controlling the machine from a distance by transmitting orders of movement to a specific point, a program execution, activation of a device, etc.

- The software of the italtec's **CIM-3000** is conceived as a tool which has a double use: as a control system and educational medium in a course room with various learning posts.

  The software executes the individual control of the integrated devices in the flexible production system. It has **DNC** applications, designed specifically for each machine to send orders of execution to the machine controller and to receive information from it. This information, displayed on the screen, permit the monitoring of the state of each device during the manufacture process.

  The software module is a manufacture process simulator. By means of drawings which represent on the screen the configuration of the flexible unit, it is possible to observe the manufacturing process evolution detecting possible errors in the sequence which can cause collisions or function anomalies in the system.

  The software automatically generates a manufacture sequence of the production necessities based on the amount of each part that needs to be manufactured, the date of delivery, the emergency of the request, the workday, etc. As soon the sequence is obtained the user takes into account the information about the sequenced working orders according to priority: the total and partial for each machine. Consisting of a similar existing Production Management package in the industry.

  Other integrated software is a CNC program editor in **ISO code** for CNC lathes and CNC milling lathes. It has a graphic simulator program which permits the respective part to the edited to be seen on the screen.

- Despite the fact that the **CIM-3000** from italtec is oriented to exclusively formative use it is very important that the control and action devices are loyal copies of the ones used in the industrial world, since it is made by technicians who are going to integrate directly in the working world avoiding technical solutions which, even though more economical, are not in use today. Such is the case of the action of the axles in an open loop, characteristic of the step-by-step motors. italtec's solution incorporates the control in a closed loop.

- The CNC lathe, the CNC milling machine and the robot have controllers that are fully tested in the industry and take into account the guaranty of its respective manufacturer.