

# Albatros

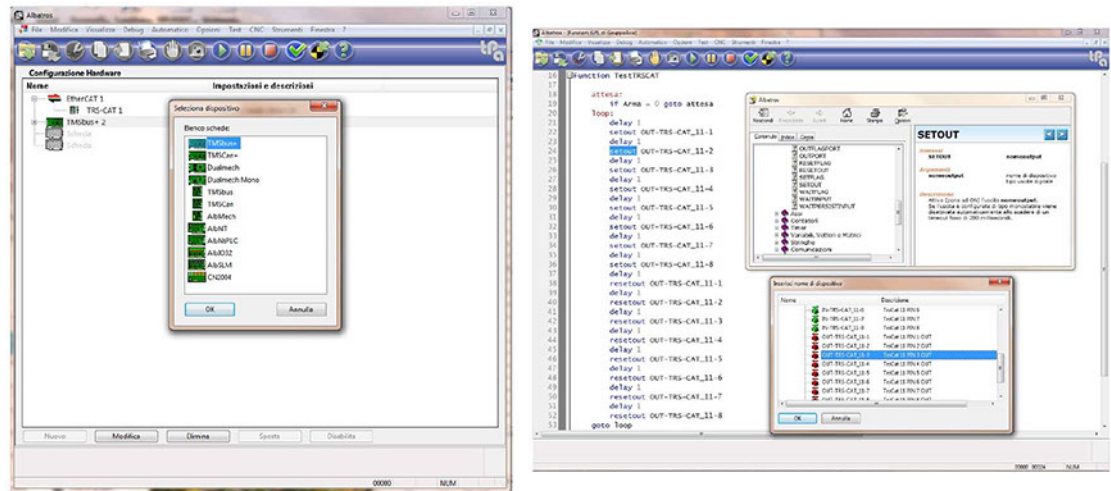
## GENERAL FEATURES

Albatros is a development system of logics for industrial automation, equipped with powerful trajectory generators that can involve the interpolation of various axes, up to a maximum of 16. Through the Albatros software you can configure the machine groups and subgroups, by associating to each of them all the input resources (analog and digital sensors), output resources (analog and digital actuators), motion resources (analog and digital axes), logics, variables, arrays, matrices, counters, timers, and finally, the specific work functions, expressed with an object-oriented automation language, the result of thirty years of experience of TPA.

The Albatros Development System is available with user interface and help translated into nine languages: Italian, English, German, French, Spanish, Czech, Russian, Dutch, Polish.

The development system enables to manage devices connected to different field buses and the mixed configuration of different buses in the application is allowed. The field buses managed by the suite are: Can Open, EtherCAT, Powerlink, Mechatrolink, SLM (Control Technique), Scan (Selema) and Greenbus4 (Tpa).

The Albatros Development System can be installed on PC platforms equipped with Microsoft operating systems. It is required a monitor with a minimum resolution of 800 x 600 pixels and a CPU with a minimum frequency of 500 Mhz.



The application that implements the basic user interface, provided by Tpa, has a twofold objective:

- acting as a development environment for configuring the hardware environment and defining the machine cycles;

- operating as a runtime environment to view the status of the hardware devices and display stylized representations of the operation of the machine (called "synoptics"). This feature enables at any time, even at a distance of years from the development of the application, on any machine managed by Albatros, without the need of any other software or tool, to make changes to the logic and test them with all the usual development tools. The same potentiality can be exploited using a remote technical support system.

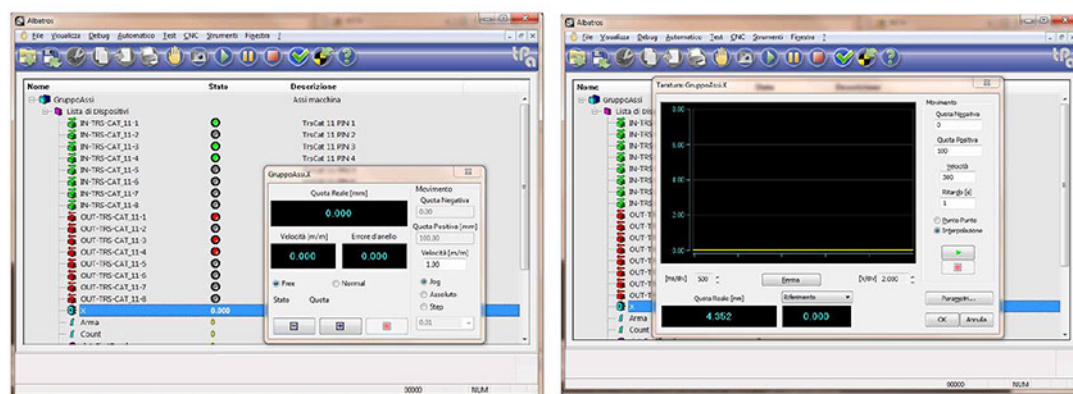
Albatros is an OLE Automation Server, thus allowing programs developed by a third party to obtain and change the status of physical and logical devices handled by the application.

## FUNCTIONAL FEATURES AND UTILITIES

Albatros displays the tree of configured devices according to different hierarchical levels. The top level, the system, allows you to select one of the machines that make it up. At the machine level, you can select the different groups that compose it. At the Group level, you can select the different subgroups. All of this makes it easy and mnemonic the path to reach a specific device within the plant, which is the necessary condition for being able to efficiently automate systems consisting of thousands of sensors and actuators, an increasingly typical condition of the environments where Albatros is used.

Albatros through its powerful multitasking (easily manages up to 512 parallel tasks) allows to set up the automation projects by reserving for every task a machine functional group (encapsulation). The system provides 512 PLCs, that exchange data (typically commands) among them with the speed with which the microprocessors access ram memory. The system thus provides excellent performance.

Based on an experience of more than thirty years in machine automation, Tpa has learned the importance of making simple the definition of the work cycles and has developed a specific programming language, in order to offer the possibility to describe very complex cycles to those who are not professional programmers. The Tpa programming language is called GPL, which stands for General Purpose Language. GPL consists of the most common control structures of the flow, of instructions for the control of the multitasking, of mathematical instructions, instructions for comparison and conditional jump and various types of data, both simple and vectors and matrices, which operate on the hardware devices. To interpolate the movements of the axes, there are specific groups of instructions, which involve five or more axes (max 16).



Albatros, through a powerful editor, allows to describe the behavioural methods of each group of devices. Thanks to the smart use of parametric functions, passing sensors and actuators in the form of parameters, an automation code which is strongly reusable and storable in specific libraries is obtained. Thanks to this structuring of the code and the reusability allowed by the system a valuable result is obtained: when the number of devices configured in the system increases often there is a significant drop in the number of lines of code required for each device. This feature becomes crucial for the respect of increasingly strict time-to-markets required by the market and to be able to address the 'specializations' of the systems, recycling the writing and testing of the standard part to efficiently focus on the variants.

Albatros, through a powerful debugger, enables the testing of the procedures at the bench (in the absence of physical devices), by executing the code step by step, setting break points, displaying at each step the status of the devices and the contents of the variables. This feature enables to concurrently carry out development and testing of the plant and its mechanical and electrical assembly. When the machines are switched on, after having tested the correctness of the connections, finishes are tested, having already tested 80% of the project being simulated.

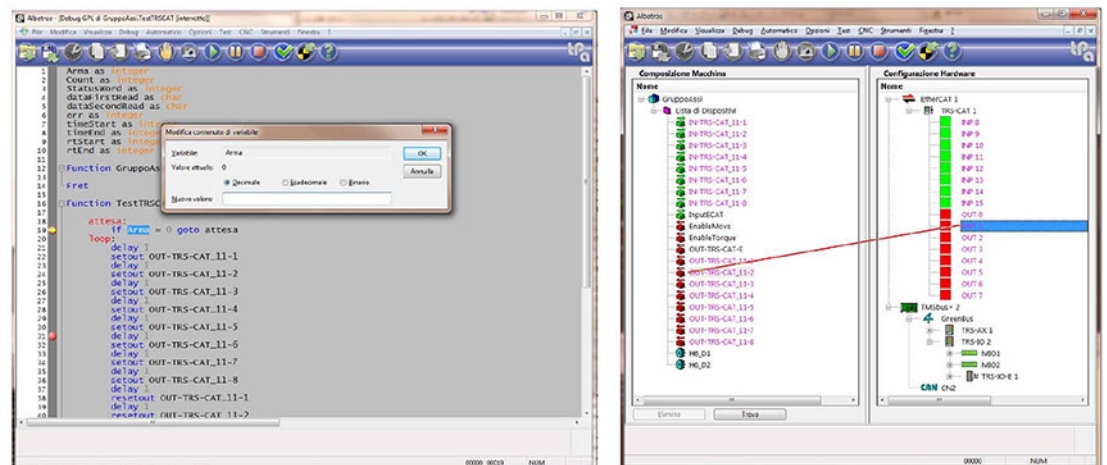
Albatros is equipped with a manual and diagnostics 'software dashboard', which displays the status of the sensors and the handling of the states of actuators, axes and logical devices (variables, flags, timers etc).

In the context of the manual dashboard, for the axis device there is a calibrating dashboard with integrated oscilloscope, very useful for calibrating the dynamic characteristics of the individual motors associated with the specific kinematic chains.

Albatros enables an easy and intuitive realization of synoptics. Starting from graphic files that can be imported as a background, it is possible to add to them the physical and logical devices. It is also possible within the specific synoptic, to characterize rectangles of hot spots. By clicking inside these hot spots you can access other synoptics. This allows to obtain specific synoptics for each machine group, easily reachable from overall machine synoptics.

Albatros stores cycle and system errors within an XML file. This always occurs automatically for all system errors, at the request of the automation programmer for the cycle errors. The basic configuration includes a display tool of the above errors that in addition to displaying them in chronological order, enables to make targeted searches or groupings of specific errors in order to make efficient the analysis on the occurrence of repetitive errors.

The Albatros Suite incorporates a logic analyser that enables to track up to 16 channels, each of which can be configured to represent the state or one of the variables that characterize a logical or physical device. The maximum sampling frequency for all 16 channels is 1 ms. A very useful pretrigger function is available, which enables to trace the values of the selected variables for a few seconds prior to the occurrence of the trigger event. This feature is very useful when an incorrect activation of an actuator occurs (often due to encoding error of the logic) and you do not understand the reason (state of the sensors) that led the logic to incorrectly actuate the device.



The interpolation path generation algorithms, available in the Albatros platform, are divided into three categories. The first one (basic) enables to perform linear, circular and helical interpolations on any plane oriented in space. The definition of the plan is achieved by defining a point of origin and the triad of directional cosines for each axis and characteristic of the plan. The second, RTCP, enables linear interpolations expressed with microcarriers with programming referred to the pivot (surface of the piece) by managing in real time all the counters of lifts to the fulcrum and all the adjustments to the dynamics of the axes needed to avoid sudden speed changes (inherent in RTCP interpolations) and properly handle the inversions of the fulcrums typically required by machining of convex surfaces or the overaccelerations on rotating axles induced by machining of highly concave surfaces. The third, MULTILINEAR, enables the linear interpolation on an imaginary curvilinear abscissa determined by the interpolation of a maximum of 16 axes. This mode exploits the maximum speeds of the dominant axes in each stretch, possibly slowed down to allow other axes contributing to the interpolation to respect their dynamic specifications. In multilinear, all axes are strictly interpolated while moving at standard speed, on the other hand, they are synchronized on changes in stretch in order to optimize the acceleration and deceleration times imposed by changes of velocity components required for individual axes or from starting or stopping of some axes during the interpolation profile. The objective of the multilinear is to travel along the imaginary abscissa in the shortest time possible, ensuring an acceptable respect of the trajectory even during speed adjustments. Through the use of these interpolation algorithms, the Albatros suite offers sophisticated Numerical Control functions that enable to manage the most popular geometries of 5-axis machines with double-rotation heads.