

## **GENERAL PURPOSE CONTROL SYSTEM**

General Purpose Control System (GPCS) is a state-of-art control system, developed under the Industrial Electronics Promotion Programme (IEPP) of Department of Electronics. Process Engineers increasingly demand something extra beyond the conventional Modulating Control or Logic Control from the latest control systems. These extra requirements span a variety of new control techniques, like optimal control strategies, modeling and simulation, on-line expert system for process and equipment diagnostics, Neural Net based problem identification, etc. in addition to the user configurability of the designer to be part of system engineering ordeal. Another major and widely demanded facility is advanced and sophisticated Man Machine Interface (MMI), animation and mimics, report generation, alarm generation and logging.

### **ARCHITECTURE**

A typical system configuration of GPCS is shown in figure. The GPCS architecture integrates various area level controls into a Plant Wide Control and Monitoring System. The heart of the plant control system network is the ADSP 21061 based Process Control Unit (PCU) that does distributed processing. Each PCU controls one section of the plant and can address 4K I/O channels. These I/O channels are spread over 256 numbers of I/O boards. The I/O's include 16 Channel Isolated Analog Input board, 8 Channel Intelligent Analog Output board, 16 Channel Isolated Digital Input board and 16 Channel Isolated Digital Output board. The I/O's are interfaced with the PCU through its back bus. The architecture of GPCS allows it to be interfaced to legacy systems like ER&DC's Advanced Plant Automation and Control System (APACS) and also to any other device that supports well-known protocols like Modbus or Allen Bradley

Two Process Control Units can work in a hot standby mode with provision for automatic take over, in case of failure of one. The redundancy in the processing nodes are implemented in the PCU's which permits I/O's of failed PCU to be taken over by a healthy PCU. All PCU's can be connected to the Control Console based on Pentium machine via Ethernet. Each PCU's has an unique Ethernet physical address which helps the Control Console to access any PCU in the network. The Control Console has all the software packages for configuring and monitoring the area controls

The Software Package provides an advanced Graphical Control System Configuration based on Windows. The software also includes advanced and sophisticated Man Machine Interface (MMI), report generation, alarm generation and logging.

## **SYSTEM SOFTWARE**

### **Highly scalable Layered Architecture**

The GPCS system software has a highly scalable , layered architecture. The system can be effectively used in small plants as well as in enterprise wide networks. Standard features like DDE client/server as well as OPC client/server are available. The layered architecture allows addition of new devices very easily without any change to other GPCS applications. MODBUS and AB protocol are available in GPCS.

### **System Configuration and Online Tag Browser**

At the area console level, the system configuration package permits the user to configure the number of PCUs in the area, the type of I/O cards used, the I/O channel description along with the TAG name etc. At the plant level, this menu helps in configuring the PCUs in different areas and assigning unique names to the various tags. The Online Tag browser supports computed tags and is an invaluable tool for system commissioning

### **Loop Configuration**

Once the hardware configuration has been specified at the area level, the control strategy can designed by the user utilizing the graphical loop configuration, which develops the control system using standard building blocks like PID, Input Processing, Alarm Checking, Integration, Logic blocks etc. Each algorithm is represented by a block. A loop can have twelve blocks and each PCU supports a maximum of one hundred loops. Facility to configure inter PCU loops is provided. A unique feature of the package is that it allows tagging of any input or output terminal of a block which greatly aids in debugging the control logic.

### **Object Oriented HMI**

User configurable integrated Object Oriented Human Machine Interface adds to the uniqueness of the versatile console features of GPCS. With integrated HMI, the user can configure the display for Bar graph, Trend, Dynamic Mimic Display, Animation, Value display etc. Over twenty customizable display as well as control objects are provided as part of the HMI

with which the user can create HMI frames. The Trend object of the HMI is an integrated on-line as well as historical data plotter. The online and historic trending can be visualized in the same MMI frame and the same trend object at a time. The system also permits hierarchical frame configuration, Parameter changing, hot key assignments for important frames etc.

### **Report Configuration and Display**

The GPCS report configuration package supports the creation of totally customizable reports. Its spreadsheet like structure allows reports to be easily configured. Report data can also be exported to other databases. Standard. VB Script commands can be used to manipulate the report cells. Event report can also be generated using the scripting facility

### **Alarm Processing**

GPCS Software offers excellent alarm handling and alarm report generation facilities.. Current, Historical and Alarm summary is also supported. Alarms can be configured into 16 groups according to the significance or priority. Multimedia support is also provided for user convenience.

## **UNIQUE FEATURES**

- 1. Total solution to process control (PLC, SER, DAS, DCS, Optimal Control etc.**
- 2. Scaleable cost effective configuration to user needs, High speed processing, Computing element**
- 3. High speed communication using ethernet**
- 4. Supports Redundant Control System strategy**
- 5. Indigenous, well proven hardware**
- 6. Addresses wide variety of application areas like Power, Cement, Oil and Gas, Space, Aircraft control, Flight simulation, Petrochemicals, R&D Labs etc.**
- 7. Graphical Control System Configuration**
- 8. Integrated MMI**
- 9. User Configurable “MIS” package**