We are taking the lead in transforming the way communities and buildings are designed, built and operated, towards creating Green Building communities, maintaining sustainable built-environment, protecting the ecosystem, and reducing the CO2 emission in our environment.

Matrix Controls building automation

World’s first LON device for optimisation of air distribution in Variable Air Volume (VAV) AHU systems

Unique chiller plant control solution (CPCS) that guarantees best performance and energy saving

Full range of pre-programmed controllers that simplify installation, commissioning, reduces implementation time and ensures proper and energy efficient operation
Matrix Controls Pte Ltd is the leading provider of direct digital controllers, servers and software for Intelligent Systems in Building Automation in Singapore as well as the region.

Matrix Control’s iS21 series of products is a complete solution for HVAC and lighting controls.

Why choose Matrix Controls?
- Open LON system
- Pre-programmed controllers for virtually every application that:
  - simplifies installation, commissioning and future expansion
  - dramatically reduces implementation time and ensures proper operation,
  - effectively reduces engineering and maintenance cost
  - saves time and money for System Integrators
  - provides reliability and peace of mind to building and facility owners
  - ensures energy efficient control strategies
- Unique control solutions applicable to any type of plant - easy to install and guarantee best performance and saving energy
- Powerful Front end supervising software

Matrix Controls' application specific DDC
LonWorks HVAC Direct Digital Controllers are application specific. Pre-programmed with energy saving processes, they save integrators time and energy of on-site programming:

Pre-programmed controllers are available for virtually every HVAC application:
- Fan Coil Unit
- Variable Air Volume (VAV) Terminal Boxes
- Air Handling Units
- Chillers, Boilers & Pumps
- Ventilation Fans
- Lighting Direct Digital Controllers
- General Purpose Direct Digital Controllers
- Motor Direct Digital Controllers
The iS21 series Universal Chiller Plant Control Solution (CPCS) is an application specific LonWorks DDC based system for capacity and lead/lag control of a group of chillers and necessary peripheral equipment. The system is pieced together using specific interactive modules, one for each type of equipment that makes up a chiller plant, and together with duty coordinating modules and a capacity commander module, is able to sequence all related equipment for the proper functioning of the chiller.

On-site experience has shown that, after fine tuning, an average energy savings of approximately 20% can be achieved by implementing the system.

Matrix Controls Universal Chiller Plant Control Solution

**FEATURES**

- CPCS automatically calculates cooling demand from supply/return temperature and the flow rate of chilled water to decide the number of chillers to switch on or off.
- Determines next available chiller, pump and cooling tower to turn on or off in sequence to maintain equal running hours and even wear & tear of each piece of equipment.
- Modulates bypass valve to maintain differential pressure across supply and return headers. System also works with de-coupling systems without bypass valves.
- Eliminates single point failures by having distributed intelligence - each piece of equipment is assigned one DDC - ensuring reliable chiller plant control.

Matrix Controls was chosen once again for the new campus of Singapore Management University after their first Bukit Campus. With the ACMV and lighting controls integrated using our LonWorks devices, the new City Campus started operations in the last quarter of 2005. Key to their selection of our brand again is the efficient controls of chiller operation that Matrix systems are able to provide. And with eight chillers in two chiller plants generating a total capacity 5550 tons, they made a carefully considered choice - Matrix Controls. After fine tuning, an energy savings of approximately 20% was achieved in first quarter of 2006 even with the increasing student population at the popular university.

**Summary**

- More than 1500 VAV & 110 AHU monitored and controlled by L-Series
- Chiller plants optimized by ASDDC
- Electronic Facility Management System (EFMS) interfaces with lighting and ACMV control by Matrix Lon DDCs
Matrix Controls Variable Pressure Regulator

Matrix UVP-LD Variable Pressure Regulator is the worldís first Lon device designed to optimise air distribution in Variable Air Volume (VAV) AHU systems and has been proven to greatly reduce energy usage. This is achieved by continually adjusting static air pressure set-points of an AHU as opposed to conventional VAV AHU systems which rely on a fixed static air pressure set-point.

Key Advantages

AHU fan runs at lower average speeds resulting in more energy savings

Individual VAV boxes (up to 25 VAV boxes under one UVP-LD) receive just enough cooling air flow resulting in more effective cooling in individual rooms

Cooling demand is met more quickly and efficiently

Requires no modification of existing hardware beyond installation of the Matrix UVP-LD Variable Pressure Regulator

Small dimensions - easy panel mount installation.

Huge energy savings at low installation cost

The diagram shows comparison of AHU duct pressure when using constant static pressure control method (purple) and UVP-LD (blue).

The initial spike shows how the UVP-LD allowed for higher static pressure to improve cooling/heating response, allowing the space temperature to reach desired set-points sooner than a constant static pressure system is able to achieve. After that, the duct pressure maintained was considerably lower than when controlled with constant pressure method - resulting in huge energy savings without compromising on space temperature

Case study - Singapore Management University

Equipment:
Air Handling Unit feeding 10 VAV boxes

Location:
Singapore Management University

Controller:
Matrix Controls UVP0000L

AHU configuration
Static pressure setpoint 150 Pa
Supply air temperature setpoint 14 C

The system was monitored for 15 days operation with constant static pressure control method and 12 days with variable static pressure control

Result:
A saving of almost 50% on power energy was achieved using variable static pressure regulator instead on standart constant pressure control.
Matrix Controls zone solutions

Matrix iS21 is a family of versatile hardware and software products developed and manufactured by Matrix Controls Pte Ltd for HVAC & Lighting controls of Intelligent Building Systems.

**VAV controller**

A LonMark(R) compliant controller designed to communicate on the LonTalk(R) open system using Free Topology non-polarised twisted-pair network.

Application specific DDC controller for pressure independent Variable Air Volume terminal box. Integrated terminal box connects to the high and low ports of the on-board differential pressure transducer for airflow measurement.

Configurable for the following applications:

- Cooling only
- Cooling with central heating
- Cooling with 3 stage electric reheat
- Cooling with 3 stage electric reheat and serial fan assist
- Cooling with 3 stage electric reheat and parallel fan assist
- Cooling with hot water reheat
- Cooling with hot water reheat and serial fan assist
- Cooling with hot water reheat and parallel fan assist

**FCU controller**

A LonMark compliant controller designed to communicate on LonTalk open system using Free Topology, non-polarised twisted-pair network. It is an application specific LonWorks Fan Coil Unit Controller configurable for analog or floating controls of chilled and hot water valves.

Provides a direct control for temperature set point and fan speed.

It is configurable for a wide range of applications including automatic switchover for space cooling and space heating application.

**Zone thermostat**

wall mount command module with display for Fan Coil unit, VAV or Air Handling unit (Unit Ventilator).

It inter-operates with other LonTalk(R) devices on a twisted-pair, non-polarized, free topology network.

Designed to meet LonMark(R) space comfort controller module object type #8090

Works in conjunction with LonTalk Fan Coil Controllers and Unit Ventilator Controllers

92mm x 50mm LCD screen to display the time & date of the day, zone temperature & temperature
Matrix Controls SCADA system

Matrix Controls' iStation/iServer/iSView is a SCADA system-level software developed from considerable experience in the automation sector to bring benefits to all users, from system integrators to end-users, by minimising investment in familiarisation and training. It can easily be integrated into any Windows application. Matrix iStation/iServer/iSView brings to you real-time viewing and control over your building services.

The software is available in both Runtime versions and Development versions. Runtime versions provide only application level capabilities whereas the Development version additionally provides development tools where the customer can fully customise and develop the software to suit their needs.

Software main features

- Compatible with Windows 95/98, 2000, NT, XP
- Single station configuration for simple cost-saving systems or, client-server configurations supporting redundant servers for added reliability
- Powerful yet easy-to-use Graphical User Interface enables generation of user-friendly HMI (Human Machine Interface)
- Structured Database with configurable variable attributes
- Historical and real-time trends windows
- Real-time update on mimics
- Historical Data Recording
- Alarm Detection
- Ability to modify and validate communications on-line
- Schedulers and Time-table management allows User to program the execution commands via a configurable schedule
- Supports up to 60 protocols
- Accessible by Internet and Intranet through web browser using iSWeb module
selected references

Police Headquarters Cantonment Complex - Singapore Police

One of the first truly intelligent buildings in Singapore with 13 subsystems integrated into the IBMS. Integration of the various subsystems resulted in seamless automated ease for occupants. Users are able to book facilities such as sports facilities, discussion rooms, and conference rooms from their desktops. The system will then proceed to link occupancy status for HVAC and lights, access control, information display and even food and refreshments orders to the booking of that facility so that all arrangements are automatically fulfilled.

18,000 monitored and controlled hardware points. Intelligent Facility Booking System. Energy optimized chiller plant automation

Singapore Changi Airport - CAAS

Our LonWorks devices are used for air conditioning controls in the airportís control tower as well as Terminal 1 & 2 to provide the soothing comfort that is expected of by all travelers arriving the worldís best airport. The networked VAV controls ensure the right temperature and humidity levels and maintain this environment for 24 hours of every single day.

More than 1500 VAV DDCs. LCD wall modules

Ministry of Environment Building - Singapore

The Ministry of Environment Building was integrated using our programmable P-Series controllers which help to automate the airconditioning and mechanical ventilation as well as pumps. Though this project may have been carried out some years ago, in recent additions to their system, our P-Series continues to be chosen for their expansion work.

8,500 monitored and controlled hardware points. More points were added in 2004

Ministry of Home Affairs Towers - Singapore

The Ministry of Home Affairs Towers is an exceptional example of Matrix Controls LonWorks devices - a demonstration of true openness. The first project tender was awarded to a contractor who used Invensys to integrate the project, but the owners were unhappy and called for re-tender. A system integrator using our products won the second tender because they retained the installed Lon devices and matched it with Matrix LonWorks DDC reducing the overall cost. The twin towers are linked to a single iStation HMI server.

15,000 monitored and controlled hardware points. Centralized control of both towers

99 Underpasses and Tunnels - Land Transport Authority

The integrated system provides the Land Transport Authority of Singapore with timely warnings and alarms, at one central location, in the event of flooding or fires at any of the underpasses installed with our system. All ventilation, lighting and electronic message displays are also provided through this system integrated with Matrix P-Series.

Centralized monitoring of multiple dispersed locations for fires and flooding. Time schedule control for lighting
Selected references

One Raffles Quay - Cheung Kong, HK Land & Keppel Land

Centrally located in the heart of the city, One Raffles Quay was developed for the leading businesses of the world-currently housing leading financial institutions such as Barclay Bank, UBS, Deutsch Bank and ABN AMRO. Comprising of two towers, the plaza bridging these towers and a retail link to the MRT station, it took 4000 Matrix L-Series to complete the main part of the IBMS integration with work is still ongoing in 2007 for the installation of tenant units. Over 3000 units of Matrix's UAV0560L VAV DDC were installed, many of which also intelligently pass network messages to activate the lighting of restrooms when occupants are detected. BTU counting is recorded for the chilled water supplied from its neighbour NTUC Centre as well as tenant AHU and is carried out using our UGP type controllers. ORQ is the latest prestige address in Singapore's business district.

4000 DDC used, including more than 3000 VAV DDC, for networked control of HVAC & lighting. Contingency chillers cut-in only if district-cooling supply fails. UGP type controllers collect BTU information of billing.

Home Team Academy - Singapore Police

The police training center of Singapore, Home Team Academy, was integrated in collaboration with Johnson Controls, this is another example of open systems where the VAV DDCs used were from Johnson Controls while other DDCs for monitoring and control of ventilation fans, AHU and chiller plant were from Matrix L-Series. More than 250 L-Series DDC installed. Uses and shares network cabling with Johnson brand VAV DDC

ITE College East - Ministry of Education

Open for operations in January 2005, ITE College East caters to a student population in excess of 10,000 whom attend a range of more than 20 courses run by four schools. The students and staff work and learn in an environment comfortably managed by our L-Series controllers VAV DDCs, with the cooling capacity handled by our chiller plant control system which optimizes the supplied BTU capacity to suit the ever changing requirements of a school with high population flows.

More than 30,000 software points handled by iSView HMI software. Over 1,000 Matrix VAV DDCs installed. 90 AHUs controlled by L-Series. Chiller plant optimizer with our ASDDCs.

Harbourfront & Cable Car Towers - PSA

Matrix LonWorks L-Series controllers were used for networked centralized control of all three towers' air-conditioning and mechanical ventilation. Data flow is seamlessly integrated into the central servers for all towers with human machine interface software iStation. Server redundancy feature in iStation was enabled in this installation, with a second server coming online providing a backup should one of the servers fail.

14,000 monitored and controlled hardware points. Centralized control of both towers. Hot redundancy of servers.
Building Management Systems is a Green Building systems provider, offering renewable energy solutions and building automation systems for governmental, commercial, industrial, residential buildings and Home infrastructure projects.

Our product portfolio and expertise help our customers and communities in improving their business efficiency, reducing their operating costs, optimizing their energy usage, and ultimately increasing their profitability.

We are taking the lead in transforming the way communities and buildings are designed, built and operated, towards creating Green Building communities, maintaining sustainable built-environment, protecting the ecosystem, and reducing the CO2 emission in our environment.