L&T AUTOMATION

Control and Instrumentation System for Cement Plants

LARSEN & TOUBRO LIMITED

COST-EFFECTIVE CONTROL & INSTRUMENTATION SYSTEM

Today's large capacity (over 2 million tonne per annum) cement plants are characterised by capital intensive, high efficiency systems.

Today's Cement Plants are designed for zero downtime, high-product quality, and better throughput with minimum energy consumed per unit of cement production.

L&T Automation advanced state-of-the-art cement plant *control & instrumentation system* a cost effective solution to help operate the plant to its designed parameters in a optimal & efficient manner.

Typical cement plant control & instrumentation system comprises:

- Powerful '**Process Controllers'** with remotely located I/O stations.
- Flexible, user-friendly Windows® NT based supervisory colour graphic **'Operator Station'** system.
- High-speed, deterministic **'plant-wide-network'** that links the Process Controllers & Operator Station System and also allows connectivity with specialised systems such as Kiln Optimisation, Energy Management, X-ray Spectrometer, etc. by means of gateways.

Cost-effective remote I/O stations

Process Controllers with remote I/O capabilities help in locating I/O stations as far away as those in Crushing Section, Packing Section, etc., to their respective Process Controllers kept in CCR, using a single co-axial or fibre optic cable (for distance more than 4 km), thus saving miles of expensive control/signal cables and associated costs of cable laying, testing & maintenance.

Alternately, Process Controllers with I/Os located at Crusher Section or Packer Section can be connected to the plant-wide-network using a simple, yet inexpensive twisted pair cable. Either way, cost-effectiveness is assured.

The total plant connectivity from Crushing Section to Packing Section facilitates better integration and results in reduction in operating costs by synchronising & optimising the operations. Trouble shooting becomes much easier with availability of centralised diagnostic information of various control and instrumentation equipment connected to the plant wide network.

Cost effective Process Controller configuration

'Hot standby' Process Controller configuration for Kiln and Cooler has been so far popular. However, with increased reliability of Process Controllers, modern plants have done away with 'Hot standby' configuration and are going in for *single* Process Controller in these critical sections also.

'Hot Swap' I/O for plant online performance

Due to the modular system architecture and 'Hot Swap' design, I/O modules can be replaced, 'ON LINE' without shutting off the power supply or affecting the other equipment. This avoids a major shut-down when only one module is to changed thus contributing to plant productivity.

Software based closed loop control

Precise closed loop control requirements such as those required in Kiln, Cooler & Raw mill sections are easily implemented using readymade PID software functions in Process Controllers. The result is optimised solutions and close integration which is in man-hours otherwise difficult when developing closed loop control strategies with dedicated single

loop controllers. With precise & accurate programming of closed loop controls for important parameters such as Kiln Feed, Draft Temperature, Coal Usage, Airflow through Cooler, etc., helps in stabilising the Kiln faster.

Cost saving in control cables

The operators in Central Control Room are now able to set and control various operating parameters of the plant. Thanks to high-speed, deterministic, token pass, plant-wide-network. It is now possible to network all the DC/AC drives of the plant with Process Controllers, using drive network for exchange of vital data between them, rather than hard wiring through expensive control cables. Apart from cost savings in supply & erection of such cables, it also results in better synchronisation & effective response to increased process complexity. The deterministic & token passing attribute of drive network contributes greatly in achieving a fast overall system response time of less than 2 seconds. This means plant operators are updated about happenings in the plant instantly. This high-speed network uses simple, inexpensive twisted pair cable for communication, hence is a very cost-effective solution. Yet, it is geared up for handling high-density, high-volume plant data over 6500 ft.

Cost Savings in programming terminals

With plant-wide-network, there is no need for a separate programming/engineering terminal / network for programming any Process Controller connected to it, as the network can handle both 'plant data' & 'programming data' with equal efficiency. This avoids unnecessary expenditure on separate programming terminal / network.

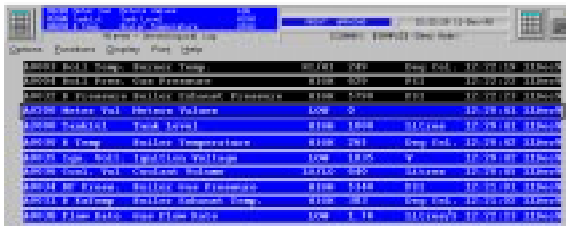
Programming any Process Controller connected on the network from any of the Operator Station System is now a reality. Redundancy in the plant-wide-network is available as an inexpensive option for increasing the reliability of data transmission. A standard bridge 'gateway' enables connectivity to third party systems for a cost-effective, yet reliable system integration.

Integration across all levels

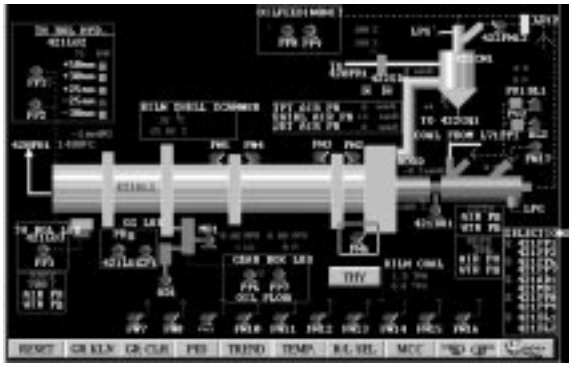
The plant-wide-network being a open architecture network, connectivity of this network to higher level packages such as Kiln Optimisation System, Fuzzy Logic, Energy Management System, MIS application, etc., is possible. This gives flexibility to the user to choose only off the relevant application systems as per the plant requirement, yet interface the same to the plant control & instrumentation system.

Cost effective Windows® NT based Operator Station System

Plant information is now available at fingertips with supervisory and colour graphic Operator Station System based on Windows® NT.



Alarm - Manager Page



Graphic Mimic Page

Cost-effectiveness & user-friendliness is the hallmark of such a system. A standard system is realised with commonly available, standard, non-proprietary hardware platforms as Operator Stations. Besides

high resolution, object oriented graphic mimics with tag-based parameter display, the system has a powerful 'Alarm-Manager' to highlight any abnormality in the process in real-time, irrespective whether the concerned section mimic is displayed or not.

Embedded trends, as a part of graphic mimic, enables viewing of parameter trends along with the associated section graphic display.

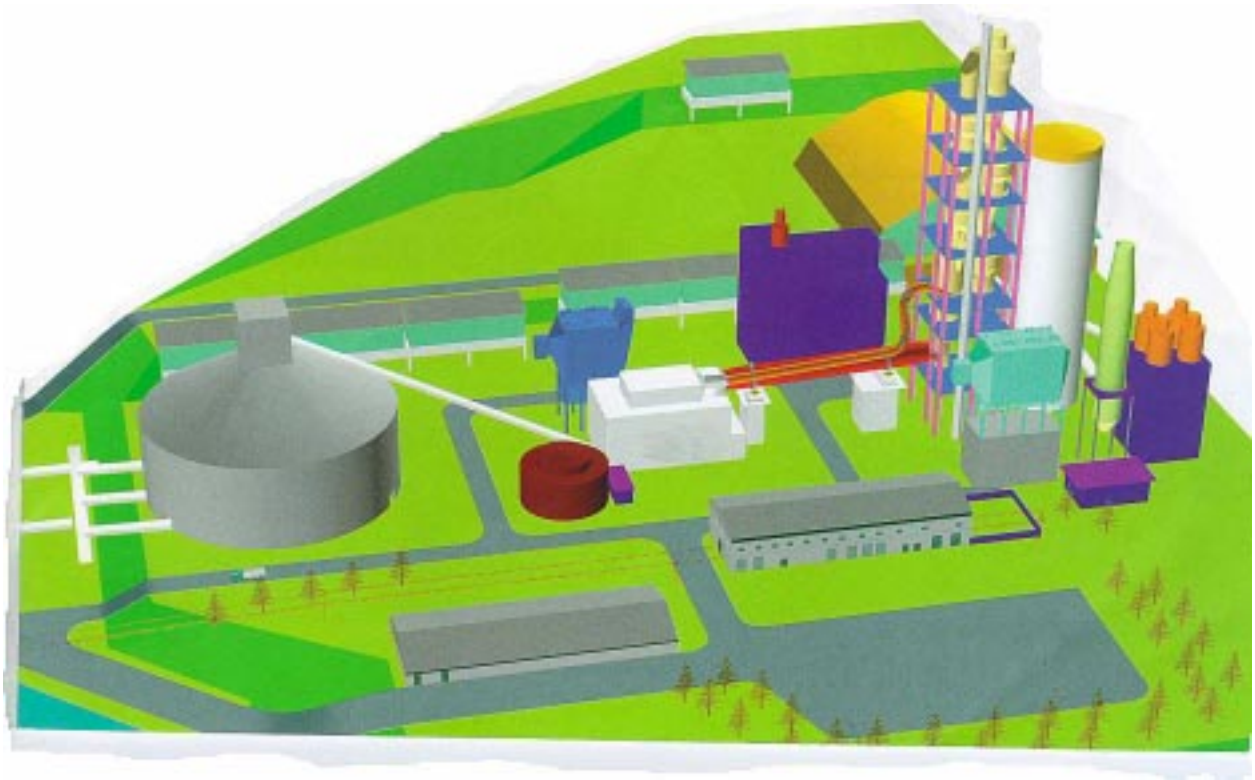
Cost effective flexibility

With such flexible system, making modification or changes 'On-line' does not call for either a separate programming network or a separate development package. Thus, saving additional expenditure. The system lends itself easily to 'on-line' changes, normally required to be done during commissioning or otherwise, from any of the Operator Stations.

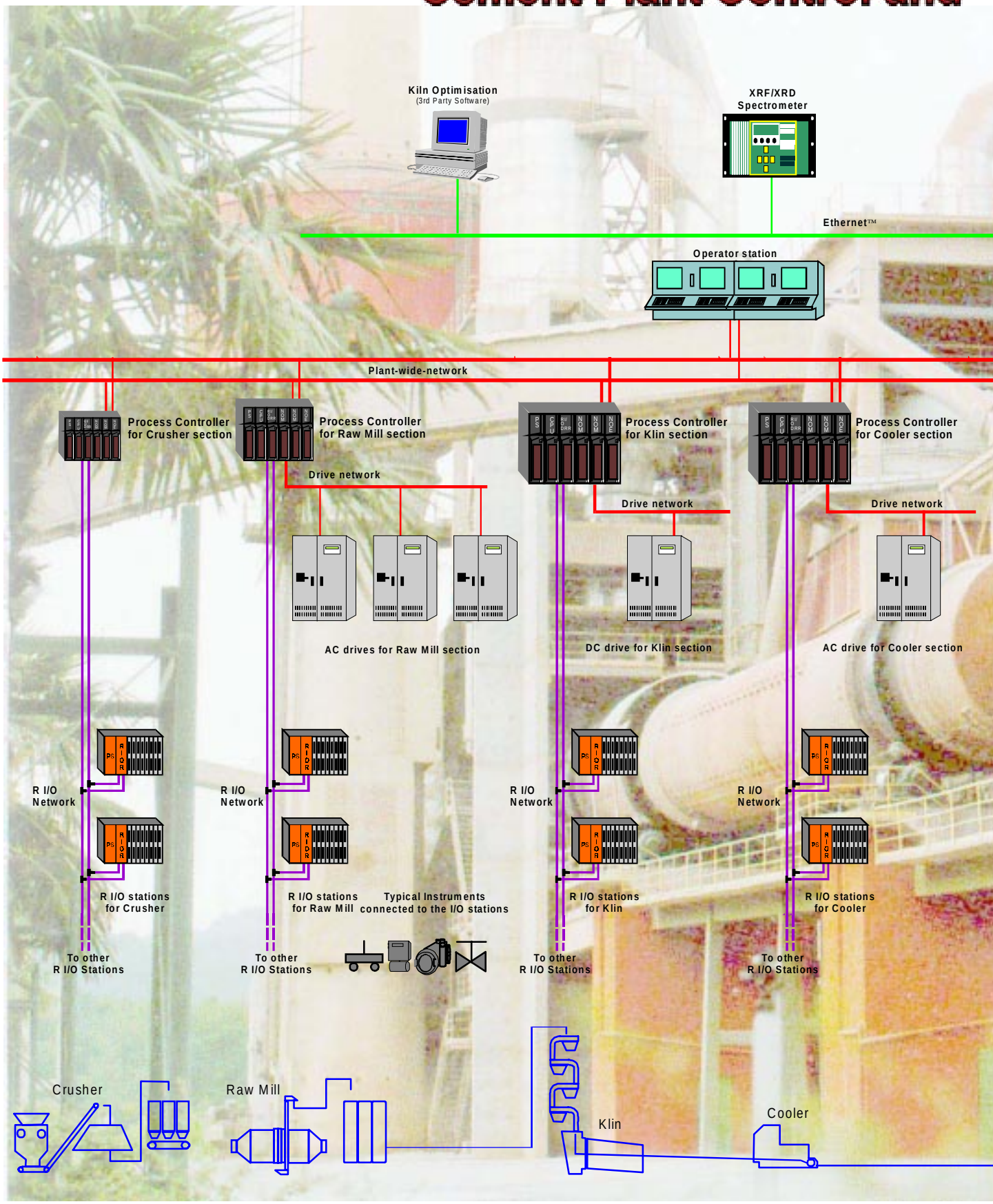
Connectivity through Ethernet TCI/IP to other application system is available using the built-in Net DDE facility.

Over 500 levels of security guards are available for protection against tampering or unauthorised operation of the plant. There is no additional cost involved for connecting third party Process Controllers to such a flexible system, as Multi-Process Controller 'protocol' is again 'built-in'.

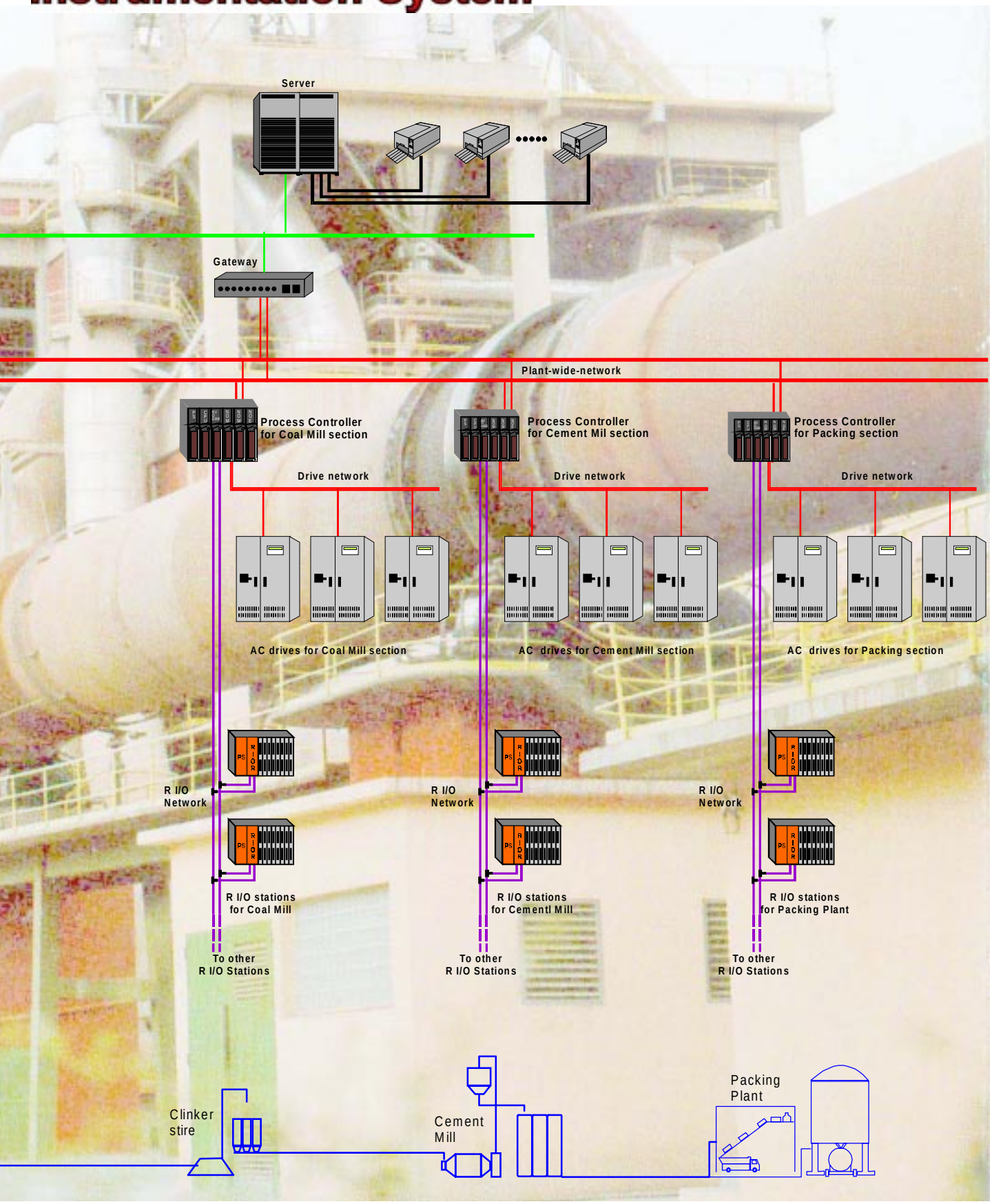
Such flexible and cost-effective system can make life of cement plant personnel at all levels, much easier.



Cement Plant Control and



Instrumentation System



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