

The Next Generation In Furnace Cleaning



Intelligent Water Cannon Control System

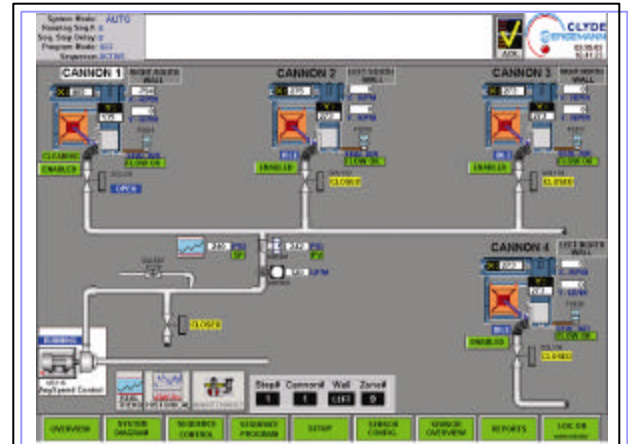
Based on the experience collected from our more than 55 North American installations Clyde Bergemann has developed SmartControls™, a new generation of intelligent water cannon control systems. It is SmartControls™ that ties in the various SmartClean™ components such as SmartCannons™, SmartSensors™, Pumps and SmartFans™ and makes it the furnace cleaning SOLUTION. Unlike purely conventional sequence cleaning control systems, SmartClean™ receives real time feedback about the cleanliness of the furnace wall from the SmartSensors™ measuring heat flux and temperature for a particular furnace area. Based on the sensor input the SmartControls™ only operates water cannons when and wherever necessary to maintain the targeted heat transfer in the furnace. SmartControls™ has built in intelligence to optimize certain key cannon operating parameters such as water pressure and progression velocity. This way the system automatically adapts to changing furnace conditions caused by fuel variances and boiler operation. SmartControls™ takes the guesswork out of boiler cleaning. SmartControls™ ensures that furnace cleanliness is maintained and avoids spraying onto clean wall areas. The latter is essential to minimize thermal impact on the wall tubes and avoid premature tube failure.

SmartControls™ can also be used to optimize traditional furnace cleaning devices such as water lances or steam sootblowers. Also a module to include the convection path sootblowers in the SmartControls™ controls package is available.

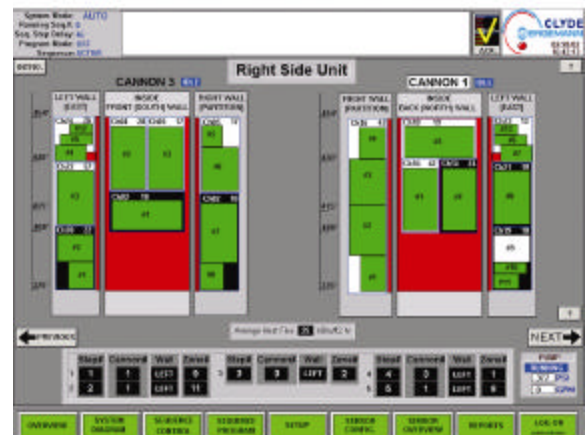
System Design

SmartControls™ consists of the PLC Panel, the SmartSensor™ Interface Panel with the Data Acquisition System and the PC based Human Machine Interface (HMI). The system uses industry standard hardware and software components such as Allen Bradley's ControlLogix PLC, a Dell or equivalent high end PC with Windows and Wonderware's Intouch HMI software, a flat panel LCD monitor and the OPC server for HMI to PLC communication using Ethernet protocol. The custom Configurator is a stand-alone, portable software tool that facilitates the definition of the boiler wall geometry and the cleaning zones.

User-friendly and easy to navigate graphic screens allow operators to monitor and control the cannon system operation at any time. In the *Overview* screen the operators are provided current cleanliness status for each of the cleaning zones of the furnace. The data acquisition system samples every 100ms the temperature and heat flux data from each sensor and makes that information available to the operators at any time. The *System Diagram* screen provides key operational parameters not only for each water cannon but also for the fans, the pump and the valves. Pre-configured shift reports in HTML format are available for display and printing as well as a tool to generate customized data logging reports in Excel format. Real time and historical trending screens are provided for system information and diagnosis.



System Diagram Screen



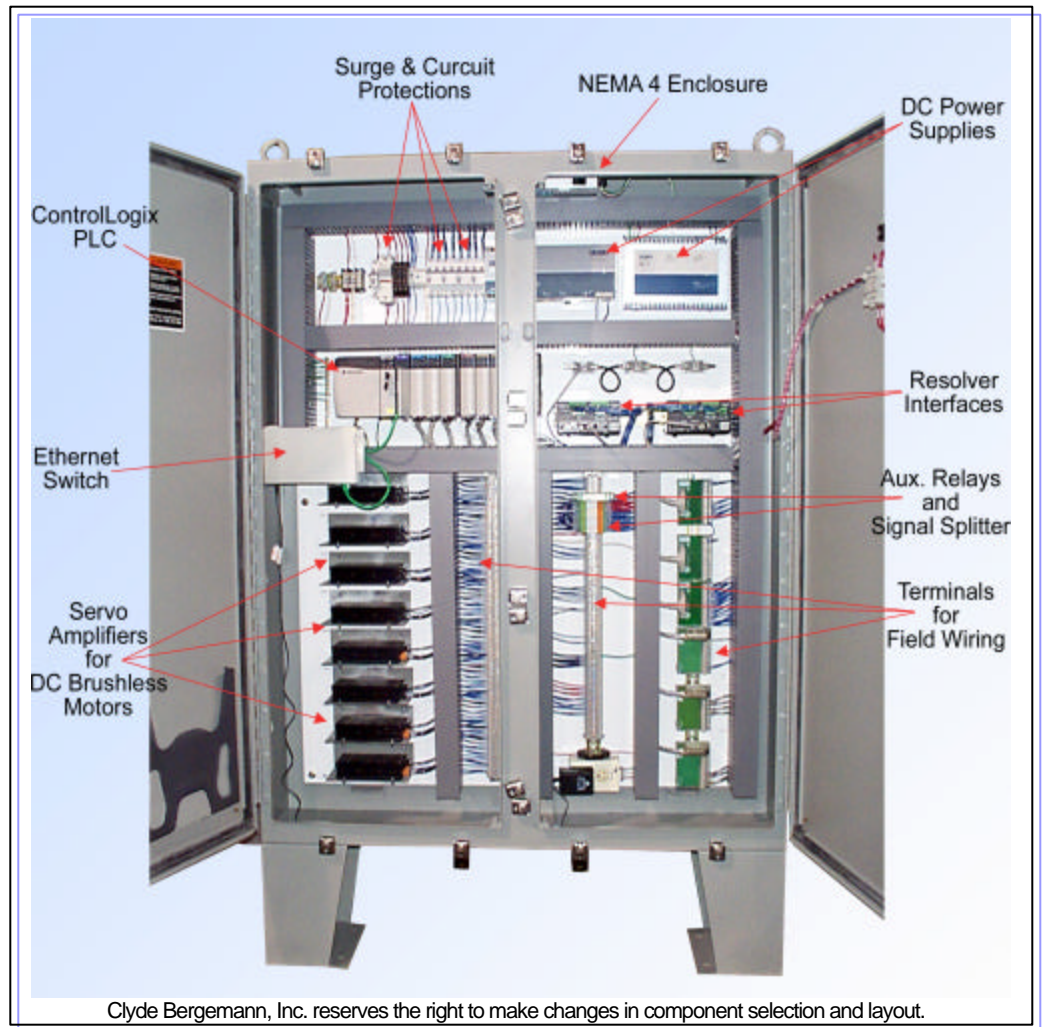
System Overview Screen



Historical Trending Screen

Why SmartControlsä ?

- SmartControls™ allows true intelligent furnace cleaning
- The system recognizes which areas have slagged and cleans these areas only.
- Precisely controls the movement of the water lance so that the targeted area is cleaned with the proper Jet Progression Velocity (JPV).
- With this system efficient cleaning is accomplished with minimal impact on tubes
- Automatic adjustment of cannon operational parameters to ensure cleaning effectiveness as well as tube integrity
- Open architecture, state of the art standard hardware and software
- Easy to monitor and trouble shoot for the operators and I&C personnel
- Remote monitoring by Clyde Bergemann via modem and pcAnywhere available



SmartControls™ PLC Panel

Specifications:

Power requirement	PLC Panel - 110 VAC, 20 A, Single Phase HMI PC - 110 VAC, 10 A, Single Phase
Panel enclosure	NEMA 4, Free Standing, Size - 62"H x 48"W x 10"D
Power Supply	48 VDC, 12 A and 24 VDC, 20 A
PLC	Allen Bradley's ControlLogix
HMI	Wonderware's Intouch
Remote monitoring & troubleshooting	pcAnywhere software
Communication	OPC server using Ethernet protocol
HMI PC	Brand name desktop PC, Pentium IV - 1.9 GHz, 256 MB RAM, two 20 GB Hard Drive, CD-RW, 56 KB Modem, 18.1" Flat Panel LCD monitor
Motor Amplifier	4 - quadrant Servo amplifier drive for DC brushless motor, rated for 10-70 VDC, 10 A continuous, supplied with the line filter chokes
Resolver Interface	4 channel resolver interface provides absolute position data directly to the PLC database.
Location	PLC panel can be located up to 500' (cable length) away from the SmartCannon™.
E-Stop Junction Box	Size – 12"H x 10"W x 5"D supplied with a 30' pre fabricated cable with a connector to connect the SmartCannon™.



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