

DEVELOPMENTS MADE ON ELECTRONIC AND PROPORTIONAL CONTROLS

By

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Dry kiln controls have been greatly improved in the past few years. Three years ago when the Medford Machinery Company purchased the FRYER Dry Kiln Co. we immediately evaluated all facets of a newly acquired business and came to the conclusion that there was great need for improvement in Dry Kiln Equipment. The principals of drying were well defined and in most cases a matter of published fact, however commercial kiln equipment had not been developed at a corresponding rate.

We noted that a great deal of improvement could be made in both air circulation and control. In the field of control we observed that the instrumentation in most common use was a two or 3 pen, filled system, pneumatic temperature controller recorder, with a round seven day chart. We felt that the control afforded by this type of instrument was in many cases inadequate. For instance we observed that most kilns operating at from 100 to 125 PSI saturated steam, that had heating surface adequate to

produce proper heat during the early part of a drying schedule would usually "over control" toward the end of the schedule. The two common ways of compensating for this condition was either to split the heating surface into sections with hand valves to allow shutting off part of the heating surface or installing a pressure reducing valve ahead of the kiln control valve so that the latent heat of the steam could be reduced by reducing pressure and accordingly reduce the effective radiation of the heating surface. Both of these methods are expensive and entirely dependent upon the operator. Also, automatic vent control being either on or off produced a condition where increased humidity would cause the automatic vents to open. The humidity in the kiln would be reduced, but so would the temperature. Vents would then shut and heat control valves open. The result was "ragged control" which produced a very uneven steam load in the boiler.

Our firm commissioned the Minneapolis Honeywell co. to design and manufacture a complete line of dry kiln instrumentation under the FRYER trade mark. We have three types of instrumentation available to the industry. These are as follows:

Type CFM which is a filled system temperature recorder controller or indicating controller, with split bulb system, 50° to 200° F Round chart, seven days, which produces a 3# to 15# "modutrol" air signal, to heat control valves, vent operators, and spray control valves. The bulb systems are vapor actuated, and split with dual elements, one on each side of the kiln, connected to a spiral measuring device, similar to the system used on most modern kiln instruments. The "Modutrol" or proportioned band is variable from 0 to 10%, depending upon the size and type of

Kiln. This adjustment is by way of a calibrated knob. This controls the width of temperature band which produces the 3# to 15# control signal. This is our standard instrument generally supplied as standard equipment on all FRYER Kilns.

Type CTM which is an electronic thermocouple temperature recorder controller which uses thermocouples instead of filled bulbs, and produces a 3# to 15# "Modutrol" control system. The advantages of this instrument is that we can build as many zones of control into the instrument as required. As an example the instruments which we recently installed at McCloud River Lumber Co. have 4 zones of heat control or 8 dry bulbs, controlling 4 control valves, "main coils near zone and far zone" and "Booster coils near zone and far zone". These each operate independent of each other. However, controlled from one load station. The spray system is duplex hot water and steam, wherein as the instrument indicates a need for humidity the water spray opens first, and if not sufficient to bring the wet bulb into control then the steam spray furnishes the balance of the spray requirements. The vents also "Modulates" from closed to open as controlled from the the wet bulb. This control instrument is quite complex, however easy to service and very trouble free. The instrument can be located at any point as the instrument automatically compensates for length of thermocouple. This system of Kiln control is many times more accurate than the filled systems due to the fact that it automatically adjusts itself.

An additional feature of this instrument is that internal board temperature drying can be accomplished on a totally automatic basis at relatively low cost if desired. Type CEF control is an electric 110 volt, thermocouple, indicating controller system used for low cost, low pressure control on progressive type kilns. This control produces a floating type 110 volt signal which is used to operate electric valves and electric vent operators. There is no air compressor or piping required with this system.

"Modutrol" is a trade name used by FRYER to describe the modulating or proportional control used by us. This system can not be adapted indiscriminately to existing heating surfaces. As these systems are commonly too long and not trapped properly. The heating surface in all type C Fryer kilns is broken into multiple heaters 16' to 20' in length and each heater trapped separately, with traps which must operate from 0# to the maximum steam pressure. This must be done because "modutrol" controls temperature by controlling the steam pressure in the heating surface. Therefore, a common condition would be for a heating surface, designed at 100 PSI to have pressures from 1# to 100 PSI according to heat requirements.

The valves supplied with all "Modutrol" instrumentation are iron body, stainless trim, with double seated plugs, similar in design to the pressure reducing valves now in common use. These valves operate in "Fail Safe", closed position when 3# of air is on the diaphragm. The body of the valves and the vent operations contain the adjustable springs which provide shut to open positions corresponding to the 3# to 15# air control signal. These valves and operators can be cascaded to provide split range

control such as in the case of two or more spray sources.

The FRYER Honeywell instrumentation as described in this report results in fully automatic control of heat, spray and vents. The load on the steam system is even and completely devoid of the surges common to on-off control.

The three systems of control described afford a complete selection from which we can provide proper control for every type kiln.

The Honeywell organization together with our own organization provide instrument service within a matter of a few hours to any point in the 11 western states.

We maintain a complete line of testing and service equipment at our Medford office, enabling us to service and adjust all of our instruments in the field.

In years to come we expect to continually allocate both time and money for the development of modern, more productive Dry Kiln Equipment.

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