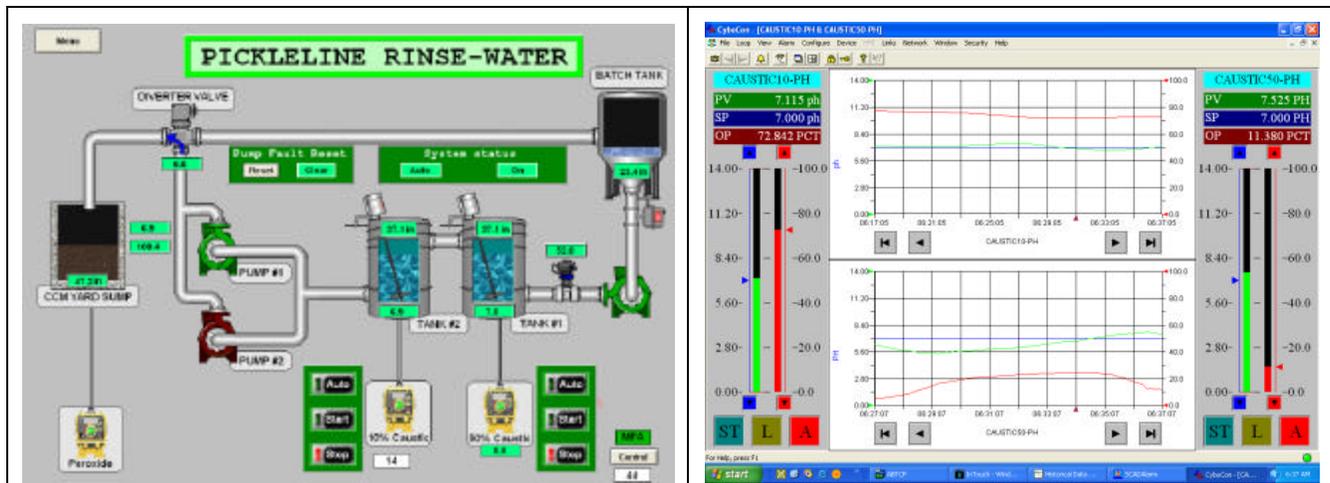


Model-Free Adaptive Control of Pickle Line Rinse Water pH

Use of MFA Control	Benefits
Tightly controls pickle line rinse water pH by using MFA pH controllers to deal with pH nonlinearity and varying flows.	Big savings in manpower, chemical consumption, and equipment corrosion.
Easy configuration and launch of MFA controllers.	Smoother and safer plant operations.
Solved two tough control problems in one day by using MFAs to control (i) Caster Supply Water Temp, and (ii) Rinse Water pH.	Return on investment (ROI) achieved within one month.



CyboSoft's MFA Control Solution for Steel Pickle Line Rinse Water pH Control

Process: In a steel mill, acidic rinse water is typically used to clean the surface of the steel in a pickle line. The used rinse water is dirty and acidic and needs to be treated and neutralized.

Application Story: Nucor Steel's Decatur, Alabama plant has a pickle line rinse water treatment process. As shown in the diagram, rinse water leaves the Batch Tank and enters Tank 1 to be mixed with 50% concentrated caustic water for a coarse treatment and then enters Tank 2 to be mixed with 10% concentrated caustic water for a fine treatment. The goal is to control the Tank 2 water pH value at 7 or a little lower.

The used rinse water entering Tank 1 can have very large variations in flow and pH. Thus, these loops are tough to control. Over dosing of caustic is commonly seen resulting in lower efficiency and waste.

pH Control Challenge: It is well known that a strong-acid-strong-base pH process is highly nonlinear. The pH value versus the reagent flow has a Logarithmic relationship. Near neutrality where pH=7, the process gain can be a few thousand times higher. Also, the large pH variation in effluent and varying time delays make the tough control problem even worse. Therefore, the pH system at Nucor was in manual control and required a lot of human attention.

Solution: Two MFA pH controllers were launched to control the pH for both Tank 1 and Tank 2.

MFA Control Results: Matt Ashby of Nucor Steel said, "Fifteen minutes after we launched the MFA pH control system, we saw a near straight line of pH value on the trend chart for the fine treatment loop (CAUSTIC10PH), very much like the top trend shown above. It was the first time this had happened. Had we not known the controllers had been changed, we would have suspected that the pH probes were broken. Everybody in the control room was impressed and very happy, because we used to have to constantly watch the pH system and manually adjust the pH control valves. MFA saved us a big headache."