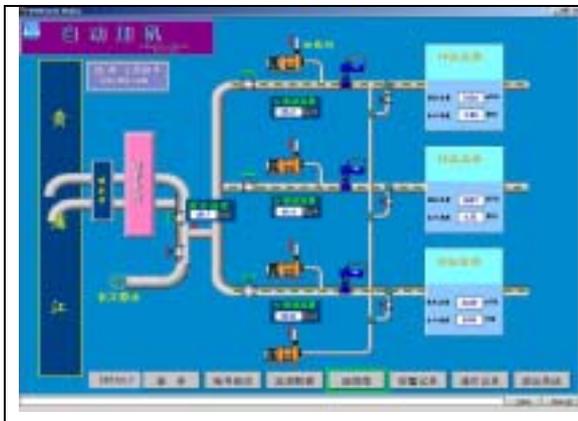




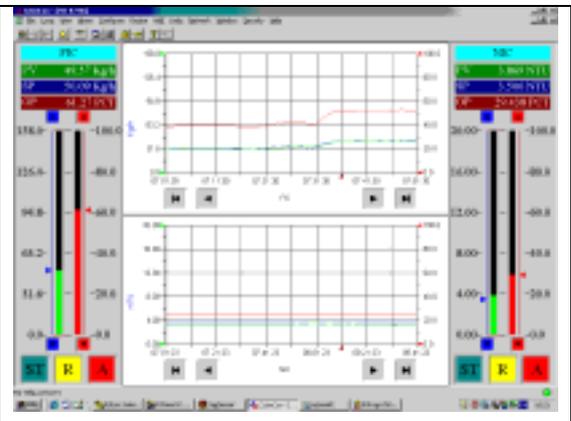
# MFA Control of Turbidity on Water Treatment Process

<i>Use of MFA Control</i>	<i>Benefits</i>
Automatically controls water Turbidity during changes in water quality, feed rate, seasons, and environment.	Smoother operations, more consistent water quality, and higher yield.
Anti-delay MFA controller can handle large process time delays in a range of 1 to 2 hours, or longer.	Avoids over-dosing or under-dosing of chemicals.
Improves water quality and reduces chemical usage.	Better standard of living and good ROI.



Left: HMI water process screen.

Right: CyboCon faceplates and trends.  
 Top: Alum  
 Bottom: NTU  
 Green: PV  
 Blue: SP  
 Red: OP



## CyboSoft's Water Turbidity Real-Time Automatic Control Solution

**Water Quality:** The U.S. Environmental Protection Agency (EPA) requires that all municipal water utilities conduct a daily test for turbidity. Turbidity particles harbor harmful contaminants like viruses and bacteria. Turbidity is the key water quality variable, which is typically measured in Nephelometric Turbidity Units (NTU).

**Process:** In order to become acceptable for public use, raw water in a water treatment plant must go through mixing, coagulation, sedimentation, filtration, and disinfection processes. Coagulation removes suspended dirt and other particles from water. Alum, Aluminum Sulfate  $Al_2(SO_4)_3$ , and other chemicals are added to form tiny sticky particles called "floc" which attract the dirt particles. The combined weight of the dirt and floc become heavy enough to sink to the bottom during sedimentation. Water turbidity is directly related to the contents in the raw water and the amount of Alum added.

**Problem:** Online monitoring and control of turbidity is desirable. Although turbidity sensors are available, automatic control of turbidity has been an industry-wide problem. The extremely long delay time between adding

Alum to the time when turbidity is finally measured at the end of the sedimentation process is the "killer" of an automatic control system.

**Solution:** CyboSoft now offers an innovative Model-Free Adaptive (MFA) control solution for controlling turbidity without having to build process models and retune controller parameters.

**Case Study:** For an international city like Shanghai with 12 million residents and 3 million visitors, the improvement of water quality has had a strategic impact on the standard of living and economy. Since 2002, Shanghai Water Treatment plant has deployed an MFA control system and achieved great results. Turbidity has been controlled consistently within  $3.5 \pm 1$  NTU even with large variations in raw water contents. The trend above shows Turbidity is under tight control.

