Claims

What is claimed is:

1. A method of correcting an error in raw measurements of a process variable taken from at least one sensor in a chemical process system characterized by properties which cause the measurements to be erroneous, the method comprising the steps of:

using the at least one sensor to obtain the raw measurements of the process variable, wherein the raw measurements have an error comprising a static error component that causes a fixed change in the raw measurement and a dynamic error component that causes dynamic state changes in the raw measurement over time;

identifying the dynamic error component, wherein identifying the dynamic error component comprises providing an association between the dynamic state changes measured by the at least one sensor and a disturbance;

identifying the static error component; and

using the identified static error component and the identified dynamic error component to alter the raw measurements to provide corrected measurements.

2. The method of claim 1 in which the at least one sensor is in informational communication with an analyzer and the analyzer is in informational communication with a controller, the at least one sensor constructed and arranged to obtain the raw measurements of the process variable, the analyzer correcting the raw measurements to provide the corrected measurements, the controller taking the corrected

measurements and if the corrected measurements indicate that the process variable is outside of a pre-determined range of acceptable values, enacting a remedial measure to change the process variable to a value within the range of acceptable values.

3. The method of claim 2 in which the remedial measure is enacted before a steady state value of the process variable is detected by the at least one sensor.

4. The method of claim 1 in which the process variable is selected from a list consisting of: oxidation-reduction potential, pH, a level of a chemical, a level of an ion, temperature, pressure, process stream flow rate, dissolved solids and suspended solids.

5. The method of claim 2 in which there are at least three sensors, wherein each of the three sensors passes on raw measurements to the analyzer, the analyzer using an average of those raw measurements to obtain a corrected measurement if at least one of the raw measurements used to obtain said average of those raw measurements fits within a pre-determined setpoint expected for specific conditions under which said raw measurements used to obtain said average of those raw measurements were taken, or alternatively the analyzer uses a historically expected measurement to obtain a corrected measurements if none of the raw measurements used to obtain said average of those raw measurements fits within a pre-determined setpoint expected for specific conditions under which said raw measurements used to obtain said average of those raw measurements were taken.

6. The method of claim 2 in which the process variable is iron concentration, the method further comprising the steps of: using the at least one sensor to obtain raw measurements of the iron concentration over time, disregarding a raw measurement that indicates zero iron concentration, and providing an adjusted raw measurement using regression analysis on the raw measurements.

7. The method of claim 2 in which the remedial measure involves adding a chemical whose effect on the process variable is non-linear in nature, the analyzer correcting for the non-linear effect of the chemical by correcting the raw measurements to provide the corrected measurements.

8. The method of claim 2 in which the remedial measure involves adding a chemical subject to a deadtime constraint and the analyzer corrects for effects of being subject to a deadtime constraint in the analyzer measurements.

9. The method of claim 2 in which the process system is a system selected from a chemical plant, a refinery, an oil refinery, a food processing facility, a manufacturing plant, a distillation column, a water filtration plant, a factory, a waste processing facility, a water treatment facility, and any combination thereof.

10. The method of claim 2 in which:

the analyzer predicts a corrosion rate that will result from the formation of salt compounds, the method utilizing inputs from at least one of each of a pH sensor,

Chloride sensor, Fe sensor. Nitrogen sensor, total nitrogen sensor, ammonia sensor, total amine sensor, and an electrical resistance corrosion probe; and

in response the controller feeds into the system an appropriate amount of at least one of: Water, Sodium Hydroxide, potassium hydroxide, lithium hydroxide, methylamine, dimethylamine, trimethylamine, ethylamine , diethylamine, triethylamine, n-propylamine, isopropylamine, di-n-propylamine, di-isopropylamine, n-butylamine, sec-butylamine, 1- amino-2,2-dimethylpropane, 2-amino-2-methylbutane, 2-aminopentane, 3-aminopentane, morpholine, monoethanolamine, ethylenediamine, propylenediamine, N,N-dimethylethanolamine, N,-N-diethylethanolamine, N,N-dimethylisopropanolamine, Methoxyethylamine, Piperidine, Piperazine, Cyclohexylamine, N-methylethanolamine, N-propylethanolamine, N-ethylethanolamine, N,N-dimethylaminoethoxyethanol, diethylaminoethoxyethanol, N-methyldiethanolamine, N-propyldiethanolamine, N-ethyldiethanolamine, t-butylethanolamine, t-butyldiethanolamine, 2-(2-aminoethoxy)ethanol di-n-butylamine, tri-n-butylamine, di-iso-butylamine, ethyl-n-butylamine, pentylamine, 2-amino-2,3-dimethylbutane, 3-amino-2,2-dimethylbutane, 2-amino-1-methoxypropane, dipropylamine, monoamylamine, n-butylamine, isobutylamine, 3-amino-1-methoxypropane and any combination thereof.