An Analysis and MIMO Extension of a Double EWMA Run-to-Run Controller for Non-squared systems

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ABSTRACT

The double EWMA (exponentially weighted moving average) control method is a popular
algorithm for adjusting a process from run to run in semiconductor manufacturing. Until
recently, the dEWMA controller had been applied only for the single controllable factor
(or input), single quality charcteristic (or output) case. Recently, Del Castillo and
Rajagopal [4] propose a multivariate double EWMA controller for squared multiple-input,
Multiple-output (MIMO) processes, where there is an equal number of inputs and outputs.
This paper extends the MIMO dEWMA controller for non-squared systems. Two different MIMO
EWMA controllers are presented and their performance studied with application to a
Chemical-Mechanical Polishing (CMP) process, a critical semiconductor manufacture
processing step that exhibits non-linear dynamics.