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(54) Title: METHOD AND SYSTEM FOR RUN-TO-RUN CONTROL

(57) Abstract: A method and system of controlling a process from run-to-run for semiconductor manufacturing. The method of control utilizes a process model to establish a relationship between process control input data and process control output data. The method of control involves minimizing the difference between target process control output data and process control output data predicted by applying the process model to the new process control input data.



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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/02770

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 19/00

US CL : 702/30

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 702/30, 120, 109, 189, 193; 700/26, 31, 117; 438/5, for.101

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
IEEE Articles, Patents, Textbook, and Web Published articles

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EAST (Examiners' Automated Search Tool), Google, Yahoo, IEEE Explore, CRC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                                                        | Relevant to claim No. |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X          | Patel et al. Adaptive Optimization of Run-to-Run Controllers: The EWMA Example, IEEE Article, February 2000, Vol. 13, No. 1, pages 97-106 | 1-15, 39-52           |
| ---        |                                                                                                                                           | -----                 |
| A          |                                                                                                                                           | 19-34, 53, 54, 55     |
| A          | Mozumder et al. A Monitor Wafer Based Controller for Semiconductor Processes, August 1994, Vol. 7, No. 3, pages 400-411                   | 1-34 and 39-55        |

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

|                                                                                                                                                                         |                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| * Special categories of cited documents:                                                                                                                                |                                                                                                                                                                                                                                                  |
| "A" document defining the general state of the art which is not considered to be of particular relevance                                                                | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                                              |
| "E" earlier application or patent published on or after the international filing date                                                                                   | "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone                                                                     |
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| "O" document referring to an oral disclosure, use, exhibition or other means                                                                                            | "&" document member of the same patent family                                                                                                                                                                                                    |
| "P" document published prior to the international filing date but later than the priority date claimed                                                                  |                                                                                                                                                                                                                                                  |

Date of the actual completion of the international search

30 August 2005 (30.08.2005)

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/02770

### Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

I. Claims 1-34 and 39-55, drawn to a method of controlling a semiconductor manufacturing system, classified in class 438/5

II. Claims 35-38, drawn to a graphical user interface (GUI) for utilizing the process model to predict process control output data, classified in class 345/619.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of any additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

- Remark on Protest**
- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
  - ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
  - ☐ No protest accompanied the payment of additional search fees.