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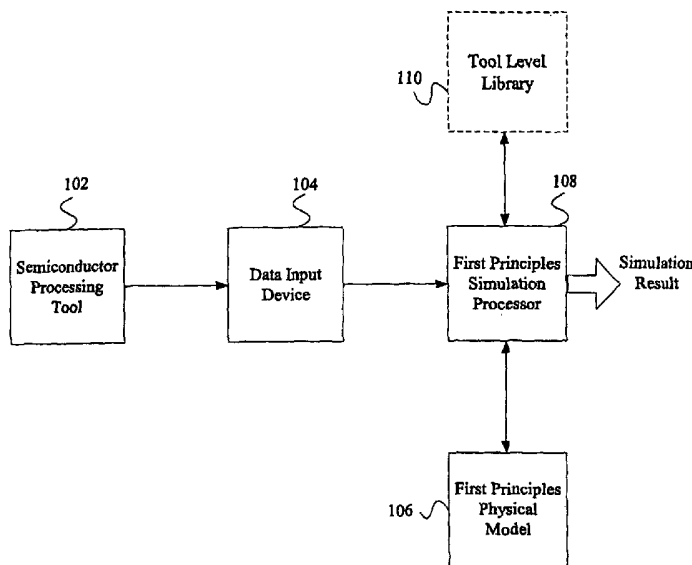
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[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR USING FIRST-PRINCIPLES SIMULATION TO ANALYZE A PROCESS PERFORMED BY A SEMICONDUCTOR PROCESSING TOOL



(57) Abstract: A method, system and computer readable medium for analyzing a process performed by a semiconductor processing tool. The method includes inputting data relating to a process performed by the semiconductor processing tool, and inputting a first principles physical model relating to the semiconductor processing tool. First principles simulation is performed using the input data and the physical model to provide a first principles simulation result; and the first principles simulation result is used to determined a fault in the process performed by the semiconductor processing tool.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/28805

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC(7) : G06F 19/00  
 US CL : 700/121, 110  
 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. : 700/96-110, 118-121; 438/5-18, 946-950; 382/141, 154, 144-152; 356/401, 630

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
 NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 Please See Continuation Sheet


**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,E --- Y,E	US 6,802,045 B1 (SONDERMAN et al) 05 October 2004 (05.10.2004), see entire document.	1-25, 32-56, 63-66 ----- 26-31, 57-62
Y,E	US 2005/0016947 A1 (FATKE et al) 27 January 2005 (27.01.2005), see entire document.	26-31, 57-62
A,E	US 2005/0010319 A1 (PATEL et al) 13 January 2005 (13.01.2005), see entire document.	1-66
A,P	US 2004/0078319 A1 (MADHAVAN et al) 22 April 2004 (22.04.2004), see entire document.	1-66
A	US 2003/0078738 A1 (WOUTERS et al) 24 April 2003 (24.04.2003), see entire document.	1-66
A,E	US 6,812,045 B1 (NIKOONAHAD et al) 02 November 2004 (02.11.2004), see entire document.	1-66
A,P	US 6,774,998 B1 (WRIGHT et al) 10 August 2004 (10.08.2004), see entire document.	1-66
A,P	US 6,763,277 B1 (ALLEN, JR. et al) 13 July 2004 (13.07.2004), see entire document.	1-66

Further documents are listed in the continuation of Box C.       See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"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 11 July 2005 (11.07.2005)	Date of mailing of the international search report <b>19 JUL 2005</b>
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## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 6,728,591 B1 (HUSSEY, JR. et al) 27 April 2004 (27.04.2004), see entire document.	1-66
A,P	US 6,628,809 B1 (ROWE et al) 30 September 2003 (30.09.2003), see entire document.	1-66
A	US 6,571,371 B1 (COSS, JR. et al) 27 May 2003 (27.05.2003), see entire document.	1-66
A	US 6,529,789 B1 (CAMPBELL et al) 04 March 2003 (04.03.2003), see entire document.	1-66

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## Continuation of B. FIELDS SEARCHED Item 3:

EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM\_TDB

search terms: partial adj least jad quare adj analysis; partial adj least adj square adj analysis; loading adj coefficient; analysis; standard adj deviation; (standar adj deviation) same mean; semiconductor adj3 processing adj4 tool; metrology; input\$4 adj5 data adj5 process\$4; sensor; semiconductor adj2 process\$3 adj3; fault adj5 process; physical adj3 sensor; processing adj4 tool; multivariate adj analysis; semiconductor adj2 process\$3 adj3 tool; simulat\$3; fault adj5 process; simulat\$3 same model\$3; detect\$3 adj6 fault adj5 process; physical adj3 sensor; data adj5 process\$4; input\$4 adj5 data adj5 process\$4; sensor; simulation adj3 result