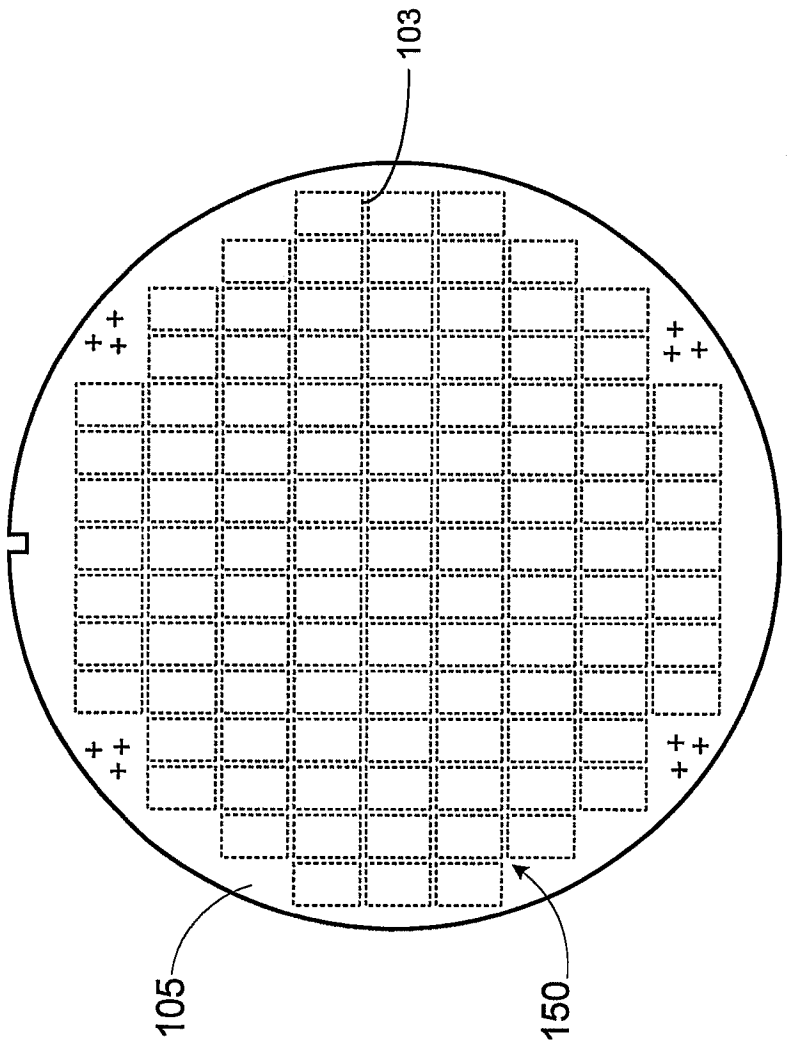


FIGURE 1

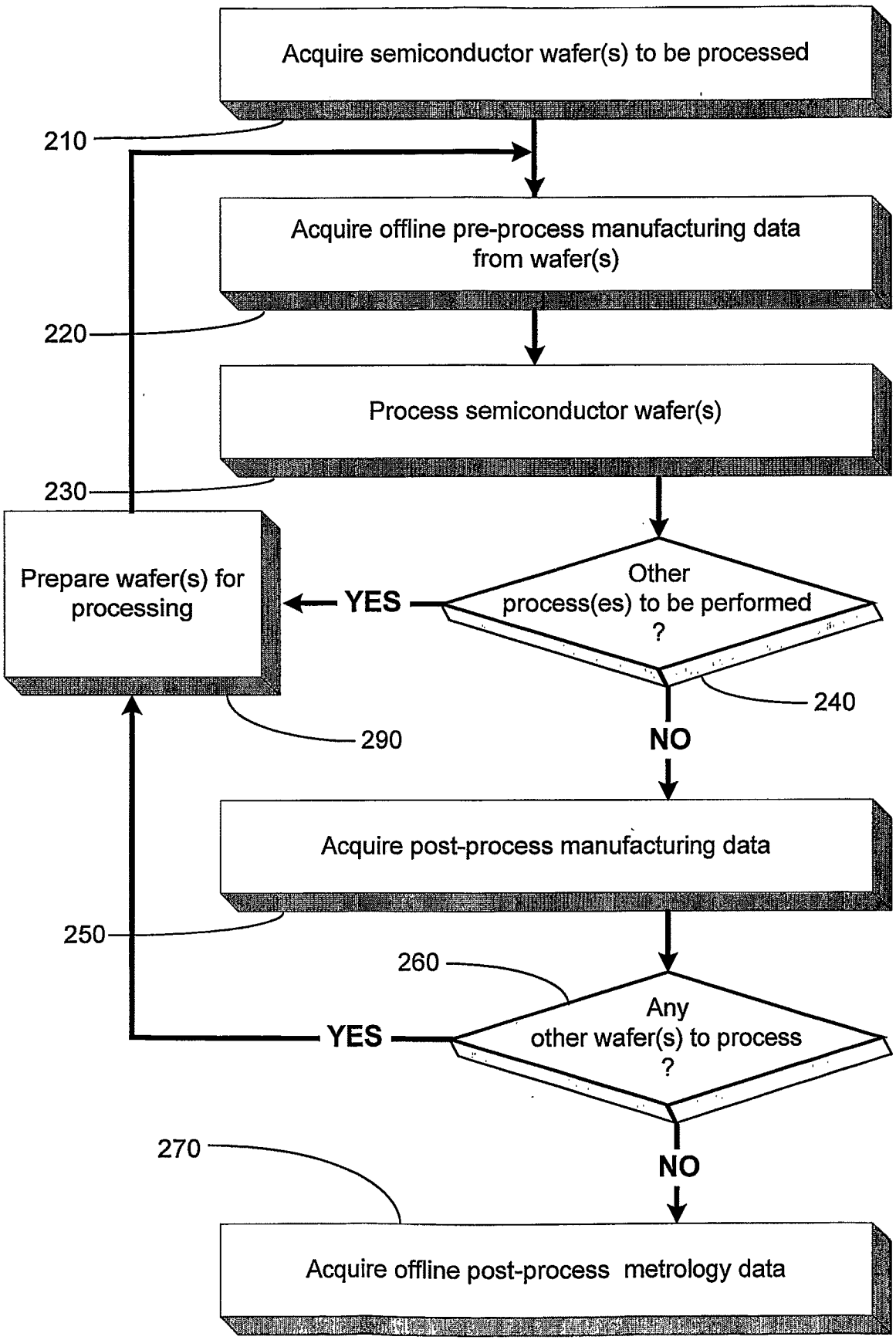

Acquire semiconductor wafer(s) to be processed
210
Acquire offline pre-process manufacturing data from wafer(s)
220
Process semiconductor wafer(s)
230
Prepare wafer(s) for processing
YES
Other process(es) to be performed ?
240
290
NO
Acquire post-process manufacturing data
250
260
YES
Any other wafer(s) to process ?
270
NO
Acquire offline post-process metrology data

FIGURE 2

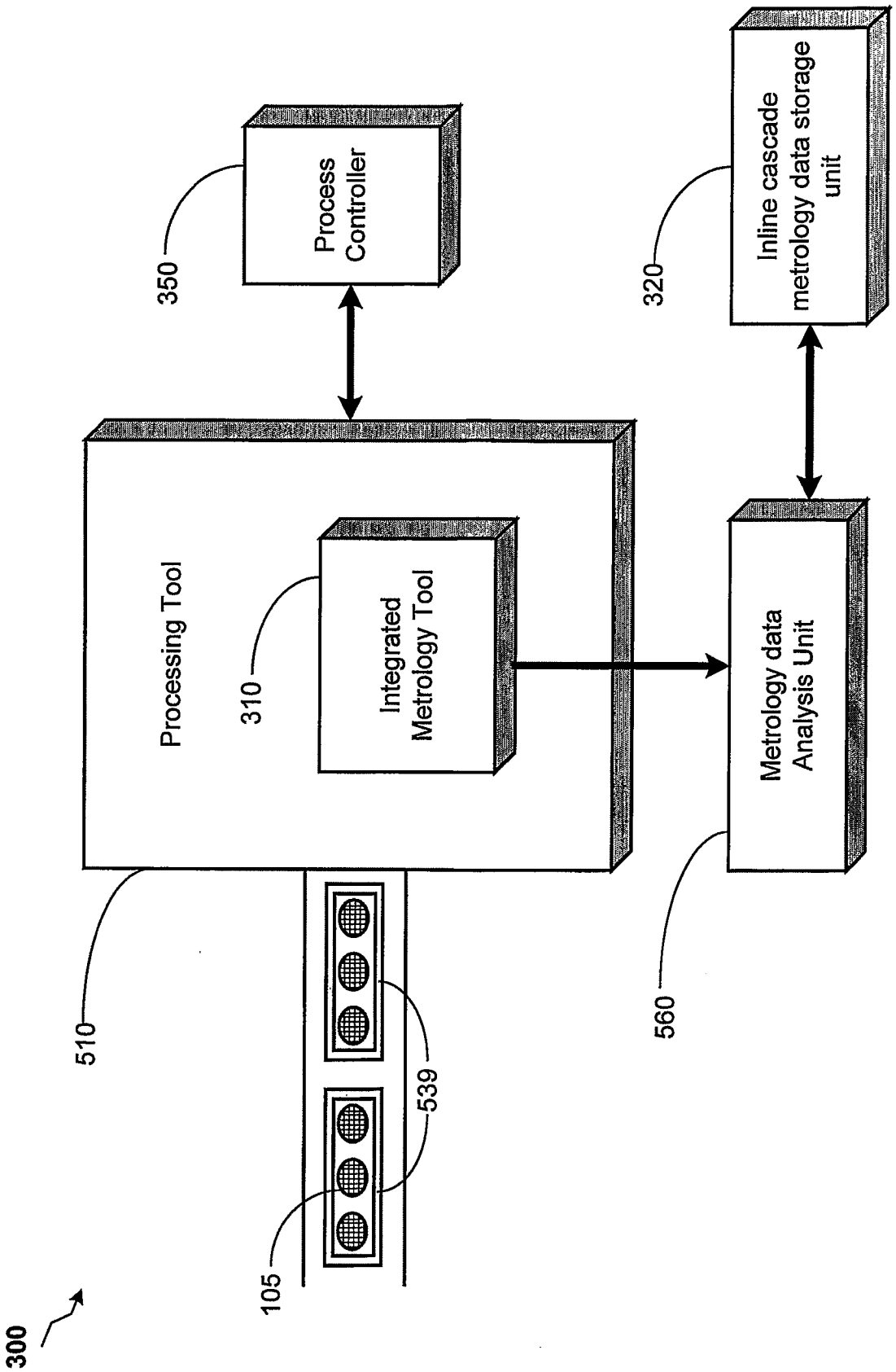

Process Controller
350
Inline cascade metrology data storage unit
320
Processing Tool
310
Integrated Metrology Tool
Metrology data Analysis Unit
510
560
539
105
300

FIGURE 3

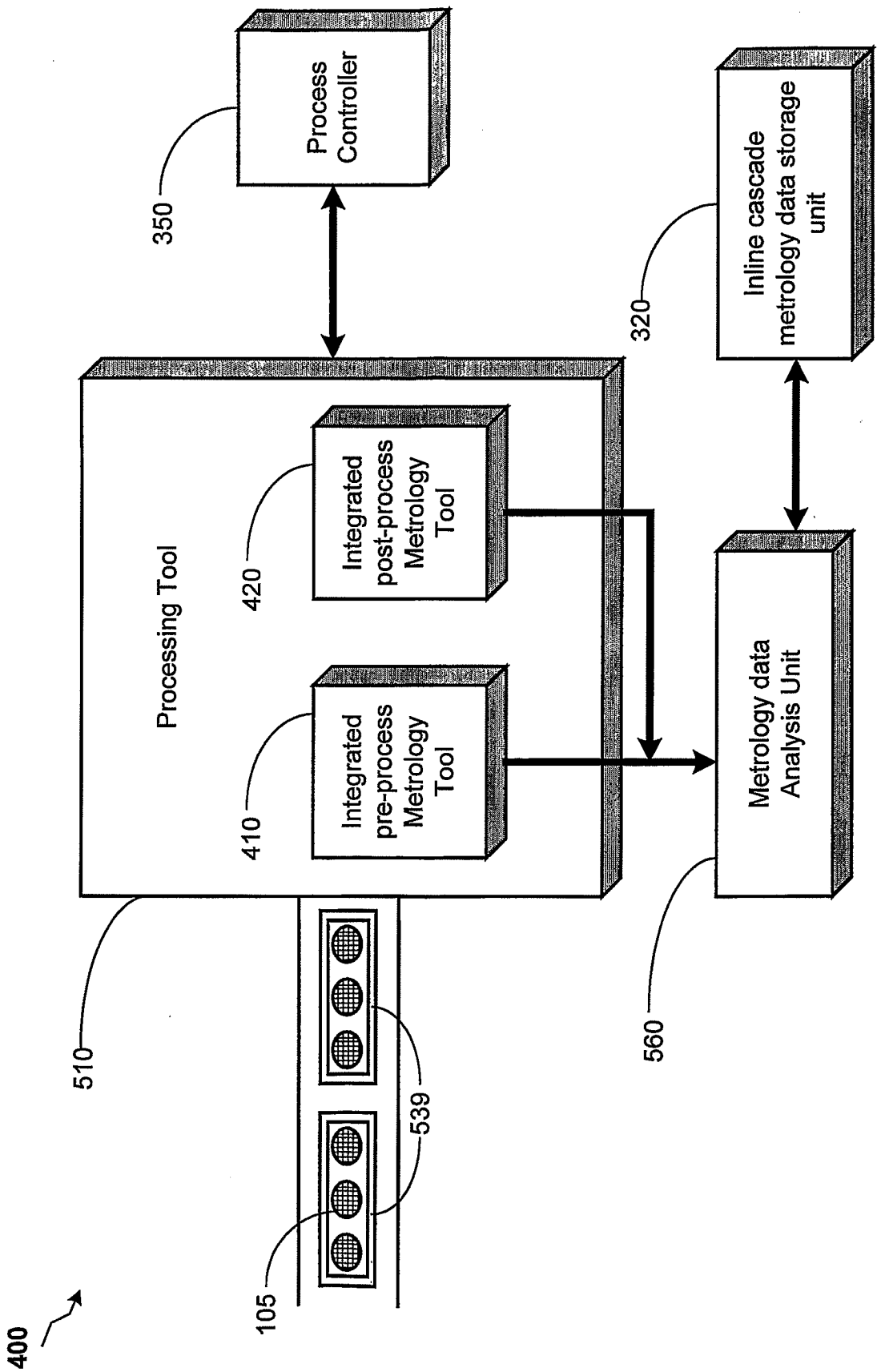

Process Controller
350
Inline cascade metrology data storage unit
320
Processing Tool
Integrated post-process Metrology Tool
420
Integrated pre-process Metrology Tool
410
Metrology data Analysis Unit
560
510
539
105
400

FIGURE 4

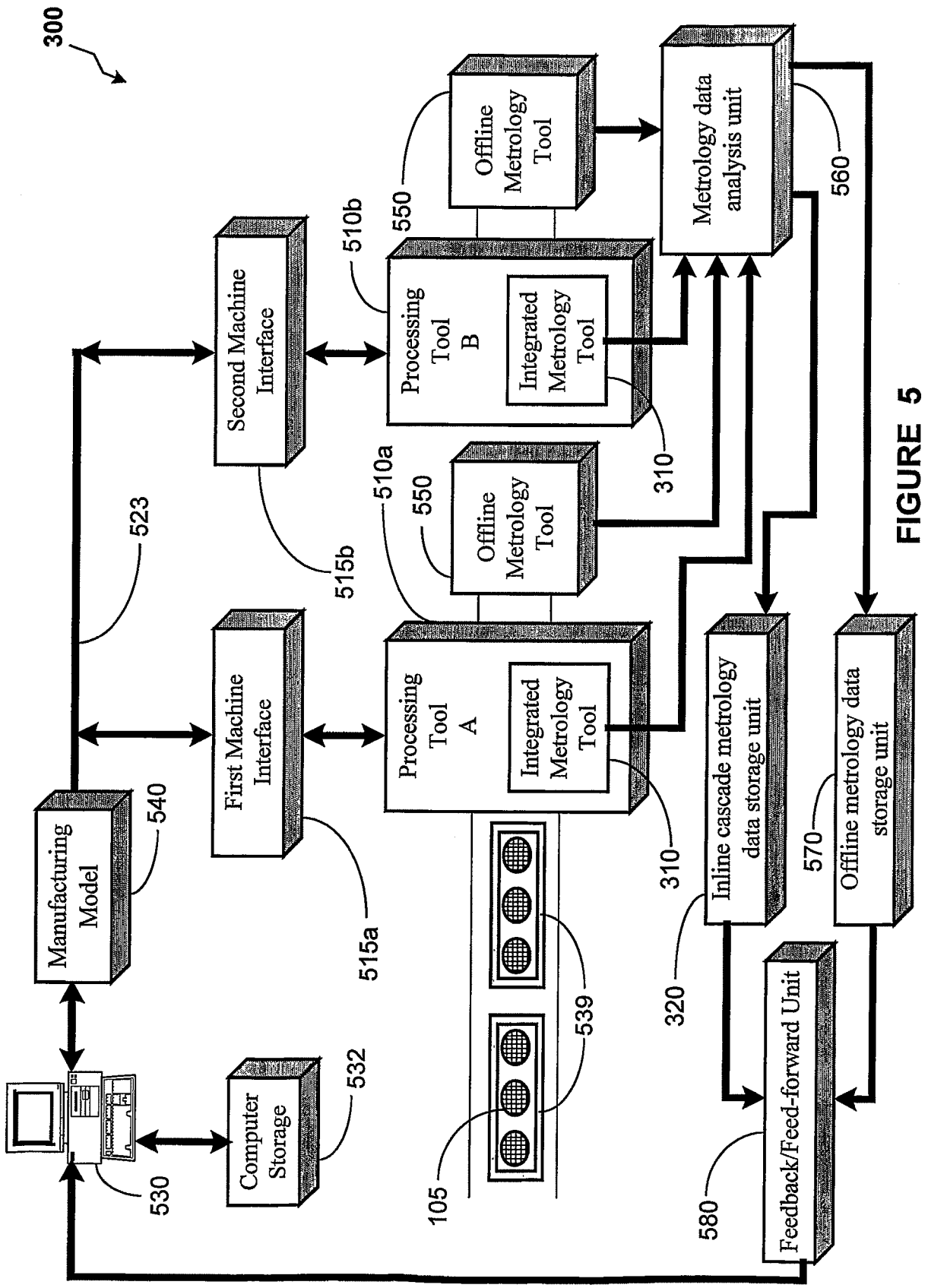

300
Offline Metrology Tool
550
Metrology data analysis unit
560
510b
Second Machine Interface
Processing Tool B
Integrated Metrology Tool
310
510a
550
Offline Metrology Tool
523
515b
First Machine Interface
Processing Tool A
Integrated Metrology Tool
310
Inline cascade metrology data storage unit
320
570
Offline metrology data storage unit
Manufacturing Model
540
515a
539
105
Computer Storage
532
530
580
Feedback/Feed-forward Unit

FIGURE 5

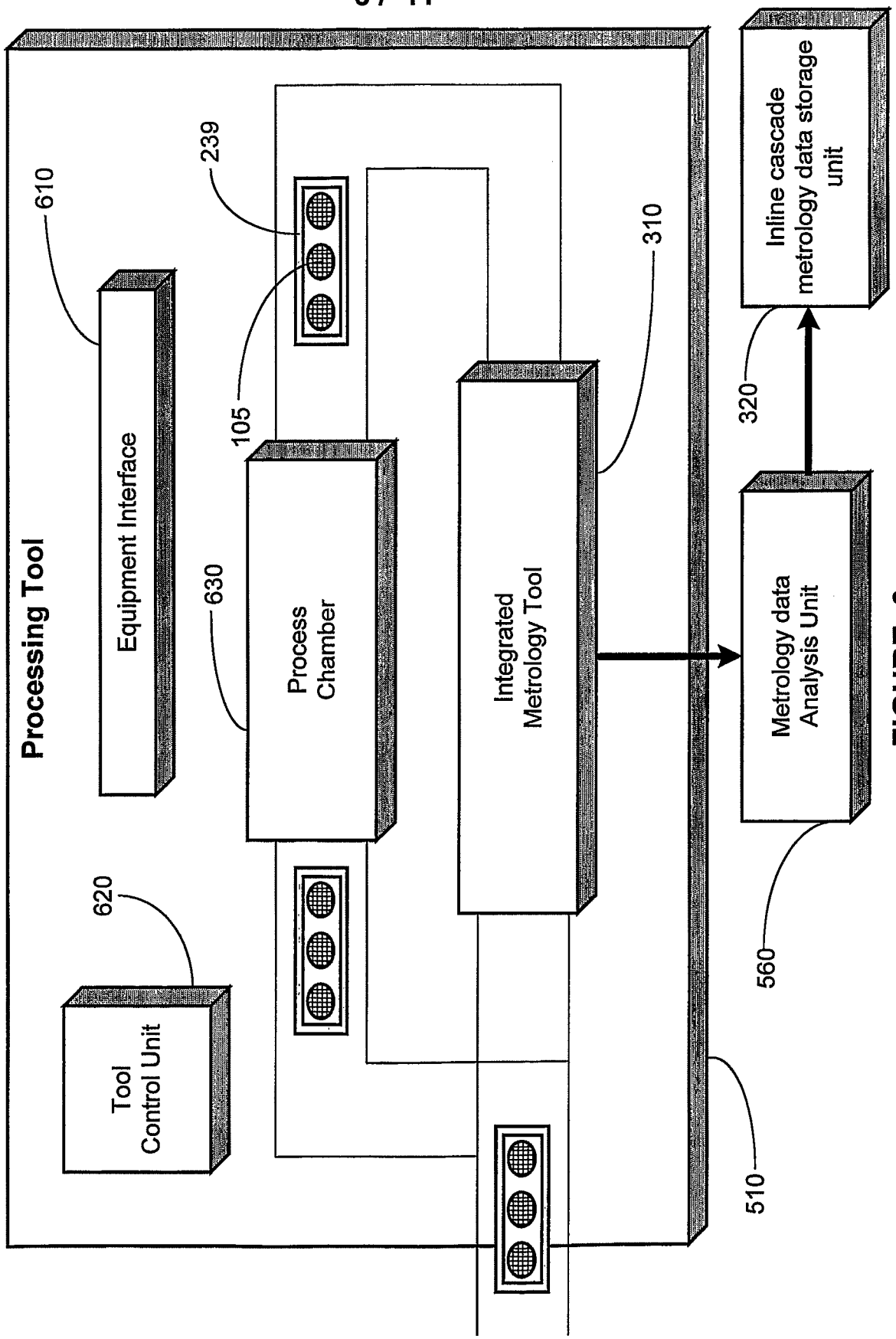

Processing Tool
Equipment Interface
610
239
105
630
Process Chamber
310
Integrated Metrology Tool
620
Tool Control Unit
510
Inline cascade metrology data storage unit
320
Metrology data Analysis Unit
560

FIGURE 6

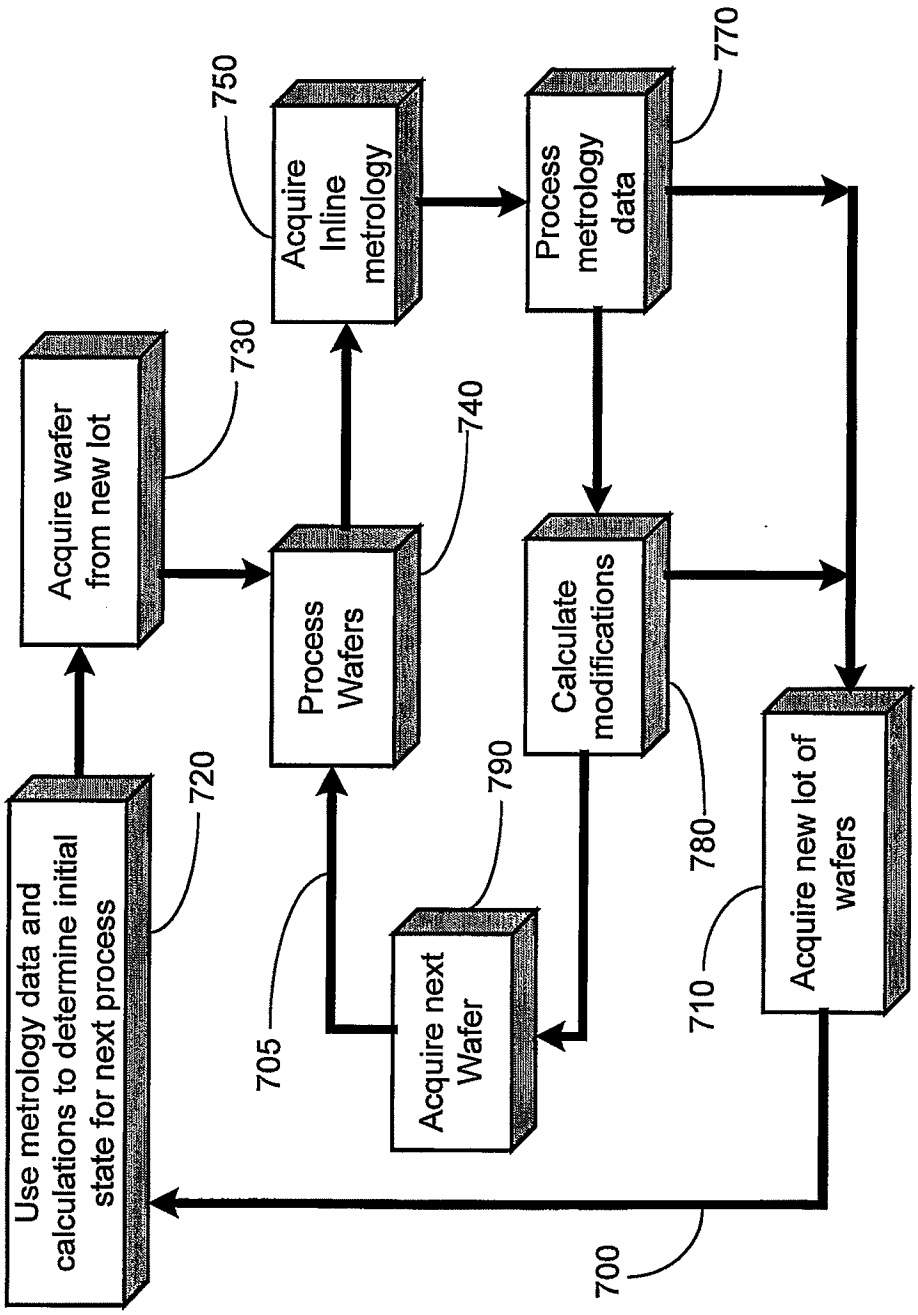

Use metrology data and calculations to determine initial state for next process
720
Acquire wafer from new lot
730
Acquire Inline metrology
750
Process metrology data
770
Process Wafers
740
Calculate modifications
780
Acquire new lot of wafers
710
Acquire next Wafer
790
705
700

FIGURE 7

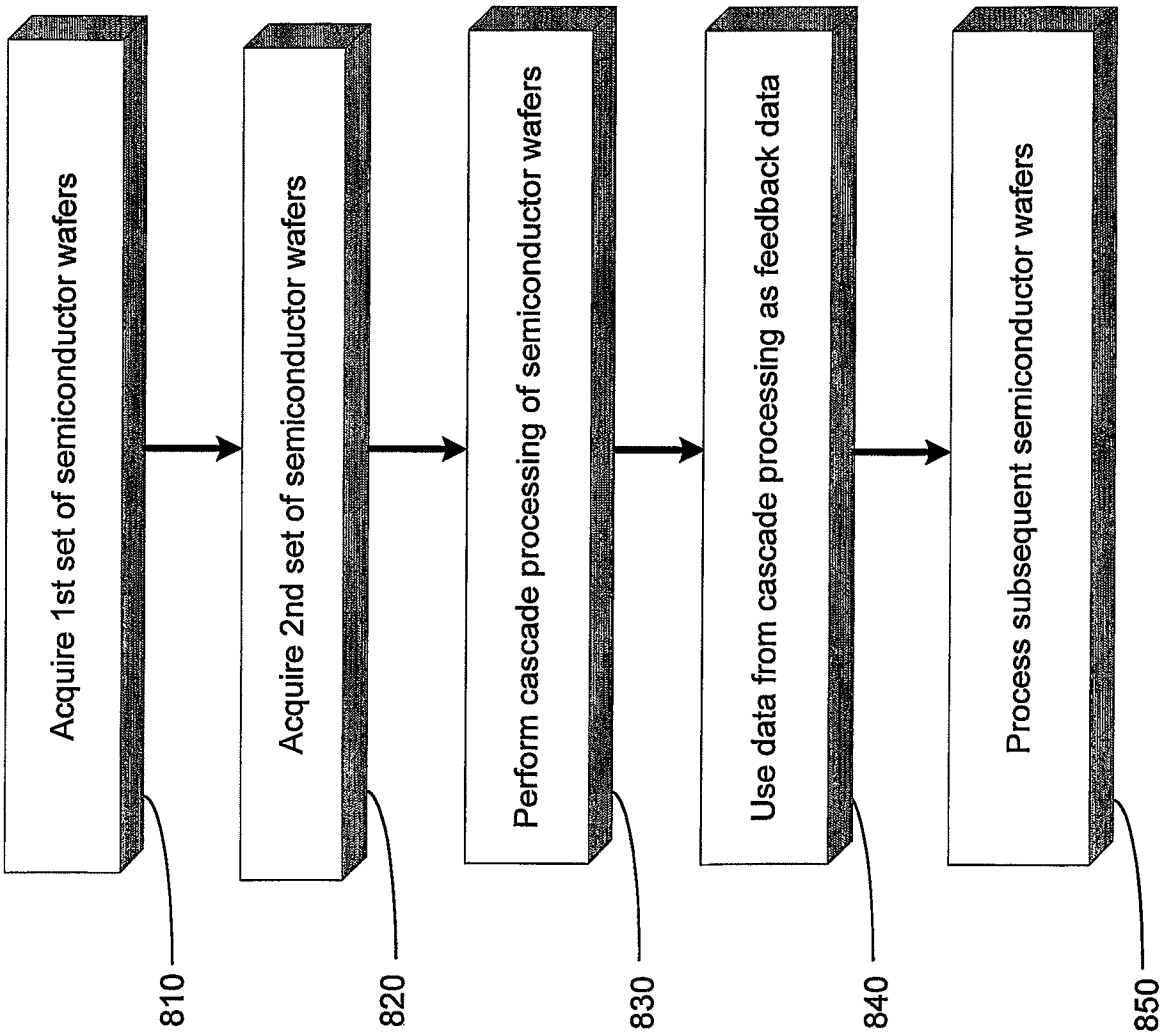

Acquire 1st set of semiconductor wafers
Acquire 2nd set of semiconductor wafers
Perform cascade processing of semiconductor wafers
Use data from cascade processing as feedback data
Process subsequent semiconductor wafers
810
820
830
840
850

FIGURE 8

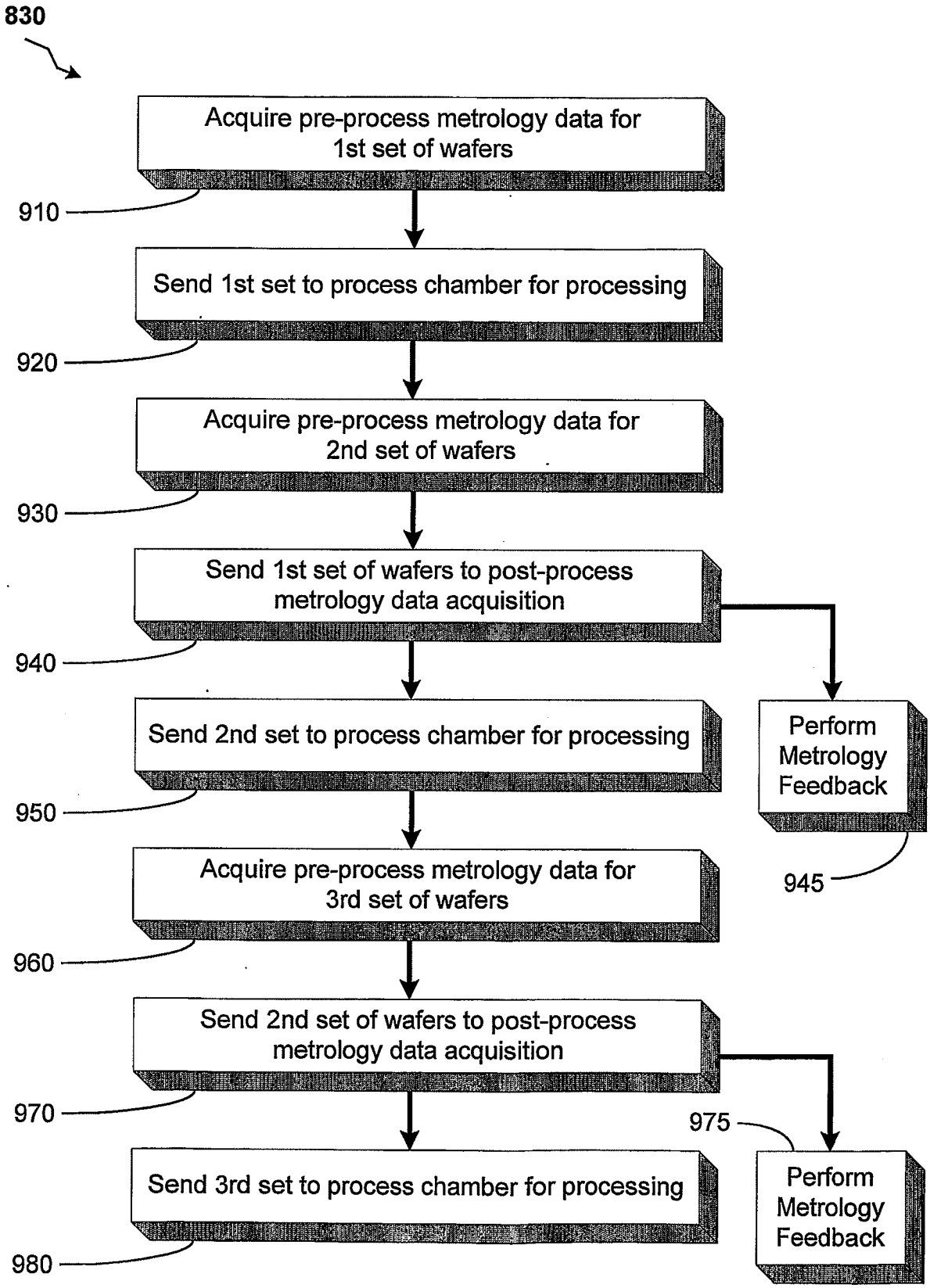

830
Acquire pre-process metrology data for 1st set of wafers
910
Send 1st set to process chamber for processing
920
Acquire pre-process metrology data for 2nd set of wafers
930
Send 1st set of wafers to post-process metrology data acquisition
940
Send 2nd set to process chamber for processing
950
Perform Metrology Feedback
945
Acquire pre-process metrology data for 3rd set of wafers
960
Send 2nd set of wafers to post-process metrology data acquisition
970
975
Send 3rd set to process chamber for processing
980
Perform Metrology Feedback

FIGURE 9

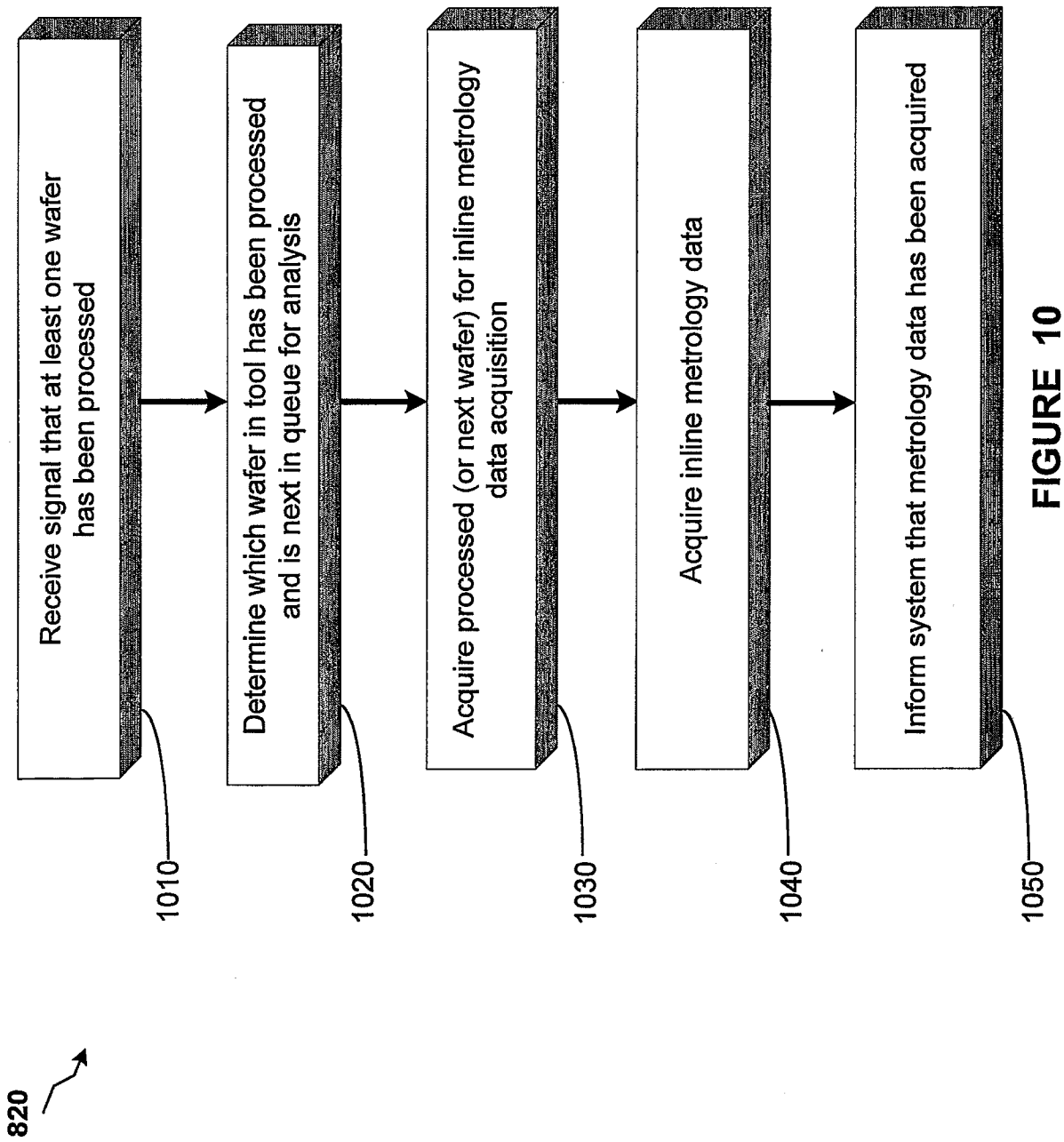

820
Receive signal that at least one wafer has been processed
1010
Determine which wafer in tool has been processed and is next in queue for analysis
1020
Acquire processed (or next wafer) for inline metrology data acquisition
1030
Acquire inline metrology data
1040
Inform system that metrology data has been acquired
1050

FIGURE 10

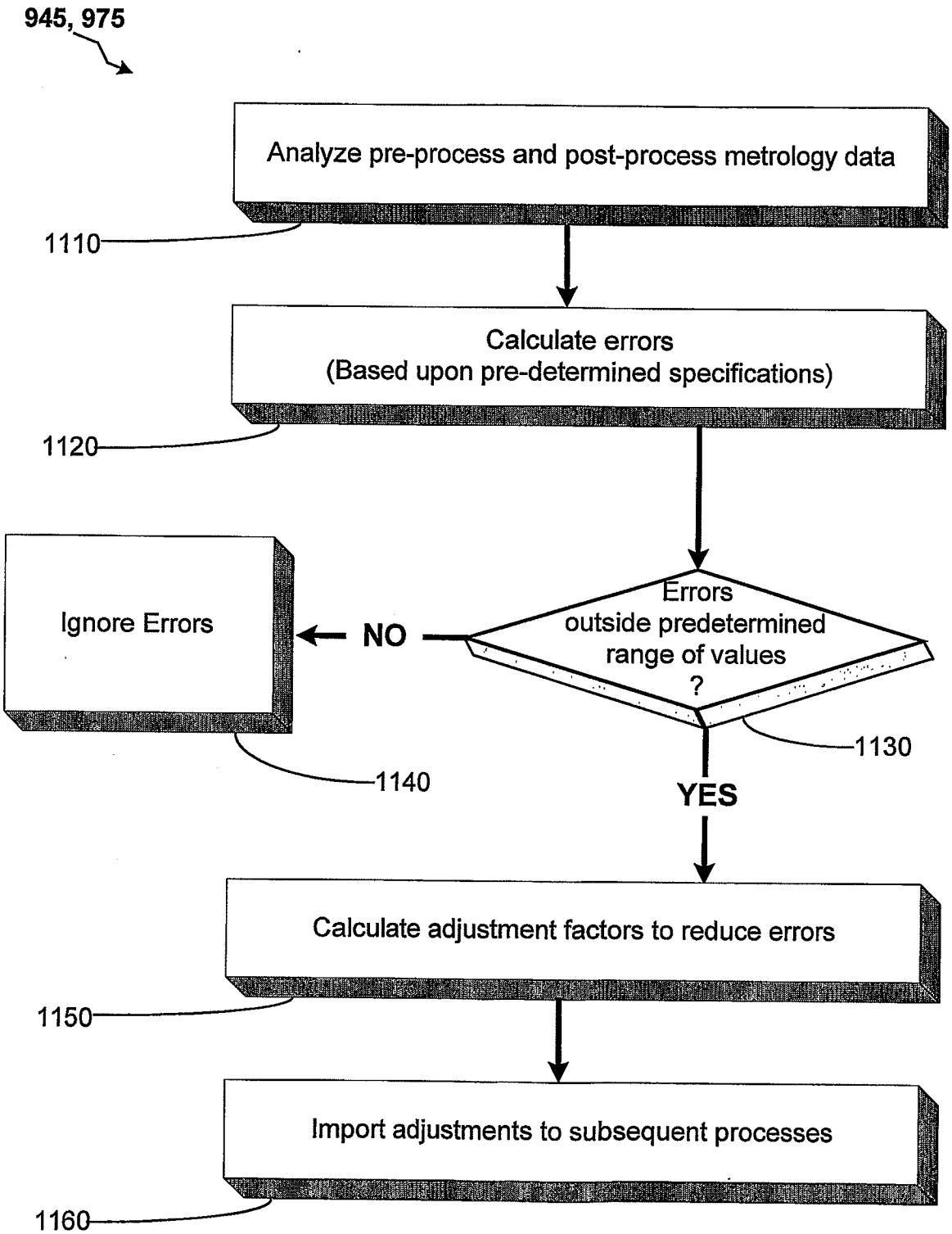

945, 975
Analyze pre-process and post-process metrology data
1110
Calculate errors
(Based upon pre-determined specifications)
1120
Errors
outside predetermined
range of values
?
1130
NO
Ignore Errors
1140
YES
Calculate adjustment factors to reduce errors
1150
Import adjustments to subsequent processes
1160

FIGURE 11