

Figure 1

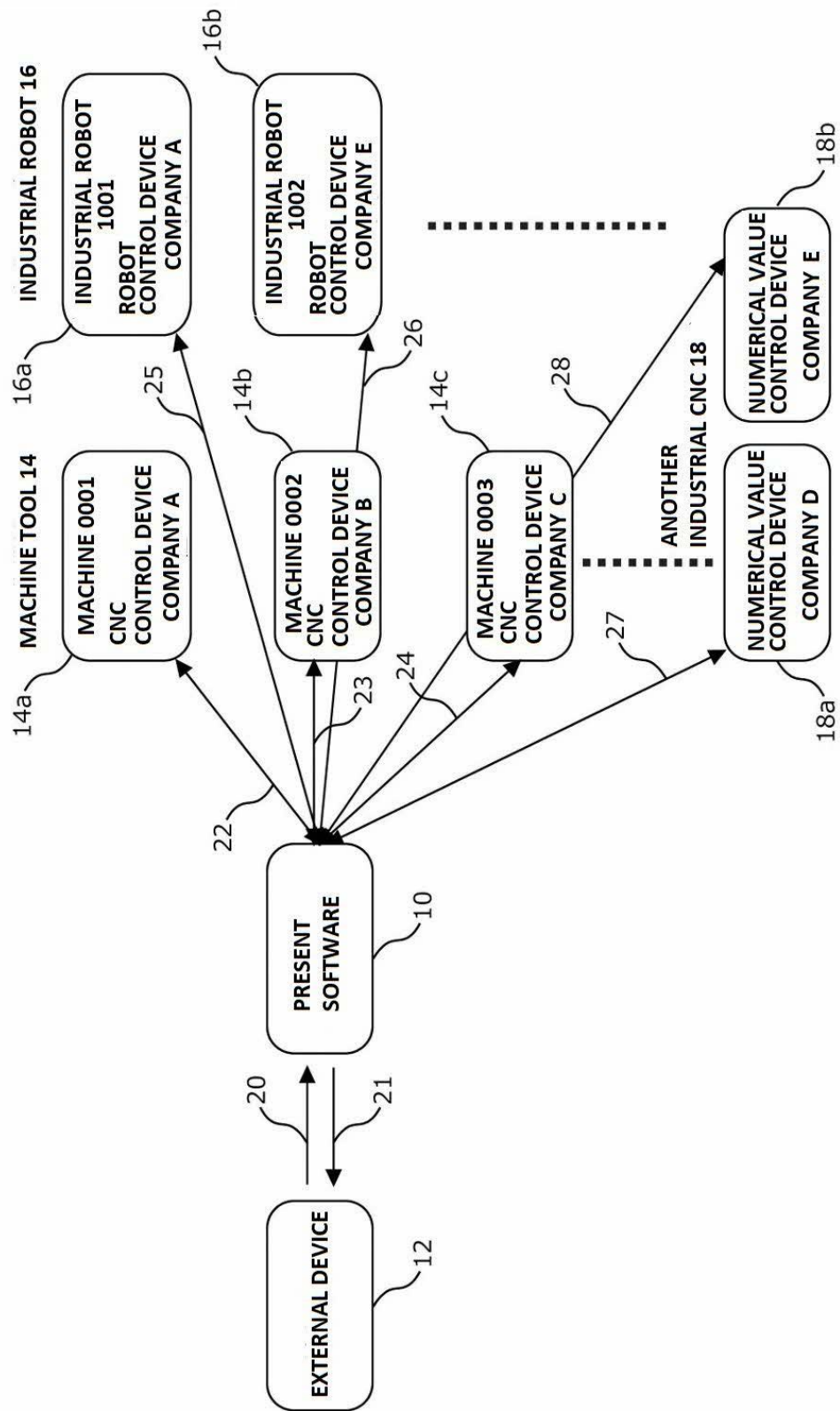


Figure 2

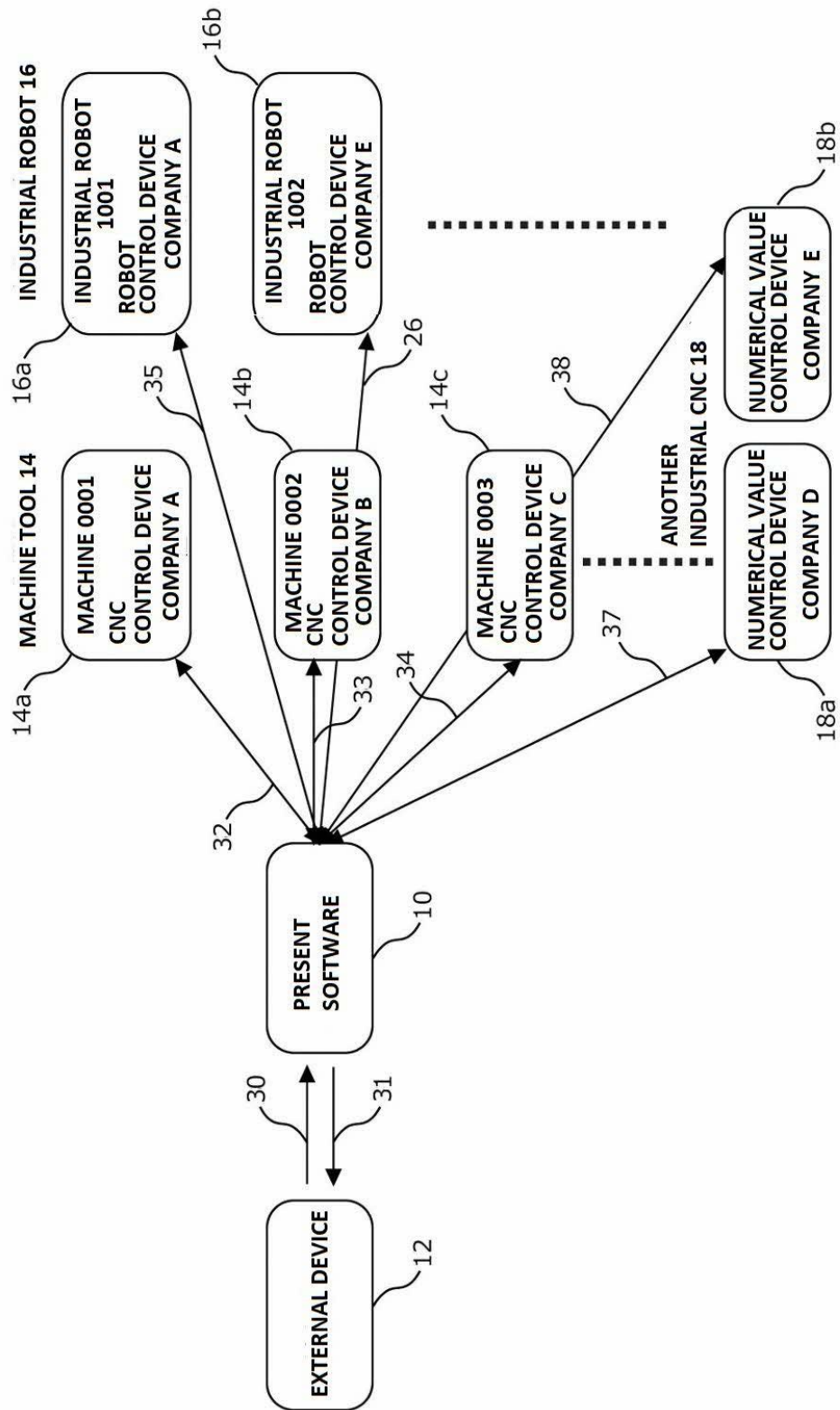


Figure 3

| MACHINE<br>NUMBER | COMMUNICATION<br>LANGUAGE | CONTROL<br>DEVICE | VARIABLE CORRESPONDENCE TABLE |            |            |   |   |
|-------------------|---------------------------|-------------------|-------------------------------|------------|------------|---|---|
|                   |                           |                   | A1                            | A2         | A3         | . | . |
| 0                 | a                         | PRESENT SOFTWARE  | # 1                           | # 2        | # 3        | . | . |
| 1                 | a                         | COMPANY A CNC     | # 1                           | # 2        | # 3        | . | . |
| 2                 | b                         | COMPANY B CNC     | # 1                           | # 2        | # 3        | . | . |
| 3                 | c                         | COMPANY C CNC     | Q1                            | Q2         | Q3         | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |
| 1001              | d                         | COMPANY A ROBOT   | REGI 1                        | REGI 2     | REGI 3     | . | . |
| 1002              | e                         | COMPANY E ROBOT   | B1                            | B2         | B3         | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |
| 2001              | g                         | COMPANY D CNC     | VARIABLE 1                    | VARIABLE 2 | VARIABLE 3 | . | . |
| 2002              | h                         | COMPANY F CNC     | V1                            | V2         | V3         | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |
| .                 | .                         | .                 | .                             | .          | .          | . | . |

Figure 4

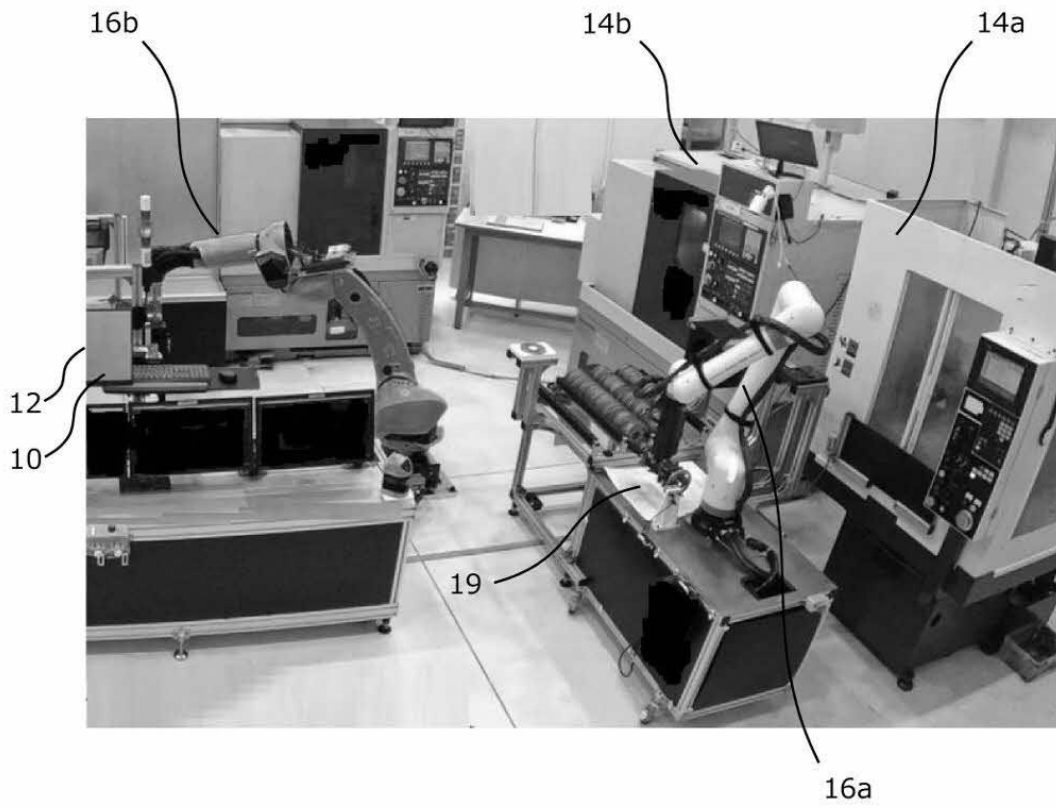


Figure 5

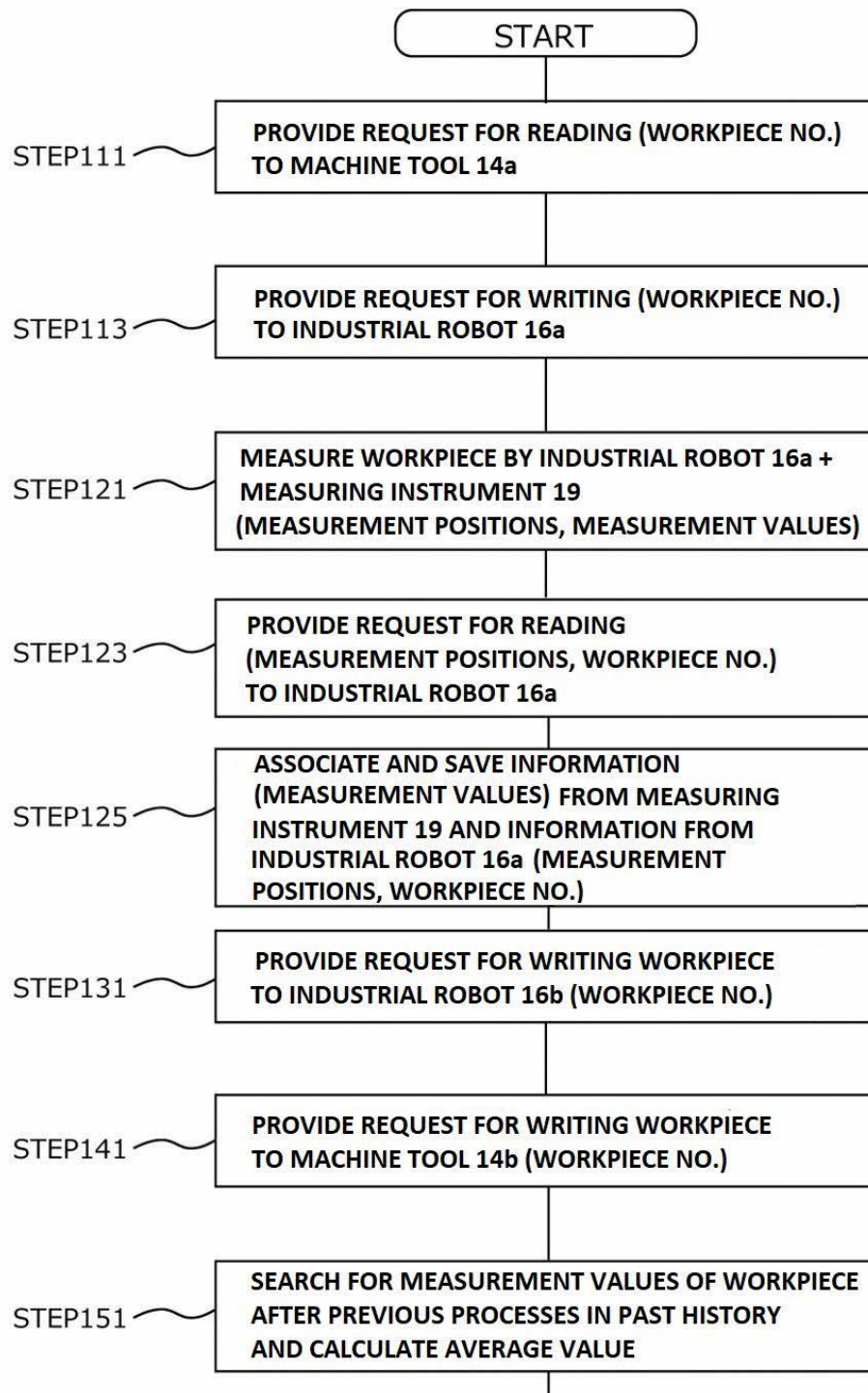


Figure 6

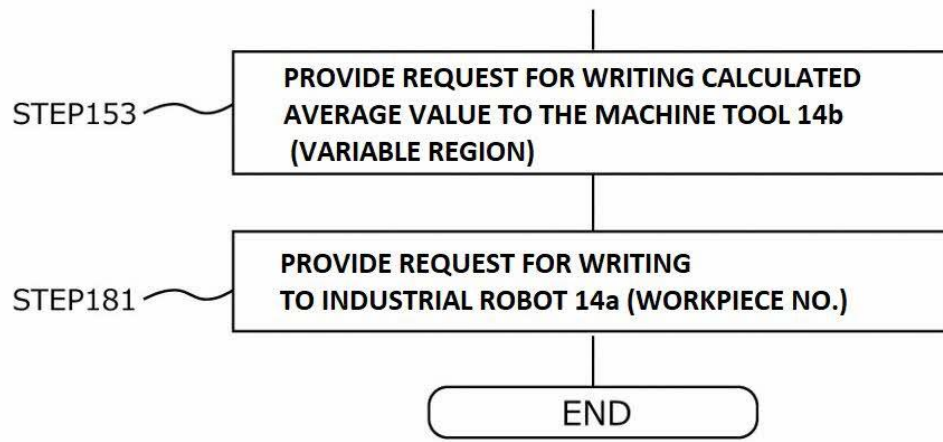


Figure 7

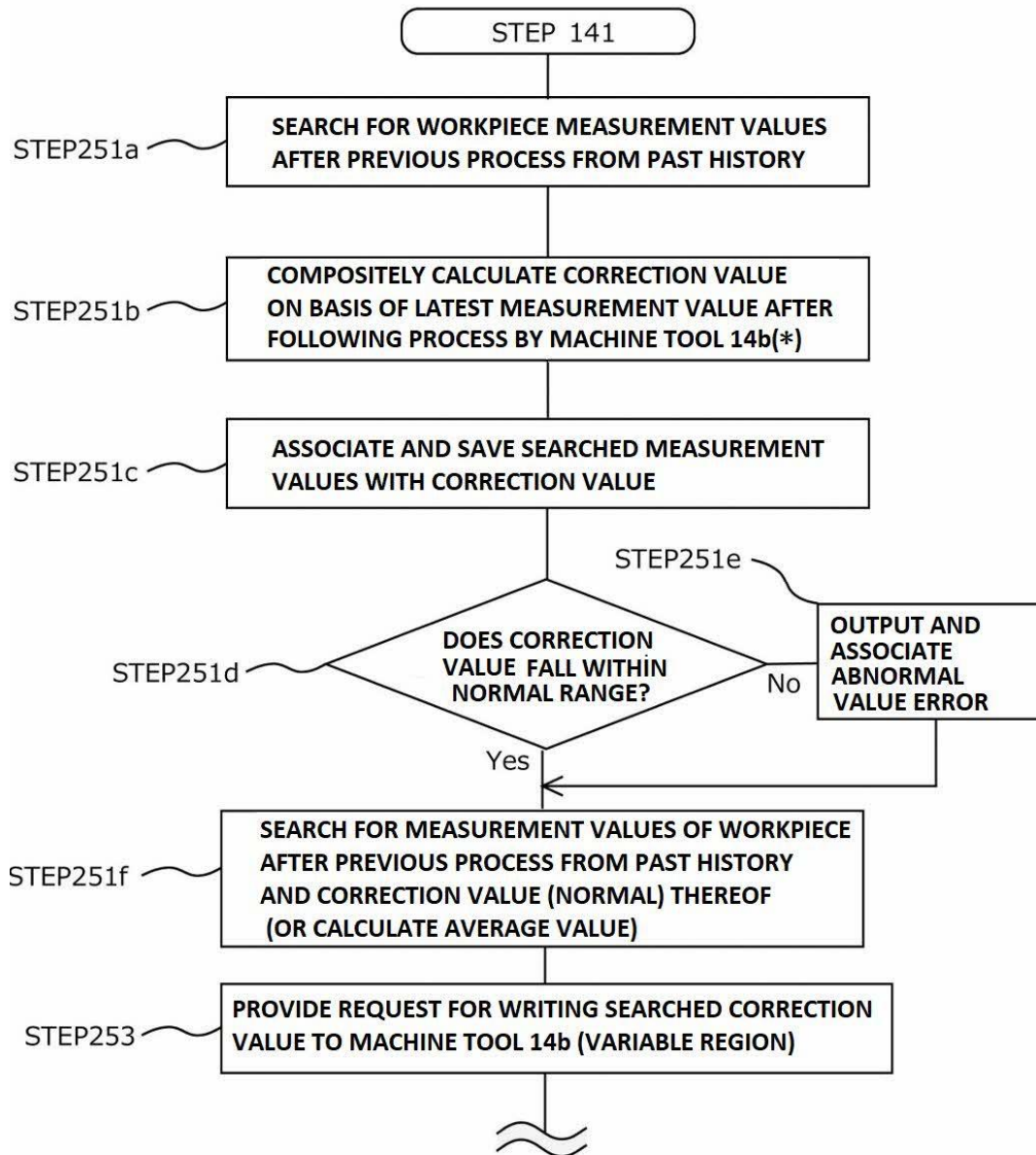


Figure 8

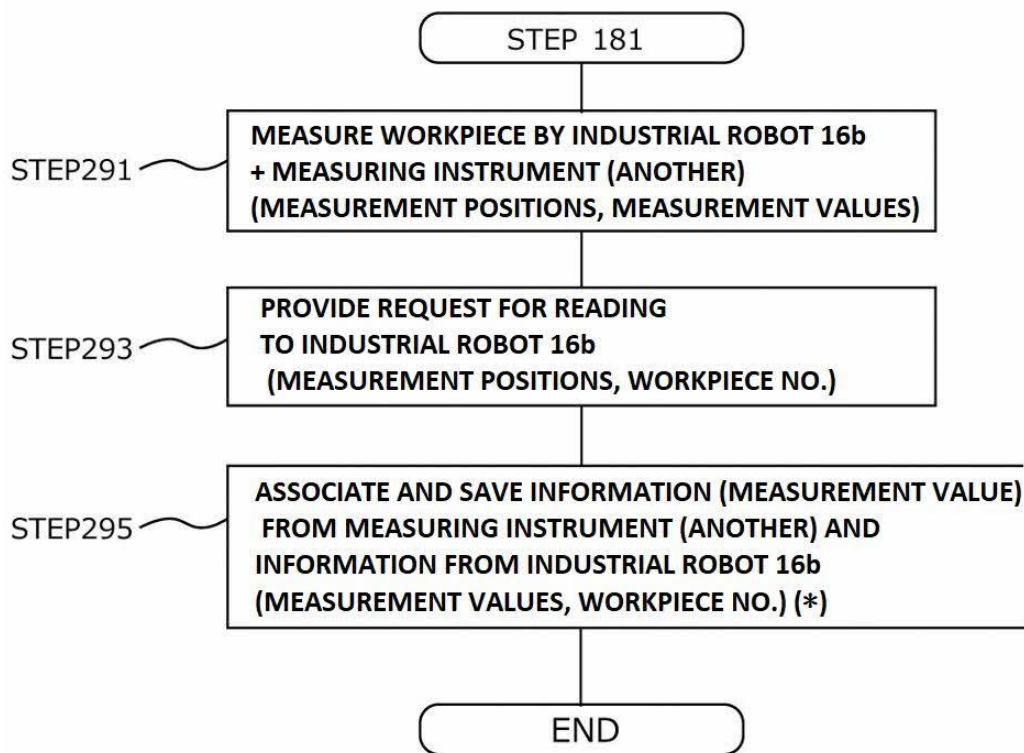


Figure 9

```

MAIN PROGRAM
%
O1100
GOTO#600(PROCESSING PROCESS NUMBER)

N00(CALCULATION PARAMETER SETTING/MANUAL READING ONLY FOR FIRST TIME AND FOR CHANGE)
#600=#0(PROCESSING PROCESS NUMBER: INITIALIZATION)
#601=0.0(CALCULATION VALUE: INITIALIZATION)
#602=1000.0(MEASUREMENT VALUE REFERENCE)
#603=0.0(CALCULATION VALUE: INITIALIZATION)
#604=-0.0005(COUNTING FOR CALCULATION)
#605=0.0(CORRECTION VALUE CALCULATION INTERMEDIATE VARIABLE: INITIALIZATION)
#606=302.760(COORDINATE REFERENCE VALUE)
#607=0.0(CORRECTION AMOUNT mm: INITIALIZATION)
#608=0.0(MEASUREMENT VALUE mm: INITIALIZATION)
#610=1.0(PROCESS 1 COUNT NUMBER: INITIALIZATION)
#611=1.0(PROCESS 2 COUNT NUMBER: INITIALIZATION)
M30

N01(PROCESS 1 CALCULATION PROCESSING)
#600=#0(PROCESSING PROCESS NUMBER: INITIALIZATION)
(CALCULATION VALUE PROCESSING: NG DETERMINATION IN CASE OF 1.2<#601<0.9→JUMP TO N999)
IF[#601]GE[1.200]]GOTO999
IF[#601]LE[0.900]]GOTO999
(IN CASE OF NORMAL DETERMINATION, PERFORM FOLLOWING CORRECTION VALUE CALCULATION WITHOUT JUMPING)
#608=#601*#602
#603=#602-#608
#605=#603*#604
#607=#606-#605
(NG DETERMINATION IN CASE WHERE CORRECTION VALUE IS ABNORMAL VALUE→JUMP TO N999)
IF[#607]GE[303.0]]GOTO999
IF[#607]LE[302.0]]GOTO999
(IN CASE OF NORMAL DETERMINATION, WRITE CORRECTION VALUE IN OFFSET WITHOUT JUMPING→JUMP TO N111)
#2601=#607(WRITE CORRECTION VALUE IN OFFSET)
GOTO111

N999(CALCULATION ERROR PROCESSING: NC ALARM)
#3000-1(ERROR-#601OR#607)
M0

N111(PROCESS 1 PROCESSING)
#503=1.0 (COMMUNICATION PROCESSING: START)
G65P8802(RECORD WORKPIECE OFFSET IN EXTERNAL PC)
M98P1001 (PROCESS 1 PROGRAM)
#610=#610+1.0(PROCESS 1 COUNT NUMBER+1)
#503=0 (COMMUNICATION PROCESSING: STOP)
M30

N02(PROCESS 2 PROCESSING)
#600=#0(PROCESSING PROCESS NUMBER: INITIALIZATION)
#2601=303.118 (WRITE FIXED POINT IN OFFSET)
#503=1.0 (COMMUNICATION PROCESSING: START)
G65P8802(MACRO/WORK OFFSET)
M98P1002 (PROCESS 2 PROGRAM)
#611=#611+1.0(PROCESS 2 COUNT NUMBER+1)
#503=0 (COMMUNICATION PROCESSING: STOP)
M30
%
```

Figure 10

```

PROCESS 1 PROGRAM
%
O1001(PROCESS 1 MAIN)

N1(PROCESSING 1)
G50S2000
IF[[[#610]MOD[2]]EQ[0]]GOTO12(BRANCHING OF TOOL TO BE USED)
N11(TOOL EXCHANGE PATTERN 1)
GOTO505
GOTO111
N12(TOOL EXCHANGE PATTERN 2)
GOTO303
GOTO111
N111
G65P8801(RECORD TOOL OFFSET IN EXTERNAL PC)
M8
G96S200M3
#504=1.0 (PROCESSING MONITORING: START)
.
.
PROCESSING OPERATION
.
.
#504=0 (PROCESSING MONITORING: START)
M01
N2(PROCESSING 2)
G50S2000
IF[[[#610]MOD[2]]EQ[0]]GOTO22(BRANCHING OF TOOL TO BE USED)
N21(TOOL EXCHANGE PATTERN 1)
GOTO404
GOTO222
N22(TOOL EXCHANGE PATTERN 2)
GOTO101
GOTO222
N222
G65P8801(RECORD TOOL OFFSET IN EXTERNAL PC)
M8
G96S200M3
#504=1.0 (PROCESSING MONITORING: START)
.
.
PROCESSING OPERATION
.
.
#504=0 (PROCESSING MONITORING: START)
M01
.
.
.
.
.
M99
%
※ CONTINUE TO NEXT PAGE FOR SUBPROGRAM

```

Figure 11

**SUB-PROGRAM 1: RECORD WORKPIECE OFFSET IN EXTERNAL PC**

```

%
O8802
#502=#502+1(WORKPIECE NUMBER)
#510=#2501(WRITE FIRST AXIS WORKPIECE OFFSET VALUE)
#511=#2601(WRITE SECOND AXIS WORKPIECE OFFSET VALUE)
#512=0(WRITE THIRD AXIS WORKPIECE OFFSET VALUE: 0 BECAUSE THIS IS NOT USED)

#506=1.0 (START WORKPIECE OFFSET RECORDING ON)
WHILE[#506EQ1.0]DO1 (REPEAT STANDBY PROCESSING EVERY 0.1 SECONDS UNTIL 0 IS WRITTEN FROM AdC BY RECORDING COMPLETION)
G04X0.1
#199=#199+0.1
IF[#199GT2.0]GOTO8888(COMMUNICATION ERROR IN CASE WHERE RECORDING IS NOT COMPLETED AFTER TWO SECONDS ARE EXCEEDED→JUMP TO N8888)
END1 (REPEAT PROCESS UP TO THIS POINT)

N8888(DO NOT STOP ALTHOUGH THIS IS ERROR PROCESSING)
#199=0
M99
%
```

Figure 12

```

SUB-PROGRAM 2: RECORD TOOL OFFSET IN EXTERNAL PC
%
O8801
#501=#4320 (WRITE TOOL NUMBER)
#513=#[15000+FIX[#501/100]](WRITE FIRST AXIS TOOL OFFSET VALUE)
#514=#[10000+FIX[#501/100]](WRITE FIRST AXIS TOOL WEAR OFFSET VALUE)
#515=#[16000+FIX[#501/100]](WRITE SECOND AXIS TOOL OFFSET VALUE)
#516=#[11000+FIX[#501/100]](WRITE SECOND AXIS TOOL WEAR OFFSET VALUE)
#507=1.0 (START OF TOOL OFFSET RECORDING ON)
WHILE[#507EQ1.0]DO1(REPEAT STANDBY PROCESSING EVERY 0.1 SECONDS UNTIL 0 IS WRITTEN FROM AdC BY RECORDING COMPLETION)
G04X0.1
#199=#199+0.1
IF[#199GT2.0]GOTO8888(COMMUNICATION ERROR IN CASE WHERE RECORDING IS NOT COMPLETED AFTER TWO SECONDS ARE EXCEEDED→JUMP TO N8888)
END1
END1 (REPEAT PROCESS UP TO THIS POINT)

N8888(DO NOT STOP ALTHOUGH THIS IS ERROR PROCESSING)
#199=0
M99
%
```

Figure 13

**VARIABLE LIST****WHAT IS USED IN PROCESSING**

#600 PROCESSING PROCESS NUMBER: ROBOT→EXTERNAL PC→PROVIDE INPUT THROUGH PATH OF PROCESSING TOOL  
 SELECT PROGRAM BY JUMPING TO ARBITRARY N[#600] IN GOTO#600  
 #601 VARIABLE mm IN WHICH MEASUREMENT VALUE IS INPUT  
 #602 MEASUREMENT VALUE REFERENCE (CONSTANT)  
 #603 CALCULATION VALUE  
 #604 COUNTING (CONSTANT) FOR CALCULATION  
 #605 CORRECTION VALUE CALCULATION INTERMEDIATE VARIABLE  
 #606 COORDINATE REFERENCE VALUE (CONSTANT)  
 #607 CORRECTION AMOUNT CALCULATION RESULT mm  
 #608 CALCULATION VALUE mm  
 #610 PROCESS 1 COUNT NUMBER  
 #611 PROCESS 2 COUNT NUMBER

**WHAT IS USED BY PRESENT SOFTWARE**

#501 FOR RECORDING TOOL OFFSET  
 #502 FOR RECORDING WORKPIECE OFFSET  
 #503 AdC COMMUNICATION PROCESSING  
 #504 PROCESSING MONITORING (RECORDING) PROCESSING  
 #510 WRITE FIRST AXIS WORKPIECE OFFSET VALUE  
 #511 WRITE SECOND AXIS WORKPIECE OFFSET VALUE  
 #512 WRITE THIRD AXIS WORKPIECE OFFSET VALUE: NOT USED  
 #513 WRITE FIRST AXIS TOOL OFFSET VALUE  
 #514 WRITE FIRST AXIS TOOL WEAR OFFSET VALUE  
 #515 WRITE SECOND AXIS TOOL OFFSET VALUE  
 #516 WRITE SECOND AXIS TOOL WEAR OFFSET VALUE

Figure 14

**MAIN PROGRAM**

%

O1100

GOTO#600(PROCESSING PROCESS NUMBER)

N00(CALCULATION PARAMETER SETTING/MANUAL READING ONLY FOR FIRST TIME AND FOR CHANGE)

#600=#0(PROCESSING PROCESS NUMBER: INITIALIZATION)

#607=0.0(CORRECTION AMOUNT mm: INITIALIZATION)

M30

N01(PROCESS 1 CALCULATION PROCESSING→ONLY WRITING PROCESSING IS PERFORMED WHILE CALCULATION AND DETERMINATION PROCESSING IS PERFORMED BY PC)

#2601=#607(WRITE CORRECTION VALUE IN OFFSET)

GOTO111

N111(PROCESS 1 PROCESSING)

#503=1.0 (COMMUNICATION PROCESSING: START)

G65P8802(RECORD WORKPIECE OFFSET IN EXTERNAL PC)

M98P1001 (PROCESS 1 PROGRAM)

#610=#610+1.0(PROCESS 1 COUNT NUMBER+1)

#503=0 (COMMUNICATION PROCESSING: STOP)

M30

N02(PROCESS 2 PROCESSING)

#600=#0(PROCESSING PROCESS NUMBER: INITIALIZATION)

#2601=303.118 (WRITE FIXED POINT IN OFFSET)

#503=1.0 (COMMUNICATION PROCESSING: START)

G65P8802(MACRO/WORK OFFSET)

M98P1002 (PROCESS 2 PROGRAM)

#611=#611+1.0(PROCESS 2 COUNT NUMBER+1)

#503=0 (COMMUNICATION PROCESSING: STOP)

M30

%