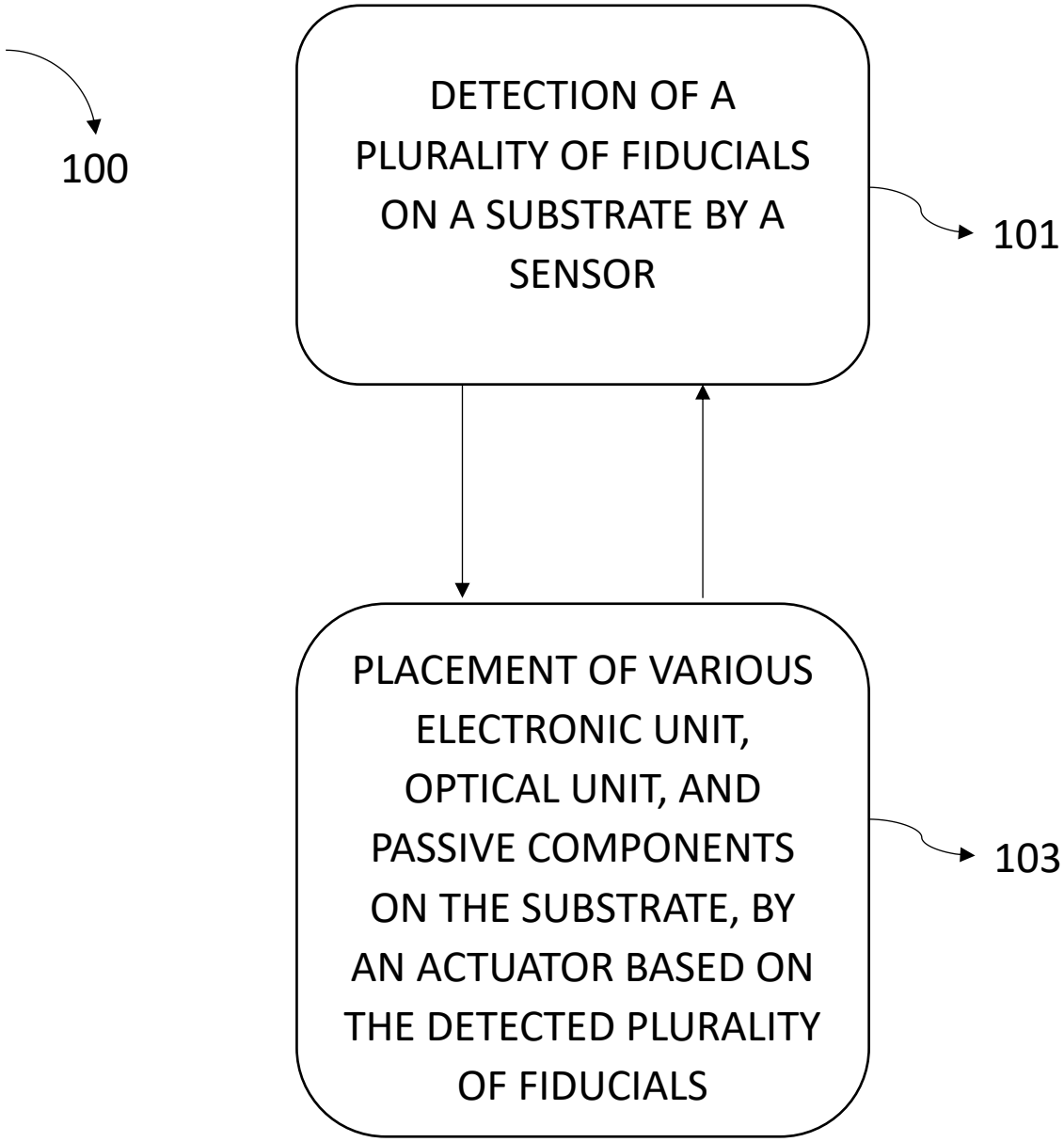

100
DETECTION OF A PLURALITY OF FIDUCIALS ON A SUBSTRATE BY A SENSOR
101
PLACEMENT OF VARIOUS ELECTRONIC UNIT, OPTICAL UNIT, AND PASSIVE COMPONENTS ON THE SUBSTRATE, BY AN ACTUATOR BASED ON THE DETECTED PLURALITY OF FIDUCIALS
103

FIG. 1A

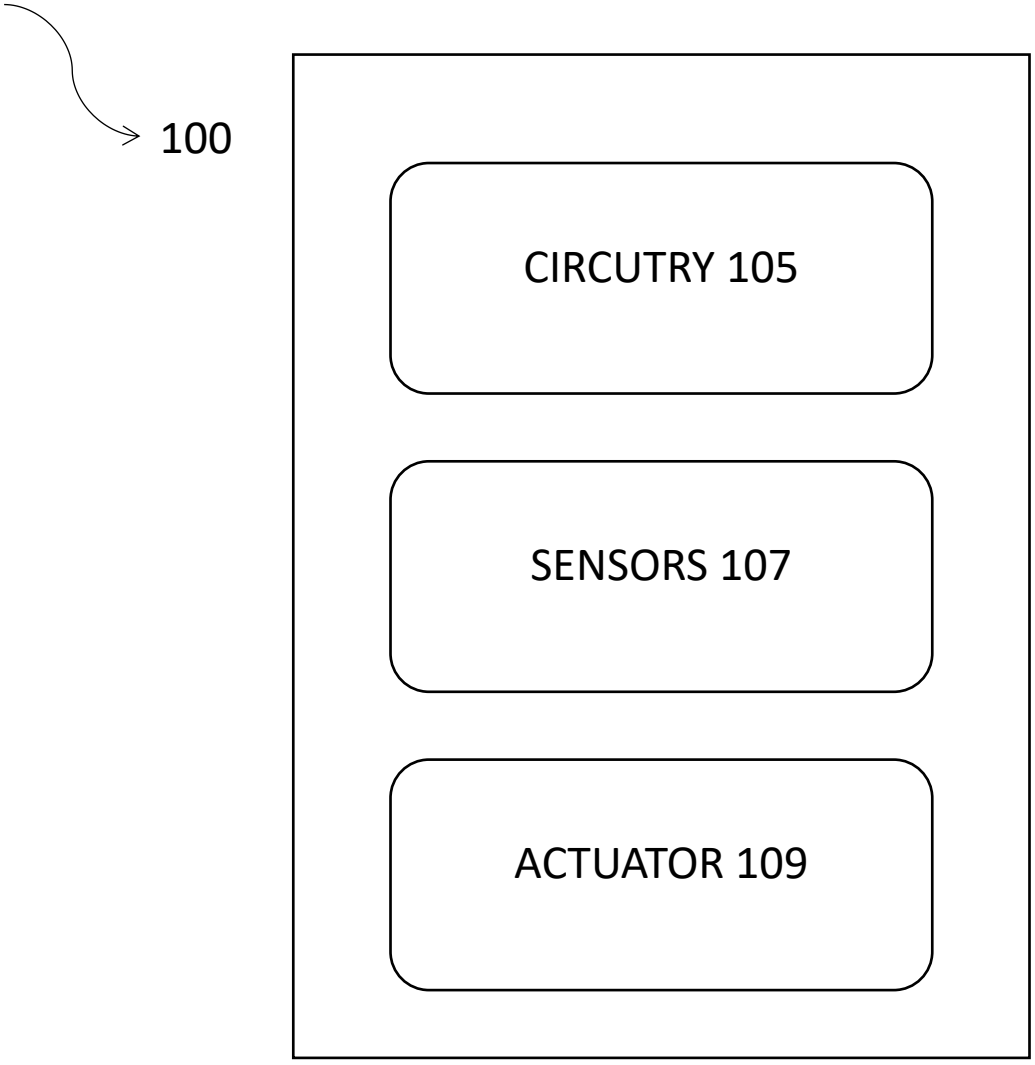


FIG. 1B

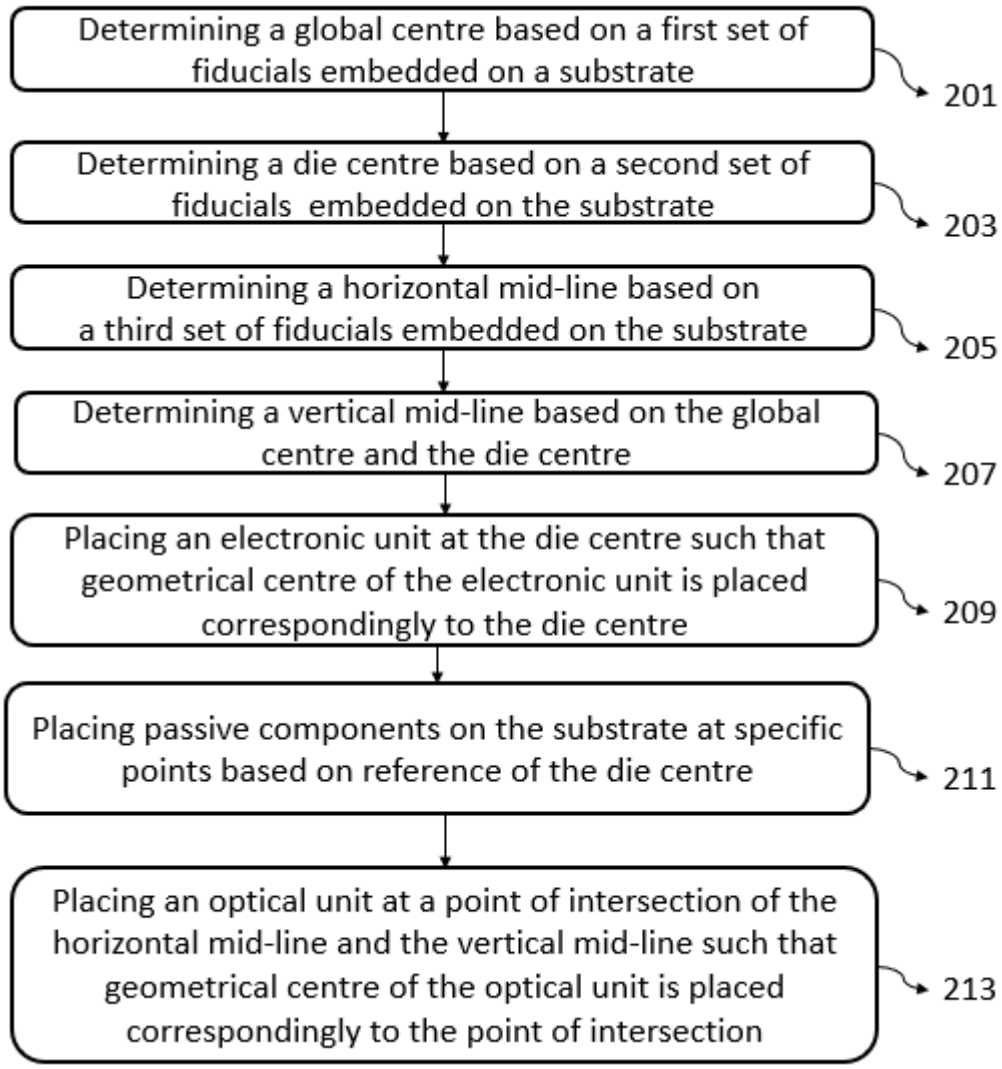

Determining a global centre based on a first set of fiducials embedded on a substrate
201
Determining a die centre based on a second set of fiducials embedded on the substrate
203
Determining a horizontal mid-line based on a third set of fiducials embedded on the substrate
205
Determining a vertical mid-line based on the global centre and the die centre
207
Placing an electronic unit at the die centre such that geometrical centre of the electronic unit is placed correspondingly to the die centre
209
Placing passive components on the substrate at specific points based on reference of the die centre
211
Placing an optical unit at a point of intersection of the horizontal mid-line and the vertical mid-line such that geometrical centre of the optical unit is placed correspondingly to the point of intersection
213

FIG. 2

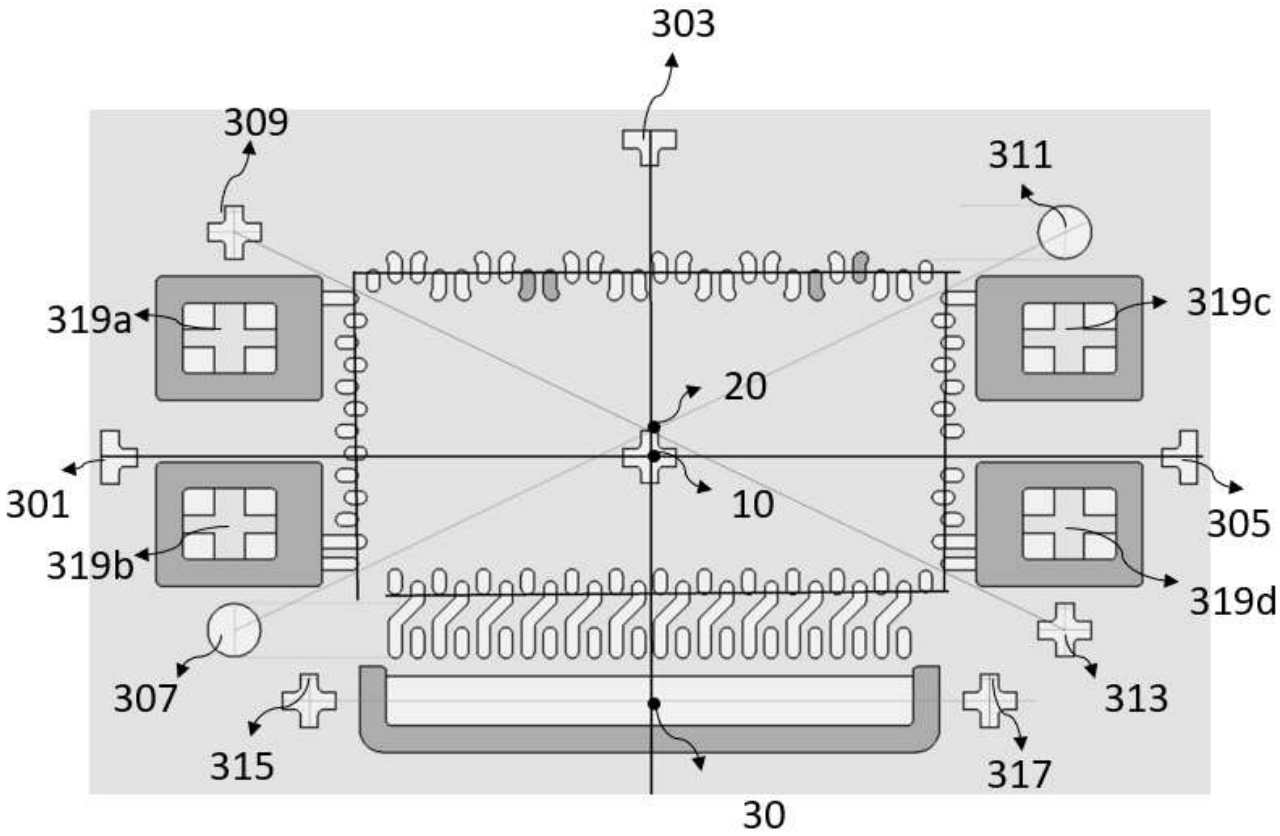


FIG. 3

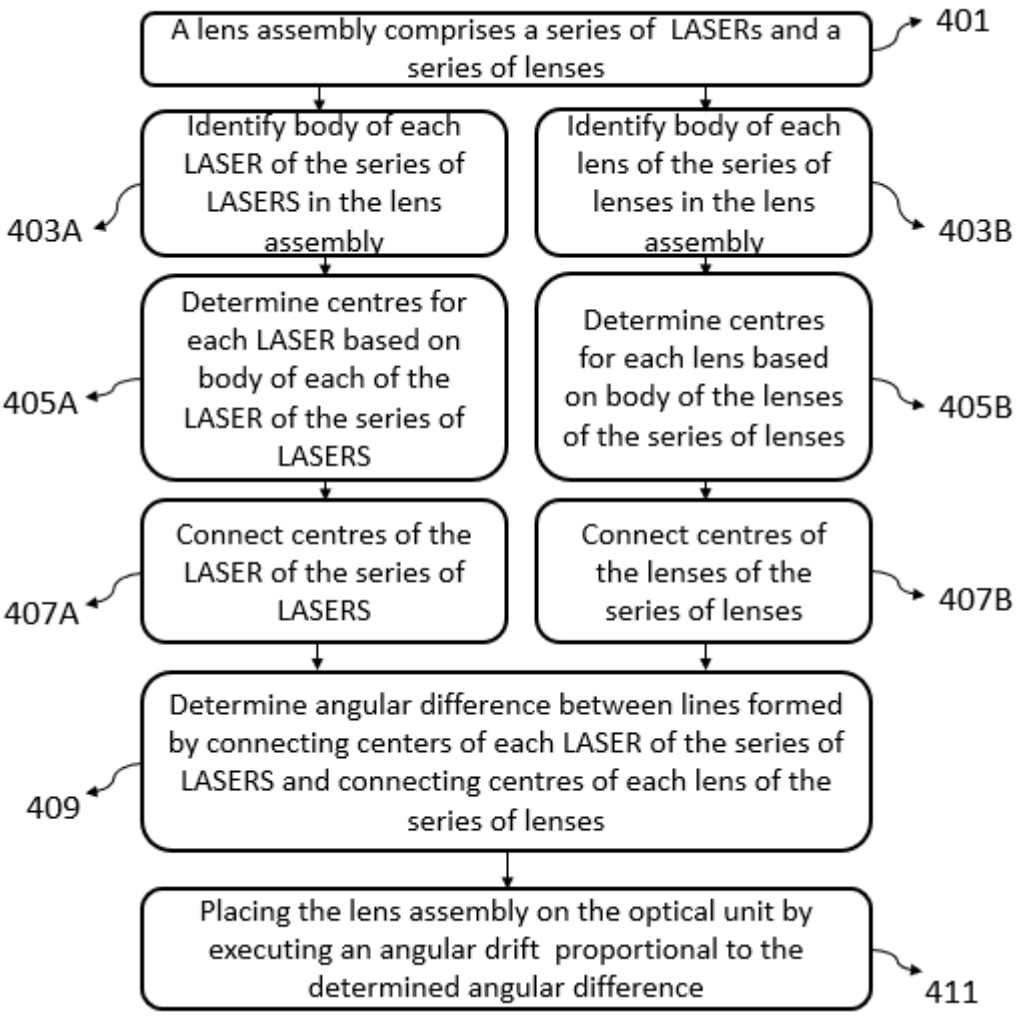

A lens assembly comprises a series of LASERs and a series of lenses
401
Identify body of each LASER of the series of LASERS in the lens assembly
403A
Identify body of each lens of the series of lenses in the lens assembly
403B
Determine centres for each LASER based on body of each of the LASER of the series of LASERS
405A
Determine centres for each lens based on body of the lenses of the series of lenses
405B
Connect centres of the LASER of the series of LASERS
407A
Connect centres of the lenses of the series of lenses
407B
Determine angular difference between lines formed by connecting centers of each LASER of the series of LASERS and connecting centres of each lens of the series of lenses
409
Placing the lens assembly on the optical unit by executing an angular drift proportional to the determined angular difference
411

FIG. 4

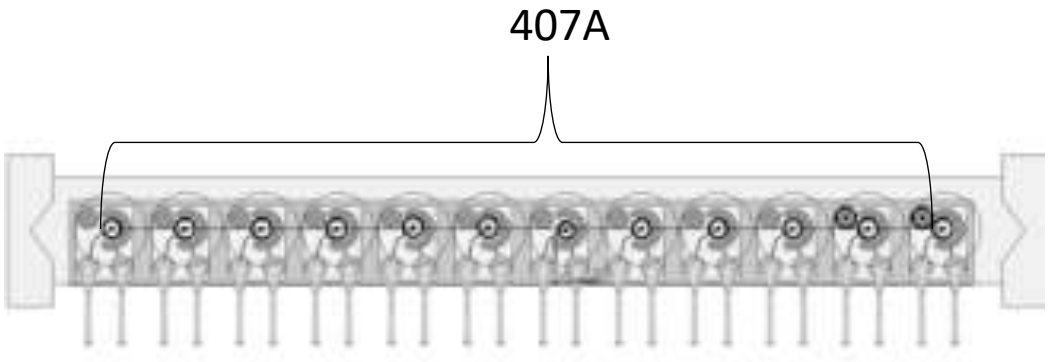


FIG. 5A

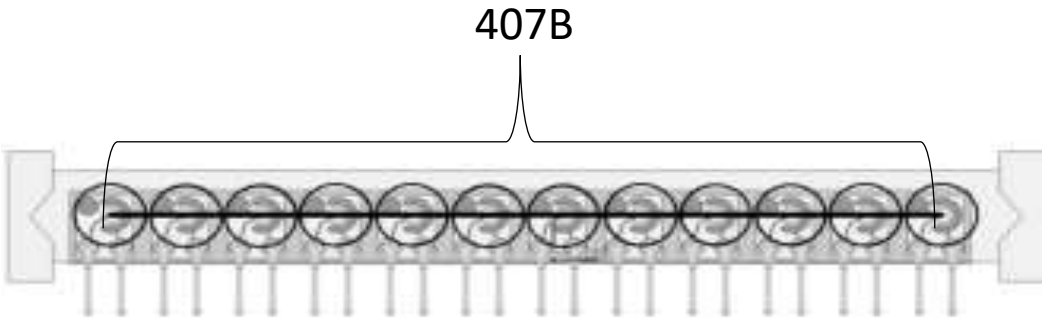


FIG. 5B

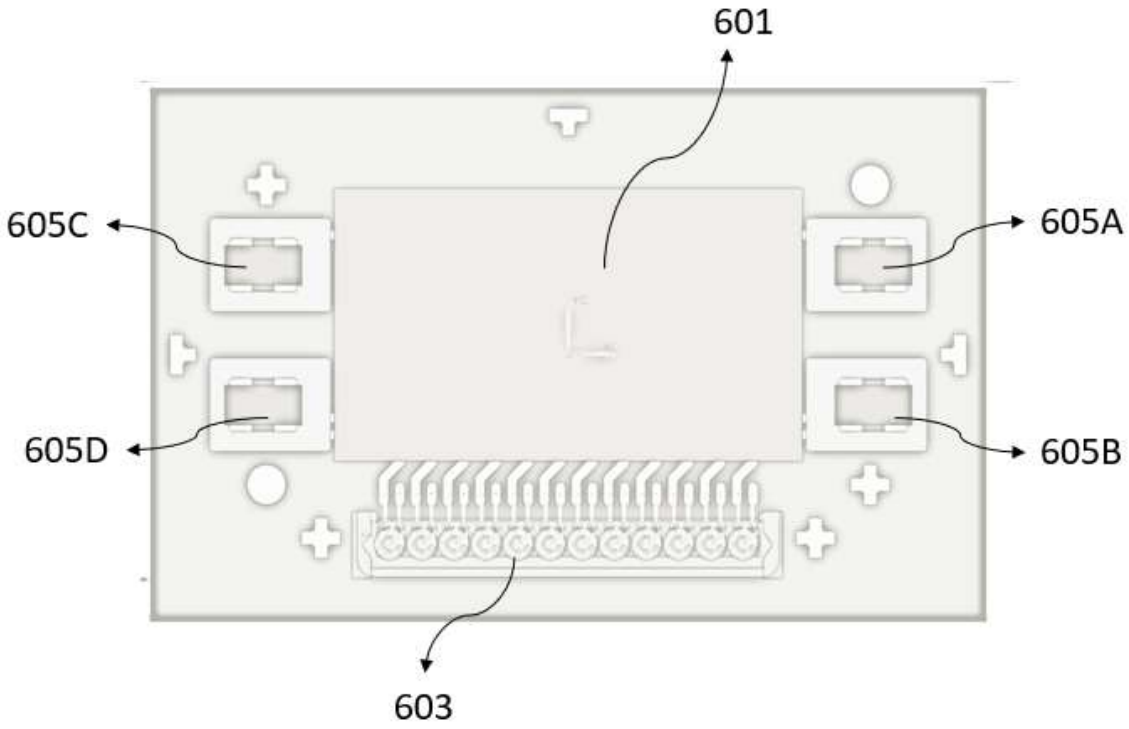


FIG. 6

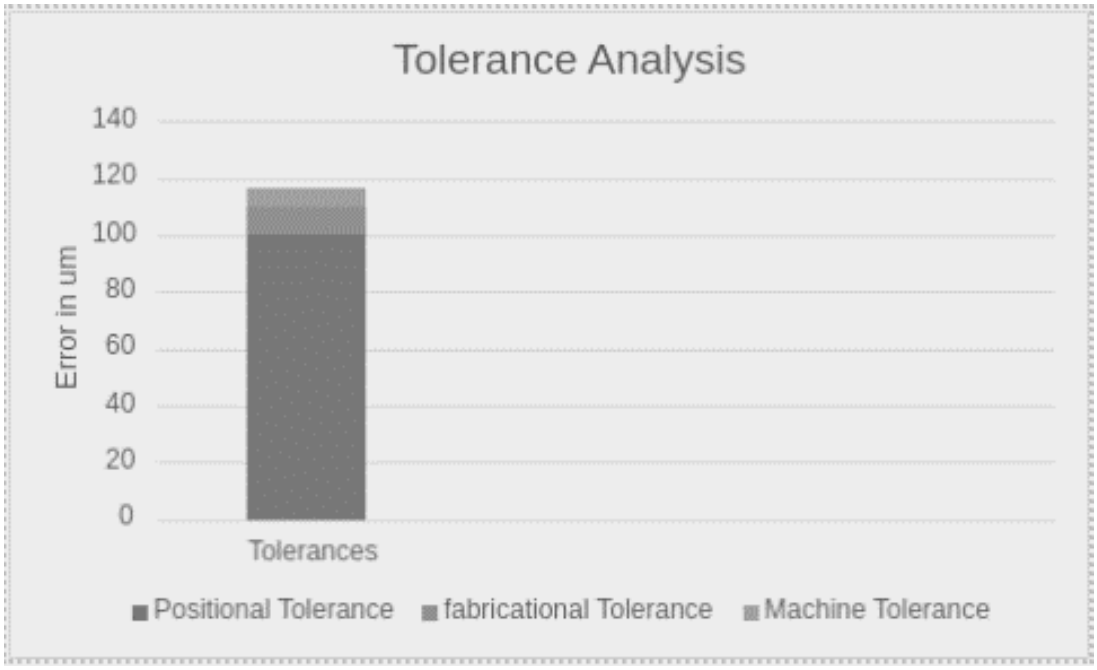

Tolerance Analysis
140
120
100
80
60
40
20
0
Error in um
Tolerances
Positional Tolerance
fabricational Tolerance
Machine Tolerance

FIG. 7A

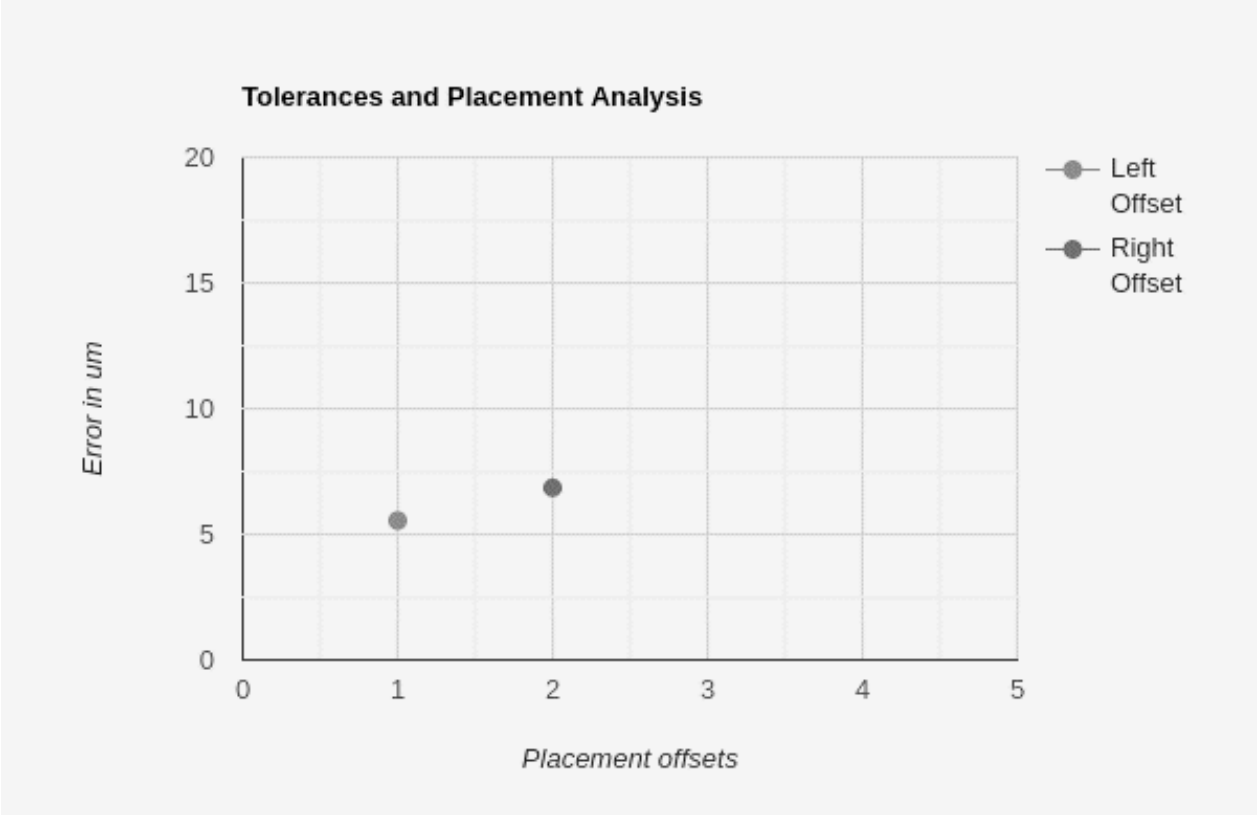

Tolerances and Placement Analysis
20
15
10
5
0
Error in um
0
1
2
3
4
5
Placement offsets
Left Offset
Right Offset

FIG. 7B