

# InspeCVision's Planar VS Manual Inspection Methods (*Calipers, tapes, etc.*)

## ***Missing or Extra Holes/Apertures:***

**It is almost impossible to identify missing or extra holes or apertures with manual methods unless the part is very simple.**

Missing or extra holes are one of the most important and common problems facing sheet metal manufacturers.

Manual methods cannot identify missing or extra holes unless the operator tries to measure the missing/extra hole/aperture. Since manual methods are so slow that most operators measure only a small percentage of the part, missing or extra holes or apertures are almost impossible to identify unless the part is very simple.

In contrast the Planar machine always measures the entire table regardless of component size or complexity. It will always spot missing or extra holes or apertures or changes in the parts design. An operator can do this easily and quickly; in less than 30 seconds and by simply putting the part on the table and double clicking the DXF.

## ***Time, Skill and Accuracy:***

Manual methods are extremely slow. To completely inspect a reasonably complex part could take many hours. In reality most operators only inspect a small fraction of the part in the available time (e.g. 20 minutes).

Manual methods also rely on the skill of the operator. The abilities of the operator can therefore greatly affect the accuracy and quality of the results.

In contrast the Planar machine requires very little skill to inspect a 2D part. 2D parts can be inspected by simply double clicking their DXF. The accuracy of the system is ISO certified to typically 25 microns (1 thousands of an inch). Inspection reports and tolerances can be predefined in the dimensions of the DXF, by the customer or the engineers.

The 3D shape of the part can then be confirmed by simply inspecting the fold lengths (please contact InspeCVision for more details on this 3 step process).

### **3D Measurement:**

Manual methods can confirm the folding of a part, however they cannot confirm the 3D shape of the part.

In contrast the InspecVision machine can completely verify the 3D shape of a folded part in less than 5 minutes and with very little skill.

First the 2D shape of a part can be confirmed in around 30 seconds with a double click. This will prevent the folding of any scrap.

The 3D parts shape can then be confirmed by simply measuring the fold lengths, since the hole/aperture positions and sizes will not change (please contact InspecVision for further information on this process). This can be done manually, or the 3D Line Laser Planar option.

### **Speed of Measurement:**

Manual methods can make and record at best 1 measurement every 10 seconds.

In contrast the Planar machine takes up to 30 million measurements in 0.1 seconds. For an operator to measure a part 30 million times at one measurement every 10 seconds would take about 10 years!

### **Number of Measurements:**

When manually inspecting a hole or line the operator will typically measure each line 2 times and each circle/arc 3 times. This process is so slow that operators usually don't measure most entities at all!

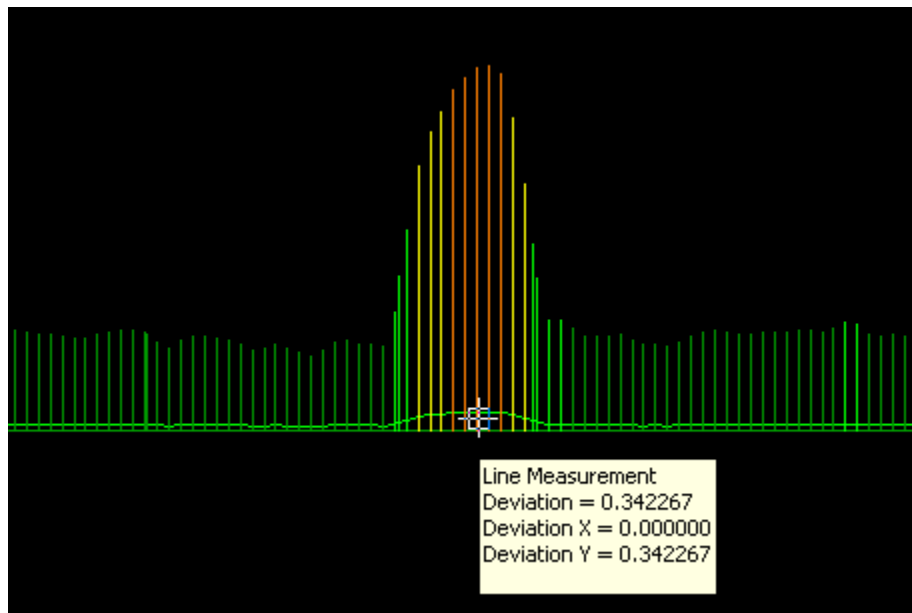
In between the few measurements which are actually taken the operator has absolutely no information about the geometry of the part.

If we neglect the effects of edge profile/Kerf, most laser cut or punched edges vary by about 0.1 to 0.2 mm (at best) due to nibbling, break away joints and general surface roughness.

It is therefore pure chance if the manual measurements are taken at a point which accurately represents the part.

In contrast the Planar machine takes up to 30 million measurements of the entire part in 0.1 seconds. It measures every burr, every break away tab, every nibbling deviation. All of this information is used to inspect the part.

The image below is a Planar inspection of a break away joint.



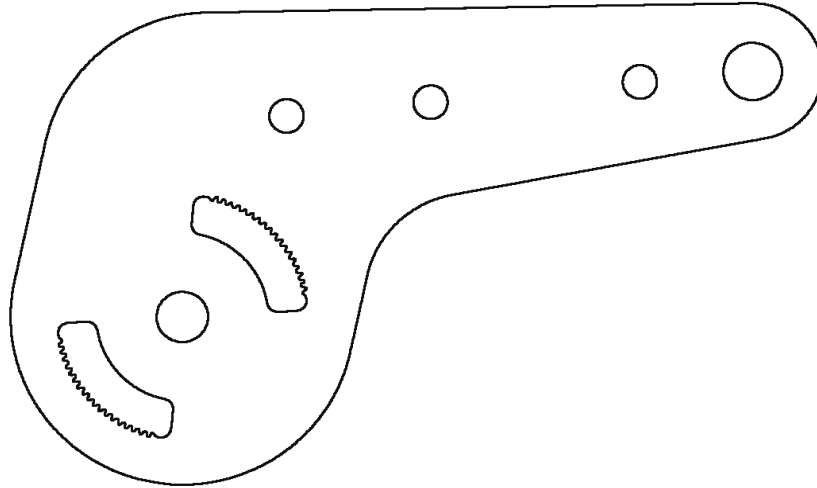
It is therefore almost impossible for manual measurements to accurately inspect a part, as the number of measurements is simply too small to have a full understanding of the parts geometry.

Because of this manual methods rely on pure chance to identify the following problems...

- Elliptical holes
- extra holes
- missing holes
- Lines with curved-sections/bows
- extra features (lines/arcs/etc)
- burred holes
- burred lines
- dented/damaged holes
- dented/damaged lines
- Missing features (lines/arcs/etc)

**Complex Shapes:**

Because all measurements must be taken relative to another surface rather than an X-Y datum, many shapes or problems, especially those containing curves cannot be measured at all. A typical example of a part which cannot be measured using manual methods is given below.



**Reverse Engineering:**

Manual methods would take well several hours just to measure our InspecVision demo part. A comparable amount of time would then be required to convert the measurements into a DXF. Furthermore many shapes which contain curves cannot be measured at all.

The Planar machine can reverse engineer any flat sheet part placed on the table in less than 1 minute regardless of size or complexity.

Furthermore the Planar machine can convert images or printed material into DXF files.