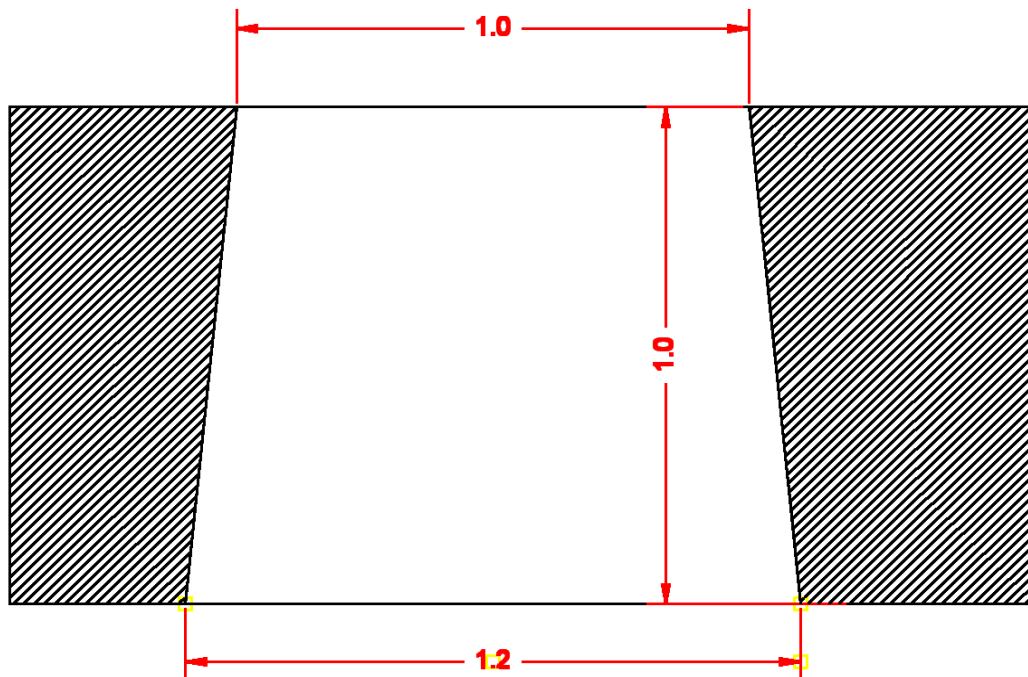


## InspeCVision's Planar VS CMM Arm

### **Accuracy:**

While CMM Arms may quote very good accuracies, they **cannot** be used to accurately measure sheet metal components.

This is because of the edge profile (kerf) of all sheet metal parts. A sheet metal part typically has an edge profile of 10%, see image below.



In the example above a 1mm thick part has a hole with a 10% edge profile or Kerf. The Diameter of this holes varies by 0.2mm from the top to the bottom as a result of this edge profile, for a 5mm thick part this variation would be 1mm! A CMM Arm has very little control or knowledge about which part of the edge profile or Kerf it is touching. Therefore while the quoted

accuracy of the CMM arm may be very high the actual accuracies achieved will be much much lower.

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

**It is almost impossible to identify missing or extra holes or apertures with a CMM arm unless the part is very simple.**

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

A CMM arm cannot identify missing or extra holes unless the operator tries to measure the missing/extra hole/Aperture. Since the device is so slow, most operators measure only a small percentage of the part. In effect missing/extra holes must be identified manually and the CMM arm cannot help in this process.

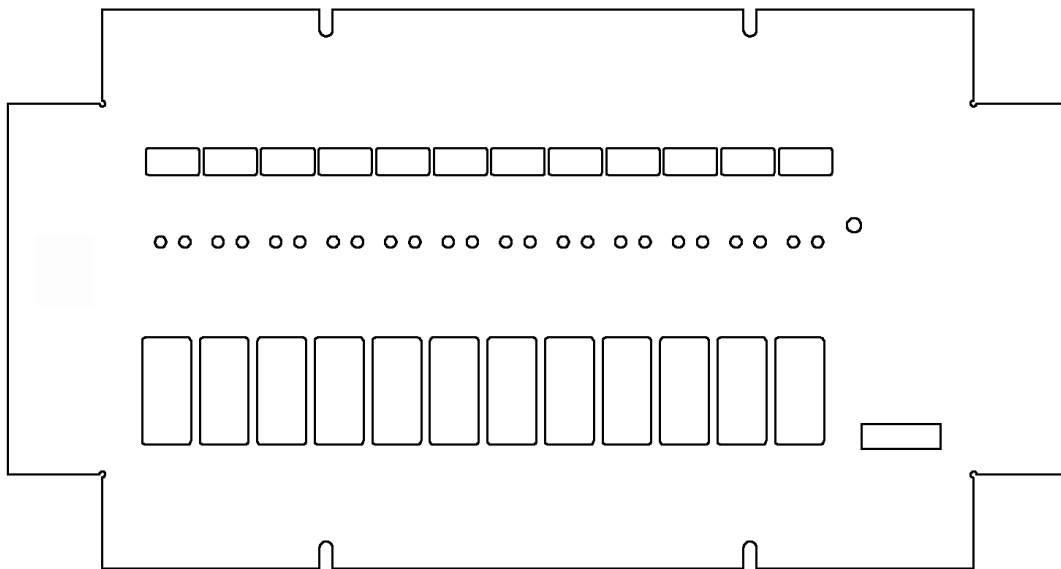
Manually identifying missing holes/apertures is almost impossible unless the part is very simple.

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.

### **Speed of Measurement:**

A CMM Arm is controlled and moved by the operator. It can take at best perhaps 1 measurement every 3 seconds.

The InspecVision Demo part is shown below.



This part is not particularly complicated, yet it contains 253 entities. If it takes 10 seconds to measure each entity (3 measurements per entity) it would take over 40 minutes just to acquire the measurement data for the entire part.

In contrast the Planar machine takes up to 30 million measurements in 0.1 seconds. It will always take under 30 seconds to completely measure any part placed on the table, regardless of size or complexity.

**Number of Measurements:**

A CMM will typically measure each line 2 times and each circle/arc 3 times. In fact, they are so slow that operators usually don't measure most entities at all!

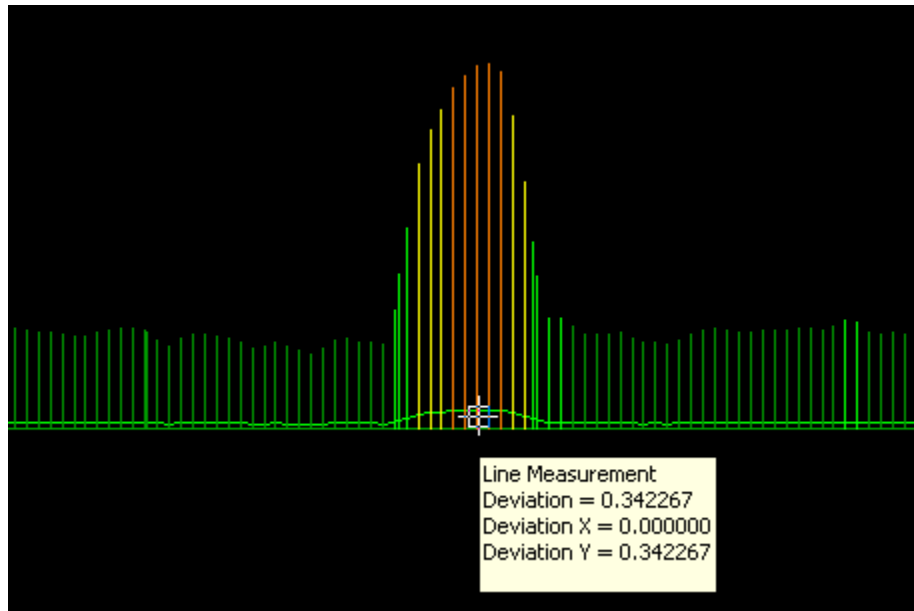
In between the few measurements which are actually taken the CMM has absolutely no information about the geometry of the part.

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 CMM takes a measurement 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 a CMM 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 a CMM therefore relies 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)

### **Automation:**

A CMM Arm must be manually controlled and moved by the operator. Set up periods are long and difficult.

The Planar machine can completely verify a 2D part in less than 30 seconds by simply double clicking its DXF.

### **3D Measurement:**

Due to their slow speeds it is impractical to measure a part in 2D and 3D using a CMM Arm. Any parts which contain missing holes, extra holes, or any other 2D error must therefore be folded before the problem can be spotted. This creates scrap, wastes time and money and increases the chance of missed production schedules.

3D measurement of the part is extremely slow and highly skilled.

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 3 step process). This can be done with a set of manual protractors and calipers, or the 3D Line Laser Planar option.

### **Reverse Engineering:**

A CMM Arm would take over 40 minutes just to measure our InspecVision demo part. A comparable amount of time would then be required to convert the measurements into a DXF.

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.

**Maintenance:**

A CMM Arm requires high precision moving parts which must be maintained, recalibrated and replaced when worn out.

The InspecVision machine has no moving parts to wear or maintain.

Furthermore, because the input to the system is the digital images captured during calibration and measurement, the system can be used and replicated remotely, effectively eliminating the need for an onsite service engineer.