

#### Case Study: 0.010" or Less Gage Pin Holding

Manufacturers today can produce parts that fall below the range of tens of thousands of an inch. In these cases the tools necessary to inspect parts for design conformance has to be within or below this range. When technicians have to work within these ranges it becomes challenging for them to hold their parts steadily and conveniently.



The medical and electronics industries are both familiar with these challenges. Specifically, medical manufacturers have to create tubing that is commonly found in operating rooms. The tubing involves complex materials and hole diameters less than 0.010". Clean room operators have to measure these diameters at regular intervals to conform with stringent industry standards. A common practice is to place the tubing under a microscope then fit a pin gage into the inner diameter of the tube in order to determine if the tube conforms to its specified design. This is commonly referred to as go/no go gage checking. Where the pin gage is a known diameter within a very high tolerance, typically +/- 0.0001".

#### Prymetech - Back to the Drawing Board:

Prymetech is familiar with designing and manufacturing work holding devices. They have been engineering custom work holding solutions for the metrology industry for almost a decade. Their engineers were faced with holding pin gages below 0.010" in diameter.

Typical clamping designs today have a 3 piece solution that involves a body, cap and collet system. These collets typically don't clamp down to less than 0.050" making the devices limited. Users have also

complained about the collets jamming into the body making it difficult to remove a pin once it has been clamped.



**Diagram 1:**  
Common 3 pc Pin Gage  
Clamping System

Prymetech decided to re-engineer the system. They felt the design could be improved in more ways than one. First, the device needed to be able to clamp down to 0.000". Second, the design needed to be more robust. That is, it had to allow for pin gages to be clamped and removed without jamming.

Prymetech realized that the jamming of the three piece design was caused by the collet crimping itself into the body when tightened. This was resolved by integrating the collet into the body of the device making it two pieces instead of three. The two piece design (see Diagram 2 below) would remove all possibilities of the collet jamming into the body.

Testing proved that the two piece design was more challenging than first realized. The range of movement for the integrated collet depended on the material of the device and the diameter of the collet. These factors were strategically placed into

a design of experiments (D.O.E) and resolved through rigorous testing. Today, Prymetech offers a range of standard pin gage holding devices that includes a range from 0.000" to 0.018". Images of these devices are shown in diagram 3 below.



**Diagram 3:**  
Images of Prymetech's standard two piece gage pin holding devices.



**Cap**  
Caps are designed to adjust smoothly to the collet. All caps are 6061 Al with Red Anodized Plating.

**Collet**  
Collets are designed to spring back when removing the pin gage. These can be reused within the range specified in the specification table below. Collets are all Aluminum Anodized, colored or clear coated depending on the part number.