How to read an inch-based micrometer caliper

Written by El Caballo from the JJ

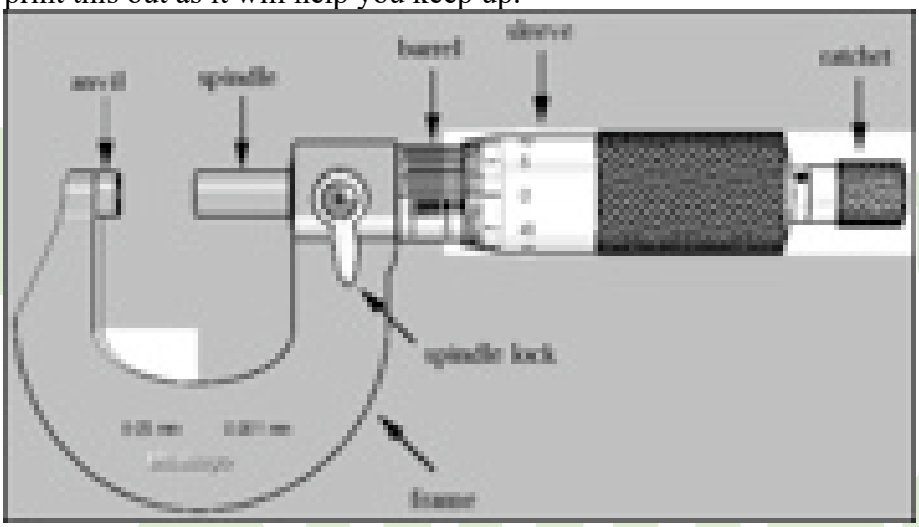
I have started to teach myself machining principles and I thought I would go ahead and do a series of tech articles like I did when I was in welding school. Not only will I be giving out some useful information, I will be reinforcing this in my own memory, I can't remember jack unless I write it down.

I have included at the bottom of the article some math how-to. I'm sure that if your math teachers had told you math would be useful in hot rodding you would not have cut class to smoke so much pot. Let's just call it a 'refresher'. Some of you are actual machinists and will laugh at the basic-ness of what I am putting out, but you have to learn somewhere, right? Therefore I am starting at the very bottom of newbie-ness.

I will be covering the 'inches' in this article because that is what is common to hot rods in the USA. I could get into Vernier and metric (International System of Units or SI) later. The science of measurement is called metrology and measurements today can be accurate to one-millionth of an inch (0.000001) or a microinch. One-millionth of a meter is called a micrometer.

Look at the picture with the parts of the micrometer that have been identified and make yourself familiar with their names as I will be throwing them about. You may want to

print this out as it will help you keep up.



The guts of the micrometer caliper and how it works!
I know you will like this part. The very basis of the micrometer is built upon a very accurately made screw (**spindle**) that rotates inside the static or non-moving **barrel**. The spindle goes in or out of the barrel by turning the **sleeve**. The sleeve is also called a **thimble**, some folks calls it a Kaiser blade, but I calls it a slingblade, mm-hmm. For the sake of continuity with the picture I will call it a sleeve. On the other end is the **anvil** and the measurements are taken between the tip of the spindle and the top of the anvil. The spindle's threaded section has 40 threads per inch and for every complete turn the spindle will move 1/40th of an inch, or (0.025) in.

The lengthwise line on the barrel is divided into 40 equal parts per inch which corresponds with the number of threads per inch on the spindle. Each vertical line equals 1/40 or 0.025 in. Every fourth division is numbered 1, 2, 3, etc., representing 0.100 in., 0.200 in., 0.300 in., etc.

The beveled edge on the sleeve is divided into 25 equal parts around its circumference. Each division equals 1/1000 or 0.001 in.
The micrometer is read by recording the highest number on the barrel that are on top of the horizontal line that are the large graduations (1=0.100, 2=0.200, 3=0.300, etc.) and then the small graduations on the bottom of the horizontal line on the barrel (1=0.025, 2=0.050, 3=0.075, remember?). Now look at the sleeve and look where the horizontal line on the barrel lines up with the graduations on the sleeve. Each of those graduations is 1=0.001, 2=0.002, 3=0.003 thru 24, dig?

So, if you were looking at a micrometer caliper and the edge of the sleeve is between 2 and 3 on the barrel on the top of the horizontal line (large graduation), and it also lines up with the third small graduation, and the eighth graduation on the sleeve lines up with the

horizontal line on the barrel you have 8.

The reading would go as follows:
2 large graduations or 2 x 0.100 = 0.200
3 small graduations or 3 x 0.025 = 0.075
8 sleeve graduations or 8 x 0.001 = 0.008

Added up:
0.200 + 0.075 + 0.008 = 0.283

Just over a quarter of an inch (0.250).

That wasn't so hard was it?

Converting a Fraction to a Decimal
Do the following steps to convert a fraction to a decimal:
For example: Convert 4/9 to a decimal.
• Divide the numerator of the fraction by the denominator
• (e.g. 4 ÷ 9=0.44444)
• Round the answer to the desired precision.

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