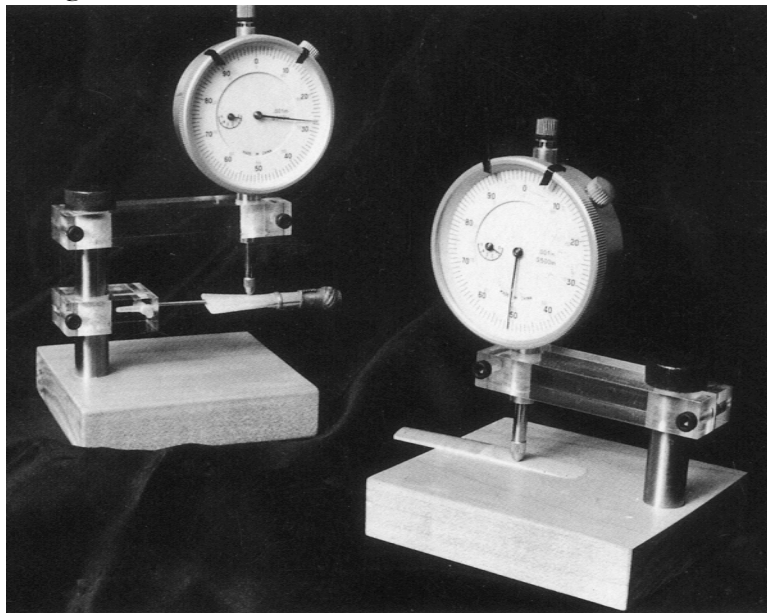


USING A DIAL INDICATOR

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ARB DESIGNS AND CONSULTANT TO NEXUS WOODWIND SUPPLY

Because my father made a dial indicator set up for me when I was still in high school, I have had a lot of experience using it and I've had a long time to think about how this tool might be best used.



*A Postcard I made for my father to advertise his dial indicator set-ups.
Shown are units for bassoon and clarinet*

I think it is a natural desire once we own a dial indicator to take the next step into feeling that if we could only machine our reeds to conform to a certain “proven” set of measurements that all of our problems would be solved. Over the years, I have read accounts of bassoonists taking apart a particularly successful reed, measuring it and then try to duplicate those measurements through setting up their machinery and hand-scraping using a grid of measurements from the successful reed. I tried this briefly and did not continue with that method, myself. In my view it doesn't take the strength of each piece of cane into account. I would not discount this method—if you *do* find this to be a good system then by all means use it. The dial gage is a great tool for this use. I am just saying that it did not work well for me; I found it to be quite labor intensive and frustrating. However, each of us should find our own way.

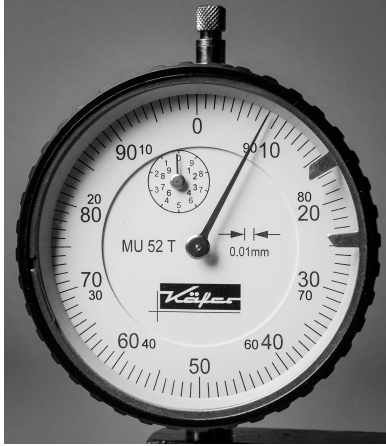
The dial indicator is a very useful tool to use in the study of the thickness of the bassoon reed blades, in setting up all of our machinery to reach a practical or theoretical set of measurements from successful reeds. Depending on our own inclinations we can take these processes either as general guidelines or extremely specific sets of measurements to match each reed against. The tool can be used either way and that choice is up to each bassoonist.

Uses of the Dial Indicating Gage

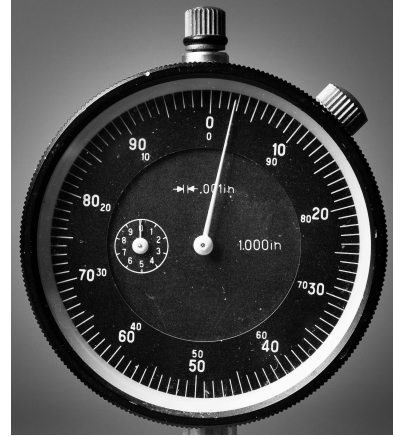
- 1) *To measure the thickness “map” of a bassoon reed which is already put together: The feeler arm of the dial indicator (depending on the physical design and dimensions of the feeler arm — Nexus provides 3 different interchangeable feelers)— allows us to measure the entire bassoon reed’s blades from the tip to the back of the reed just in front of the collar. Not only is it useful to compare reeds to a “model design”, but we can check a reed for evenness of thickness from one side of each blade as well as against the other blade (wire up and wire down side of the reed).*
- 2) *To measure the thickness of anything, for example the thickness and evenness of the cane’s gouge, the thickness of cane the profiler, gouger or tip profiler takes to adjust the blade “overhang”.*
- 3) *The dial indicator is extremely useful during the process of changing the settings of any reed machine. It is useful to measure the starting points of thicknesses before changing anything and then if you know where you want to go insofar as new measurements, the dial indicator will help to zero in on those values more quickly.*
- 4) *When sharpening profiler, tip profiler or gouging blades, the dial indicator is extremely useful in finding the proper depth of the blade in each respective machine by measuring the thickness of the ribbon of cane the blade cuts once it is replaced.*

DECIDING ON A MEASURING SYSTEM— INCH OR METRIC

Before we decide to invest in a dial indicator we need to decide which measuring system we are most comfortable; will we use a gage that reads in metric or inches? These days there are digital gages available that allow us to easily switch measuring systems. When I started measuring reeds, these were not yet available. I chose to use a gage that reads 1/1000th of an inch rather than 1/100th of a millimeter. Here was my rationale: A given thickness using the metric gage shows a much larger amount of movement on the analog dial gage’s face. Look at the photographs below. I have measured the same small sheet of paper on both gages. This paper measures 3/1000” in inches and that is about the thickness of an average human hair. Notice how far this hair thickness moves the metric gage’s needle with the white face. Contrast that to the movement of the needle on the inch gage with the black face. For me, **psychologically** this very small thickness makes much more sense to me on the inch gage. If the difference between two supposedly similar places on the reed should match and there was only a hair’s difference between them, that small difference would appear quite exaggerated on the metric gage compared to the inch gage. Having said this, I think either system works well enough as long as you realize that a metric reading looks far more exaggerated than an inch reading for the same thickness. Personally I feel that I might worry endlessly over almost insignificant differences in thickness if I used a metric gage, but that is just my feeling about it. I realize that many reed-makers prefer to use metric measurements and it has become very much of a trend to use metric.



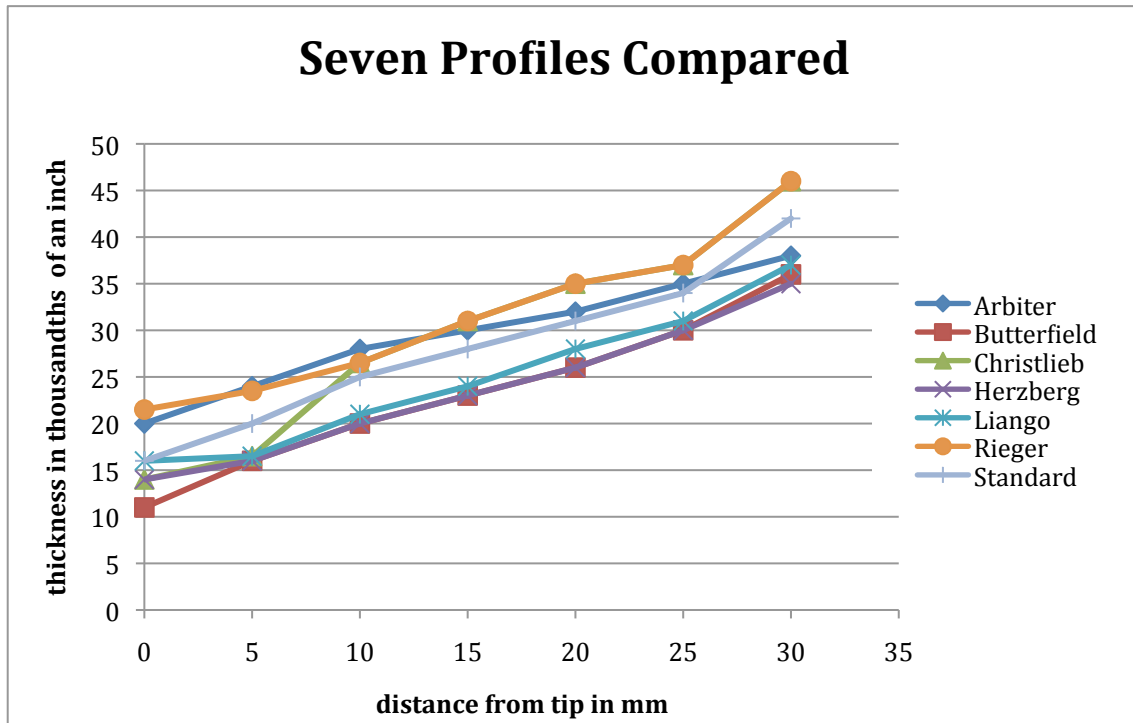
This metric gage shows 1/100mm marks
The same thickness of a human hair shows almost 3 times as many deflection marks on the metric gage.



The inch gage shows 1/1000 inch marks

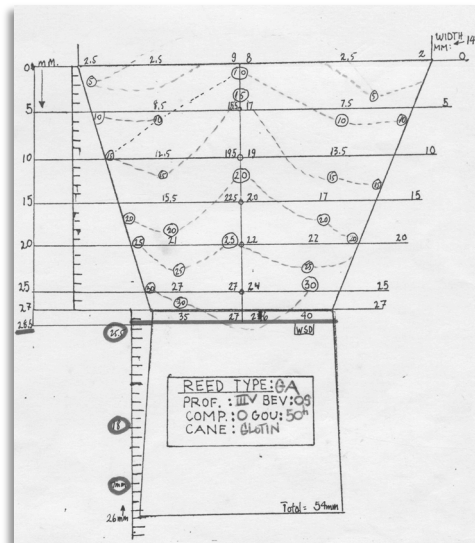
Measuring Successful Cane or Finished Reeds

If you have a dial indicator, and you are purchasing already processed cane, you can begin to keep track of the profile measurements in terms of thickness profile that seem to make good reeds for you. If you examine the chart I complied you can see the idea that I am driving at.



Notice that much of the cane available seems to fall within fairly limited dimensional range. So as a start, if you are a student you can begin to compile data so that if and when you get your own profiler, you have a reference point based on commercial cane that works well for you to guide you in setting up your profiling machine. This is a good place to start: seeing if your new machine profiles close to the dimensions of your successfully

profiled commercial cane you have used previously, or the profiler you learned on in music school, your teacher may have set up.



A reed thickness map from an excellent reed I made in the 1973

The Dial Indicator — Refining Machine Adjustments

If you have a profiling machine, then you can begin to study if the output of your machine brings you close to measurements that other cane processors use. Even if your machine **does** come close to these values, you can make subtle modifications and test your results to refine your reeds to your own needs and preferences.

Having a dial indicator allows you to see where you are starting out on a machine's output (the profile or gouge of the cane) and then by changing the machine's setting you can see if the adjustment brings you closer to your goal or it will show you if you have gone too far.

It is best to try the new settings on about 20 reeds before drawing conclusions. You need this large a number of reeds to evaluate if the change was successful or not. This is because the cane itself will need to be taken into consideration. Checking the output of a machine by measuring the result with a dial indicator is an efficient way to eliminate a lot of time and energy with a profile too far outside of usable limits. Again you can get some idea of this by comparing the range of commercially available cane, in the above comparison chart above. Having guidelines such as in a "map" of successful reed as a reasonable starting place will save a lot of time and wasted cane.

Another use of the dial indicator is to set the blade depth for gougers, profilers and tip profilers. Each machine has its geometry figured from the initial setting of the blade as the manufacturer of the machine designed it— the distance the blade protrudes past the blade carriage.

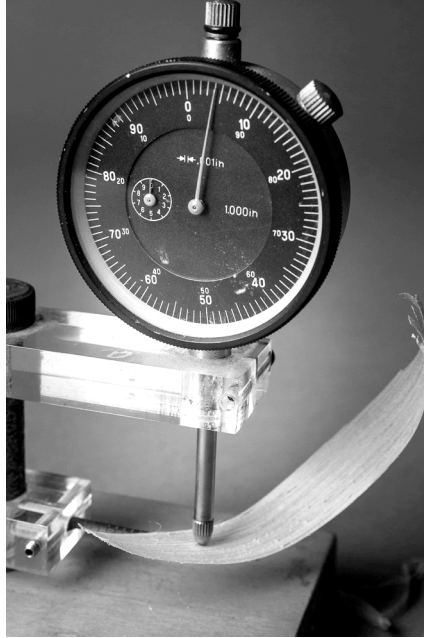


Figure 6.5— This photograph shows a ribbon of gouged cane measuring .004" (.101mm)

In general, a thickness of cane that seems about right is between .003 and .005" (.0762— .127 mm). I set my gouger, profiler and tip profiler to take cane off around this thickness. As with many things, being too extreme in either direction seems inadvisable. Too thin and it takes forever to get to the desired dimension, too heavy and the blade has to cut through too much cane at once; this also may sacrifice accuracy. An incorrect projection of the blade may also adversely affect the performance of the whole machine.

Feeler Arm Designs

There is a divergence of opinions about how rigid the feeler arm needs to be in order to avoid the flexing of the arm when lightly pressing or tapping on the stem of the dial gage to make sure it is seated on the reed. The problem is that in order for the arm to be rigid and have no flex, it must be rather thick and wide. This makes it difficult to fit into the aperture of the reed's tip and also it makes it hard to obtain reading of the edges of the reed's blade especially at the sides near the collar. Another approach is to temper a smaller diameter feeler, but this brings problems of brittleness. The feeler may break if the unit is dropped. Each reed-maker needs to access his or her intended use for these tools. What I mean by that is: how important is it for each reed-maker to measure the whole blade that thoroughly?

My father came up against this divide of opinion as to rigidity of the feeler arm quite often with the people buying his gages. As the saying goes, you can't please all the people all the time. Ultimately we came up with a compromise between the size and shape of the feeler balanced with getting as much rigidity as we could, but still allowing the feeler to be small enough to measure the back of the reed and at the rails. But by-and-large those

considerations were driven by my own thoughts about this issue— the slight flex wasn't a problem for me as long as the needle returned to "0" after seating the gage by gently tapping the indicator's stem. After all, the slight flex was around .002"; that is less than the thickness of a human hair.

We at Nexus decided to offer 3 different interchangeable feeler arms to hopefully address as many of these diverse opinions about the issues of flex and rigidity versus the ability to measure into the back corners of the reed blade and also into the rail (sides) of the blades where the two blades meet. Roger Tropman and I have taken all of these varying thoughts expressed by a range of bassoonists concerning the feeler arm design by offering these 3 different feelers. No other bassoon dial indicator that I am aware of offers such accommodations of flexibility of design. I am very proud of Roger's commitment to try and address such a variety of opinions on this matter.

I include on the Nexus website a separate article on the different feeler arms Nexus offers with a test of the results of the 3 Nexus feelers as well as 3 other feelers along with my comments on the tests.

Thanks to my father, Bill Arbiter, I have been using a dial indicating thickness gage since I began making reeds at age 12. My many years of study and observation of the whole reed-making process leads me to the conclusion that although it is a great boon to have such measuring devices, by the very nature of the material we work with— reed-cane— these measurements can only get us so close to making fine finished reeds. The cane contributes its own character to each piece of cane; measurements give us a very important but *partial* view of the process. Nonetheless, I would not want to be without my dial indicators, especially one as fine as this unit that Roger has brought to life based on my father's old designs.