

Review of the Ultra Tec Digital Angle Dial

Recently I was given the opportunity to review the Digital Angle Dial for the Ultra Tec faceting machine. The Ultra Tec is the machine that I have used for years and is still my favorite in spite of having used or experimented with others at various times. Unsurprisingly, any improvements to this machine are always of interest to me.

The new Digital Angle Dial (also known as the DAD) promises to give greater accuracy and ease of use to what is already a very accurate and easy to use machine. It is available both as a replacement for the analog angle dial on older machines or as an option on new Ultra Tec machines.

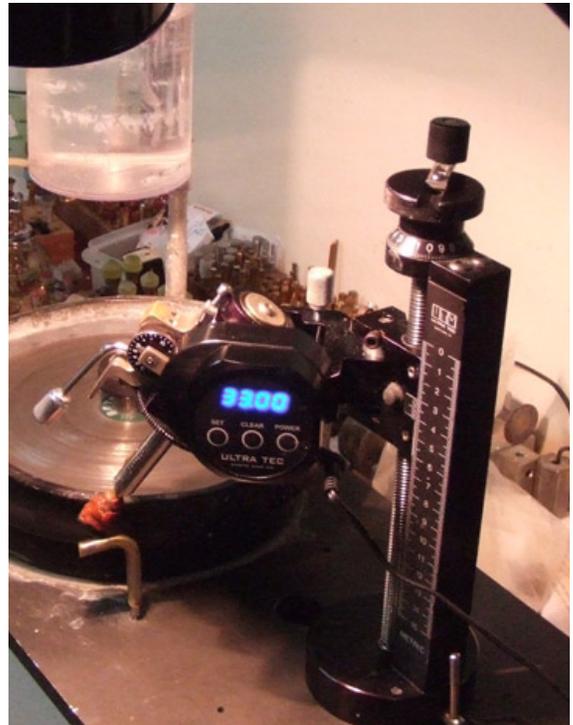
Installation:

Since I already own and use the Ultra Tec I got the upgrade kit and installed it myself. I found the process to be relatively simple as long as I followed the instruction on the Ultra Tec website. Video and PDF instructions are currently available at <http://ultratec-facet.com/DAD.htm> . The only problem I had is that my printer was down at the time so I had to keep going back and forth between my computer and faceting machine at each step. When I tried skipping reading the instructions to save myself a trip back to the PC I ended up punching the wrong buttons which obviously didn't work! However, once I went back to reading the instructions for each step it was all quite simple. Overall the installation went smoothly and relatively quickly.

Accuracy:

The DAD displays the angle reading to 1/100 of a degree. This accuracy was one of the main attractions for me as I could see multiple uses and potential for increased efficiency for the professional cutting I do.

An interesting additional benefit that opens up all kinds of possibilities is that the DAD, like its predecessor analog angle dial, on the Ultra Tec gives a reading of the angle even if it is not on the stop. Because of this you are not just reading the angle that you have set the stop at but the actual angle of the quill at that moment in time. While the Ultra Tec has always been one of the few machines to do this the difference is that the DAD does it with significantly greater accuracy.



The DAD installed on my used Ultra Tec.



Accurate to 2 decimal points
(.01 of a degree)

This very accuracy can cause some anxiety to the perfectionistic faceter. Because my DAD angle reading is now so accurate I became more aware of the fact that none of my laps are perfectly flat and even slight amounts of machine flex are shown in the angle reading. As the machine is on and the facet is in contact with the moving lap the last digit on the display will flash numbers constantly as the lap turns. This is normal since one one-hundredth of a degree is exceptionally fine reading and any small variation or wobble in the lap will show up. This could lead to an unnecessary paranoia on the part of the faceter but in reality even if your lap does have some slight amount of wobble that shows up on the display you will still be fine. (So far some of the flattest laps I have tried are the BATT polishing laps and the Nubond and Dyna prepolish laps. However, even these do have some small amount of runout.)

Just to discover how accurate the .01 degree readout of the DAD is I cut a square gem girdle as a test. I cut all the sides of the girdle and then turned the lap off and rested the girdle against the lap in the same place on the lap for each side of the gem. When one side gave me a higher angle reading I cut it a little more and repeated the process. (The machine was turned off during measuring, in this way lap runout was not interfering with the fine .01 angle readout.) I cut all sides to within .01 to .02 degrees of each other and then measured the resulting gem with a digital caliper. (For this test to work each side had to be rechecked on the DAD each time the machine was turned off because the height of the lap varies very slightly from spot to spot. It is also important that the rubber splash guard and other objects not be in contact with the dop or quill when checking the angle of the girdle as they will interfere and can cause height differences due to the upward pressure they apply.) After this test I was pleasantly surprised to see that the resulting gem was almost perfectly square, its width varied only about .01 of a mm from one side to the other using my digital caliper. (Such a small difference was rather hard to measure.)



This same technique can be used when dopping the gem to get higher yields from the preform. If you use dop wax or some other method in which it is possible to reposition the gem on the dop you can lower the head until the dopped gem touches the stationary lap at about 90 degrees. As you do this even small differences of height from one side to the other of the gem become quickly evident in the angle reading. You can then readjust the gem on the dop until the angle readings are either equal or at least very close. This can help to better center the gem on the dop and lose less when cutting, due to not having to cut more off one side of the gem than the other to center it on the dop while meetpoint faceting.

During my testing I have become convinced of one thing, the DAD is VERY accurate! In my opinion any inaccuracies that are encountered while using it are due to some other piece of equipment, be it the lap, slight amounts of flex in the faceting machine or something else entirely. This accuracy is very useful to me because I cut a variety of cuts that have carving on

the pavilion of the gem and do not have a good way of using meetpoints to achieve a symmetrical gem. I used to achieve fairly good results using the analog angle dial (about .1 to .05mm accuracy when cutting a square). However, the DAD's accuracy is an order of magnitude greater than this and it is also easier to use than trying to discern by eye differences in angle that were much finer than 1/10th of a degree on the old angle dial.

As another test to see just how accurate and sensitive the DAD is I cut a girdle facet at 90 degrees and then turned the lap off to get an exact stable reading. I then took one of my own hairs and put it between the facet and the lap to see how much of a difference that would make. I found that this changed the reading by .03 degrees, that was pretty impressive to me since my hair is somewhat thick but not THAT thick. (On my digital caliper my hair measures .003 inches, so that is 3 thousands of an inch.)

Speed:

One of my hopes was that the DAD would help me to cut faster while maintaining the same level of quality. One neat extra is that it comes equipped with an alarm that beeps or squeals when the pre-set angle is reached. The idea is that it will help you judge the proper depth of cut using the angle reading; once it hits that angle the DAD starts making noise.

So far in my tests I have not been able to cut a gem without inspecting the meetpoints and still achieve meetpoints that are good enough to meet my standards. That is what I had hoped for but have not quite been able to achieve yet. This is not due to any shortcomings on the part of the DAD however. The reason for the lack of perfection in the meetpoints cut in this manner is that when I cut the way I press on the gem varies very slightly from time to time and this combined with a small amount of flex and some lap runout make for a very slight difference from one facet to another in depth of cut and the resulting meetpoint. While some might be happy with the results after some practice and using an exceptionally flat lap I still feel the need to inspect the results and improve them slightly by the cut and look method.



However, while I was not able to entirely substitute the inspection process with the DAD this alarm is very useful as a "Look now!" alarm. It can be set to go off just before you get to where you want to in cutting the facets of each tier. In this way much less time is wasted inspecting the gem too early and more time is spent with the gem on the lap being cut. If properly used this can result in significant gains in terms of the speed in which a faceter is able to cut a quality gem.

Since the Digital Angle Dial also has a constant angle readout you can look at it as the gem is in contact with the lap and have a good idea of how much farther you have to go in cutting the facet. This is another good feature and comforting if you think you might have over cut the facet because things are taking longer than you expected. One quick look at the angle reading and you know where you are without lifting the gem from the lap. Remember, for those who are looking to speed up their cutting, time spent inspecting is time spent NOT cutting. So less need for inspection equals faster cutting.

Ease of use:

The DAD is very easy to use, there are no significant problems that I have run into in using it. In almost all cases you just turn it on and use it since it is designed to keep the angle settings even when turned off or unplugged. The only difficulty I had was that I did manage to cause it to lose its angle calibration twice, how exactly I did this I am not sure. I am told by the manufacturer that only one other person has had this happen once. However, this was immediately obvious and easily remedied by redoing the simple calibration steps using the calibration block that is sent with the DAD as a backup measure.

The LED display is very easy to read, easier and brighter by far than the more common LCD display and also probably has a faster response rate to angle changes as they happen. This makes it harder (almost impossible) to set the wrong angle by mistake. With analog angle dials



or the different non-digital angle settings on other machines this happens at times, usually being a mistake of 5 to 10 degrees due to misreading exactly where the angle setting is. If caught in time there is no problem but sometimes cutting is begun using the wrong angle and facets are cut in the wrong way requiring a partial or complete recut. The DAD virtually eliminates this potential confusion and so makes it easier for beginning faceters. Because it is so easy to read the angle it can also be faster to set it and no confusion makes for more speed and confidence.

Another major benefit for beginners (and also helpful for pros) is that the DAD can be used to find the center point for the initial cutting in of the culet. This is the basis for most meetpoint faceting and is usually done by a combination of consistent pressure (hard to achieve) and listening to the noise the lap makes as it cuts the gem. Once the gem makes a similar sound against the lap on all sides it is then assumed to have the culet close to the center of the gem.

The cut and listen method is effective but a little bit slow and requires some degree of experience. With the DAD you can either use the alarm to tell you when each of the main facets are cut to approximately the same depth OR you can turn the machine off and rest each facet against the lap in the same location to see if one has been cut more than the other. With either of these procedures you should get precision that is equal to or better than just listening and trying to use a consistent pressure and it will be easier and faster. Any final refining of the meetpoint should be done with the cut and inspect method as would also be necessary with the listening technique.

Final comments:

One additional benefit for those upgrading their older Ultra Tec and installing the DAD is that it includes a guard around the angle gears that protects them from polishing powder and splashing. This is an upgrade that comes with all new Ultra Tec machines but for those with older machines it is one more reason to consider a DAD (although admittedly not the most compelling one).

The only shortcoming of the DAD that I have discovered is that it cannot read past 0 degrees. If the cutter realizes this fact it is not really a problem as I will explain. This will not be important to those who always use the tabling adapter to cut and polish the tables on their gems since they will probably never use anywhere close to 0.00 degrees. However, I often cut the table at 0 degrees without removing the dop and placing it in the adapter, to raise and lower it I just crank the height up and down slightly instead of lifting the quill as would be normal at a higher angle. This takes a bit more care in how you hold the quill and how fast and far you lower the gem into the lap so that the lap does not catch and tug the gem but it can be a time saving method when compared to setting up the tabling adapter.

The potential for error comes with the fact that the DAD reads the angle until 0.00 degrees and then it keeps reading 0.00 even if you go past that point. So you could have the angle set at -2.1 degrees (a negative angle) and the DAD would still read 0.00.

Once you know this, it is very simple to set the angle at 0.01 when cutting the table. In this way you know exactly what angle you are at and this TINY angle difference from a “perfect” 0.00 makes no difference in real life. Just the lap’s friction against the stone is sure to pull on it enough to make a far larger difference than that. I have found this method to be quite reliable and it is the one I recommend. You can also “creep up on” 0.00 and try to stop the second you hit it so as to be at 0.00 degrees and not go beyond it but I prefer to know that I have not gone past by using 0.01 degrees.

I hope this review is of use to you. Happy cutting!

UPDATE: The DAD is wonderful if you want to precisely and easily read the angle that you are setting your machine at. In day to day use if you are wanting a stop indicator I find an Ohm meter setup using what is known as the Beale Woolley depth of cut indicator to be a better way to cut to a specific point without as much inspection.
http://www.usfacetersguild.org/articles/dave_wooley/beale_wooley_indicator/

Who is John Dyer?

John Dyer is a well-known gem cutter who has won 48 international cutting awards. Gem cutting is one of his favorite occupations due to the challenges it offers and the creativity required in the attempt to create the most beautiful and unique gem possible. His designer gems are sold worldwide. John is also an Ultra Tec sales representative and undertook this review at the request of the fine people at Ultra Tec Manufacturing.

His websites are www.johndyergems.com and www.ultratecfacetingmachine.com