WO GTF102 Review... by Timm Bottoni on July 14, 2013

Disclaimer - I am not an employee of WO, but I am fan of some of their products after having purchased and used a number of them for about 8 years, and I will do my best to write a fair and unbiased review. I am currently a volunteer moderator for the William Optics (WO) Yahoo group, have been for a long time, and have written a number of reviews including prior WO product reviews and reports over the last 8 year or so. Hopefully you will enjoy reading this review and learn all about the GTF 102 APO refractor from William Optics.

Overall first impressions - I was very impressed from the moment I opened the case, because the fit and finish is excellent and the scope is really nice looking. The surfaces are covered in a nice white powder painted surface that is very clean looking, and doesn't show fingerprints. The finish seems very durable, easy to wipe off, and the red anodized trim on various places and the red felt lined lens cover is very nice looking. It was quite a bit heavier than my old WO 80mm doublet by comparison, and feels very solid and well made. It came with a nice durable soft case, with thick padding, and very solid rings assembled on a matching red 8 inch Vixen style dovetail. The original package was advertised with a 2" photo adapter and Canon T-ring, but since I already owned those, William was kind enough to substitute a 1.25" dielectric diagonal instead. William noted that because the scope and focuser length is optimized for astrophotography, not all 1.25" eyepieces would reach focus using a 2" diagonal, even racked all the way in. The trade off, is that you will not need any additional extension besides the 2" photo adapter which makes for a very solid hookup with the camera because the focuser isn't required to be pushed out to its farthest limits. It's important to know that if you are using the scope for visual use, you should plan to have a 1.25" diagonal.

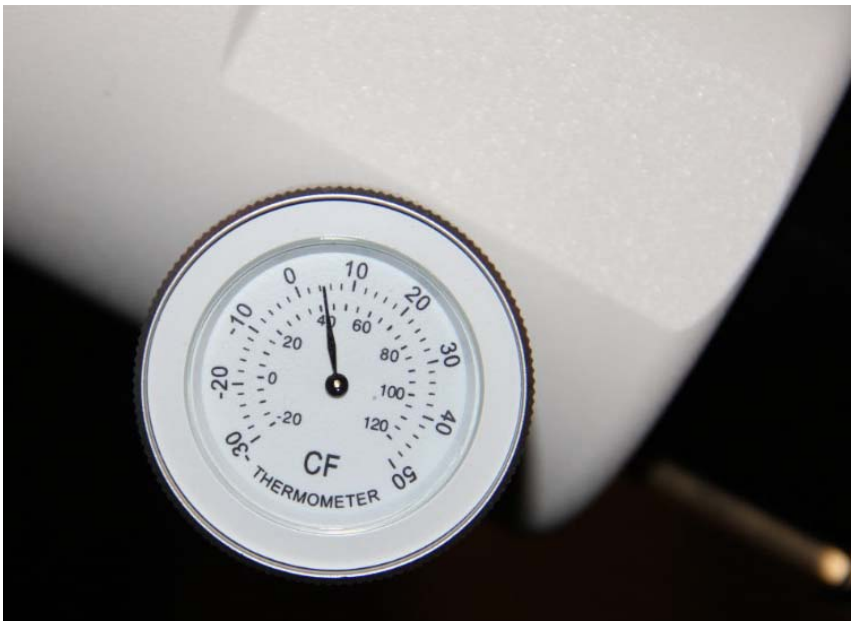
Optical components - The optics appear crystal clear with no sign of dust or dirt, and the front lens cell appears to have very nice coatings, making the lens seem to disappear. The optics are designed with an FPL53 air spaced triplet as the front lens cell, along with a doublet flattener installed inside the tube at the red junction near the focuser. The dew shield is retractable, and stays in place when extended on its own but can be locked in place with a thumbscrew, which works well even in cold weather. I originally received the refractor in February 2013, which in the Chicago area usually means the weather is warming up. Of course the new scope curse hit quickly, and I take full responsibility for the weeks of cold weather and late Winter snow that followed us into April this year. The only good thing about it from a testing perspective is that that I was anxious to try it out, and some of my initial testing was in weather below freezing. This gave me a chance to test in very wide range of temperatures, but more on that later.

Specifications - The optical specifications include a focal length of 703mm, with a 102mm diameter aperture, for a focal ratio of F/6.9. Inside the tube are built in metal baffles, with 3 before the flattener and 1 between the flattener and focuser. The entire inside is a non-reflective flat black finish that eliminates glare, as far as I can tell. Based on several nights of excellent seeing, I was able to do several star tests on several stars including Sirius, and could find no false color, and what appears to be as near of a perfect star test as I have seen. Stars are round all the way to the edge of my 82 degree field of view WO UWAN eyepieces. I'm still very much an amateur when it comes to astrophotography, and have recently purchased an iOptron iEQ45 mount (I will review that in the future as well) so I hope to really make a serious attempt at some good astrophotography this Summer. Using my Canon 60D, with an APS-C size sensor, it was easy to see that stars are round all the way to the edge of the chip. The field of view at a focal length of 703mm equals

The optical tube is able to be disassembled by unscrewing the focuser, and if necessary the back section after the field flattener. This would allow for easy transport on a plane if desired, however I would expect that you would need a shorter carry case than the one provided. The dew shield can be removed as well, and the lens cell is fully adjustable, with 3 sets of matching collimation screws (4 per element). I would highly recommend that if it were ever to need adjusting that it not be attempted, and instead be sent back to WO because this is a complex process on a triplet like this.

Focuser - In the past, WO has changed designs several times with their own focusers, making improvements as they go. I have used the original Crayford style, added the 2-speed upgrade, and then replaced it with the original DDG Crayford style. I also have the SCT linear power focuser. The design used on this model is a new rack and pinion design, using a 10:1 dual speed knob on one side (with a very nice screw on protection cap), and a DDG readout on top. Overall, I found this design to be very robust with the following notes. The focuser is fully rotatable, however it needs some tweaking for best performance. There is a rotation locking thumscrew on top, and three small black nylon slotted rotation screws that hold it in place. If these three screws aren't tensioned precisely, the focuser can shift when rotated, or appear to wobble during use. If they are too tight, the focuser will not rotate. To make it smoother, I removed the nylon screws and the thumbscrew and put a thin layer of high quality grease in the track. This allowed me to add enough tension to the screws to prevent any sort of play, yet still allow for smooth rotation. The focuser itself, has a main tension adjustment on the bottom, with a metric inset hex screw, and a thumbscrew on the bottom for locking the focuser. Both of these work as expected, however there are also two large silver slotted screws that can be used if even more tension is needed to the drawtube.

Testing the Focuser - The design of the focuser is very solid, and I did some testing and found no problem lifting my Canon DSLR. I wanted to see what the focuser's maximum lifting capacity was, so I used some PVC pipe and some weights and found that lifting 5lbs and 10lbs of weights was no problem. I tried 15lbs and it was able to lift the weight, however this is really pushing the limits, and without either locking the focuser or increasing the tension significantly, it would unwind under this much load. The two speed knob was very smooth, and seemed a bit tight at first, but loosened as I used it over time. In fact, it actually felt a little too loose to me after a while, and it is possible to adjust its tension independent of the drawtube tension. In order to adjust it, you will need to remove it by removing the two small metric inset hex screws . One is used to hold a bearing assembly (which accounts for some of the smoothness), and one is used to hold the 2-speed assembly onto the main shaft. Once removed, it is easy to use a small slotted screwdriver to tighten the tension if you find that the main focuser knob is fine, but the 2-speed knob is slipping. Be careful not to over tighten it, or you may damage the bearings inside, but over time it is easy to keep it adjusted to your liking.



Focuser Features - Additional features of the focuser include the DDG digital readout. It allows you to get a precise reading of focus, and I find that it works well for photographic use, however I feel it's a "nice to have" and I still use the DSLR 10X live zoom to check focus. I think that WO has started to offer it both with and without the DDG focuser, so if you want to save money and don't think you will use it, you will have that option. The 2" receiver end has two thumbscrews, and third inset screw that can each be adjusted to put pressure on the brass inside retaining band. This allows for precise adjustment and a very secure non-marring hold on the 2" components that would be attached. There are two locations with removable inset screws that allow for the WO finderscope/guidescope base to be attached depending on your preference, or you could even use both if you like. One final nice feature, is the addition of a thermometer in the side of the single speed knob, showing temperatures in both Fahrenheit and Celsius. The focuser has a full 81mm of focuser travel, and I couldn't

detect any sag or image shift in mine at any point in the travel. Of all the other WO focusers to compare it to, this new rack and pinion design is by far my favorite. All WO focusers can be unscrewed from the tube, and based on my limited peek inside, I have a feeling that this new model is likely to be the best design from WO in the long run for both precision and durability.

Viewing results - Moon, planets, deep sky objects, and comparisons to 80APO doublet and C8 SCT
Overall there is a huge difference between the GTF102 and my 80mm FPL53 doublet. The extra aperture shows significantly more detail and the optics are nothing short of stunning to look through. I wasn't able to detect any chromatic aberration on anything I observed, including the Moon, Jupiter, Venus, Sirius, or Vega. The star tests were perfect, textbook concentric circles, even on both sides of focus. Equally amazing, was that the flatness of the image. Even my 33mm 2inch UWAN looks pretty good, and that eyepiece has the most curvature in my 80FD. The 16mm UWAN also has a lot of curvature and it looks amazing and in focus across almost the entire view. Planets look really good at high magnification. I was able to push Jupiter as high as 234X with my 3mm WO SPL eyepiece, and it was just at the maximum usable magnification. The 4mm UWAN was also very good, but the SPL eyepieces are a tad better for planets. I was able to see the Great Red Spot on Jupiter on one night, and the contrast was stunning for this small of a scope. Double stars are amazing, and crisp due to the tight airy disk produced by the high quality optics.

Drawbacks - There are always drawbacks or compromises with any product, but it was really a stretch to find anything significant. The DDG feature on the focuser is nice, but I found I really don't use it. Cool down time can be significant, and in cold weather (below freezing) it took about 45 minutes before it was usable for visual use. While 102mm is a significant aperture for astrophotography, I have so much light pollution that my old C-8 SCT with the cracked corrector is still a better choice for seeing DSOs. On planets, the moon, and even star clusters (both globular and especially open), even though the GTF 102 is less bright, the extra contrast it provides due to the outstanding optics make is a much better choice. I have to admit, I would love to move up to an even larger APO refractor now that I have had a taste of such good optical quality. I think they call that "aperture fever". The size and weight means you need a solid mount, and I think the iOptron iEQ45 is a really good choice for this scope, and you could probably get by with a smaller mount, but if you are buying this telescope for astrophotography you will want a good mount.

Astrophotography examples

Moon - full frame from Canon 60D

M13 - full frame from Canon 60D - slight elongation of stars is due to periodic error in RA (I'm still a novice with this iEQ45 mount and Deep Sky Stacker, but hoping to get better as I go)

Cropped image - Center shot of M13

M51 courtesy of Erskin71 of CloudyNights.com