Teknatool's Nova Live Center—A Review

by Lyn J. Mangiameli

If the recently departed comedian Rodney "I can't get no respect" Dangerfield were to be re-incarnated as a woodturning device, it would surely be as a Nova Live Center [NLC]. The NLC is a great tail center, quite possibly the best available to woodturners, but it has never achieved a level of recognition commensurate with its versatility and performance. I too have been guilty in neglecting the NLC, for though I have occasionally reported my preference for it over the last five years or so, it is only now that I provide a formal review.

To fully appreciate the NLC, one must focus on two aspects of its design: 1) use of multiple ball bearings; 2) a deliberate systems approach using modular components to achieve multiple configurations. The first allows for great stability as well as load bearing and longevity; the second makes this system especially adaptable to the varied work holding needs of the turner.

First let us consider the significance of bearing designs, and why they are incorporated into modern tail centers. Most turners are aware that tail centers have not always been "live" centers; that is, the work holding center mounted in the tailstock has not always utilized a bearing to allow the center's point to move with the rotating work piece. Prior to the middle of the 20th century, wood lathes used a tail center that was basically a solid piece of pointed metal that was fixed to the tailstock. This "dead" center, was fitted into (or self-formed) a small hole or cup in the end of the spindle, and the work piece rotated against this fixed point. Depending on the wood, tailstock pressure and the lathe speed, a lot of friction could be produced in such an arrangement, such that many long-time turners can recall more than one instance of charring and/or smoke rising from the interface between the dead center point and the wood. Often a little grease or wax was applied to the contact area to reduce friction, but even this was not always successful, and often had to be renewed if the piece were to be worked on for any extended period of time. Thus it is easy to imaginer why rotating "live" centers, despite a higher cost, were quickly adapted by woodturner and manufacturer alike.

However, unless very well designed, live centers come at a cost that is more than just financial. Most bearings introduce problems of their own. Every live center I am aware of uses ball bearings. Ball bearings by their nature have a lot of individual components and those many moving parts offer a lot of opportunity for play (i.e. movement in directions other than the intended) and associated vibration. Each individual bearing also has limited contact area with its race (the channel that holds them) so load bearing is reduced relative to some other bearing types such as roller bearings (though they have their own problems with friction and vibration) and sleeve bearings. So except when all but the very most expensive ball bearings are used, ball bearings introduce a certain amount of play and vibration.

This view shows the Nova Live Center with the rigid external housing removed from the three bearings and the cup center also removed from the housing.

The Standard Nova Live Center set provides a very useful addition to any lathe having a No. 2 Morse Taper in the tailstock.

Some might consider the level of any such play and vibration to be inconsequential for woodturning, but this may not be the case. Tobias Kaye, a talented professional woodturner has commented: "...I began to notice that when working on spindles held with a dead tail center, the tool was many times less likely to rattle and screech than on work held with a live tail center. Obviously, I am not talking about burn and squeal at the tail itself but about how the work responds to the tool. I would not now attempt extra long stair spindles using a live center. This is down to the balls [ball bearings] again"

Now nearly all OEM, and even most after-market live centers only use one set of bearings. But what if a manufacturer installed two sets of ball bearings, might this increase load bearing, reduce vibration and eliminate play? Alas, often not, particularly with respect to the latter two factors. If the sets of ball bearings are separated by much distance the spacing of the bearing sets allows the live center to rock around its central axis, as well as continue to vibrate within the individual bearings. This phenomenon has been repeatedly reported in at least one live center, though it is improved when the center is under load.

Since both single and spaced double ball bearing sets have problems, roller bearings have even worse problems (at least with respect to vibration and thrust loading), and sleeve bearings are not easily implemented in a live center, how can a maximally stable live center be manufactured? Teknatool's approach with their Nova Live Center has been to utilize three sealed ball bearings fitted side by side along a central shaft and within a rigid external housing, essentially coupling them into a single wide bearing. But better than a single bearing set, spreading the load over three individual bearing sets increases thrust load capacity, and makes it unlikely that the frequency of vibration of any single set of bearings, even if all sets resonate at the same frequency, will be precisely in phase with both of the others. Vibration and play are at best canceled out, and almost always will be greatly diminished. Thus a three bearing set up not only increases the overall stability of the center (by reducing both vibration and play) but also greatly increases the overall load carrying capacity of the center. With both stability and load bearing being exceptional to begin with, one also will find performance is maintained for a longer period of time. My NLC is now approximately 5 years old, and I can discern no loss in stability.

Of course all this stability and load carrying capacity does not count for much if you can not effectively interface your live center to the shape and other characteristics of your work piece. Here again the design of the NLC excels. Teknatool was one of the first, if not the first, manufacturer to design a woodturning tail center that is intended to be part of a larger system (appropriately titled the Nova Live Center System) incorporating modular, interchangeable, and even user modifiable points and components. These interface components all mount either directly onto the front of the live center where they are held by a combination of friction and pressure from the tailstock, or they insert into a socket in the NLC that will take a shortened #2 Morse Taper. The former makes for very quick and easy hand removal by simply backing off the tailstock ram or the entire tailstock; the latter allows for quick and easy removal using a knock out bar in the same way as you would remove a Morse Taper from your headstock. The latter mounting method (which most of the interchangeable components use) also allows the inserts to be used directly in the #2 MT found in most headstocks as well as tailstock rams (which in the latter case, allows them to be used as dead centers).

Enough for the design decisions, now to the specifics. The foundation of the live center is a smooth-surfaced main body, almost 1-3/4 inches in diameter by 2-1/8 inches long, which houses the three side-by-side ball bearings. The housing is press fitted onto the bearings, which in turn are press fitted on a shaft which ends in a full length #2 Morse Taper. The shaft has a 10 mm bore (essentially 3/8s of an inch) that runs its entire length. This allows a similarly sized drill to be extended through those tailstocks which have a hollow ram (almost all do) and then through the shaft of the live center to allow guided drilling of mounted spindle work such as legs and lamp bases. The bore also allows a knock out bar to be used for quick change-over of the various points and other inserts. The unit comes with a short knock out bar that works fine to do this when the NLC is removed from the tailstock. If you purchase a longer section of drill rod, you can usually change the inserts while the NLC is still fitted into the tailstock ram.

The outside forward end of the body tapers for about 0.9 an inch, giving clearance for tools used close to the end of small diameter work. The taper on the end of the housing also serves as an integral cone to directly mate to larger work piece bores or sockets in the range of 3/4 to 1-1/2 inch. This tapered nose also provides a means to easily mount and remove the Nova Stepped Cone and other shop made interfaces (more about this later). At the center of the tapered nose is a socket that is 0.8 inches in depth that has a #2 Morse taper to it. This socket will accept any short (about 1/3 length) #2 Morse taper device, whether it be one of the NLC inserts supplied by Teknatool, a center with regular or half length tapers you shortened yourself, or even shop made metal or wooden tapers (a 3/4 inch hardwood dowel is good stock from which to turn one).

Depending on distributor and country, the NLC comes with one or more hardened inserts to fit into the Morse taper socket. Those not included can be obtained from Teknatool and others, either individually, or in a set. Everyone provides at least the Hollow Cup Center.

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The Hollow Cup Center is indeed a good choice as a primary center. It works well for softer, spalted and green woods, and by limiting the depth of penetration of the point, it reduces the chance of splitting in some harder woods. Though intended primarily for spindle turning, I often use it for tailstock support of "faceplate" work. The center point is removable and replaceable (you can get spares direct from Teknatool). When the point is removed the insert can provide pressure with minimal marking of your work piece, and leaves a 5/16 inch bore to provide a guide for that size drill. If you want to use a drill of 10mm or 3/8 inch diameter (the maximum interior bore of the NLC shaft), either leave off the cup insert and use the bare nose of the body as a cup, or get a second cup insert and bore it out slightly to 3/8 inch. The approach that will work best for you will depend upon how much drill support you need as the drill leaves the center's body and first enters the wood.

Also available is a one piece solid insert that angles to a 60 degree point (and is fittingly named the "60 Degree Center"). When fully seated, this insert extends about one inch out from the NLC body. It is a heavy duty point that will work out well as a general purpose tip for many medium density woods. It will also work well to center a work piece that has an end bore of about 1/8 to 5/8 inch.

A narrower but longer Miniature Extension Center is one of my favorites. I like it because it provides considerable clearance for use of tools right at the tailstock end of the work piece. When fully seated, the Extension Center extends almost 1-1/2 inches out from the body. The shaft of this insert has two steps, the one closest to the body being a little over 3/8s of an inch in diameter, the distal section of the shaft being 1/4 of an inch. I have never used it in this configuration, but Teknatool notes that this center can double as one half of a 1/4 inch pen mandrel, and encourage turners to obtain a second to fit directly into the headstock spindle to pair with the tail center for this application. Aside from pens, the 1/2 inch long section of 1/4 inch diameter shaft does make for very secure holding when matched into a similar 1/4 inch socket drilled into the spindle's end.

The most unusual, but versatile of the inserts is called the Threaded Center or "Mounting Hub." This insert is 1-1/2 inches long and is basically a double ended stubby #2 Morse Taper. One end is bored and tapped with 5/16 NC threads, the other end is solid with a flat terminal surface. Both ends have a slight chamfer, leaving an approximately 9/16 inch flat disk on the solid end. I like to use this end as a nonmarking means to press against the bottom of bowls when they are being held in Cole Jaws, or a jam or vacuum chuck. But what makes this mounting hub really shine is the threaded end will take either a 5/16 inch NC machine bolt or a hanger bolt. This allows you to attach any number of shop made fixtures to tailor a custom interface to unusual work pieces. I have fixtures turned from Delrin, UHMW plastic and wood that support unusual shapes and minimally mark my workpiece. My shop-made fixtures include large flat pressure plates, long thick tenons for fixing the inside of warped bowls during re-truing after drying, deep cups to put pressure on only the shoulders of narrow vases, blocks of various radius for spheres, very large cones, and a few others. All can be quickly and easily attached to the hub, and then in turn mount to the Nova Live Center. Indeed, I have so many attachments that I have two of these mounting hubs, one on which I keep a hanger bolt and one left available for a flat head bolt. With respect to the latter, one of my favorite attachments is simply a long bolt that has had the hex sides ground down leaving a small smooth faced disk. This tip works well to provide some stabilizing pressure when vacuum and jam chucking, but allows me to finish the back of a bowl down to only a 3/8 inch spot in the center that is later easily cleaned up with a chisel and a little sanding.

Teknatool also offers what they call a Stepped Cone. The interior is the typical smooth cone that allows for safe self-centering of square or round stock up to about 1-9/16 inches, while the outside has a series of five steps of different diameter (approximately 1-1/8, 1-3/16, 1-3/8, 1-9/16, 1-3/4 - yes, I know that some catalog copy shows different dimensions, but these were measured directly from my Stepped Cone). When the unit is oriented to utilize these outside steps, the cone fits over the tapered end of the NLC body, and is held in place by friction and pressure from the tailstock. This actually allows for a very secure attachment, but one that can be undone in seconds by backing off the tailstock quill. The steps not only allow for a tight, wedge fit into pre-established holes or sockets in the work piece, but they also serve as a convenient way to fix additional large attachments to the stepped cone (such as large pressure disks) and even to center some faceplates and chuck inserts. As the cone is open at its center, one can run a 3/8 inch drill through it when the work piece is held in one of the external steps. When the Stepped Cone is reversed to point the interior cone towards the work piece, the center bore is used to mount the Stepped Cone to the NLC body. The center bore has a female Morse Taper to it, which allows the Stepped Cone to mount to one side of the threaded center mounting hub, with the other side of the mounting hub is held in the NLC body. This is why the mounting hub has a double ended taper.

I now come to the last of the attachments that Teknatool presently manufactures. Not long ago I obtained a prototype of a new insert for the NLC. With vacuum chucking becoming popular, a few items have appeared to assist turners in centering a reversed work piece onto a vacuum chuck. Vacuum chucks (really more accurately descriptive names would be vacuum disks or vacuum bells) lack the ability to self-center a work piece, so some external means is desirable. The quickest and easiest method is to retain the chuck or faceplate used to hold the work piece before reversal, and remount it at the tailstock end to center and stabilize the work piece as it is being seated and sealed to the vacuum chuck. A few folks, including Best Wood Tools, offer a Morse Taper-to-spindle thread adapter that can be screwed onto the back of the chuck or faceplate, then the whole assembly fitted into the tailstock quill. The only problem with this is that it does not allow for rotation, precluding one from rotating the form to examine it as the vacuum is being formed (and thus having the opportunity to observe for depressions revealing weak spots, or to check for leaks), and it prevents one from using this mount for tailstock support during turning. Oneway recently addressed this issue by making a spindle thread adapter that will screw on the end of their live center; Teknatool has now done something similar. Rather than screw on, Teknatool's spindle thread adapter uses the same stubby Morse Taper system to attach the adaptor directly into the socket of the NLC. It is an effective, elegant, and stable approach that makes change over quick and easy. I really hope Teknatool will choose to make this tail center spindle thread adaptor readily available. Not only is a great solution for vacuum chucking, but it has lots of application when dealing with difficult to hold work

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Nova Live Center shown with the optional stepped cone center. The cone center slips onto the tapered nose of the basic live center to provide a number of steps to fit different sizes of holes in the workpiece.

Here the Nova Live Center is shown with the optional cone attached so that it can be used to easily center both square and round stock.

This view shows the Nova Live Center with an optional threaded section to mount a chuck onto the live center. This can be very useful when mounting bowls onto a vacuum chuck.

Custom made inserts to work with the Nova Live Center.

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pieces. Imagine being able to secure a fragile or very long or heavy work piece with a faceplate or chuck at both ends using one of the new small sized faceplates or compact chucks.

Before I end this review, and while addressing secure work holding at both ends, I want to discuss one of my own adaptations for the NLC. Like many, I often like to initiate roughing out large green blanks between centers. This lets me manipulate the blank for the best patterns, and serves as a good way to prepare a flat spot or tenon for later mounting of a faceplate or chuck. I have a lot of choices of heavy duty drive centers (my favorite being the BestWoodTools Texas Drive Centers), but I never was able to get comparable holding power at the tailstock end. More times than I care to recall, I have had the point of a tailstock center shear out of a massive green blank as it was being roughed out. Simply put, there was not enough contact area between the live center and the relatively soft, wet surface of the work piece. I finally solved my problems with blanks coming loose by taking an extra Morse Taper 4 prong live center and grinding the taper short enough to fit into the socket at the end of the NLC. Since using this drive center at the tailstock end, I have yet to have a blank tear loose. A simple solution made possible by the versatile design of the NLC. Now I am looking to find a particular massive but punky blank to mount at the tailstock end with a six prong Texas drive center attached using the new NLC spindle thread adaptor. I suspect this will be the ultimate in between centers work holding for roughing out.

What all this comes down to is that the Nova Live Center is virtually unmatched in its combination of stability, reliability, and capability to quickly and easily interface with almost every conceivable work piece. There are some other quality live centers out there, and modular systems are coming into vogue, but there is no other tail center I am familiar with that is superior. Mine has been used extensively for approximately five years now, and not only has there been no decline in performance, but I find it has actually increased in capability. For me, tools don't get much better than this- so, it sure gets my respect.

The Pen Turner's Corner

by Scott Greaves

This is the time of year to try new things! Secreted away in our workshops, lathes spinning and tools cutting, we venture into areas outside our normal fare. Penturners are known for a willingness to try to turn most anything imaginable into a pen.

It's also a time to try some new pen kits, and try a few new shapes to boot! Our vendors are busy introducing new kits for us to try, and the good old standards are being brought out in new platings that should thrill even the most jaded penturner! There's always something to be learned from our fellow turners, and I've been noticing some subtle new shapes on the penturning forums that I'm just going to have to try.

So grab a mug of hot cocoa, turn on your favorite music, and lets make some different pens!

NEWS

It was an exciting day when Bill Baumbeck started coming out with his own unique pen kits. One of the first things he offered was a Cigar Pen kit with black titanium plating. Since then he has tantalized penturners with a tasteful array of new offerings, including the Olympia kit reported in last month's column.

Recently he announced the new Baron kit. It's resemblance to the Junior Gentleman kit from Craft Supplies is remarkable! But it has some interesting differences, such as making both bushings for the lower barrel the same size, and both bushings for the upper barrel the same size. This should reduce the cost of the bushings, but more importantly it makes the kit more versatile. He is also offering it in a number of desirable platings, including Platinum, Upgrade Gold, Titanium, both black and gold, Silver, and Chrome.

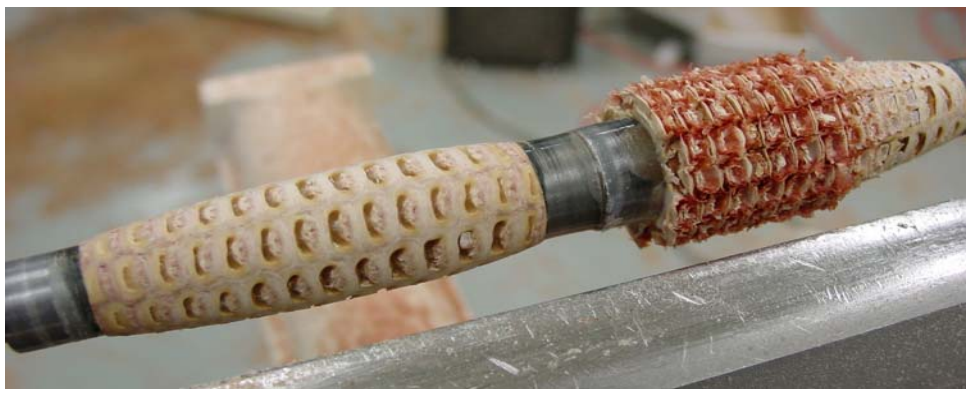
The roller-ball version of this pen has one of the nicest features I've seen on an elegant pen in a while. The lower barrel has six facets on the nib section that really set it apart from other kits in it's class. The fountain pen, while it doesn't have the faceted nib section, does come with a two-toned nib, and he says he will have replacement nibs in the near future.

In all, I think the new Baron kit is an excellent addition to the market place! You can see the new kit online at http://www.arizonasilhouette.com/

A CORNCOB PEN

If you frequent the penturning forums on the Internet you have seen pens turned from corncobs. I have wanted to try one myself, but never had any cobs available to experiment with. Last Fall, a friend named Richard Coers sent me a package of nicely hulled and dried cobs to play with.

I started by cutting the corncob into sections to match the brass tubes.



Partially Turned Pen.

Finished Corn Cob Pen with sample of the rough material.

I chose to use a cigar pen kit for this project to show off the interesting "grain" of the material. The cob cut and drilled remarkably easy, but the center was plenty dense enough to stand up to the glue. I used epoxy to glue the tubes in for this pen, primarily because I had temporarily run out of my standard polyurethane glue the day before. But it seemed to do a fine job of holding the cob to the brass.

After trimming with a barrel trimmer, I put the blanks on the lathe and started turning. Corncobs are not wood, and it really wouldn't take much to tear it all apart on the lathe. I went slowly, taking light cuts with a very sharp skew. I worked my way in from the bushing towards the center of the blank to make sure the material was adequately supported.

What came off the cob was almost like chaff until I got closer to the harder center. Then I started to get little shavings. Many who turn corncobs recommend frequent applications of thin CA glue while turning to stabilize the light and porous material. I found the cob I was working with to be dense enough to skip the CA until I got down to the size and shape I desired.

I used some coarse sandpaper, about 150 grit, to get to the final shape, and then I turned the speed of the lathe down and did a seal coat of CA with the sandpaper I had used to create a slurry of the sanding dust. I have found this to be a good practice for a lot of materials, as it fills those pesky little voids common to "interesting" materials.

After the seal coat I went through my standard sanding regimen, starting with 220 grit and going up to 400 grit, then switching to Micro Mesh. When I had a nice smooth surface, I applied my usual CA/BLO finish (cyanoacrylate glue and boiled linseed oil). I start this by wiping down the sanded blank with the BLO, and then using a folded paper towel, I apply some BLO, and while holding the paper to the underside of the spinning pen blank, I drip CA glue on the blank from above. I usually do four coats of this finish, then either use Micro Mesh to polish, or buff it on the buffing wheel.

This pen was a lot of fun to make! And the reaction I have gotten from the people I have shown it to is very positive! I think I will make a lot of corncob pens! If you want to try a corncob pen, a source for cobs is the dried corn sold as squirrel food at stores such as Wal Mart. Go ahead and feed it to your squirrels - they will leave the cob for you. And thanks to Rich Coers for the cobs and the information, and to Patricia Lawson for first getting me interested in a corncob pen!

HOT TIP

I like to tear my sandpaper into strips about six inches long and about an inch and a half wide. I then fold the paper into threes. This gives me a thick pad about two inches by one and a half inches. It provides three surfaces to sand with, and is thick enough that any heat buildup won't burn my fingers!