RodDNA

(**Rod D**esign a**N**d **A**nalysis)

We all like our tools, toys, and amusements. Rodmakers are suckers for new tools and toys. Rodmakers are also easily amused by waving a simple stick (a.k.a. Cane Rod) in the middle of a steam. Yet in the simplicity of that stick lays untold truths. It is that search of those truths that begins a journey that many rodmakers never finish. That truth is the taper. Tapers! What makes a good taper? Analyzing a taper! How to make a better taper? Tweak the taper! Converting a beloved taper yet retaining its beauty. Issues that haunt rodmakers.

Consider Garrison working out his stress curves in a hospital bed using only his slide rule (surely you remember them – if not just substitute a handy dandy scientific calculator) and then plotting the resultant stress curve on graph paper. Only the really dedicated engineer needs to try this. Forgive me Lord I have sinned. Oh no, not manual calculations! Help!

Now let me use Wayne Cattanach's HEXROD or one of the derivatives of it. Much better! But I still feel so limited! Stress curves what do they mean and how do they help me. Confusion still reigns. Stress curves only show that a taper is coherent. It is only a simple tool to analyze a set of numbers but does not yield the holly grail of a perfect taper

It is easy for today's rodmakers to find rods they like – attend enough rodmakers gatherings, cast enough rods, and soon you will be saying "so many tapers, so little time". OK, you finally find a bamboo fly rod that you like. This rod casts like the rod of your dreams. Smooth, responsiveness, and exhibits the power you crave. It is everything that you want in a rod. But it is the wrong length and line weight. Besides, only two sections and you want three. In reality, each rodmaker will pick certain tapers they personally like and enjoy. Now they want to build, "improve", and possibility even "modify" them. This is the crux of the problem. How to change something and still retain what they enjoyed about the original?

The first such program that would let you modify known tapers in a coherent manner was John Bokstrom's set of Controlled Modification DOS programs. However, the "beloved" tapers were John's personal favorites. Not a bad selection, but very limited. John worked the "numbers" by hand. His program was especially useful, if you like Garrison. (Editorial Note – Never underestimate the Garrison tapers – latter you will find out why!)

Now comes RodDNA. This has been a joint project with Larry Tusoni spearheading the effort. He first developed what turned out to be the foundation upon which current program's capabilities were built.

I had been working with John Bokstrom to put a modern interface upon his Control Modification (CM) programs. I understood the principles behind the program due to lengthy emails and conversations with John. The crux of the problem was to solve how to

automatically characterize the data set for a new taper. John had used manual methods to get the original data sets in his programs. I figured out that techniques applicable to Digital Signal Processing (DSP) could be applied to developing the data sets. Over sampling the taper was the key – sample far more points and the determent. This was the key we needed.

Larry had already developed a rod design & database program written in Java. Java is a potable computer language across Operating Systems. I had been using Visual Basic that wasn't. Larry already had sophisticated display and graphing capabilities incorporated that I would have struggled to implement. Larry is a proficient programmer and I wasn't. I had mastered CM and Larry had yet to understand its concepts. At the Corbett Lake Gathering in April 2004 we (John Bokstrom, Larry Tusoni, and myself) sat down and mapped out a development strategy for what turned out to be RodDNA. Larry was the programmer I have been his Beta tester and John remains the sage.

The philosophy of the program is to provide in one package all the tools capability a rodmaker will require to store, analyze, and modify a taper. This includes the capability to access existing documented tapers (data base of 445 plus tapers) and add new tapers – even at irregular intervals.

So in a nutshell, what important capabilities RodDNA provide?

RodDNA provides the capability to:

- Maintain a rod, customer, vendor, and taper (model) databases
- Sort and display the taper database on desired fields
- Input new tapers (regular or irregular measurement spacing)
- Print the taper and rod planning form setting reports
- Access and display selected taper(s) (single or multiple tapers) dimensions in tabular or graph form
- Calculate and display selected taper(s) (single or multiple tapers) stress curve in tabular or graph form
- Switch between above displays and data base information
- Convert selected a taper from Hex to Quad or Penta and vice-a-versa
- Convert selected a taper from 2-piece to 3 or 4 (even more) while maintaining the same stress curve and vice-a-versa
- Modify the fly rod length, line weight, and action of a selected taper using John Bokstrom's CM
- Automatically calculate the tip top and ferrule sizes for a selected taper(s)
- Automatically calculate guide spacing
- Input user defined default values

Now, Let look at each the above capabilities RodDNA and what they mean to today's rodmaker.

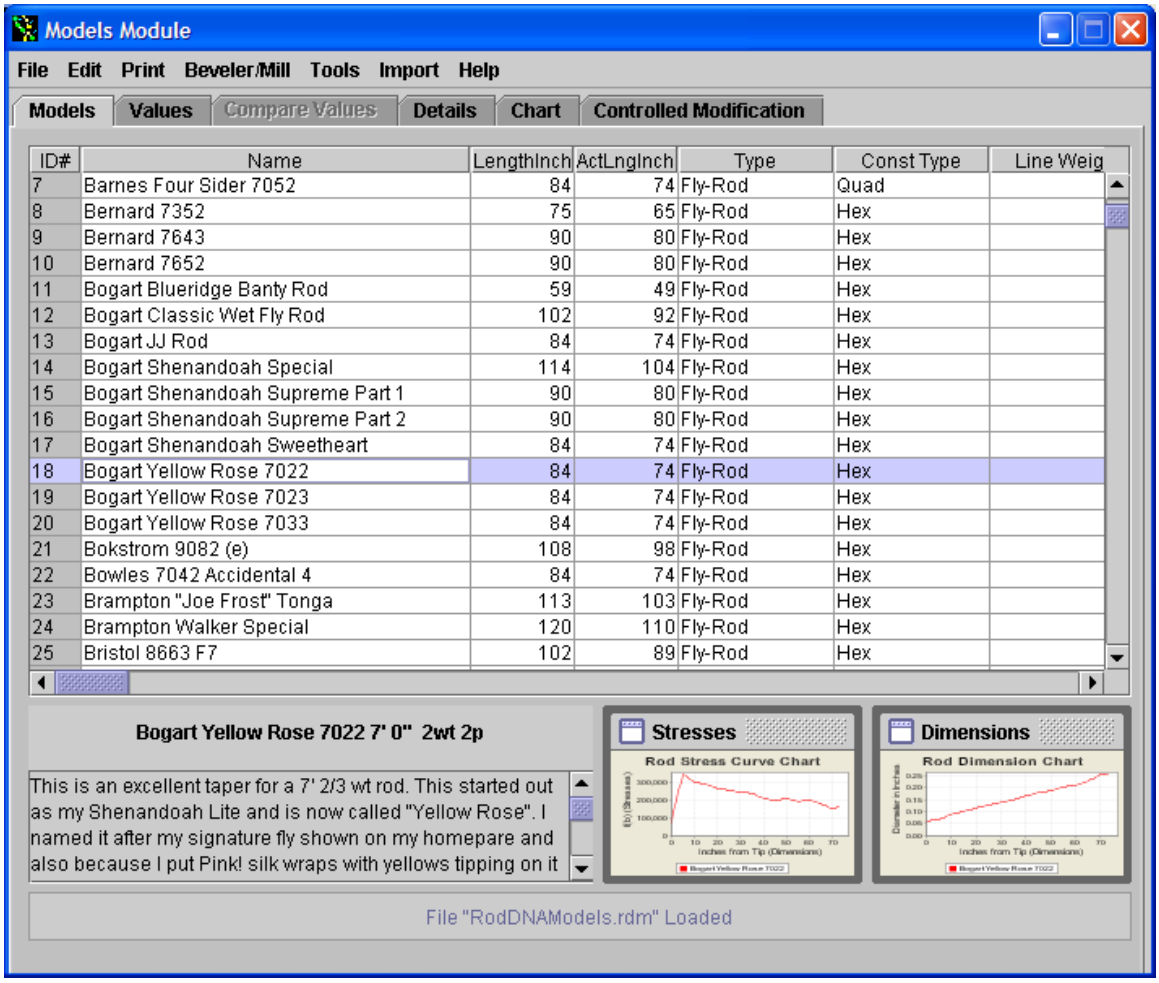
// Short Para describing each bullet above with screen captures //

Maintain a rod, customer, vendor, and taper (model) database.

Actually you can maintain four separate databases with RodDNA. You can maintain information on your sources (vendors), your customers, and the rods you have built. These capabilities are fairly straightforward and provide a useful tool. The display of the information is not as good as Joe Byrd's rodmakers database program. Below is the top level window with the pull down for the various database modules.

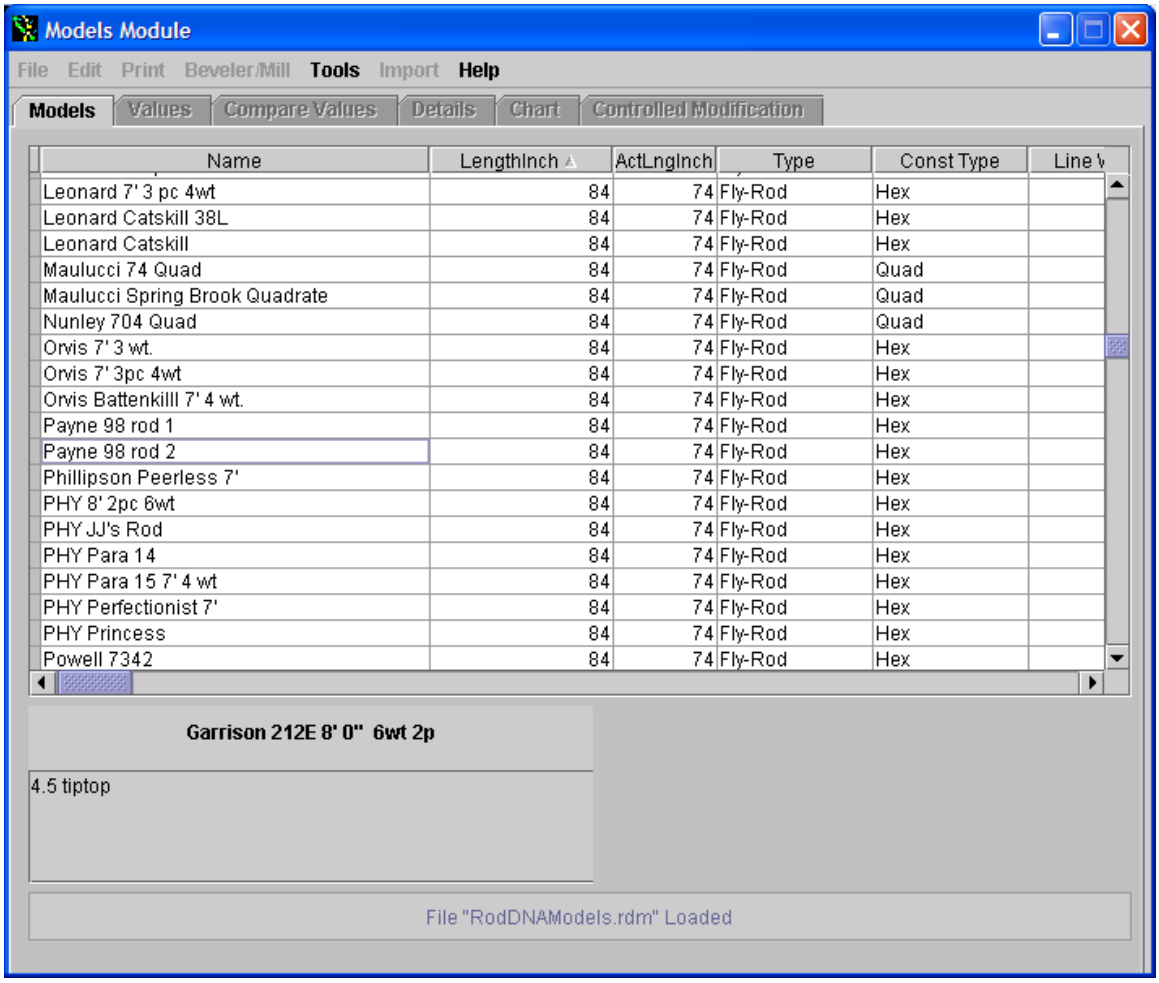
The real gem in this program is the Models Database module. There is nothing close to the capabilities exhibited by this module anywhere. When you download RodDNA it comes populated with 445 tapers. You can choose to use them all, some of them, or start a new database all together. You can choose any of these to load into RodDNA on startup. I have a separate database for all my production tapers.

When you click on a taper a taper or tapers it will display the name of the selected taper, the comments pertaining to that taper, and resultant stress curve and dimension plot in two preview windows:



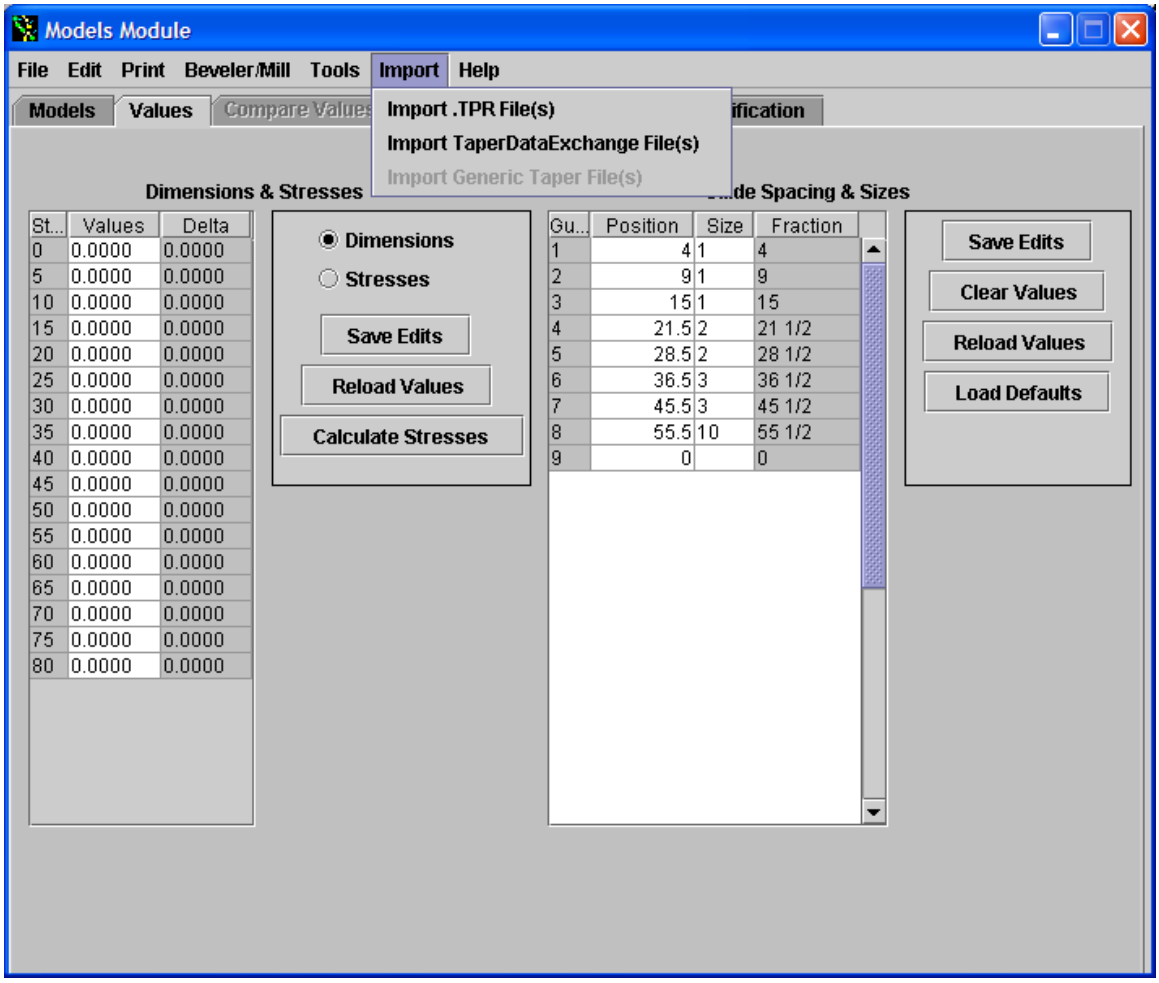
Sort and display the taper databases on desired fields.

This is a handy feature allows you to reorder the database by a simple click on the field header. This will produce a little arrow indicating you have sorted on it. Latter you can choose to keep the database saved in the sorted order or not. The following example is the database sorted by length.



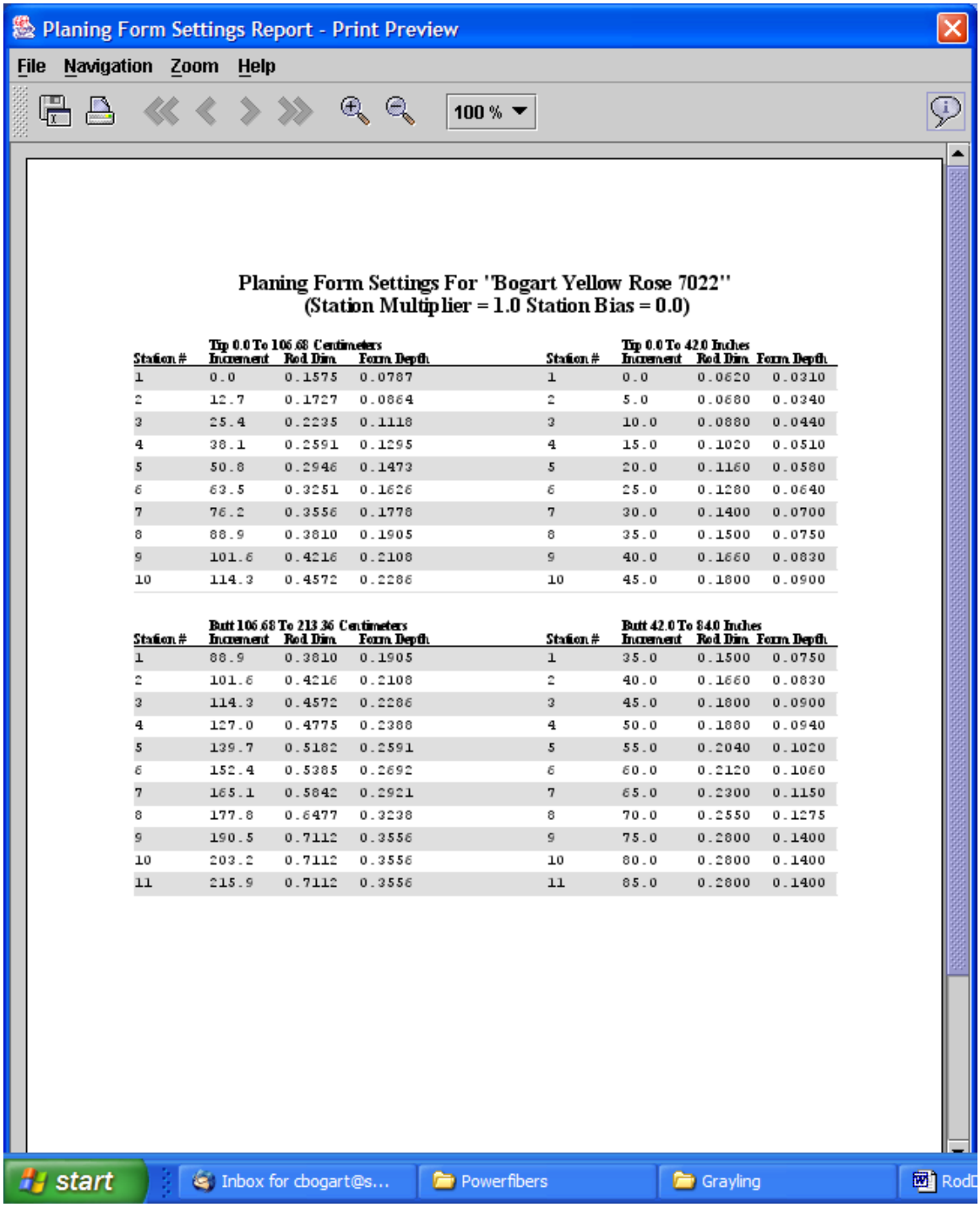
Input new tapers (regular or irregular measurement spacing)

You can keep adding tapers to the database. There is also the capability to import tapers inform other programs (HEXROD and Joe Byrd's Rodmakers Database) and also in plain text.



Print the taper and rod planning form setting reports

Printing reports are easy. The downside is that you have little control over the format. The format is useful but I personally find that printing both metric and inch planing form settings confuses things when you are only interested in one. However they are easy to read.



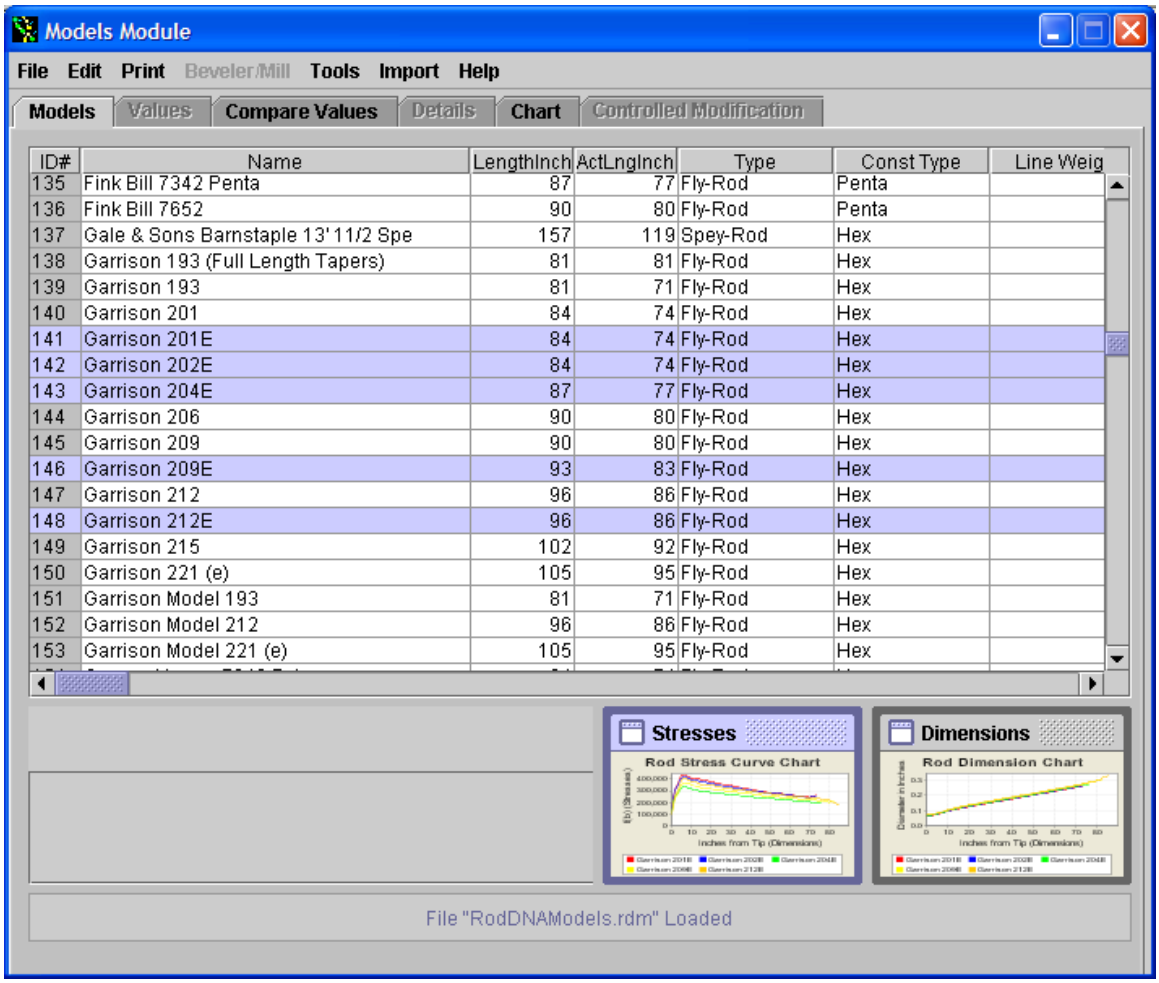
Planing Form Settings For "Bogart Yellow Rose 7022"
(Station Multiplier = 1.0 Station Bias = 0.0)

Station #	Tip 0.0 To 106.68 Centimeters Increment	Rod Dim	Form Depth	Station #	Tip 0.0 To 42.0 Inches Increment	Rod Dim	Form Depth
1	0.0	0.1575	0.0787	1	0.0	0.0620	0.0310
2	12.7	0.1727	0.0864	2	5.0	0.0680	0.0340
3	25.4	0.2235	0.1118	3	10.0	0.0880	0.0440
4	38.1	0.2591	0.1295	4	15.0	0.1020	0.0510
5	50.8	0.2946	0.1473	5	20.0	0.1160	0.0580
6	63.5	0.3251	0.1626	6	25.0	0.1280	0.0640
7	76.2	0.3556	0.1778	7	30.0	0.1400	0.0700
8	88.9	0.3810	0.1905	8	35.0	0.1500	0.0750
9	101.6	0.4216	0.2108	9	40.0	0.1660	0.0830
10	114.3	0.4572	0.2286	10	45.0	0.1800	0.0900

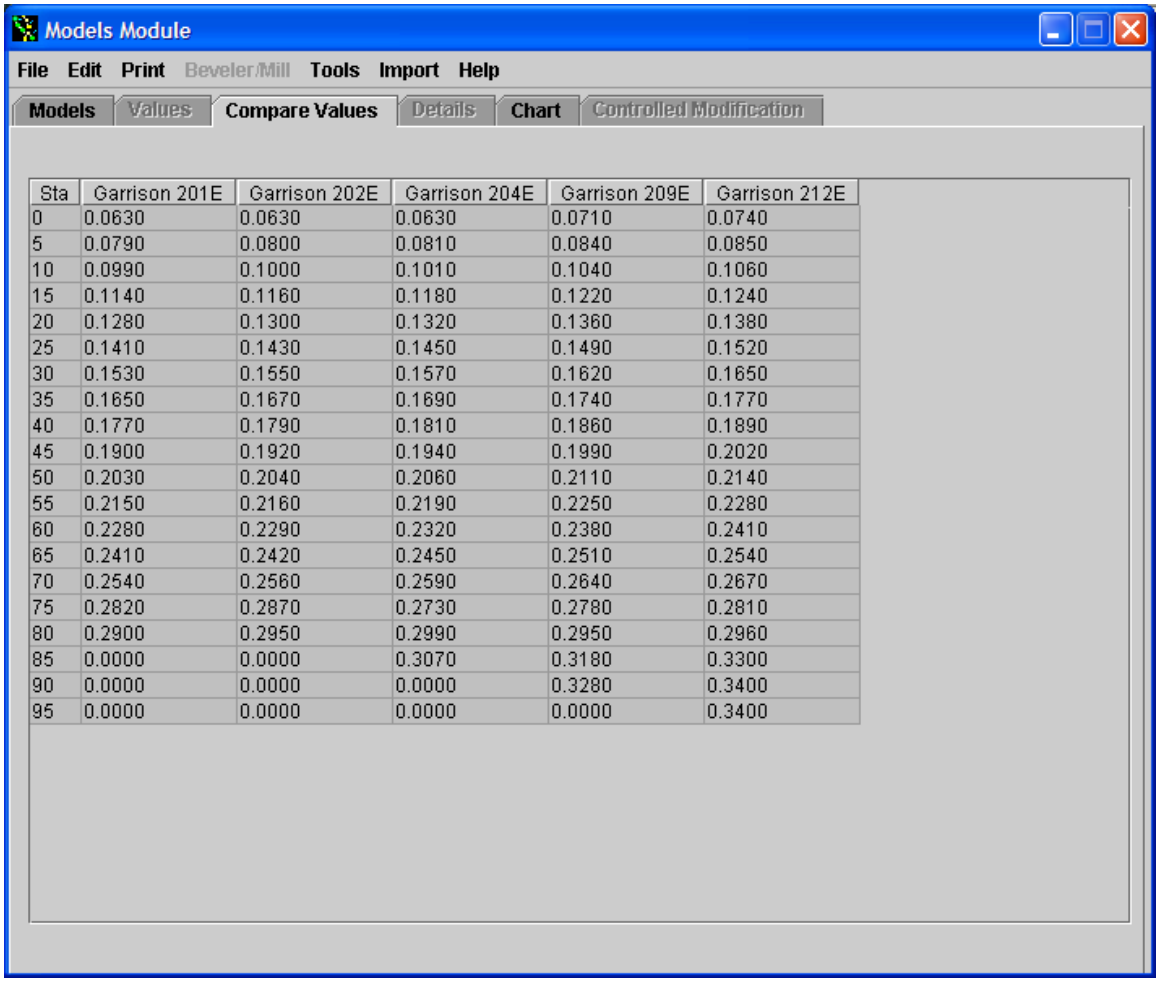
Station #	Butt 106.68 To 213.36 Centimeters Increment	Rod Dim	Form Depth	Station #	Butt 42.0 To 84.0 Inches Increment	Rod Dim	Form Depth
1	88.9	0.3810	0.1905	1	35.0	0.1500	0.0750
2	101.6	0.4216	0.2108	2	40.0	0.1660	0.0830
3	114.3	0.4572	0.2286	3	45.0	0.1800	0.0900
4	127.0	0.4775	0.2388	4	50.0	0.1880	0.0940
5	139.7	0.5182	0.2591	5	55.0	0.2040	0.1020
6	152.4	0.5385	0.2692	6	60.0	0.2120	0.1060
7	165.1	0.5842	0.2921	7	65.0	0.2300	0.1150
8	177.8	0.6477	0.3238	8	70.0	0.2550	0.1275
9	190.5	0.7112	0.3556	9	75.0	0.2800	0.1400
10	203.2	0.7112	0.3556	10	80.0	0.2800	0.1400
11	215.9	0.7112	0.3556	11	85.0	0.2800	0.1400

Access and display selected taper(s) (single or multiple tapers) dimensions in tabular or graph form.

Simply by using selecting multiple tapers in the models tab (in Windows hold the CTRL key while clicking the mouse – standard windows function) you can select multiple tapers for display.

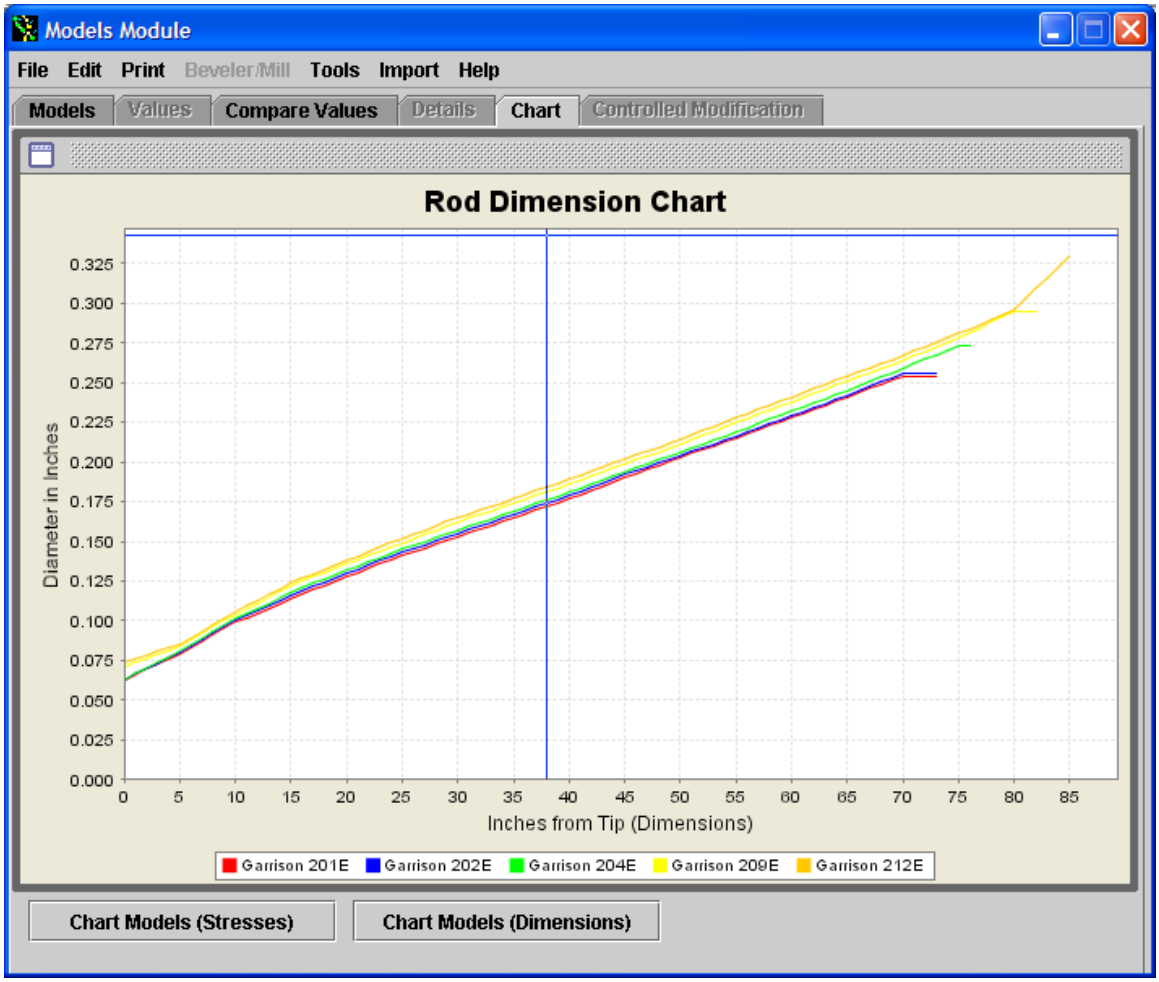


Now click on the Compare values Tab and you will see the tapers side by side. I chose the vertical display option in Program options vice horizontal display option. My preference. This is a great analysis tool:



Sta	Garrison 201E	Garrison 202E	Garrison 204E	Garrison 209E	Garrison 212E
0	0.0630	0.0630	0.0630	0.0710	0.0740
5	0.0790	0.0800	0.0810	0.0840	0.0850
10	0.0990	0.1000	0.1010	0.1040	0.1060
15	0.1140	0.1160	0.1180	0.1220	0.1240
20	0.1280	0.1300	0.1320	0.1360	0.1380
25	0.1410	0.1430	0.1450	0.1490	0.1520
30	0.1530	0.1550	0.1570	0.1620	0.1650
35	0.1650	0.1670	0.1690	0.1740	0.1770
40	0.1770	0.1790	0.1810	0.1860	0.1890
45	0.1900	0.1920	0.1940	0.1990	0.2020
50	0.2030	0.2040	0.2060	0.2110	0.2140
55	0.2150	0.2160	0.2190	0.2250	0.2280
60	0.2280	0.2290	0.2320	0.2380	0.2410
65	0.2410	0.2420	0.2450	0.2510	0.2540
70	0.2540	0.2560	0.2590	0.2640	0.2670
75	0.2820	0.2870	0.2730	0.2780	0.2810
80	0.2900	0.2950	0.2990	0.2950	0.2960
85	0.0000	0.0000	0.3070	0.3180	0.3300
90	0.0000	0.0000	0.0000	0.3280	0.3400
95	0.0000	0.0000	0.0000	0.0000	0.3400

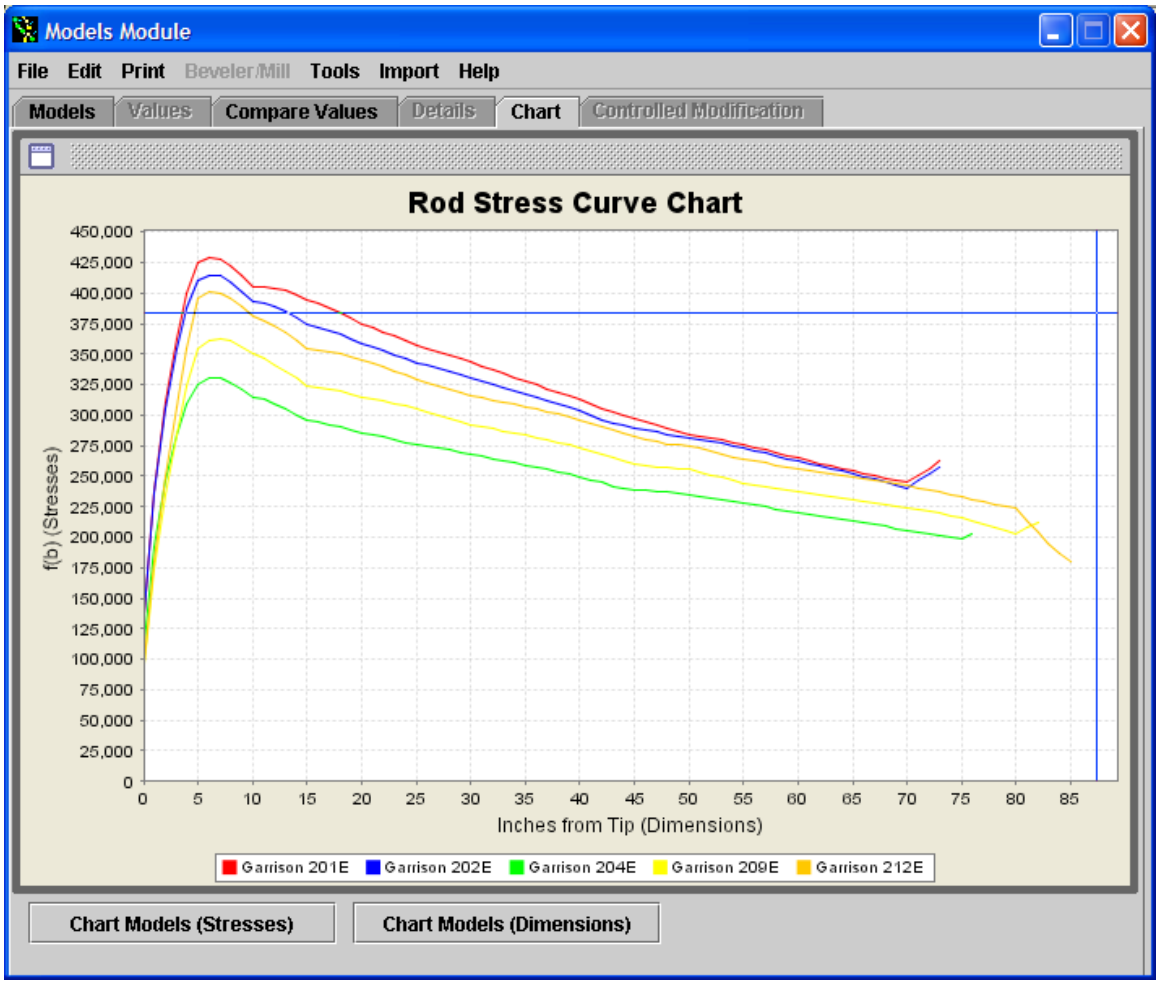
Now click on the Chart Tab and you will see the results displayed in graphical form:



Note that each taper has its own color making the dimension chart easy to read.

Calculate and display selected taper(s) (single or multiple tapers) stress curve in graph form

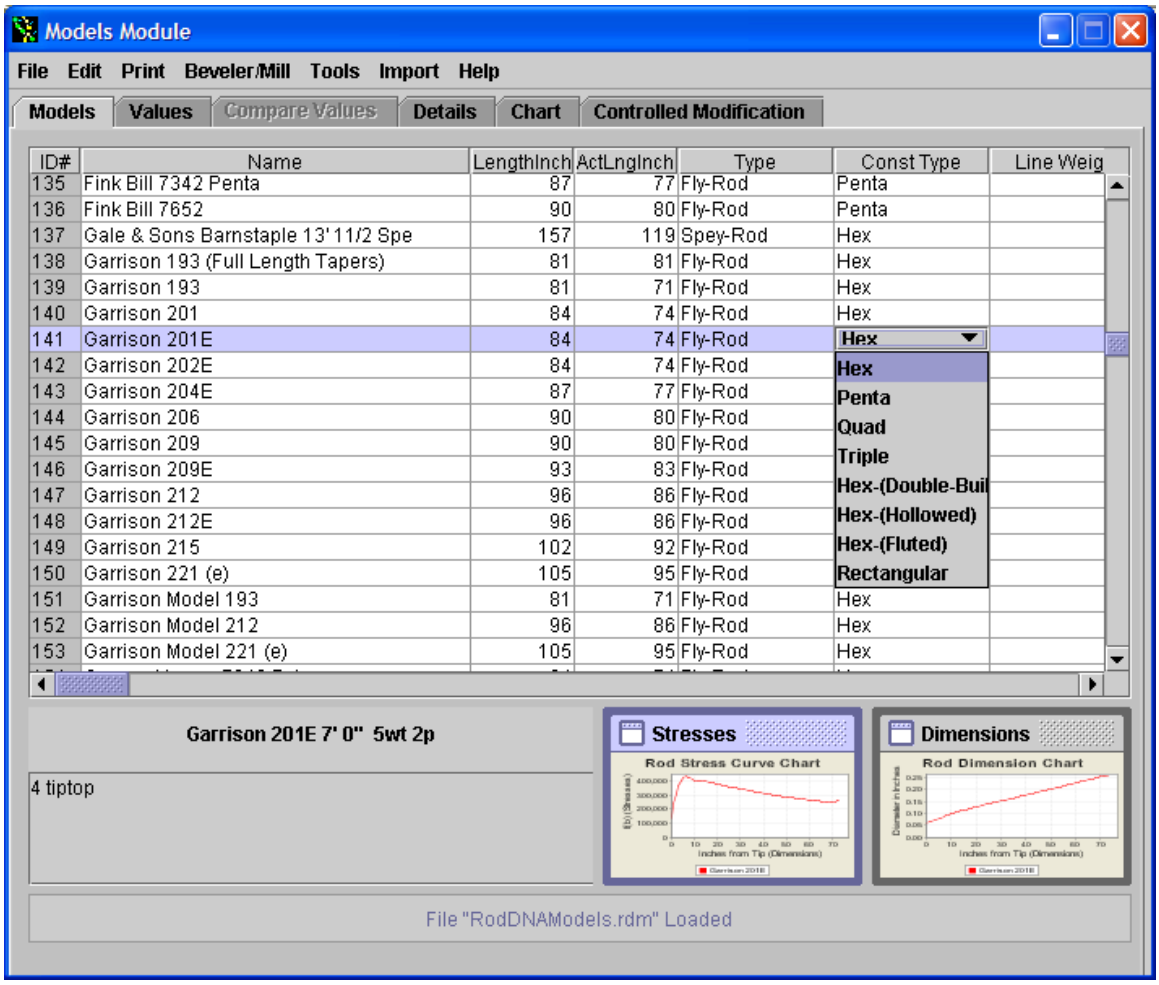
Now simply click Chart Models (Stresses) at the bottom of the graph and you will immediate see the stress curves plotted for the selected model(s)



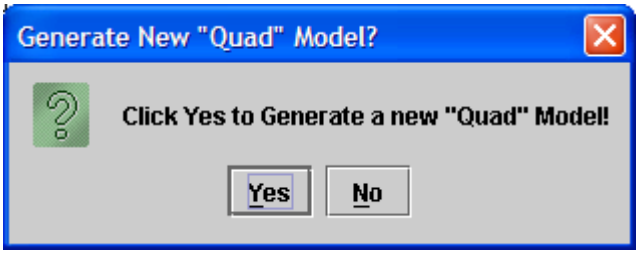
Note that the color code is the same for the dimension plot. You can quickly toggle back to dimensions to database information by clicking on a button or tab.

Convert selected a taper from Hex to Quad or Penta and vice-a-versa

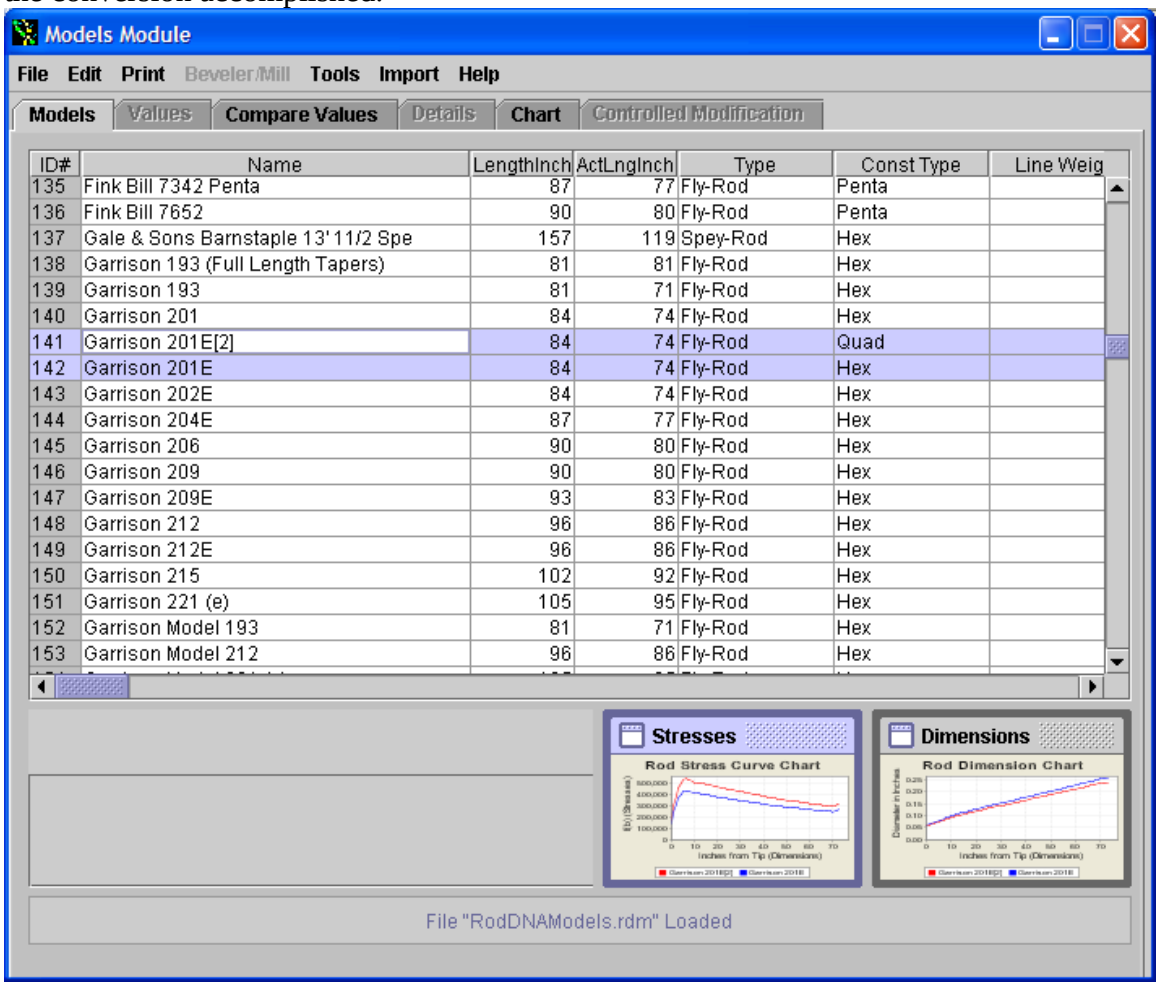
RodDNA has automatic conversion of a taper for 6 to 4 to 5 sided. This feature is extremely easy to use. Simply click on construction type field of a selected taper and a drop down menu selection presents itself.



If you select a different type of construction a pop-up window shows up to warn / alert you that you will automatically generate a new taper.



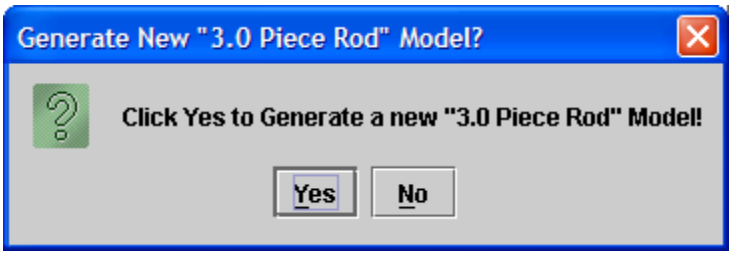
You will then see a new taper with the name annotated with [2} above the old one with the conversion accomplished.



Taper conversion is as easy as that.

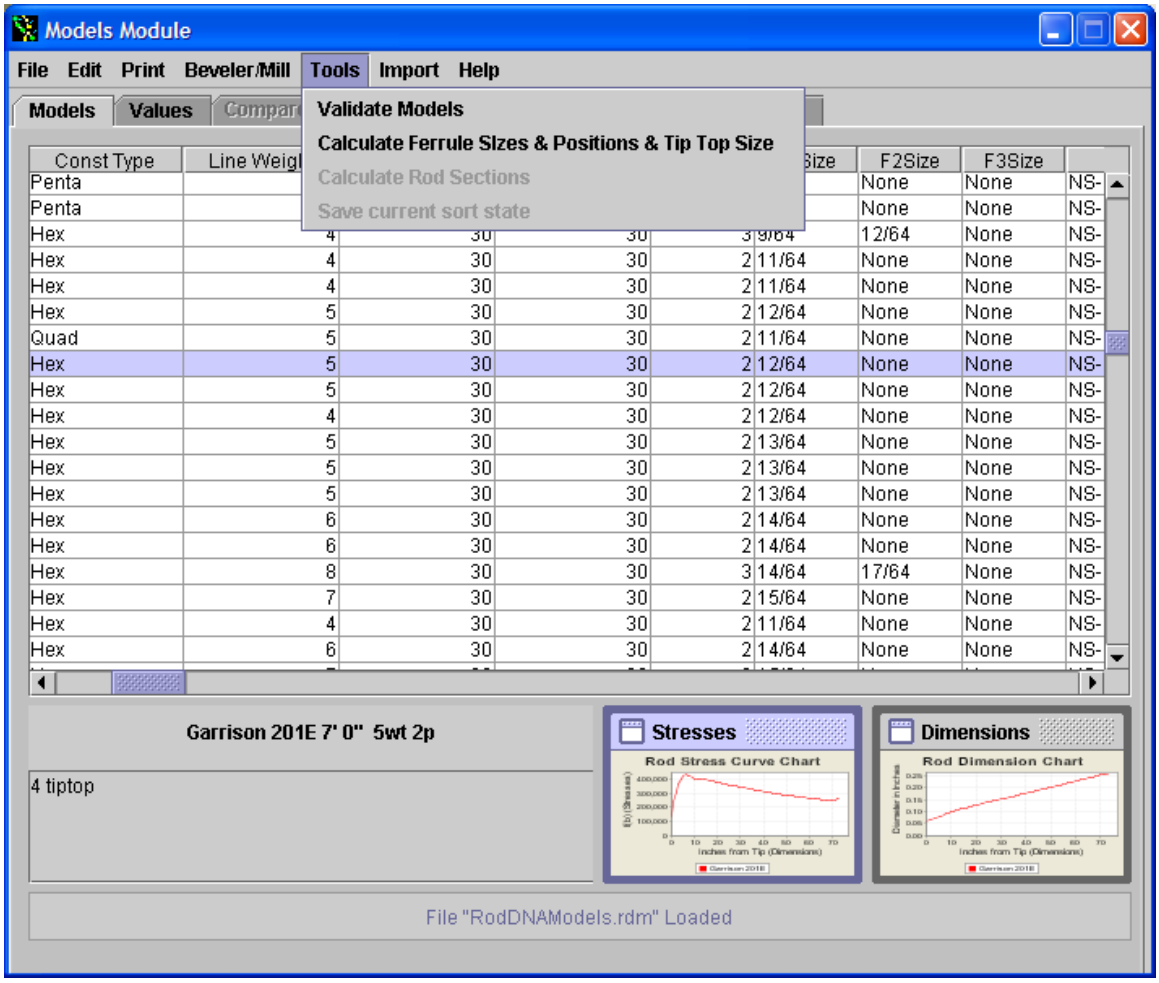
Convert selected a taper from 2-piece to 3 or 4 (even more) while maintaining the same stress curve and vice-a-versa

This function is as easy to use as taper conversion. Simply choose a taper and in the “Pieces” field enter the number of sections you want. The conversion is done using stress curves. It takes the original stress curve and using the new number of ferrules and standard location for them, calculates the taper. Again a pop-up window asks if you want to generate a new taper with 3 pieces vice the two you started with. When you answer yes a new taper is inserted above the old one in the database.



Automatically calculate the tip top and ferrule sizes for a selected taper(s)
Automatically calculate guide spacing.

Another simple chore for RodDNA, simply select the rod and in the tools menu item select the Calculate ferrule Sizes & position & Tip Top Size and it will update the database entry.



Modify the fly rod length, line weight, and action of a selected taper using John Bokstrom's Controlled Modification (CM).

This is one of the real "Power Tools" of this program. This represents complete update and enhancement of John Bokstrom's original DOS BASIC programs. What Controlled Modification (CM) represents is a proven and scientific method that will allow a rodmaker to start with a known taper and make changes to that taper in a systematic manner. I have done testing and I can say that the changes can go either way, in DSP we call this transforms. You will end up with what you started with. No hocus pocus here.

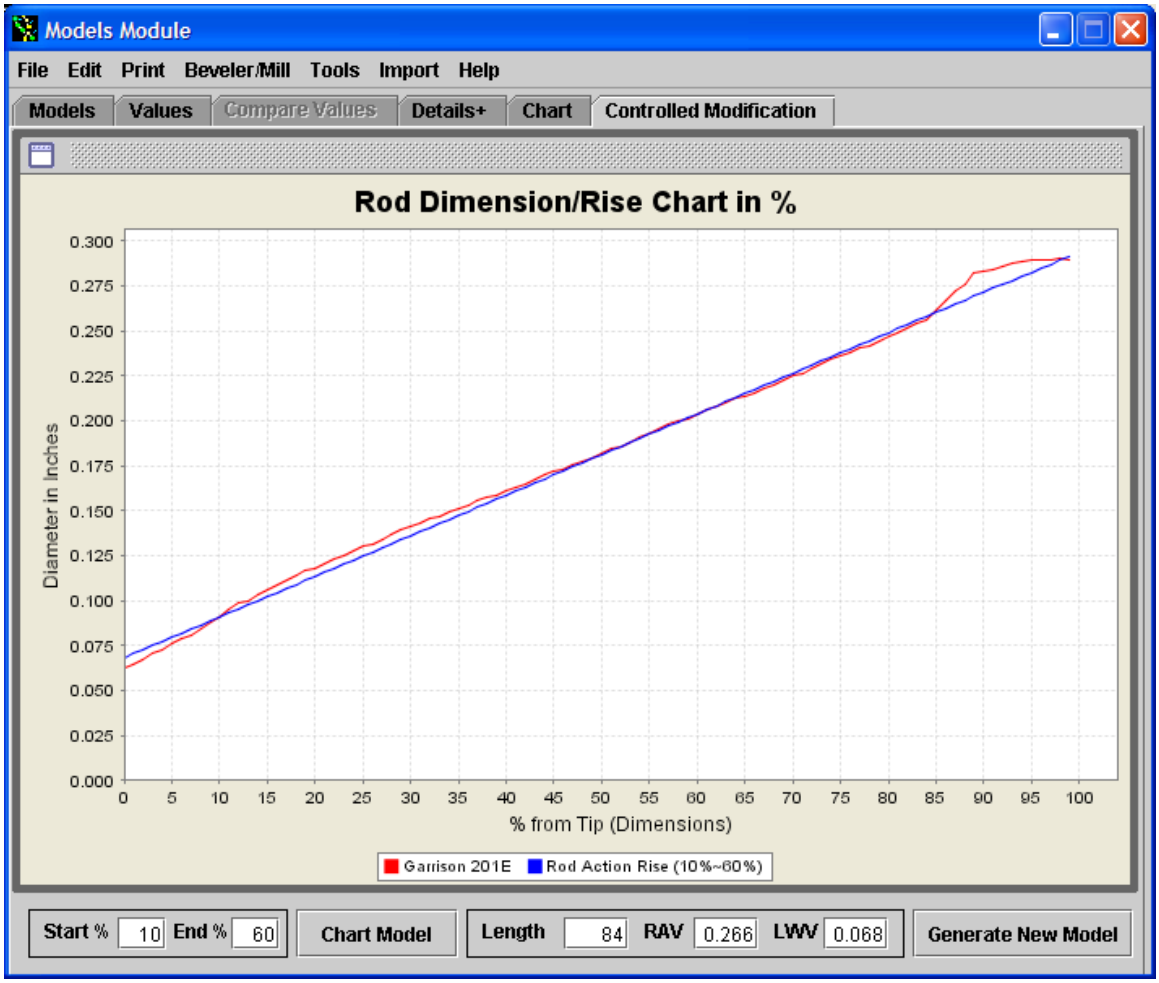
CM first characterizes a taper independent of its length. At the 10 and 60 percent values a line is drawn through the taper. At 1% intervals a data values are calculated of the taper value and its relationship to the line drawn through the two points. This results in 101 data points that represent the taper regardless of its length.

Now for the nay Sayers who say why 10% and 60% - please argue with John Bokstrom who has done the research. I have found that these values do capture the rod action. However, if you want to be dogmatic about it, RodDNA allows you to choose your own values and it will calculate everything based upon them. Just change the values in the lower left hand of the window.

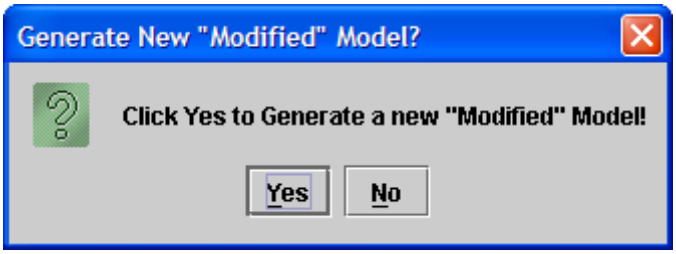
The slope of this line represents the Rod Action Value (RAV). The higher the number the faster the rod, the lower the number the slower the rod is. Changing this number upwards or downwards will quicken or slow the rod. A good general rule to follow is make longer rods slower and shorter rods quicker.

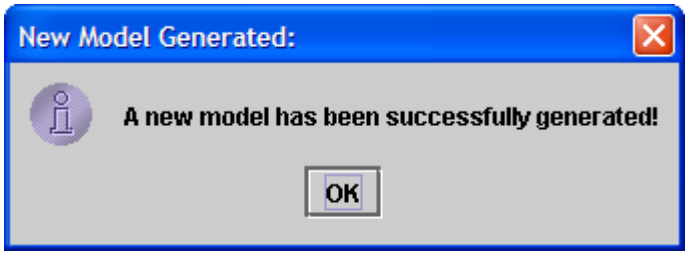
The place where the slope crosses zero is the Line Weight Value (LWV). In most cases this will be different than the taper value at the tiptop. Most tapers play little games here. Now to change the line weight of a rod, simply increase this number. An increase of .005 - .006" will result in one line weight increase. Conversely decrease this number and the line weight will decrease.

To use Controlled Modification simply click on the tab. You will see the dimensions displayed. In the lower right corner you have the rod length, RAV, and LWV displayed.

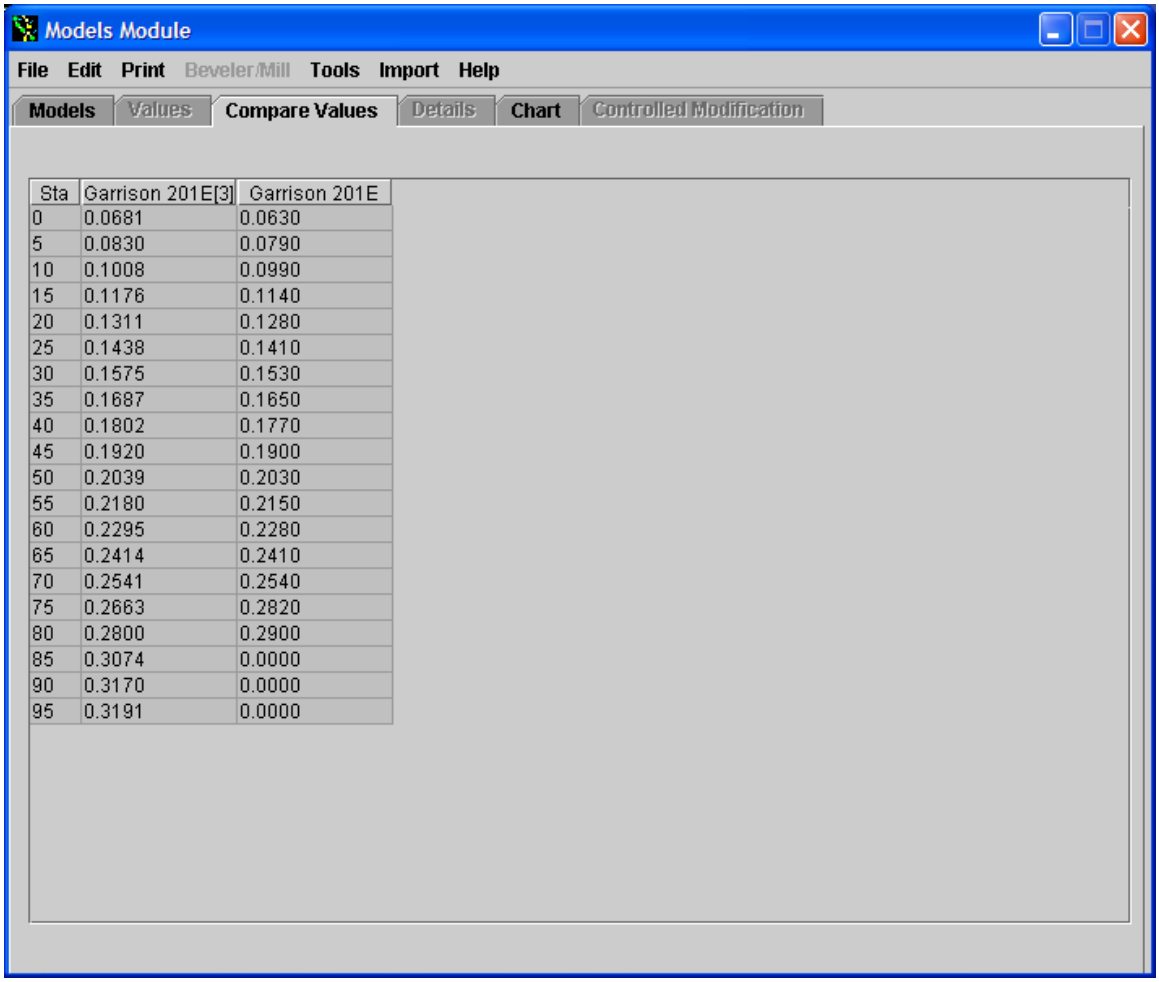


Now simply change one, two, or all of those numbers and click Generate New Model button. Now you get a pop-up to confirm the action, click yes and a new taper is created and entered in the database above the old one.

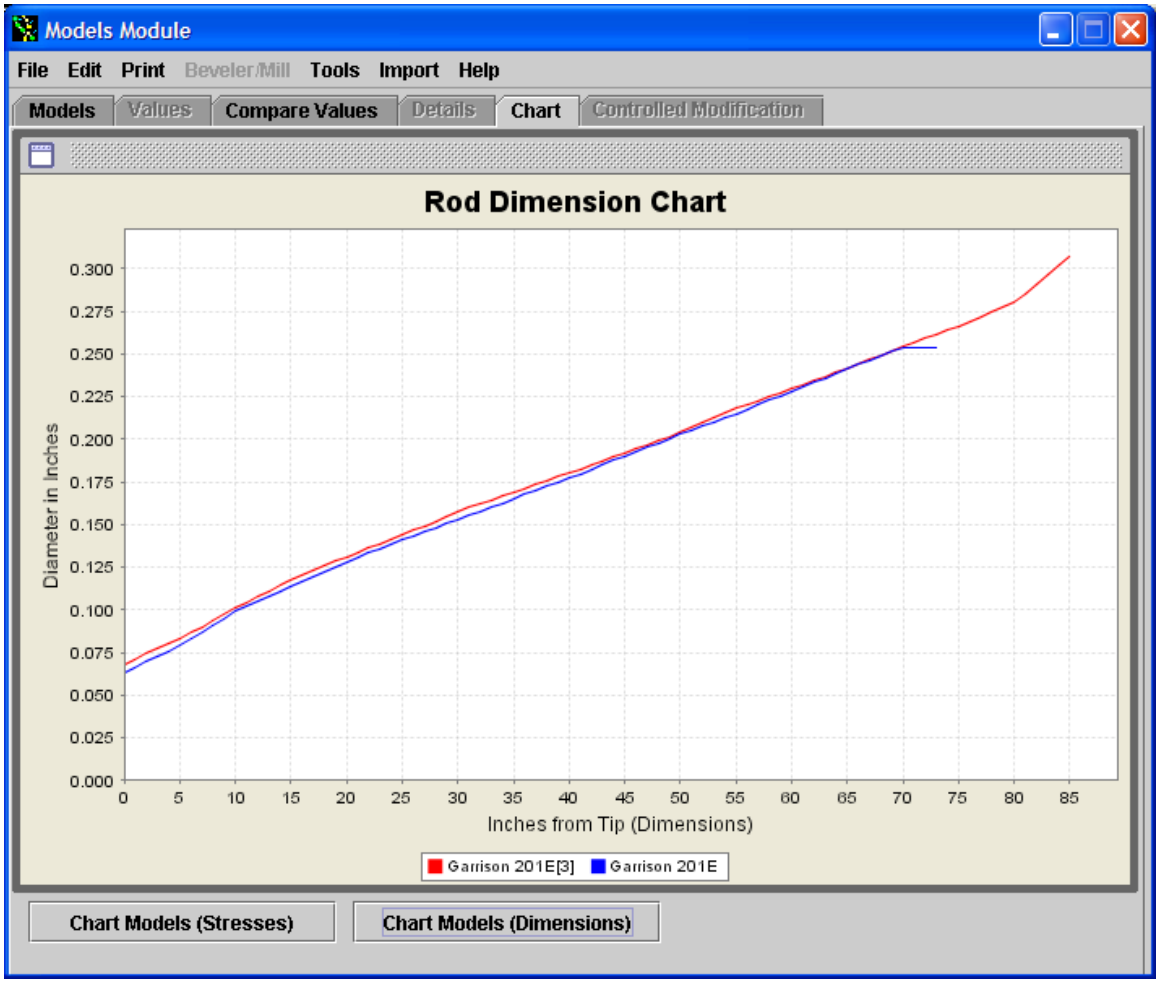




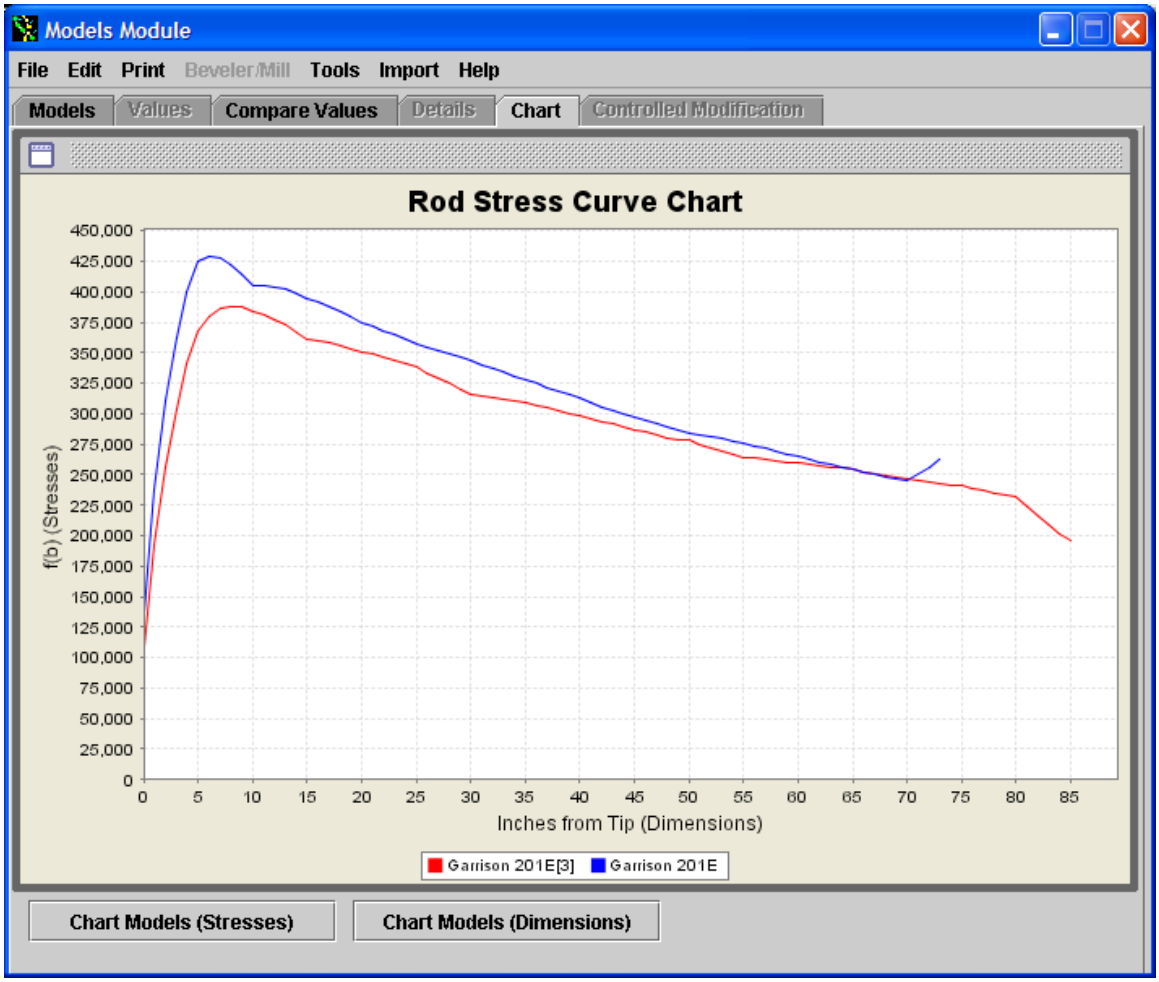
Now look at the Compared values:



Sta	Garrison 201E[3]	Garrison 201E
0	0.0681	0.0630
5	0.0830	0.0790
10	0.1008	0.0990
15	0.1176	0.1140
20	0.1311	0.1280
25	0.1438	0.1410
30	0.1575	0.1530
35	0.1687	0.1650
40	0.1802	0.1770
45	0.1920	0.1900
50	0.2039	0.2030
55	0.2180	0.2150
60	0.2295	0.2280
65	0.2414	0.2410
70	0.2541	0.2540
75	0.2663	0.2820
80	0.2800	0.2900
85	0.3074	0.0000
90	0.3170	0.0000
95	0.3191	0.0000


Models Module
File
Edit
Print
Beveler/Mill
Tools
Import
Help
Models
Values
Compare Values
Details
Chart
Controlled Modification
Rod Dimension Chart
Diameter in Inches
0.300
0.275
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
Inches from Tip (Dimensions)
Garrison 201E[3]
Garrison 201E
Chart Models (Stresses)
Chart Models (Dimensions)

Then compare the stress curves of the old versus new taper:

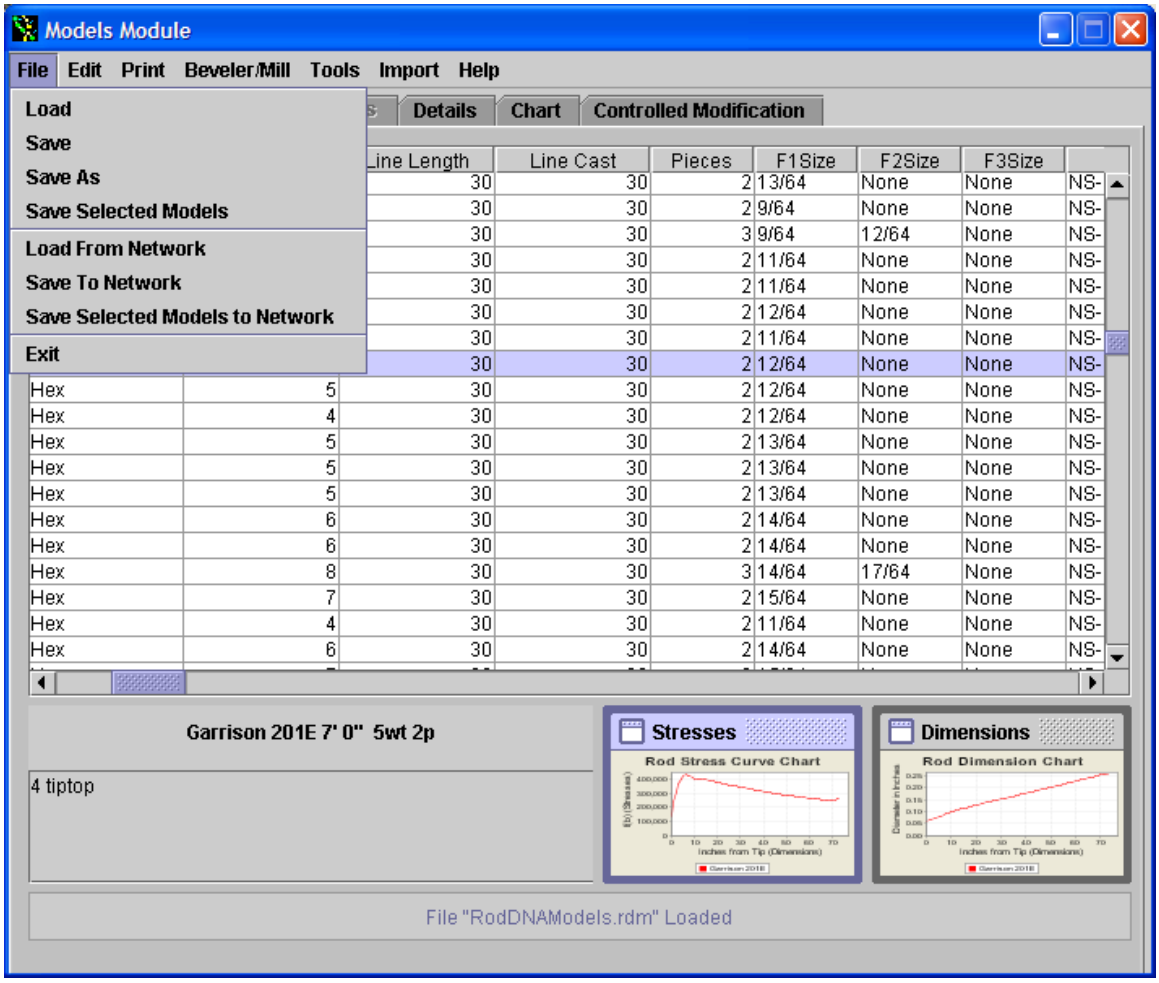


In the click of a mouse you have modified an existing taper made it longer, slightly slower and one line weight heavier. Wow!

When I first demonstrated this program I was asked could I make a Payne 101 slightly faster since the rodmaker thought it was a bit wimpy for tastes but like the rod otherwise. Changing the RAV and leaving length and line weight the same; it was accomplished simply and quickly. No second-guessing on how to modify a taper.

Now, start thinking about parlaying RodDNA's capabilities. I just played with the Garrison 201E. I made it longer, slightly slower and one line weight heavier. Nice, but we can now make it a 3-piece rod, or even a Quad! Power at a rodmaker's fingertips!

One last item should be noted. You can have fun with the database all day long and when you go to close you can choose not to save, save with the same name, or chose save as with a new name. This is helpful to keep multiple databases and then load the one you are interested in the next time you use the program. You can also save or load a database from the network (on Larry's server). You can allow other to load a database you have saved – the choice is yours.



Now let's discuss the Holy Grail for rodmakers – developing a consistent set of tapers having the same basic desired taper and action but in different lengths, number of sections, and line weights. Remember our earlier discussion of Garrison. In using RodDNA you will find that the Garrison Tapers have a consistency across various lengths and line weights. Using the CM feature you will be able to start with one Garrison taper and end up with another. In my presentation at Grayling and also at Roscoe I show how you can start with a Garrison 215 (8' 6" 3 piece 8wt) and end up with a 201 (7' 2 piece 5wt). He was surely the "Master". Other famous rodmakers tapers do not exhibit this consistency across models – not even Paul Young's famous Para Series. He accomplished it by empirical means and Garrison used a proven scientific method. Now is your chance to take your "favorite" rod taper and "clone" it across a range of

lengths, number of sections, and line weights. RodDNA provides the tools for accomplishing this.

In summary, the program is still a “work-in-progress” providing many exciting new capabilities. There are some tricks and tips to using the program effectively that may not be intuitive to some at first. But once mastered, RodDNA provides the modern rodmaker with a software tool that allows him to play and design his beloved toys. RodDNA is a powerful tool that has been sorely missing. The more a rodmaker plays with RodDNA, the more they discover things about tapers they have never observed before. It allows a rodmaker to quickly accomplish things that were near impossible before. Garrison would have loved it. This is the ultimate complement.

RodDNA is available free from: http://www.HighSierraRods.com