



# Theta Enterprises, Inc. NEWSLETTER

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## How to Ensure your data is accurate by Importing RODDIAG or XDIAG files into RODSTAR

RODSTAR has the capability to load RODDIAG or XDIAG files. This allows you to do several useful things that include:

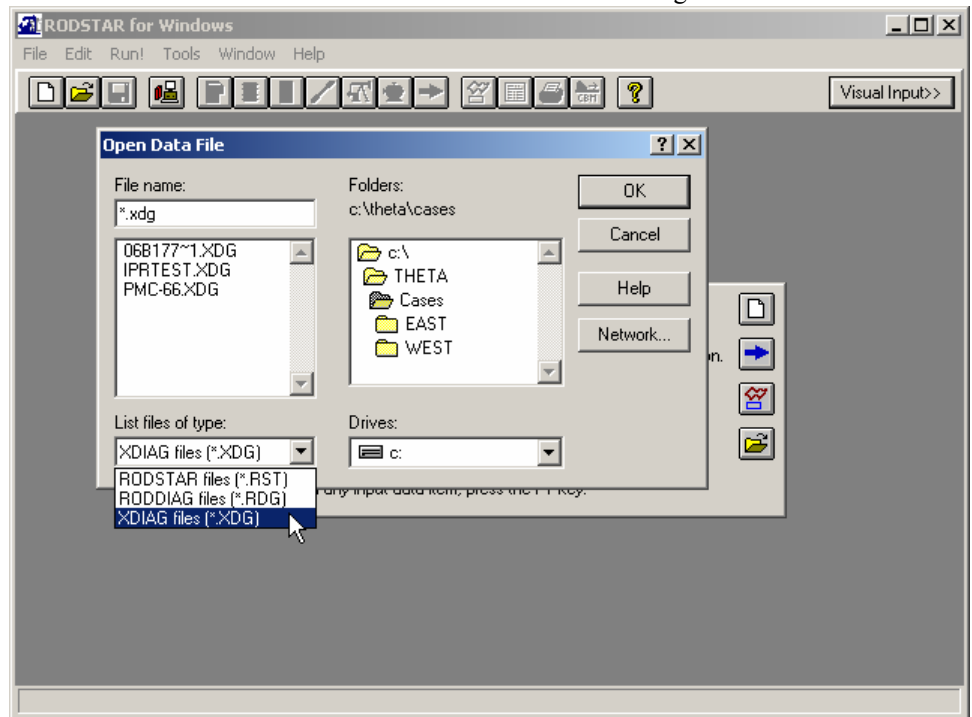
- Being able to get a "history match" between the predicted and actual dynamometer cards for the purpose of determining unknown quantities such as the correct rod-tubing friction coefficient, the correct fluid level or fluid specific gravity, etc.
- Save time by not having to re-enter all the well data into RODSTAR for the purpose of making system changes.

- Check if the load cell used to measure the data was reading correctly.
- Check if the well data is correct before making design changes.

To load a RODDIAG or XDIAG file into RODSTAR, select "Open File" from the menu bar, or click on the Open File icon on the toolbar to see the Window shown in Figure 1.

cell was reading correctly, then you should be able to get a fairly close match between the predicted and actual cards. However, in some cases you may have to change the rod-tubing friction, especially if the actual well has more friction than normal due to paraffin or scale, or a crooked hole.

To do this, you go to the Pump/Tubing Information window in RODSTAR and select to enter your own rod-tubing friction coefficients.



**Figure 1. RODSTAR can load RODDIAG or XDIAG Files**

Then, click on the drop down arrow under "List files of type:" and select RODDIAG or XDIAG file type. This activates a file "filter" that displays only the files of the type you selected. Then, to select the file you want, simply double click on its name.

If all data in the RODIAG or XDIAG file is correct and the load

To get an idea of what is normal for the average well, make a run first after selecting to have RODSTAR calculate the rod-tubing friction for you and then go back and change it yourself. This way the program will display the default value of the rod-tubing friction coefficient for you. For example, if you see a default value of 0.5, then to double the amount of rod-tubing friction you can enter 1.0 and then run the

program to see if this gives you a closer match with the measured dynamometer card. Then you can continue to adjust the rod-tubing friction coefficients for both upstroke and downstroke to try to get as close as possible to the measured card. When you are done, you will have a much better value for rod-tubing friction than letting the program estimate this for you.

Having XDIAG makes this process much easier. When you load an XDIAG file into RODSTAR, it has a "custom" value for rod-tubing friction that should get you a lot closer to the measured card. However, you can get even closer by making a few additional runs yourself.

This capability also allows you to detect an out of calibration load cell that is reading too high or too low (this is a common problem especially if you are using pump off controllers).

a comparison such as the one shown in Figure 2. This indicates that the load cell is reading too low.

Another clue that the load cell is out of calibration is whether the downhole pump dynamometer card shows too much negative or not enough negative loads. Normally, the downhole pump card should show a negative load that is in the order of 50-500 lbs (if buoyancy effects are not included). This negative load is mostly due to pump friction plus left-over rod-tubing friction not removed by the wave equation, and other frictional effects. If the zero load on the downhole pump card is too high or too low as compared to where it should be, that indicates that the load cell is reading either too high or too low.

Another thing to be aware of, is that

lem with the pump, or the pump is worn out), and this value will be transferred to RODSTAR.

Please remember that to get a good match in RODSTAR; the pump must be in fairly good mechanical condition. If the pump is worn out or if there are other mechanical problems, the match may not be very good since RODSTAR can only simulate a good pump.

It is also important to specify the correct pump condition and to include motor speed variation not only for Ultra High Slip motors, but also for NEMA D motors for a closer match between the predicted and actual cards.

Sometimes, you may not be able to get a good match if you load RODDIAG files if those files were created using dynamometer cards from a pump off controller that has phase shift problems or if the top of stroke setting was incorrectly set. For more information on this subject please refer to the June 2001 newsletter on our web site

(<http://www.gotheta.com/support-framed.asp>)

XDIAG will detect and correct most of these type of errors automatically. Then, when you load one of those files into RODSTAR the program will give you the option to either load the corrected or uncorrected dynamometer card. Select to bring in the corrected one. This will allow you to get a good match with this type of POC dynamometer card.

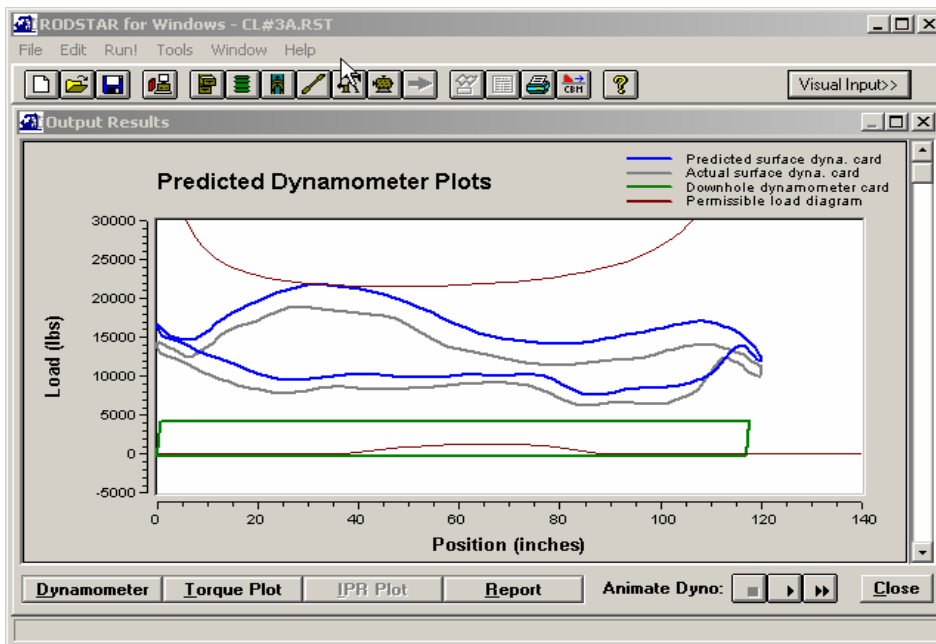


Figure 2. Comparison between predictive and actual cards shows load cell is reading too low.

If the overall history match for the shape is good but one card is shifted up or down from the other one, this indicates a load calibration error. Actually, this does not happen in most cases if you have XDIAG since XDIAG corrects this problem for you.

However, RODDIAG does not do this since it is not an expert program. So, if you load a RODDIAG file, you may see

if you load a RODDIAG file in which the fluid level was not entered, RODSTAR will default to fluid level at the pump. So, to get a good match when you run RODSTAR, you must enter the fluid level yourself.

However, if you load an XDIAG file, in most cases it will contain the fluid level calculated by XDIAG (unless there is a mechanical prob-

## Remaining Schools for 2003:

### Rod Pumping Optimization:

Midland, TX: November 18-20

Houston, TX: December 1-5

For more information, for the 2004 schedule of courses, or to enroll please visit our web site at <http://www.gotheta.com>