Stress

Hardware Setup

1. Determine whether omega or psi tilts will be used in the stress measurement. Answer the follow questions to make the determination:

    1. Is the material being analyzed a few microns thick or more?

    Yes, Is there a strong diffraction peak at an angle at 80 degrees or higher?

    No, use psi tilts.

Yes, use omega tilts.

No, use psi tilts.

2. Determine whether the point or line focus of the x-ray tube should be used.

If psi tilts will be used, use the point focus.

If omega tilts will be used, what is the sample size?

If the sample is larger than 5mm, use the line focus.

If the sample is smaller than 5 mm use the point focus.

3. Rotate the x-ray tube to either the point or the line focus as determined in step 2.

4. Mount the incident beam optics. If the line focus is being used mount the divergence slit. If the point focus is being used mount the x-ray lens.

5. Mount the 0.27 parallel plate collimator on the diffracted beam side. Make sure the collimator slit is **not** inserted.

User Setup

6. Open the **Organiser** program.

7. Enter your user name and password. (see page 3-3 in the X'Pert Organiser User's Guide to create a new user if you do not have a user name.)

8. Select the **Users & Projects** menu.

9. Select **Select Projects** to select an existing project or **Edit Projects** to create a new project. (See page 3-10 in the X'Pert Organiser User's Guide for more information on creating new projects.)

10. Select **Modules/X'Pert Data Collector** or the Data Collector button on the tool bar to open the Data Collector Program.

11. Select **Instument/connect** in the Data Collector. The Go On Line box will appear.

12. Select the proper configuration that defines the selected optics setup. Then press the OK button.

Optics Setup

13. Selected the incident beam optics tab. Change the optics to reflect the optics mounted on the system. If the programmable divergence slit is used set it to ½ degree.

14. Select the diffracted beam optics tab. Set the optics to reflect the parallel plate collimator set up. (All tabs should be set to none.)

15. Select the Goniometer tab and set the generator to 45 kV and 40 mA.

Sample Mounting

16. Press the change positions button, and enter 90 degrees in the psi field so the sample can be easily mounted on the stage.

17. Mount the sample as flat as possible on the stage.

18. Mount the micrometer on the stage and close the enclosure doors.

19. Move the z position of the sample stage until the micrometer reads 1.0. (The small inner dial will read 1 and the large outer dial should point to the 0 at the top of the micrometer.)

20. Return the stage to its upright position by setting psi to 0 degrees. Remove the micrometer and close the doors.

Peak Find

21. The position of a peak with a large 2theta angle, which does not overlap any other peaks must be found. Select **Measure/Manual scan** from the main menu.

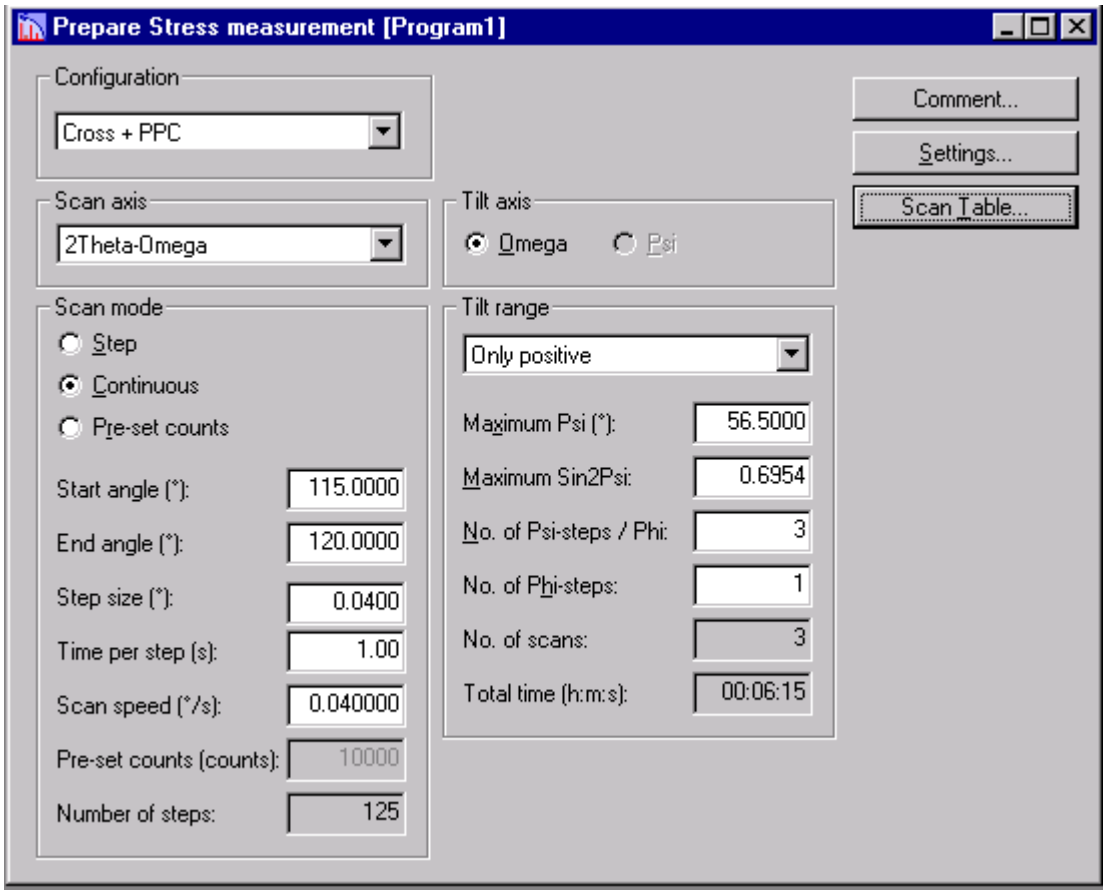
22. Select Gonio scan. Then, enter 120 in the *2theta* field, 0 in the *offset* field, 0.04 in the *step size* field, 60 in the *range* field, and 0.1 in the *time per step* field. Press the start button.

23. After the measurement is completed zoom on the highest angle peak.

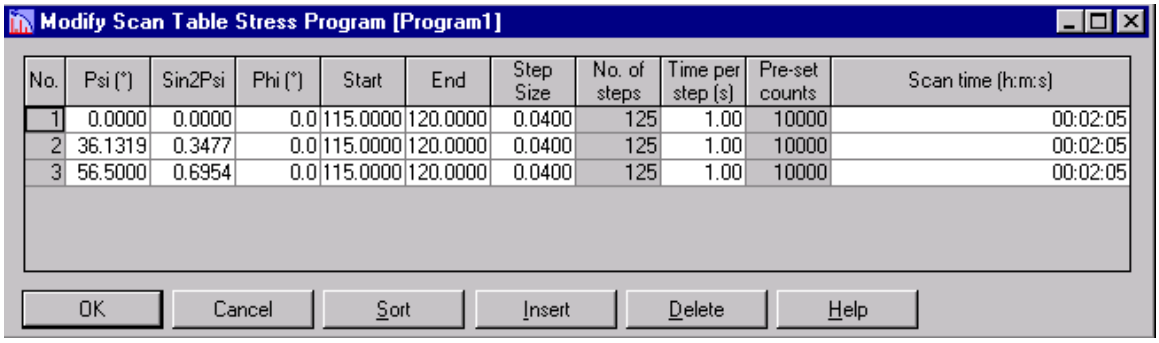
24. Press the right mouse button and select peak mode. Note (write down) the 2theta value and the width of the peak. Close the graph and manual scan setup windows.

Measurement Programs

25. Select **File/New Program /Stress program** and enter the information in the fields as shown in figure s-1.



26. The scan table can be reviewed or edited if necessary by pressing the Scan table button. Figure s-2 shows an example scan table.



27. Select **File/Save as** and enter a name for the program and then press the OK button. Close the window.

Measuring

26. Select **Measure/Program /Stress program**.

27. Enter the appropriate program name if it does not already appear. Enter a data set name and a description.

28. Press the start button.