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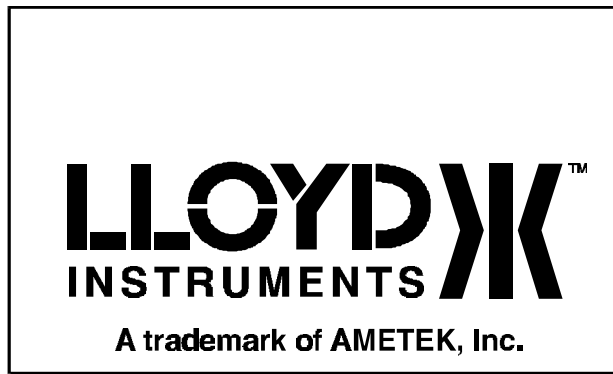
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LLOYD INSTRUMENTS LTD

TRAINING WORKBOOK

FOR NEXYGEN V4 AND

BATCH TESTING UTILITY V2.0

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1. INTRODUCTION

1.1 General

This workbook assumes that the NEXYGEN software is loaded onto the required computer and that the system is configured ready for use. If the software has not been loaded, or is not connecting correctly to the testing machine, please refer to sections 1.2 to 1.8 of the NEXYGEN V4 Training Manual and sections 2 and 3 of the NEXYGEN V4 User Manual.

1.2 Workbook Support CD

This workbook is accompanied by a Support CD which contains several manuals (including this manual) and example files which are required to work through the following examples.

Load the files by inserting the CD in the CD drive then follow the prompts. The files will be copied to a folder called C:\NEXYGEN V4 TRAINING, the BATCH TESTING UTILITY will be installed and several files will be copied to the DESKTOP for ease of use.

1.3 New Features of NEXYGEN V4.0

The NEXYGEN V4.0 contains the following additional features:-

- 1 New Automatic Column Called SamplePassed for Word Reports
- 2 Selected Rows remain Selected during Deletion
- 3 Can Set the Graph Favourite Axes
- 4 Marker Values displayed on Status Bar when Moving Marker
- 5 EZ Console Sample Stiffness Field added
- 6 Additional OLE Automation Commands

1.4 New Test Set-ups Supplied with NEXYGEN V4.0

The General Purpose Tension and Compression Set-ups have been modified to allow the Preload to be disabled if this feature is not required. And also have an additional Chord Modulus Option (slope between 2 defined points).

The additional Test Set-ups are:-

- 1 General Purpose, Comprehensive Tear and Peel Set-up
- 2 Springs, Creep Test
- 3 Springs, Spring Test
- 4 Textiles, Extension and Modulus (Elastic Materials) to M & S P14
- 5 Textiles, Peel Bond Strength (Delamination) to M & S P13
- 6 Textiles, Tensile Strength to M & S P11

1.5 NEXYGEN Concepts

The NEXYGEN software is a multi-tasking 32 bit Windows 95 / Windows98 / Windows NT V4 / Windows 2000 program for use with a Lloyd Instruments Materials Testing Machine. It has been designed to be easy to use by all operators including those who have little computer knowledge. It fully complies with both the WINDOWS 95 and Windows NT philosophy and uses the right mouse button to display a SHORTCUT MENU to access many of it's parameters and features. The program may be operated by either the mouse, keyboard or both as desired. The program allows the use of long filenames and provides easy to use drag and drop or cut and paste of data and graphs into other Windows 95 compatible programs.

The NEXYGEN program is an analysis **Engine** which requires a **TEST SET-UP** to control the materials testing machine and calculate the results. It is supplied complete with a library of predefined **TEST SET-UPS** which are ready to perform many different types of tests, either general purpose or according to International Standards. Each **TEST SETUP** is pre-programmed by Lloyd Instruments Ltd but the test speeds, sample dimensions etc can be easily customised by the user to suit the sample.

There will always be occasions when the predefined test set-ups are not suitable and in these cases, a customisable Test Set-up called **ONDIO** can be purchased to allow the user to fully define the test action and the test results by writing the set-up using Microsoft VB Script. Typical uses of the ONDIO set-up are to control the machine in a specialised way, e.g. perform a cyclic test to stabilise the sample then apply a constant load to measure the sample creep. This makes the ONDIO program suitable for research laboratories or educational institutes.

When a **TEST SET-UP** has been selected, the NEXYGEN will control the machine, display the graph then automatically calculate the predefined results. The graph type, ranges and displayed units do not have to be specified before the test as in previous programs and can be altered either during or after the test as required. When the next test is performed, the new graph will be displayed exactly the same as for the last test. User specified Pass/Fail (specification) Limits can be set for any measured parameter and the software will indicate which samples have passed or failed.

When several tests have been performed, the batch statistics can be viewed either as a data table, an X Bar/Range chart or as a Histogram. The batch data can be easily filtered by using the Row Query (Search) feature. The statistics are normally shown for all the batch but will be restricted if a filter is applied to a column containing the date or any of the user defined text pre-test questions. The NEXYGEN can store the data for up to 1500 tests in a single batch when used under Windows 95 or Windows 98 or for an almost unlimited number of tests when used under Windows NT V4 or Windows 2000. It can print test graphs, SPC charts and simple test reports with statistics from its built-in statistical and print features and can also produce **custom reports when used together with Microsoft Word (Windows 95 or later versions)**.

Therefore, Microsoft Word MUST be installed on the computer and it IS HIGHLY RECOMMENDED that Office 95, Office 97 or Office 2000 is installed because many additional features are provided by using NEXYGEN with Microsoft Excel and / or Microsoft Access.

1.6 NEXYGEN Reports

The NEXYGEN program is supplied complete with many predefined test reports which are ready for use immediately after installation. There are two types of reports:- a Row Report and a Batch Report. A Row Report prints the data and graph for ONE TEST in the Batch and is created by selecting the required Row then selecting REPORT, PRINT ROW REPORT.

A Batch Report prints the data for ALL VISIBLE ROWS in the Batch and is created by selecting REPORT, PRINT BATCH REPORT. Note that no graph is printed for a Batch Report unless the optional Batch Testing Utility is used.

Once a Batch Report has been printed, the SAME Batch Report can be easily printed by clicking on the PRINT BATCH REPORT toolbar.

The codes have the following meanings:-

<MAXIMUM <i>column</i> >	Reports the maximum value of a numeric column
<MINIMUM <i>column</i> >	Reports the minimum value of a numeric column
<MEAN <i>column</i> >	Reports the mean value of a numeric column
<MEDIAN <i>column</i> >	Reports the median value of a numeric column
<COV <i>column</i> >	Reports the Coefficient of Variation of a numeric column
<DEVIATION <i>column</i> >	Reports the Standard Deviation of a numeric column
<TRANSLATION <i>column</i> >	Reports the column Title
<FIRST <i>column</i> >	Reports the data for the FIRST VISIBLE Row
<VALUES <i>column</i> >	Reports the data for ALL the VISIBLE Rows
<TRUE <i>column</i> >	Reports the number of rows with Boolean True
<FALSE <i>column</i> >	Reports the number of rows with Boolean False
<PERCENT <i>column</i> >	Reports the percentage of rows with Boolean True
<Rows Passed>	Reports the number of rows that passed
<Rows Failed>	Reports the number of rows that failed
<Batch Name>	Reports the name of the batch without the path

where the word *column* should be replaced by the DEFAULT COLUMN TITLE, e.g. <TRANSLATION MAXIMUM LOAD> or <VALUES MAXIMUM LOAD>.

There are two further codes available but these cannot be selected from the Column Properties:-

<Graph>	Inserts the Test Graph for a Row Report Note that if this code is omitted, the graph is automatically inserted at the END of the document
<Graph Name>	Reports the name of the graph for a ROW REPORT.

If the Batch Testing Utility is used, there is one further code which again cannot be selected from the Column Properties:-

<Overlay>	Inserts the Overlay Graph for a Batch Report This overlay contains last tests performed
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The data will be presented in the Word Document in the **SAME FORMAT** as shown in the NEXYGEN Batch table, so the date will be shown as (say) 09/03/2000 and not as 9th March 2000.

1.7 Importing Data from WINDAP or Windows R Control

During the NEXYGEN installation, a utility called FSD2BCH.EXE is also installed and is automatically registered by Windows so that FSD files can be automatically read by NEXYGEN and are listed with a Lloyd logo Icon within Explorer etc.

To view an FSD file, **DOUBLE CLICK** on the file and the converter will automatically create a **NEW** batch file in the same directory. After the file batch file has been converted, NEXYGEN will automatically start and load the converted file ready for viewing. This provides a "seamless" conversion for existing data files which can then be combined into batches as required.

1.8 Using the Optional Batch Testing Utility

The optional Batch Testing Utility is similar to the NEXYGEN Quick Starter and provides the following additional features:-

- 1 Automatic entering of sample number into the NEXYGEN Batch.
- 2 Automatic Graph Re-Sizing at the end of each test.
- 3 Automatic closing of the Batch when the required number of samples have been tested.
- 4 Elimination from the statistics those samples that slipped out of the grips etc.
- 5 Automatic printout of sample results including test graph at the end of each test.
- 6 Automatic printout of batch statistics including overlaid graphs for the samples just tested even if the batch was ended early by clicking on the EXIT BATCH button.
- 7 Automatic File Archiving either by date or by the number of samples tested.
- 8 Automatic transfer of graph data points and/or measured results to Excel.
- 9 Automatic display of the Software Console when the Utility is started and automatic hiding of the Console when the Utility is closed.
- 10 Easy creation of Test Files from "Master Files" when each production batch or lot requires a new Test File.
- 11 Easy transfer of Completed Tests created from "Master Files" to a "Storage" directory.

2. EXERCISE 1

CREATING A SPRING COMPRESSION TEST

2.1 General

This chapter shows how to create and configure a new test document ready to perform a Compress to Limit test on a coil spring. The test document will be created on the desktop and will be used to perform 5 tests then print a simple test report. Three questions will be asked before each test to identify the operator, sample colour and production tool number. The required result is the load in Newton's, to 3 decimal places, when the spring is compressed by 10mm.

2.2 Creating the Test Document on the Desktop

- 1 **RIGHT CLICK** anywhere on a blank area of the desktop.
- 2 Select **NEW, NEXYGEN BATCH DOCUMENT** to display the Set-up Wizard.
- 3 **DOUBLE CLICK** on the **GENERAL PURPOSE** Test Category.
- 4 Select the **COMPRESS TO LIMIT TEST SETUP** then click on NEXT.
- 5 Type **10mm Compression** as the name for the Test Document
- 6 Click on FINISH to create the Test Document.

2.3 Configuring the New Test

- 1 Open the test by **DOUBLE CLICKING** on the **10mm Compression.bch** Icon just created on the desktop to display the BATCH window, which looks similar to a spreadsheet.
- 2 **RIGHT CLICK** on a blank area in the Batch screen.
- 3 Select **PROPERTIES**, select **ALWAYS REUSE THE PREVIOUS ONE** then click on the OK button.
- 4 Click on **the INSERT NEW TEST** Icon (4th from the left, identified by a graph), or press the **F5** key to display the graph window showing a blank graph area together with a paper-clipped **TEST SETUP**.
- 5 **RIGHT CLICK** anywhere in the graph window.
- 6 Select **PROPERTIES** then select the **GRAPH PAPER** tab.

- 7 Click on **RECTANGULAR GRAPHS**, click on **LARGE GRAPHS** then click on the OK button.
- 8 **DOUBLE CLICK** on the paper clipped test set-up to display a shaded border around it.
- 9 Specify a **PRELOAD** of **1N**.
- 10 Specify a **TEST SPEED** of **100mm/min**.
- 11 Set **HEIGHT** to **NOT APPLICABLE**.
- 12 Set **AREA** to **NOT APPLICABLE**.
- 13 Set **STOP AT** to **10mm**.
- 14 Enter **Coil Spring** in the **SAMPLE INFORMATION** field.
- 15 Press the **RIGHT MOUSE** button inside the shaded area then select **PRE-TEST EXTRA RESULTS**.
- 16 Delete any previously defined questions by selecting them then pressing the DELETE key.
- 17 Click on the **ADD RESULT** button then select **NEW TEXT RESULT**.
- 18 Rename the question to **Operator** then press the ENTER key.
- 19 Click on the **ADD RESULT** button then select **NEW TEXT RESULT**.
- 20 Rename the question to **Colour** then press the ENTER key.
- 21 Click on the **PROPERTIES** button, select **REMEMBER SEVERAL PREVIOUS ENTRIES** then click on the OK button.
- 22 Click on the **ADD RESULT** button then select **NEW TEXT RESULT**
- 23 Rename the question to **Tool Number** then press the ENTER key.
- 24 Click on the OK button to return to the shaded paper clipped test set-up.
- 25 Click on the graph area to close the test set-up.

2.4 Testing the First Sample of the Batch

- 1 Fit the compression plates to the machine.
- 2 Move the crosshead, using the keys on the machine's Control Console or the keys on the Software Console, so that the plates are approx. 2mm further apart than required to fit the spring between them.

- 3 **Press the ZERO button on the machine's Control Console or the Software Console.**
- 4 Position the spring into the central part of the lower compression plate.
- 5 Click on the **START TEST** Icon on the Graph Screen (6th from right, identified by a right facing arrow) or press the **F5** key to start the test
- 6 Enter your name for the **OPERATOR**, **BLUE** for the sample **COLOUR** and **21** for the **TOOL NUMBER**. Take care **NOT** to click onto the OK button, or press the ENTER key, **UNTIL** all the information has been entered because the test will start.
- 7 Click on the OK button or press the ENTER key to start the test.
- 8 The spring will be compressed by 10mm then the machine will automatically return to the start of test position.
- 9 Remove the sample from the compression plate.
- 10 Click on the **ZOOM RIGHT OUT** Icon (8th from left with a square box) or press the **HOME** key to display the full graph trace.
- 11 Select **DEFLECTION FROM PRELOAD** as the graph **MAJOR AXIS** from the drop down box on the left hand side of the screen. Use the HOME key to display the full trace as required..
- 12 Click on the **CLOSE BOX** on the top right of the **GRAPH** window to return to the **BATCH** window which now contains the results for this sample.
- 13 Click on the **VIEW** menu option then select **SHOW/HIDE COLUMNS**.
- 14 Uncheck all results except for **DATE, TIME, OPERATOR, COLOUR, TOOL NUMBER** and **LOAD AT LIMIT** then click the OK button.
- 15 Press and hold the **LEFT** mouse button over the **LOAD AT LIMIT** column, drag the column between the **TIME** and **OPERATOR** columns then release the **LEFT** mouse button.
- 16 **RIGHT CLICK** on the **LOAD AT LIMIT** column then select **3 DECIMAL PLACES** as the required format.
- 17 **RIGHT CLICK** on the **LOAD AT LIMIT** column, select **PROPERTIES**, enter **Load at 10mm** as the **COLUMN TITLE** then click the OK button.

2.5 Testing the Remaining Samples of the Batch

- 1 Click on **the INSERT NEW TEST** Icon (4th from the left, identified by a graph), or press the **F5** key to display a blank graph window ready for the next sample.

- 2 Position the next spring into the central part of the lower compression plate.
- 3 Click on the **START TEST** Icon on the Graph Screen (6th from right, identified by a right facing arrow) or press the **F5** key to start the test
- 4 Enter **RED** for the sample **COLOUR** and **21** for the **TOOL NUMBER**.
- 5 Click on the OK button or press the ENTER key to start the test.
- 6 At the end of the test, the machine will automatically return to the start of test position.
- 7 Remove the sample from the compression plate.
- 8 Click on the **CLOSE BOX** on the top right of the **GRAPH** window to return to the **BATCH** window which now contains the results for this sample.
- 9 Repeat stages 2 to 8 above for the remaining samples, entering the following information:-

	Colour	Tool Number
Sample 3	BLUE	21
Sample 4	BLUE	22
Sample 5	RED	22

- 10 Click on the **FILE** menu option then select **SAVE** to save the test document.

2.6 Printing a Simple Report

- 1 Click on the **FILE** menu option then select **PRINT** to print a simple table containing the test results.
- 2 Click on the **STATISTICS** Tab at the bottom left of the screen to display the statistics page.
- 3 Click on the **FILE** menu option then select **PRINT** to print the statistics screen.

2.7 Exiting the Batch

- 1 Click on the **CLOSE BOX** in the top right of the **BATCH** window, or press the **ALT and F4** keys together, to close the document.
- 2 The program will close and the document is ready for testing the **SAME** sample type later.

3. EXERCISE 2

CREATING A SIMPLE WORD BATCH REPORT

3.1 General

This chapter shows how to create a custom Batch Report using Microsoft Word. The test document will be created on the desktop and will be used to print a report for the Compress to Limit test on a coil spring. The report will display the results and statistics on the same page but no graph will be included. The Load at Limit result is required in kgf instead of the default Newton's.

3.2 Creating the Test Document on the Desktop

- 1 **RIGHT CLICK** anywhere on a blank area of the desktop.
- 2 Select **NEW, MICROSOFT WORD DOCUMENT**.
- 3 A Word document will be created on the desktop and the document name will be selected ready for renaming.
- 4 Rename the document to **10mm Compression.doc**.

3.3 Configuring the Word Document

- 1 Open the blank document by **DOUBLE CLICKING** on the Icon just created on the desktop.
- 2 Click on the **VIEW** menu option then select **HEADER AND FOOTER** to display the page HEADER.
- 3 Click on the **INSERT** menu option, select **PICTURE** then click on **FROM FILE**.
- 4 Select the **LLOYD.BMP** file from the DESKTOP then click **INSERT**.
- 5 Press the TAB key twice to move along the header.
- 6 Click on the **INSERT** menu option, select **PICTURE** then click on **FROM FILE**.
- 7 Select the **NEXYGEN.BMP** file from the DESKTOP then click **INSERT**.
- 8 Click on the **SWITCH BETWEEN HEADER AND FOOTER** button (3rd from the right on the header toolbar) or press the **PGDN** key or to view the page FOOTER.
- 9 Click the **CENTRE** button on the main toolbar (or press **CTRL** and **E**).

- 10 Type "**Page Number**" followed by a space.
- 11 Click on the **INSERT PAGE NUMBER** button (1st on the left on the header toolbar) to insert the page number
- 12 Click the **CLOSE** button on the header toolbar to return to the main document.
- 13 Press the ENTER key twice to move down the document.
- 14 Click the **CENTRE** button on the main toolbar (or press **CTRL** and **E**).
- 15 Select **ARIEL** Font, **18 point size** from the toolbar.
- 16 Click the **BOLD** button on the main toolbar (or press **CTRL** and **B**).
- 17 Click the **UNDERLINE** button on the main toolbar (or press **CTRL** and **U**).
- 18 Type "**SPRING TEST REPORT**" as the Document Title.
- 19 Press the ENTER key to move to the next line.
- 20 Remove the previous formatting by clicking the **CENTRE**, **BOLD** and **UNDERLINE** buttons then selecting **12 point size** (or press **CTRL** and **Q** then **CTRL** and **SPACEBAR**).
- 21 Press the ENTER key twice to move down the document.
- 22 Type "**Tests performed on**" followed by a space.
- 23 Click on the "-" on the top right of the screen to minimise the document.
- 24 Open the "**10mm Compression**" NEXYGEN Batch file.
- 25 Click on the **REPORT** menu option then select **COLUMN PROPERTIES** to display the Word Report Codes selector screen.
- 26 Select **DATE** from the drop down box then select the COMPLETE CODE which starts with **<FIRST**, i.e. **<FIRST Date>**.
- 27 Press the **RIGHT MOUSE** button then select **COPY** (or press **CTRL** and **C**).
- 28 Press **ALT** and **TAB** to redisplay the Word document (or select it from the TASKBAR).
- 29 Press the **RIGHT MOUSE** button then select **PASTE** or click on the **EDIT** menu option then select **PASTE** (or press **CTRL** and **V**).
- 30 Type "**by <First Operator>**."

- 31 Press the ENTER key twice to move down the document.
- 32 Click on the **TABLE** menu option then select **INSERT TABLE** to display the table dialogue box.
- 33 Select **4 Columns** and **4 Rows** then click on the **AUTOFORMAT** button.
- 34 Select **ELEGANT** from the drop down box, uncheck **HEADING ROWS** check box then click the OK button twice to insert the table into then document.
- 35 Complete the table as shown below, noting that the **CODES** may either be typed or selected from the NEXYGEN Word Report Codes Screen. Also note that the **CODE** for the Load at 10mm column **MUST** use the **DEFAULT** name of **Load at Limit**.

	Colour	Tool Number	Load at 10mm
	<Values Colour >	<Values Tool Number >	<Values Load at Limit >
Mean			<MEAN Load at Limit >
Standard Deviation			<DEVIATION Load at Limit >

- 36 Click on the **FILE** menu option then select **SAVE** to save the document.

3.4 Printing the Report

- 1 Press **ALT** and **TAB** to redisplay the NEXYGEN document (or select it from the TASKBAR).
- 2 Close the **COLUMN PROPERTIES** screen if this is displayed.
- 3 Click on the **REPORT** menu option then select **PRINT BATCH REPORT AS** to display a **FILE OPEN** dialogue box.
- 4 Select the **10mm COMPRESSION.DOC** file from the DESKTOP then click **OPEN**.
- 5 The document will now be printed to the **DEFAULT** printer.
- 6 Note that the load values printed on the document are in Newton's because the document displays the results in the same format as shown in the batch table.
- 7 **RIGHT CLICK** on the **LOAD AT 10mm** column then select **kgf** as the required unit.
- 8 Click on the **REPORT** menu option then select **PRINT BATCH REPORT** (or click the **PRINT BATCH REPORT** button on the toolbar) to print the document with the load values in **kgf**.

4. EXERCISE 3

CREATING A SIMPLE WORD ROW REPORT

4.1 General

This chapter shows how to create a custom Row Report for use as an internal Company memo. The test document will be created on the desktop and will be used to print a report for the Compress to Limit test on a coil spring. The report will display the results and the test graph on the same page. The Load at Limit result and the graph Y axis is required in kgf instead of Newton's.

4.2 Creating the Test Document on the Desktop

- 1 **RIGHT CLICK** anywhere on a blank area of the desktop.
- 2 Select **NEW, MICROSOFT WORD DOCUMENT**.
- 3 A Word document will be created on the desktop and the document name will be selected ready for renaming.
- 4 Rename the document to **10mm Compression Test Memo.doc**.

4.3 Configuring the Word Document

- 1 Open the blank document by **DOUBLE CLICKING** on the Icon just created on the desktop.
- 2 Click the **CENTRE** button on the main toolbar (or press **CTRL** and **E**).
- 3 Select **ARIEL** Font, **18 point size** from the toolbar.
- 4 Click the **BOLD** button on the main toolbar (or press **CTRL** and **B**).
- 5 Click the **UNDERLINE** button on the main toolbar (or press **CTRL** and **U**).
- 6 Type "**MEMO - SPRING TEST REPORT**" as the Document Title.
- 7 Press the ENTER key to move to the next line.
- 8 Remove the previous formatting by clicking the **CENTRE**, **BOLD** and **UNDERLINE** buttons then selecting **12 point size** (or press **CTRL** and **Q** then **CTRL** and **SPACEBAR**).
- 9 Press the ENTER key twice to move down the document.

- 10 Type "**Date of test** " then press the TAB key 4 times.
- 11 Click on the "-" on the top right of the screen to minimise the document.
- 12 Open the "**10mm Compression**" NEXYGEN Batch file.
- 13 Click on the **REPORT** menu option then select **COLUMN PROPERTIES** to display the Word Report Codes selector screen.
- 14 Select **DATE** from the drop down box then select the COMPLETE CODE which starts with **<FIRST**, i.e. **<FIRST Date>**.
- 15 Press the **RIGHT MOUSE** button then select **COPY** (or press **CTRL** and **C**).
- 16 Press **ALT** and **TAB** to redisplay the Word document (or select it from the TASKBAR).
- 17 Press the **RIGHT MOUSE** button then select **PASTE** or click on the **EDIT** menu option then select **PASTE** (or press **CTRL** and **V**).
- 18 Press the ENTER key twice to move down the document.
- 19 Type the next 6 lines to complete the document as shown below, noting that the **CODES** may either be typed or selected from the NEXYGEN Word Report Codes Screen.

The **CODE** for the Load at 10mm column **MUST** use the **DEFAULT** name of **Load at Limit**.

Date of Test	<First Date>
Operator	<First Operator >
Colour	<First Colour >
Tool Number	<First Tool Number >
Load at 10mm	<First Load at Limit >
Work to 10mm	<First Work to Limit >
Stiffness	<First Stiffness >

- 20 Click the **CENTRE** button on the main toolbar (or press **CTRL** and **E**).
- 21 Type **<Graph>** then press the enter key twice.
- 22 Type **<Graph Name>** then press the enter key 5 times.
- 23 Type "**Signed**", press the Tab key 4 times then type "**Date**".
- 20 Click on the **FILE** menu option then select **SAVE** to save the document.

4.4 Printing the Report

- 1 Press **ALT** and **TAB** to redisplay the NEXYGEN document (or select it from the TASKBAR).
- 2 Close the **COLUMN PROPERTIES** screen if this is displayed.
- 3 Select the graph for the LAST Test in the Batch by **DOUBLE CLICKING** on the last row.
- 4 **RIGHT CLICK** on the graph then select **PROPERTIES**.
- 5 Click on the **LOAD** Tab, select **kgf** from the UPPER LIMIT drop down box then click OK.
- 6 Press the HOME Key to resize then graph then close the graph from the close box.

Note that the LAST row will still be highlit to show that this test is selected.
- 7 Click on the **REPORT** menu option then select **PRINT ROW REPORT AS** to display a **FILE OPEN** dialogue box.
- 8 Select the **10mm COMPRESSION TEST MEMO.DOC** file from the DESKTOP then click **OPEN**.
- 9 The document will now be printed to the **DEFAULT** printer.
- 10 Note that the text under the graph will indicate the **ROW NUMBER** in the Batch which will **NOT** always be the same as the sample number tested in a "Batch".

5. EXERCISE 4

ANALYSING THE TEST DATA

5.1 General

This chapter shows how to analyse the test data using Row Query, Statistics Table, Histogram and X Bar/Range Charts. The statistics and histogram can be displayed for any number of samples but the SPC charts (X Bar/Range) generally require at least 50 samples before the graphs can display meaningful data. The Charts are **ONLY** displayed for measured parameters that have **PASS/FAIL LIMITS** defined. The statistics, charts and Word Reports **ONLY** display the data for the **VISIBLE** columns in the batch table so the **ROW QUERY** feature can be used to report the required information, e.g. all the samples of a specified colour or samples tested on a specified date.

5.2 Batch Statistics

- 1 **DOUBLE CLICK** on the **SPC.BCH** Test document on the DESKTOP.
- 2 Click on the **STATISTICS** Tab at the bottom left of the screen to display the statistics page.

Note that the Coefficient of Variance for the **LOAD AT LIMIT** result is **1.14%**.

Also note that this screen has two ways of indicating how many of the samples passed:-
The first way shows **SAMPLEPASSED** as **100%** and the second way shows **NUMBER OF ROWS THAT PASSED** as **229** and **NUMBER OF ROWS THAT FAILED** as **0**.

5.3 Defining Pass/Fail Limits

- 1 Click on the **RESULTS** Tab at the bottom left of the screen to display the Batch Table.
- 2 **RIGHT CLICK** on the **LOAD AT LIMIT** column then select **PROPERTIES**.
- 3 Click on the **LIMITS TAB**, select **WITHIN RANGE**, set the values to **2.25N** and **2.35N** then click the OK button.
- 4 Click on the **VIEW** menu option then select **SHOW PASS/FAIL STATUS**. Move through the rows using the scroll bar on the right hand side of the screen and check that the rows are displayed in either **RED** or **GREEN**.. Tests that **PASS** will be displayed in **GREEN** and tests that **FAIL** will be displayed in **RED**.
- 5 Click on the **STATISTICS** Tab at the bottom left of the screen to display the statistics page. Note that the **SAMPLEPASSED** value is now **97.38%** and the **NUMBER OF ROWS THAT PASSED** is now **223**.

5.4 Displaying the Data on a Histogram Chart

Note that a Histogram for a measured result can only be displayed if a PASS/FAIL LIMIT has been defined for that result. A histogram is produced by splitting the range of measured values into subgroups then plotting the number of tests that fall into each subgroup as a bar chart.

- 1 Click on the **HISTOGRAM** Tab at the bottom left of the screen to display the Histogram for all the samples.

The chart shows the Lower Specification Limit (**LSL**) of 2.25N and the Upper Specification Limit (**USL**) of 2.35 as vertical dotted lines to indicate the Pass/Fail Limits. The chart shows that some results are outside the Specification Limits, so **"failures"** are being produced.

The fact that failures are being produced is also shown by the values of **Cp** and **Cpk** displayed on the left hand side of the chart. **Cp** is the ratio of the **SPECIFICATION RANGE** compared to the **ACTUAL SPREAD** of measured results and a value less than 1.0 means that "failures" are being produced. Cpk is not only the ratio but also checks how close the MEAN value is to either of the Specification Limits so the value of Cpk will only be the same as the value of Cp if the MEAN value is EXACTLY between the LSL and the USL. Therefore, the Cpk value will normally be lower than Cp and is the value generally reported.

The chart shows a Cpk of **0.625** so all the samples are **NOT** within specification.

5.5 Displaying the Data on X Bar and Range Charts

Note that an X Bar and Range Chart for a measured result can only be displayed if a PASS/FAIL LIMIT has been defined for that result. An X Bar chart is produced by splitting the range of measured values into subgroups then plotting the average value of each subgroup on the chart.

- 1 Click on the **X BAR/RANGE** Tab at the bottom left of the screen to display the Charts for all the samples.

The top chart is the X Bar chart and this shows that the data is split into subgroups as shown by the vertical lines. The chart also indicates the range of the CONTROL LIMITS by the shaded grey area. The Control Limits are calculated from the MEAN value of the X Bar chart (X Bar Bar), the MEAN of the Range chart (R Bar) and a constant which depends upon the size of each Subgroup. Note that the Control Limits are NOT the same as the Pass/Fail (Specification) Upper and Lower Limits.

The bottom chart is the Range chart which shows the variation of each group compared with the mean value.

The text to the left of the chart shows that the **SUBGROUP** size is set to the **DEFAULT** size of **5 samples**.

There are several “**Rules**” which are used to give **SPC WARNINGS** and the X Bar Chart displays 4 of these rules. **The process is not in a state of statistical control if:-**

- 1 Any subgroup value is above or below the control limits
- 2 Seven or more consecutive subgroups are on one side of the mean value
- 3 Eight or more consecutive subgroups are increasing or decreasing in value
- 4 Less than 2/3 of the subgroups are in the centre 1/3 of the chart

The first 3 WARNINGS listed above are shown by Red lines on the X Bar Chart and the last WARNING is indicated by text on the left hand side of the chart. It is important to note that a WARNING **does NOT indicate that “failures” are being produced**. The X Bar Chart is based upon the MEASURED RESULTS and will NOT change if the Pass/Fail Limits are altered.

- 2 Note that the X Bar Chart displayed has four red areas which indicate SPC WARNINGS.
- 3 The first SPC warning is shown by the two red lines on the chart which join a subgroup which is above control limit. Clicking on the peak will indicate that this is **SUBGROUP 10**. The reason why this subgroup has failed can be investigated by **RIGHT CLICKING** on the subgroup then selecting **SHOW ROWS**.
- 4 The tests that belong to this subgroup are shown as rows 210, 211, 212, 213 and 214 and the Load at Limit values are 2.343, 2.335, 2.314, 2.335 and 2.335N. Row 210 contains a value of **2.343** which is high and together with the high values in rows 211, 213 and 214 has given a high subgroup average value and so caused the warning to be produced. Note that the SUBGROUPS are indicated by the thicker dividing lines in the Batch Table and each subgroup contains 5 samples.
- 5 Click on the **X BAR/RANGE** Tab at the bottom left of the screen to redisplay the Chart.
- 6 The second SPC warning is shown by the red lines on the chart which join too many subgroups which are below the mean value. Clicking on each subgroup will indicate that the range of suspect subgroups is from **SUBGROUP 23** to **SUBGROUP 31**.
- 7 The third SPC warning is shown by the red lines on the chart which join too many subgroups which are increasing in value. Clicking on each subgroup will indicate that the range of suspect subgroups is from **SUBGROUP 33** to **SUBGROUP 42**.
- 8 The fourth SPC warning is shown by a red line on the chart which shows a subgroup which is again above the control limit and this is identified as **SUBGROUP 45**.
- 9 The tick next the 2/3 at the left hand side of the screen shows that the data passes the "2/3" rule.

5.6 Specifying a Different Subgroup Size

The X Bar/Range charts normally split the data into subgroups of 5 samples but any TEXT column can be used to split the data as required.

- 1 Click on the **RESULTS** Tab at the bottom left of the screen to display the Batch Table.
- 2 **RIGHT CLICK** on the **DATE** column then select **PROPERTIES**.
- 3 Click on the **QUERY AND SPC TAB**, select **INCLUDE THIS COLUMN AS AN SPC DELIMITER** then click the OK button.
- 4 Click on the **X BAR/RANGE** Tab at the bottom left of the screen to display the Charts.

The text to the left of the chart shows that the **SUBGROUP** size is now set by the **DATE** Column.

- 5 Note that the X Bar Chart displayed now only has one red area to indicate an SPC WARNING.

Note that the LAST Subgroup has a different Control Limit because there are 7 samples in this subgroup. The subgroups will always be split so that there are between 3 and 10 samples per subgroup.

- 6 Click on the **RESULTS** Tab at the bottom left of the screen to display the Batch Table.
- 7 Move to row 210 (can use **EDIT, GOTO ROW**).

Note that the SUBGROUPS indicated by the thicker dividing lines show that each subgroup now contains 6 samples and that this subgroup was tested on 17/01/2000.

The tests that belong to this subgroup are shown as rows 207, 208, 209, 210, 211 and 212 and the Load at Limit values are 2.323, 2.262, 2.242, 2.343, 2.335 and 2.314N. The subgroup contains lower values so the average value is now within the control limits.

5.7 Restricting the Data using the Row Query Feature

The Statistics, Histogram and X Bar/Range charts will only display data for the **VISIBLE** rows in the Batch but any TEXT column can be used in a Row Query to restrict the data as required.

- 1 Click on the **STATISTICS** Tab at the bottom left of the screen to display the statistics page.
- 2 Click on the **VIEW** menu option then select **ROW QUERY** to display a Row Query screen which allows Passed or Failed rows to be selected..

- 3 Check the **ROWS THAT PASSED** box then click the OK button.
Note that the Coefficient of Variance for the **LOAD AT LIMIT** result is now **1.08%**.
- 4 Click on the **RESULTS** Tab at the bottom left of the screen to display the Batch Table.
- 5 **RIGHT CLICK** on the **COLOUR** column then select **PROPERTIES**.
- 6 Click on the **QUERY AND SPC TAB**, select **INCLUDE THIS COLUMN IN ROW QUERIES** then click the OK button.
- 7 Click on the **STATISTICS** Tab at the bottom left of the screen to display the statistics page.
- 8 Click on the **VIEW** menu option then select **ROW QUERY** to display a Row Query screen which now also lists the sample colours.
- 9 Uncheck the **ROWS THAT PASSED** box, check the **COLOUR:ORANGE** box then click the OK button.

Note that the Coefficient of Variance for the **LOAD AT LIMIT** result is now **1.25%**, the **NUMBER OF ROWS THAT PASSED** is **37** and **NUMBER OF ROWS THAT FAILED** is **1**.

- 10 Click on the **HISTOGRAM** Tab at the bottom left of the screen to display the Histogram for the **ORANGE** samples.

The chart shows a Cpk of **0.590**.

- 11 Click on the **VIEW** menu option then select **ROW QUERY**.
- 12 Uncheck the **COLOUR:ORANGE** box, check the **COLOUR:WHITE** box then click the OK button.

Note that the histogram now has a wider spread of values with a Cpk value of **0.553**.

- 13 **Note that there is now not enough data to produce meaningful X Bar/Range charts.**

5.8 Changing the Specification Limits

The specification limits used above were close together to show how failures can be investigated. The limits will now be set wider to show the effects on the measured data.

- 1 Click on the **RESULTS** Tab at the bottom left of the screen to display the Batch Table.
- 2 **RIGHT CLICK** on the **LOAD AT LIMIT** column then select **PROPERTIES**.

- 3 Click on the **LIMITS TAB**, select **WITHIN RANGE**, set the values to **2.2N** and **2.4N** then click the OK button.
- 4 Move through the rows using the scroll bar on the right hand side of the screen and check all the rows are now displayed in **GREEN**.
- 5 Click on the **HISTOGRAM** Tab at the bottom left of the screen to display the Histogram for all the samples.

The chart shows the Lower Specification Limit (**LSL**) of 2.2 near the left hand axis and the Upper Specification Limit (**USL**) of 2.4 as the right hand axis. The chart shows that **ALL** of the results are well inside the Specification Limits, so **No Failures** are being produced.

The chart shows a Cpk of **1.36** which is a good margin of error. Some companies try to work to a minimum Cpk of 1.6 or higher to ensure that no failures will be produced.

- 6 Click on the **X BAR/RANGE** Tab at the bottom left of the screen to display the Charts.

Note that the X Bar and Range charts **NO NOT** change when the specifications limits are changed. The CONTROL LIMITS are set by the measured data and not by the values of the specification limits.

5.9 Using Multiple Pass/Fail Limits

The Batch Table shows the Pass/Fail status of each test by colouring the rows. If only one Pass/Fail Limit is defined, e.g. Load at Break, then it is obvious why the sample failed. However, if 2 or more Pass/Fail Limits are defined, e.g. Load at Limit and Work to Limit, then any red row only shows one or both of the results was out of specification and it is not immediately obvious why the sample failed.

- 1 Click on the **RESULTS** Tab at the bottom left of the screen to display the Batch Table.
- 2 **RIGHT CLICK** on the **LOAD AT LIMIT** column then select **PROPERTIES**.
- 3 Click on the **LIMITS TAB**, select **WITHIN RANGE**, set the values to **2.25N** and **2.35N** then click the OK button.
- 4 **RIGHT CLICK** on the **WORK TO LIMIT** column then select **PROPERTIES**.
- 5 Click on the **LIMITS TAB**, select **WITHIN RANGE**, set the values to **0.027J** and **0.0295J** then click the OK button.

The table will now display more red rows.

- 6 Click on the **VIEW** menu option then select **ROW QUERY**.
- 7 Uncheck the **COLOUR:WHITE** box, check the **ROWS THAT PASSED** box then click the OK button.

8 The failed rows will be displayed but the reason for the failure is not indicated.

9 Click on the **EDIT** menu option then select the **SELECT ALL** option.

10 Click on the **EDIT** menu option then select **PROPERTIES**.

A Properties screen will be displayed which shows each failed row as a Tab. The screen shows that Row 64 failed the Load value but passed the Work value.

11 Click on the Row 277 Tab. This shows that the test passed the Load value but failed the Work value

12 Click on the Row 751 Tab. This shows that the test failed both the Load value and the Work value

13 Note that steps 9 and 10 may be performed by clicking on a cell in the top row (row 64), holding the SHIFT key down, **RIGHT CLICKING** on a cell in the bottom row (row 752) then selecting **PROPERTIES**.

5.10 Exiting the Batch

1 Click on the CLOSE BOX in the top right of the BATCH window, or press the **ALT and F4** keys together, to close the document. Do **NOT** Save the Batch so that it is ready for another exercise later.

6. EXERCISE 5

ANALYSING THE GRAPH DATA

6.1 General

This chapter shows how to analyse the test graphs using the Zoom, Cursor and optional Markers. The traces for several tests can also be overlaid onto one graph to check the consistency of the samples.

6.2 Zoom Options

- 1 **DOUBLE CLICK** on the **RELAXATION.BCH** Test document on the DESKTOP.
- 2 **DOUBLE CLICK** on the first row to display the graph.

Note that the graph axes are approx. **75N** and **90s**
- 3 Click on the **TOOLS** menu option then select **ZOOM IN** or click on the **ZOOM IN** Icon (shown by a magnifying glass with a +).
- 4 Position the mouse cursor at approx. **75N** and **10s**, hold the LEFT mouse button down, move the mouse cursor to approx. **60N** and **20s** then release the LEFT mouse button to display the magnified graph.
- 5 Click on the **TOOLS** menu option then select **ZOOM RIGHT OUT** or press the **HOME** key to redisplay the FULL TRACE.
- 6 Click on the **TOOLS** menu option then select **ZOOM TO FAVOURITE** to display a graph with axes of **150N** and **150s**.
- 7 **RIGHT CLICK** anywhere in the graph window.
- 8 Select **PROPERTIES** then click on the **LOAD** Tab.
- 9 Enter **100N** as the **UPPER LIMIT** and **0N** as the **LOWER LIMIT** then click on the **TIME** Tab.
- 10 Enter **100s** as the **UPPER LIMIT** and **0s** as the **LOWER LIMIT** then click on the OK Button to display the graph with these new axes.
- 11 Click on the **TOOLS** menu option then select **SET FAVOURITE AXIS**.
- 12 Click on the **TOOLS** menu option then select **ZOOM RIGHT OUT** or press the **HOME** key to redisplay the FULL TRACE.

- 13 Click on the **TOOLS** menu option then select **ZOOM TO FAVOURITE** to display a graph with the defined axes of **100N** and **100s**.

6.3 Cursor Feature

- 1 Position the mouse cursor over the Marker Asterisk (Star) labeled "A" then click the **LEFT MOUSE** button to display the values at this point. Note that the values reported are in the units defined by the graph axes, i.e. Newtons and Seconds.
- 2 Position the mouse cursor over the grid at **20N** and **20s** then click the **LEFT MOUSE** button to display the values at this point. Note that the cursor reports the **MOUSE POSITION** so the values **MAY NOT ALWAYS** be the values obtained during the test.

6.4 Optional Markers

- 1 Click on the **MINIMIZE** button on the top right of the graph screen to display the batch.
- 2 Note that the **RATE OF RELAXATION** value is **0.561N/s**.
- 3 **DOUBLE CLICK** on the first row to redisplay the graph.
- 4 Click on the **TOOLS** menu option then select **MOVE MARKER** or click on the **MOVE MARKER** Icon (shown by a down arrow with an asterisk).
- 5 Position the arrow over the Marker labeled "A", press and hold the **LEFT** mouse button then move the marker to approx. **20s**. Note that the values at the marker position are displayed in the status bar at the bottom of the screen as the marker is moved.
- 6 Click on the **MINIMIZE** button on the top right of the graph screen to display the batch.
- 7 Note that the **RATE OF RELAXATION** value is now approx. **0.251N/s**.
- 8 **DOUBLE CLICK** on the first row to redisplay the graph.
- 9 Position the arrow over the Marker labeled "A", press and hold the **LEFT** mouse button then move the marker to approx. **5s**.

Note that the marker will **NOT** move to this position and a message will be displayed on the Status Line to indicate that the marker cannot be moved this far to advise the user that the marker is not in the region of the graph calculated by the **TEST SETUP**.
- 10 Press and hold the **CTRL** key, position the arrow over the Marker labeled "A", press and hold the **LEFT** mouse button then move the marker to approx. **5s**. This time is **WILL** move because the **CTRL** key overrides the position checking.
- 11 Click on the **TOOLS** menu option, select **RESET MARKERS**, click on **YES** to confirm that the reset is required and the marker will be automatically reset to the load peak.

6.5 Overlaying Graphs

- 1 Click on the **CLOSE BOX** on the top right of the **GRAPH** window to return to the **BATCH** window.
- 2 Click on the **EDIT** menu option then select the **SELECT ALL** option.
- 3 Click on the **EDIT** menu option, select **OPEN TESTS TOGETHER** then click on **YES** to confirm that the overlay is required.

Graph number 7 (as shown at the top of the screen) will be displayed in black and graphs 2 to 6 will be overlaid on the same axes in different colours.

- 4 Note that steps 2 and 3 may be performed by clicking on a cell in the top row (row 2), holding the **SHIFT** key down, **RIGHT CLICKING** on a cell in the bottom row (row 7) then selecting **OPEN TESTS TOGETHER**.
- 5 Note that the graph axes are set by graph 7 so pressing the **HOME** key (**ZOOM RIGHT OUT**) will **NOT** resize the axes to fit all the traces.
- 6 Click on the **TOOLS** menu option then select **ZOOM TO FAVOURITE** to display a previously defined graph axes of **100N** and **100s**.
- 7 Click on the **OVERLAY** menu option or click on the **SHOW OVERLAY KEY** button to display a list of the overlaid graphs together with their colours.
- 8 Click on the **CLOSE BOX** in the top right of the **GRAPH** window, or press the **ALT** and **F4** keys together, then click on **NO** to prevent the overlays from being saved onto graph 7.
- 9 Click on the **CLOSE BOX** in the top right of the **BATCH** window, or press the **ALT** and **F4** keys together, to close the document. Do **NOT** Save the Batch so that it is ready for another exercise later.

7. EXERCISE 6

ANALYSING THE TEST DATA USING EXCEL

7.1 General

This chapter shows how to use Microsoft Excel to analyse the test data. The data can be manually copied to Excel and can also be automatically transferred and analysed using Excel Macros.

7.2 Creating the Excel Worksheet on the Desktop

- 1 **RIGHT CLICK** anywhere on a blank area of the desktop.
- 2 Select **NEW, MICROSOFT EXCEL WORKSHEET**.
- 3 An Excel Worksheet will be created on the desktop and the worksheet name will be selected ready for renaming.
- 4 Rename the worksheet to **Pie Chart.xls**.

7.3 Copying Data to Excel via the Windows Clipboard

- 1 Open the blank worksheet by **DOUBLE CLICKING** on the Icon just created on the desktop.
- 2 Click on the **MINIMIZE** button on the top right of the screen to hide the worksheet.
- 3 **DOUBLE CLICK** on the **SPC.BCH** Test document on the DESKTOP.
- 4 **RIGHT CLICK** on the **LOAD AT LIMIT** title then select **COPY**.
- 5 Press **ALT** and **TAB** to redisplay the Excel worksheet (or select it from the TASKBAR).
- 6 **RIGHT CLICK** in cell A1 then select **PASTE**.

Note how the data is listed in the **A** column as **NUMBERS** and also note that the title indicates the units.

Note that if the data is copied from then clipboard into Microsoft Word, the display will be similar to that shown in NEXYGEN. The reason why the data is modified when it is copied to Microsoft Excel is that the data can only be used in calculations is it is numeric and not text, e.g. 50.678 and not 50.678N.

- 7 **RIGHT CLICK** in the **A** title then select **CLEAR CONTENTS**.

7.4 Creating a Pie Chart of Passed and Failed Samples

- 1 Click on **TOOLS**, select **MACRO**, select **MACROS**, type **Piechart** then click on the **CREATE** button.
- 2 A blank screen will be displayed with the beginning and end of the macro already entered.
- 3 **Type the macro as shown between the Sub and End Sub commands below:-**

```
Sub Piechart()
```

```
Set Batch = GetObject("C:\NEXYGEN V4 Training\SPC.bch")
```

```
Cells(1, 1).Value = "Passed"
```

```
Cells(1, 2).Value = "Failed"
```

```
For X = 1 To Batch.Rows
```

```
    If Batch.Row(X).passed Then P = P + 1
```

```
Next
```

```
Cells(2, 1).Value = P
```

```
Cells(2, 2).Value = Batch.Rows - P
```

```
End Sub
```

- 4 Click on the **CLOSE BOX** in the top right of the **MACRO** window, or press the **ALT and F4** keys together, to return to the spreadsheet.
- 5 Run the macro by clicking on **TOOLS**, select **MACRO**, select **MACROS**, select **Piechart** then click on **RUN**.
- 6 The macro will obtain data from the batch and enter the number of samples that passed in cell A2 and the number of samples that failed in cell B2.
- 7 Select Cells A1 to B2 then click on **INSERT**.
- 8 Select **CHART**, select **PIE** then click on **NEXT**.
- 9 Click on **SERIES IN ROWS** then click on **NEXT**.
- 10 Enter **SPC Batch** as the **CHART TITLE**.
- 11 Click on the **LEGEND** tab then uncheck the **SHOW LEGEND** checkbox.
- 12 Click on the **DATA LABELS** tab, select **SHOW LABEL AND PERCENT**, uncheck the 2 other check boxes then click on **NEXT**.
- 13 Select **AS OBJECT IN** then select **SHEET 1** then click on **FINISH**.
- 14 The chart will now be displayed on the worksheet.

- 15 Click on **FILE** then select **SAVE** to save the worksheet.
- 16 Click on the **MINIMIZE** button on the top right of the screen to hide the worksheet.
- 17 **DOUBLE CLICK** on the **SPC.BCH** Test document on the DESKTOP.
- 18 **RIGHT CLICK** on the **LOAD AT LIMIT** column then select **PROPERTIES**.
- 19 Click on the **LIMITS TAB**, select **WITHIN RANGE**, set the values to **2.3N** and **2.35N** then click the OK button.
- 20 Press **ALT** and **TAB** to redisplay the Excel worksheet (or select it from the TASKBAR).
- 21 Run the macro again by clicking on **TOOLS**, select **MACRO**, select **MACROS**, select **Piechart** then click on **RUN**.
- 22 The macro will obtain the **CHANGED** data from the batch, enter the new numbers cells A2 and B2 then update the Pie Chart.
- 23 Click on **FILE** then select **SAVE** to save the worksheet.
- 24 Click on **FILE** then select **EXIT** to exit the worksheet.
- 25 Press **ALT** and **TAB** to redisplay the NEXYGEN (or select it from the TASKBAR).
- 26 Click on the CLOSE BOX in the top right of the BATCH window, or press the **ALT** and **F4** keys together but do **NOT** Save the Batch so that it is ready for another exercise later.

8. EXERCISE 7

TESTING MORE SPRINGS

8.1 General

This chapter shows how to define suitable Pass/Fail limits then test a further 3 samples in the batch and print the results using the previous Word Report.

It will be seen, however, that the report does not list the results for the 3 samples as required.

8.2 Testing Further Samples

- 1 **DOUBLE CLICK** on the **10mm Compression.BCH** Icon on the desktop.
- 2 **RIGHT CLICK** on the **LOAD AT LIMIT** column then select **PROPERTIES**.
- 3 Click on the **LIMITS TAB**, select **RELATIVE TO NOMINAL**, set the tolerance to **+/- 5%** then click the OK button.
- 5 Click on the **VIEW** menu option then select **SHOW PASS/FAIL STATUS**.
- 62 **Press the ZERO button on the machine's Control Console or the Software Console.**
- 7 Position the spring into the central part of the lower compression plate.
- 8 Click on the **START TEST** Icon on the Graph Screen (6th from right, identified by a right facing arrow) or press the **F5** key to start the test
- 9 Enter your name for the **OPERATOR**, **GREEN** for the sample **COLOUR** and **25** for the **TOOL NUMBER**. Take care **NOT** to click onto the OK button, or press the ENTER key, **UNTIL** all the information has been entered because the test will start.
- 10 Click on the OK button or press the ENTER key to start the test.
- 11 The spring will be compressed by 10mm then the machine will automatically return to the start of test position.
- 12 Remove the sample from the compression plate.
- 13 Click on the **CLOSE BOX** on the top right of the **GRAPH** window to return to the **BATCH** window which now contains the results for this sample. Note that the bottom row (last test) should be displayed in **GREEN**.

14 Repeat stages 7 to 13 above for the remaining samples, entering the following information:-

	Colour	Tool Number
Sample 2	GREEN	25
Sample 3	GREEN	26

15 Click on the **FILE** menu option then select **SAVE** to save the latest samples.

8.3 Printing the Word Report

1 Click on the **REPORT** menu option then select **PRINT BATCH REPORT** to print the report on the **DEFAULT** printer.

2 Note that the report contains 8 samples and not just the last 3 samples. This is because the batch report is designed to print all the **VISIBLE** rows in the batch.

3 The last 3 samples were all **GREEN** so the report can be easily restricted using the **ROW QUERY** option.

4 **RIGHT CLICK** on the **COLOUR** column then select **PROPERTIES**.

5 Click on the **QUERY AND SPC TAB**, select **INCLUDE THIS COLUMN IN ROW QUERIES** then click the OK button.

6 Click on the **VIEW** menu option then select **ROW QUERY** to display a Row Query screen which lists the sample colours.

7 Check the **COLOUR:GREEN** box then click the OK button.

8 Click on the **REPORT** menu option then select **PRINT BATCH REPORT** to print the report on the **DEFAULT** printer.

9 Note that the report now only contains the data for the last 3 samples.

Note that this feature will only work if the data can be sufficiently restricted, e.g. **COLOUR** and **DATE**.

8.4 Exiting the Batch

1 Click on the **CLOSE BOX** in the top right of the **BATCH** window, or press the **ALT and F4** keys together, to close the document, selecting **YES** to save the new data.

2 The program will close and the document is ready for testing the **SAME** sample type later.

9. EXERCISE 8

USING THE BATCH TESTING UTILITY

9.1 General

This chapter shows how to install and use the optional Batch Testing Utility which is designed to allow easy reporting of sample data including an optional overlay graph using a Word Macro. The utility can also automatically transfer data to Microsoft Excel and has an easy file maintenance feature where test files can be automatically created from MASTER files.

9.2 Creating the Word Overlay Graph Macro

- 1 Start Microsoft Word, click on **TOOLS**, select **MACRO**, select **MACROS**, type **Batchreportfinished** then click on the CREATE button.
- 2 A blank screen will be displayed with the beginning and end of the macro already entered.
- 3 **Type the macro as shown between the Sub and End Sub commands below:-**

```
Public Sub BatchReportFinished()
```

```
Selection.HomeKey Unit:=wdStory
```

```
Selection.Find.Execute FindText:="<Overlay>", Forward:=True
```

```
If Selection.Find.Found = True Then
```

```
    Selection.Delete Unit:=wdCharacter, Count:=1
```

```
    Selection.MoveRight Unit:=wdWord, Count:=1, Extend:=wdExtend
```

```
    Selection.Delete
```

```
        Selection.InlineShapes.AddPicture FileName:="C:\Overlay.wmf", _
```

```
        LinkToFile:= False, SaveWithDocument:=True
```

```
End If
```

```
ActiveDocument.PrintOut
```

```
End Sub
```

(Note the underscore after "C:\Overlay.wmf",)

- 4 Click on the CLOSE BOX in the top right of the MACRO window, or press the **ALT and F4** keys together, to return to the blank document.
- 5 Save the macro by clicking on **FILE** then selecting **SAVE**.
- 6 Exit Word by clicking on **FILE** then selecting **EXIT**

9.3 Creating a New Word Report for an Overlay Graph

- 1 **RIGHT CLICK** on the **10mm Compression.doc** Icon on the desktop then select **COPY**.
- 2 **RIGHT CLICK** on a blank area of the desktop then select **PASTE**.
- 3 **RIGHT CLICK** on the new document Icon, select **RENAME** then type **10mm Compression Overlay.doc**
- 4 **DOUBLE CLICK** on the **10mm Compression Overlay.doc** Icon to open the document.
- 5 Insert 2 blank lines below the table then type **<Overlay>**.
- 6 Save the document by clicking on **FILE** then selecting **SAVE**.

9.4 Configuring the Utility

- 1 Start the Utility by clicking on the **START** button, selecting **PROGRAMS**, then selecting **BATCH TESTING V2**.
- 2 The utility will be displayed with a blank drop down box.
- 3 Click on the **CONFIGURATION** menu option to display the Configuration screen.
- 4 Click on the **SETUP** menu option then click on **NEW** to display a File Open screen.
- 5 Click on the top dropdown box, select desktop then select the **10mm Compression.bch** NEXYGEN file.
- 6 Click on the **BATCH REPORT** drop down box then select **PRINT BATCH REPORT** to display a new Word Report field.
- 7 Click on the **WORD REPORT** field to display a File Open screen.
- 8 Click on the top dropdown box, select desktop then select the **10mm Compression Overlay.doc** Word Document.
- 9 Click on the OK button to return to the main screen with the **10mm Compression** test automatically displayed in the drop down box.

9.5 Testing More Springs

- 1 Click on the **PERFORM TESTS** button (or press the ENTER key).
- 2 The utility will disappear and the NEXYGEN **GRAPH** screen will be displayed together with a new **PRE-TEST** screen which will be used to control the tests.

Note that this screen can be moved to a suitable position by placing the mouse cursor over the top coloured bar, holding the **LEFT MOUSE** button then dragging the screen.

Also note that this screen indicates that the system is configured to test 5 samples in a "Batch" and is ready to test sample number 1.

3 **Press the ZERO button on the machine's Control Console or the Software Console.**

4 Position the spring into the central part of the lower compression plate.

5 Click on the **PERFORM TEST** button on the new Screen to start the test. **Do NOT use the START TEST button on the Toolbar.**

6 Enter your name for the **OPERATOR**, **BLUE** for the sample **COLOUR** and **16** for the **TOOL NUMBER**. Take care **NOT** to click onto the OK button, or press the ENTER key, **UNTIL** all the information has been entered because the test will start.

7 Click on the OK button or press the ENTER key to start the test.

8 The spring will be compressed by 10mm then the machine will automatically return to the start of test position.

9 Another new screen will be displayed which contains a **GREEN TICK** to indicate that the sample has passed the Pass/Fail limits.

This screen also allows the sample to be repeated if the test was obviously incorrect to prevent a bad sample from being included in the Statistics.

10 Click on the **SAVE TEST** button to save the data. Note that the batch is automatically saved at this moment to minimise data loss

11 The **PRE-TEST** screen will be redisplayed indicating that the system is ready to test sample number 2.

12 Remove the sample from the compression plate.

10 Repeat stages 4 to 12 above for two more samples, entering the following information:-

	Colour	Tool Number
Sample 2	GREEN	25
Sample 3	GREEN	26

12 Click on the **EXIT BATCH** button after the third sample has been tested.

13 The Batch screen will be displayed for a short time as the system collects the data for the **LAST 3 SAMPLES** then automatically prints the Word Report which now contains an overlay graph.

Therefore, the utility will **ONLY** print a report for the **SAMPLES JUST TESTED**, even if not all the specified number of samples in the batch were tested.

Note that if a report is required for **ALL THE SAMPLES IN THE BATCH**, use the **REPORT, PRINT BATCH REPORT** option in NEXYGEN as shown in Exercise 2.

Also note that the overlay graph is **ONLY AVAILABLE** if the samples are tested using the Batch Testing Utility.

- 14 The Batch Testing Utility main screen will be displayed ready to test the next batch of samples.

9.6 Exporting Data to Excel to Create an Average Graph

- 1 **RIGHT CLICK** anywhere on a blank area of the desktop.
- 2 Select **NEW, MICROSOFT EXCEL WORKSHEET**.
- 3 An Excel Worksheet will be created on the desktop and the worksheet name will be selected ready for renaming.
- 4 Rename the worksheet to **Average Graph.xls**.
- 5 Open the blank worksheet by **DOUBLE CLICKING** on the Icon just created on the desktop.
- 6 Click on **TOOLS**, select **MACRO**, select **MACROS**, type **Average** then click on the CREATE button.
- 7 A blank screen will be displayed with the beginning and end of the macro already entered.
- 8 **Type the macro as shown between the Sub and End Sub commands below:-**

```
Sub Average()
```

```
    If Range("F2").Value = 1 Then  
        Range("C1:G1000").ClearContents  
        Range("C1").Value = "Divider"  
        Range("D1").Value = "New Ext"  
        Range("E1").Value = "New Load"  
        Range("G1").Value = "Max Ext"  
        Range("G2").Formula = "=Max(A1:A1000)"
```

```

    Select Case Range("G2").Value
        Case Is <= 1: Interval = 0.001
        Case Is <= 10: Interval = 0.01
        Case Is <= 100: Interval = 0.1
        Case Is <= 1000: Interval = 1
    End Select
    Range("G3").Value = Interval
End If
Max = Range("G2").Value
Interval = Val(Range("G3").Value)
Y = 1
For X = Interval To Max Step Interval
    Y = Y + 1
    Cells(Y, 3).Value = Cells(Y, 3).Value + 1
    Divisor = Cells(Y, 3).Value
    Cells(Y, 4).Value = X
    C = 5
    While Cells(C, 1) < X
        C = C + 1
    Wend
    LowE = Cells(C - 1, 1).Value
    HighE = Cells(C, 1).Value
    If LowE = HighE Then Exit For
    LowL = Cells(C - 1, 2).Value
    HighL = Cells(C, 2).Value
    NewL = LowL + ((X - LowE) * (HighL - LowL) / (HighE - LowE))
    avgL = ((Cells(Y, 5).Value * (Divisor - 1)) + NewL) / Divisor
    Cells(Y, 5).Value = avgL
Next
End Sub

```

- 9 Click on the CLOSE BOX in the top right of the MACRO window, or press the **ALT and F4** keys together, to return to the spreadsheet.
- 10 Select Columns D and E then click on **INSERT**.
- 11 Select **CHART**, select **XY SCATTER**, select the graph showing **SMOOTH LINES WITHOUT MARKERS** then click on **NEXT**.
- 12 Click on **SERIES IN COLUMNS** then click on **NEXT**.
- 13 Enter **AVERAGE LOAD** as the **CHART TITLE**.
- 14 Click on the **LEGEND** tab then uncheck the **SHOW LEGEND** checkbox.
- 15 Click on the **DATA LABELS** tab, select **NONE** then click on **NEXT**.

- 16 Select **AS OBJECT IN** then select **SHEET 1** then click on **FINISH**.
- 17 The chart will now be displayed on the worksheet.
- 18 Move the chart so the top left corner is at approx. cell G10.
- 19 Click on **FILE** then select **SAVE** to save the worksheet.
- 20 Click on **FILE** then select **EXIT** to exit the worksheet.
- 21 Click on the **CONFIGURATION** menu option on the Batch Testing Utility to display the Configuration screen.
- 22 Click on the **EXPORT** menu option then click on the **ROW EXPORT** tab
- 23 Click on the first drop down box then select **EXPORT ALL TESTS**.
- 24 Click on the **WORKBOOK** field to display a File Open screen.
- 25 Click on the top dropdown box, select desktop then select **AVERAGE GRAPH.xls**.
- 26 Click on the second drop down box then select **POST SAVE MACRO**.
- 27 Click on the next field to the right then type **AVERAGE**.
- 28 Click on the **GRAPH X AXIS** field then select **DEFLECTION FROM PRELOAD**.
- 29 Click on the **GRAPH Y AXIS** field then select **LOAD**.
- 30 Click on the **RESULT 1** field then select **SAMPLE**.
- 31 Check the **VALUE** checkbox to the right of RESULT 1.
- 32 Type **F1** in the **CELL** field to the right of RESULT 1.
- 33 Click on the OK button to return to the CONFIGURATION SCREEN.
- 34 Click on the OK button to return to the MAIN SCREEN so that the Batch Testing Utility is ready to test the next batch of samples.
- 35 Test 3 springs as previously outlined, changing the load by hand give a different curve.
- 36 Press **ALT** and **TAB** to redisplay the Excel worksheet (or select it from the TASKBAR).
- 37 Check that the average graph is displayed on the worksheet.

9.7 Using Master Files

- 1 **RIGHT CLICK** anywhere on a blank area of the desktop.
- 2 Select **NEW, FOLDER**.
- 3 A New Folder will be created on the desktop and the name will be selected ready for renaming.
- 4 Rename the folder to **MASTERS**.
- 5 Create 2 more folders on the desktop called **STORAGE** and **WORKING**.
- 6 Copy the files **FRICITION.BCH**, **TENSION.BCH** and **WELD.BCH** from the desktop to the **MASTER** folder.
- 7 Click on the **CONFIGURATION** menu option of the Batch Testing Utility to display the Configuration screen.
- 8 Click on the **SETUP** menu option then click on **NEW** to display a File Open screen.
- 9 Click on the top dropdown box, select the **MASTER** folder from the desktop then select the **FRICITION.BCH** NEXYGEN file.

Note that the field to the right of the filename will show **MASTER FILE** to indicate that this file will **NOT** be used to perform tests.

- 10 Click on the **SETUP** menu option then click on **NEW** to display a File Open screen.
- 11 Click on the top dropdown box, select the **MASTER** folder from the desktop then select the **TENSION.BCH** NEXYGEN file.
- 12 Click on the **SETUP** menu option then click on **NEW** to display a File Open screen.
- 13 Click on the top dropdown box, select the **MASTER** folder from the desktop then select the **WELD.BCH** NEXYGEN file.
- 14 Click on the OK button to display the Main Screen.

Note that the menu now has a new option called **CREATE**.

- 15 Click on the **CREATE** menu option to display a screen which lists the 3 **MASTER FILES**.
- 16 Enter **June 2000** as the **FILE PREFIX**, check all 3 checkboxes then click on **CREATE**.
- 17 The Main Screen will be displayed with **JUNE 2000 WELD** displayed in the drop down box.

- 18 Click on the drop down box and check that **JUNE 2000 FRICTION** and **JUNE 2000 TENSION** are also listed. This box shows the **WORK IN PROGRESS**.
- 19 Note that the menu now has another new option called **STORE**.
- 20 Click on the **STORE** menu option to display a screen which lists the 3 **WORKING FILES**.

Note that the **10mm Compression** test is **NOT** listed because this set-up was **NOT** created from a **MASTER** file.
- 21 Click on the **JUNE 2000 WELD** checkbox then click on **STORE**
- 22 The Main Screen will be displayed with **JUNE 2000 TENSION** displayed in the drop down box.
- 23 Click on the drop down box and check that **JUNE 2000 WELD** is **NOT** listed.

9.8 Creating a Combined Test Report Using an Excel Macro

If **WORKING** files have been created from **MASTER** files, then the data can be easily retrieved into a single Excel Worksheet by specifying the file **PREFIX**. Therefore, if the 3 **MASTER** files listed above were used to test samples in **MAY 2000**, the **WORKING** files would have a **PREFIX** of **MAY 2000**. The macro listed below can will sequentially read the data from each of the test files and combine the results into the report.

- 1 **RIGHT CLICK** anywhere on a blank area of the desktop.
- 2 Select **NEW, MICROSOFT EXCEL WORKSHEET**.
- 3 An Excel Worksheet will be created on the desktop and the worksheet name will be selected ready for renaming.
- 4 Rename the worksheet to **Test Report.xls**.
- 5 Open the blank worksheet by **DOUBLE CLICKING** on the Icon just created on the desktop.
- 6 Click on **TOOLS**, select **MACRO**, select **MACROS**, type **Monthlyreport** then click on the **CREATE** button.
- 7 A blank screen will be displayed with the beginning and end of the macro already entered.
- 8 **Type the macro as shown between the Sub and End Sub commands below:-**

Sub MonthlyReport()

On Error GoTo Problem

Range("A1:P100").ClearContents

prefix = InputBox("Enter File Prefix")

Range("E2").Value = "REPORT FOR FILM PRODUCED IN " & UCase\$(prefix)

Range("B5").Value = "STATIC FRICTION"

Range("D5").Value = "KINETIC FRICTION"

Range("F5").Value = "TENSILE STRENGTH"

Range("I5").Value = "STRETCH AT BREAK"

Range("L5").Value = "WELD STRENGTH"

Set batch = GetObject("C:\NEXYGEN V4 Training\" & prefix & " Friction.bch")

For X = 1 To 4

Cells(X + 5, 2).Value = batch.Row(X).formatted("Static Coefficient")

Cells(X + 5, 4).Value = batch.Row(X).formatted("Kinetic Coefficient")

Next

Set batch = Nothing

Set batch = GetObject("C:\NEXYGEN V4 Training\" & prefix & " Tension.bch")

For X = 1 To 4

Cells(X + 5, 6).Value = batch.Row(X).formatted("Maximum Load")

Cells(X + 5, 9).Value = batch.Row(X).formatted("Deflection at Break")

Next

Set batch = Nothing

Set batch = GetObject("C:\NEXYGEN V4 Training\" & prefix & " Weld.bch")

For X = 1 To 4

Cells(X + 5, 12).Value = batch.Row(X).formatted("Load at Yield")

Next

Set batch = Nothing

Exit Sub

Problem:

End

End Sub

9 Click on the CLOSE BOX in the top right of the MACRO window, or press the **ALT and F4** keys together, to return to the spreadsheet.

10 To run then macro manually, click on **TOOLS**, select **MACRO**, select **MACROS**, select **Monthlyreport** then click on **RUN**.

- 11 The macro can be run easier by creating a button on the worksheet.
- 12 Click on the **VIEW** menu option, **SELECT TOOLBARS** then select **FORMS**.
- 13 Click on the **BUTTON** Icon (2nd Icon down from the top on the right hand side) then "draw" the button near the bottom right hand side of the screen, e.g. on cell M30.
- 14 The **ASSIGN MACRO** screen will be displayed.
- 15 Select **MONTHLYREPORT** then click OK.
- 16 Sweep the mouse cursor over the face of the new button, type **READ** then click on a blank area of the worksheet.
- 17 Click on the **X** on the **FORMS TOOLBAR** to close the toolbar.
- 18 Click on **FILE** then select **SAVE** to save the worksheet.
- 19 Click on the **BUTTON**, enter **MAY 2000** then click OK.
- 20 Check that the data is imported to the worksheet.
- 21 Click on the **BUTTON**, enter **APRIL 2000** then click OK.
- 22 Check the **NO** data is imported to the worksheet.

10. EXERCISE 9

CREATING A FOAM COMPRESSION TEST

10.1 General

This chapter shows how to create and configure a new test document ready to perform a Foam Relaxation test. The test document will be created on the desktop and will be used to perform 5 tests. Two questions will be asked before each test to identify the sample colour and density. The test will automatically measure the sample height using the Datum Feature. The required result is the Comfort Factor in 3 significant figures.

10.2 Creating the Test Document on the Desktop

- 1 **RIGHT CLICK** anywhere on a blank area of the desktop.
- 2 Select **NEW, NEXYGEN BATCH DOCUMENT** to display the Set-up Wizard.
- 3 **DOUBLE CLICK** on the **FOAMS** Test Category.
- 4 Select the **INDENTATION TEST – SPECIFIED DEFLECTION SETUP** then click on **NEXT**.
- 5 Type **Seat Foam** as the name for the Test Document
- 6 Click on **FINISH** to create the Test Document.

10.3 Configuring the New Test

- 1 Open the test by **DOUBLE CLICKING** on the Icon just created on the desktop to display the **BATCH** window, which looks similar to a spreadsheet.
- 2 Click on **the INSERT NEW TEST** Icon (4th from the left, identified by a graph), or press the **F5** key to display the graph window showing a blank graph area together with a paper-clipped **TEST SETUP**.
- 3 **RIGHT CLICK** anywhere in the graph window.
- 4 Select **PROPERTIES** then select the **GRAPH PAPER** tab.
- 5 Click on **RECTANGULAR GRAPHS**, click on **LARGE GRAPHS** then click on the **OK** button.
- 6 **DOUBLE CLICK** on the paper clipped test set-up to display a shaded border around it.

- 7 Specify a **FIRST IFD of 25%**.
- 8 Specify a **SECOND IFD of 50%**.
- 9 Specify a **HOLD TIME of 1 minute**.
- 10 Enter **Seat Foam** in the **SAMPLE INFORMATION** field.
- 11 Press the **RIGHT MOUSE** button inside the shaded area then select **EXTRA RESULTS**.
- 12 Delete any previously defined questions by selecting them then pressing the DELETE key.
- 13 Click on the **ADD RESULT** button then select **NEW TEXT RESULT**.
- 14 Rename the question to **Operator** then press the ENTER key.
- 15 Click on the **ADD RESULT** button then select **NEW TEXT RESULT**.
- 16 Rename the question to **Colour** then press the ENTER key.
- 17 Click on the **PROPERTIES** button, select **REMEMBER SEVERAL PREVIOUS ENTRIES** then click on the OK button.
- 18 Click on the **ADD RESULT** button then select **NEW TEXT RESULT**
- 19 Rename the question to **Density** then press the ENTER key.
- 20 Click on the OK button to return to the shaded paper clipped test set-up.
- 21 Press the **RIGHT MOUSE** button inside the shaded area then select **ADVANCED**.
- 22 Specify a **CONTACT FORCE of 1N**.
- 23 Specify a **TEST SPEED of 100mm/min** then click the OK button.
- 24 Press the **RIGHT MOUSE** button inside the shaded area then select **PRECONDITIONING**.
- 25 Specify **COMPRESSION of 75%**.
- 26 Specify **SPEED of 250mm/min**.
- 27 Specify **PAUSE TIME of 10 seconds** then click the OK button.
- 28 Click on the graph area to close the test set-up.

10.4 Testing the First Sample of the Batch

Note that this test uses the Datum Feature so **MUST** be performed as outlined in this procedure.

The **ZERO** button must **ONLY** be pressed **ONCE** at the beginning of the test and must **NOT** be pressed at any other time otherwise the sample height will not be measured correctly.

- 1 Fit the compression plate and top probe to the machine.
- 2 Move the crosshead, using the keys on the machine's Control Console or the keys on the Software Console, so that the probe is approx. 2mm higher than required to fit the foam.
- 3 **Press the ZERO button on the machine's Control Console or the Software Console. Do NOT press the ZERO button again during the tests.**
- 4 **Carefully** move the crosshead down until the probe is approx. 5mm above the compression plate.
- 5 Click on the **START TEST** Icon on the Graph Screen (6th from right, identified by a right facing arrow) or press the **F5** key to start the test
- 6 Enter your name for the OPERATOR, YELLOW for the sample **COLOUR** and **LOW** for the **DENSITY**. Take care **NOT** to click onto the OK button, or press the ENTER key, **UNTIL** all the information has been entered because the test will start.
- 7 Click on the OK button or press the ENTER key to find the **DATUM POSITION**.
- 8 The probe will move down to touch the compression plate then will move back to the **ZERO** position previously defined.
- 10 Position the foam into the central part of the lower compression plate.
- 11 Click on the OK button or press the ENTER key to start the test.
- 12 The foam will be compressed and released twice then the machine will stop.
- 13 After 10 seconds, the crosshead will compress the sample again and hold the sample compressed for 1 minute.
- 14 At the end of the test, the machine will automatically return to the start of test position.
- 15 Remove the sample from the compression plate.
- 16 Click on the **ZOOM RIGHT OUT** Icon (8th from left with a square box) or press the **HOME** key to display the full graph trace.

- 17 Select **PERCENTAGE COMPRESSION** as the graph **MAJOR AXIS** from the drop down box on the left hand side of the screen. Use the HOME key to display the full trace as required..
- 18 Click on the **CLOSE BOX** on the top right of the **GRAPH** window to return to the BATCH window which now contains the results for this sample.
- 19 Click on the **VIEW** menu option then select **SHOW/HIDE COLUMNS**.
- 20 Uncheck all results except for **DATE, TIME, OPERATOR, COLOUR, DENSITY, ORIGINAL THICKNESS, THICKNESS AFTER PRECONDITIONING** and **COMFORT FACTOR** then click the OK button.
- 21 **RIGHT CLICK** on the **COMFORT FACTOR** column then select **3 SIGNIFICANT FIGURES** as the required format.

10.5 Testing the Remaining Samples of the Batch

- 1 Click on **the INSERT NEW TEST** Icon (4th from the left, identified by a graph), or press the **F5** key to display a blank graph window ready for the next sample.
- 2 Position the next sample into the central part of the lower compression plate.
- 3 Click on the **START TEST** Icon on the Graph Screen (6th from right, identified by a right facing arrow) or press the **F5** key to start the test
- 4 The screen will indicate that the **DATUM** is still valid. Note that if the **ZERO** button has been accidentally pressed then the datum will need to be re-measured.
- 5 Enter **GREY** for the sample **COLOUR** and **LOW** for the **DENSITY**.
- 6 Click on the OK button or press the ENTER key to start the test.
- 7 The sample will be preconditioned, compressed then the machine will automatically return to the start of test position.
- 8 Remove the sample from the compression plate.
- 9 Click on the **CLOSE BOX** on the top right of the **GRAPH** window to return to the BATCH window which now contains the results for this sample.
- 10 Repeat stages 2 to 9 above for the remaining samples, entering the following information:-

	Colour	Density
Sample 3	GREY	MEDIUM
Sample 4	GREY	LOW
Sample 5	YELLOW	MEDIUM

- 11 Click on the **FILE** menu option then select **SAVE** to save the test document.

10.6 Exiting the Batch

- 1 Click on the CLOSE BOX in the top right of the BATCH window, or press the **ALT and F4** keys together, to close the document.
- 2 The program will close and the document is ready for testing the SAME sample type later.