

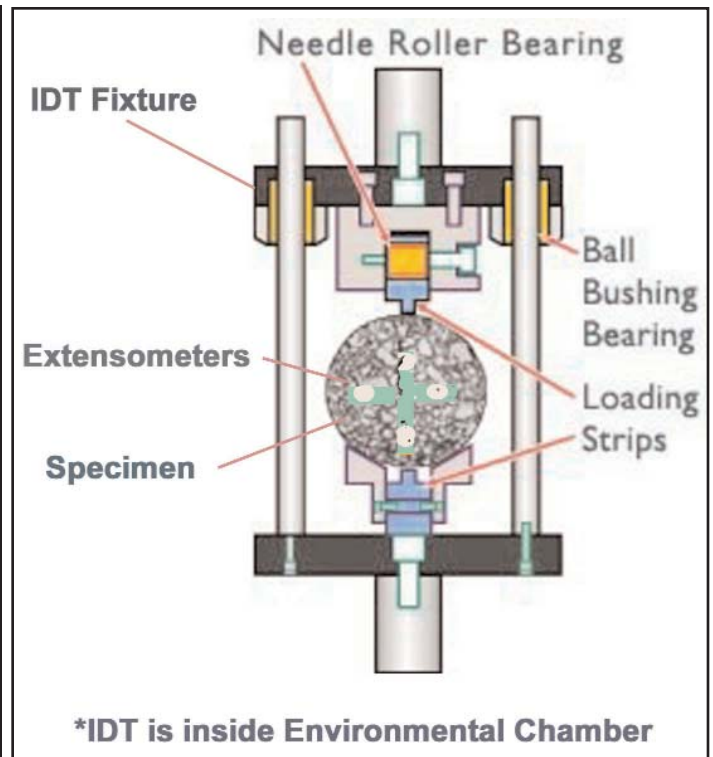
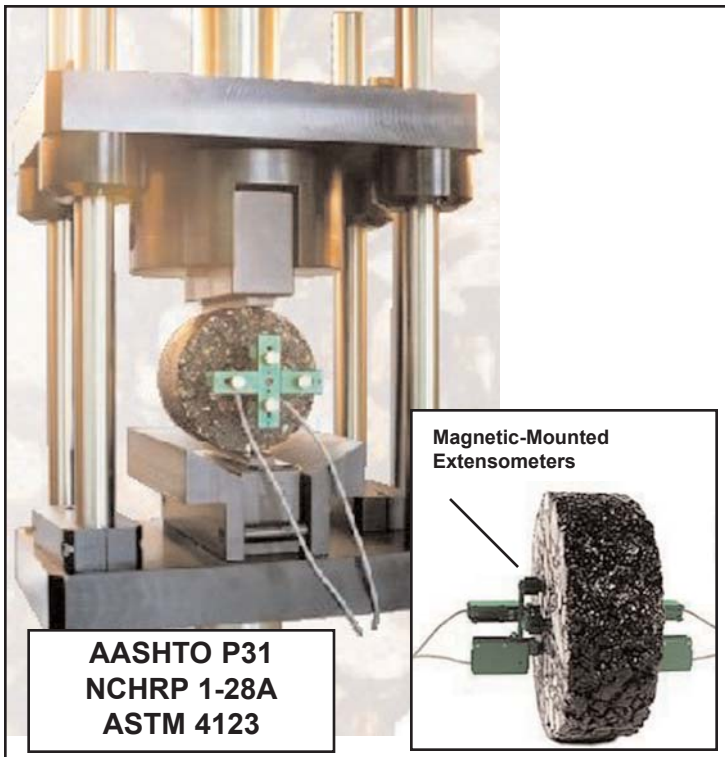
**Asphalt Resilient Modulus Pre-Programmed Testing Software**

Procedures Covered

**AASHTO P31, NCHRP 1-28A, ASTM 4123**

**System Configurations:**

AASHTO P31, NCHRP 1-28A, and ASTM 4123 require a dynamic testing frame, an indirect tensile (IDT) fixture, an environmental chamber, load cell and face mounted horizontal and vertical extensometers. Requires Interlaken UniTest Control System to run pre-programmed software.

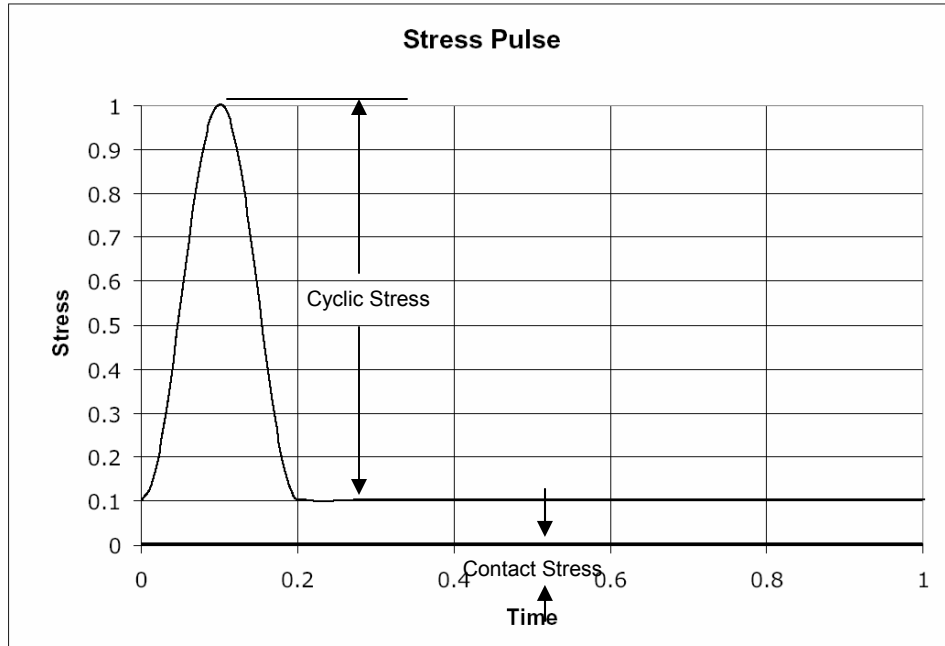


**Background:**

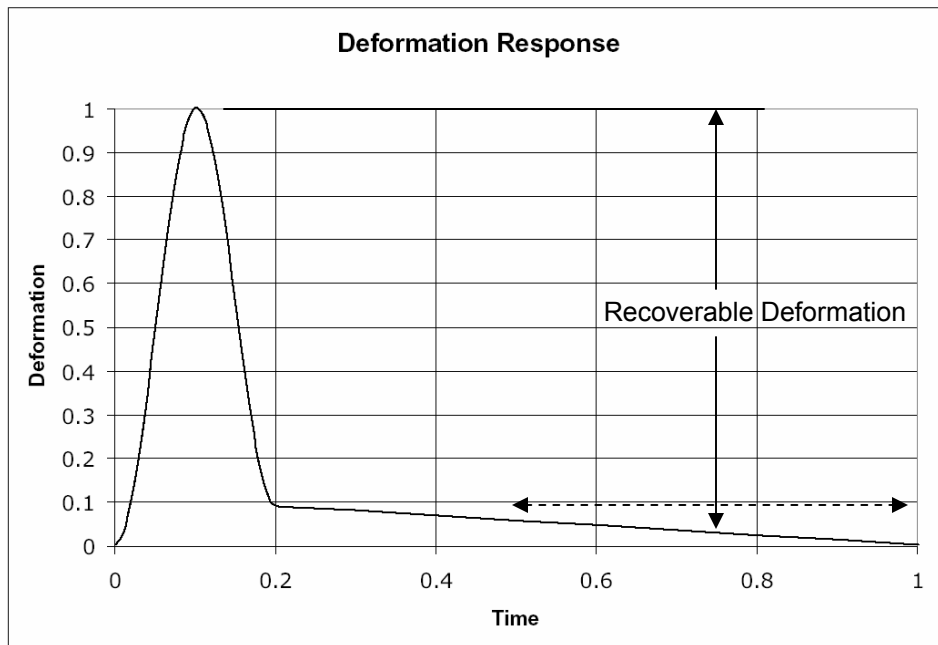
This application will support the procedures specified in AASHTO P31, NCHRP 1-28A and ASTM 4123. The difference is in the analysis.

The loading waveform is a haversine pulse followed by a dwell. The load levels are specified by a contact load and cyclic load.

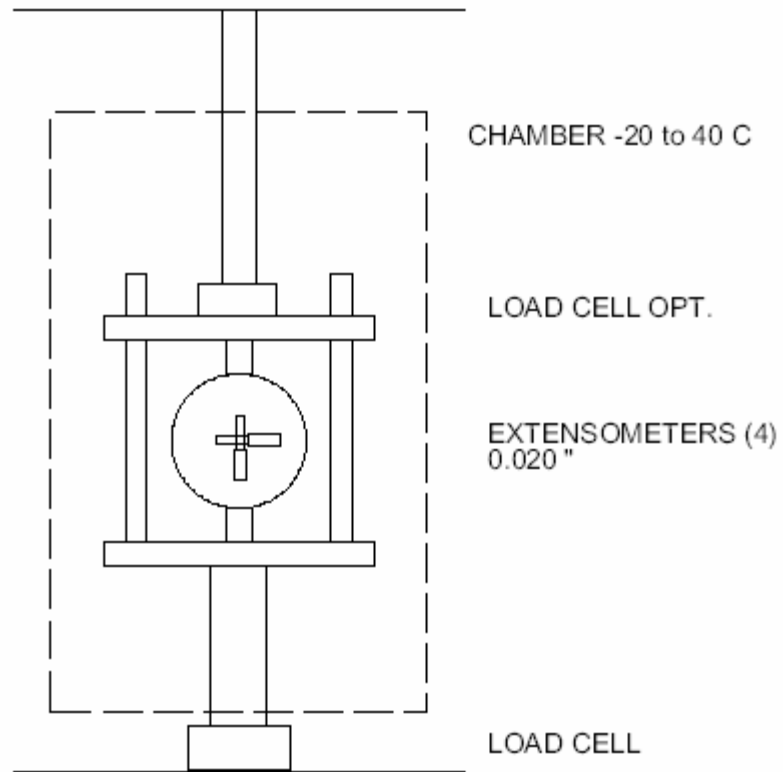
This procedure uses cores of HMAC materials to determine resilient modulus values using the repeated load indirect tensile test. Resilient modulus values can be used with structural response analysis models to calculate the pavement structural response to vehicle wheel loads.



Applied stress pulse. The contact stress, cyclic stress and pulse duration are specified in the pulse file.



The recoverable deformation is based on the difference between the peak and the average of the last 50 %.



External load cell and deformation transducers as described in P 31 and NCHRP 1-28A.

## Selecting the Software

To start the application go to **Resilient Modulus-Asphalt** on the **Test** pull down menu.

Then select the **Define** option.

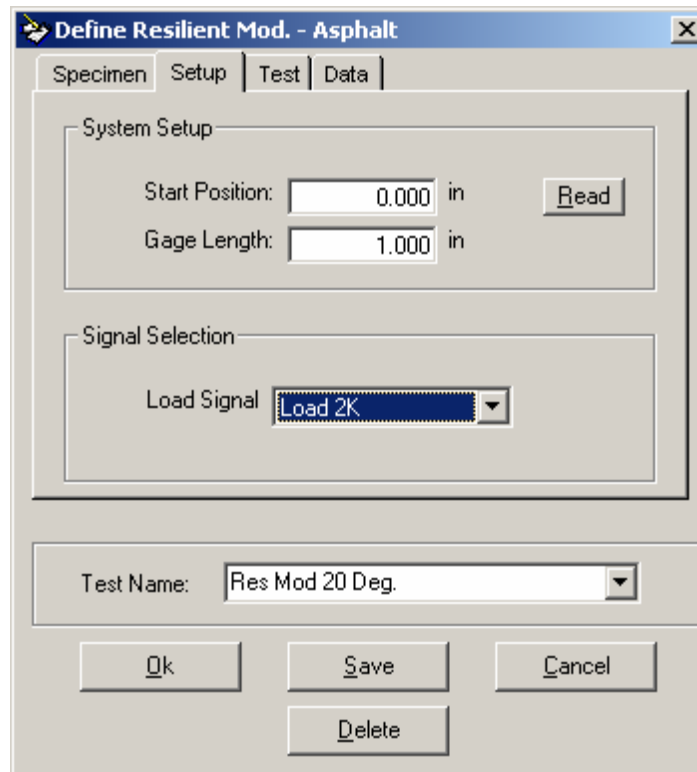
The screenshot shows a software dialog box titled "Define Resilient Mod. - Asphalt". It has four tabs: "Specimen", "Setup", "Test", and "Data". The "Specimen" tab is selected. Inside the dialog, there is a section titled "Specimen & Operator Information" containing several input fields: "Project Name" with the value "AET", "Operating Technician" with "XXX", "Specimen ID" with "YYY", "Specimen Diameter" with "6.000 in", "Specimen Thickness" with "2.000 in", and "Comments" which is empty. Below this section is a "Test Name" dropdown menu currently showing "Res Mod 20 Deg.". At the bottom of the dialog are four buttons: "Ok", "Save", "Cancel", and "Delete".

Specimen Tab — User inputs can be changed for the following variables:

- Project Name - General information
- Operating Technician - General information
- Specimen ID - General information
- Specimen Diameter - Used in calculations
- Specimen Thickness—Used in calculations
- Comments - General information

Test Name - Identifies a specific version of the test. Multiple versions can be created and saved.

All of the above fields are saved to the raw data file by default.



Setup Tab — User inputs can be changed for the following variables:

Start Position—Move the actuator until the upper loading strip is close to the top[ of the specimen, but not touching. The click on **Read** to set the start position.

Gage Length - Distance between gage point centers.

Load Signal - If the system has multiple load cells the one to be used is selected here

All of the above fields are saved to the raw data file by default.

The image shows a software dialog box titled "Define Resilient Mod. - Asphalt". It has four tabs: "Specimen", "Setup", "Test", and "Data". The "Test" tab is selected. Inside the dialog, there is a section labeled "Test Parameters" containing six input fields with their respective units: "IDT Strength" (100. lbs), "Maximum Load" (5. %), "Load Duration" (0.1 sec), "Frequency" (1. Hz), "Temperature" (40.0 °C), and "Load Cycles" (100). Below this section is a "Test Name" dropdown menu currently showing "Res Mod 20 Deg.". At the bottom of the dialog are four buttons: "Ok", "Save", "Cancel", and "Delete".

Test Tab — User inputs can be changed for the following variables:

IDT Strength – Maximum load from the Strength Test.

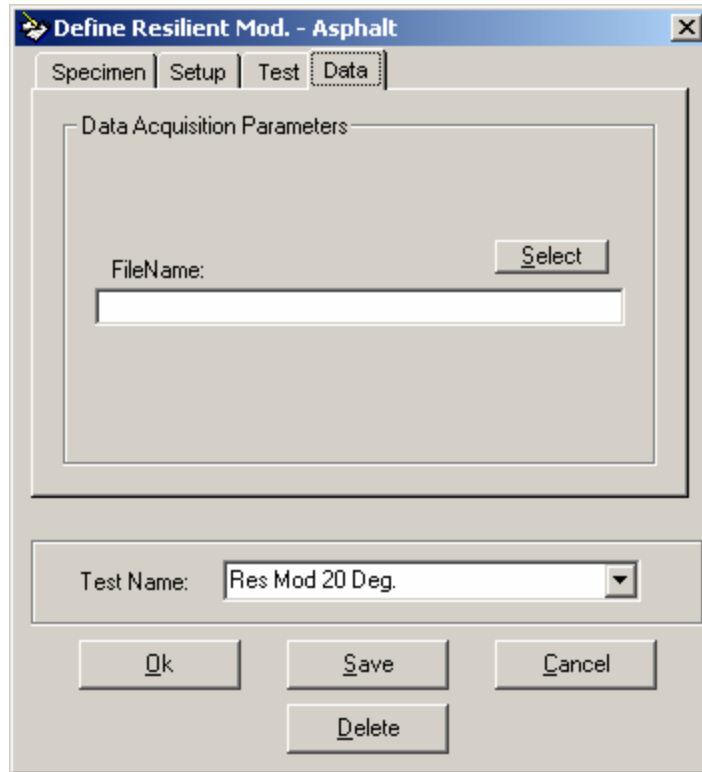
Maximum Load – Peak load as a percent.

Load Duration—Length of the loading pulse.

Frequency—Repetition rate for the loadin pulses.

Temperature – Nominal test temperature.

Load Cycles– Total number of load pulses to be applied.



### Data Tab

Select directory and file name for data.

Reports

The results are reported in an Excel work book. The raw data is also saved in a file with the extension .dat.

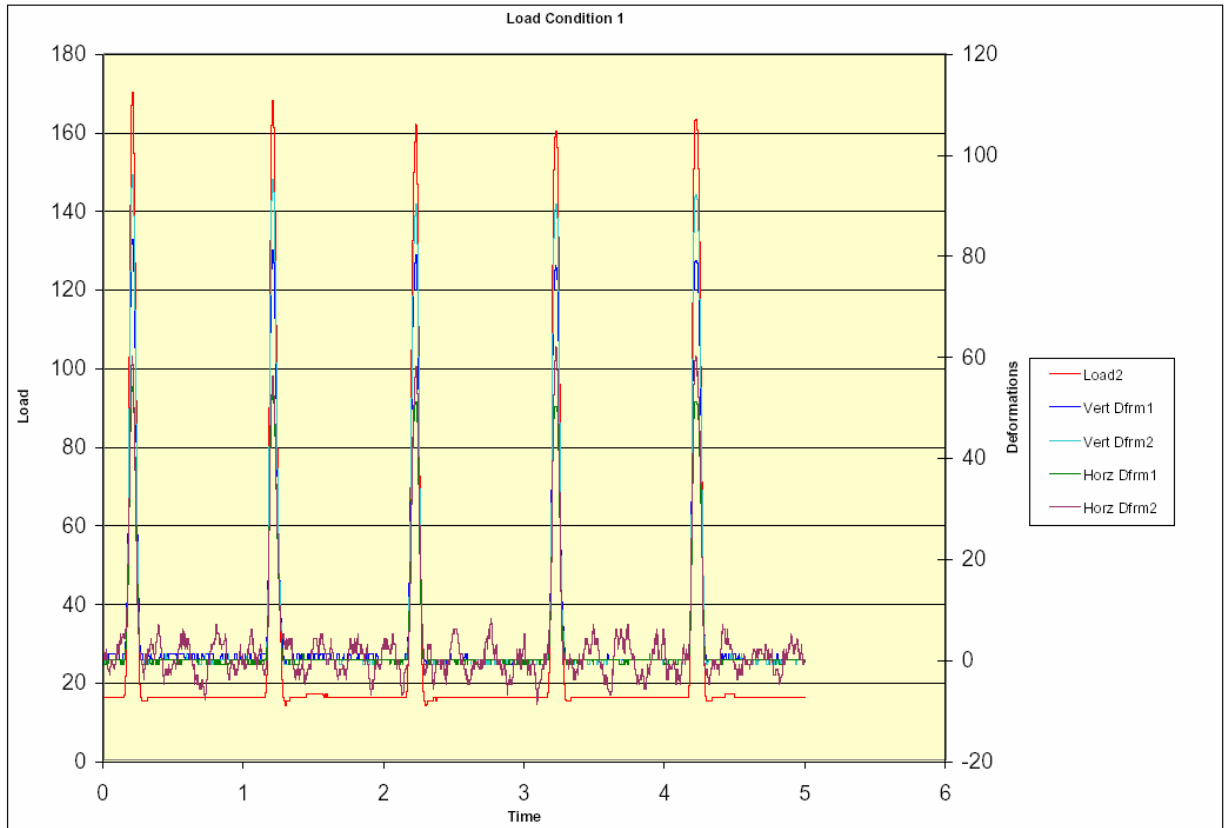
<b>Date:</b>	11:59:42 AM
<b>Time:</b>	3/6/2006
Project Name:	AET
Operating Technician:	dfk
Specimen ID:	123.00
Specimen Dia. (in):	4000000
Specimen Thickness. (in):	2
Cross Sec. Area (in <sup>2</sup> ):	
Specimen Gauge Length (mic-in):	1000000
File Name:	C:\ITC\Data\ResModCheck1
Data Points:	2000
Data Rate (Hz):	400

<b>Pre-Conditioning:</b>	
Number Load Cycles:	100
Load Duration (Sec):	0.1
Frequency (Hz):	1

<b>Temperature (25 C):</b>	
Max Load (lbs):	150
Number Load Cycles:	100
Load Duration (Sec):	0.1
Frequency (Hz):	1

The input information and summary of test conditions are displayed in tables. The results are displayed in another table.

<b>Results</b>			
<b>Temperature (25 C):</b>			
<b>Avrg. Load</b>	<b>164.60lbs</b>	<b>Calculate Instantaneous &amp; Total Resilient Poisson's Ratio</b>	
Avrg. Total Vert1	80.1063in	Instantaneous Resilient Poisson's Ratio (Vri1):	0.422
Avrg. Inst. Vert1	74.0000in	Total Resilient Poisson's Ratio (Vrt1):	0.399
Avrg. Total Vert2	92.8313in	Instantaneous Resilient Poisson's Ratio (Vri2):	0.398
Avrg. Inst. Vert2	85.8000in	Total Resilient Poisson's Ratio (Vrt2):	0.636
Avrg. Total Horz1	51.7662in	<b>Calculate Instantaneous &amp; Total Resilient Modulus</b>	
Avrg. Inst. Horz1	49.0000in	Instantaneous Resilient Modulus (Mri1):	1.162PSI
Avrg. Total Horz2	59.1786in	Total Resilient Modulus (Mrt1):	1.063PSI
Avrg. Inst. Horz2	55.4000in	Instantaneous Resilient Modulus (Mri2):	0.992PSI
		Total Resilient Modulus (Mrt2):	1.260PSI



There is also a graphical display of the data used in the analysis. The raw data is in the workbook.