

# DEPA V9 Quick Reference

*"The most comprehensive suite of Non Destructive Testing Solutions"*



Quick Reference

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DEPA Version	DEPA Edition	Doc. Version	Date Created	Last Modified
V9	Basic	V 1.1	Aug 28, 2009	Jan 26, 2010



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Quick Reference

# V9 Introduction

Welcome to Jagdish Electronics (JE) DEPA V9 – The most Comprehensive Suite of Non-Destructive Testing Solutions.

This Quick Reference Guide provides information which will help you get started with DEPA V9 quickly. We recommend that you take a printout of this document for your future reference.

The core technology behind DEPA V9 is based on the American Society of Testing and Materials (ASTM) approved methodology called the Impulse Excitation Technique (IET). IET has found wide acceptance in industry and research due to its non-destructive nature, extreme accuracy, cost effectiveness and high result repeatability.

The simplicity of testing with the DEPA V9 software is one of its biggest selling points. The test sample is placed over a sonic sensor and excited with a small tap. The sound emanated by the sample is then broken down by the DEPA software into its component frequencies. The fundamental frequency intrinsic to the material is then analyzed to accurately reveal the material's characteristics.

Numerous Industries and Research Organizations that currently use DEPA V9 include:

<b>1. Abrasives and Industrial Ceramics</b> <ul style="list-style-type: none"><li>• Abrasive Grinding Wheels</li><li>• High Finish Polishing Stones</li><li>• Ceramic Tiles</li><li>• Thermal ceramics applications</li></ul> <b>2. Metal and Metal Alloys</b> <ul style="list-style-type: none"><li>• Aluminum (Aluminium) Alloys</li><li>• Copper and copper alloys such as Brass and Bronze</li><li>• Nickel</li><li>• Steel Alloys – Mild steel, Stainless steel, Cast iron</li></ul> <b>3. Space Age Materials</b> <ul style="list-style-type: none"><li>• Titanium and Titanium Alloys</li><li>• Carbon and high strength Nano Carbon Composites</li><li>• Industrial Diamond</li><li>• Powder Metals</li></ul>	<b>4. Cement, Concrete and Structural Materials</b> <b>5. Silica and Silicone Composites</b> <b>6. Graphite Electrodes and Rods</b> <b>7. Plastics and Polymers</b> <b>8. Refractory Linings and High Temperature Materials for Refractories</b> <b>9. Rubber and Rubber Composites</b> <b>10. Wood and Wood Composites</b> <b>11. Construction Industry</b>
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In our continuous efforts towards product evolution, the new DEPA V9 software showcases numerous enhancements:

- Launch of a new JE Brand
- Solution Bundles targeting specific customer requirements
- Enhanced e-commerce capable online customer support and web presence
- Completely modernized user-friendly User Interface (UI)
- Advanced Dynamic Performance testing features
- Item Database capability and Automated Testing Functionality

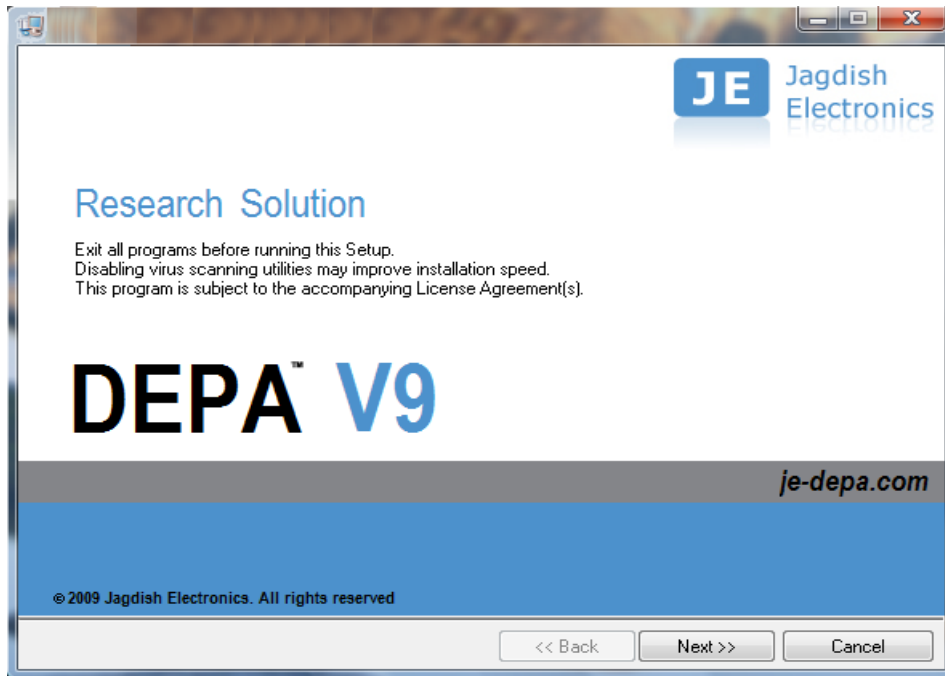


# V9 Installation

Welcome to the DEPA V9 Installation. Please follow these simple steps to Install DEPA V9.

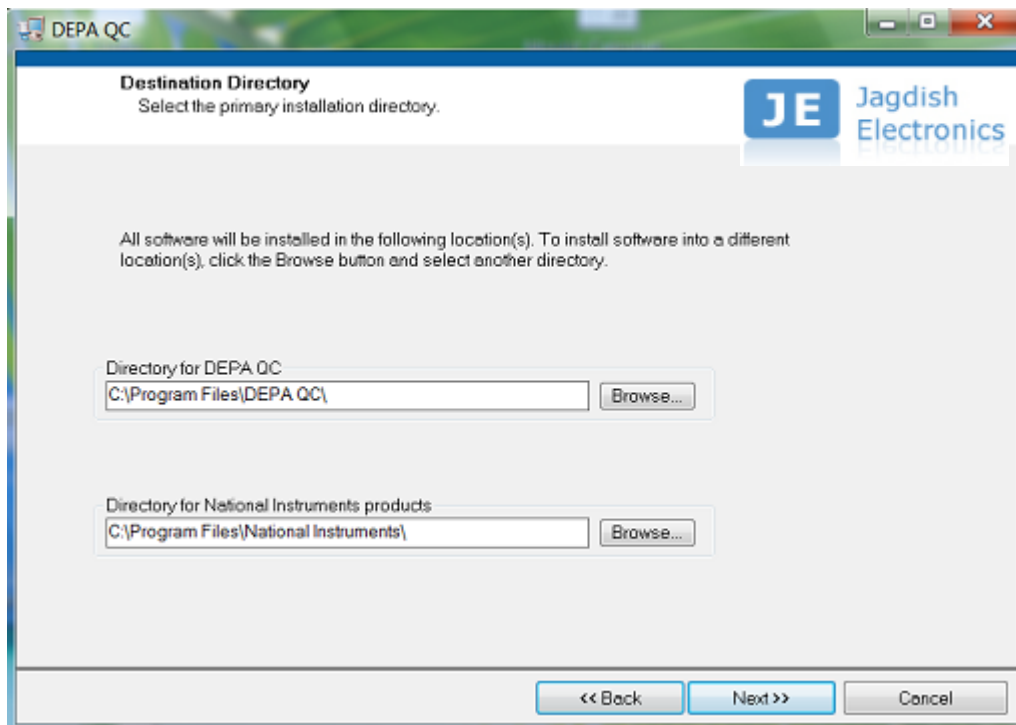
1 Insert the DEPA Installation CD into your CD ROM drive. Microsoft Installer should start automatically guiding you through the rest of the Installation Process.

2



Click Next

3



Browse to File Locations

Click Next





# V9 Installation

4

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You must accept the license(s) displayed below to proceed.

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<< Back   Next >>   Cancel

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Click Next

5

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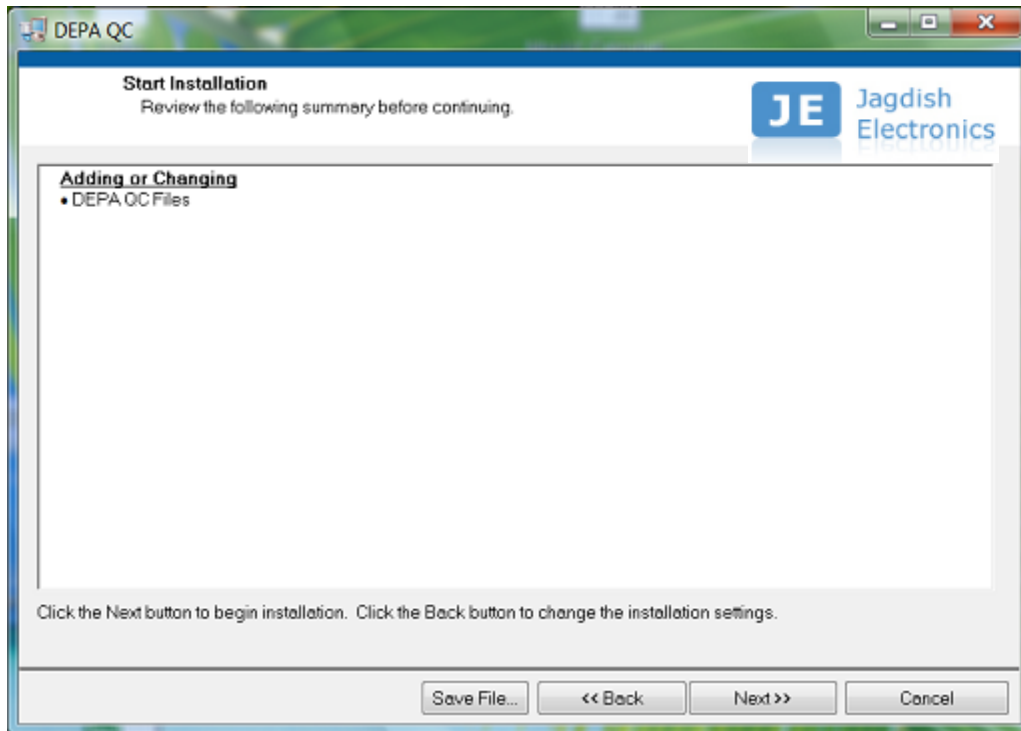
<< Back   Next >>   Cancel

Read & Accept NI License Agreement

Click Next

# V9 Installation

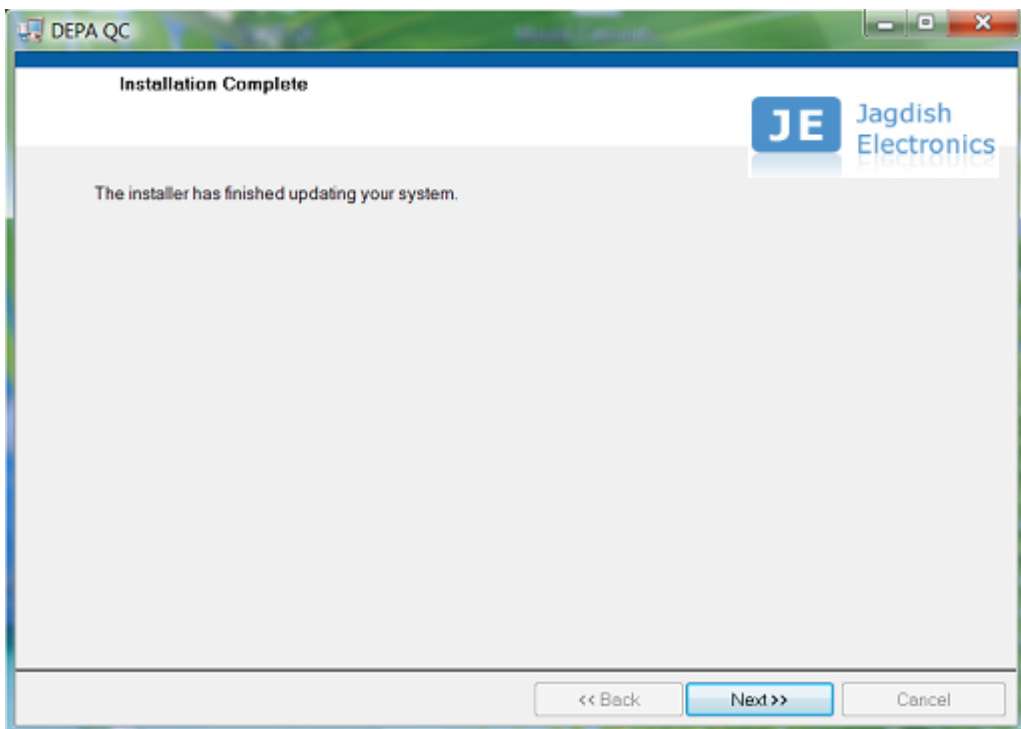
6



Review Installation Progress

Click Next

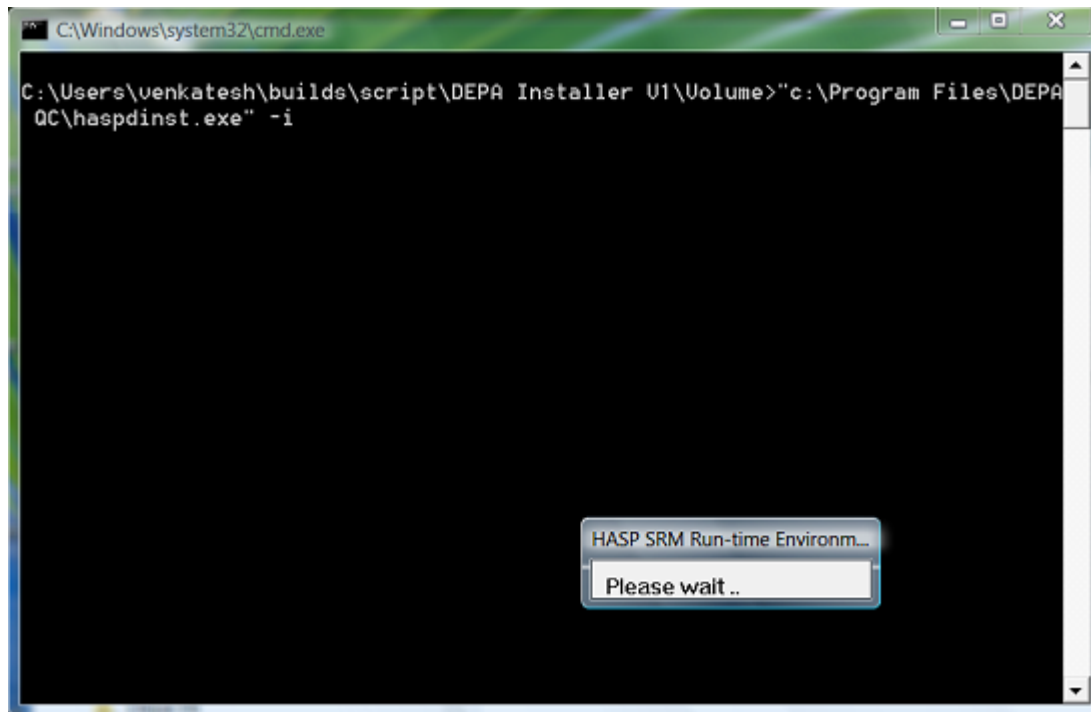
7



Click Next

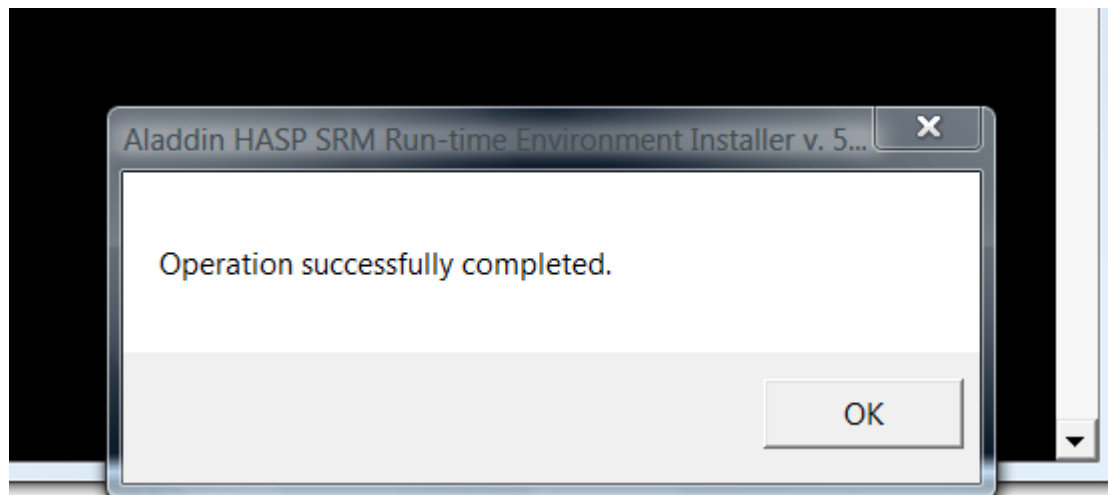
# V9 Installation

8



Wait for automated  
Run-Time Environment  
Setup

9



Click OK

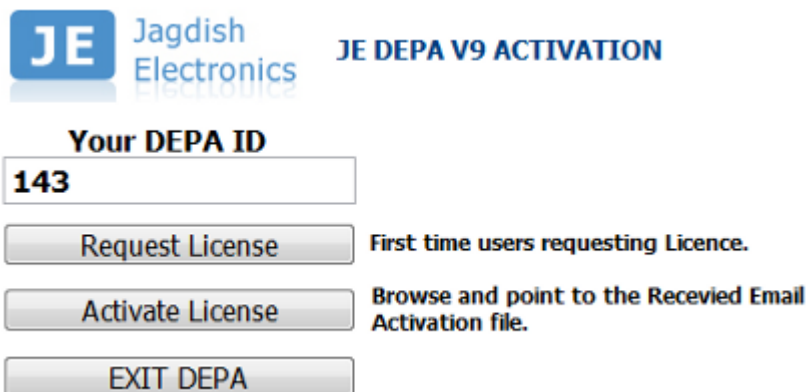
Congratulations! You have successfully installed JE DEPA V9.



# V9 Activation

- 1  Double Click on the DEPA V9 Desktop Icon to launch the application.

- 2 First time activation attempt opens window below. Click on **REQUEST LICENSE**.



**JE** Jagdish Electronics **JE DEPA V9 ACTIVATION**

**Your DEPA ID**  
143

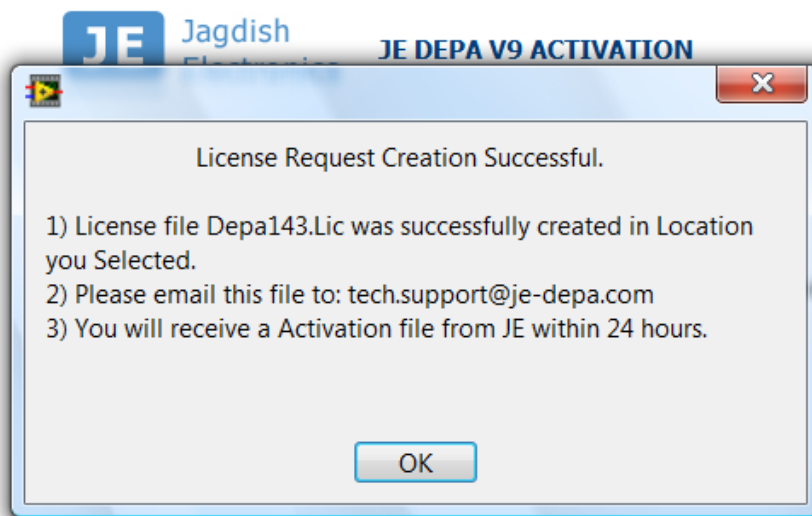
Request License First time users requesting Licence.

Activate License Browse and point to the Received Email Activation file.

EXIT DEPA

- 3 Browse to location for storing the License Request file (.Lic). **Click OK**.

- 4 Once License Request file is successfully created. Mail to [tech.support@je-depa.com](mailto:tech.support@je-depa.com)  
You will receive a License Activation file (.Act) within 24 hours.



Click OK

# V9 Activation

- 5 Download and Save the License Activation file (.Act) mailed to you by JE in any local folder (e.g. Desktop)
- 6 Double click on the DEPA V9 Icon to open window below and click on **ACTIVATE LICENSE**. Browse and point to the downloaded license activation file above. **Click OK**.

**JE** Jagdish Electronics **JE DEPA V9 ACTIVATION**

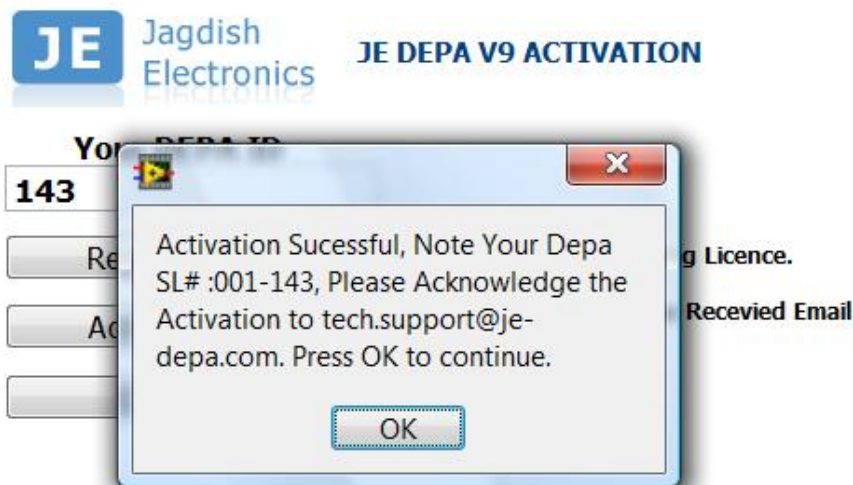
**Your DEPA ID**  
**143**

**Request License** First time users requesting Licence.

**Activate License** Browse and point to the Received Email Activation file.

**EXIT DEPA**

- 7 DEPA V9 automatically moves the license activation file (.Act) to the appropriate DEPA V9 folder and activates your copy of V9
- 8 The Activation Successful Screen below indicates a successful activation. Please send a conformation email to [tech.support@je-depa.com](mailto:tech.support@je-depa.com). Please include the **DEPA Serial#** in your email.



Click OK

Congratulations! DEPA V9 is now activated ready for use.

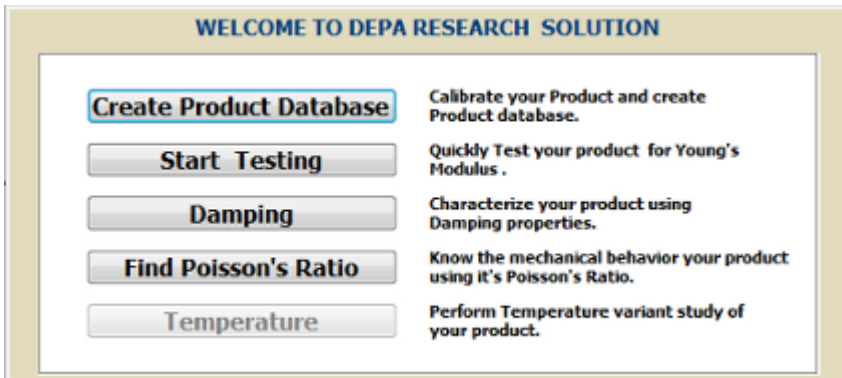


# V9 Activation

9



Double Clicking on the DEPA icon brings up the DEPA V9 Welcome Screen that launches the User Interface.

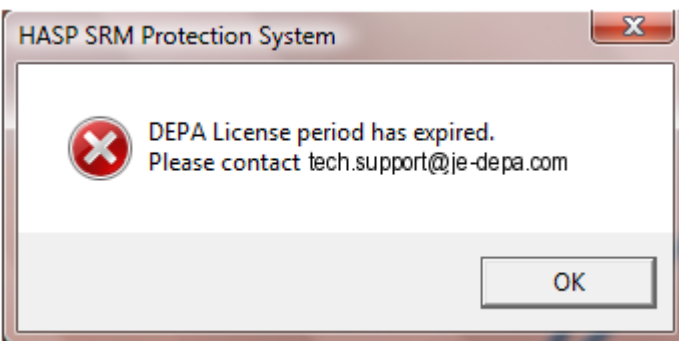


10

If you are unable to activate DEPA or get an error message, please email JE at [tech.support@je-depa.com](mailto:tech.support@je-depa.com) and include the **DEPA Serial#**.

11

Upon License expiry, the following message will be displayed. A new license will be required to re-activate DEPA V9. Please email JE at [tech.support@je-depa.com](mailto:tech.support@je-depa.com) and include the **DEPA Serial#** in your email.



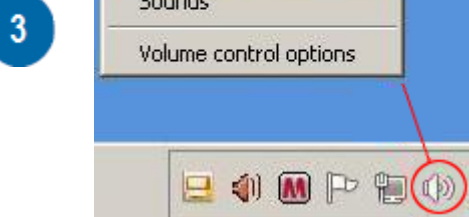
Click OK

# Sound Card Configuration (Windows 7)



1 Correct setup of your system's sound card is critical step for an error free DEPA V9 experience

2 Connect the sensor to the MIC input of your computer (please double check this step as its a common user error)



**Right Click** on the Speaker Icon in the Windows Task Bar

Select "**Recording Devices**" Option

4 Goto the Recording Tab



Ensure that the Microphone is working by a test tap.

**Proper sound sensing is indicated by the green indicator bars.**

If Microphone is NOT Working



DEPA V9 will not work until Audio Driver is properly installed or Hardware issues with your computer are addressed.

# Sound Card Configuration (Windows 7)



1 In the Sound window click on the Microphone button to enable the **PROPERTIES** Icon and then click on it



3 In the Microphone Properties window, go to the **Levels** Tab

4 Slide and set the **Microphone** sensitivity to 100

Slide and set the **Microphone Boost** settings bar based on the following table:

Normal Settings	Noisy Environment Settings	Very Thin, Small Samples Settings
+10 dB	0 dB	+20dB



Click OK

# ◀ [Table of Contents](#) [Link!](#) Sound Card Configuration (Vista)

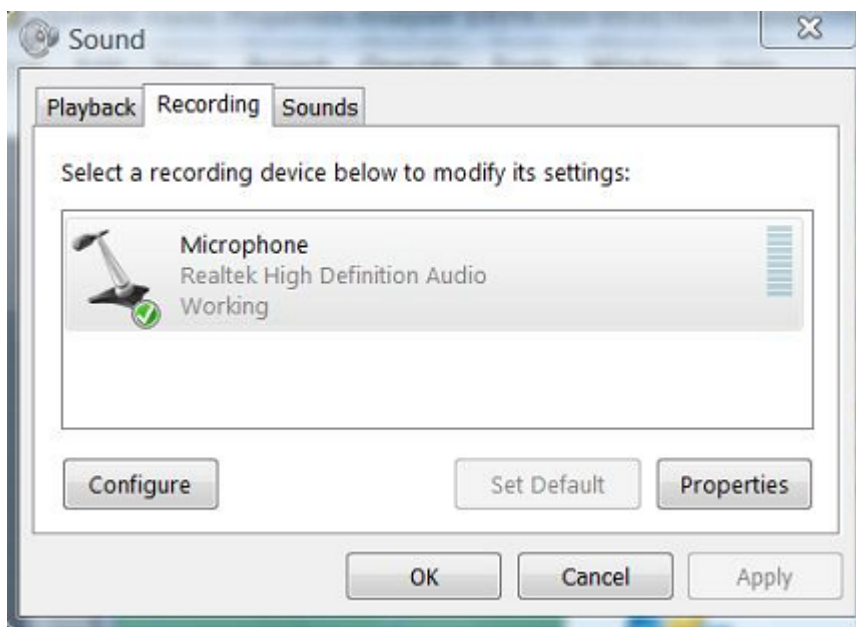


1 Correct setup of your system's sound card is critical step for an error free DEPA V9 experience

2 Connect the sensor to the MIC input of your computer (please double check this step as its a common user error)



4 Goto the Recording Tab



Ensure that the Microphone is working by a test tap. Proper sound sensing is indicated by the green indicator bars.

If Microphone is NOT Working



DEPA V9 will not work until Audio Driver is properly installed or Hardware issues with your computer are addressed.



# Microphone Sensitivity Settings (Vista)



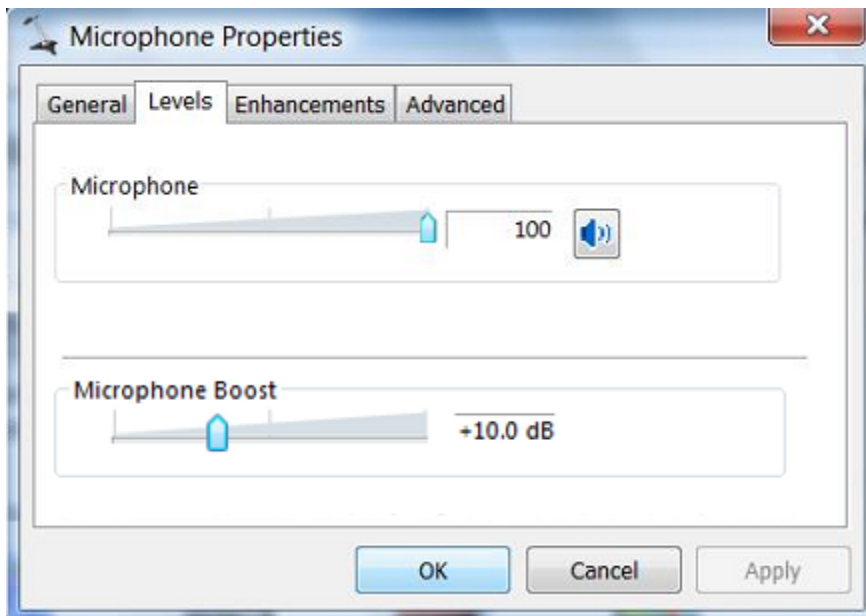
1 In the Sound window click on the Microphone button to enable the PROPERTIES Icon and then click on it



3 In the Microphone Properties window, ensure that the MIC is enabled and sensitivity is set to 100

4 In the Microphone Properties window, slide and set the Microphone Boost settings bar based on the following table:

Normal Settings	Noisy Environment Settings	Very Thin, Small Samples Settings
+10 dB	0 dB	+20dB



Click Apply

Click OK

# [Table of Contents](#) [Link!](#) Sound Card Configuration (XP)



1 Correct setup of your system's sound card is critical step for an error free DEPA V9 experience

2 Connect the sensor to the MIC input of your computer (please double check this step as its a common user error)

3    

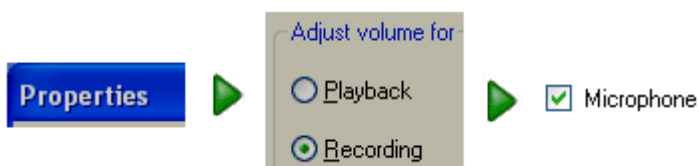
4 In the "Sounds and Audio Devices Properties" window select the "Audio" tab and in the "Sound Recording" Section click on the "Volume" button.



5 In the "Recording Control Window". **Check "Select" box to enable Microphone.** Then click on "Options" drop down menu and then on "Properties"



6 In the "Properties" window under "Adjust Volume for Recording" ensure that the Volume controls for Microphone is checked. This ensures that your Microphone is turned ON and controls will be displayed.



# Microphone Sensitivity Settings (XP)

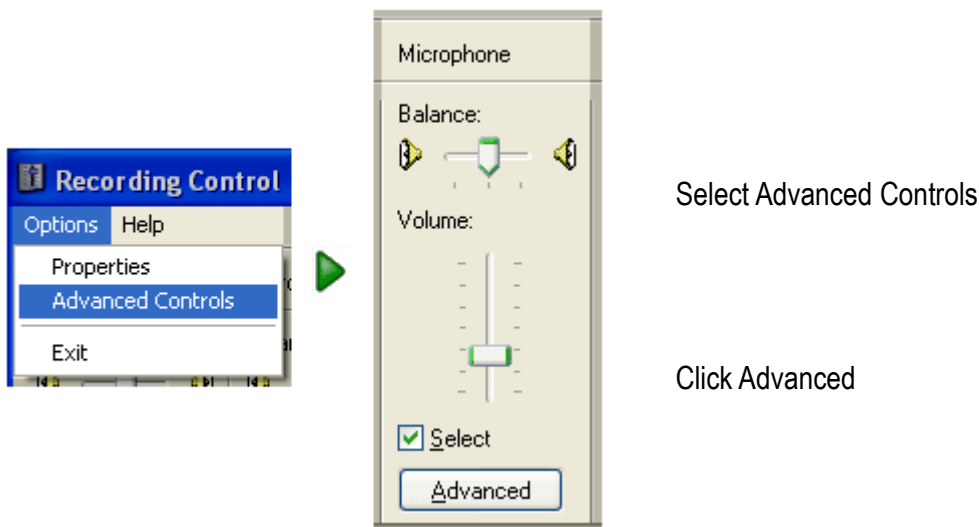


- 1 In the Recording Control Window, set the Microphone Volume to the values based on the table below:

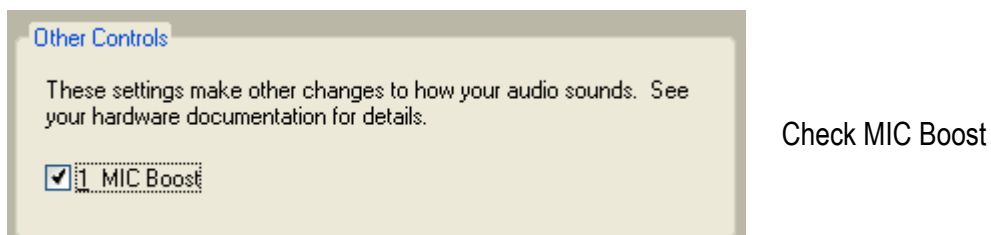
Normal Settings	Noisy Environment Settings	Very Thin, Small Samples Settings
Full Volume	Volume at 2 below full	Full Volume AND <i>Advanced Settings</i>

ADVANCED SETTINGS BELOW ARE FOR VERY THIN SAMPLES OR SMALL SAMPLES ONLY

- 2 In the "Recording Control" Window in the "Options" drop down menu select "Advanced Controls". An "Advanced" button is added and enabled in the Microphone settings Column. Click on the "Advanced" Button.



- 3 In the "Advanced Controls for Microphone" Window in the "Other Controls" section check "MIC Boost". This will amplify the MIC input for the hard to sense samples.



# DEPA V9 User Interface

## Fast Fourier Transform (FFT) Graph

Shows Peak Frequency of Vibration

## Shape Window

Displays current Shape selected, Sensor and Tapping Positions and Ideal Sample Dimensions

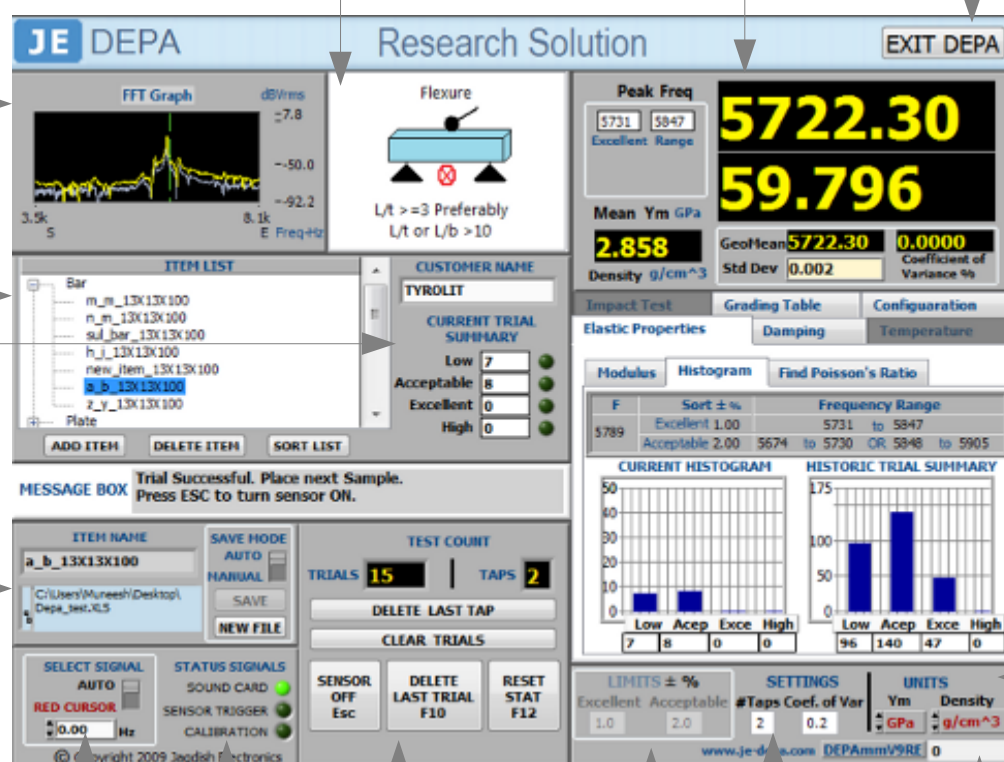
## Main Output Window

Displays Current Test Output

- Peak Frequency (or G#) and Young's Modulus (YM)
- Density (p)
- Mathematical Statistics
- Calibrated Excellent Range and Grading Table Placement

## Exit DEPA Button

Ensures that application exits after committing all temporary file data



## Save Mode Control

Allows Save Mode Settings and displays current Save Item Name and File Path.

## Online Status Signals

Displays dynamic status of critical system criteria

## Performance Limits Setting

Sets "Excellent" and "Acceptable" % ranges for Calibrated Items

## DEPA Serial Number

Unique Serial Number specific to your Installation

## Module Display

Display area for Module specific data

## Select Signal Window

Enables an advanced "Red Cursor" bulk testing mode

## Test Controls

Central console for major test controls

- Sensor ON/OFF
- Tap Controls
- Trial Controls
- Resetting all Statistics
- Current Trial and Tap Counts

## Test Settings Window

Allows setting number of Taps per Trial and Coefficient of Variance between the taps for a valid trial.

## Units Window

Allows YM and Density to be displayed in MKS or FPS Units

## Item Database Interface

Central console for DEPA Testing

- Shape Selection
- Item Calibration
- Online Manipulation of Item Database

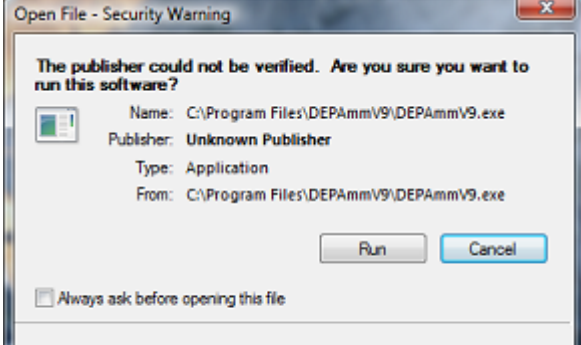
# Your First DEPA V9 Test

DEPA V9 ships with a pre-calibrated steel bar and a factory created entry for the bar in the Item Database. In this important first step, we test the proper functionality of DEPA V9 by revalidating the bar against the factory created entry.

**RECOMMENDATION: Perform this validation test before starting any DEPA V9 session.**


1 Connect the sensor to the MIC input of your computer (please double check this step as its a common user error)

2 Double Click  to launch the DEPA V9 Application

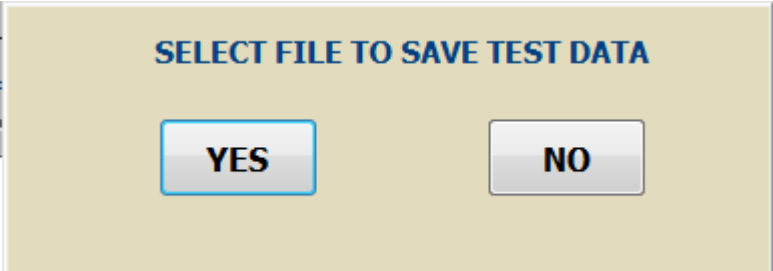
3  Uncheck "Always ask before opening this file"

Click Run

DEPA V9 Welcome Screen launches

4  Click "Start Testing"

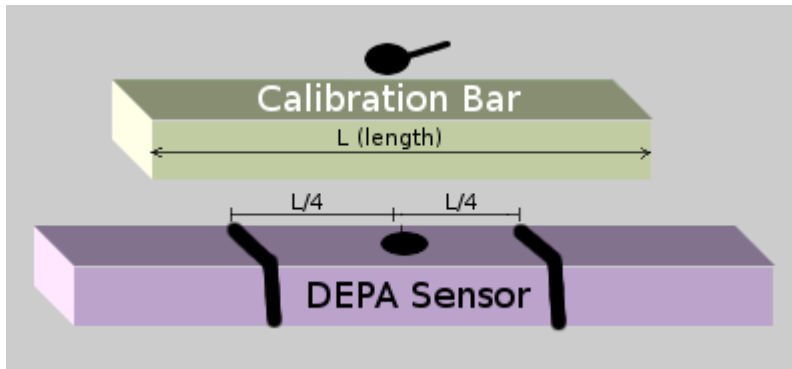
5 Do you want to save the results of the calibration test? For now, select "NO"  
The DEPA V9 GUI launches.

 Click "NO"

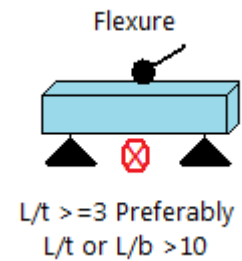
**RECOMMENDATION: Create a single file for storing daily DEPA V9 calibration data for a record of every session.**

# Your First DEPA V9 Test

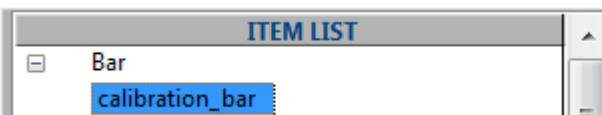
- 6 Place the rubber band supports on the DEPA sensor at a distance of (L/4) on either side of the sensor microphone



Shape Window Illustration in DEPA V9



- 7 Place the calibration bar on top of the rubber band supports with the center of the bar directly over the microphone. From the top, gently tap the calibration bar in the center to register a Tap.



Expand the “Bar” shape menu in the Item List

**Double click** “calibration\_bar” entry to select it.

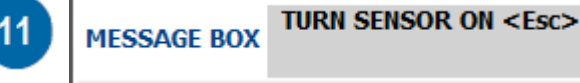
DEPA V9 populates all configurations of the calibration bar test done at JE factory.



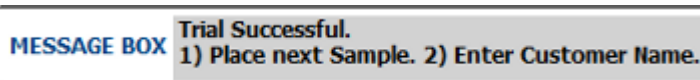
Enter any string in the Customer Name Box  
**RECOMMENDATION:** Enter a string with date of the test. This helps track data with ease if being saved



Since correct mass is already populated from the Database,  
**Press the Tab key to goto the next step.**



Turn the Sensor ON by mouse click (or press Esc)



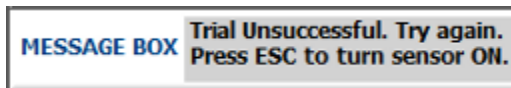
Tap the Calibration bar gently 2 times using the Tapper as shown in **Step 6** to register a successful trial.





# Your First DEPA V9 Test

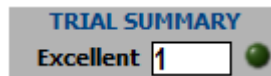
- 12 If you make a mistake with a tap. You can delete it by clicking "Delete Last Tap" or "Reset Stats" (see [Basic Test Controls](#) [Link](#)).
- 13 If you register Trial Unsuccessful (below), since the two taps didn't coincide, Turn the Sensor ON <Esc>, Try again.



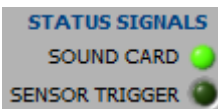
Registering a Successful Trial concludes the Calibration Test.

## Results to be Observed

14

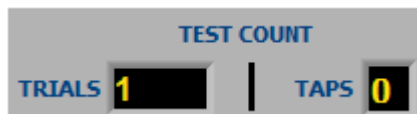


Excellent Count increments to 1  
Output signal relay glows momentarily on Increment

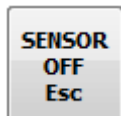


"Sound Card" Status signal should turn ON first time you turn Sensor ON and **REMAIN ON**

"Sensor Trigger" Status Signal flashes momentarily every time a tap is sensed



After two successful Taps:  
1. Trials Count increments to 1  
2. Taps Count resets to 0



"Sensor" turns off after every Trial (2 registered successful Taps)

15

To retest, repeat from **Step 9** and tap twice.  
Excellent Trial Count increments to 2 and so forth

***Increment in the Excellent Trial Count indicates successful testing of the Calibration Bar validating the DEPA V9 installation as per JE specifications.***

# DEPA V9 Item Database Calibration

DEPA V9, introduces for the first time, a user customizable online Item Database of baseline test entries. Calibration is the process of creating an entry in the database.

Calibration optimizes the use of the DEPA V9 software. During Item Calibration:

- A baseline test entry is created in the Item Database.
- Any similar test sample can be efficiently compared against this baseline.
- Samples are dynamically sorted into user defined **Excellent**, **Acceptable**, **High** and **Low** ranges.
- Histograms of Current and Historical testing sessions are displayed online.
- DEPA V9 automates all software settings greatly improving test speed and reducing user error.

**RECOMMENDATION:** Create an Item Database of the baseline samples of your entire inventory.

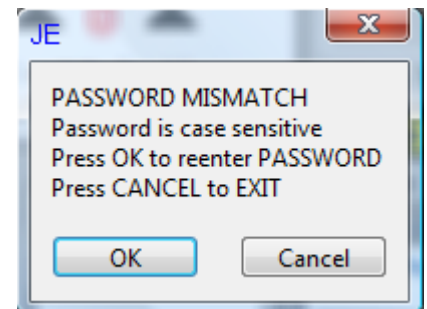
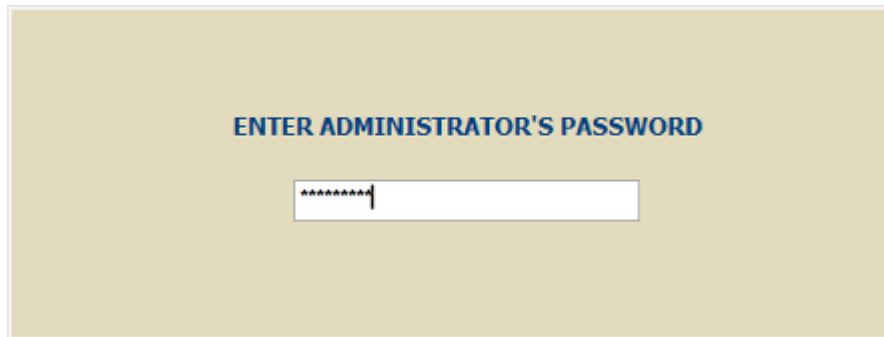
- 1 Initiate a Calibration session by either:
- i) Clicking on **"Create Product Database"** in the Welcome Screen
  - ii) Clicking on **"Add Item"** in the Item Database window of the GUI

**Create Product Database**

OR

**ADD ITEM**

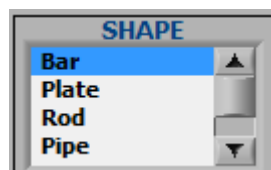
- 2 This section is password protected. Enter the Admin Password. First time users type in **"depa"**. Wrong password entry gives an error message. Click "OK" to reenter or "Cancel" to exit



- 3 **CALIBRATION**  The Calibration Status Signal comes ON

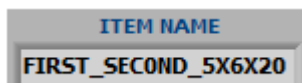
**Follow the instructions in the Message Box to guide you through the rest of the process**

- 4 **MESSAGE BOX** New Item Calibration Mode, Select Shape.



Select Item Shape

- 5 DEPA V9 uses the following naming convention for new entries in the Item Database  
**CALL GRADE\_INTERNAL GRADE\_DIMENSIONS**



We enter the CALL GRADE and INTERNAL GRADE fields next.

# DEPA V9 Item Database Calibration

6

MESSAGE BOX TYPE CALL GRADE

CALL GRADE  
FIRST

## Enter Call Grade

Alphanumeric string for 1st half of the name

TIP: Use the External Product name

7

MESSAGE BOX TYPE INTERNAL GRADE

INTERNAL GRADE  
SECOND

## Enter Internal Grade

Alphanumeric string for 2nd half of the name

TIP: Use the Internal/Factory Product name

8

MESSAGE BOX TYPE DIMENSIONS

Modulus    Abrsiv

Thickness(t)  
5.000 mm

Breadth(b)  
6.00 mm

Length(L)  
20.00 mm

Mass (m)  
3.000 g

## Enter the Dimensions and Mass

This menu will differ based on shape selected

9

4.564

Density g/cm<sup>3</sup>

UNITS

Ym    Density

GPa    g/cm<sup>3</sup>

g/in<sup>3</sup>  
✓ g/cm<sup>3</sup>  
lb/ft<sup>3</sup>  
lb/in<sup>3</sup>

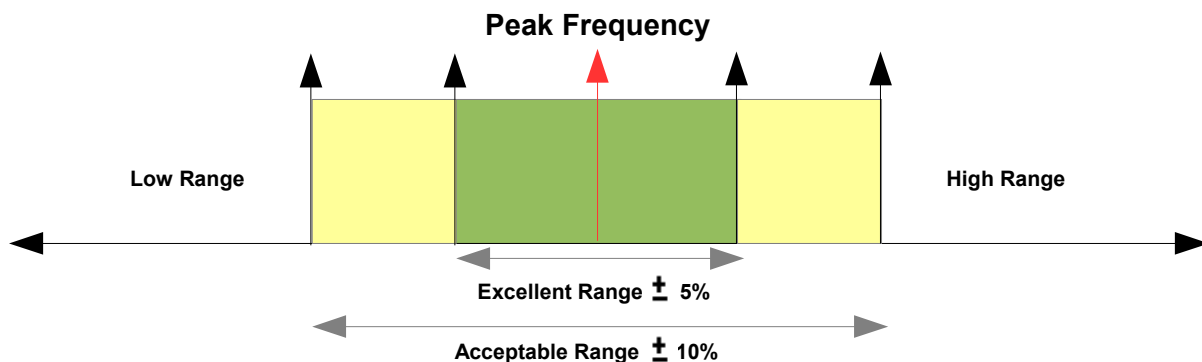
Density is calculated and displayed in the Output Window (top right of GUI under YM).

Use "Units" section (bottom right of GUI) to change Density units if desired.

10

## Performance Limits Setting

This is one of the most advanced features of DEPA V9. It allows the User to set custom performance limit % based on which all samples tested against the database entry will be sorted. *E.g. if we set **Excellent limit** = 5% and **Acceptable limit** = 10%:*



MESSAGE BOX TYPE EXCELLENT LIMIT

MESSAGE BOX TYPE ACCEPTABLE LIMIT

LIMITS  $\pm \%$

Excellent    Acceptable

5.0    10.0

## Enter the Excellent and Acceptable ranges (%)

NOTE: Excellent Range% < Acceptable Range%

**EXCELLENT** if  $-5\% < \text{Measured Frequency} < +5\%$

**ACCEPTABLE** if  $+5\% \leq \text{Measured Frequency} \leq +10\%$  OR  $-10\% \leq \text{Measured Frequency} \leq -5\%$

**HIGH** if  $\text{Measured Frequency} > +10\%$

**LOW** if  $\text{Measured Frequency} < -10\%$

NOTE: If unsure of what values to set, leave it at the defaults. **Excellent Range = 2.5%, Acceptable Range = 5%**

# DEPA V9 Item Database Calibration

**11** MESSAGE BOX TURN SENSOR ON <Esc>  Place item on Sensor and turn Sensor ON

**12** MESSAGE BOX Tap 3 more times  
MESSAGE BOX Tap 2 more times  
MESSAGE BOX Tap 1 more time

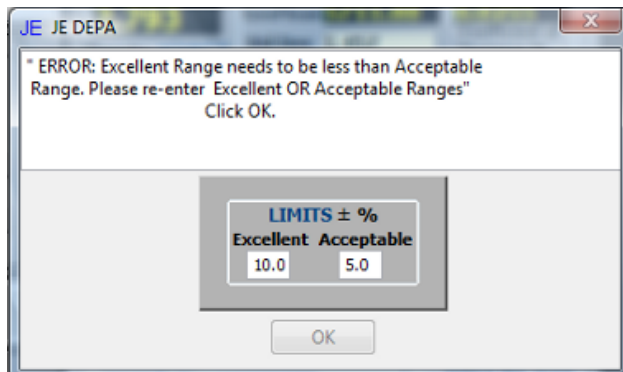
Place tap the test item three (3) times to register a Successful Calibration. Item placement will differ based on shape

**13** If you get an "Calibration Failed" message below, RESET STAT first then Turn Sensor ON [Step 11] and try three (3) taps again [Step 12].

MESSAGE BOX Calibration Failed, Please Try again. THEN  AND 

**14** DEPA V9 performs a final validation of the collected data:

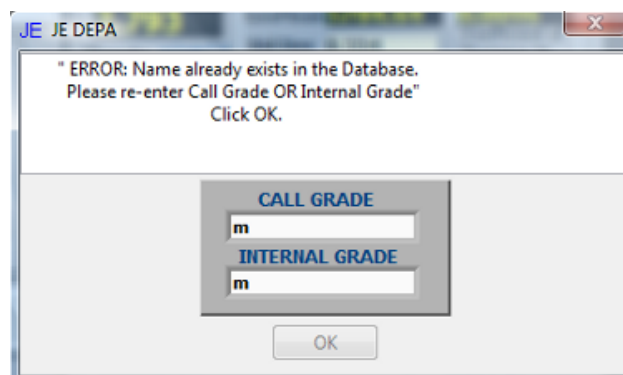
MESSAGE BOX "Validating data entries"



If you see this message:

**Re-enter the Excellent and Acceptable ranges.**

Click OK



If you see this message:

**Re-enter the Call Grade and Internal Grade.**

Click OK

# DEPA V9 Item Database Calibration

15

MESSAGE BOX CALIBRATION SUCCESSFUL  
CLICK "SAVE DATABASE"

SAVE  
DATABASE

Click "Save Database" to save the entry


**THIS STEP IS MANDATORY**

16

ADD  
ITEM

OR

CLOSE  
DATABASE

CALIBRATION 

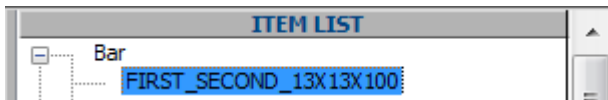
Click on "Add Item" to start another Calibration session

OR

"Close Database" to end Calibration and start testing . Calibration signal goes OFF.

17

CONGRATULATIONS! You have successfully created an entry in the Item Database.

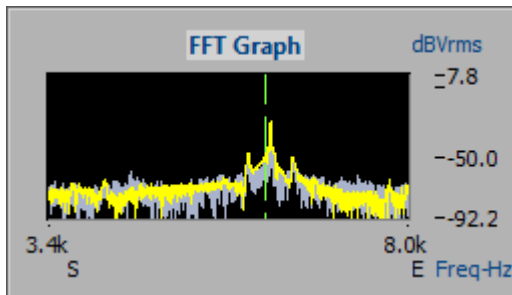


The newly created entry appears in the Item Database Tree under the selected shape

**The following information is stored for every entry in the Item Database:**

ITEM NAME  
FIRST\_SECOND\_5X6X20

Item Name



Automated range setting for Graph

Peak Freq

1229.28

Peak Frequency (Green dashed line)

Modulus Abrisiv  
Thickness(t)  
5.000 mm  
Breadth(b)  
6.00 mm  
Length(L)  
20.00 mm  
Mass (m)  
3.000 g

Dimensions and Mass (so in effect also Density)

LIMITS  $\pm$  %  
Excellent Acceptable  
5.0 10.0

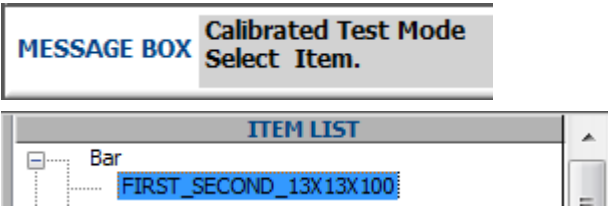
Performance Limits



# Testing Against a Calibrated Item

Test samples are sorted based on comparison against a Baseline entry in the Item Database

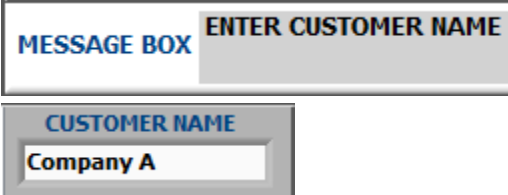
- 1



Expand the shape menu in the Item List

**Double click** on the Item entry of interest

DEPA V9 populates all configuration details of the Item selected
- 2




Enter a Customer Name

For current sample, the Trial stored in the Output file will reference this Customer


TIP: Use name that uniquely identifies this test
- 3

Place the sample on the sensor as shown in the “**Shape Window**” Top Center of GUI

This will differ based on shape selected
- 4




Enter the mass of the Sample
- 5

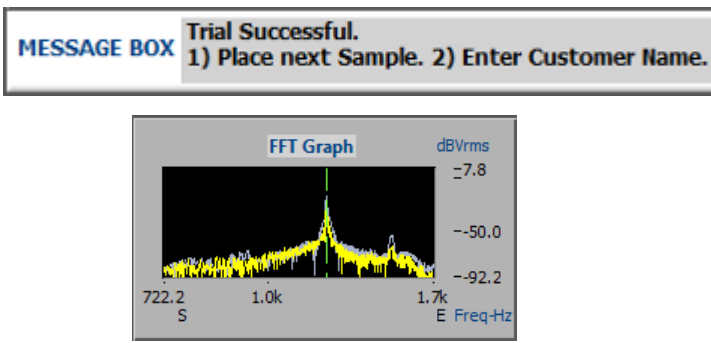


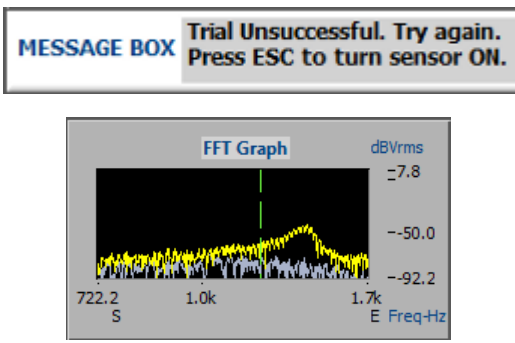
Turn the Sensor ON <Esc>
- 6

Tap the sample **2** times to register a Successful Trial. This concludes the test. Just that simple folks!


- You will register either a “Successful” Trial or an “Unsuccessful” Trial. Unsuccessful trials are simply discarded. If you register Trial Unsuccessful (right), since the two taps didn't coincide, Turn the Sensor ON <Esc>, Try again.

7




- 8

To test another *identical* sample goto **Step 2**

To test against another stored Item in the database goto **Step 1**

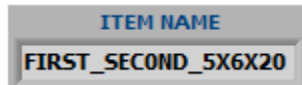


# Testing Against a Calibrated Item

## Calibrated Test Mode – Understanding the Results

When an item is selected from the Database, the following information is auto-populated into DEPA V9:

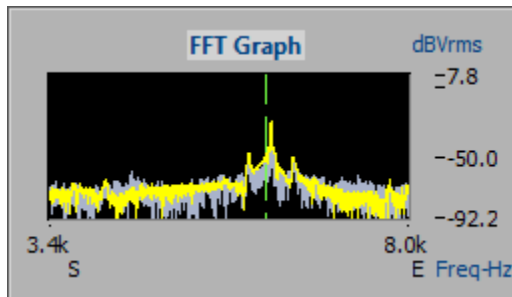
1



ITEM NAME  
FIRST\_SECOND\_5X6X20

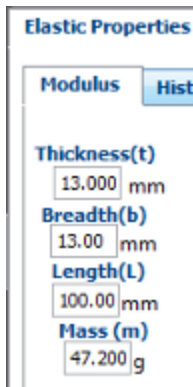
- Item Name

2



- A Green Bar is placed in the FFT graph where the Peak Frequency is expected.
- DEPA resets the graph range to center it around the expected Peak Frequency.
- Blue and yellow superimposed graphs of individual taps on the same test item are displayed.
- Correlation of the taps to each other and the proximity of the highest peak to the value saved in the DB can be seen.

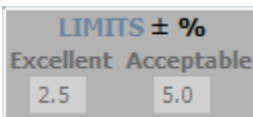
3



Elastic Properties  
Modulus Hist  
Thickness(t)  
13.000 mm  
Breadth(b)  
13.00 mm  
Length(L)  
100.00 mm  
Mass (m)  
47.200 g

- Item dimensions and mass (and density) are auto-populated.
- Of these fields, the **Mass** is editable during regular testing.

4



LIMITS ± %  
Excellent Acceptable  
2.5 5.0

- Excellent and Acceptable ranges are auto populated.
- These fields are grayed out and not editable.

5

After two successful taps (Trial), the results of the test are displayed in the Output Window (Top right of the GUI)



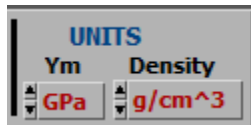
Peak Freq  
5484 5766  
Excellent Range  
Mean Ym GPa  
2.793  
Density g/cm<sup>3</sup>  
GeoMean 5420.58  
Std Dev 52.435  
0.0007  
Coefficient of Variance %

- Peak Frequency (Hz) and the "Excellent" range
- Mean YM (GPa) between the two taps
- Mean Frequency(Hz) between the two Taps
- Standard Deviation
- Coefficient of variance (%) between the two Taps
- Density (gms/cc)

# Testing Against a Calibrated Item

## Calibrated Test Mode – Understanding the Results

6

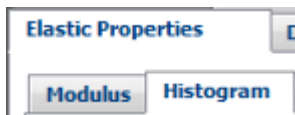


To change the display units of Density and YM click on the UNITS selection window (Bottom Right corner) of the GUI.

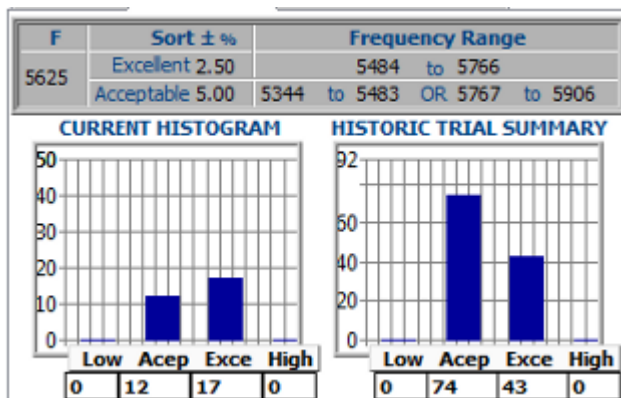
## Histogram

7

DEPA V9 introduces an advanced Histogram feature to dynamically display real time test count statistics.



In "Elastic Properties" window goto the "Histogram" tab.



For the Item selected in the Database the table displays:

- Peak Frequency (F)
- Excellent and Acceptable Ranges (%)
- Excellent and Acceptable frequencies as per the ranges

Histograms displayed:

- **Current Histogram:** Test Sort count of the current session
- **Historic Trial Summary:** Aggregate Test Sort count of all tests conducted since the creation of the entry in the DB.

# DEPA V9 Single Test Mode

Single item test. In this mode the test is stand alone without being compared to any entry in the Item Database.

- 1

MESSAGE BOX Single test Mode Select Shape.

ITEM LIST  
+ Bar

Double Click on the **shape** name to select it.
- 2

MESSAGE BOX ENTER CUSTOMER NAME

CUSTOMER NAME

## Select a Customer Name

For current sample, the Trial stored in the Output file will reference this Customer

TIP: Use name that uniquely identifies this test
- 3

MESSAGE BOX TYPE CALL GRADE

CALL GRADE  
FIRST

## Enter Call Grade

Alphanumeric string for 1st half of the name

TIP: Use the External Product name
- 4

MESSAGE BOX TYPE INTERNAL GRADE

INTERNAL GRADE  
SECOND

## Enter Call Grade

Alphanumeric string for 2nd half of the name

TIP: Use the Internal/Factory Product name
- 5

MESSAGE BOX TYPE DIMENSIONS

Modulus Abrsiv

Thickness(t)  
5.000 mm

Breadth(b)  
6.00 mm

Length(L)  
20.00 mm

Mass (m)  
3.000 g

## Enter the Dimensions and Mass

This menu will differ based on shape selected
- 6

4.564  
Density g/cm^3

UNITS

Ym Density

GPa g/cm^3

g/in^3

✓ g/cm^3

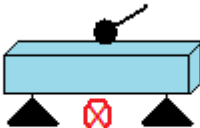
lb/ft^3

lb/in^3

Density is calculated and displayed in the Output Window (top right of GUI under YM).

Use "Units" section (bottom right of GUI) to change Density units if desired.
- 7

Flexure




L/t >=3 Preferably  
L/t or L/b >10

Place the sample on the sensor as shown in the "Shape Window"

This will differ based on shape selected

# DEPA V9 Single Test Mode

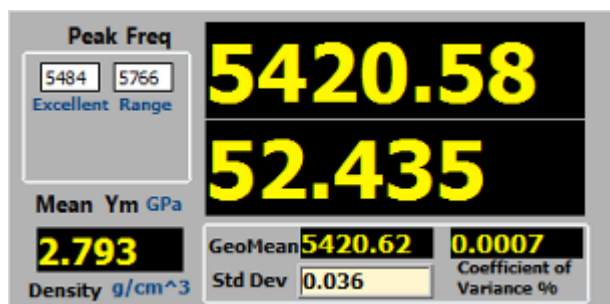
- 8 MESSAGE BOX TURN SENSOR ON <Esc>  Turn the Sensor ON <Esc>
- 9 MESSAGE BOX Tap 2 more times  
MESSAGE BOX Tap 1 more time  
MESSAGE BOX Trial Successful.  
1) Place next Sample. 2) Enter Customer Name.
- 10 If you make a mistake with a tap. You can delete it by clicking "**Delete Last Tap**" or "**Reset Stat**"  
If you register Trial Unsuccessful (below), since the two taps didn't coincide, **Turn the Sensor ON <Esc>**, Try again.

MESSAGE BOX Trial Unsuccessful. Try again.  
Press ESC to turn sensor ON.

To test another sample for a different customer goto **Step 2**  
To test another new independent shape goto **Step 1**

## Single Test Mode – Understanding the Results

- 11 After two successful taps (Trial), the results of the test are displayed in the Output Window (Top right of the GUI)



- Peak Frequency (Hz) and the "Excellent" range
- Mean YM (GPa) between the two taps
- Mean Frequency(Hz) between the two Taps
- Standard Deviation
- Coefficient of variance (%) between the two Taps
- Density (gms/cc)

- 12 UNITS  
Ym Density  
GPa g/cm<sup>3</sup>

To change the display units of Density and YM click on the UNITS selection window (Bottom Right corner) of the GUI.

# Closing DEPA V9

---

- 1 Click on "EXIT DEPA" (top right of the GUI) to commit all uncommitted data and exit the application safely. **IMPORTANT!**

EXIT DEPA

# Basic Test Controls and Terminology

◀ [Table of Contents](#) [Link!](#)

MESSAGE BOX

ENTER CUSTOMER NAME

Message Box gives hints on next steps

## Main Test Controls

TEST COUNT

TRIALS 0

TAPS 1

DELETE LAST TAP

CLEAR TRIALS

SENSOR OFF Esc

DELETE LAST TRIAL F10

RESET STAT F12

ITEM NAME

new\_item\_13X13X100

SAVE MODE

AUTO

MANUAL

SAVE

NEW FILE

C:\Users\Muneesh\Desktop\Depa\_test.XLS

- Trials ▶ Trial Count of current session
- Taps ▶ Tap Count of current session
- Delete Last Tap ▶ Click to delete wrong tap
- Clear Trials ▶ Soft Reset of Trial Count  
Saved data unaffected.
- Sensor ON/OFF ▶ Button turns sensor ON/OFF  
Turns OFF after trial success
- Delete Last Trial ▶ Soft delete of previous trial
- Reset Stat ▶ Delete Last Tap+Clearing of all  
Mathematical Statistics
- Item Name ▶ Current test item name stored in O/P file
- Path ▶ Path to the O/P file
- Save Mode ▶ AUTO: Successful trials stored automatically  
MANUAL: Successful trial stored on pushing SAVE
- New File ▶ Click to create NEW or different O/P file

DEPA V9 Terminology	Details
Tap	Every time a sample is excited and a reading is sensed by the DEPA Software
Trial	Two (2) subsequent taps on the SAME sample with a Coefficient of Variance less than (<) 0.1. <b>DEPA V9 Software stores successful Trials and not individual Taps.</b>
Item Database	User created online Database of baseline test entries against which test samples can be compared.
Calibration	Process of making an entry into the Item Database
Calibrated Test Mode	Mode of DEPA testing in which tested samples are being compared against an entry in the Item database.
Single Test Mode	Mode of DEPA testing in which a stand alone test is being performed.



# Young's Modulus Ranges of Test Materials

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Material	Young's Modulus (GPa)	Young's Modulus lbf/in <sup>2</sup> (psi)
Rubber (small strain)	0.01-0.1	1,500-15,000
PTFE (Teflon)	0.5	75,000
Polyethylene (low density)	0.2	30,000
Polypropylene	1.5-2	217,000-290,000
Polystyrene	3-3.5	435,000-505,000
Nylon	2-4	290,000-580,000
Fiber board (medium density)	3.654	530,000
Wood (along grain)	8.963-11	1,300,000-1,600,000
High-strength Concrete (under compression)	30	4,350,000
Glass fiber reinforced plastic (70/30 by weight fibre/matrix, along grain)	40-45	5,800,000-6,500,000
Magnesium (Mg)	45	6,500,000
Aluminium (Al)	69	10,000,000
Abrasive Ceramics (vitrified/bonded)	20-90	2,900,000-13,530,000
Glass	50-90	7,251,000-13,530,000
Mother-of-Pearl (nacre, largely calcium carbonate)	70	10,000,000
Brass and Bronze	100-125	17,000,000
Titanium (Ti) and Titanium Alloys	105-120	15,000,000-17,500,000
Copper (Cu)	117	17,000,000
Carbon fiber reinforced plastic (50/50 fibre/matrix, unidirectional, along grain)	125-150	18,000,000-22,000,000
Wrought Iron	190-210	27,550,000-30,450,000
Steel	200	30,000,000
Yttrium Iron Garnet (YIG)	193-200	28,000,000-30,000,000
Beryllium (Be)	287	42,000,000
Tungsten (W)	400-410	58,000,000-59,500,000
Sapphire (Al <sub>2</sub> O <sub>3</sub> ) along C-axis	435	63,000,000
Silicon Carbide (SiC)	450	65,000,000
Osmium (Os)	550	79,800,000
Tungsten Carbide (WC)	450-650	65,000,000-94,000,000
Single-Walled Carbon Nanotube	1,000+	145,000,000+
Diamond (C)	1220	150,000,000-175,000,000