**What is the IML Resistograph and how can it save you time and most important money?**

The Resistograph is a portable, battery operated wood decay detection micro drill that is the only testing method available that can test below grade including concrete-set poles without excavation and provide accurate and reproducible results for every test performed.

Testing with the PD Resistograph is an extremely easy process. The device is lightweight and self contained with point and click ease of use! There is no complicated setup required, large amount of heavy equipment to carry from pole to pole or extensive training required to use the instrument.

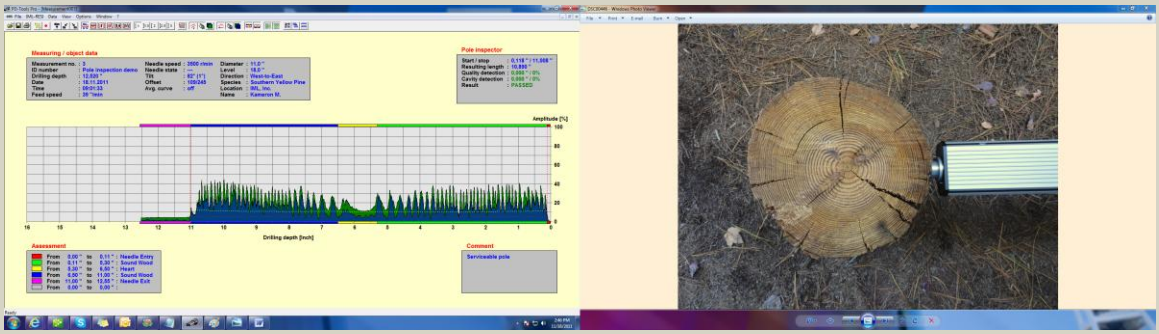
When combined with our Pole Inspector Pro software, developed specifically for the utility inspection industry it takes all of the guess work out of interpreting graph profiles and streamlines the process of analyzing the data collected.

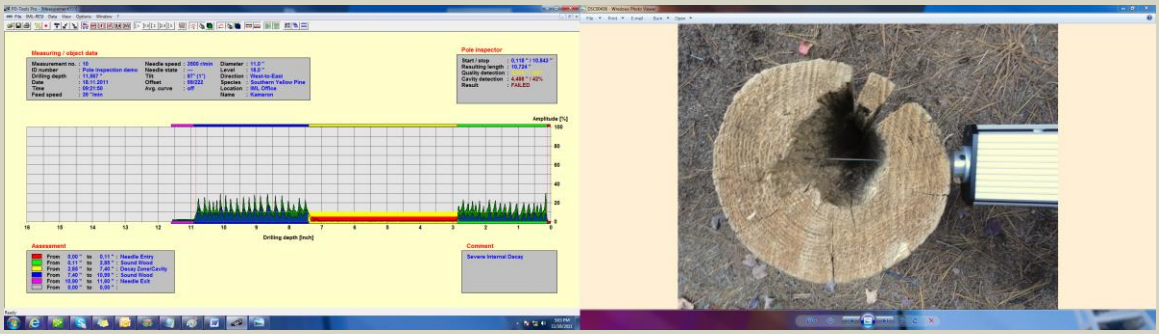
**Save Time**

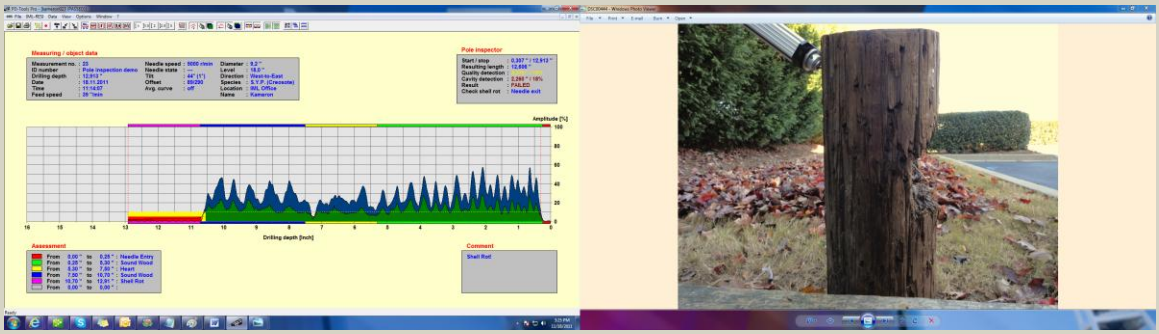
No setup is required to use the Resistograph, simply center the device on the pole to be inspected, select the desired drilling angle and press the start button. Each measurement takes under 30 seconds to complete, when used with Pole Inspector Pro the result will show as “Pass, Fail or Check for Shell Rot” immediately on the display along with the graph profile indicating if further inspection is required or not.

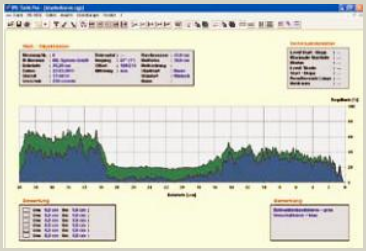
**Save Money**

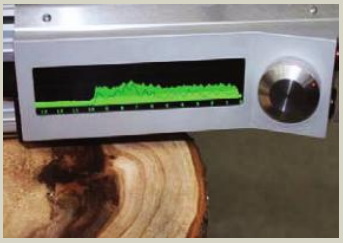
Replace no pole before it’s time. The information provided by the PD Series Resistograph will identify if decay is present, where is it starting and what stage it is in to assist in determining if treatment, bracing or replacement is necessary all without costly and time consuming excavation.
The PD Series Resistograph has an extremely low operating cost; the only consumable required is drill needles. The power comes from Lithium Ion batteries which have a long service life due to no memory effect or self discharge.









www.imlusa.com

## Take a Measurement

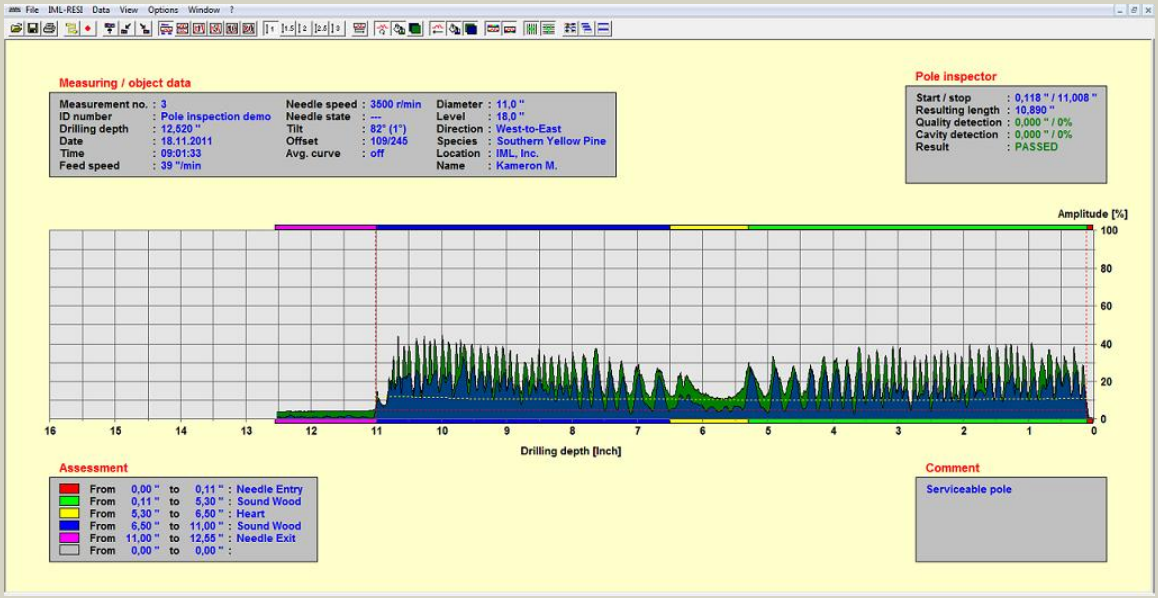
To take a measurement using the PD is as simple as placing the device against the pole in the center position at the desired angle (drilling angle is shown on the display) apply forward pressure on the instrument to disengage the safety lock and press the start button. Once the needle has exited the opposite side of the pole simply release the forward pressure and the needle will automatically retract completing the test.

## Download

The screenshot is what the output of the PD Resistograph will be when downloaded to a PC with our PD-Tools software included with the Resi package. The software allows the profile viewed at several different magnification levels of the X and/or Y axis, perform an annual ring analysis, an assessment report and view the Pole Inspector data, which the device automatically fills in along with conditions of the measurement. The information provided including the graph profile is exportable to .PDF, Word.doc, .XLS and other popular formats with our PD-Tools Pro package.

This profile is the common output from a sound utility pole. Each peak represents an annual ring, notice how close the annual rings are to each other toward the outer edges of the pole and in the center have a bit more distance between them. Looking at the graph, the Resistograph displays this exact structure of the rings. If we were to cross a crack during the inspection it would display as an area of zero amplitude (vertical gain on the graph) for however wide the actual crack is.

Pole Inspector Pro has determined this reading to be acceptable as seen in the box in the upper right corner, the last line reads “Passed”. The same message will also be displayed on the Resi after the measurement is complete. How Pole Inspector works is it determines the start and stop point of the test, measures the percentage of decay or a cavity that falls below an amplitude point, set by the user and also checks for shell rot at the end of the a profile.


File IML-RESI Data View Options Window ?
Measuring / object data
Measurement no. : 3
ID number : Pole inspection demo
Drilling depth : 12,520 "
Date : 18.11.2011
Time : 09:01:33
Feed speed : 39 "/min
Needle speed : 3500 r/min
Needle state : ---
Tilt : 82° (1°)
Offset : 109/245
Avg. curve : off
Diameter : 11,0 "
Level : 18,0 "
Direction : West-to-East
Species : Southern Yellow Pine
Location : IML, Inc.
Name : Kameron M.
Pole inspector
Start / stop : 0,118 " / 11,008 "
Resulting length : 10,890 "
Quality detection : 0,000 " / 0%
Cavity detection : 0,000 " / 0%
Result : PASSED
Amplitude [%]
100
80
60
40
20
0
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Drilling depth [Inch]
Assessment
From 0,00 " to 0,11 " : Needle Entry
From 0,11 " to 5,30 " : Sound Wood
From 5,30 " to 6,50 " : Heart
From 6,50 " to 11,00 " : Sound Wood
From 11,00 " to 12,55 " : Needle Exit
From 0,00 " to 0,00 " :
Comment
Serviceable pole

**Find Decay**

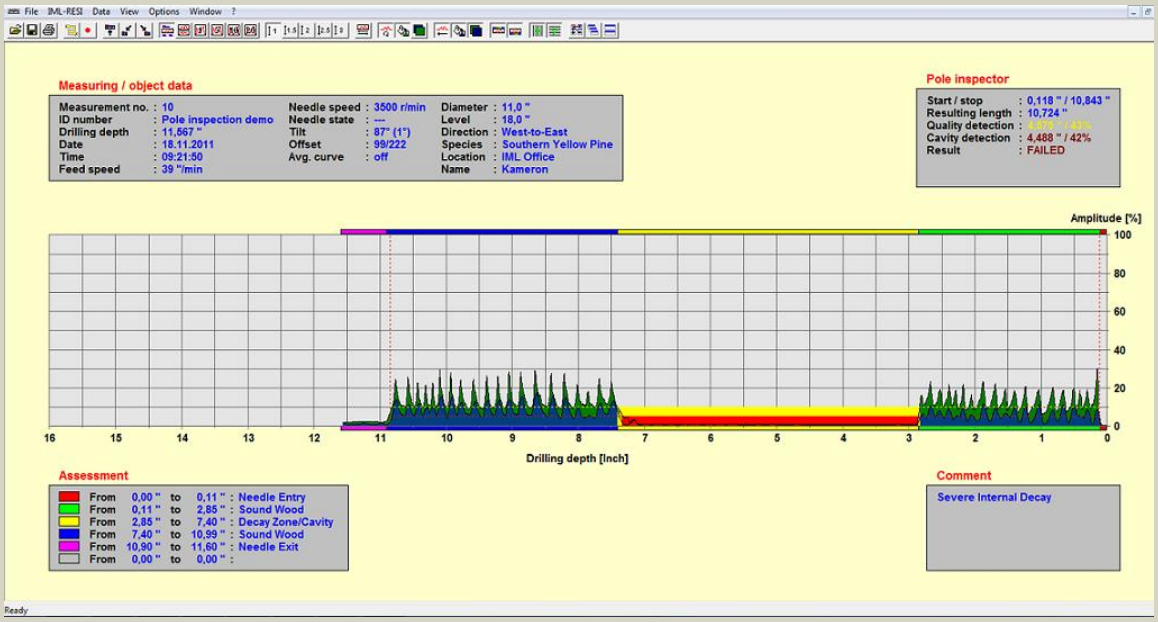
Here is a typical profile from a pole with a cavity; the needle is visible in the center where the hollow spot is.

Looking at the Pole Inspector box of this measurement you will see that “Quality Detection and Cavity Detection” are now highlighted along with a FAILED message.

Quality detection failure, shown by the yellow line in the graph and yellow text in the Pole Inspector box is due to the wood strength or density falling below the user adjustable amplitude and width percentages we have set the PD to send the warning message. This indicates that the pole does not have a cavity yet but is in the beginning stages of decay. The Resistograph has calculated that 43% of the pole’s diameter is in the decay zone.

The Cavity Detector, shown by the red line and text indicates that there is no wood fiber left in the area the needle has passed through. Cavities show on the graph as an area of zero amplitude as where decay will have very low amplitude compare to the sound sections of the pole. The fail level is also user adjustable as is the width, which would be set according to how large of a cavity is deemed acceptable.

When calculating the total area of decay, the Resistograph will take into account all areas of decay. An example is if a 10 inch diameter pole is being tested, first it finds an area of decay that is 2 inches wide, then travels through 3 inches of sound wood and finds another 4 inches of decay It will calculate a total decay area of 6 inches or 60% of the pole’s diameter decayed rather than looking only for large hollow areas.


File IML-RESI Data View Options Window ?
Measuring / object data
Measurement no. : 10
ID number : Pole inspection demo
Drilling depth : 11,567 "
Date : 18.11.2011
Time : 09:21:50
Feed speed : 39 "/min
Needle speed : 3500 r/min
Needle state : ---
Tilt : 87° (1°)
Offset : 99/222
Avg. curve : off
Diameter : 11,0 "
Level : 18,0 "
Direction : West-to-East
Species : Southern Yellow Pine
Location : IML Office
Name : Kameron
Pole inspector
Start / stop : 0,118 " / 10,843 "
Resulting length : 10,724 "
Quality detection : 4,478 " / 42%
Cavity detection : 4,488 " / 42%
Result : FAILED
Amplitude [%]
100
80
60
40
20
0
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Drilling depth [inch]
Assessment
From 0,00 " to 0,11 " : Needle Entry
From 0,11 " to 2,85 " : Sound Wood
From 2,85 " to 7,40 " : Decay Zone/Cavity
From 7,40 " to 10,99 " : Sound Wood
From 10,90 " to 11,60 " : Needle Exit
From 0,00 " to 0,00 " :
Comment
Severe Internal Decay
Ready

**Test Below Grade**

The 45 degree inspection shown is the most important; it will show the inspector the condition of the pole at the critical area 8-10 inches below ground where 90% of decay is found.

To test below ground, the Resistograph is placed at a 45 degree angle at ground level. In the picture the green line represents ground level. The display will show what angle the device is at giving an audible and visual alert when the correct angle is reached.

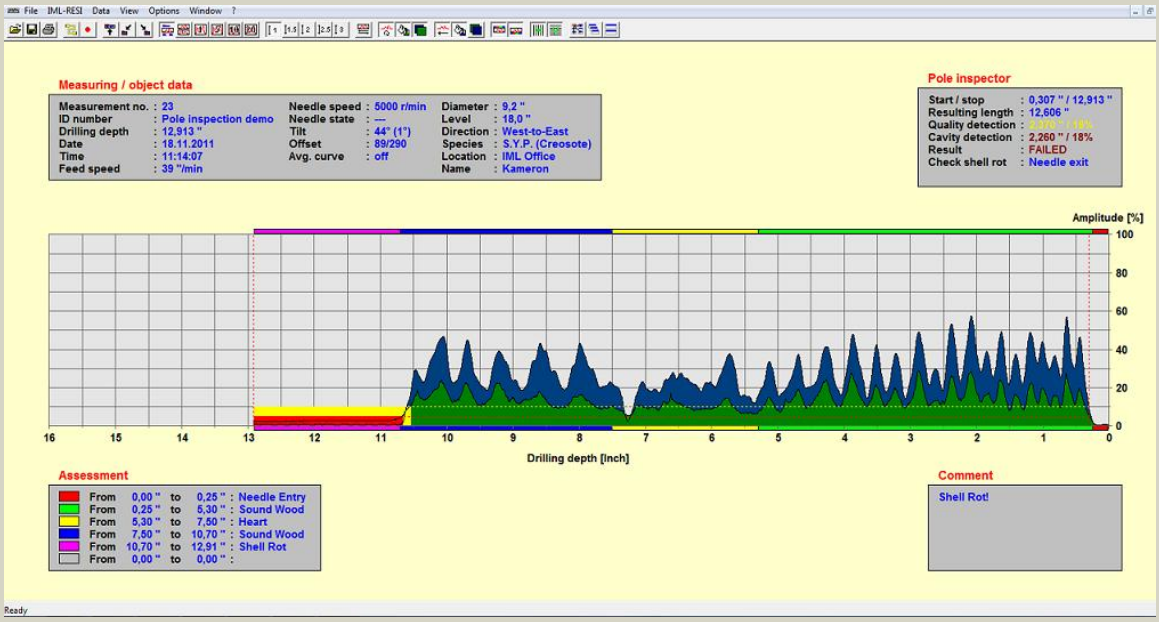
The dashed red line indicates where the edge of the pole should be if shell rot was not present. When held at the 45 degree angle the Resistograph will automatically calculate the distance the needle must travel to get to the exact edge of the pole using the formula:

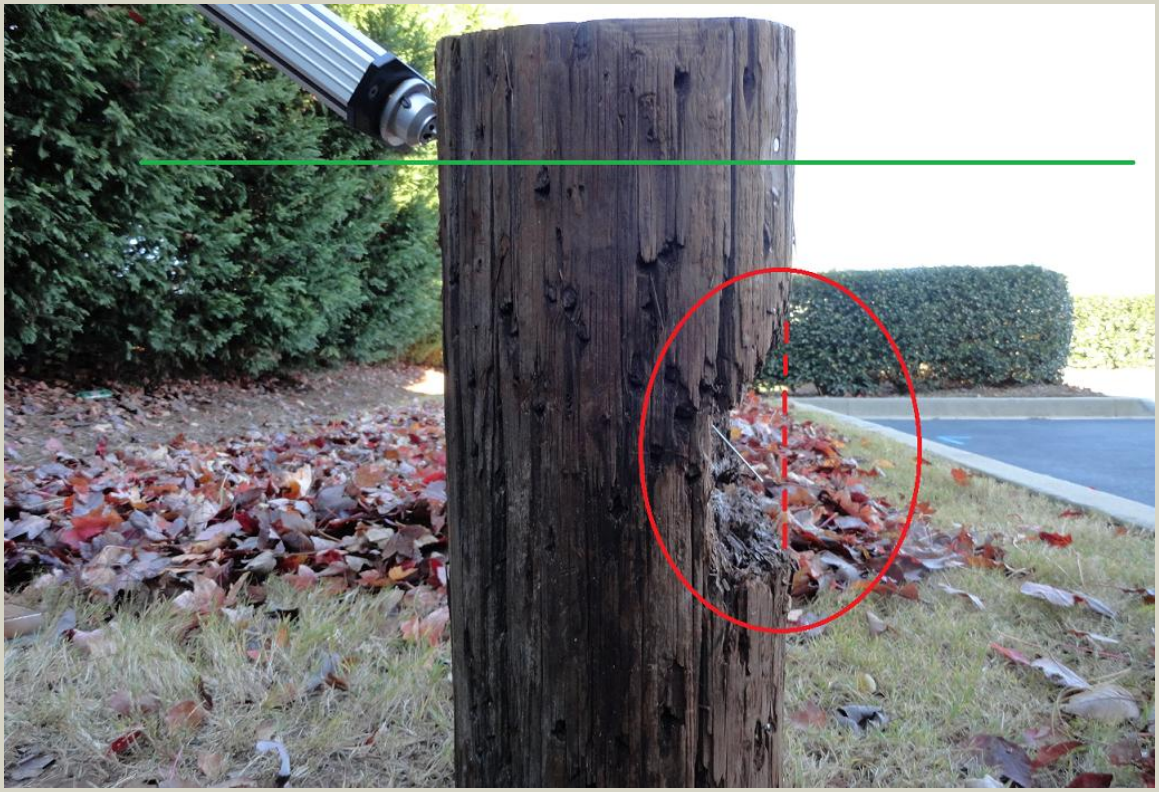
Diameter/ .71

In this case the diameter of the pole tested is 9.2 inches. The diameter can be found looking at the graph from a 90 degree drilling or using a set of calipers.

9.2 / .71= 12.95 inches

The graph should show positive amplitude the entire 12.95 inches of drilling depth, if the graph stops short of the calculated depth that indicates there is shell rot present. In the Pole Inspector box there is now a FAILED and Check for shell rot message also pointing out the area that needs to be looked at- the Needle exit. The profile shows we have 2.2 inches of shell rot or 18% of the diameter.
The Resistograph will also show the same information on the display.


File IML-RESI Data View Options Window ?
Measuring / object data
Measurement no. : 23
ID number : Pole inspection demo
Drilling depth : 12,913 "
Date : 18.11.2011
Time : 11:14:07
Feed speed : 39 "/min
Needle speed : 5000 r/min
Needle state : ---
Tilt : 44° (1°)
Offset : 89/290
Avg. curve : off
Diameter : 9,2 "
Level : 18,0 "
Direction : West-to-East
Species : S.Y.P. (Creosote)
Location : IML Office
Name : Kameron
Pole inspector
Start / stop : 0,307 " / 12,913 "
Resulting length : 12,606 "
Quality detection : 2,370 " / 18%
Cavity detection : 2,260 " / 18%
Result : FAILED
Check shell rot : Needle exit
Amplitude [%]
100
80
60
40
20
0
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Drilling depth [inch]
Assessment
From 0,00 " to 0,25 " : Needle Entry
From 0,25 " to 6,30 " : Sound Wood
From 5,30 " to 7,50 " : Heart
From 7,50 " to 10,70 " : Sound Wood
From 10,70 " to 12,91 " : Shell Rot
From 0,00 " to 0,00 " :
Comment
Shell Rot!
Ready



**Drill Needle**

The needle is made of extremely durable and flexible spring steel. It is threaded at one end allowing for easy automatic needle changes rather than the previous generation's chuck and key method.

The Resistograph has an option that will automatically check the condition of the needle after each inspection to ensure the output is accurate and to reduce the chance of a needle failing while taking a measurement.

The drilling tip of the needle is 2.7mm and the shaft is 1.5mm. The micro drill inspection is considered a non destructive method of inspection.

Several pull tests of utility poles have been conducted, on average after 150 drills on the same 6 inch plane structural integrity of the pole was reduced by only 10 percent.

**Transfer Data**

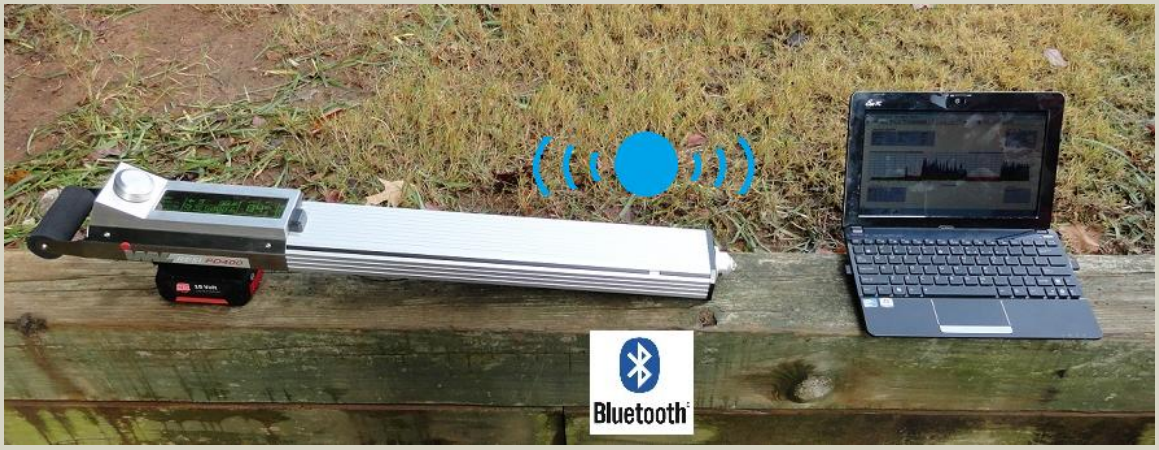
Data is captured and stored in the Resistograph flash memory until it is ready to be downloaded.

There are three data transfer options available:

1. Bluetooth wireless transfer- The Resistograph has built in Bluetooth radio, if your computer is not equipped with Bluetooth the Resistograph package includes a USB Bluetooth adapter.

2. USB Cable- The Resistograph has a micro USB 2.0 port that makes data transfer as simple as plugging in the cord and clicking the transfer button.

3. RCI Command- RCI stands for Remote Control Interface, this option enables the Resistograph to work with devices other than laptop or desktop computers. The IML IT department will work with the customer's software developer to create a customized program to interface the data collection device of their choice, like Magellan Mobile Mapper®, Trimble GeoXH® both of which can provide GIS information along with the inspection data or the Android O.S. based tablet computer pictured and several other GPS/handheld computers.


Bluetooth


USB
UNIVERSAL SERIAL BUS


Bluetooth

**Information Display**

The Resistograph features a large OLED display that is very easy to read and menu driven operation makes changing settings quick and simple. Navigation of the different functions and settings are controlled by the large jog wheel, just rotate and click!

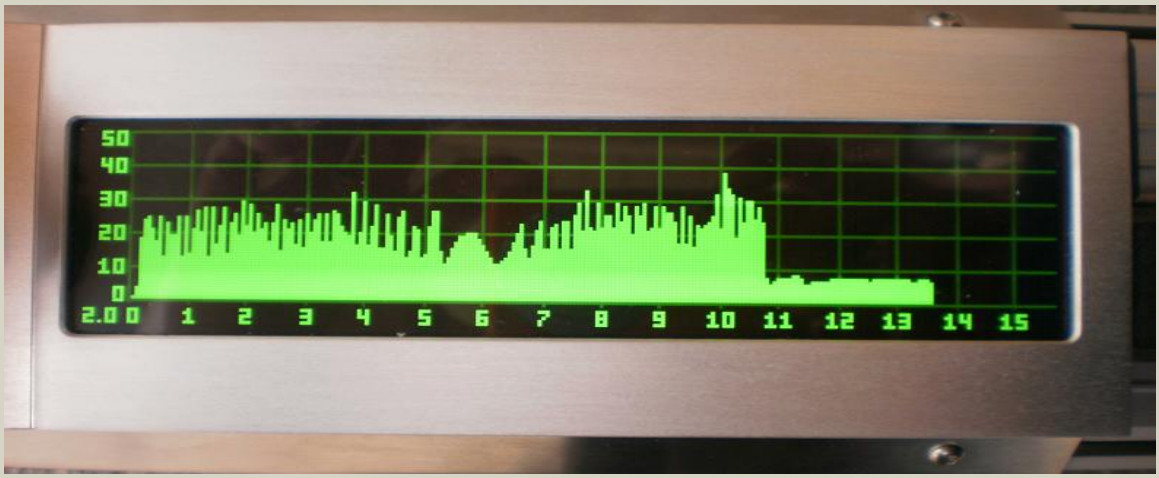
On the home screen the important functions are displayed in the center, forward speed, rotational speed and tilt angle. On the right side of the display is the needle change icon, settings and device info. On the left is remaining memory displayed in inches, measurement number and profile viewing options.

ID numbers and quick remarks can be stored for each measurement and are also transmitted with the corresponding drilling to the PD-Tools software.

The second picture shows a graph in Overview mode, the entire drilling on one screen. The standard view will be on a 1:1 scale, with the available scaling package, the graph can be magnified on the X or Y axis to provide a more detailed view right on the device!

The last picture shows the information that is stored for each drilling, the data is also transmitted to PD-Tools when downloaded off the device.


POLE 69168
IML TEST
034
3231 in
3
39 in/min
4
3500 r/min
90°
11/22/11
10:45:27


50
40
30
20
10
0
2.0 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15


MEASUREMENT 34/34
ID NUMBER
POLE 69168
REMARK
IML TEST
DRILLING DEPTH
11.42 in
FEED SPEED
39 in/min
NEEDLE SPEED
3500 r/min
TILT
85°
DATE
11/22/11
TIME
09:24:31
NEEDLE STATE
Worn
OFFSET
97/219
OK
NEXT
PROFILE
PRINT
SELECT

## Options

There are several hardware and software options available for the IML PD series Resistograph, here are a few:

If hard copies or on the spot print out is required there is an optional Bluetooth wireless printer available, the printer is lightweight, rechargeable and can be attached to a belt with the included belt clip. It prints on a 1:1 scale and the header contains all information about the measurement conditions.

The 3.0Ah premium battery will provide over 130 drillings on the PD500 and weighs less than 1 pound. Since it is Lithium Ion technology it has no memory effect and charges in only 30 minutes!

On the longer drilling depth Resistographs a addition handle is available to help stabilize the instrument while taking a measurement.


MZ 320


Li-ion
18 Volt
3,0 Ah Premium

**PD-Series Package**

The Standard scope of delivery for the PD series includes all items shown:

One IML PD Series Resistograph with one drill needle installed

Five spare drill needles

Stainless steel drill needle storage tube

One aluminum and ABS plastic lockable storage case with two keys

One Bosch 30 minute battery charger

Two 2.6 Ah Lithium Ion Batteries

PD-Tools software CD

One USB Bluetooth adapter

One USB cord

One pair of pliers

**Testimonials**

*When I first started in the telephone business, I was shocked at how crude and inaccurate the old way of sound testing poles seemed. Imagine my surprise to find a device like the IML Resistograph. It is the only method of testing wooden poles that will give an accurate and reproducible result every time. It is th only accurate method of testing poles encased in concrete. It is the only way to test for compression weakness at the brand level. The fact that the test results can be referenced and compared from year to year is invaluable to all utility systems. This is a product that is a welcomed addition to our industry.*

Wayne B. Camick, Director, International Operations, WELTEC

*It's the first tool we have found for testing the integrity of poles that gives you hard, tangible, verifiable data at a fraction of the traditional cost. Our clients were very pleased at the savings they realized in using the IML Resistograph over existing industry methods.*

Jerry Farrell, Regional Manager, Byers Engineering Company

*In our 15 years of experience working in the utility industry, we have used various methods for testing poles (sound, drill and cork), but nothing compares to the accuracy and reliability of the IML Resistograph. We have found that it not only gives us very accurate and real-time results, but also has increased our productivity in the field, which in turn saved our customers needless replacements of poles and maintenance costs.*

*The thing we like most about the IML Resistograph is that it is non-destructive to the pole. With the integrated 45 degree adapter we are able to test below grade where most decay begins. We used to have to dig around the pole to test below grade and disturbing the compaction of the soil around a pole can do much more harm than good.*

*over the last two years we have researched and compared various methods of testing utility poles and all types of wooden structures. We have found the IML Resistograph to be the most accurate and reliable form of testing. We are not only pleased with the product but the service as well.*

Shawn Palmer, President, TMS TECHNOLOGIES