



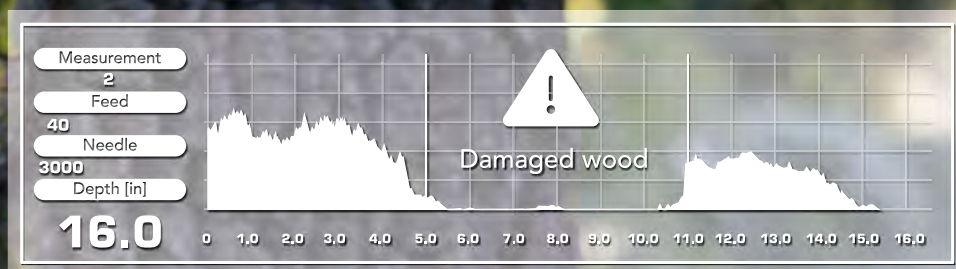
IML-RESI PowerDrill®

Drill resistance- and feed force
measurement for trees and timber

PROMAT



With Passion and Precision



A reliable and efficient method for wood inspection

The IML-RESI PowerDrill® measures the drilling resistance and feed force of the wood to supply the user with data to make a clear statement about the condition of the wood.

Wood inspection technology designed for every application

The IML-RESI PowerDrill® delivers reliable and meaningful measurement results; draw conclusions about the safety of different types of wood. Whether trees, wooden poles, wooden bridges, playground equipment, pilings, or other construction wood - the IML-RESI® is suitable for every application. With a fine drilling needle, the measuring device penetrates the wood in a minimally invasive way and records both the drilling resistance and the feed force in relation to the penetration depth.

When the bit enters a void or decay, the measurement curve will lose resistance and be seen as a flat or decreasing line in the graph clearly defining a loss in wood structure.

Only the IML-RESI PowerDrill® has the additional feed force curve „FEED“, which increases the drill's sensitivity to detecting deteriorated wood. For example, in case of fungi, which leads to wood embrittlement, the FEED curve has the ability to capture this defect at an early stage.

The IML-RESI PowerDrill® is actively used in the following scenarios:

- In-depth inspection and safety assessment of urban trees
- Capturing the remaining strength in wooden utility poles
- Decay diagnosis of wooden playground equipment
- Structural testing in stilt and timber homes
- Bridge piling and wooden railway inspections
- Testing both above and below water-level of submerged dock pilings with a specialized device



Innovative & tailored to your needs

The IML-RESI PowerDrill® combines technical innovation and individual flexibility. Use the advantages for your specific application.



Digital measurement results

Accurate measurement results easily transferred to a PC or handheld device. Measurement graphs are visible directly on the IML-RESI PowerDrill® during and after the measurement.



Clear organization

Measurement data can easily and efficiently be sorted by typing in the ID number or tree number.



Long battery life

Powerful lithium-ion batteries lead to high drilling performance with all levels of wood density.

Optional accessories

Thanks to the flexible modular system, you can adjust the IML-RESI PowerDrill® to your requirements.

- Feed force measurement curve „FEED“
- Tilt sensor „TLT“
- Scaling package „SCL“
- Memory enlargement „MEM“
- Needle check „NC“
- WoodInspector for automatic evaluation of wooden poles
- Bluetooth printer
- Carrying bag with shoulder strap
- Shoulder strap
- Screenprotector

We are available to discuss your specific needs and recommend what may work best for your inspection.

IML-RESI PowerDrill® at a glance:

Drill depth:	20 cm to 100 cm
Drill speed:	adjustable based on wood density
Attributes:	light weight and ergonomic design
Operation:	intuitive and user-friendly
Interpretation:	unique feed curve for clear statements with a manual provided
Quality:	high quality, Made in Germany

Further information
via QR-Code!





IML Service – Always there for you!

You benefit from the expertise of the market leader. IML offers the unique combination of wood science and technical knowledge.

Seminars & training

We offer on-site seminars and training opportunities for every field of application.

With a knowledge of 35-years of experience, learn about the functions, measuring method and correct use of the device directly from us.

- Online training videos
- Seminars provided worldwide for various areas of application
- On-site seminars and trainings
- Online seminars
- Confirmation of participation by certificate
- Technical device instructions included

You can find current dates and further information on our website at:
www.iml-service.com/seminars

Safety & customer service

Safety requirements are closely monitored and continually increase with policy updates. This is an added value for our customers:

- Annual inspection including testing, cleaning, and calibration – according to IML's DIN EN ISO 9001 certification
- Fast and efficient customer service worldwide
- TÜV certified company
- Reliable measurement method used for over 35 years
- Rapid support response times
- Assistance in interpretation and evaluation of measurement results
- Quick shipping turnaround times

Evaluation and documentation

Paperless evaluation of measurement results with the help of an integrated electronic unit and software solutions.

IML evaluation software

With our IML software for Windows, Android, iOS and MacOS you can transfer the measurement data directly from the IML-RESI® to your end device.

Additional details such as tree species, project number, recommendation for action, or general comments can be entered in the software.

Different areas in the measurement curve can be marked in various colors to show the difference between healthy and defective wood. After the measurement has been exported as a PDF file, the results can be shared or uploaded in a GIS system.

WoodInspector for wooden poles

Simple and objective assessment of your wooden poles with the IML WoodInspector. The WoodInspector software can be individually configured to national standards or specific requirements in your company.

In addition to the visual inspection, the IML-RESI PowerDrill® provides non-subjective results. Our office offers training and customer support preparing the operator for safe, effective, and proper handling of the equipment. With an international presence, large network operators such as German Telekom, have been relying on the IML-RESI PowerDrill® for many years.



Measurement graphs shown in the IML Software



Measured Variables of IML-RESI PowerDrill®

Drilling resistance and feed force measurement

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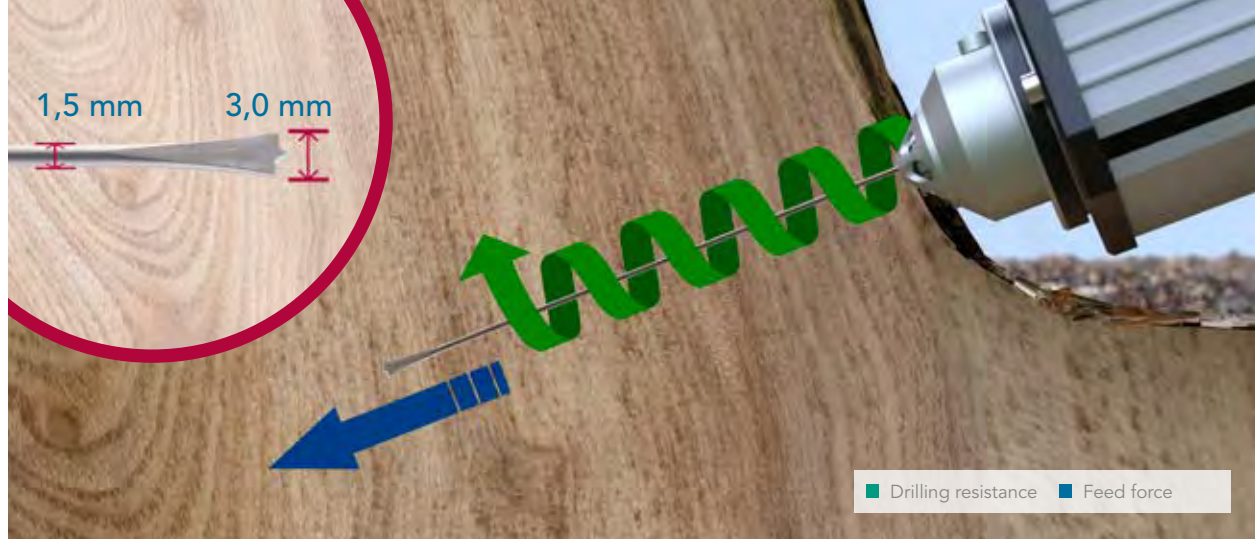
Advantages of the feed force measurement

Together with the drilling resistance, the measurement of feed force allows for realistic conclusions to be drawn regarding the evaluation of the wood.

The IML-RESI PD-Series additionally measures the feed force required to push the needle into the wood. Practical experience has shown that the feed curve is only minimally influenced by

shaft friction, which facilitates the detection of areas with wood decay, especially in early stages of decay.





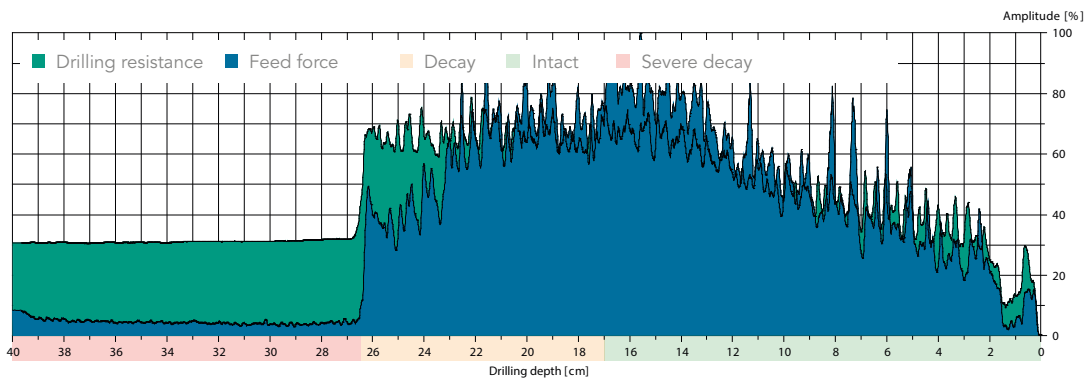
Shaft friction influences drilling resistance

Shaft friction creates an additional resistance and influences the drilling resistance measurement.

Drilling resistance and shaft friction

During drilling resistance measurement in wood, the 3mm-thick drilling needle at the tip is increasingly clamped by the wood shavings remaining in the drill channel as the bit's depth increases. This creates additional friction, known as shaft friction. Therefore, the drilling resistance consists of the measurement of the torsional force at the needle tip and the friction at the drill needle shaft.

For hard deciduous woods (such as oak, beech, and locust), this shaft friction is more pronounced than in softwoods (such as poplar and pine). In the drill profile, a high shaft friction can be identified by an increasing trend of the drilling resistance with increasing depth. Therefore, when the drill needle exits the tree or enters a cavity, the drilling curve does not fall back to the initial level.



Picture shows measurement on a beech tree with a defect

Beech with decay

The measurement curve is read from right to left. The bark can be assigned to the range from 0 to 1.5 cm. From 1.5 to 17 cm, the measurement curves of drilling resistance and feed force increase steadily, indicating the drilling through intact wood. At 17 cm drilling depth, the feed curve drops slightly, which is an indicator of incipient wood decay.

Drilling resistance remains constant in this range without an increasing trend. The drop in the feed curve is even more pronounced between 23 and 26.5 cm. From 26.5 cm, the feed resistance almost completely falls back to the initial level. However, due to shaft friction, the drilling resistance remains at around 30% amplitude.



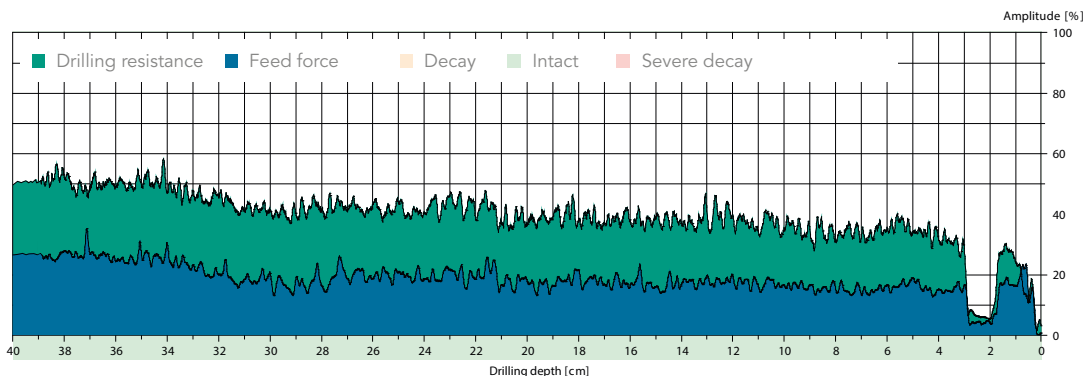
Estimating wood defects & remaining wall thickness

The feed force measurement facilitates the user's assessment of the remaining wall thickness and provides indications of the stage of decay.

Chestnut tree with Kretschmaria Deusta

The following example shows two measurements on a chestnut tree with brittle cinder fungus. Visually, the typical black discoloration of the brittle cinder was recognized on the bark, and both a reference measurement in the intact area and a measurement at the base of the

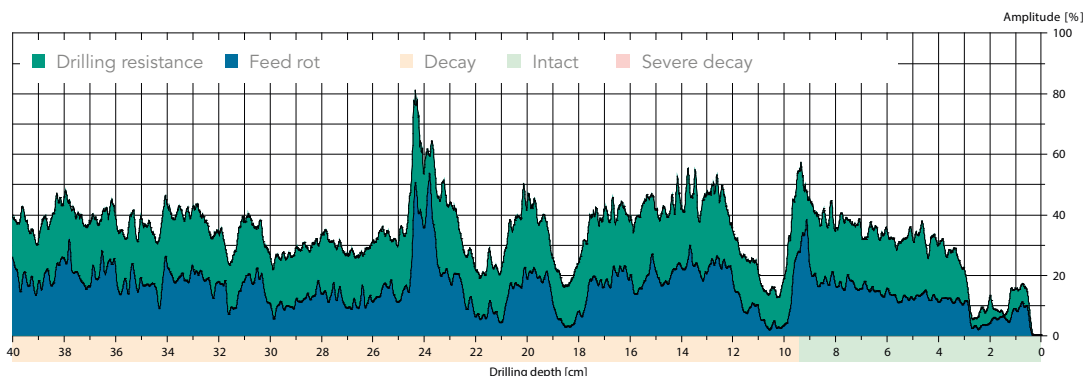
trunk were taken. The reference measurement serves to compare the measurement curves and facilitates the identification of defects in the tree. In the example, it can be seen that both the drilling resistance curve and the feed curve have a constant course.



Picture shows reference measurement on a chestnut tree

The result of the measurement directly at the base of the stem shows clear differences compared to the reference measurement. From a drilling depth of 9.5 cm onwards, a first significant

decrease in both measured values can be observed. A uniform course of the curves is also not visible in the following area, which is typical for wood decay caused by brittle cinder.



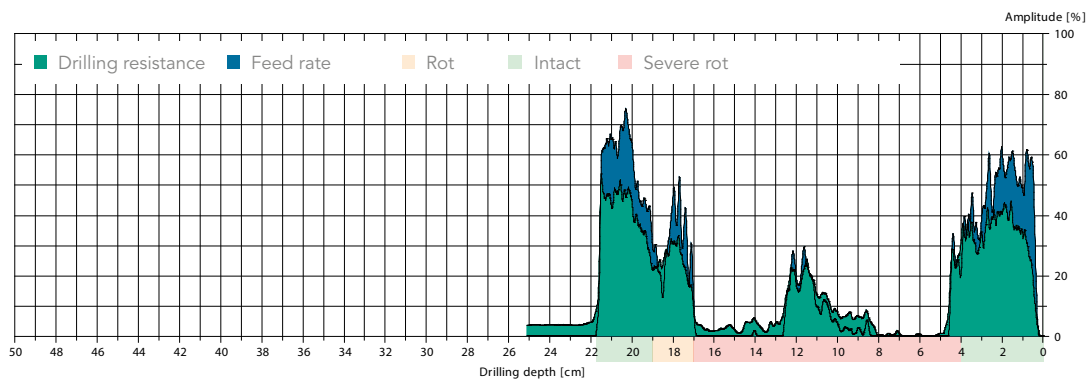
Picture shows measurement in a damaged area of a chestnut tree

Timber Inspections

The IML-RESI PowerDrill® provides clear measurement results when inspecting the structural integrity of timber.

The following example clearly shows the internal defect in both the drill resistance and feed force measurements. To inspect the area directly below ground level, the measurement was performed at a -30° angle at the base of the play-

ground structure. Both measurements show a significant decrease from 4 cm drilling depth, and the damaged area extends to the increase in resistance from 19 cm. The exit of the drill bit from the structure is visible at a depth of 22 cm.



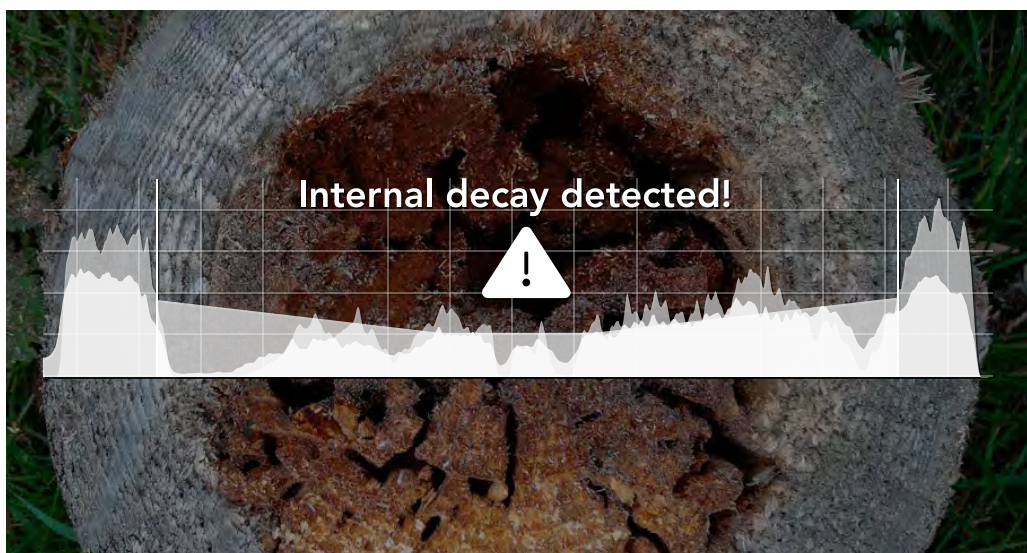
Picture shows measurement on a wooden play equipment at a playground



Further information
via QR-Code!



Do you have
any questions?
We are happy to
assist you personally
Tel. +49 6222 6797-0
E-mail: info@iml.de



IML WoodInspector

Intelligent measurement curve evaluation
for automated wooden pole inspections

PROMAT





MEASUREMENT 23/23					
DEFECT PATTERN		SUM DECAY		HEART ROT	
NO DECAY		0.0% 0.0% 0.0%		0.0% 0.0% 0.0%	
SHELL ROT		REM WALL		STRENGTH	
NO NO		50.0% 50.0% 50.0%		100.0% 100.0% 100.0%	
RESULT (AUTO)			RESULT OVERALL		
PASS			PASS		
OK	NEXT	PROFILE	PRINT	SELECT	

Test results with virtually no effort

Even on site, the IML WoodInspector supports you with automated assessments when inspecting wooden poles.

Display of the test results

The test result is displayed immediately after the drilling process removing any chance of subjective assessments. Not only does this speed up the process, but it makes it objective and repeatable.

Using various processes, the IML WoodInspector software enables the automated evaluation of test results and supports you in the best way possible during the assessment of the wood condition. Following the assessment, measures to safeguard the wooden pole can be taken directly on site.

For this reason, the extended functions of IML WoodInspector enable you to achieve the simplest, safest, and most cost-effective test process possible. This significantly improves the quality of the measurement.

Furthermore, once the measurements are downloaded, there is also the option to evaluate these measurements on the computer using PD-Tools PRO, or to export them into other programs such as GIS.



Always a step ahead

The most sustainable & economic method of condition analysis for wooden poles - intelligent, tailored, automated.



Automated evaluation

Measurements are evaluated directly on site in the IML-RESI PowerDrill® and can be transferred to an external handheld device.



Economic & sustainable

The most efficient and reliable method of wooden pole inspections equipped with digital measurement data storage.



Objective analysis

The internal condition of wooden poles is assessed objectively and reproducibly via the drilling resistance measurement and the automated evaluation.



Safety

Defects which cannot be detected from outside are identified and measured securely, to increase safety and reliability of the network.

IML WoodInspector functional scope:

- Display:** Remaining wall thickness, residual strength, percentage of decay value
- Flexibility:** Adjustable thresholds for automated assessment of the test objects
- Connection:** Digital storage of measurement data for further processing in databases or GIS systems
- Control:** Ensure reproducible and objective measurement results to avoid operator errors



Tailored for your application

Particularly for demanding applications, the IML WoodInspector is the perfect companion for wooden pole inspections.

Detection of early decay

The detection of early decay is based on a unique system which uses automated detection of different densities within the wood. The decay level (red area) is adapted automatically,

depending on the density of the wood. Harder poles have a higher level of density therefore a higher amplitude is displayed on the measurement graph. Softer wood has a lower density

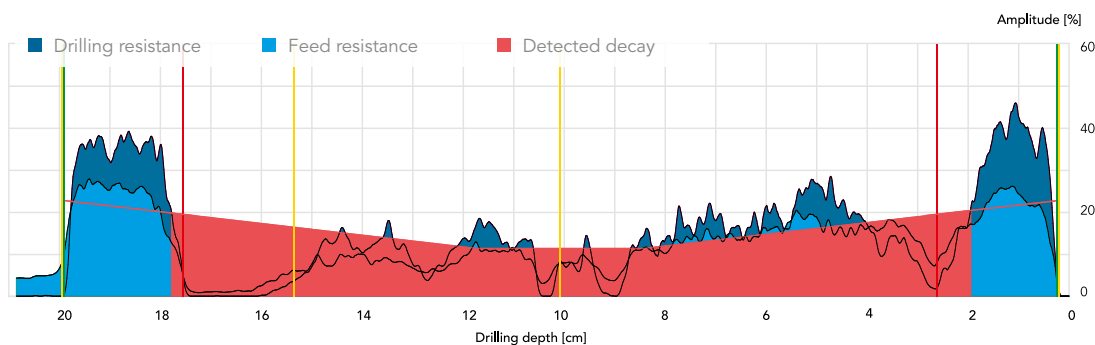


Diagram shows IML WoodInspector displaying a wooden pole's single measurement with decay

and is easier for the bit to drive through the wood providing a lower level graph. Using the IML WoodInspector software, thresholds for remaining wall thicknesses, residual strengths or percentage of decay values can be custom-configured. This allows specification of a "bad"

value for the inspection of wooden poles. Alternatively a range can also be set where just a warning is displayed. Specifications from energy suppliers and network operators can simply and easily be implemented and complied with accordingly using IML WoodInspector.