

WAGNER METERS

MOISTURE MEASUREMENT SOLUTIONS FOR THE FOREST PRODUCTS INDUSTRY

**Product Spotlight: The L622
Hand-held Moisture Meter**

**When should you choose
an end-to-end vs a sideways
in-line system?**

**Cutting Energy Costs
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**Select Hardwoods:
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Our Company

Wagner Meters unleashes your expertise by providing you with world-class moisture measurement technology. For over 50 years, our field-proven technology has helped thousands of valued customers improve profits and eliminate moisture-related problems.

Innovation

Drying-related degrade costs the industry millions. 80% of problems in wood products manufacturing are moisture-related. That's why sawmills and wood products manufacturers have trusted Wagner Meters' products for decades. The superior moisture measurement systems and handheld moisture meters improve grade recovery, eliminate wet claims, and boost your bottom line.

World Class Support

Our Field Service Professionals consult with our customers by providing professional and expert opinions, vision, advice, training, and/or services regarding information or material related to Wagner products or moisture measuring. We will assist you with making the right decisions or in performing tasks associated with Wagner products and processes.

Partner with Wagner and get permanent access to our US-based customer support staff. We don't wait for you to call us – our proactive Customer Care Call Program means that we take the initiative to help you resolve issues before they become problems. When you need us, we're here for you.

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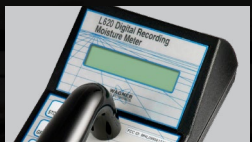
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From left to right: Ron, Tony, Larry, Steve, and Kirt



We Take Care of YOU

For over 5 decades, Wagner Meters has made Technical Service and Support a key priority for our sawmill and wood products manufacturing customers.

Wagner has great products, but that's not all there is to the picture. A great product or system can have all the modern features in the world, but if you don't have the technical support you need when YOU need it, the best product in the world can be of no value to you.

We have a highly-trained and responsive team of senior technicians ready to support you and answer your questions. We support you remotely, via phone, computer, or email, and when you need us on site, we are ready to show up and give you that great support and training value for your money, providing a superior hands-on approach that Wagner is known for. And when we need to bring our engineering horsepower to a problem, we pull in that part of our team.

And for customers of Wagner's moisture measurement systems, we don't wait to hear from you, but we are actively calling or emailing you, to find out how things are going. If we don't hear back with a status, we try to reach you again during the next round.

Bottom line: Wagner's philosophy is not to sell you great products and then not be there when you need us. When you purchase from Wagner, you are purchasing great products AND the great support to go along with it.

Respectfully,


Ron Smith, Wagner Meters

OMEGA

In-Line Moisture Measurement System

Whether your company is a primary lumber mill or a secondary wood products operation, with or without dry kilns, the Omega In-Line Moisture Measurement System should be your most important moisture measurement and analysis tool.

Whether or not it is installed upstream or downstream of your planing or molding operation, or is a sideways or end-to-end system, several benefits are the same:

Keep moisture problems out of your manufacturing operation

Improve your kiln drying, your grade recovery, and your bottom line by minimizing moisture-related degrade, energy costs for drying, wet claims, and overall moisture quality control issues.

The Omega, Wagner's latest generation of moisture measurement systems, continues our legacy of providing comprehensive and robust moisture measurement and data analysis tools that are so critical for today's modern wood products operations.

Especially designed for the lumber mill or wood products manufacturing environment, the Omega and its optional data collection and analysis software are invaluable tools for improving your kiln drying or overall moisture quality control.

Moisture Data Collection and Analysis

The Omega is designed to improve your kiln drying if you are a high-production lumber company. It's also an excellent tool for maintaining tight moisture QC if you are a remanufacturer or a secondary wood products operation such as a door, window, wood flooring, or cabinet manufacturer.

The Omega's optional data collection and analysis software gathers moisture data from every measured board. This offers you a comprehensive tool to help pin down kiln drying or moisture-related manufacturing problems, and can assist in the identification of lumber suppliers that are not meeting your moisture specifications.

For in-depth kiln analysis, primary mills are able to map packages in the kiln and determine hot or cold spots based on moisture data from the planer mill. Moisture data by product is also available.

The benefits of having an Omega system are significant and highly customizable. Contact a Wagner specialist to determine which type of system is best for your operation.

omega
MOISTURE MEASUREMENT SYSTEM

COMPU-RIP

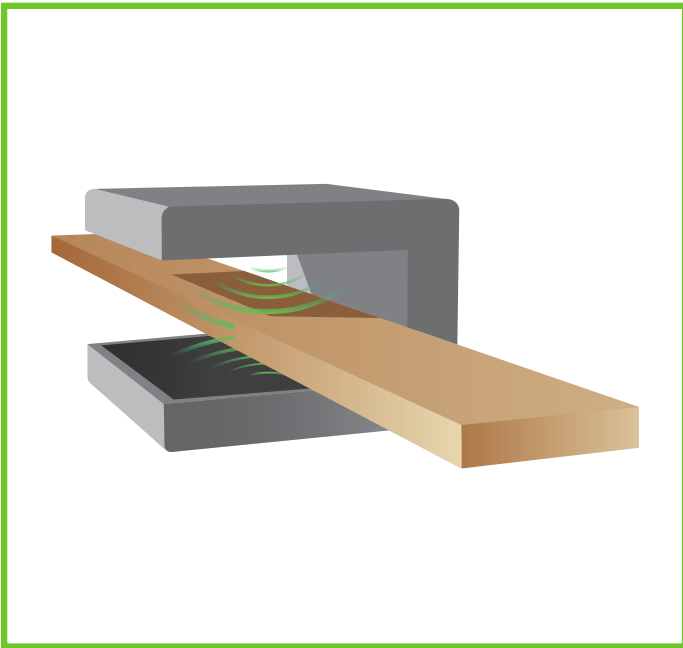
SAVE TIME AND MONEY

- Virtually eliminate wet claims
- Reduce overdrying & lumber defects
- Use optional software to help troubleshoot and correct kiln performance
- Automate the process by redirecting rejected pieces
- Reduce time conducting quality control checks with hand meters
- Reduce or eliminate the man-hours that used to be necessary hand sorting wet boards
- Reduce grading time by using the Omega system to identify wet boards prior to spending time grading those boards
- Automatically integrating moisture data with the grading systems
- Reduce drying time
- Greatly reduce man-hours with quick, accurate moisture readings
- Automatically differentiate levels of moisture

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When should you choose an end-to-end vs a sideways in-line system?



End-to-End Configuration

Most often installed on the outfeed side of high-speed planers or moulders, an Omega system with an end-to-end sensor scans your lumber, flooring, or wood components at over 500 measurements per second. End-to-end measurement is preferable when there is a need, for example, to identify wet pockets along the length of lumber that will be sold to laminated beam manufacturers. It will also allow the identification and trimming out of wet areas within strip flooring.

Additionally, with the Omega's fast scanning rate capability, board moisture content can be profiled in great detail along the length of boards with this high-speed data being communicated to today's sophisticated grading systems, providing additional moisture information for your automated lumber grading solutions. //

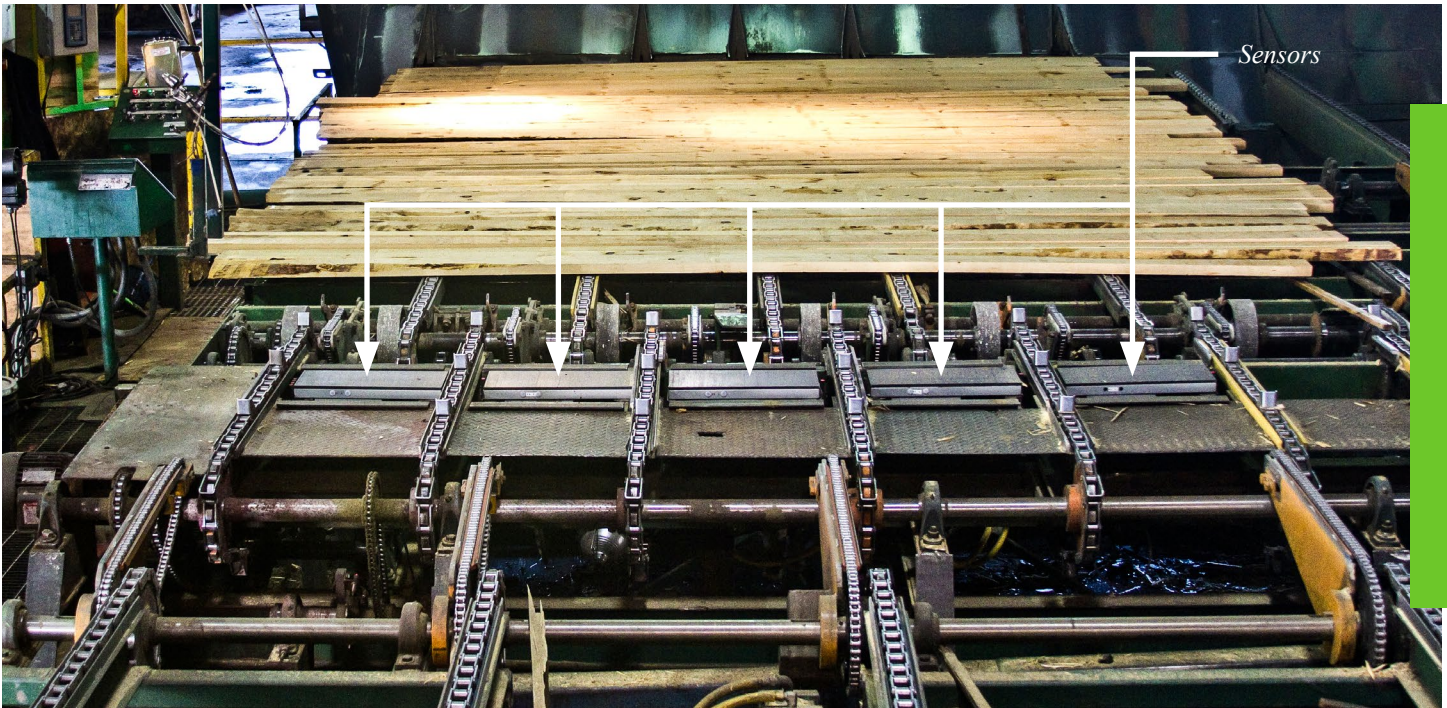
Sideways Configuration

Up to eight sensors can be installed between the chain races.

Boards pass over these sensors at a high rate of speed, and multiple moisture content readings from each sensor are taken on every piece of lumber. Those that have an out-of-spec (too wet or too dry) moisture content can activate outputs in the Omega system's main console to trigger spray-marking devices or your dropout gate.

If your application requires longitudinal measurement of your lumber or wood components, then an end-to-end sensor version of the Omega is an option. //





Optimizing Kiln Performance with In-Line Moisture Measurement

In producing an effective kiln-drying program for lumber, comprehensive analysis of your wood moisture content should be the number one concern.

That's obvious, you're probably thinking, but what is less obvious is the number of key points in the manufacturing process where moisture content can and must be monitored in order to optimize kiln performance. Moisture measurement at various points in the process is crucial, but post-kiln moisture measurement of all of your incoming lumber prior to further processing provides the greatest insight into how efficiently and effectively your kiln operations are drying. Post-kiln moisture measurement also gives you the additional important benefit of catching pieces of lumber that do not meet your critical moisture requirements before they are processed down the line.

In-line moisture measurement systems in the processing plant or planer mill can measure all of the dried lumber early in the process and are ideally positioned to collect important moisture

metrics about the upstream drying process. Data collected from these systems can provide truly comprehensive moisture data on a charge-by-charge or product run basis to assist in fine-tuning the kiln-drying process.

In-Line (In-Process) Moisture Measurement Systems: Getting the Big Picture with Comprehensive Data

With an in-line moisture measurement system, every single board in the production chain can contribute to your moisture quality evaluation. With a sample size that encompasses all of your lumber from all of your kilns, you should be able to determine at minimum two major indicators of your kiln process performance: a standard deviation (loosely defined as the variability in moisture content on a per charge basis), and a percentage of unacceptably wet and dry lumber.

1. Standard Deviation

Standard deviation both visually and numerically demonstrates the variance of a kiln’s performance on a charge-by-charge basis. In thinking of the traditional bell curve representation of standard deviation, the smaller the range from the target moisture content to the actual post-kiln results, the better the kiln performance and, therefore, the better the grade production for each kiln and charge. Obviously, there will always be lumber that falls outside the target range but an optimized kiln setup should reduce the number of board feet that miss the target moisture content significantly.

Standard deviation becomes statistically significant when a history of data can be examined, both on a kiln-by-kiln basis and on a charge-by-charge basis. If a particular kiln regularly demonstrates a higher standard deviation compared to other kilns, it may indicate a maintenance issue, or possibly even an operator issue that can be addressed through further training. Tracing the standard deviation of different species or even specific suppliers of green lumber can allow initial kiln setups to be optimized for each charge. Simply put, the standard deviation can help point you in the right direction when asking why the data is the way it is.

Tracking standard deviation is a good indicator of potential drying changes that may improve kiln performance. A mechanical change (i.e., reversing air flow more frequently) or a procedural change (i.e., adjusting the venting schedule) may be all that is necessary to improve the standard deviation for a particular kiln and to prevent over-dry or over-wet lumber. If you have a very specific moisture content target, additional practices like stacking procedures or schedule

variance for different species may also become important. But overall, the lower the standard deviation, the better the process.

It should be noted that there are potential limitations with using standard deviation in traditional QC standards. A 2007 Wagner Meters study demonstrated that standard and average deviation were found to be unreliable for determining optimum kiln drying targets for softwood grading targets. Put briefly, a similar average moisture content (MC) reading between separate charges does not always indicate the same lumber value. This observation led to a six-sigma process that Wagner Meters refers to as “lognormal statistical analysis.” While this application has not been extensively tested for hardwood applications, it may merit further examination for data that fall outside the expected norm.

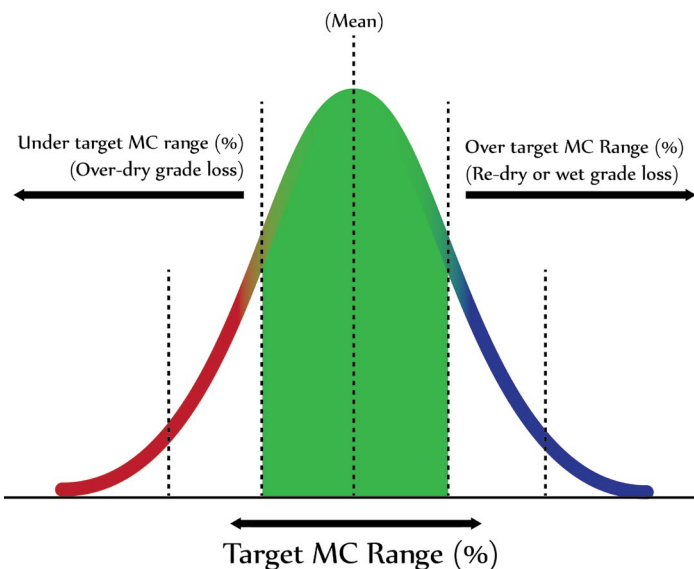
2. “Wet” Lumber

Lumber that finishes over the maximum acceptable moisture content is obviously going to be problematic. The costs in kiln time for re-drying create a difficult balance when considered against the business loss through grade loss, sort or mold issues, and regrade claims. The obvious response is to increase drying time in the kiln if this number is consistently high. But the risk of overdrying presents just as much a challenge for target product production. The obvious correlation between moisture content and grade recovery possibly presents the strongest case possible for the necessity of an in-line moisture measurement system. With a larger sample size, and with the right assessment and reporting tools integrated with an in-line system, kiln performance can be analyzed and corrected to find that “sweet spot” – the ideal drying conditions that come with optimized kiln performance.

Developing the Data

There are a variety of in-line moisture measurement systems available and very few mills or secondary wood products processors operate without one. Integration of specific components is obviously important but the real key to success comes in making the best use of the data collected for real-world insight into kiln-drying performance. Optimization means being sure the cycle of information is moving smoothly. And this is where your kiln operators or data collection specialist becomes crucial.

There are a number of questions to ask in order to turn data collection into practical insights:



1. Are we maximizing utilization of our moisture measurement?

Is your in-line moisture measurement system in continuous operation to maximize data collection? Is your system automated to record the data collected? Statistically, significant monitoring is dependent on the volume of data collected as well as the consistency in the process point where it is collected. The more data you have to assess, the greater the insights into your kiln-drying operations.

2. Who is responsible for collecting and assessing the data?

In some mills, moisture content levels are monitored by graders; in others, by quality control (QC); in others, by kiln operators. Once data is collected, there also needs to be an ability to sort the data by relevant categories such as a particular kiln, dimension and/or species, date of kiln load, etc. There are a variety of assessment and reporting tools available on the market that offer a wide range of reporting options, but ultimately the reports also need to be used to drive and optimize the kiln drying process.

3. How are changes implemented?

As in any large production enterprise, communication of the findings needs to be clear in order to produce effective and productive change. Ideally, there will be several people trained in operating your in-line moisture measurement system so that assessment, the parameter setup, and kiln setup changes can be handled promptly and accurately in response to the data reports.

Putting the Data to Use

The ultimate goal of data storage and analysis in kiln performance is not just to choose best charge times or address kiln maintenance issues, but to be able to see each step of the drying process achieve the optimum lumber grade percentages possible. Particularly for mills that do not make use of a redrying process for over-wet lumber, finding the optimal set-point for the kiln process can mean even higher savings in lumber grade value.


In-line moisture measurement systems also offer other very practical features for mill operations. For example, the Wagner Meters Omega In-Line Moisture Measurement System offers up to four programmable moisture limits that can trigger spray-

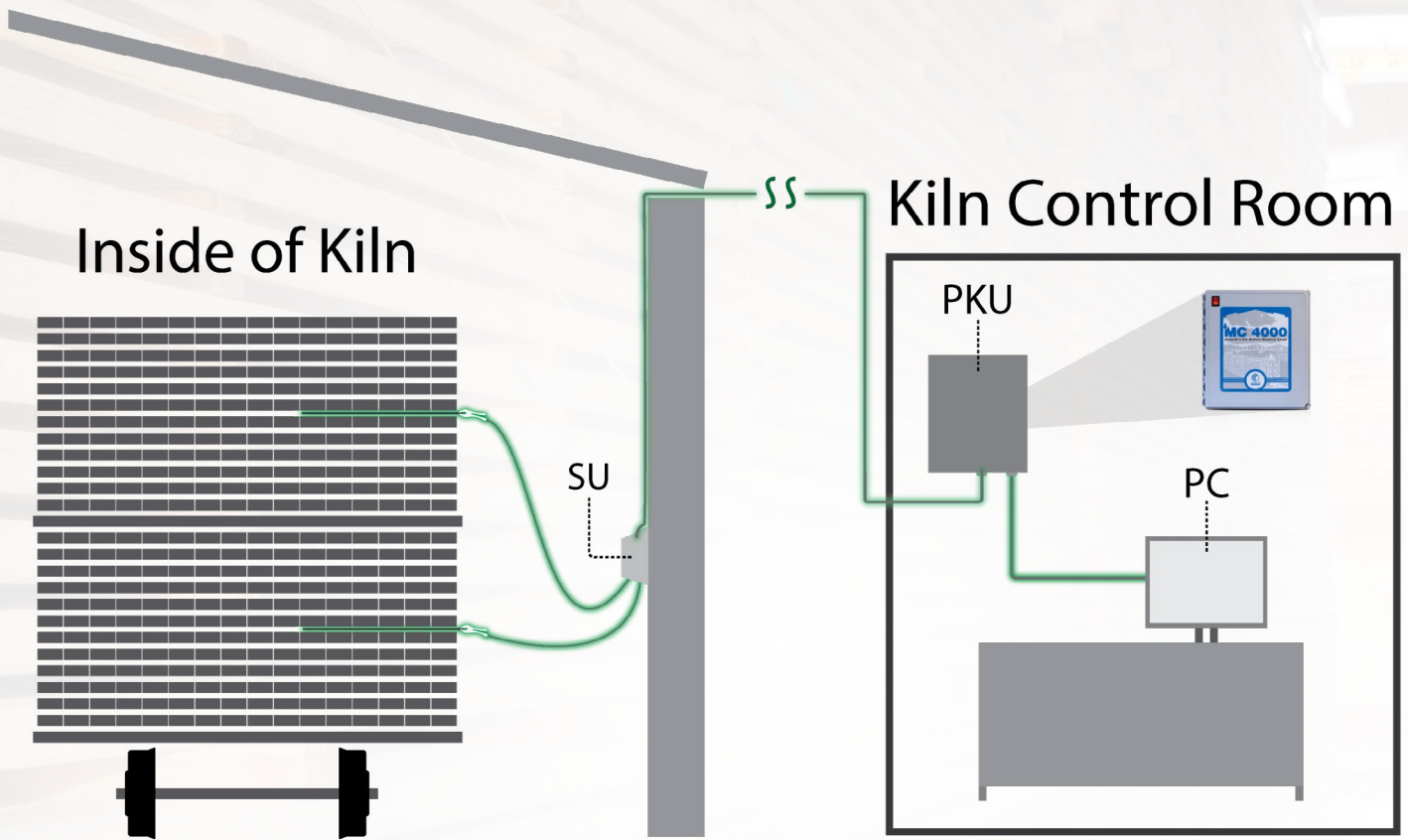
marking systems to quickly and accurately mark lumber that has not met the moisture content specification. This lumber can be easily identified and turned around for re-drying or re-milling as necessary. Omega in-line systems offer easy setup for different wood products in addition to providing extensive report generation capability.

When a history of specific data is collected for a particular kiln, it is also possible to use the data to create a 3D representation or moisture content 'color map' of a kiln to help identify kilns with potential maintenance or performance issues. It is a fact that there are no hard-and-fast rules for guaranteeing every charge will respond identically to the same conditions, but with significant data records, trends can be mapped to target specific issues or variables more quickly and responsively. Even if the information only means a reduced number of shutdowns for manual checks in the kiln, the cost savings in energy consumption would be significant.

For specific kiln situations, data from an in-line moisture measurement system can also have a practical application for kiln operation. For a mill that routinely runs charges with mixed species or mixed dimensional lumber, an accurate picture of the kiln performance can impact the kiln schedule or processes for any given charge.

Optimization on the Mill Floor

The process of drying lumber is, without question, as much an art as it is an exercise in data tracking. The myriad ways moisture data can be applied make a proper assessment and reporting tools a must to any company looking to optimize kiln performance while increasing product quality. With a robust and integrated in-line moisture measurement system, your kiln-drying results and the quality product you deliver to your end users can be a work of art. 

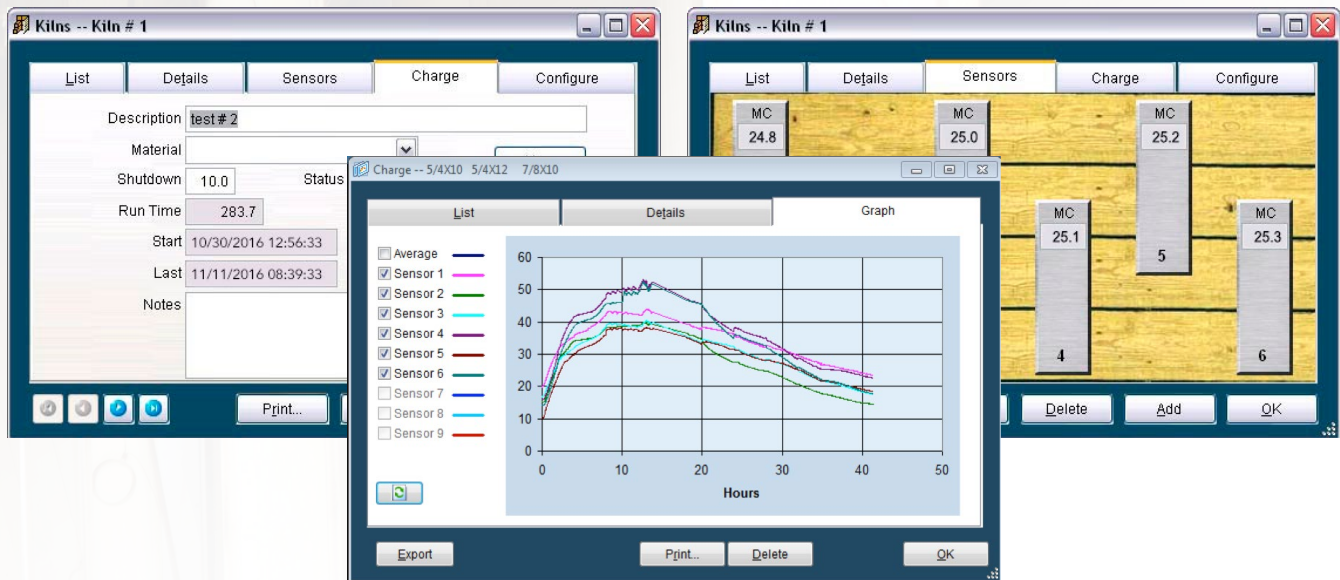


MC4000

Advanced In-Kiln Moisture Measurement System

In the 1970s, with the introduction of our Model 776, Wagner Meters revolutionized the industry with the first generation of electrical, field-based, in-kiln moisture measurement systems. Wagner has continued to refine and update this basic and proven design concept with the launch of our current Model MC4000, which is ruggedly designed and easy to use.

The MC4000 can stand alone as a valuable, automatic in-kiln moisture measurement system, or it can be interfaced with computerized kiln control system software packages, providing the kiln operator with an accurate moisture measurement and monitoring tool to afford more control over the kiln-drying operation.



Closer Look at the MC4000 Software

The MC4000 software application offers a real-time view of the moisture content for each sensing zone, and provides a moisture content trend graph of all of the sensors during the drying schedule. Additionally, the MC4000 software allows the user to set up, for each new charge, a moisture content average shutdown or alert set-point for the charge. When

the average moisture content of a kiln's Sending Units' (moisture sensing zones) measurements reaches the set-point, a relay output activation will occur that can trigger an alert notification signal to annunciator panels or a shutdown command to kiln control system hardware. //



A TYPICAL MC4000 SYSTEM CONSISTS OF:

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- One or more Per Kiln Units (PKU; one main enclosure per kiln)
- At least four Sending Units (SU; moisture sensing zones per kiln; 9 maximum per kiln)
- The main MC4000 computer with user interface software for setup and monitoring of the moisture content status of each sensing zone in each SU kiln during the drying process

MC4000 FEATURES

- Displays moisture content trending of sensors throughout the drying process
- Designed to operate reliably even in a kiln temperature of 300° F
- Large sensing zones; obtains average moisture content between sensor plates
- Automatic alert or shutdown, a shutdown alarm based on a moisture set-point
- Open architecture allows integration with virtually any computerized kiln controller



Case Study: In-Kiln Moisture Measurement at Carl Diebold Lumber

This article was first published in 2016

Founded in 1945 by Carl Diebold and located in Troutdale, Ore., the Carl Diebold Lumber Company (CDLC), a third-generation family business, processes mostly clear and higher grade lumber products that they don't actually sell to customers.

"We don't have any product sales," says Dave Smith, plant manager. "All this wood we're processing belongs to somebody else. Lumber wholesalers, for example, will buy rough green material from a sawmill and bring it to us. They specify what they want us to do with it."

In order to meet the stringent specifications issued by their customers, CDLC takes extra steps to ensure the upper-grade materials they process are of the highest quality. One of these steps involves using a computer-driven in-kiln moisture measurement system.

In 2010, TimberLine magazine featured CDLC and its then newly-installed in-kiln moisture measurement system. After six

years of using the MC4000 in-kiln system, we checked in with CDLC to see if it was still living up to expectations.

In-Kiln Moisture Measurement

CDLC installed three dry kilns in 2005 to keep pace with production at a remanufacturing plant built in 1989. Smith says that even before deciding on which kiln to install, they chose the MC4000 In-Kiln Moisture Measurement System from Wagner Meters – a worldwide manufacturer of moisture meters and industrial moisture measurement systems.

"In order to produce high-quality products, knowing the moisture content (MC) throughout the drying process is very important. If you overdry the wood, you can destroy it," Smith declares.

"It's also key that the material not be wet, that it be the right MC

when it comes out of the kiln, otherwise it won't mill properly and we won't get a good, quality finish. Also, once the wood gets installed in its final use, if it's too wet, it will start shrinking and cause problems.

"That's why the MC4000 is so critical. For the past six years, it has provided us with consistently accurate information about the wood's MC," he adds.

Economics is another factor in carefully monitoring MC.

"If you buy a 2x4 at your local big-box store that's full of knots, you're talking about \$500 to \$600 per 1,000 board feet. Most of the materials we're producing are clears and other high grades that range from \$4,000 to \$5,000 per 1,000 board feet. So we can't afford to destroy any wood in the drying process because it gets very expensive."

Smith says another economic advantage of the MC4000 is that it has saved CDLC time, money, and energy costs by shortening their drying schedules. Instead of drying lumber in seven days, the MC4000 allows operators to monitor the process and make adjustments as quickly as the wood is drying.

"We can shorten that time to maybe five or six days. So we can take a day or two's worth of energy consumption out of the equation, which is fairly high.

"We run a Hurst gas-powered boiler, so we have a lot of gas we're pumping in there to heat the water to generate the steam. And then kilns have large fans in them which consume a fair amount of electricity. So by shortening that time, we save time, energy, and money," Smith explains.

Minimizes "Hot Checks"

The in-kiln moisture measurement system also minimizes "hot checks." Instead of having to conduct several manual checks during a charge, which requires cooling down the kilns, operators do one check near the end of the drying schedule and a final one at the end.

"By having the in-kiln system, we don't have to shut the kiln down several times, open it up, and lose all that heat. We rely on the Wagner system to tell us when the wood reaches 10% to 12% MC. It's very costly to bring the kilns back up to 180 degrees. By eliminating additional checks, we're not losing that heat. This saves us energy," he says.

CDLC processes mostly Douglas fir, western red cedar, and

occasionally hemlock. These species present some drying challenges, especially the western red cedar and, to a lesser degree, the hemlock.

Because cedar is a very delicate species to dry, Smith says that if they're too aggressive in drying it, such as getting it too hot, too fast, they'll end up with cell collapse in the wood. As a result of the cedar's super-sensitivity to changes in temperature, CDLC makes adjustments in the schedule as the MC goes down.

"We can increase the kiln temperature by using the Wagner system because it tells us in real time where that moisture is. So we can make those adjustments sooner than later. Again, this will shorten the time in the kiln and lower our costs," Smith says.

Computer Controlled

Each kiln has its own MC4000 measurement system with one computer running all three. American Wood Dryers' Drystar Computer Control System, which supplied the kilns, takes the information provided by the MC4000 and tells the kilns what to do – heat up or cool down, adjust the dry bulb or wet bulb, and adjust fan speed.

Two of the kilns are single track and hold about 60,000 board feet per charge. The other is a double track kiln and holds about 140,000 board feet per charge.

The kilns dry about 1.4 million board feet monthly, while the plant processes upwards of 3.2 million board feet per month.

As most kiln drying operators will attest, kiln drying is an art requiring skill and technical knowledge. But having a sound in-kiln moisture measurement system working hand-in-hand with a solid computer system makes it much easier, while saving time, energy, and money.

CDLC kiln operators can attest to that. Looking back over the past six years, they say their in-kiln system is still proving its worth. //

HANDHELD MOISTURE METERS



L622 Hand-held Moisture Meter

The L622 comes from the factory with 32 user-selectable species settings, and these can be customized by you. When paired with the companion L722 stack probe accessory, you can easily check the moisture content of kiln packages, and with our Stat Pak software included with this meter, it is easy to record your results for future comparison. The easy-to-read backlit LCD screen features a two-line, 32-character display. Function buttons and scroll arrows operate a menu system that guides the user step-by-step through the selecting, storing, and reporting process.

SPECIFICATIONS

Size	L 8.5" x W 4" x H 3.75" (L 215.9mm x W 101.6mm x H 95.25mm)
Scanning Area	2.5" x 2.5" (63.5mm x 63.5mm)
Scanning Depth	1" (25.4mm)
Weight	18 oz (.51 kg)
Power	5%-30%
MC Range	4 AA batteries
Ports	RS-232 Serial Interface (for connecting with desktop computers) - L722 Stack Probe Interface

OTHER NOTABLE FEATURES

- Takes up to 5,000 separate moisture readings.
- Stores readings of up to 200 easily organized groups for comparison of average moisture content (MC), standard deviation, and minimum/maximum MC.
- Built-in real-time clock/calendar.
- Uses nonvolatile memory to retain stored readings even when the batteries are removed or changed.
- Battery life up to 50 hours.
- "No activity" automatic shut-off in 1 minute saves battery life.
- Operating temperature 30-120 degrees F (-1-48.9 degrees C).
- 1-year warranty.
- Comes standard with a calibration verification block, allowing you to check factory calibration.
- Stat-Pak, a PC-compatible software package.

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L722 Lumber Stack Probe Sensor

The L722 Stack Probe Sensor coupled with the L622 Digital Recording Moisture Meter makes it easy to reach deep into stickered units of lumber and take accurate moisture readings without the danger of broken pins. Wagner Meters' electromagnetic wave technology makes it possible to take multiple readings throughout an entire stack in just minutes.

The L722 is an attachment for the L622 hand meter. This combination allows the user to store readings taken in the kiln, and download the information to reports. The information can then be used to help a mill improve its moisture content quality control procedures.

SPECIFICATIONS

Probe Reach	L722L: 40.5" (102.9cm); L722S: 27.75" (70.49cm)
Extrusion and Sensor Head Thickness	0.5" (12.7mm)
Minimum/Maximum Sticker Thickness Range (Standard Spring Option)	0.5"-0.9" (12.7mm-22.9mm)
Minimum/Maximum Sticker Thickness Range (European Spring Option)	1"-1.4" (25.4mm-35.6mm)
Scanning Area	2.5" x 2.5" (6.35cm x 6.35cm)
Scanning Depth	1" (25.4mm) minimum
Weight	L722L: 78 oz (2.2kg) L722S: 56 oz (1.6kg)
Overall Size Including Handle	L722L—L 48" x W 6" x H 1.625" (121.9cm x 15.2cm x 4.12cm) L722S—L 34" x W 6" x H 1.625" (86.3cm x 15.2cm x 4.12cm)

THE L722 IS ROBUSTLY DESIGNED

- Probe hinge assembly is resistant to breakage when overstressed.
- Metal extrusion provides durability and ruggedness for mill environments.
- Leaf spring design ensures proper contact with the lumber for more accurate readings. The springs are user replaceable if worn or damaged.
- Sensor Probe Head is easily detachable from the extrusion for field servicing.
- Spare Sensor Probe Heads can be purchased separately.
- Available in Long (L) and Short (S) lengths.

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Wagner Digital Moisture Meter Spotlight: **The L622**

In the primary and secondary wood products markets, industry-leading sawmills and wood processing companies must control their critical moisture levels in their lumber or wood products. Accurate and convenient electromagnetic wave technology is now routinely used for monitoring of product moisture content (MC).

Wagner Meters' L622 Hand-held Moisture Meter (and its predecessor, the L612) with the L722 Lumber Stack Probe Sensor accessory are used effectively in high-production sawmills as a valuable tool to allow dry kiln personnel to easily perform moisture checks in stickered packages of lumber.

Additionally, the L622 can be used alone as a very convenient handheld moisture meter for fast checks of lumber in the planer mill. The L622 also stores up to 5,000 moisture readings into

as many as 500 different groups, calculating the average and standard deviation statistics for each group of readings. The L622 also comes with Stat Pak statistical software to allow downloading and storage of readings to a personal computer. The Wagner L622 standalone, or with the L722 Stack Probe, is one of the best handheld moisture measurement tools available for convenient and comprehensive tracking of lumber moisture quality control.

For lumber or wood processing operations that don't need to probe stickered packs of lumber with a stack probe, and don't require PC storage of information, Wagner's L620 (predecessor: L610) moisture meter provides the same technology and accuracy, providing data storage and some statistical calculation for up to 500 moisture readings.



Testimonials

Glen Hodges, lead kiln operator for Spearfish Forest Products (Spearfish, SD) has used the L612 moisture meter for three years.

"It's much simpler than how we used to check our kilns," says Hodges. "We use the wand with this...and we use the different groups in different zones for hot checks. We download a graph for every kiln chart, and it's pretty nice. They [Wagner Meters] provide more feedback than we've ever had on moisture with the wood planer."

Jeff Eades, purchasing director for Somerset Wood Products (Somerset, KY), states that the company's Wagner L610 meter has delivered consistent MC readings at an accuracy rate of over 99% from true bake-out conditions – for a decade. Somerset processes maple and hickory species.

"They're valuable," says Eades. "We check off the truck, out of the kilns, through wood planing and ribbing systems...throughout the whole process. I've tried several brands, and...I'll continue to use them. They're a good product." //



L620 Digital Moisture Meter

The affordable L620 Digital Moisture Meter from Wagner Meters combines proven Wood-Friendly™ electromagnetic scanning with an easy-to-read LCD screen, featuring a full-function, two-line, 32-character display. A simple menu system guides you step-by-step through the selecting, storing, and reporting process.

SPECIFICATIONS

Size	L 8.5" x W 4" x H 3.75" (L 215.9mm x W 101.6mm x H 95.25mm)
Scanning Area	2.5" x 2.5" (63.5mm x 63.5mm)
Scanning Depth	1" (25.4mm)
Weight	18 oz (.51 kg)
Power	4 AA batteries
MC Range	5%-30%

OTHER NOTABLE FEATURES

- Storage of up to 500 individual moisture readings.
- Readings are retained even when the batteries have been replaced.
- Factory supplied with 32 built-in common species. These can be customized to allow for changes in regional calibration.
- Readings can be stored in up to 5 different groups for comparison of average moisture content (MC), standard deviation, and minimum/maximum MC.
- The LCD screen is backlit, making it easier for measurements to be taken in low-light environments.
- Battery life up to 50 hours.
- When battery voltage is low, "BAT" will be displayed.
- Auto shut-off in 1 minute unless a function button has been pressed or an MC reading has changed.
- 1-year warranty.
- Comes standard with a Calibration Verification Block, to allow you to check factory calibration.
- Improved accuracy in the 15%+ MC range compared to earlier models.

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L601-3 Hand-held Moisture Meter

The rugged L601-3 is specifically designed for the demanding environments of primary mills or wood products manufacturing plants where quick scanning of lumber is a must. Even large boards can be scanned from end-to-end in seconds; it makes the job of moisture measurement easier, more thorough, and more accurate.

The L601-3's Wood-Friendly™ electromagnetic waves penetrate beyond the surface into the wood to a depth of 1" (25.4mm) and provide an instant averaged reading of the board's moisture content utilizing a 2.5" x 2.5" (63.5mm x 63.5mm) scanning area.

SPECIFICATIONS

Size	L 8.5" x W 4" x H 3.75" (L 215.9mm x W 101.6mm x H 95.25mm)
Scanning Area	2.5" x 2.5" (63.5mm x 63.5mm)
Scanning Depth	1" (25.4mm)
Display Resolution	1.0%
Weight	16 oz. (.453 kg)
Power	4 AA batteries
MC Range	5-30%

OTHER NOTABLE FEATURES

- This model is available in 2 different versions: pre-calibrated for either Douglas-fir or Southern yellow pine. If a species setting is not in the provided adjustment tables, please feel free to call Wagner Meters at 844-533-9091 and someone will be happy to help you find the setting.
- Non-invasive scanning: does not mar or damage the surface of wood being tested.
- Low battery light: warns the user that voltage has been drained to a level where the batteries must be changed to ensure the meter functions properly.
- An optional Calibration Verification Block (CVB): can be purchased separately to confirm that the meter is properly calibrated.
- Automatic shut-off (battery saver).
- 1-year warranty.

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Case Study: **Select Hardwoods:** **Premium Kiln Drying for Over 3 Generations**

Select Hardwoods, a kiln-drying division of Church & Church Lumber Company in Millers Creek, North Carolina, has a proud tradition of providing Appalachian hardwood to a global market.

Appalachian hardwood, valued for its color, grain structure, and other attributes, and the quality of Church & Church's products, have opened markets for the forest products company in Asia and the European Union (EU). Their products are used in furniture, millwork, cabinetry, flooring, decking, log homes, containers, and pallets.

In past years, they were doing 100 percent poplar, but they couldn't secure all the poplar they needed. They've since added red oak and white oak.

"We kiln dry about 70 percent poplar and 30 percent red oak and white oak. Some of that goes to domestic and EU customers, but we ship most of it to China and Vietnam, with more going to Vietnam," says Kin Church, partner in both Church & Church and Select Hardwoods.

The lumber originates in the vast Appalachian Mountain timber stands. After it is cut, subcontractors haul the lumber to the Church & Church Sawmill. Once milled, the company trucks it

four miles to its Select Hardwoods facility.

"Of the 23 million board feet our mill cuts annually, we dry 9 to 10 million board feet of that production. The rest goes out in a green state to either furniture companies or other dry kiln operations," notes Church.

The four-quarter poplar takes about seven days to dry, while the eight-quarter poplar takes 12 days. Because the oak is denser, the four-quarter oak requires 35 days to dry.

"You can only extract so much moisture out of oak without causing the cells to collapse. If we dry it too quickly, it will severely damage the oak beyond use," he says.

Kiln Drying Lumber for Three Generations

The Church family lays claim to three generations in the forest products industry. Church's grandfather started in the business

back in the 1940s. His father, who helped his grandfather through the late 40s, started Bruce Church Paneling in the early 1950s.

“I started a small dry kiln operation in 1988 after spending 15 years in the poultry industry, though I helped my grandfather and dad with their lumber business when I was in high school and college,” Church says.

Rather than simply expand a single mill as many operations do, the Church family decided to try a different approach.

“After I started my dry kiln business, my brother and dad bought a couple of mills together along with two other fellows. We decided to pool all our resources. They had a sawmill and I had a dry kiln that handled just 40,000 board feet. Since they wanted to get in the dry kiln business, it was a perfect marriage,” he remarks.

Today, Church’s brother Sebastian runs the sawmill while Kin works Select Hardwoods. In 1994, Church increased Select Hardwoods’ capacity by adding more kilns. Today, it has six kilns with a capacity of 390,000 board feet.

Importance of Moisture Measurement

Moisture measurement is mandatory in Kin Church’s operation.

All his customers require the lumber be at a certain moisture content (MC). Most want it at 9% to 10% MC.

“That’s because most of our customers are either gluing, end matching, or finger jointing, or the lumber’s going into a home interior, such as framing, moldings, door and window jambs. So they don’t want it moisture-laden.



“If the wood were installed in a home with 15% MC, once the homeowner turns on the heat or the house becomes much drier, the joists would start pulling apart. If the wood were in furniture and had excessive moisture levels, once it was exposed to much drier conditions, the glue joints would start cracking and falling apart,” Church declares.

To help Select Hardwoods maintain its level of quality, Church uses two Wagner moisture meters.

“We use the L612 model (later replaced by the L622) which has a pad that accurately detects moisture in our lumber. Over the 13 years we’ve used it, it’s been extremely reliable,” he says.

“We can also attach a stack probe about three feet long to it with a flexible cord like a telephone cord. Once we insert the probe between the boards, it has springs that press the end-mounted sensor flat against the wood, ensuring deep penetration of the wood. We then slide the probe slowly out of the stack, reading the moisture in each board as the sensor passes over it.

“This allows us to take multiple readings throughout an entire stack in just minutes. We used to have to pull the packs out of the kiln and break them down for measurement. But with the stack probe, we can leave the packs intact.

“This meter makes our job a heckuva lot easier,” Church declares. //



Premium Case Rugged Carrying Case for L-Series Moisture Meters

Purchase this very high-quality, ruggedized carrying case for our L601-3, L620, and L622 handheld moisture meters. This foam-lined case will provide great protection for your investment in your Wagner moisture meter.

The carrying case features padded ABS handles, two heavy-duty ABS snap latches, full-length hinges, and padlock loops for premium protection.

SPECIFICATIONS

Size	10" x 9" x 5" (254mm x 228.6mm x 127mm)
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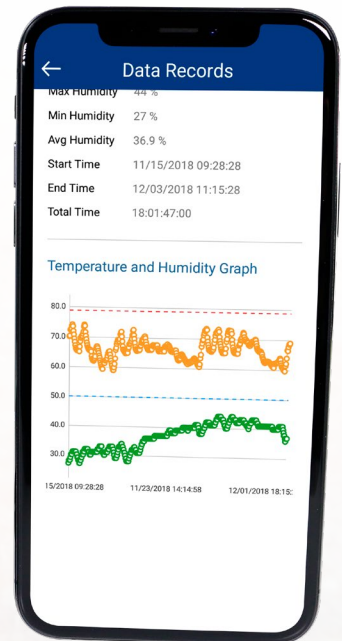
Smart Logger™ Bluetooth® Temperature & Humidity Sensor

24/7 Temp/RH Monitor

The Wagner Meters Smart Logger™ is a small, lightweight, easily portable and highly accurate Bluetooth® temperature and humidity data logger. Capable of capturing, recording, and sending up to 12,000 readings or 300 days of ambient temperature and relative humidity data for job site monitoring. The Smart Logger monitor incorporates the latest Bluetooth technology and works in tandem with the Smart Logger app, which can be downloaded for free at the Apple Store or Google Play. The app connects the Smart Logger monitor through a mobile device's Bluetooth (Android or iOS devices), enabling users to transmit and record data, and even send reports via email.

SPECIFICATIONS

Weight	1 ounce (30g)
Product Dimensions	2.3" (58mm) x 2.5" (64mm) x 0.8" (20mm) (This includes the mounting tabs)
Material	ABS, PCB, FR4
Power Source	Battery Powered
Output Power	-4 dBm, adjustable
Battery Replacement Information	Lithium CR2450 3V 550mAh





Smart Logger™

Critical RH Data Logging During Storage or Shipping

Moisture levels in wood are like a moving target. They move up and down from piece to piece or from location to location. After all, wood is a hygroscopic material that easily absorbs and releases moisture depending on environmental conditions until it reaches final equilibrium.

Sawmills and their customers have to be aware of this natural tendency of wood to absorb and release moisture to avoid problems during storage or shipping. Store wood in a place where it's exposed to moisture or high humidity and the wood will soon swell. Or ship wood from a humid environment to one that's dry, or from a dry locale to a humid one, and problems like warping, splitting or cracking can occur.

For example, consider a coastal sawmill that ships lumber on an oceangoing vessel to a domestic or foreign port. What happens when the vessel's crew carelessly handles the lumber subjecting it to excess moisture . . . or they store the lumber in the ship's hold where the humidity is extremely high? This can cause dry lumber to absorb the excess moisture requiring that it either be re-dried or undergo a lengthy period of acclimation before it can be used.

Shipped lumber is always at risk for changes in moisture content. For instance, wood is often shipped by sea in a container. Yet it can easily absorb moisture if the hold floods or condensation occurs. Anytime a cargo of wood is placed inside a steel box, it carries the risk of moisture damage as a result of condensation, or what's commonly referred to as "cargo sweating."

Cargo sweating occurs when the surface of the cargo is cooler than the dew point of the air outside the container, causing water droplets to form (condense) on the cooler areas of the cargo itself. Temperature and humidity changes during transit occur from direct solar heating of the hold during the day and cooling at night, combined with high humidity when passing through tropical zones.

But water content in the ship's hold can also cause condensation/sweating. Typically, moisture is found in timber dunnage and pallets, the wood cargo itself, and even the air inside the hold. When there's high humidity during loading, that high humidity will also be present in the vessel's hold.

Moisture problems can also occur when wood is shipped by rail or truck.

That's why it's imperative that the sawmill continually monitor the wood's environment – whether in storage or transit – to avoid any moisture-related problems that can result in wet claims, higher cargo insurance premiums, additional manufacturing costs, additional freight charges for reshipments, lost revenues, and customer-incurred costs such as cancelled sales or delayed fulfillment.

An Innovative Solution

So how can sawmills easily and cost-effectively monitor wood shipments after they leave the mill? One of the best, most innovative ways is using data loggers.

Data loggers are portable, autonomous data recorders that can be placed aboard ships, trains, and trucks that cannot readily support fixed monitoring equipment. They record the actual times and conditions during shipment so sawmills can identify potentially damaging ambient temperature and humidity conditions.

Industries that are shipping temperature-sensitive foods, pharmaceuticals, and chemicals use data loggers to monitor their shipments. They're also used in the lumber industry to measure ambient conditions within storage facilities or dry kilns. And, as already suggested, they can be an effective tool to document environmental conditions and identify high-risk stages during shipping.

Wagner Meters recently introduced its own portable data logger that allows mills to proactively mitigate moisture risks when either storing wood or shipping it to customers. Called the Smart Logger™, this small, lightweight, portable, and highly accurate device tracks ambient temperature and relative humidity (RH) conditions remotely wherever wood is located – either in storage or in transit.

Simple Operation

The way the Smart Logger works is simple. The mill installs the 2-inch-square portable monitoring device wherever wood is stored or in the stack of wood being shipped out.

Should there be a moisture problem when the customer receives the shipment, he sends the monitor back to the mill. The mill

then uses the Smart Logger app to quickly and easily collect data from the device via Bluetooth.

By tracking the ambient conditions, the mill personnel can determine when during transit less-than-ideal environmental conditions may have occurred that negatively impacted the wood shipment. For instance, it might be determined that the lumber was exposed to high humidity conditions while being shipped – either by rail, truck, or ocean vessel.

After transferring the collected readings to a mobile device, the user can quickly compile the temperature/RH into a report that he can send to the interested parties as evidence of what transpired during shipping.

Operating off of a lithium battery, the Smart Logger can store up to 12,000 pieces of data for up to 300 days. The monitor incorporates the latest Bluetooth technology and works in tandem with the Smart Logger app, which can be downloaded for free at the Apple Store or Google Play. Together the monitor and the app enable users to transmit and record data and even send reports via email.

In effect, the Smart Logger can help both the sawmill and the customer avoid finger pointing and eliminate breakdowns in their shipping and storage processes. It can also lead to a solution for avoiding the same or similar problems with future shipments. //

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Wagner Meters is a family-owned American business that aims to provide solutions in moisture measurement technology that will enhance the quality and value of each customer's project. With a 56-year legacy of innovation, Wagner continues to be a resource for both individual craftsmen and high-performance commercial endeavors.

Unparalleled Support

At Wagner, we know how important it is for you to get the most out of your investment in our products. It's important to us, too. When you partner with Wagner, we become a part of your team, offering world-class, long-term support tailored to meet your specific needs.

With Wagner, your mill personnel will have access to expert equipment training and support. Our suite of long-term support services includes:

- **Expert Training:** a Wagner Meters System Technician can provide staff training on any one or more parts of your system hardware or software, and for necessary maintenance and troubleshooting.
- **Remote Support:** a Wagner Meters System Technician can schedule a time to remotely log into your in-line or in-kiln system and provide critical troubleshooting and support..
- **Phone Support:** Wagner Meters System Technicians are available via phone each day for certain limited-use situations.
- **Email Support:** Wagner Meters System Technicians are available via email on a semi-regular basis for certain limited-use situations.

To Learn More, Call 844-533-9091 Worldwide Toll-Free

www.wagnermeters.com



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