

IMPROVE Your Lumber Drying¹

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The IMPROVE System Lumber Drying Program is intended to increase awareness of the lumber drying system as a critical component in the manufacture of quality lumber. Its goals are to help mills improve lumber drying quality and identify sources of drying losses, both grade and volume. The Lumber Drying Program is designed to systematically evaluate the drying operation, thus identifying opportunities to improve drying quality, both in the drying operation and at every prior stage of lumber manufacture.

A package of analytical tools for the IMPROVE System is under development. These tools will measure and improve processing efficiency and product quality in sawmills, veneer mills, and plywood plants. They will provide means to evaluate how effectively logs are being converted into end products, to identify opportunities to increase product yield and value, and to predict the results of proposed improvements.

Objectives of the IMPROVE Lumber Drying Program are to provide easy-to-use methods and techniques that a kiln operator can use routinely in the course of normal work around the kilns without doing special studies or interfering with production. To help meet these objectives, we have written the Checklist and Guidebook for Softwood Drying Quality. Kiln operators can use the checklist to readily evaluate how well their operations rate on those factors that most strongly affect drying quality. Particular emphases are given to kiln operation as well as kiln maintenance and lumber handling. The guidebook section explains the importance of each item on the checklist and tells how to evaluate it. It also provides a quick reference on drying quality.

It was not our intent to cover all the detailed components of the lumber drying system, nor was that practical. We encourage you to use the checklist and guidebook as guidelines and adapt them to fit your individual situations. Many other maintenance and operating factors are important and should not be neglected, but these do not have as direct a bearing on drying quality. Additional information

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on lumber drying is also available from other sources. The Dry Kiln Operator's Manual contains maintenance checklists and discusses many factors in kiln maintenance. Kiln manufacturers and consultants can also supply maintenance checklists and additional information.

Uses for the Checklist

The checklist can be used in four ways. First, it can be used to make an overview of the entire kiln operation. Secondly, a particular kiln that is suspected of causing drying problems can be checked more closely, or all kilns are checked through all steps of the drying cycle as a routine. Third, the checklist can be used to monitor the effects of improvements by providing a "baseline" for a later comparison. Finally, it can be used to "check out" individual system components.

Overviewing the kilns-- When using the checklist as an overview, it is not necessary to look at all items in the same kiln. You may cover the checklist items done in an empty kiln in one kiln, then check the items related to a running kiln at a second kiln, and check the dry end as a third kiln is being unloaded. This overview can be completed in several hours or less.

Studying one kiln-- Your experience or the overview may suggest one particular kiln is causing drying quality problems. You can use the checklist to evaluate that one kiln from loading through unloading. You will have to keep the checklist to wait for each step of the drying cycle to be completed.

Monitoring the effects of changes-- If changes are made that affect the drying operation, either at the kiln or in the prior lumber handling, you can use the checklist to monitor how those changes affected drying quality. Rate the kiln or operation before the changes are made and save the checklist. Repeat the checklist rating after the changes have been made. You can then compare the before and after ratings to see what effect the changes had.

Checking out individual system components-- At times you may suspect one individual system component is causing non-uniform drying or increased degrade. For example, you may see areas of wetter lumber that lead you to suspect heat distribution or air-circulation problems. For convenience in checking individual system components, such as heating or air circulation, a summary of the checklist items arranged by subject area is also provided.

Following the Checklist

The checklist was deliberately designed for kiln operators to use themselves. It allows you to evaluate the many factors that affect drying quality in a systematic manner. Each item on the checklist has a rating key based on a scale from 4 (high) to 1 (low). Each level of rating is described in the guidebook. The high rating of 4 is intended to be attainable, but challenging, for most of the industry. It gives a goal to aim for. The low rating of 1 indicates a strong need for improvement. For a well-operated kiln, most of the ratings should be 4 or 3.

The checklist is arranged so items are grouped together by the area of the kiln or yard where they are checked. For example, all inspections of valves and controls normally found in the control room are grouped together, as are checks of stacking and stickering done at the dry end. The following major topics appear in the checklist.

Standard operating procedures--The first series of items ask about standard operating procedures. These relate to maintenance procedures, maintenance

schedules, moisture content monitoring, recordkeeping, and communications. These are items that should be checked regularly to prevent problems or correct them before they become serious.

Control room--In the control room, you will be asked to inspect valves and controls to see that these are in working order. The control charts provide information to help confirm that the controls are operating properly and that the desired schedule is actually being met.

Fan deck and kiln roof--On the fan deck and the kiln roof, check the fans, heating coils, and vents for proper installation, maintenance, and operation.

Yard area--In the kiln yard area, check the thickness uniformity of stickers and bolsters, preferably with dial calipers or a micrometer.

Inside an empty kiln--Inside an empty kiln, look for evidence of condensation and corrosion. Check that the reheat coils are clean and if there is an adequate water supply to the wet bulb. Turn on the steam to check the steam pipes, heating coils, and steam spray.

While preparing charges and loading the kiln--Move from the empty kiln to one that is being loaded. Check the loading practices as packages are loaded on the kiln trucks or load supports. After that kiln is loaded, check that the package loading will ensure proper airflow through the packages. Lumber thickness variation and track kiln rails are also evaluated as the kiln is being loaded.

During kiln startup and operation--During startup, check the airflow across the wet-bulb and confirm that the traps are functioning. While the kiln is operating, look for leaks and drainage and confirm that the scheduled fan reversals actually reverse the airflow direction.

After drying is completed--Go to a kiln that is ready to be unloaded and check those items that ensure adequate airflow through the load. These include pile height uniformity, baffles in place against the load and held securely the entire time, and adequate plenum width. Before breaking down the piles, spot check the final moisture content.

Evaluate stacking and its effect on drying quality--Once drying has completed but before the load is broken down, you can see the effect of stickering and stacking practices on drying quality. Look for warp and other drying defects.

Drying defects and drying problems reported--Finally, evaluate the amount of drying defects or degrade and moisture content variability.

The Checklist and Guidebook for Softwood Drying Quality is the first in a series of techniques and analysis tools that are being developed as part of the IMPROVE Lumber Drying Program. We would appreciate your comments and suggestions how it could be made more useful for you. Also, if you have ideas for other techniques or information that will help you do your job better, please let us know.

Copies of the Checklist and Guidebook for Softwood Drying Quality are available from

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