

APPLICATION OF STATISTICAL QUALITY CONTROL
TO THE SEASONING OF REDWOOD LUMBER

By: R. E. Newman

Mr. Chairman, Gentlemen:

The quality of any product is the determining factor in whether or not that product will continue to be purchased by the ultimate consumer - the man who pays the bills.

When quality drops below a recognized standard, or falls short of a higher standard set by a competitor, the company producing the substandard product is soon in trouble.

Low or variable quality in a product is not only a reflection on the producer but upon the industry as a whole. This in turn results in the consumer diverting his money to substitutes or competing products.

In the seasoning of lumber all of us here today are primarily concerned with quality. We are, first of all, required to dry the lumber to within specific moisture content limits as prescribed by the grading rules. In addition, we are concerned with stress relief, prevention of stain, and other allied problems peculiar to the particular species we are seasoning. Every time we turn a valve or adjust a vent we are attempting to control the quality of our product.

What kind of a job are we doing? How do we determine our success or failure? By visual inspection, by moisture content checks and by case-hardening tests, we can pretty well tell the quality of our product. But how does this degree of excellence compare with what we did last month? Last year? How do we stack up with the industry as a whole; with what our brother operators are doing at their mills?

In order to determine these things we must keep records of our samplings. It is at this point that Statistical Quality Control enters the picture.

The California Redwood Association has recently introduced to the industry a system of quality control of moisture content based on the principles of Statistical Quality Control now being applied widely in many manufacturing processes.

The system involves two forms:

- A. A data sheet for recording the moisture content of ten samples each from 40 kiln charges, the average moisture content of each group of samples, and the range of moisture contents within each group.
- B. A sheet for graphically representing the average moisture content and the range of moisture contents in each charge sampled.

After the first 40 charges have been sampled the data obtained is used to plot upper and lower control limits for both average moisture content and range of each charge. Any future samplings falling within these established limits are deemed to be satisfactory; when a sample average or range fails to come within

the control limits it is an indication to the operator that the quality of this charge is not up to par.

In an article entitled "Systematic Quality Control" in the "Timberman" magazine for August 1952, Byrne C. Manson of the California Redwood Association, who was instrumental in introducing the system to the kiln operators, discussed the implications of the recorded data. He points out that chance causes over which we have no control are responsible for the minor deviations within the control limits, but when either the range or average for a sample group falls outside the control limits it is due to an assignable - preventable - cause. Mr. Manson also states, and I quote, "The chart has a use in preventing trouble even before points fall outside the limits. Experience has shown that anytime seven consecutive points on either chart fall on the same side of the average line, trouble is indicated, and these seven points should be considered as serious as one point falling outside the limits".

Proper interpretation of the average and range chart can show us when a charge was pulled too soon or left longer than necessary in the kiln; it can indicate faulty functioning of the kiln equipment; and may, where lumber is segregated into weight classes, show when the lumber is not being properly sorted.

At the mill, where I work, our lumber is segregated into light, medium and heavy groups for seasoning. The heavy lumber is air-seasoned for a year before kiln drying, the medium is air-seasoned six months, and the light segregation goes directly to the kilns. Shortly after the quality control system was inaugurated it became apparent that our heavy and medium lumber was being satisfactorily dried but that the light segregation was characterized on the chart by generally high averages and wide ranges of moisture content. At once this suggested that either we weren't taking enough time in the kiln, or the light lumber was not being properly sorted, or both. We lengthened our drying time, tightened up on our segregation and got out of trouble. This is a factual instance of how the control chart can serve as a barometer of quality.

About six months after the inception of this program we devoted one Seasoning Committee meeting to the subject of quality control. Each operator brought what data he had accumulated to date and we compared notes. We found we were all doing fairly comparable work with about an equal number of "wild" samples showing on the various charts. We all agreed the system gave an excellent picture of what we were doing. Some questions arose, such as "Does it make any difference whether moisture tests are made by a moisture meter or by the oven-dry method?" "Should samples be taken at the dry sorter or at the trim saws in the planing mill?" It was decided that if each operator was consistent in his own sampling technique his results would be as valid and vary but little from the results of a different sampling technique.

It has also been brought to our attention that moisture content is not the only factor concerned in lumber quality. What about drying stresses, stain, seasoning checks? Perhaps the major ones of these factors can some day be brought under the quality control system.

Meanwhile, we feel that the application of the principles of Statistical

Quality Control to the seasoning of redwood lumber has been well worthwhile in that it has given us:

1. Common basis for judging quality.
2. A mutual incentive to improve our product.
3. A simple and efficient system of recording and analyzing sample data.
4. An alarm system for detecting trouble in its early stages.
5. Not least of all, a workman-like report to management to show them we are turning out a product of consistently high quality.

Thank you.