QUALITY CONTROL OF TREATED WOOD PRODUCTS

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Quality Control in Treated Wood Products is a subject with which many people in the wood preserving industry are familiar or, at least should be cognizant. Many people do something about it, but a few do little or nothing but give it lip service. For them there can be little but disgust or, to be most generous, pity. For failure to exercise all aspects of proper quality control results in a great disservice to this industry. Improper quality control results first, in dissatisfied customers, architects, contractors and consumers and second, in litigation with many lawsuits in the multimillion dollar class and third, and most important, in an erosion of confidence on the part of consumers that treated wood products can perform as well as, or better than, other construction materials in the marketplace.

There is little need to discuss quality control with those aware of its necessity and who are using it in the daily production or utilization of their products. It is to those who are unaware of the benefits of employing complete quality control techniques and of the consequences of failure to utilize those techniques that the writer would like to direct these remarks.

During the American Wood-Preservers' Association Annual Meeting in April, 1975, a Symposium was held on the subject *"Quality Control, Before, During and After Treatment"* in which the writer participated. The writer quoted an old Arabic story 1/ which will be quoted here again for it bears strongly on quality control.

1/ Gardner, Val, Baxter Extra; Feb. 28, 1975

"In the City of Bagdad lived Hakeem, the Wise One, and many people went to him for counsel, which he gave freely to all, asking nothing in return.

There came to him a young man, who had spent much but got little, and said: "Tell me, Wise One, what shall I do to receive the most for that which I spent?"

Hakeem answered, "A thing that is bought or sold has no value unless it contains that which cannot be bought or sold. Look for the Priceless Ingredient."

"But, what is that Priceless Ingredient?" asked the young man.

Spoke then the Wise One: "My son, the Priceless Ingredient in the marketplace is the Honor and Integrity of him who makes it. Consider his name before you buy."

It is obvious that those who have Integrity in the marketplace are those who exercise Quality Control. For without it no product can consistently meet specifications and perform as the user expects it should.

Architects and engineers must design and specify materials to meet both the aesthetic and strength requirements of projects and buildings. In any well-planned project, this results in rigid and clear-cut specifications which become the foundation upon which a quality control program may be built. Similarly, distribution and transmission design engineers in utility companies must specify products which meet their design requirements. Railroads must have crossties or sleepers which meet their design needs. Thus, every treated wood product must meet some kind of specification to perform well in its intended end use.

None of this is possible without proper quality control in several areas of the manufacture and use of these treated wood products. These areas include, but are not limited to:

- the selection of wood for treatment;
- care and handling of wood in the forest;
- transport to the manufacturing facility, be it sawmill or treating plant;
- the manufacturing process itself;
- the treatment process;
- storage and handling of materials both before and after treatment;
- shipping the products to their destination of use;
- storage at the construction site; and
- proper use and handling in construction.

Not all of these areas are controllable by the treating plant, but all must be subject to quality control if the end requirements of the project are to be met.

To adequately elucidate in writing on all of these areas would require a large book, and to discuss them all in this forum would require many days. Therefore, the author would like to concentrate on those controllable by the treating plant. For the purposes of these remarks, the writer will assume a plant which processes both poles and lumber. Such a plant would have storage facilities for "barkies" (i.e. poles and piling which have not been peeled or shaved), untreated round material, treated round material, untreated and treated sawn material, a treating facility and perhaps, a dry kiln.

Quality control in a treating plant starts with exercising care in unloading the wood product so that it is not damaged mechanically. No one wants a slabbed pole, gouged timber or broken piece of lumber. But carelessness in unloading may cause all three defects.

Knowledge, experience and care allow a debarker or shaver operator to produce a piece of round stock free from the "barber-pole" defect which leaves unsightly spiralling ridges along a pole's surface. Inadequate stickering or overloading of pole stacks will result in broken or dented poles.

Inadequate or careless inspection of poles after shaving may result in poles with excessive sweep, twist, knot size, combination of knots, compression wood, decay, timber break, insufficient sapwood, rotten knots, undersize, oversize or other defects. Any or all of these defects may render a piece unfit for its intended use.

Improper retort tram loading, improper use of binders or cables, or inadequate protection of projecting tops or butts all may result in strength-reducing or unsightly mechanical damage.

In the retort or treating cylinder, the use of excessive temperatures, pressures or processes may result in serious strength reductions which also, may be of a type difficult to detect by after treatment visual inspection. Serious internal bursts can result from improper processes being applied to inadequately seasoned or conditioned round stock. Insufficient preservative solution strength or insufficient injection pressure or time may result in material which superficially appears to be well-treated but, which is, in fact, drastically under-treated so that it has either or both insufficient penetration of, or retention of, preservative. With plywood, the writer has observed blistering or delamination of veneers caused by too rapid a release of hydraulic pressure immediately following the pressure period.

All of these defects result from an inadequate quality control program.

From the foregoing it may be seen that the writer does not view quality control as solely inspecting core samples for conforming preservative penetration and analyzing the specified assay zones from the borings for compliance to retention specifications. That part of quality control may be compared to total quality control as we compare the tip of an iceburg to its whole. There is far more to total quality control than taking cores and assaying them.

Now, what are the elements of a Total Quality Control Program?

First, it must utilize the specifications applicable to the products it expects to control.

Second, it must contain a system of observing and measuring whether these specifications are being met.

Third, it must contain a means of immediately effecting correction of those properties which are non-conforming or rejecting the material.

Fourth, it must have a system of measuring those factors which, may, directly or indirectly, affect product quality and of correcting those factors before quality is impaired.

Fifth, it must have a training program to assure that everyone involved in product manufacture is aware of what constitutes a quality produce and how to produce it.

Sixth, it must contain the element of a final "look-see" or inspection to insure that all specifications have been met and that the product will meet the consumer's end use.

That may seem like a big order, but is it?

First, what do we have for specifications? I will cite both U. S. and Canadian sources, where known:

American Lumber Standards and related grading agency rules, such as those of the PLIB, WCLIB, SPIB, CSA, etcetera.

CSA Committee 080. Wood Preservation Standards.

American Wood-Preservers' Association (AWPA) Standards:

M-1 Purchase of Treated Wood Products

M-2 Inspection of Treated Timber Products

M-3 Quality Control Procedures for Wood Preserving Plants

M-4 For the Care of Preservative-Treated Wood Products

A-1 through A-11, Sampling and Analyses Methods

C-1 through C-30, Commodity Treatment Standards

ASTM Standard D-25 Rough Timber Piles

ANSI 05.1 Poles

PLUS the many specifications of individual utility companies.

PLUS the many railroad specifications.

PLUS the many, many city, county, parish, district, state, provincial, federal and other governmental agencies specifications.

So, we do not lack for specifications to guide us in the production of quality treated wood products. We do, however, sometimes find people not reading them or following them. This requires that we train people to read and act upon what they have read.

Second, who is measuring or inspecting these products for specification compliance? Every plant should have its own graders, inspectors, and quality control people. But, lacking that there are private inspection agencies, utility company representatives, government inspectors, and others involved

in the overview inspection of graders and agency inspectors. A plethora of such people are available either for training, consulting or inspection. But the best and most reliable control is in-house.

Third, assuming that we have an in-house team of graders, inspectors and quality control people, whatever be their titles, they must have the authority to reject material which is non-conforming in any detail. This requirement may seem obvious to everyone, but the writer has been in several plants where the quality control people did not have authority to reject non-conforming material. They could point out defects, but the final authority for rejection rested with someone else; the plant manager, the salesman, or sales manager, etcetera. Such a program is unsatisfactory. The writer has found several orders handled in this manner to result in very costly litigation. In a successful quality control program, the highest level of management must support the program and empower the graders and inspectors to have final authority in quality materials. Their quality decisions must not be subject to the whims or dictates of others.

Fourth, there must be a routine system of checking tank gauges, pressure gauges, vacuum gauges, thermometers, tanks, pipelines, blind flanges, controllers, etcetera, to detect inaccuracy, malfunction, or impending failure of these items. It is also necessary to monitor the treating processes with sufficient frequency to assure that the treating instructions are being accurately adhered to. The treating plant operators, "valve twisters", or whatever you may call them, can acquire strange habits or "a new and faster way" of accomplishing a process which, in fact, may adversely affect the quality of the product. Look well in this area for many quality problems may be found here.

Fifth, if your goal is a quality product, everyone must know what is necessary and expected. They will learn that faster and more uniformly if they are trained. Having every plant employee quality-conscious does improve product quality and lessen the need for extensive final inspections.

Sixth, until everyone is quality-conscious and you wish to assure that quality products are leaving your plant, there must be a final inspection of material for appearance, mechanical damage, packaging conformance, proper loading and restraints on rail car or trucks, and protection from weather and the environment when necessary, to assure that a quality product will arrive in a quality state at its final destination. We are aware that railroads, some trucking companies, and government agencies have rules concerning proper rail and truck loading and use of load restraints. However, in many cases those rules fall short of adequately protecting a load from damage. The writer has seen loads shift on both rail cars and trucks which resulted in anything from minor damage to loss of over one-half of the product and death or injury to one or more individuals. The writer has observed architectural finished products considerably damaged from weather or smoke in highway or rail tunnels because the load was not properly covered or bundle-wrapped. The results of this lack of quality control were dissatisfield customers, replacement of materials, delays in construction and penalties for the delays.

It may be appropriate to cite a few examples of litigation stemming from poor or non-existent quality control.

In one case, the wrong species-treatment combination was agreed to by a knowledgable company and its treater was a firm having little or no knowledge of this combination or of consequences of using it. The result was failure

of some of the product in service coupled with unsightly appearance of much of the balance of the product. Consequence, a $20,000,000 lawsuit. Status, pending, but partially settled out of court in favor of the plaintiff.

A firm supplied construction poles to a contractor who built living units on them. Incorrect and insufficient treatment was supplied. Consequence, a lawsuit for $5,000,000. Status, in negotiation for settlement.

Truck loses load on freeway, injures others and is killed himself. Consequence, several lawsuits involving over one-half a million dollars. Status, all settled out of court for "big bucks".

A good quality control program may not be cheap, but, note how dear the costs can be without it. Surely, these are extreme examples, but the point is illustrated.

Consider too, how much is lost if a valued customer is lost for ten, twenty or thirty years because he received poor quality products. Is that not expensive to a business? Of course it is!

It was noted earlier that we assumed a plant with a dry kiln. It is probably used to dry water-bourne salt treated products and perhaps some untreated material to prepare it for treatment. Here too, quality control is necessary for prevention of mechanical damage and degrade.

In the foregoing, we have outlined many quality control areas confronting treating plants and have suggested some ideas for their resolution.

But, there is another area of Quality Control in Treated Wood Products which has received insufficient attention, in past or present time. That is the education of the consumer concerning what constitutes a quality product for his needs and how he should use it.

We have, in fact, two kinds of consumers. One is the sophisticated utility company, railroad, or heavy construction contractor. They employ engineers, designers, purchasing agents, architects, construction foremen, etcetera, who are familiar with treated wood products, their care and use.

The other, in today's market, is the handyman, the do-it-yourselfer, who, for the most part, knows nothing of the use or care of treated wood products. But there he is, out buying material for his house, fence, patio, garden, gazabo or deck. Does he know what species-treatment combinations to purchase for whatever purposes? Probably not!

It is he who needs that Priceless Ingredient in the marketplace, which cannot be bought or sold, Integrity. And by Integrity, we mean Quality. In addition, our Mac, the Handyman, needs a Hakeem, of whom to ask "What treated wood product do I need here, and what for there?" Or, "What should I do when I install this product; is there something I should do to a cut end?" Or, countless other questions which need answers.

There may be organizations in Canada such as the Canadian Wood Council or the Canadian Standards Association or others who perform part of that service now. However, much more is needed and it occurs to the writer that the voice of Hakeem might well be the Canadian Wood Preservation Association. If not this Association, you might promote the idea with another group just as able and willing to accept the challenge of educating the little consumer.