THE TECHNICAL MAN AND THE WOOD INDUSTRIES

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IN A previous paper, to which the reader is referred,¹ a number of conclusions, respecting the unsatisfactory technical status of our wood utilization, were stated. These conclusions were reached after some twenty-six years of close contact with our wood industries and with timber research.

The point was made that the state of affairs indicated involves an economic and monetary loss of major proportions.

Two main remedies were suggested, namely, (a) greatly increased intensity in our timber research effort and (b) the employment of properly trained technical men in the wood industries. The second of these proposed measures was briefly discussed and some of the gains to be expected from applying it (given sufficient time for these gains to be achieved) were detailed.

The present article illustrates by actual examples the need for technical men in the wood utilization field, discusses the type of training they should receive and endeavors to answer several pertinent questions, relative to the whole matter of introducing such men into industry, which are frequently asked.

While it is not the purpose to deal with timber research at this time, it should be stressed that each of the two remedies proposed above is, to a great extent, complementary to the other, and that neither can reach its full effectiveness alone. Our effort in timber research in Canada is painfully incommensurate with the present and possible moment of our timber resources and wood industries, as well as with our capacity to grow timber. Its inadequacy may be partially gauged when it is realized that, while the amount annually devoted to research by industry as a whole, in North America, has been estimated at about 1½ per cent of the yearly value of the products of industry, the sum available for research pertaining to wood totals less than one-twentieth of one per cent of the corresponding product value. In view of this fact, and of others to be brought forward later in this paper, it is abundantly clear that the time has come for a searching re-examination of our whole timber research structure and effort in this country.

Disproportionate as our timber research is to the need and opportunity for it, it has yielded and is yielding a fund of information and data which, if fully and promptly applied, would be productive of new values in industry. Such practical application, however, meets a very serious obstacle in that there is virtually no personnel within the industries themselves trained to translate and adapt investigative findings into terms of industrial production. That is, there is no effective linkage between timber research and the wood industries. Part of our machine is missing.

Suppose we illustrate the need for the application of more technical knowledge in the use of wood by a few typical examples. In giving these examples it is not overlooked that wood-fabricating concerns may be found

¹A Long-Time Plan for Increasing the Value of Wood as an Industrial Material. Forestry Chronicle, Sept., 1940.

whose methods and outlook are progressive in a very high degree. Unfortunately, however, they are few and far between. How many wood-fabricating plants can be named which have set up any effective machinery (using that word in a figurative sense) for systematically scrutinizing the findings of the research agencies and making use of those findings where that can be done?

The hardwood interests in the United States have, during recent years, lost one of their major markets because of the change from wood to steel in automobile bodies. This change sounds like a long step in advance to a public which is being educated to believe that steel is a better material than wood for all purposes. The term "all steel" body has, as you know, been so capitalized in advertising and sales that it has become almost a household word. But what do the body builders themselves say? The leading builders in the United States are reported to have expressed the opinion that the combined hardwood-steel body is very greatly superior to the all-steel product in almost every respect. There are very definite engineering reasons, supported by careful and extensive tests, for this view.

A technical man, with long experience in the sale of hardwood for body building, with whom this matter was discussed, gave it as his considered opinion that the business had been lost chiefly because of insufficient information, on the part of the hardwood people, of the properties of their own product. Changes were made in the manufacture of automobiles which raised certain problems affecting the wood used. The wood people were unable to solve these problems and so the market was lost. It may be added that the problems themselves were not particularly difficult and that, had the hardwood industry been adequately supplied with alert and properly trained technical men, these questions would not only have been easily answered but the answers would have been ready even before the questions arose. (An interesting statement regarding the swing from hardwood to steel in body work may be found in the September issue of *Timber of Canada*.)

Some time ago a large manufacturing plant reported about 30 per cent breakage in the fabrication of a wood part involving a steam-bending process. Study of procedure showed that the basic technology of the bending process was not understood, that rule-of-thumb methods were in use, and that the trouble could be almost entirely eliminated at small expense.

A retail lumber dealer recently supplied the flooring for a new residence. Some months after the floors were laid the joints opened up badly and the dealer was called upon to replace the floors at his own expense. The causes leading to this condition in floors are well understood by technicians and it can be prevented by observing certain precautions. Cases of this kind are of very common occurrence.

A concern kiln drying hardwood lumber has an output of about sixty thousand board feet per day. Loss, through damage in the drying process, amounts to about \$95 per day. Study of the operation indicated that this loss could easily be cut to half that figure, with a good chance of reducing it to one-third. The saving possible would pay the salary of a technically trained kiln man and still leave a substantial surplus to the company after that salary had been paid.

A firm manufacturing furniture began using a new adhesive, which, in several respects, possessed marked advantages over that previously employed. In machining bonded parts difficulties arose which threatened to rule out the new formula. A good technical man was engaged who solved not only that particular problem but several others also. The saving effected, as stated by the head of the firm, will not be quoted here because it would sound like an exaggeration. In addition, of course, the quality of the company's product was raised.

The technology of so-called "dry rot" in industrial buildings of wood construction has already been very well worked out. It may fairly be said that if, when such a building is erected, the mechanism of this condition is clearly understood it can be entirely avoided in every case. A few years back inspection of a large building in Toronto disclosed the fact that the laminated floors were so badly decayed that it was possible to push an ordinary pencil into the wood for a distance of some four inches. It cost about five thousand dollars to make the necessary repairs. The cause was not the employment of wood. It was ignorance of the whole subject. Numerous comparable instances could be mentioned and the expense involved has often been far greater than the figure named.

Every year heavy property losses, to say nothing of loss of life, result from fires in buildings constructed of wood. Research has already gone far in the direction of making wood fire-retardant. Does the building industry which employs timber for construction, or the lumber industry which supplies it, make any attempt to apply practically the available knowledge of fire-retardant treatments? Do these industries sponsor research in this field? Do they actively promote it? You know the answers. It is scarcely an exaggeration to say that these industries are almost oblivious of the existence of fire-retardant processes.

Not long ago specimens of glued-up work were taken from the regular output of a certain plant. Tests showed that the strength of the glued joints was much lower than could be obtained with the same adhesive and the same wood when technically correct methods of bonding were used. Thus an inferior article was being made when a superior one could have been made just as easily.

A company which shall be nameless is at present developing a new product in which extensive use is made of wood. It is of paramount moment that certain glue-bonded parts shall possess maximum attainable strength. To secure this a correct pressure-consistency relationship in gluing is essential and some other technical requirements must be satisfied. Adequate technical control is not being exercised and there is reason to believe that the best results are not being secured.

The above are merely a few haphazard illustrations which go to show the urgent need for good timber engineers in the wood-industry field. It would be very easy to give a great many additional examples. In fact, whenever one gets beneath the surface in practically any wood industry that can be named the same state of affairs is likely to manifest itself; the industry is not on a proper technical and engineering basis and is making slow

progress, if any, towards reaching such a basis. In other words, it is failing to develop, from the wood it uses, the maximum values and services.

The experience of industry in general demonstrates clearly that research findings cannot be applied to industrial operations fully, promptly, and gainfully and that timely research cannot be adequately initiated and stimulated if men with the right sort of technical training are lacking from industrial personnel.

If the whole situation is patently indicative of the need for technical men in the wood industries, just what kind of technical training should they receive? This question was partly dealt with in a former paper in which it was shown that, in the actual functioning of a wood-fabricating plant, problems fundamentally engineering in character, and others, basically wood technological in nature, constantly present themselves in about equal proportions. To be of maximum value to a wood industry, a technical man must therefore receive a thorough grounding both in mechanical engineering and in wood technology. Wood technology is understood to mean comprehensive scientific knowledge pertaining to wood, with special reference to the industrial use of that material. The plan now in operation at the University of Michigan provides for completion of three years in the regular mechanical engineering course followed by two years in wood technology. A bachelor's degree in engineering may be earned at the end of four years and a master's degree in wood technology on completion of the fifth year.

Other plans might, of course, be adopted. For example, the student might continue in mechanical engineering to the end of his four years and then take the work in wood technology. This would have the disadvantage of adding another year to his university period, and few men would be willing or able to spend the additional time. The years devoted to mechanical engineering, might be reduced to two and followed by two years in wood technology. Such a procedure, however, would certainly not provide a sufficient engineering foundation and cannot be recommended. No reduction in the two-year period given to wood technology should be considered, since it would decidedly not be possible to give the student an adequate grounding in this part of the work in any shorter time.

A feature which should receive careful study, as tending to promote the success of any plan of training, is the temporary employment of the men during the summer. This should prove helpful to the employer, since it affords him an opportunity of estimating the capabilities of different men before more permanent employment is offered. It is obviously advantageous to the student because it introduces him to industrial conditions, gives him practical experience, and enables him to begin the process of bringing theory and practice to a common meeting ground.

In considering how these men should be prepared and what they are capable of contributing one salient point should always be kept unmistakably clear. A university can train them only up to a point. The industries themselves must initiate them into the innumerable details and conditions peculiar to each. Since Rome cannot be built in a day, too much must not be expected of them at the start. Industry must shoulder its responsibility

in the handling of the men to just as great an extent as the university in initially training them. Only in that way will success be achieved.

Is there a demand for such men? The *need* for technical men in the field under discussion has, it is submitted, been shown. The *demand* is largely potential and has to be transmuted into the expressed and active stage. It is slowly developing as the fact that the men are being prepared becomes known. Growth of demand depends to a major degree upon gaining the understanding, friendship, and active co-operation of the industries themselves. When it is noted that, in Ontario alone, there are 797 wood-industry units, employing capital exceeding forty-nine million dollars, employing upwards of thirteen thousand persons, and having an annual product output valued at well over thirty-two million dollars it appears certain, in view of facts previously brought out, not only that a potential demand for technical men exists in Canadian wood industries but that it can be changed into an active demand if the task of so changing it is approached in the right way and pursued with the requisite persistence.

What do the industries themselves think of the type of training under discussion? To obtain an answer to this question for United States wood industries, a letter was sent out from the University of Michigan a few months ago to about forty of the leading men concerned in various parts of the country. These men were selected only because they were recognized as leaders by their own business associates. They were not personally known to us. Something like thirty replies were received. Without a single exception the writers expressed themselves as in favor of our plan.

Have Canadian wood industries been sounded out on this matter? This has not been done by us nor, so far as I am aware, by anyone. It may not be out of place, however, to mention that the Province of Quebec appears to be well to the fore in recognizing the moment of putting its house in order in regard to the utilization of wood. Mr. Piche has several times spoken along this line at the Society's meetings. The article by Professor Risi of Laval, in recent issues of *La Forêt Québécoise*, is very much to the point. The title alone is significant "Faut-il imposer une nouvelle orientation à notre industrie forestière."

What actual gains could reasonably be expected from the employment of timber engineers in the wood industries? The long-time objective would be the introduction of these men into every wood industry and every fabricating plant of any size. They would form the linkage, now lacking, between the research agencies and the manufacturing plants. If we project into the future and suppose this objective reached, certain very definite gains can very conservatively be anticipated. These were stated in a previous paper and will bear repetition here.

(1) Disclosures of numerous technical problems of moment not now recognized to exist by the managements of plants.

(2) Mutual stimulation as between technicians in industry and those in the timber research organizations and hence more extensive and effective research.

- (3) Quicker and more effective application of research findings in manufacturing practice.
- (4) Lower production costs in many instances.
- (5) Higher quality in manufactured products.
- (6) Improved and new types of machines and equipment.
- (7) New and improved processes, products, and wood uses.
- (8) Adequate support for timber research agencies.
- (9) A more intelligent and active interest in timber production (i.e., in forestry) on the part of the wood-fabricating industries than is now in evidence.

Why should foresters interest themselves in this question; why not leave it to the engineers? As was stressed in a previous paper, our engineers are not thinking in terms of wood, though of course there are the occasional exceptions. As a general rule, their interest in, and knowledge of, wood are extremely meager. There are no reasonable grounds whatever for the hope that the engineering profession will move to establish any course of training designed to prepare technical men adequately for the wood-industry field.

What procedure is suggested in dealing with the problem of initiating such a course of training in Canada? It has already been proposed that, as a first step, a small, well qualified committee be selected to undertake the task of investigating the whole question thoroughly and to submit recommendations to the Society as to further appropriate action in the matter. Assuming the committee's findings were in favor of the plan, it would presumably be recommended that the Society officially approach the University with the request that such a course of training be established. Such a request would of course be supported by a presentation of the Committee's findings.

A final question may well be asked: Why bring this matter up during the war? Even the terrific stresses of war in England are not preventing earnest thought and planning for the time when the problems of a post-war period will descend upon us in all their force. Whatever the nature of those problems may be (and they will include that of paying for the war and of finding employment for large numbers of demobilized men without special training for civil life) it seems certain that, to help meet them, to aid in stabilizing conditions, and in creating employment, we shall be well advised if we bring every resource of science and technology to bear upon the utilization of our raw materials. It is not too soon to move, now, to increase the values and services obtainable from a Canadian material of such outstanding national importance, both present and potential, as wood. Anything we can do in this direction is bound to be constructive in the highest degree and, quite possibly, may turn out to be of crucial moment in the years that are coming.

In conclusion, it is urged that the Society deal with this matter without delay. If it is worked out to a successful issue it is believed we shall have made one of the most constructive and forward-looking steps which can be taken in the entire forestry and wood utilization scheme of things in this country.