## Is Wood Suitable for Mill Buildings?

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THE Forest Products Laboratories have frequently had occasion to draw attention to the serious financial losses resulting from the ravages of so-called dry rot in mill or factory buildings of wooden construction. Numerous cases in which this trouble has occurred in Canadian buildings have been carefully investigated, and one of these, which has been under observation for upwards of a year, affords a typical example of a deplorable state of affairs which could have been entirely avoided had those concerned in the erection of the building been guided by the necessary knowledge of the technology of timber and the mechanism of the decay of wood.

From the point of view of the owners of the building the facts are as follows: Five years ago a large factory building was constructed with heavy timber columns and beams and laminated floors of 2-inch x 6-inch planks overlaid by 7/8-inch hardwood. The timber was partially seasoned only when installed. The operations carried on in the building are such that the relative humidity in the interior is usually high. Serious decay was first noted about three years after the erection of the factory, and since that time has apparently become steadily worse. The tearing out of practically the whole of the timber construction has now become imperative, and such is the prejudice against wood as a structural material which has been created in the minds of the owners that they have decided to replace entirely with reinforced concrete at an estimated expenditure of \$100,000.

From a technical standpoint some additional important facts present themselves. The decay of wood is due to the action upon it of low forms of plants known as wood-destroying fungi and bacteria. For practical purposes the bacteria may be ignored. The germs of decay are no more inherent in timber than tobacco is inherent in a tobacco pipe; infection must come from outside, and sound wood becomes infected in two ways, namely, by contact with either tissue or spores of a wood-destroying fungus suitable conditions of temperature, under moisture and air supply. It should be noted that this is not merely an interesting theory. It is a hard fact, proved beyond dispute by extensive research and thousands of carefully conducted tests, and we can now induce decay in timber at will in the laboratory. A number of kinds of fungi which can be definitely identified are responsible for the destruction of timber in buildings. In the particular case under discussion the range of temperature and relative humidity of the air in the factory were such as to provide exceedingly favorable conditions

for the growth of several of the most destructive kinds. In addition the unseasoned state of the timber facilitated decay because it was not even necessary for the wood to absorb water from the humid air before reaching the moisture content permitting the action of the destructive agent-the moisture was there already. Lastly, a large quantity of the timber used was of the character shown in Fig. 1-that is to say, of rapid growth and low density. Different pieces of wood, even of the same species, differ in their ability to resist attack. Fig. 2 shows timber of slower growth and higher density and possessing much greater resistance to wood-destroying What occurred, therefore, was that fungi. timber of low resistance in a condition to invite decay (*i.e.*, unseasoned) was placed in a building in which the operations to be carried on gave rise to very favorable conditions for the growth of several extremely destructive kinds of fungi. It is, therefore, obvious that it could have been predicted that in all human probability decay of the timber would occur.

Such instances, and they are numerous, raise two important points for the consideration of the lumber trade. Firstly, they bring wood into serious disrepute as a structural material and indirectly advertise other materials; the net result being loss of business to the lumber dealer. Secondly, they do not simply happen without warning like an earthquake nor are they due to some mysterious and unknown cause. The cause is known and the trouble can be prevented Wood initially sound by proper procedure. will last for an indefinite period so far as decay is concerned if any one of the factors essential to the growth of fungi is lacking or can be effectively controlled. The moisture factor is especially important. If the required amount of moisture is present in the wood the fungi can grow in it. If it can be kept thoroughly air-dry their growth is absolutely prevented. It is, of course, rarely practicable under ordinary conditions to control the moisture content of the wood, the humidity of the air, temperature or air supply. The food supply of the fungus, however, that is the wood itself, can readily be controlled in that by efficient impregnation with a suitable preservative it can be made chemically impossible for the fungus to act upon it. In the particular mill with which we are now concerned the conditions were so exacting that the timber should without doubt have received efficient preservative treatment.

The selection of the preservative to be used for the treatmentof timber for a mill or factory building should depend on the circumstances of the particular case. A material which has been