SCHEDULE DEVELOPMENT FOR HYBRID POPLAR

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Introduction

Large amounts of hybrid poplar were planted near Boardman, Oregon, by Potlatch a number of years ago for pulp. The trees are now large enough to make lumber. A custom dryer was drying small amounts of the material on a five- to seven-day schedule. The length of the schedule may have been related to the kiln and a drying schedule for this material had never been developed.

OSU, at the same time, offers an undergraduate class in wood drying. The development of a schedule was taken on as a class project. This would provide the class with a real world problem and provide Potlatch with additional information with which to design a sawmill and drying facility.

Three charges were dried. Each was approximately 1000 bf. The packages were 4-feet wide. The airflow was 1000 ft/min during the first day of the schedule, then decreased to 400 to 500 ft/min at the end. The wood was 1-inch in nominal thickness, random width, and 10-feet long. It was cut in January, 2006. The first charge was dried approximately two weeks after sawing and one charge was dried per week. The lumber was stacked on 0.75-inch stickers on a two-foot spacing and a top weight of 50 psf was applied. Eight sample boards were monitored during drying for moisture content and defects. The wood was cooled and then the concrete was removed 24 hours prior to unstacking. As the wood was unstacked, bow and crook were measured (in 1/4-inch increments) on every other piece and moisture content was measured in two places on every piece using a hand-held capacitance-type moisture meter. The SG setting was 0.33. Shell-core moisture content and stress were evaluated on eight 10-foot pieces from each charge.

The drying schedules and resulting charge moisture contents are shown in Figure 1. The first charge followed the USDA moisture-based schedule for cottonwood. The poplar, however, gave up moisture so quickly that the sample boards could not be weighed often enough to make schedule changes at the correct moisture content. Therefore, the other two schedules were time-based. Drying times for the three schedules were 108, 89, and 72 hours, respectively. This is considerably less than the five to seven days currently being used and will affect the planning for the kiln installation.

Defects

There was some checking in all charges near the pith and above and below knots; however, drying checks were absent in clear wood. There was no honeycomb or collapse. There was some splitting on the wane surfaces, but we did not attribute this to the drying schedule. We observed no differences in the amount of defects among the drying schedules.

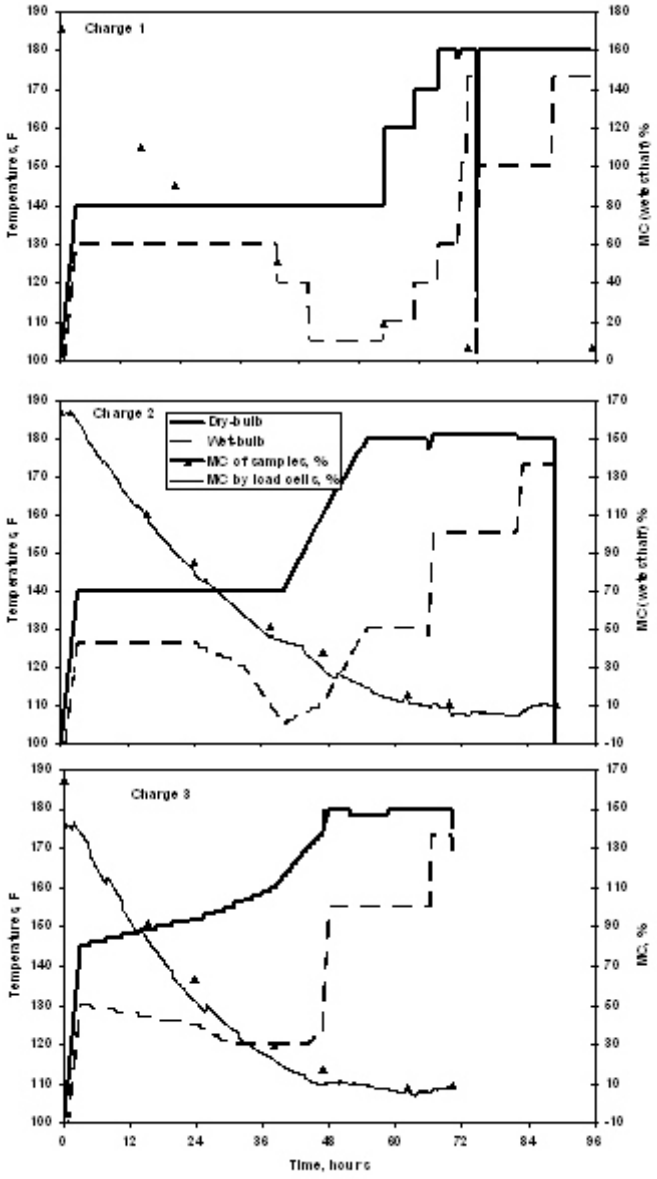

FIGURE 1. Drying schedules and charge moisture contents.

Moisture Content

The moisture content for the charges is shown in Table 1. There was good agreement among the methods. Charge one was slightly over dried. We raised the EMC during equalizing from 5% to 6% so that we were closer to the target moisture content of 9% in the second two charges. Moisture content variability increased as the schedule got shorter, from a standard deviation of 0.3% in charge one to 0.8% in charge three. Shell core moisture content differences were small, less than 0.5 to 1%.

TABLE 1. Average final moisture content (%) for the charges.

	Charge 1	Charge 2	Charge 3
Sample boards	7.6	9.7	8.5
Shell/Core	7.3	9.2	8.0
Meter	7.9	9.1	8.5

Warp

The average warp is shown in Figure 2. Bow increased as drying time decreased. Crook showed no consistent change with drying time. It is not clear than drying time influenced warp.

Stress

Stress was adequately relieved with as little as four hours of conditioning at an 11% equilibrium moisture content. The wood readily absorbs water, so it will be important to not have the equilibrium moisture content too high during conditioning or reverse case hardening may result. We observed a slight amount of this in one charge.

Conclusion

The hybrid poplar should be a very easy species to dry. If the class project was longer, it is likely that we could have achieved additional reductions in drying time.

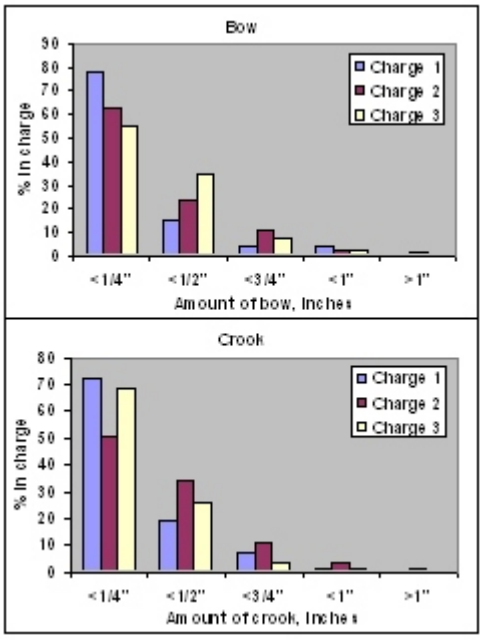

FIGURE 2. Bow (top) and crook in the three charges.