LETTERS TO THE EDITOR

Eleventh Particleboard Symposium Held at Washington State University
Composition board industry searching for solutions to problems

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Over 370 people from 23 countries participated in the 11th Particleboard Symposium at Washington State University in March 1977. Approximately 100 of these individuals were from countries outside the U.S. This important meeting covering particleboard, dry process fiberboard, and composite products has been well received internationally and the participants not only gained from the formal presentations but from the interactions at the different receptions scheduled throughout the Symposium.*

The symposium covered important topics in the areas of binders, medium density fiberboard and structural panel products. Several other papers were presented under the general category of special considerations.

Binders are extremely important to any glued product. Their importance is increasing as further shortages of synthetic adhesives or their components are expected because of their present heavy dependence on natural gas or petroleum as the raw material. Considerable discussion arose at the symposium concerning some of the new binder systems. The isocyanate while costing more has been finding popularity in Europe and is on the verge of application in the United States although it is a petrochemical based product. It may be that the total cost of producing the product will be approximately the same with isocyanate as it is with the conventional binders because of savings in the drying and pressing operations. In addition, the isocyanate appears to be performing very well in exposed or exterior conditions. Recently a urea-modified melamine-phenolic binder has been approved in the Federal Republic of Germany. This binder has undergone extensive testing and the data were presented to the symposium. Boards bonded together with the new adhesive were subjected to a number of severe tests before approval was given. New developments on the phenolic binders were also discussed where the alkaline content of the phenolic has been reduced which in turn reduces the water absorption of the particleboard; thus, the good weathering characteristics of phenolic-bonded particleboard should be enhanced further.

Conserving binder has been of great interest particularly in the last few years with the onslaught of increases in binder prices and shortages of supply. A system for applying the binder in the form of gaseous monomer and thus uniformly distributing the binder over all particles at potentially lower levels was an interesting new development. Phenol, formaldehyde, and ammonia are all applied in the gaseous form. These components are then reacted in situ within the board as it is being hot pressed. Better properties were also claimed for this type of board which at the present time is being considered as a high density fiberboard.

Experimental work on nonconventional bonding was one of the highlights of the binder session. This research is designed to take advantage of the chemical heterogeneity of the wood surfaces by modifying them chemically. Such wood surfaces can be made receptive to chemical

combination with added monomer or by recombination with other modified wood surfaces. Success in this work will lead to bonding with minor amounts of chemicals.

Considerable controversy has developed in recent years on resin efficiency in medium density fiberboard produced by the dry process. A new plant in New Zealand is producing excellent board with a minimum of resin as compared to other plants. It is known that phenolic-type adhesives can be applied to wood fiber before it is dried without curing of the resin taking place in the dryer. This plant is injecting the urea-formaldehyde resin into the blow line feeding from the refiner to the dryer contrary to established practice. This system has been successful in the plant because the fiber is not being dried to an extremely low level where curing would take place. Another important feature of this plant is the production of relatively thick medium density fiberboard (19 mm) with a uniform thickness density profile. This has been accomplished with a technique called position control where the press closing is handled in such a way as to provide the relatively uniform density profile.

Resin efficiency in medium density fiberboard particularly using short-retention-time type blenders was shown to vary according to resin level, loading of the machine, and speed of the rotor within the blender. A complete understanding of how this type of blender works with the particular fibers going into a plant would assist any plant in improving their resin efficiency.

In the United States a number of mixed Southern hardwoods are available for use in composition boards. Extensive research has been conducted on these hardwoods looking at them as a source of raw material for medium density fiberboard. Species effects have been observed and these must be considered in the final design of a plant. The species evaluated can be, with the use of proper technology, successfully used for board.

The effect of high frequency on the curing of medium density fiberboard was a presentation of value to those interested in producing boards with relatively uniform density profiles with a minimum of surface softness. A better understanding of the thermodynamics and how to apply the high frequency heat can make this type of heating system in the hot press a more attractive alternative.

Numerous questions have been asked about the problems on a board production line which may occur when using different species and raw materials with a variety of particle geometries. The process variables influencing the production of medium density fiberboard of several different species in a western United States plant provided a number of answers to these questions. This plant is producing an excellent product but the various problems with species and raw material quality had to be considered in the plant operation. At one time these factors were felt to not be as significant as they would be in a particleboard plant. However, it has been found that these factors must still be carefully evaluated and considered in the design of any medium density fiberboard plant.

The composition panel industry while using much previously wasted material has environmental problems of its own. One of the serious problems has been with the dryer. To assist in correcting problems with dryers an analysis of emission controls strategies was presented at the symposium. Some of the strategies have been extremely successful while others depending upon process limitations within the plant have not been as successful as originally hypothesized.

Ingenious scientists and engineers have been responsible for many of the developments on the composition board plant lines. Many times fundamental information was not available and ingenuity had to substitute for the vital fundamentals that were lacking. However, in most cases the ultimate or optimum situation on the production line has not been achieved because of a lack of knowledge. Recently, fundamental work leading to more efficient drying has been performed. The main consideration in this work was on the wood particle drying rates. Later work will bring this into practical application where drying should be improved.

The computer has been used for more and more industrial applications and it is gradually working its way into the composition board plants. A recent development to control mat forming by computer has improved this part of the processing line. It not only saves time on the line but assists in conserving the valuable raw materials that have now been blended together and formed into a mat ready for pressing. Further work using the computer is expected to assist with controlling other parts of the production line.