

## TECHNICAL NOTE NUMBER 256

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

FOREST PRODUCTS LABORATORY

MADISON 5, WISCONSIN

February 1953

HOW TO SELECT A WOODWORKING GLUE

The variety of types and trade-name brands of glues available to the woodworker often makes selection of the proper glue appear difficult. This choice may be simplified, however, by answering the following four questions with reference to the particular job in mind. It is the purpose of this short discussion to merely raise the questions. The glue user may answer these for his own application by reference to past experience, to literature supplied by the glue manufacturers, and to reports of the Forest Products Laboratory (See Technical Notes Nos. 257 and 258).

(1) What sort of glued joint is involved? The answer to this question requires consideration of the design of the joint, its dimensions, and sometimes the species of wood used. Certain plywood and flat grain-to-flat grain laminated joints are relatively easy to glue with a variety of glues; other types of joints, such as a butt joint of two end-grain surfaces, may be very difficult or almost impossible to glue satisfactorily with any glue. Some glues, such as soybean glues, are particularly suitable for gluing softwood veneers, some for assembly work with dowels or dovetail joints, and some for heavy laminated constructions. Certain glues may be used in a variety of constructions and types of joints.

(2) What facilities will be available for the gluing operation? Or, what working properties will be required of the glue? Nearly all glues are suitable for industrial use if plants are provided with the necessary equipment, but equipment requirements vary considerably for the different types of glues. The choice of glues for small-scale operations or hobby work is likely to be more restricted than for large-scale operations because of the limited equipment available. For some glues, equipment is required for heating the joints at elevated temperatures in order to develop proper strength, although others may be pressed at normal room temperatures. Consideration must also be given to the equipment needs for measuring out ingredients, mixing glues, spreading glue, and

applying and maintaining pressure on the joint. Temperature requirements for the shop, wood, and glue, the length of time required between spreading and application of pressure (assembly period), and the length of time that the joint must be under pressure are important in choosing a glue. The user will also wish to consider the length of time that any glue remains usable (the working life or pot life) once it is prepared for use, as well as the length of time that the glue components may be safely stored before being prepared for use (the shelf life or storage life). Glues also differ in the ease with which they can be cleaned from equipment after use.

(3) How durable should the glued joint be? When properly used, most currently available glues are capable of giving high original dry-joint strength and of remaining durable under dry, normal temperature conditions. However, the resistance of the joints to deterioration in service varies widely with different glues. In fact, the improved resistance to deterioration of the newer resin glues is a principal reason for their development and increasing use. Generally, different brands of the same chemical type of glue will have similar durability characteristics. Durability of glues thus varies from the relatively low moisture resistance of animal and vegetable glues to the high all-around durability of the phenol-, resorcinol-, and melamine-resin glues, which when properly used give joints that are as durable as untreated wood itself under severe exposure.

(4) How important is cost? Since prices of glues are continually changing and often depend largely on the quantities ordered, it is impractical to list exact figures. Costs increase, however, from the relatively low-cost soybean and vegetable glues to the animal, casein, urea-resin, and phenol-resin glues, to the melamine-resin glues, and finally to the resorcinol-resin glues, which are most expensive on the pound basis. Cost must be considered, however, in terms of the actual cost per pound of mixed glue, rather than the cost of ingredients as received, and of the amount of glue spread required; that is, the cost to spread a certain area of surface must be considered. Wastage due to short pot life, costs of rejected material due to lack of control of the gluing process, and costs of the equipment and manpower needed for commercial processes must also be weighed in comparing glue costs.