

THE

BOOK ON

GLUING

THE JAMES L. TAYLOR COMPANIES

NEW IDEAS IN EDGE GLUING, CLAMPING & ROUGH MILL TECHNOLOGY



www.jamestaylor.com

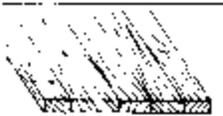


www.cameronautomation.com

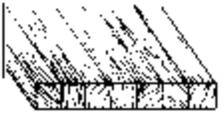


www.jltclamps.com

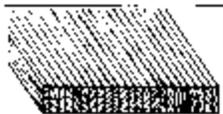
APPLICATIONS



FLAT STOCK is the most common product glued on the Taylor machines. Since our clamps are individually adjustable, panels of various sizes can be glued simultaneously.



BUTCHER BLOCK is also commonly glued. With rocker plates installed, our standard clamps can be used to produce butcher block tables, counter tops, knife holders, etc. Rocker plates are installed in seconds, and must be used for all laminating.



RAILS AND POSTS can be glued on the Taylor machines. 16' long handrails are often glued on 16 1/2' Clamp Carriers with standard or automated tighteners.



TURNINGS and other laminates up to 8" thick can be glued with our standard clamps, using our rocker plates, thick stock adapters, or #401 style clamps



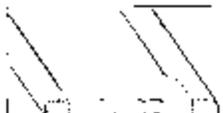
TOP PROFILE STOCK including mouldings and window frame components can be glued on the Clamp Carrier.



WASTE RECOVERY is a common application for the Taylor machines. Stock of varying shapes sizes, and thicknesses can be glued for waste recovery.



LUMBER BANDING (two sides) can be accomplished using our standard equipment. A common application is the edge banding of hardwood to a particleboard base.



CABINET DOORS can be produced with our JLT products. Clamping and squaring are done simultaneously for high quality doors and frames.

FUNDAMENTAL GLUING INFORMATION

INTRODUCTION

Generally the wood gluing operation consists of applying a liquid adhesive and then pressing the parts tightly together until the glue sets. During this setting process, the glue and water penetrate the pores of a thin wood surface layer. As the water goes through the pores, the glue is retained on the wood fiber walls. The adhesive gains strength as the water leaves the adhesive film. Speed of set, assembly time and depth of glue penetration are dependent on the speed of water removal. Strength, amount of wood failure, resistance to water, humidity, solvents, and heat are dependent on the nature of the polymer.

The quality of a gluing operation is dependent on a large number of factors. The failure to properly control any one of these can result in a defective or weakened glue joint.

JOINT PREPARATION

If a panel joint is poorly prepared, it is impossible to make a high quality panel.

There are several requirements of a good joint for gluing.

1) The joint should fit as closely as possible. A thin glue line is stronger than a thick one.

2) Glue penetration into the wood surface is never more than several thousandths of an inch deep. For this reason, the surface layers of wood being bonded should be sound. Dull or vibrating cutting tools (as, for example, caused by worn bearings) often loosen fibers, but do not remove them, leaving a poor and unsound surface for the glue to adhere to. Rupture of such a glue line reveals a thin layer of wood fibers covering the glue line.

3) When the cutting edge of a knife becomes worn and rounded off, it beats down the surface fibers, closing them to adequate glue penetration. Sometimes this becomes severe enough with both moulders and saws that the wood turns dark from being burned.

4) The joint should be straight, square and sound. In some cases, plants do not surface at least one side of the board far enough (hit or miss planing) to be flat before making the edge glued joint. If this is not done, a warped board will produce a glue joint which is not square.

Surfacing of lumber for gluing should be done just prior to gluing. Many rough mill operations plan their production so that joints are glued the same day they are made. This produces a surface essentially uncontaminated by wood resins and one which has not deformed from moisture change.

MOISTURE CONTENT

The glue must be rigid enough to resist the stresses applied to the glue line by moisture change, particularly before this moisture interchange is slowed by the finish. Since wood absorbs and releases moisture faster through the end grain than through the radial or tangential face, a moisture change sets up stresses in the panel. If the glue joint is weaker than the wood, it will open, otherwise, when the stress becomes great enough, the wood may split. Many times inferior quality joints will remain closed until subjected to a moisture change, when the stress will break the joint instead of the wood. This moisture change may occur on exposure to oven heat or with time.

Wood is normally processed for furniture at 6-8% to minimize expansion and shrinkage in service. 6-8% moisture represents a good average between the extremes of summer and winter exposure. It must be remembered, the application of a finish does not stop the moisture interchange—only retards it.

Sometimes wood shrinkage is erroneously considered to be negligible. For example, beech shrinks tangentially 1% for every 3% moisture change. In a 50" wide panel, changing from 8% to 5% moisture content will shrink the panel 1/2". Even a 1% moisture change will shrink this panel more than 1/8". Since this will be a differential shrinkage, the stress in the panel is considerable.

FUNDAMENTAL GLUING INFORMATION

TEMPERATURE

The temperature of the wood, glue and room are important in determining the speed of set. Clamp times at summer temperatures can be one-half that encountered in cold shops in winter.

Reducing the temperature of the wood, glue, or room adversely affects most wood glues. Setting speed is usually retarded, and in some cases strength is decreased if the glue is colder than the critical temperature.

In an emulsion adhesive, the discrete particles of adhesive are suspended in water much as is fine sand in water. Upon drying the loss of water pulls the particles together with enough force to form a continuous adhesive film. If the drying temperature is below a critical point, the force of the water evaporation is inadequate to pull the particles into a continuous film, leaving discrete and unjoined particles in the dry film. This will make the dried film appear whiter than normal. This is known as "chalking" and the critical temperature is the "chalk temperature". When it occurs, the glued joint loses strength. This can be corrected by raising the temperature of the air, glue or wood, or changing to a glue which does not chalk at the operating temperature.

Since the mass of glue in a joint is small compared to the mass of the adherend, the temperature of the substrates being glued is usually the controlling factor. The temperature of the air is important in that it usually affects the temperature of the surfaces being glued. It also influences the temperature of the

glue squeezed out of the joint, which may be the temperature of the glue in the joint minus the lowering due to evaporation of water from the surface. It can be seen that as the critical temperature is approached, chalking may occur in the squeeze-out but not in the joint.

ADHESIVE

The adhesive affects the speed of set in many ways. An adhesive with a high percent solids will often set faster than a lower percent solids. An emulsion adhesive releases its water more easily than an adhesive dissolved in water. Some emulsion adhesives "break" or coalesce more readily than others, causing a faster set. Some with a wet tack will give a faster grab than a non-tacky adhesive. The formulation of a fast setting adhesive should be left to the adhesive manufacturer. Speed of set cannot be simply determined by comparing percent solids of two glues. There is a wide difference in the speed of set of cold glues

ADHERED MATERIALS

With a fast-setting cold glue, joint strength increases faster in the initial stages of setting than in the later stages. The strength at 1-minute will be doubled at approximately 4 minutes; and the 4-minute strength will be approximately doubled at 15 minutes.

With normal gluing conditions, cold glues set over twice as fast on hard maple as they do on ring porous woods such as walnut, oak, and ash.

Many of the less dense woods, such as pine and poplar in reality set more slowly than maple but their lower strength and resultant lower rigidity reduce the stress placed upon the glued joint when unclamped; the required clamp time is, therefore, not as long as for denser ring-porous woods.

As speed of set is directly related to the drying of the glue in the joint, it can readily be seen that drier wood with its fast water absorbency, will set faster than higher moisture content wood. Higher wood moisture content will significantly increase the clamp time.

The same concept carries over into the effect of exposure conditions on the gluing surface immediately prior to gluing. Though no change might be noticed on a moisture meter reading, the exposure of surface-to-be-glued to high humidity will slow down the speed of set because these surfaces collect a thin film of water. This is particularly noticeable during humid summer weather. The effect is magnified when machining is done some days prior to gluing.

FUNDAMENTAL GLUING INFORMATION

GLUE APPLICATION

On roller spreaders, in which the roll turns in a glue container, the use of a felt sleeve has proven useful. It has two main advantages over a steel or rubber roll. 1) its flexibility allows complete coverage over the surface to be glued even though some irregularity exists in the lumber. 2) The spread can be adjusted much lower and still obtain complete coverage. Exact measurements of roller circumference and width are needed to specify the proper felt.

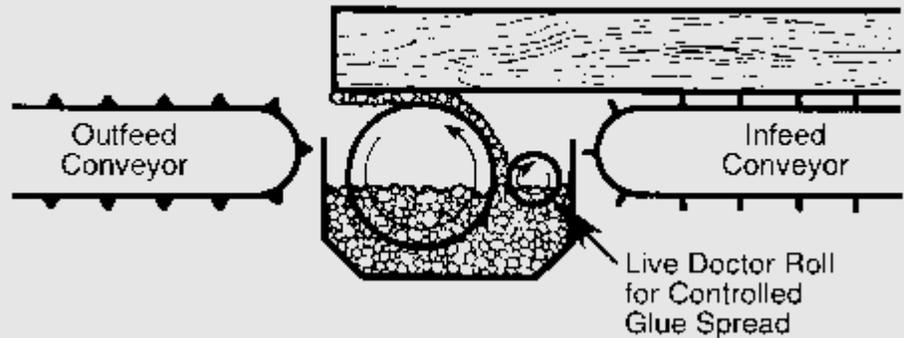
It is usually necessary to spread glue on only one surface. It is important, however, that the operator inspects every piece for complete spread before putting the panel into the clamp. A light over the spreader will speed this inspection. Some people mount a mirror on the far side of the spreader so the operator need only turn the glue line toward the mirror for inspection.

WET FILM GAUGE

A wet film gauge is a convenient way to measure wet film thickness. To use it accurately the film and substrate must have a smooth surface. A ridged glue film cannot be accurately measured.

The film gauge readings, in mil wet film thickness, are convertible into pounds per square feet by the formula, shown on this page.

Recommended Spread = 7-9 mils



$$\text{SPREAD} = \frac{\text{WET FILM THICKNESS (mils)}}{1.6^*} \times \text{WEIGHT PER GALLON (lbs.)}$$

As an example, spreading an eight mil wet film of an adhesive weighing 9 lbs. per gallon: $\text{SPREAD} = 8/1.6 \times 9 = 45$ lbs. per 1000 sq. ft. Rearranging the formula to find the wet film thickness for a certain spread, it becomes:

$$\text{WET FILM THICKNESS (mils)} = \frac{1.6 \times \text{SPREAD (lbs. per 1000 sq. ft.)}}{\text{WEIGHT PER GALLON (pounds)}}$$

Using the above example: $\text{FILM THICKNESS} = \frac{1.6 \times 45}{9} = 8.0$

*A gallon of adhesive uniformly spread in a film one mil thick will cover 1,604 sq. ft.

FUNDAMENTAL GLUING INFORMATION

CLAMPING

The purpose of clamps is to bring the members being glued in close enough contact to produce a thin uniform glue line and to hold them in this position until the glue has developed enough strength to hold the assembly together. If the members of a glued construction were to fit together perfectly so that a thin even glue line could be produced, no clamp pressure would be required. But, from a practical standpoint, since machining of stock is never perfect, a certain amount of clamping pressure must be used.

The joint strength of resinous woods, such as pine, is frequently improved by machining the joint to be glued just prior to gluing. It is usually easier to make a straight and square joint than to try to pull it up in a clamp.

Decreasing the glue line thickness increases the strength. Since many woodworking adhesives utilize water to yield a spreadable viscosity, the dried glue film does not fill the space in a thick glue line. A void is left where the water has left the glue line. As the glue line gets thicker, the effect of the voids on strength is more detrimental.

For edge or face gluing, pressures of 50-150 p.s.i. should be used. The minimum is dependent on the resistance of the panel to be brought up tightly. The maximum is limited by the crushing strength of the wood. Pressure serves only to bring up the joint snugly and hold it there until the glue has enough strength. Often in these operations, the uniformity of pressure is more important than the exact amount.

A lack of ample pressure may be due to uneven pressure. Some clamping devices may apply adequate overall pressure, but not distribute it evenly over the entire surface. For example, this may occur in a panel if the edge piece of the panel is too narrow, transmitting little pressure between the clamps. The same thing can occur occasionally when clamping posts from 4/4 stock, with no reinforcement to apply pressure between the clamps.

Assembly time refers to the time lapse between glue spreading and application of pressure. The time between glue spreading and closing the assembly is open assembly time. The time between closing the assembly and pressure application is closed assembly time.

With cold, ready-to-use glues, pressure may be applied immediately after spreading. There is no minimum closed assembly time.

If glue squeeze-out occurs on the application of pressure, the maximum assembly time has not been exceeded. As long as the glue is wet enough to transfer uniformly to the opposite face when pressure is applied, good strength will result.

The minimum clamping time is determined by the time required for the glue to retain its clamped position after pressure is removed.

It, therefore, becomes important to introduce as many factors as possible to speed up this acquisition of strength in the glue joint. Some of these factors may be quite obvious; others may be less apparent.

It should be pointed out here that the squeeze-out on the outside of the joint does not indicate the condition of the glue within the joint, particularly where short clamp times are involved. The bead squeeze-out dries much more slowly than the film in the joint. The thicker or bigger the squeeze-out, the slower the glue will appear to dry.

With cold-setting, ready-to-use glues, the rate of strength development (speed of set) is dependent on how fast the liquid glue can dry to become solid enough to hold the joint in place. Since most of the water sinks into the substrate, the materials being glued are important. Obviously, the choice of adhesive is important. Also the conditions of gluing have an effect. By combining as many favorable conditions as possible, a maximum speed of set can be obtained.



FUNDAMENTAL GLUING INFORMATION

AFTER GLUING

When surfaces are machined too soon after gluing, a sunken joint may result. A water based adhesive swells the woods in the vicinity of the glue line and planing will make the joint flush. Later when the moisture throughout the panel is equalized, the swollen wood in the vicinity of the glue line will shrink more than the rest of the panel, leaving the wood near the glue line depressed below the rest of the surface.

Sunken joints are more obvious with glossy finishes than with dull or matte finishes.

Sunken joints can be corrected by (1) seasoning the glue joint longer before machining, (2) using less glue so that only a slight bead squeeze-out occurs on clamping and (3) using methods to get faster drying at the glue line, (4) the use of faster drying glues or (5) heating the wood.

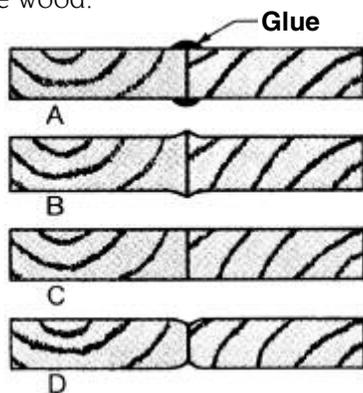


Figure 9: A sunken joint is caused by machining a joint too soon after gluing. Glue squeeze out in "A" caused the wood in the vicinity of the glue line to swell as in "B." If the joint is machined as in "C" before the moisture in the vicinity of the glue line has been equalized with the rest of the panel, a sunken joint as in "D" will result.

It is unwise to let glued panels remain in the white as any moisture change with its resultant stresses will increase the panel rejects due to wood or glue line failure.

If the boards in a panel are not of uniform moisture content, after gluing and machining to a uniform thickness, the higher moisture content boards will shrink more than the lower moisture content ones giving the finished panel rippled effect at each glue line. The same effect will occur if plain sawn and quarter sawn boards of the same moisture content are placed next to each other and the whole panel changes markedly in moisture content. The quarter sawn board will shrink in thickness more than the plain sawn board.

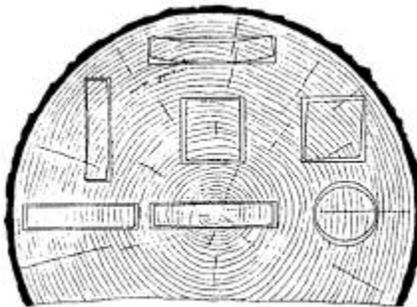


Figure 17: Characteristic shrinkage and distortion of flats, squares, and rounds as affected by the direction of the annual rings. Tangential shrinkage is about twice as great as radial. (Courtesy of U.S. Forest Products Laboratory)

Plain sawn lumber shrinks more on the sap side than on the heart side. Therefore, if panels consist of very wide boards or if several boards are glued together with the sap side facing one surface, the panel will warp markedly toward the sap side if the moisture content is lowered. If no board going into the panel is over four inches wide and the annual ring direction is reversed on adjoining boards, the cupping or warping will alternate and be less noticeable.

CONCLUSION

A successful gluing operation requires several fundamental procedures to be followed. Because gluing is still an art and not a science, not all procedures must be followed. However, when defects occur it is often a combination of problems that create the defects.

The best corrective method is a step by step troubleshooting procedure. Identify the symptoms, change one factor at a time and check the results.

A helpful tool in setting up or monitoring a gluing is a "Gluing Check List". The subjects contained in this booklet and others particular to your operation can be listed and checked on a regular basis. The result will be fewer rejects and lower cost production.

SELECTIONS OF WOODWORKING ADHESIVES

Min	Type	Viscosity o.p.s.	Minimum Temp. of Use °F	% Solids	Comments
Edge & Face Gluing					
Cold Clamp					
Titebond 50	Aliphatic	3500	35	45	Fastest setting Titebond, excellent creep and heat resistance, solvent resistance, sandable, and low minimum use temperature.
Titebond Regular	Aliphatic	3500	35	42	Moderate setting rate, excellent creep and heat resistance, solvent resistant, sandable and low minimum use temperature.
Titebond Supreme	Aliphatic	3500	35	43	Specifically designed for oak and other ring porous woods, moderate to fast setting rate, good creep and heat resistance, sandable, and low minimum use temperature.
Titebond Imperial	Aliphatic	3500	35	39	Provides superior heat resistance, long assembly time, solvent resistance, sandable, and low minimum use temperature.
Multibond-EZ-1	X-PVAC	4000	55	48	Type II water resistance.
Assembly 65	PVAC	3500	59	60	Extremely fast setting rate, excellent gap filling.
Woodbond 285	PVAC	4100	56	43	Fast setting rate, excellent gap filling, general purpose.

*Compliments of Franklin Intl., Columbus, Ohio

There are three basic categories of high production edge gluing equipment on the market today. The Clamp Carrier, Batch Press and Continuous Flow machine. The Clamp Carrier is essentially hand clamps mounted on a revolving conveyor chain which provides storage while the glue dries at room temperature. The Batch Press Type of machine, uses a thermosetting Adhesive to produce a finished batch of panels in one to three minutes. Batches of panels are loaded and cured on each cycle. The Continuous Flow machine glues stock on a continuous basis. Lumber is fed into one end and a ribbon of glued panels emerges from the other end.

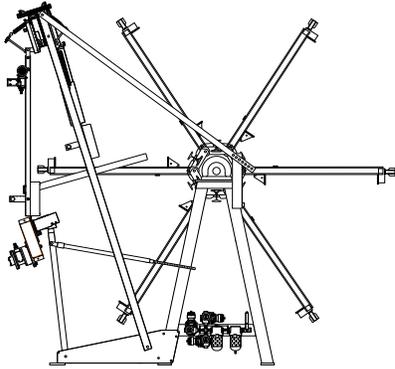
Each category offers different advantages. The Clamp Carrier comes in a wide variety of sizes, prices and levels of output. The Batch Press also comes in a variety of sizes and is the best machine for large thin panels. The Continuous Flow Machine is the fastest, but has less versatility than the others.

A fast curing machine does not necessarily produce the most because the cycle time is ultimately measured by how quickly the operators load stock and unload glued panels. Room temperature curing machines are more popular and more reliable because the slower curing process does not require as strict a set of tolerances for the glue joints. This results in higher production because you have fewer rejects.

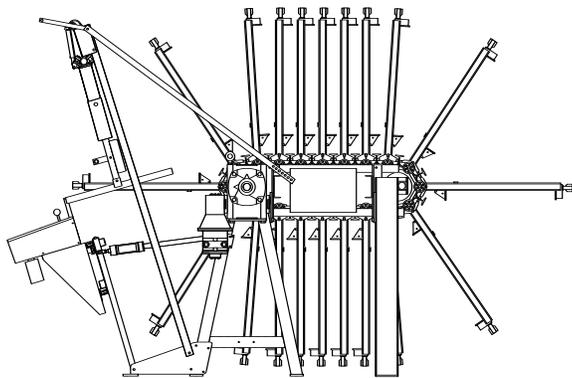
The following pages include some fundamental information, a brief description of each machine type and several production examples. If, after reviewing this information, you have any additional questions regarding any of the types of gluing machines, do not hesitate to contact Taylor Manufacturing at:

Phone No. 845-452-3780
Fax No. 845-452-0764
www.jamestaylor.com
e-mail: info@jamestaylor.com

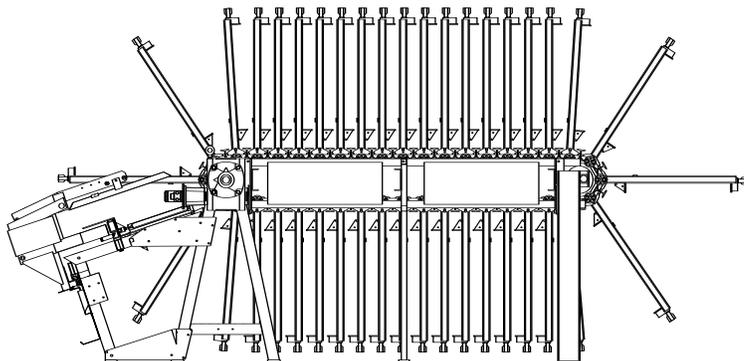
CLAMP CARRIER



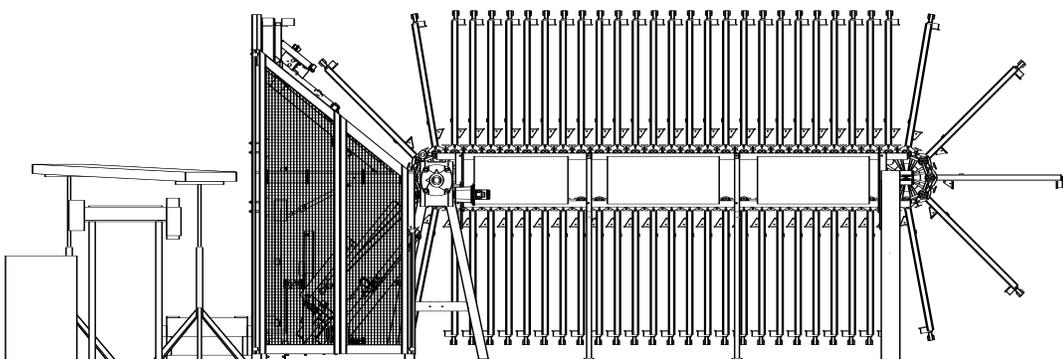
6 SECTION STANDARD
CLAMP CARRIER



20 SECTION
SEMI-AUTOMATIC
CLAMP CARRIER



40 SECTION
AUTOMATED
CLAMP CARRIER

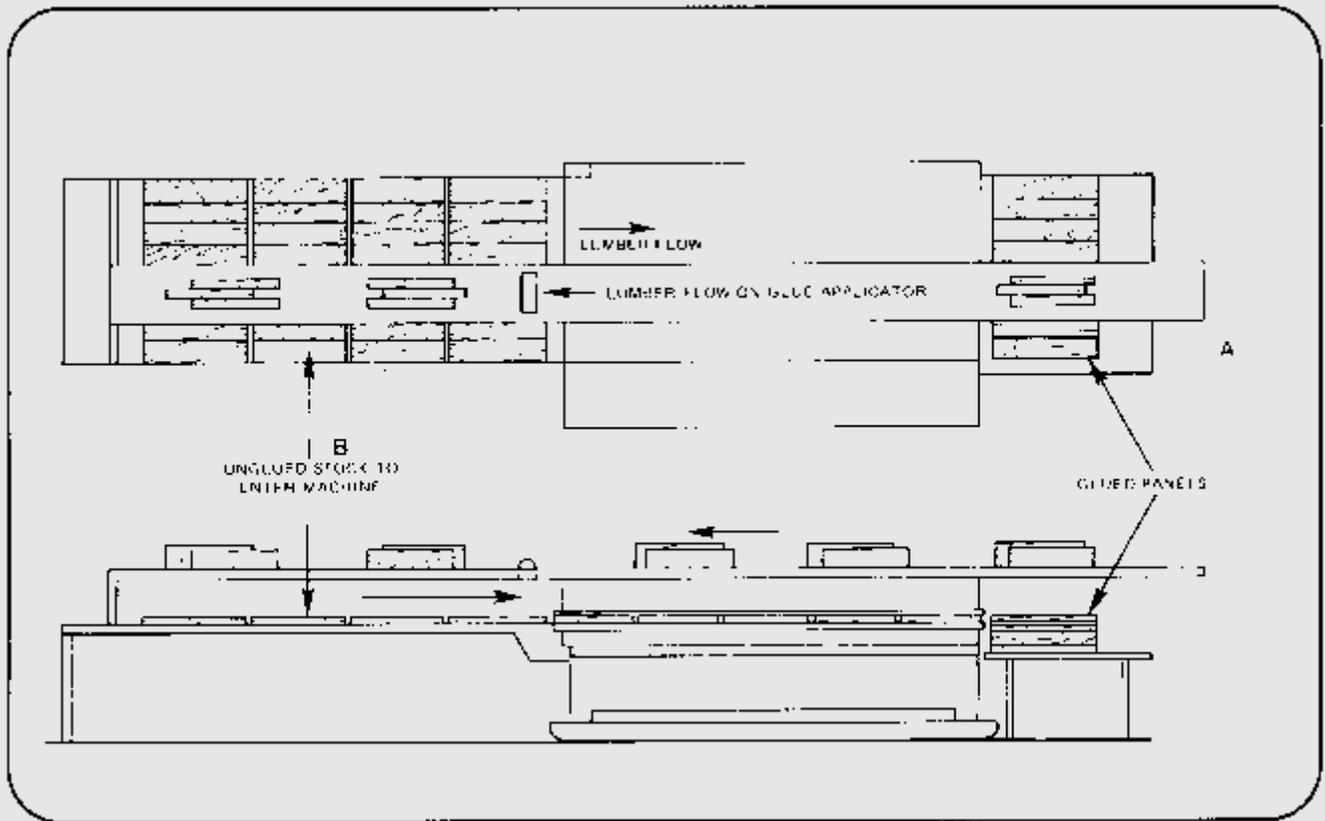


60 SECTION
DUAL AUTOMATED
CLAMP CARRIER

The Clamp Carrier is essentially hand clamps mounted on a revolving conveyor chain in a moving storage configuration. The glue in each panel dries as its section (row of clamps) makes one revolution around the frame. Most standard clamp carriers will accommodate 32" wide panels up to 8 1/2" long, but each manufacturer offers a wide range of sizes for different applications and production requirements. Historically, the clamp carriers were operated manually. Modern day clamp carriers can be equipped with pneumatic or hydraulic accessories to tighten the clamps, flatten the panels, and rotate the carrier from section to section.

The operations can be semi-automatic with the operator positioning the tightening and flattening devices or fully automatic where a programmable controller controls the operations of the machine, freeing the operator to do other jobs and increase worker productivity.

BATCH PRESS

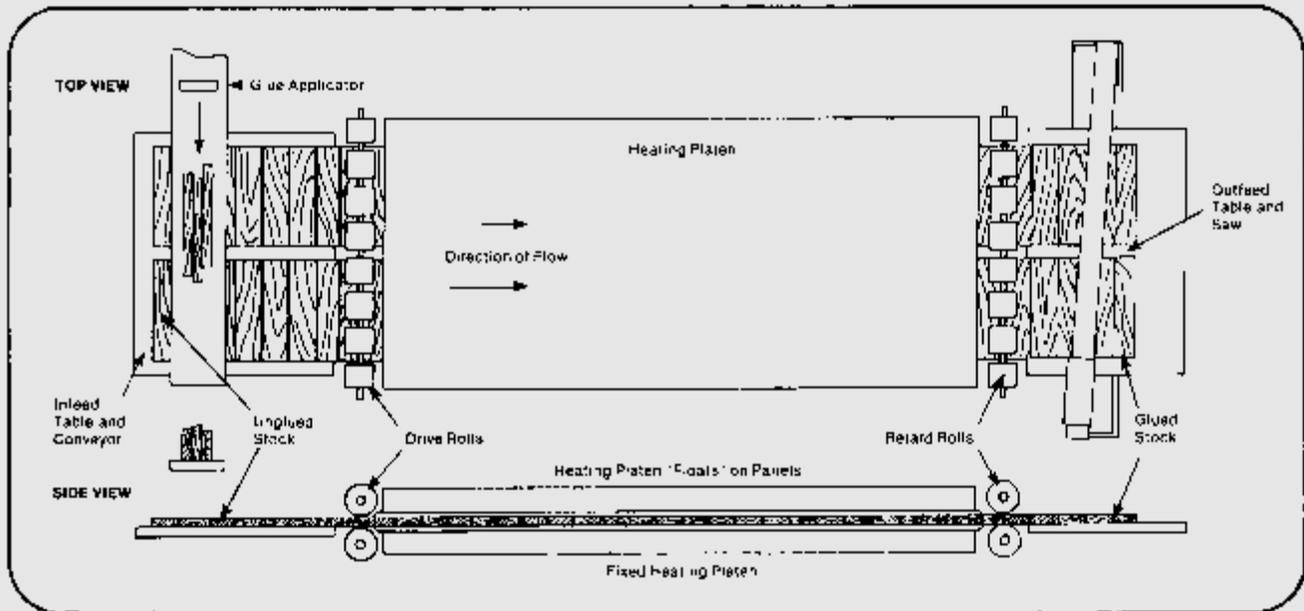


The name Batch Press describes the overall operation of the machine. Glue is applied to the stock with a glue applicator. The stock is laid into panels on the lay up table and fed into the machine in batches. Horizontal and vertical pressures are applied by air or hydraulic cylinders. Each gluing cycle lasts 1 to 3

minutes and depends on the thickness and specie of stock. Platen area determines the production capabilities of the machine and sizes range from 2' wide by 3' long to 5' wide by 20' long. The glue is heated by radio frequency energy (RF). Cured batches of panels are pushed out of the machine when new stock is fed in.

The diagram above illustrates the Batch Press with a top mounted conveyerized glue applicator. Floor mounted glue applicators are also used.

CONTINUOUS FLOW MACHINE

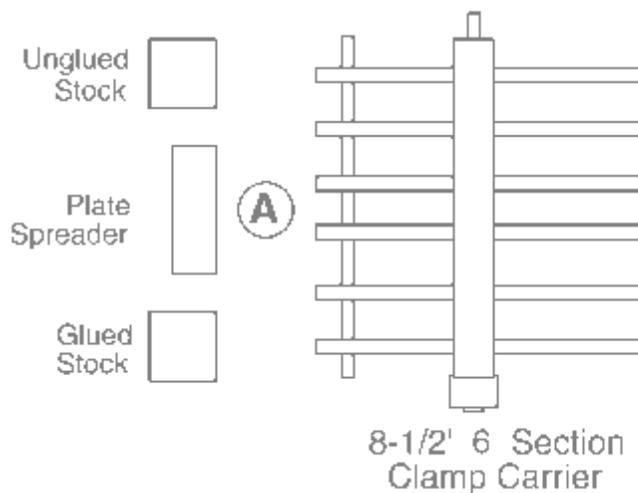
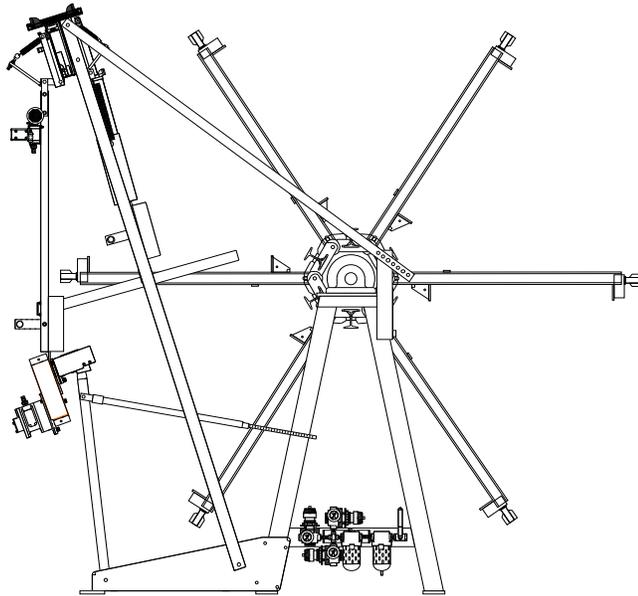


Again, the name Continuous Flow Machine describes the overall operation of the machine. Glue is applied to the stock with a conveyorized glue applicator. The infeed table is equipped with conveyors which transfer the stock into the machine.

The stock is driven by rolls, belts or tracks. Positive joint pressure is supplied by retard rolls, tracks or friction shoes at the outfeed end of the platen. When the stock exits the machine, it has been glued into a continuous "ribbon". This "ribbon" is cut into panels with a sizing saw which makes a square cut without stopping the flow of the machine.

Platen area determines the production capabilities of the machine and sizes range from 5' wide by 10' long to 8' wide by 20' long. Platens are heated by steam, hot oil, or radio frequency energy (RF).

96 PANELS PER SHIFT



- 1 operator (part-time)
- Unloading, reloading time:
3 minutes/section
- Cure time:
60 minutes
- 6 Clamps/2 panels per section

EQUIPMENT

8 1/2 - 6 Section Clamp Carrier equipped with 6 clamps per section. (Clamp Tightened) Panel Flattener and Plate Spreader.

The operator loosens all the clamps, unloads all glued panels and stacks them. He applies glue to fresh stock and loads it into the clamps. When a panel is laid up, he energizes the Panel Flattener in the middle of the panel and tightens both clamps. He applies glue to more stock for the second panel. When it is loaded, he energizes the Panel Flattener and tightens both clamps. He repeats for the third panel. The operator rotates the carrier forward to the next section and repeats the sequence.

Since the carrier is filled in less than 1 hour, it may be necessary to delay unloading of the first row to allow appropriate cure time.

PRODUCTION

The curing time of glue limits the production on small machines. The loading/unloading time is 15-20 minutes.

- Production output:
- = 12 panels/60 minutes (cure time)
 - = 96 panels/shift
 - = 420 sq. ft./shift
 - = 40 m²/shift

420 PANELS PER SHIFT

- 1 operator
- Unloading, reloading time:
3 minutes/section
- Cure time:
60 minutes
- 6 Clamps/3 panels per section

EQUIPMENT

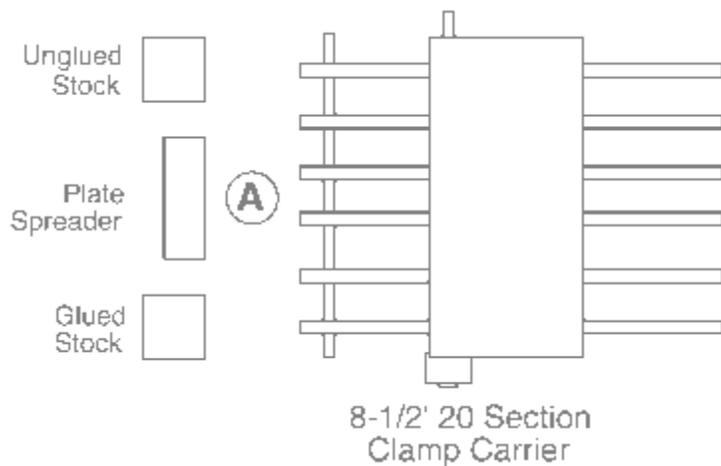
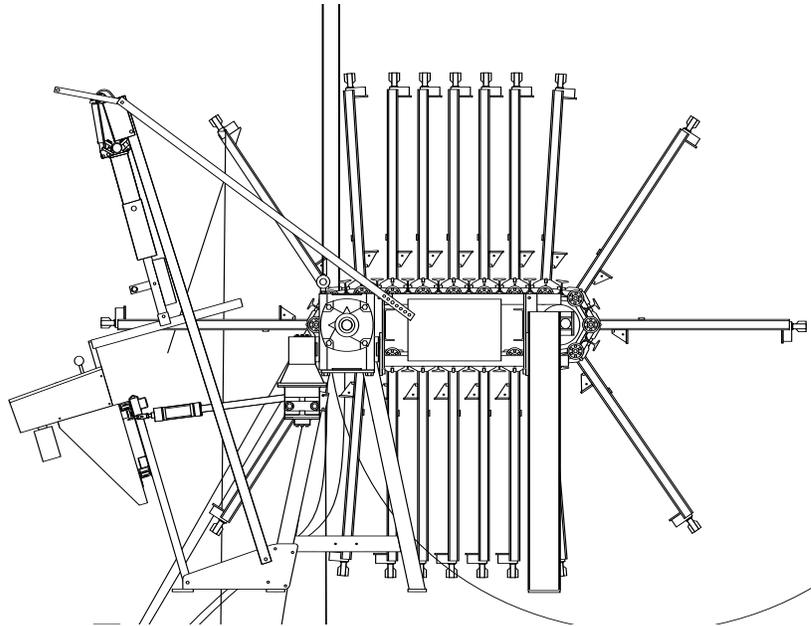
8 1/2' - 20 Section Clamp Carrier equipped with 6 clamps per section, Air Motor Drive, Semi Automatic Clamp Tightener, Panel Flattener and Plate Spreader.

The operator loosens all the clamps using the clamp tightener, unloads all glued panels and stacks them. He applies glue to fresh stock and loads it into the clamps. When a panel is laid up, he energizes the Panel Flattener in the middle of the panel and uses the Clamp Tightener to tighten both clamps. He repeats this sequence for the second and third panels. The operator uses the Foot Pedal Assembly and Air Motor Drive to rotate the carrier forward to the next section. The whole sequence is then repeated.

PRODUCTION

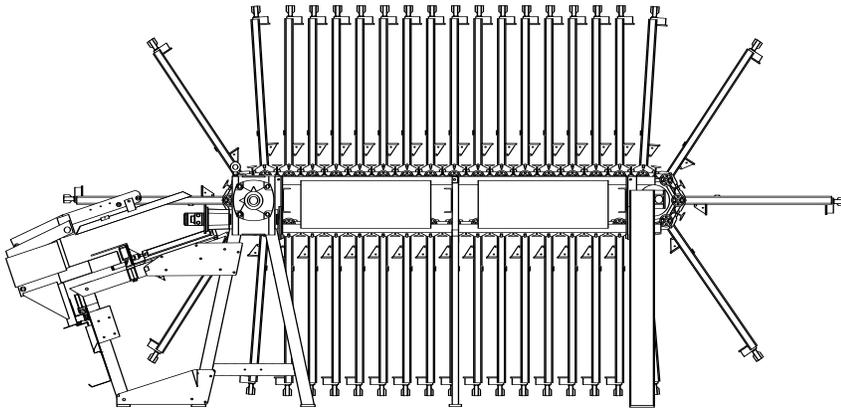
Production is based on cycle time and panel size. Assuming that each section is curing 3 panels whose dimensions are 24" x 24" (60 cm x 60 cm) and assuming a cycle time of 3 minutes, production per shift equals:

- One Panel:
= 4 sq. ft. (.36 M²)
- One Section:
= 12 sq. ft. (1.1 M²)
- One Cycle:
3 = minutes
20 = cycles/hour
140 = cycles/shift
- Production output:
= 12 sq. ft. x 140 cycles
or 1680 sq. ft./shift
= 1.1 M² x 140 cycles
or 154 M²/shift



At 3 minutes per section and 20 sections, the cure time for all rows of panels is 60 minutes. For most gluing operations using cold setting glues, this is ample cure time. Therefore, this machine can be operated on a continuous basis.

960 PANELS PER SHIFT

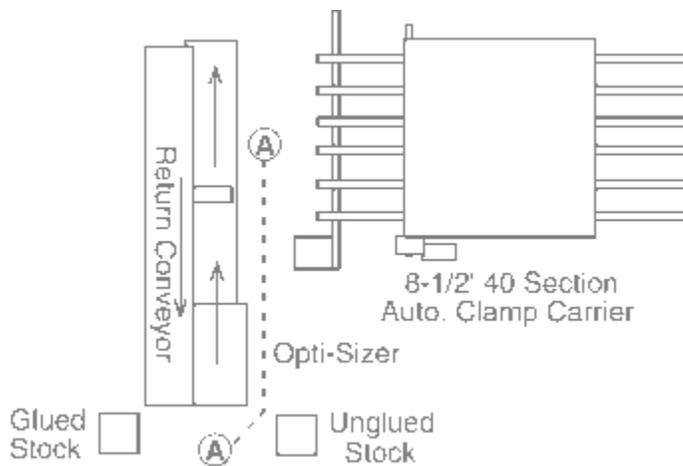


- 1 or 2 operators
- Unloading, reloading time:
1 1/2 minutes/section
- Cure time:
60 minutes
- 6 Clamps/3 panels per section

EQUIPMENT

8 1/2' - 40 Section Clamp Carrier equipped with 6 clamps per section, Air Motor Drive, Automated Clamp Tightener/Panel Flattener and Conveyorized Glue Applicator.

The operator unloads the three glued panels and places them on the return conveyor. He replaces them with fresh stock (batched by panel) from the Glue Applicator. When all the panels are loaded, he presses the "Tighten" button on the control stand. The machine will tighten each clamp left to right and flatten the panels as it is tightening. While the machine is running, the operator walks to the end of the Glue Applicator, unloads glue panels from the return conveyor and loads enough new stock for three more panels onto the infeed of the Glue Applicator. When the machine finishes tightening, it rotates the carrier to the next section and loosens all the clamps. He then returns to the Clamp Carrier to unload and reload the next section of clamps.



PRODUCTION

Production is based on cycle time and panel size. Assuming that each section is curing 3 panels 24" x 24" (60 cm x 60 cm) and assuming a cycle time of 90 seconds, production per shift equals:

- One Panel:
= 4 sq. ft. (.36 M²)
- One Section:
= 12 sq. ft. (1.1 M²)
- One Cycle:
= 90 seconds
= 40 cycles/hour
= 320 cycles/shift
- Production output:
= 12 sq. ft. x 320 cycles
or 3840 sq. ft./shift
= 1.1 M² x 320 cycles
or 352 M²/shift

1120 PANELS PER SHIFT

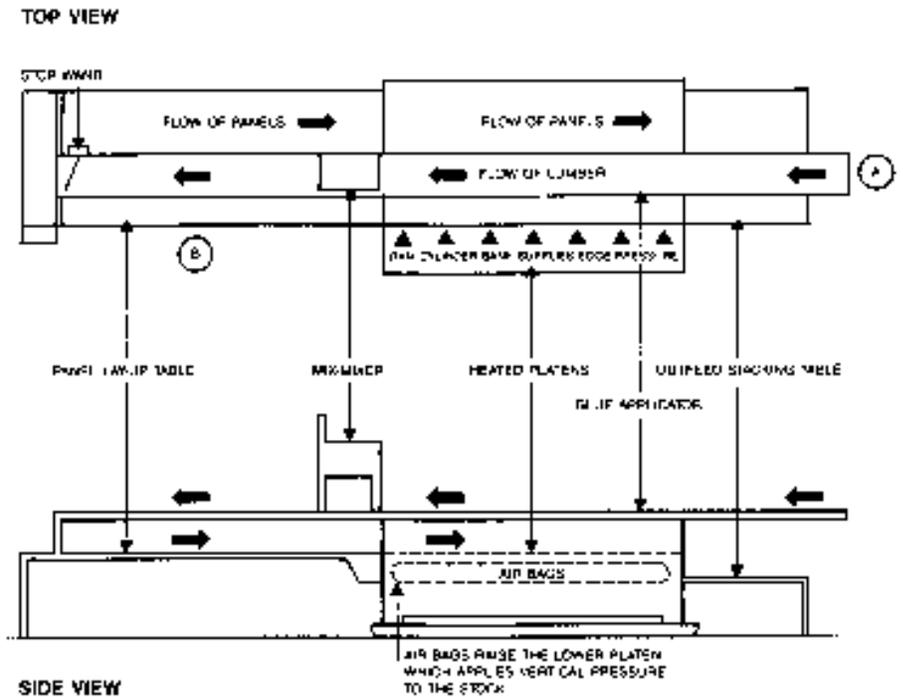
- 3 operators
- Loading time, unloading time:
3 minutes/batch (8 panels)
- Cure time:
3 minutes
- 8 panels per batch

EQUIPMENT

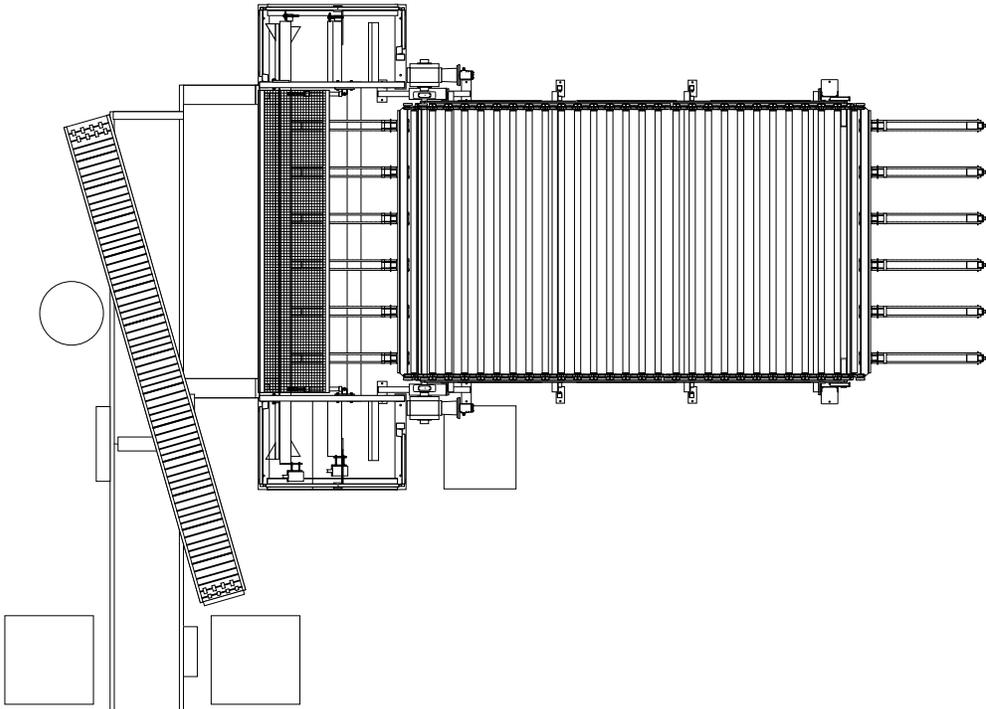
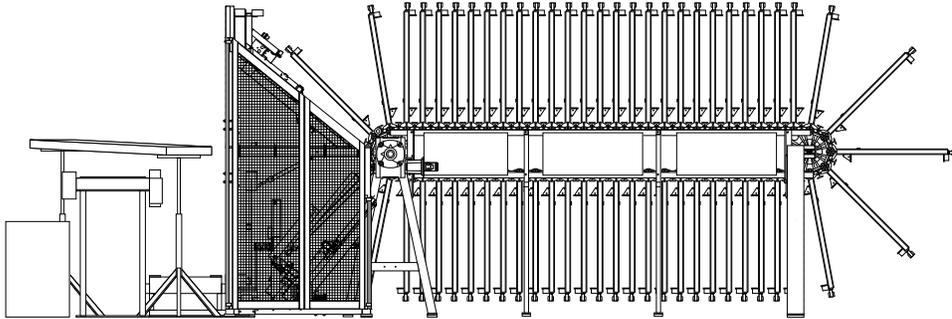
An RF batch press, platen size is 8' long by 4' wide, equipped with a powered layup table and Conveyorized Glue Applicator.

Operator A loads unglued material onto the Conveyorized Glue Applicator. Operator B transfers the stock from the glue applicator to the layup table. When the layup table is full and the material in the press has cured, the press opens and the stock on the layup table is pushed in. Operator A stacks cured panels as they are pushed out of the back of the machine. The press is then energized and as the material is curing, Operator B begins to reload the layup table.

It is important to remember with all gluing machines that production is based on operator speed. In this example, cure time is 3 minutes but if the operators cannot load the next batch in 3 minutes, then production goes down. Cycle time is equal to cure time or loading time, whichever is longer. Production is based on panel size and utilization.



1728 PANELS PER SHIFT



- 4 operators
- Unloading, reloading time:
50 seconds/section
- Cure time:
60 minutes
- 6 Clamps/3 panels per section

EQUIPMENT

8 1/2 - 80 Section Clamp Carriers equipped with 6 clamps per section, (2) Air Motor Drives, Dual Automated Clamp Tightener, Panel Flattener and 20" wide ConveyORIZED Glue Applicator.

Operator A loads material onto the ConveyORIZED Glue Applicator. Operators B unload glue panels and transfer fresh stock into the clamps. While Operators B are unloading and reloading, the loosening carriage above automatically loosens each clamp on the next row to be loaded. Simultaneously, the tightening carriage below automatically tightens each clamp on the row that has just been loaded. When the operations are complete, the cycle button is pushed and the machine rotates. Loading, tightening and loosening then commence simultaneously for the next section. Operator C is used to unload glued panels from the return conveyOR and move stock.

PRODUCTION

Production is based on cycle time and panel size. Assuming that each section is curing 3 panels 24" x 24" (60 cm x 60 cm) and assuming a cycle time of 50 seconds, production per shift equals:

- One Panel:
= 4 sq. ft. (.36 M²)
- One Section:
= 12 sq. ft. (1.1 M²)
- One Cycle:
= 50 seconds
= 72 cycles/hour
= 576 cycles/shift
- Production output:
= 12 sq. ft. x 576 cycles
or 6912 sq. ft./shift
= 1.1 M² x 576 cycles
or 635 M²/shift

3024 PANELS PER SHIFT

- 4 operators
- Loading, reloading time:
continuous at 6 feet/minute
- Cure time:
1 1/2 minutes electronic (RF)
- 2 1/2 minutes steam or hot oil

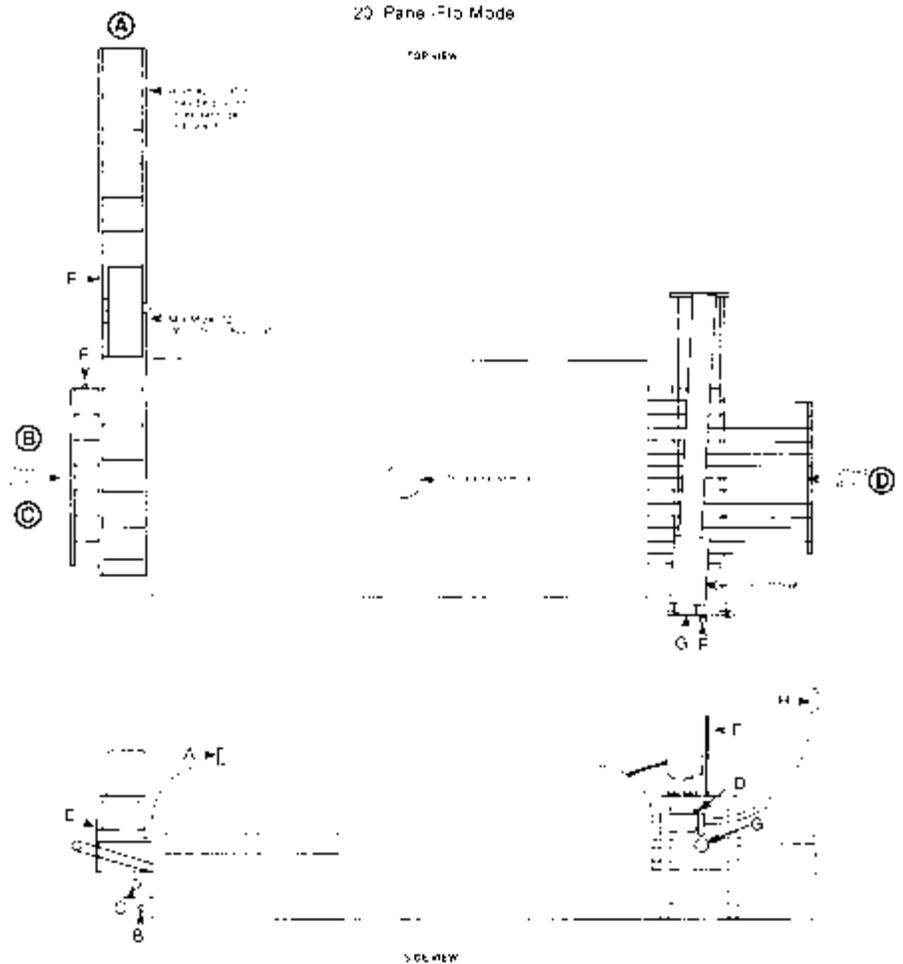
EQUIPMENT

Operator A loads materials onto the Conveyorized Glue Applicator. Operator B and C transfer the stock onto the infeed table. The material flows through the machine and the adhesive is cured. A continuous ribbon flows out of the machine. The cut off saw is used to size the panels to width. Operator D stacks glued and sawn panels.

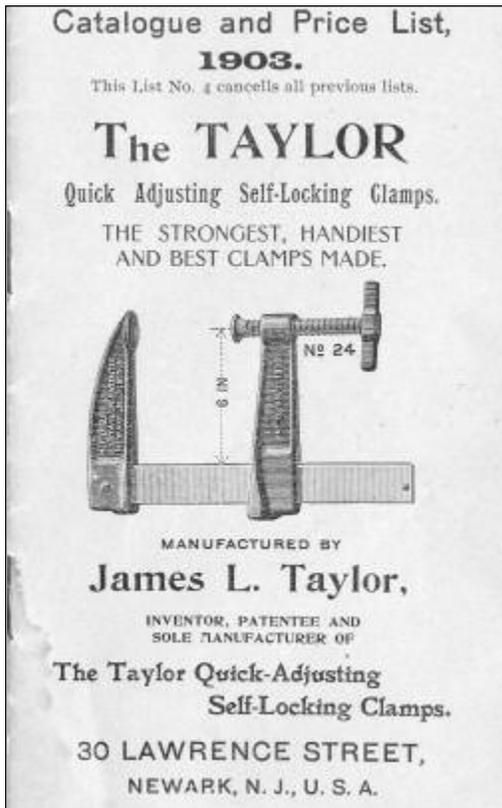
PRODUCTION

Production is based on platen size, platen utilization and feed rate. In a continuous feed machine, the length of the panel or width of the ribbon is perpendicular to the flow. The wider the ribbon the greater the platen utilization. The feed rate depends on stock thickness, moisture content, number of glue lines and other factors

Total production varies widely from job to job.



THE TAYLOR STORY



James L. Taylor established the James L. Taylor Manufacturing Co. in 1903 to produce his patented quick-adjusting, self-locking bar clamps. This patented clamp was a significant step forward in the edge gluing of lumber

In the 1920's, the Taylor revolving Clamp Carrier was developed and patented. It was a major first step toward mass production. In 1940 Taylor engineers developed the Panel Flo, a continuous feed edge gluing machine. From the very beginning, the Panel Flo was acclaimed as the answer to mass production gluing. In 1950 Taylor introduced the Panel Mint, a batch type semiautomatic edge gluer which filled the gap between the Clamp Carrier and the fully automated Panel Flo.

Midway through the 1980's Taylor designed and produced the first Automated Clamp Carrier. This changed the direction of the Clamp Carrier line and made it the industry standard for edge gluing machines. "Challenger Award" winners and finalists

were awarded in 1986 for the Clamp Carrier, 1988 for the Opti-Sizer, 1992 for the Dual Automated Clamp Carrier, 1994 for the Automated Glue Applicator, 1996 for the Opti-Rip, and 2002 for the Opti-Match.

Today, Taylor operates out of two locations; Poughkeepsie, NY and Greensboro, NC producing three distinct product ranges.

Taylor Clamp Carriers and accessories
JLT Clamps
Cameron Optimization Systems

We continue to develop innovative and labor saving machines for the woodworking industries that are durable, easy to install and easy to operate.

