FENCE TEAM WORKING NOTES

This file will be modified each week as we build our fences. Any ideas should be recorded in this file.

9/26/01

Had initial team meeting. Discussed how to conduct our portion of the project. In general, we will use a series of teams to construct various subassemblies of the Fence.

Initial name assignments: Bottom Brace, Middle Brace, Top, Clamp shim, Clamp jaw, Left sliding fence, Right sliding fence.

The Top team stated that the width of the top will 33 ½ inches and thickness is TBD.

Initial teams: J. Brockway and Margaret – Bottom and Middle: Lee and Jerry – Top; Howard and Rod – Sliding Fences; and Dave – Clamps for fence and Production Quality Control.

Additionally, Lee assigned the task of recording the board feet of all lumber used by the team.

Most of the major components were constructed of a new fence design (suggested by J. Brockway) that we will evaluate before beginning production. This design builds the fence core using four parts. The purpose is to ensure the back and front are exactly parallel and to make the fence construction consistent.

A total of 15 BD FT of 8/4 Maple were used for this prototype.

10/3/01

The fence team met to discuss details of the fence design.

The plan is to build 33 complete fences. The initial working length will be approximately 42 inches.
The following approach was agreed upon after some debate.
A. Brockway, Dave and Margaret will build back part of fence;
B. Howard, Lee and Jerry will front top and sliding part of fence.

A total of 333.5 BD FT of 8/4 Maple were selected. A significant portion of the fence pieces were rough cut and jointed on two faces. Not all pieces were planned and not all pieces for the back of fence were selected. Approximately 70 of the 99 pieces for the back of the fence were finished (planned to initial blank size).

A jig has been designed that will be used to cut the four dados for the middle piece of the back of the fence. The dados will be initially cut with the table saw and finished with jig

using a router. This jig will also cut approximately 10 pieces at a time to insure uniformity.

10/10/01

Started with a team meeting to discuss the construction of the fence. Progress today includes preparation of all stock for the sliding fence and half of the fence top piece. All middle pieces of the back of the fence were completed and all dados rough-cut. The jig was completed to finish the dados for the middle piece and about 10 pieces were completed before running out of time. Below is a picture of the jig:

An additional 14 Bd Ft of 8/4 maple was milled for other parts of the fence. We continue to have problems with stock movement – expect to work on the sliding fences next time to correct. Length is an issue as we cut most of the stock at 42 ½ to get the best yield of the available lumber. After milling some pieces may be slightly shorter than required.

10/17/01

An additional 8 Bd Ft of 8/4 maple was milled for additional pieces for the front top and sliding fence pieces. Work was completed on the sliding fence and the front top. Glue up was begun on the back three pieces for the fence. A total of 20 units were glued up by the team. After cutting to size the front top will be glued on next session.

The jig for finishing the four dados in the middle of the fence was displayed for the entire class. In checking progress with this jig it was found that the dados were too deep. Several changes were make to the jig to improve performance. These include lowering the sides and squaring the entire jig. It was decided that the some of the rough dados made by the saw were also too deep. This is not a serious problem as long as the bottom piece is milled to exact 1.5 inch.

10/24/01

The team completed the following items:

1. The remaining 15 back units of the fence were glued up. See photo below:

2. The sliding fence pieces (two per fence) were all milled to a consistent 2 7/8 inches in height.
3. The first 20 back units were jointed so that the front and bottom were at right angles. See photo below to see operation. Then the back was planed.

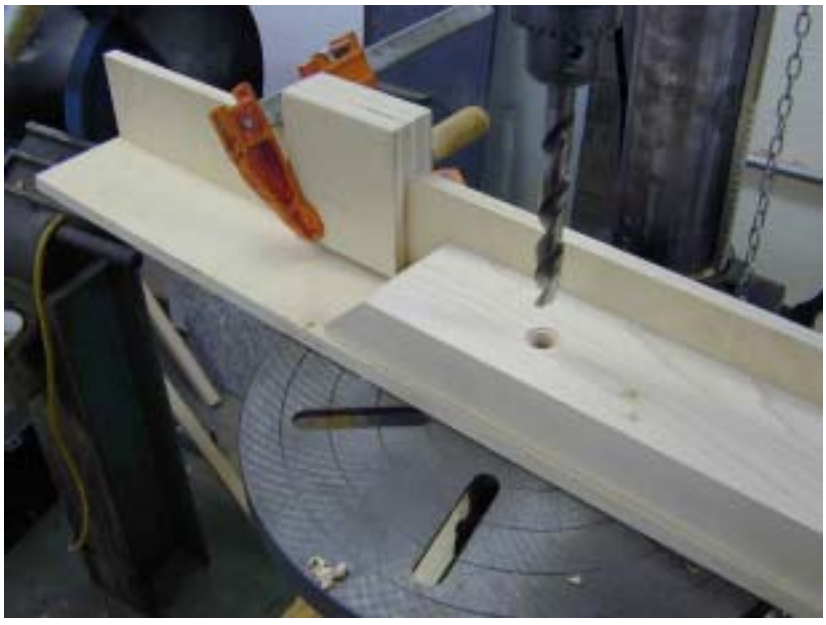
4. A soft jig was made to cut the bottom piece at 1.5 inches in height. This is important to insure that hardware connecting the sliding fence is in the correct position. The slots in the middle board of the back fence were to used to register the jig. That is, the pins were positioned exactly the same distance from the edge of the jig that slides along the saw fence. The piece is forced in position by using shims to so that the board is held in the position so that the saw can cut at exactly 1.5 inches from the pins. The photo below shows the jig and shims.

5. The front top pieces were then cut to final size in the vertical dimension so that it matched the height of the back part of the fence. They were then glued to the back of the fence. See photo below showing pieces in the gluing frame. A total of 20 were completed. The remaining units will be completed next time. Note that this front piece and the sliding fence pieces were milled at the same time to ensure that the "overhang" was exactly the same thickness as the sliding fence pieces. The sliding fences were sized vertically to correspond to the height of the bottom and center portions of the fence.

10/31/01

Progress today included the following items:

1. The remaining 13 were milled to final shape for gluing on the front top piece. This gluing was completed.
2. The first 20 fences were run on the table saw to flatten the tops after the glueup. This should mark completion of this phase of the fence construction. Remaining operations include holes for the clamps and slots for the t bolts and addition of other attachments.
3. The holes were drilled for both left and right sliding fences. See the photo below:



Note that the hole for the insert has been countersunk. About a dozen pieces were completed with the two inserts.

4. A special chop saw with an abrasive blade was used to cut the threaded bolt stock into pieces for the fence – each fence needs 6 pieces – almost all were completed. Each fence requires two pieces of drill rod stock that are used as locator pins for the fence clamps. Almost all of these were cut. Each bolt piece and drill stock piece was ground smooth, see photo below:

5. Work was begun on the fence clamps – each fence receives two clamps. Each clamp consists of a clamp piece and a shim piece. All the clamp pieces have milled and are ready for assembly. 50 of the 66 shim pieces were cut, the rest will be completed latter.

11/7/01

After a brief team meeting the following items were completed:

1. All the necessary all thread pieces have been cut and ends polished. Also, all of the 3/8 drill rod stock have been cut. A total of 50 feet of 5/16 all thread rod and 15 feet of 3/8 drill rod stock were required.
2. All the inserts have been installed in the sliding fence. The "automatic" tool required a lot of patience to operate – the drive chuck does not grip reliably all the time, so many were installed by hand.
3. All the fence clamps were constructed and glued up. Next they will be milled to final size. The photo below shows several in glue rack:

4. All 33 fences were cut to a final length of 41 inches. The procedure was to index off the center line mark of the fence and then cut the right end. Next a simple jig was made to ensure that every fence was exactly 41 inches in length. See next photo:

5. The next step was to cut out the center piece of the fence (the center bit opening). During assembly two methods were used – no glue for approximately 4.5 inches and

the band saw was used to cut a out piece about .5 by 3.5 inches (the glue was still omitted). The final width of this opening was 3.75 inches. Both methods appeared to work. The actual cuts were made using a sliding table and two stop blocks set on the table saw. Note that the safety shield must be removed on the sliding table. A few minutes of chisel work were required for most to clean up the opening.

6. Initial production was started on the dust collection fitting for the back of the fence. It was decided not to drill out the hole for the hose as each person may have a different type or size. The jig from the last class was used with the pin router to cut each piece to shape. They will be formed using heat at a latter class. See photo below.

11/14/01

The team worked on the following items

1. After considerable discussion about what to chamfer on the fence the following was completed on all 33 fences – all edges of the sliding fence were chamfered except for the edge that is cut at 45 degrees. For the main fence all top and end edges were chamfered except for edges that sit on the top. See photo below:

2. The all thread pieces were then inserted into the sliding fences – used JB Weld to attach. A small dab was used on the threads to lock in place. The photo below shows the material before mixing:

3. The sliding fences were then attached to the main fence. See photo below:

The next step was to cut an approximate ½ inch deep dado in the top front edge. Next time it is planned to use a router bit to finish cutting the T-slot. The 33 fences were carefully checked – several sliding fences have defects and will require rework next time. Several fences have already been repaired and will be shorter that the standard 41 inch length.

4. All of the clamps were milled to final size. Next time, it is planned to begin the drilling the various holes needed to install the clamps to the main part of the fence.

5. Approximately 25 of the 33 safety guards were cut out and shaped on the pin router. Next week will begin the bending process for this part along with the dust collection connection.

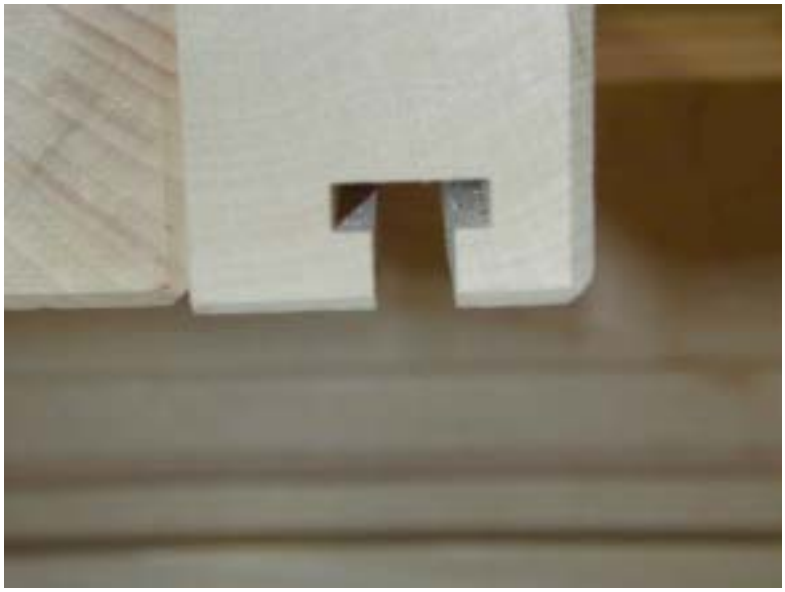
11/21/01

A brief meeting started the workday.

1. The clamps were finished and drilling should start next week. Also, lumber was milled for two stop blocks for each fence.

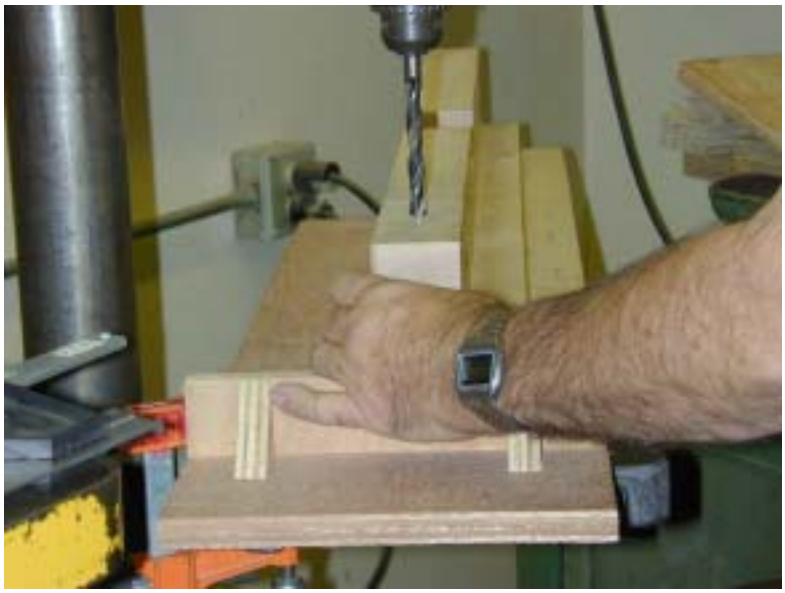
2. The t-slots were finished for all fences. This process requires patience, as the slot must be cut in one pass. Several techniques were used – normal left to right with lots of stops and backing up to clear slot and a brief reverse cut followed by a normal cut.

The photo shows the final slot. While not visible in the photo the bit is set up to leave a slight depression in the top of the slot – this is to help with the cutting process.

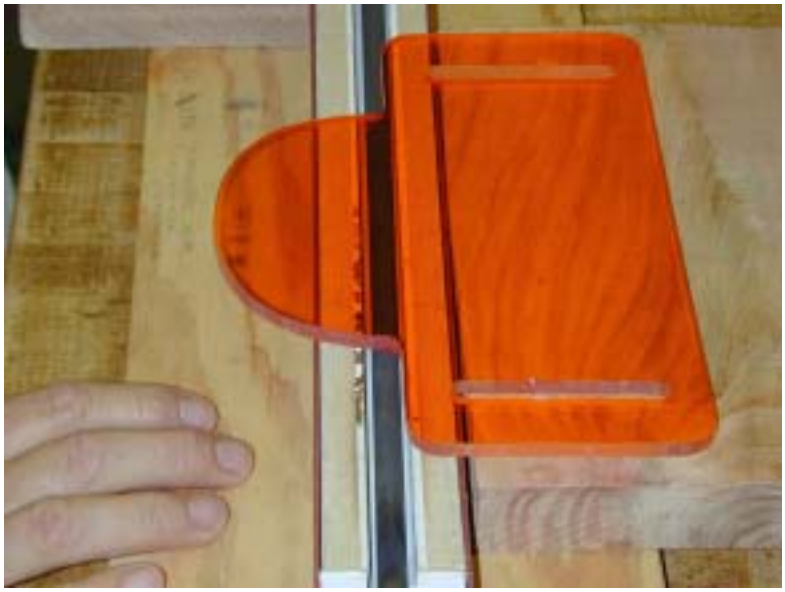


3. Of the 33 fences six needed repairs, mainly to the sliding fences. These repairs were done by drilling a hole for a small dowel and then inserting glue in the crack. The dowel was then inserted and the piece clamped to close the crack. Also, because of repairs three fences are one inch short.

4. The fences were now drilled for the clamps. This is a very slow process as the available drill bit was bad and the substitute was not long enough to go all the way through the fence. Only two holes were drilled on one end of each fence. And the hole through the fence was not completed. A longer drill bit will be used next to complete this phase of the project – need at least 6 inch 13/32 drill bit as the bolt is 3/8 inch. A jig was used to control the drilling process, see photo below.



5. Two pieces of plastic are required for each fence – the dust control fitting on the back and a safety cover on the front. The school bending heater was used to bend these pieces. The first step is heat the joint both top and bottom followed by the use of a simple bending jig. The two following photos illustrate the process. The plastic must be held as it cools to insure it maintains the desired shape.



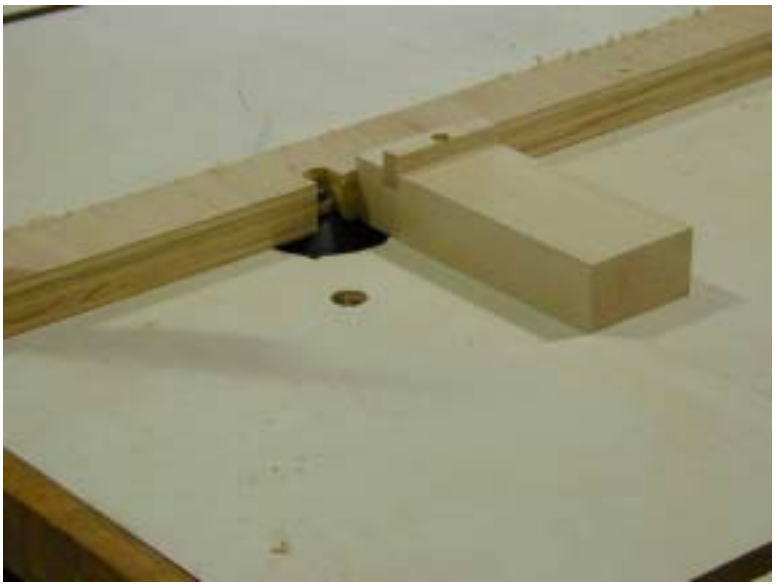
11/28/01

After a brief team meeting the following items were completed:

1. All holes were drilled for the fence clamp system in the main part of the fence. The procedure was to drill the through holes as deep as possible and finish with a hand drill and an extra long bit. A backing board was used to minimize blowout.

2. Using the same jig the blocks for the clamp were drilled, all were completed.

3. Next the stop blocks (see photo below) and all the clamp blocks were chamfered. This setup and a push block allowed for a safe operation with these small pieces.



4. To plan for the pin routing attachment to be made next semester a hole was drilled in each fence for an insert. The next photo shows the jig made to locate this hole. A stop positions the jig and hitting the pin put a mark in the fence top. The inserts will be installed next class.

5. The bit guard hardware was assembled for each fence. It uses the t-slot for attachment. The t bolts had to be cut down by about an inch. See following photo.

12/5/01

After the morning lecture the team had a brief meeting to plan the days work. The fences were all moved in the lecture room tables for final detailing. The first two photos show all the fences.

The detailing process involved several steps. First the tops were sanded on the large belt sander to remove all saw marks. Next all the paper markers were removed. While these were very helpful in keeping the front tops together with the sliding fence, they were hard to remove. We used a chisel and scrapers to remove. Next, the last remaining insert was installed manually in the top of each fence. The next step was to remove all pencil marks

and do detail sanding (120 grit) for each fence along with quality control. One fence was found where the t-slot was not completed. Each fence owner will have to do more sanding before a finished is applied. See the next photo:

On the 19th we will do the final grading and select a fence for each class member.

The other project this week was to prepare a bag of parts for each fence. This bag contains:
1.Two stop blocks with 2 t-bolts, 2 washers and 2 knobs (located lower left hand corner of photo – slide in t-slot and are used control the stock movement)

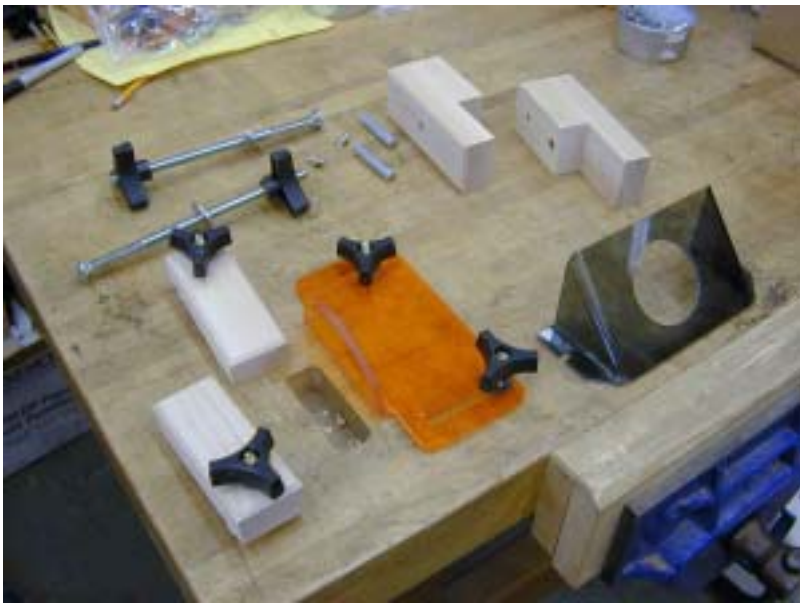
2. Two clamps with 2 carriage bolts, 2 fender washers, 2 knobs and 2 locator pins (these are across the top of the photo and are used to attach the fence to the router table top)

3. One safety shield with 2 t-bolts, 2 washers and 2 knobs (orange plastic in center of photo – used to cover top of bit for safety. Slides in the t-slot)

4. One dust collection port with 2 screws and 2 washers (located in lower right hand corner of photo – installed on the back of the fence for dust collection)

(Note – each class member was given the option of having this port cut for a 2 ½ inch connector and an adapter attached for a dust collection system. There was a slight charge for this option).

The total contents of the bag are displayed in the next picture:



12/12/01

Some late hardware was attached and the dust collector was attached to the plastic plate.

We had a lot of fun this semester: