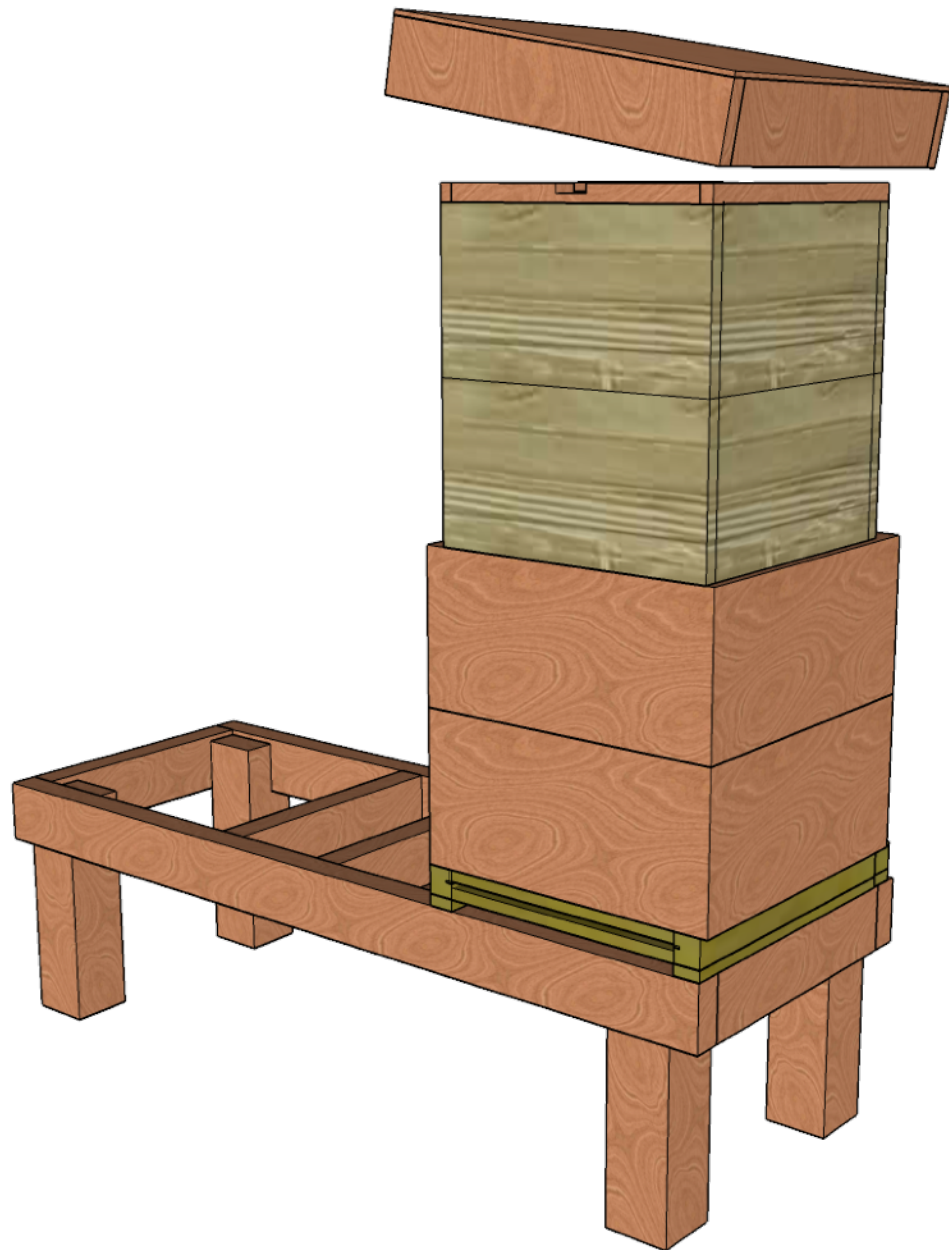


Stackable beehive

Langstroth



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Introduction

This document provides step-by-step instructions for building Langstroth beehives and related jigs. You will find information about necessary tools, materials, and detailed drawings to facilitate construction. It is suitable for both beginners and experienced beekeepers.

When I started beekeeping, I decided to make my own beehives. I struggled to find comprehensive guides and plans, so I created this document to help myself and others. These descriptions are not definitive, but I hope they provide a good starting point.

Before You Begin

Tools

When building stacked beehives, precise measurements are crucial. The tolerances are minimal, down to the millimeter, ensuring stability and proper bee passageways. If the passages are too small, bees risk being crushed, and if too large, they may encourage wild comb construction.

Good tools and machines significantly simplify the woodworking process. However, since beekeepers often work with limited budgets, I've compiled a list of the most essential tools to ease the manufacturing process.

Note: It's possible to build beehives using only hand tools, but if you plan to construct more than one, I recommend investing in some machinery. In each section, I suggest tools to simplify the work, but if you lack a specific machine, there are often alternative methods.

Recommended Tools

BAND SAW

A band saw is fast and saves material, particularly when cutting bee frame slats. Alternatively, you can use a circular saw or, for the dedicated, a hand saw and planer. *Remember:* Always use push tools when working near the blade to avoid injuries.

TABLE SAW

A table saw simplifies cutting straight edges, which is crucial for beehive construction. Always use safety guards and push tools. While a handheld circular saw can work, it requires more precision.

JOINTER AND PLANER

Accurate dimensions are vital. A planer is invaluable for achieving uniform 22 mm walls in honey supers. It also simplifies gluing boards together for consistent thickness and smooth surfaces.

CORDLESS DRILL AND DRIVER

Always pre-drill screw holes to prevent wood from splitting. A drill is also essential for creating wire holes in frames. A cordless driver makes assembling boxes much easier.

NAIL GUN

A nail gun speeds up frame assembly and other temporary constructions.

OTHER USEFUL TOOLS:

- Hammer
- Screwdrivers
- Sheet metal pliers (for metal roofing)
- Brushes for glue and paint
- Joinery tools (e.g., biscuit joiner, tongue-and-groove router bit)

PAIN

Avoid using lacquer paint—it doesn't breathe and may cause moisture issues. Oil-based paints or stains are better suited for beehives. Never paint the inside of a hive; bees will naturally protect it with propolis.

PLANNING AND SAFETY

Plan your work carefully and ensure all materials and tools are ready. Use protective equipment such as masks, goggles, and gloves.

Maintain a well-lit, safe workspace. Keep a first aid kit nearby at all times.

Frames

Bee frames are available in several sizes and primarily come in two types: Hoffman frames and traditional frames.

The choice is a matter of preference:

- **Advantage of Hoffman frames:** They don't require spacer pins.
- **Advantage of traditional frames:** They are slightly easier to manufacture.

The frame dimensions are the same for both types.

Simple Frames

TOOLS

To create simple bee frames, you'll need:

- Jointer and planer
- Table saw
- Band saw (as an alternative to the table saw)
- Drill
- Nail gun or hammer

NOTE:

- A jointer and planer are optional; you can dimension the wood using a rip saw or band saw instead.
- A drill can be replaced with specialized hole-making tools available from beekeeping suppliers.

MATERIALS

For approximately 10 frames:

- Use spruce or pine, or any untreated, knot-free wood.
- **25 mm planed boards:** About 2 meters long and 120 mm wide.
- 40 nails or staples

- Outdoor-grade wood glue

BLUEPRINT

Each frame consists of a top, a bottom, and two sides with the following dimensions:

A. Top Bar:

- Length: 480 mm
- Width: 25 mm
- Thickness: 15 mm

B. Bottom Bar:

- Length: 448 mm
- Width: 25 mm
- Thickness: 15 mm

C. Side Pieces (2 pcs):

- Length: 202 mm
- Width: 25 mm
- Thickness: 10 mm

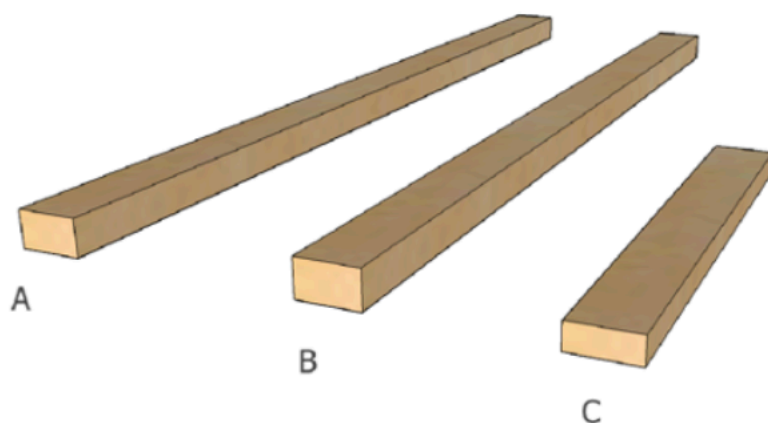


Image 1

INSTRUCTIONS (FOR APPROXIMATELY 10 FRAMES)

1. Plane the boards down to 25 mm thickness, if necessary.
2. Joint one edge to ensure a 90-degree angle (if the board isn't already neatly cut).
3. Cut the boards to length using the table saw according to the blueprint.
4. Use the band saw to slice the boards to the required thickness. Start with the jointed side.
5. Drill holes (2–3 mm) evenly spaced in the top and bottom bars.
 - One hole should be in the center, and the outermost holes should be about 30 mm from the ends.
 - For Langstroth frames, five holes are recommended.
6. Assemble the frame by nailing it together with glue at the connection points.

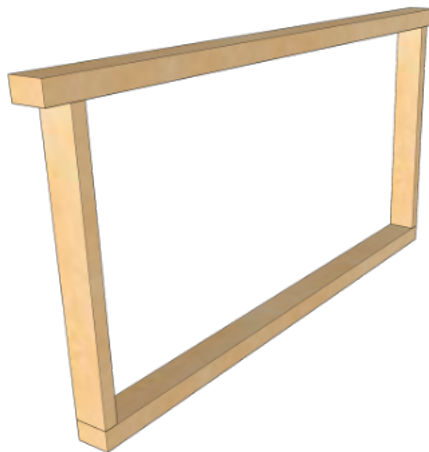


Image 2

Hoffman Frames (Simplified)

Hoffman frames offer several advantages, particularly their design, which

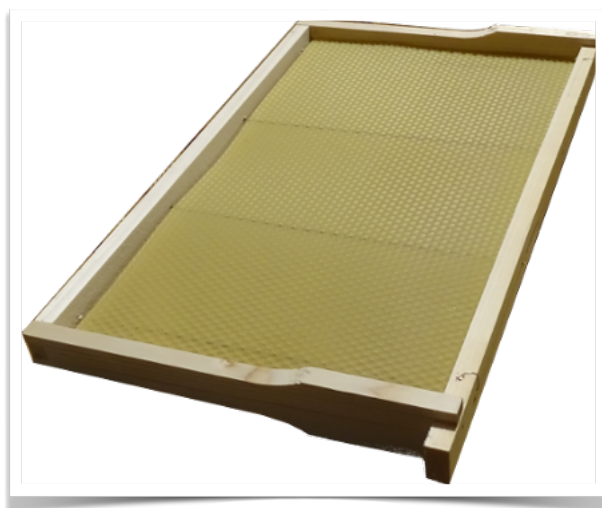


Image 3

ensures correct spacing in the hive without the need for spacer pins. One side of the side bar is rounded, while the other remains flat to prevent the frames from sticking together.

Tools

To make Hoffman frames, you will need:

- Jointer and planer
- Table saw
- Band saw
- Router (table-mounted)
- Drill
- Nail gun or hammer

NOTE:

- A jointer and planer are optional; you can dimension the wood with a rip saw or band saw.

- A drill can be replaced with a hole-punching tool available from beekeeping suppliers.

Materials

Almost any wood will work, but spruce or pine is recommended for its affordability and durability. Untreated scrap wood can also be used if it is knot-free. Avoid wood with knots as they compromise the frame's strength.

MATERIALS FOR APPROXIMATELY 10 FRAMES:

- 22 mm planed boards (about 2 meters, 120 mm wide)
- 35 mm planed boards (about 2 meters)
- 40 nails or staples
- Outdoor-grade wood glue

Construction and Design

Each frame consists of a top bar, a bottom bar, and two side bars.

- The top and bottom bars have drilled holes for wiring.
- For larger frames, drilling holes on the side bars helps prevent deformation.

A groove on one side of the side bars prevents bees from cementing the frames together with propolis. The thickness of the side bars is consistently 10 mm.

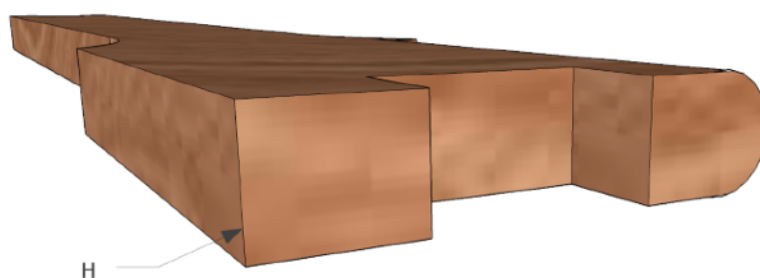


Bild 4

DIMENSIONS FOR LANGSTROTH FRAMES

A. Side Bar:

- A: 10 mm
- B: 22 mm
- C: 10 mm
- D: 10 mm
- E: 35 mm
- F: 15 mm
- G: 15 mm
- H: 50 mm (length is less critical)
- Total length: 232 mm

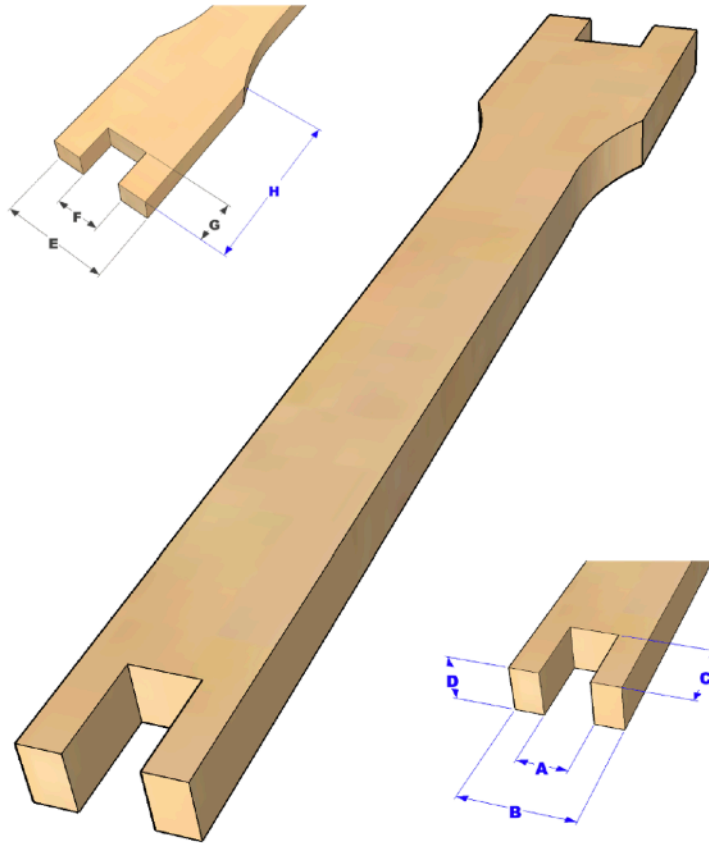


Bild 5

B. Top Bar:

- A: 10 mm
- B: 480 mm
- C: 15 mm
- D: 16 mm
- E: 10 mm
- F: 3.5 mm

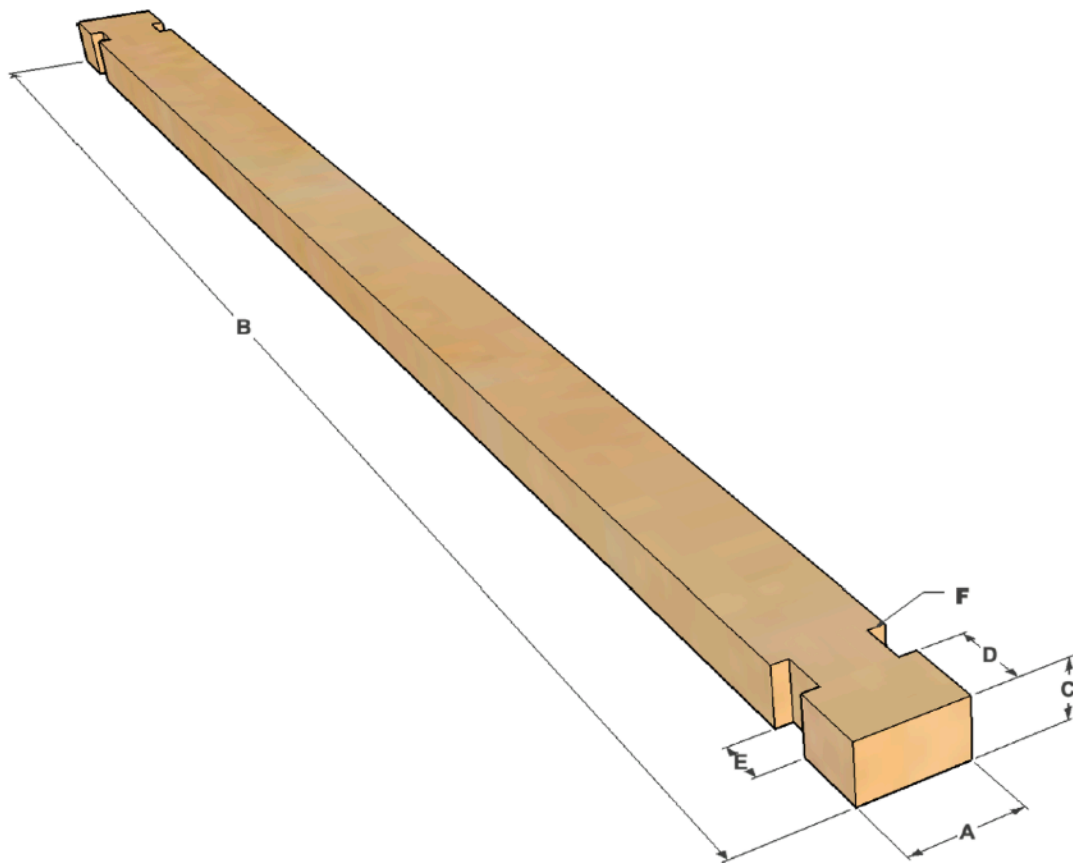


Bild 6

C. Bottom Bar:

- A: 448 mm

- B: 22 mm
- C: 10 mm
- D: 10 mm

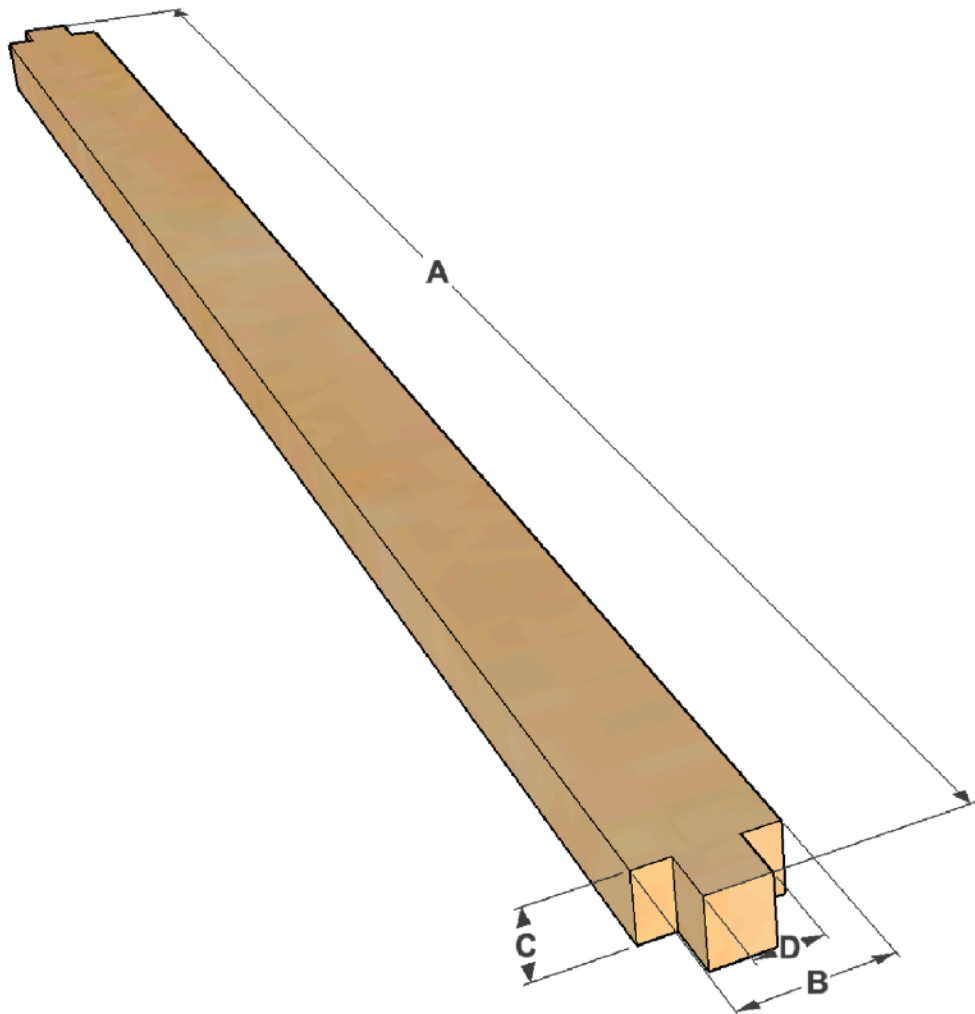


Bild 7

Instructions (for approximately 10 frames)

1. Prepare 22 mm boards and 35 mm planks. Plane them for precise measurements.
2. Cut the boards to the correct lengths for the top and bottom bars.
3. Router a groove (3.5 mm deep, 10 mm wide) in the top bar boards.



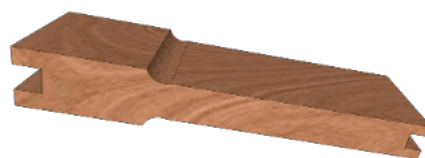
4. Router grooves in the bottom bar boards and slice them to size.



5. Cut the planks to the correct length for the side bars.
6. Router grooves for the top and bottom bars in the side bars.



7. Shape the side bars using a saw or router according to the blueprint.



8. Slice the planks to the correct thickness.
9. Drill holes for the wires in the side bars.
10. Router one side of the side bars to prevent bees from cementing the frames together with propolis, or round the edges with sandpaper or a hand planer.
11. Assemble the frames by gluing and nailing them together.

Bottom Board

To build a beehive bottom board, you will need the following tools:

- Jointer and planer
- Screwdriver/drill
- Table saw
- Brush or tool to spread glue and paint

For materials, spruce or pine is recommended. Scrap wood is also acceptable if untreated and in good condition.



Bild 8

Materials (for one bottom board):

- 2 meters planed plank: 45 x 70 mm
- 2 meters planed board: 18 x 95 mm
- 6 wood screws: 50 mm
- 10 wood screws: 90 mm

- Lacquered board: 3 mm thick
- **Wire mesh:** 2 mm mesh size
- **Wood glue:** Outdoor grade
- Oil-based paint or stain

Dimensions and Instructions

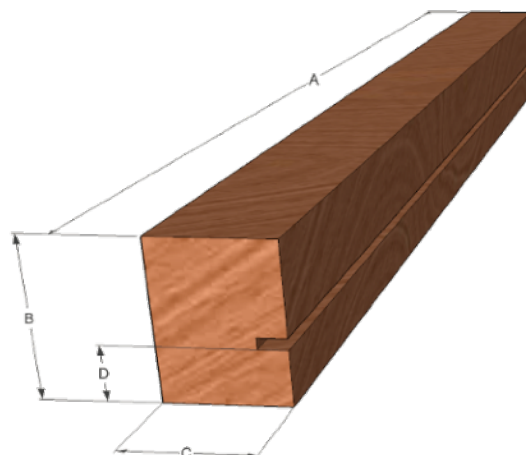
The grooves in the bottom plate are designed for a sliding insert and are easiest to make with a table saw. Make one cut, shift the fence by about 2 mm, and make another cut to achieve the correct width.

Important: Always use a push stick when sawing to protect your hands. The saw blade makes no distinction between wood and fingers!

PARTS AND DIMENSIONS:

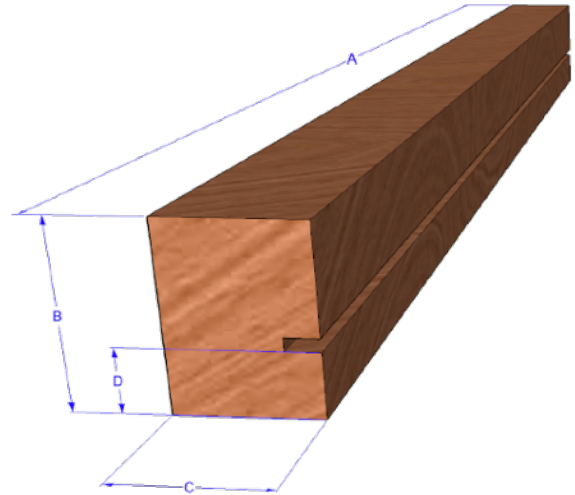
1. Sides (lower section):

- Quantity: 2 pcs
- Groove: 5 mm high, 10 mm deep
- Dimensions:
 - A: 464 mm
 - B: 55 mm
 - C: 42 mm
 - D: 19 mm



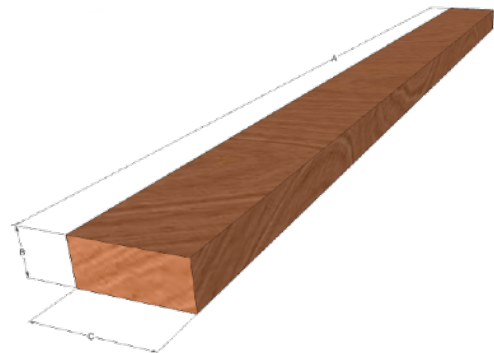
2. Back Piece (lower section):

- Quantity: 1 pc
- Groove: 5 mm high, 10 mm deep
- Dimensions:
 - A: 454 mm
 - B: 55 mm
 - C: 42 mm
 - D: 19 mm



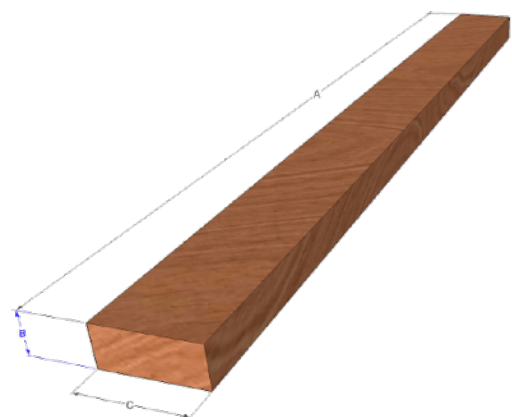
3. Side (upper section):

- Quantity: 2 pcs
- Dimensions:
 - A: 506 mm
 - B: 18 mm
 - C: 42 mm



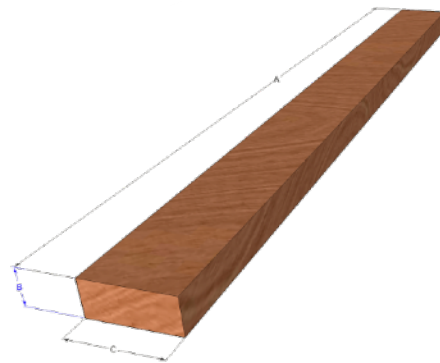
4. Front (lower section):

- Quantity: 1 pc
- Dimensions:
 - A: 370 mm
 - B: 18 mm
 - C: 42 mm



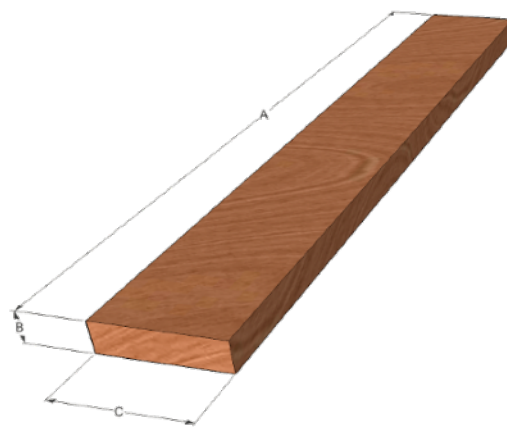
5. Back Piece (upper section):

- Quantity: 1 pc
- Dimensions:
 - A: 370 mm
 - B: 18 mm
 - C: 42 mm



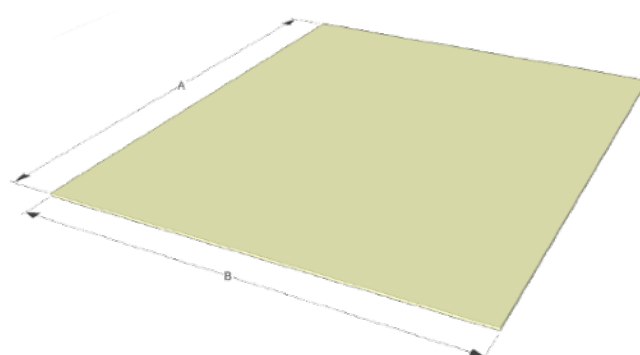
6. Front (upper section):

- Quantity: 1 pc
- Dimensions:
 - A: 370 mm
 - B: 18 mm
 - C: 70 mm



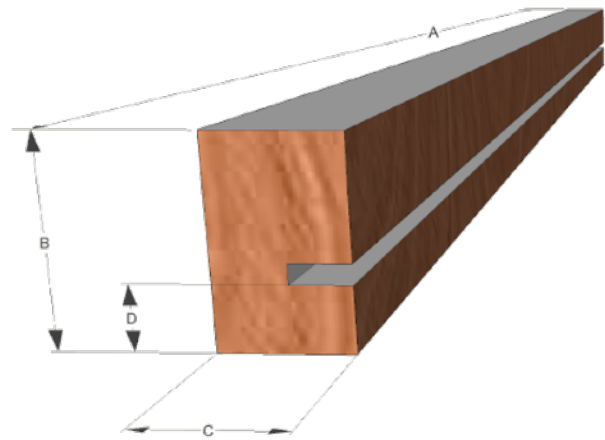
7. Bottom Plate:

- Material: 3 mm plywood, painted
- Dimensions:
 - A: 386 mm
 - B: 471 mm



8. Front Plate (bottom):

- Quantity: 1 pc
- Groove: 3 mm
- Dimensions:
 - A: 464 mm
 - B: 35 mm
 - C: 22 mm
 - D: 15 mm



Assembly Instructions

1. **Pre-drill screw holes:** To avoid splitting the wood during assembly.
2. Assemble sides and back (lower section):
 - Screw two sides (AA) to one back piece (AC). Ensure the grooves align perfectly.
3. Attach the front piece (AD):
 - Screw AD to the front, flush with the bottom. The top edge of AD must be just below the groove for the varroa tray.
4. Install the upper front piece (AE):
 - Attach AE flush with the top edge of the bottom.
5. Secure the mesh:
 - Place the mesh between the side pieces (AB) and back piece (AD). Use glue and screws to secure it.
6. Glue and attach the bottom plate:
 - Glue the plate to the front and screw it in place.
7. Paint the bottom board:
 - Finish by painting all surfaces with oil-based paint or stain for protection.

Brood Box / Honey Supers

Tools

For uninsulated boxes, you will need the following tools:

- Table saw
- Drill/screwdriver
- Brush for glue and paint
- Router (optional)
- Clamps

Materials

For Langstroth boxes, you may need to glue multiple boards together to achieve the required width.

RECOMMENDED MATERIALS:

- Spruce or pine (untreated wood)
- Wooden dowels or wood screws (approx. 50 mm) – not necessary if using finger joints
- Wood glue
- Paint
- Frame rest strip

Uninsulated Box with Wooden Dowels or Screws

Note:

The dimensions are designed for the use of a 1 mm thick frame rest strip. If no frame rest strip is used, the rabbets must be adjusted. In this case, the rabbets should measure 18 mm instead of 27 mm.

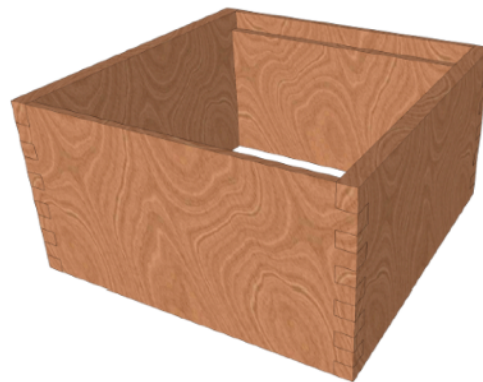


Image 9

Internal dimensions for 10 frames:

- Length: 370 mm
- Width: 464 mm
- Height: 240 mm

Length refers to the side with the rabbet.

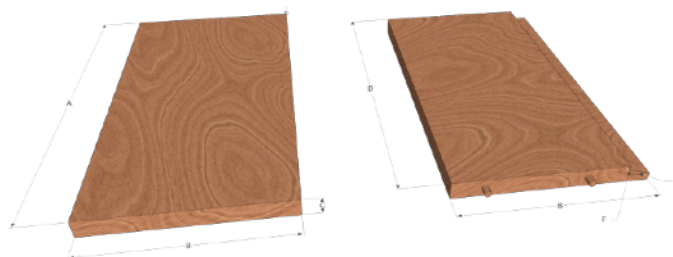


Bild 10

DIMENSIONS:

- A: 508 mm
- B: 240 mm
- C: 22 mm (thickness)
- D: 370 mm
- E: 32 mm (rabbet height with frame rest strip)
- E: 23 mm (rabbet height without frame rest strip)
- F: 13 mm (rabbet depth)

Uninsulated Box with Finger Joints

Finger joints are the strongest corner connection method but require more effort. If you are not building many boxes, it might be worth trying. Specialized tools, such as Leigh jigs, can simplify the process. You can also find DIY guides for building your own jigs on YouTube.

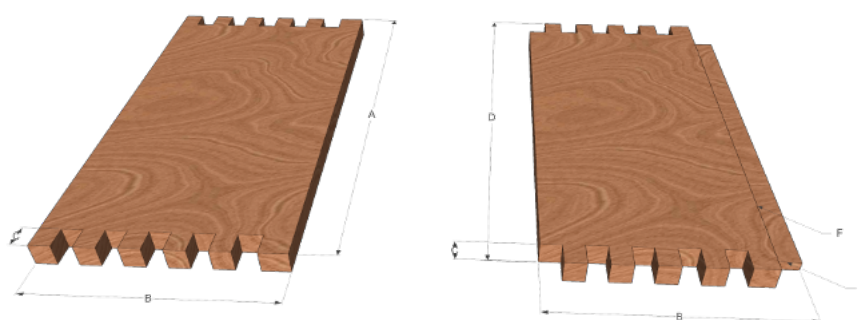


Bild 11

DIMENSIONS:

- A: 508 mm
- B: 240 mm

- C: 22 mm (thickness)
- D: 414 mm
- E: 32 mm (rabbet height with frame rest strip)
- E: 23 mm (rabbet height without frame rest strip)
- F: 13 mm (rabbet depth)

Uninsulated Box with Other Corner Joints

Other corner joint methods can also be used, but the dimensions must be adjusted to ensure the specified internal dimensions (370 x 464 x 240 mm).

ALTERNATIVE METHODS:

- **Mitered corners (45 degrees):** Glue and reinforce with glued wedges.

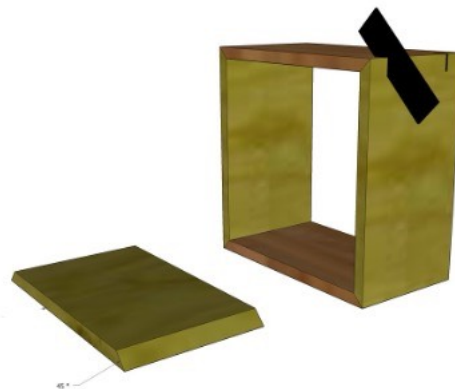


Bild 12

•

- **Rabbeted corners:** A rabbet provides a larger bonding surface than a butt joint.

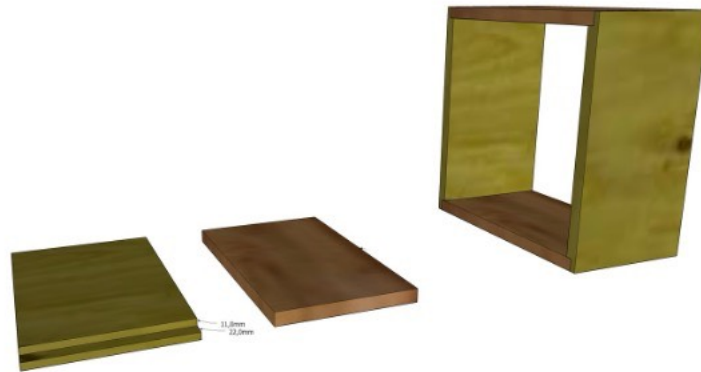


Image 13

- **Sliding dovetail:** A very strong method, though it requires extra precision and appropriate tools.



Image 14

Langstroth Inner Cover

Tools

To construct an inner cover, you will need:

- Planer
- Screwdriver/drill
- Table saw or router

Materials

For the edges, use spruce or pine, and for the cover panel, use 4 mm plywood. Any untreated wood will work, but spruce and pine are affordable and easy to source. If using planks with dimensions 45x100 mm, plane them to 38 mm thickness and rip them to 24 mm width, yielding three strips per plank.

Dimensions

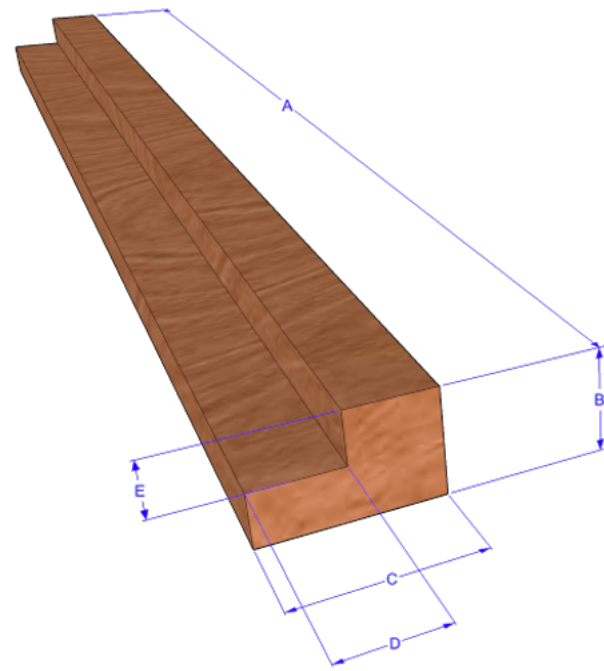
The outer dimensions of the inner cover should match the outer dimensions of the uninsulated box.

Drawing (dimensions in mm)

Number of parts: Two of each.

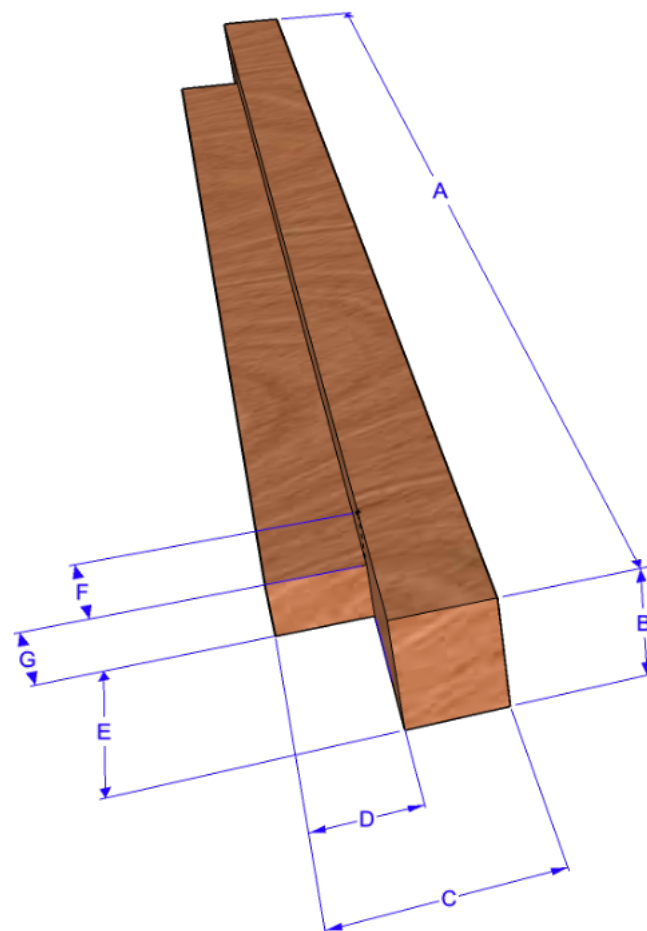
1. First dimension:

- A: 388
- B: 24
- C: 38
- D: 19
- E: 12



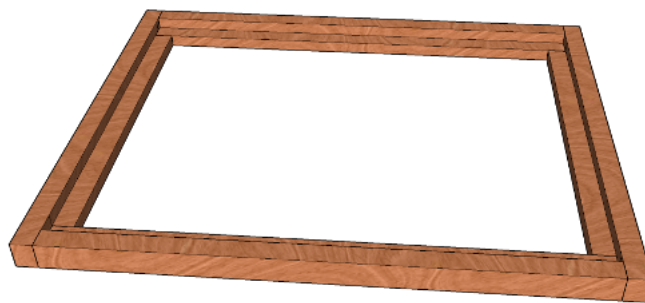
2. Second dimension:

- A: 426
- B: 24
- C: 38
- D: 19
- E: 38
- F: 12
- G: 12



Assembly Instructions

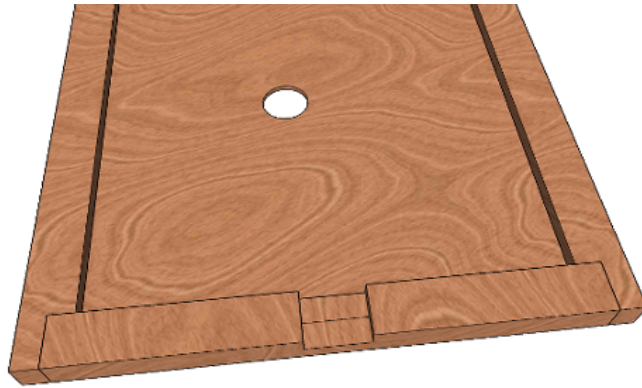
1. Prepare the strips:
 - Plane a plank (e.g., 45x100 mm) to the correct thickness (38 mm).
 - Rip and cut the strips to the dimensions 24 mm x 38 mm and the specified lengths.
2. Create rabbets:
 - Use a table saw or router to create the rabbets as shown in the drawing.
3. Adjust one strip:
 - On one strip, remove 38 mm of the rabbet at one corner, as illustrated in the drawing.
4. Assemble the frame:
 - Screw the strips together to form a rectangular frame.
 - Pre-drill screw holes to reduce the risk of splitting the wood.



5. Prepare the plywood panel:
 - Cut the 4 mm plywood to fit inside the frame, resting in the rabbets.
 - Drill a hole in the center of the plywood. If the inner cover will also be used as a bee escape, adjust the hole's size and position accordingly.
6. Attach the plywood panel:
 - Secure the plywood panel to the frame with screws.

7. Ventilation hole:

- Drill a ventilation hole on the side of the inner cover that faces the hive entrance.



Langstroth Roof

In Nordic regions, an insulated roof is necessary for overwintering. During summer, insulation is not required, and the roof is typically used on uninsulated boxes. These roofs are slightly oversized to fit insulated boxes.

Tools

To construct the roof, you will need:

- Screwdriver/drill
- Table saw
- Jointer and planer

Materials

Spruce is recommended as it is relatively resistant to rot.

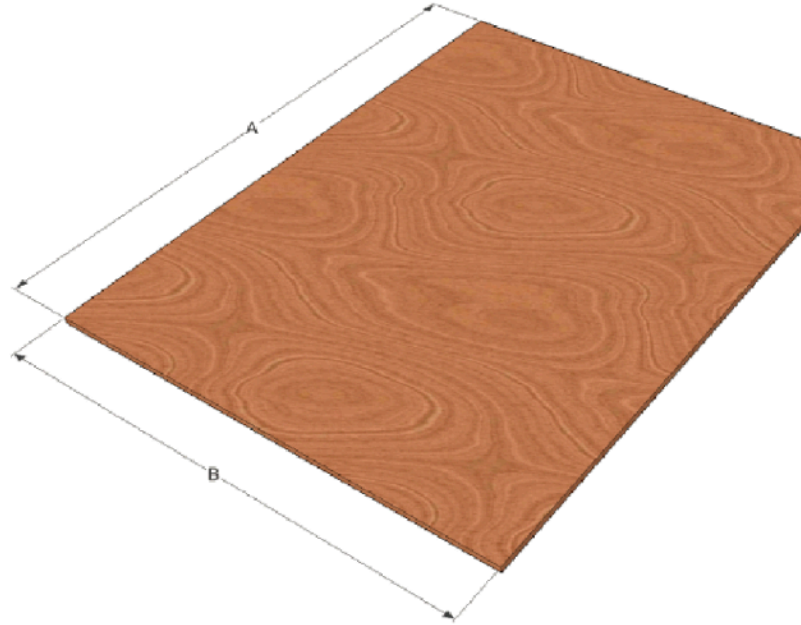
MATERIAL LIST:

- 22x100 mm boards (or 1"x4" equivalent)
- 7 mm thick plywood sheet
- Wood screws
- Insulation board
- Wood glue

Dimensions and Drawing

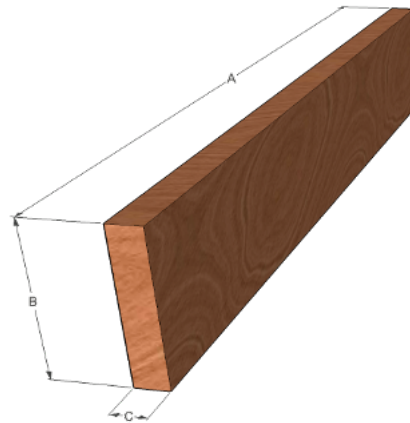
1. Top Panel:

- A: 524 mm
- B: 524 mm



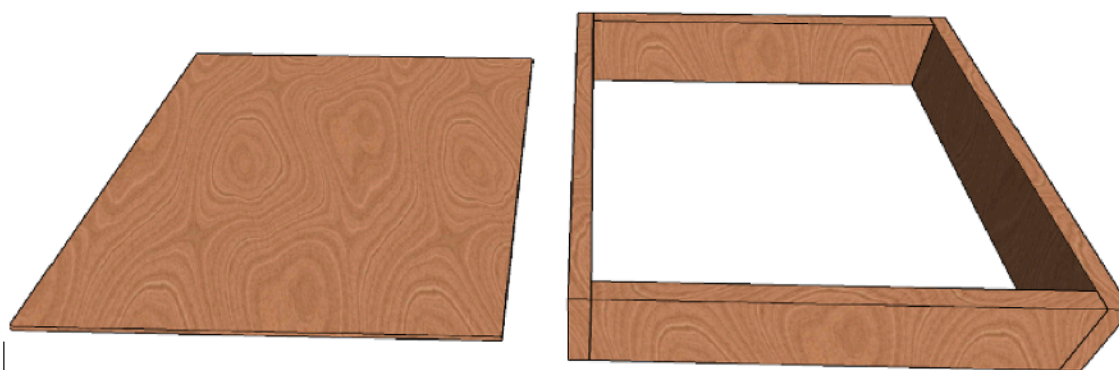
2. Sides: (two of each)

- A: 480 mm
- B: 100 mm
- C: 22 mm
- A: 524 mm
- B: 100 mm
- C: 22 mm



Assembly Instructions

1. Prepare the side boards:
 - Cut the boards to the correct lengths according to the dimensions provided.
2. Assemble the frame:
 - Screw the side boards together to form a frame. Ensure all corners are perfectly square.



3. Attach the plywood sheet:
 - Secure the plywood sheet to the top of the frame using screws.



4. Paint the roof:
 - Paint the entire roof, including both the inside and outside, to protect it from weather and moisture.
5. Apply roofing material:
 - Use flat roof sheet metal, aluminum, or roofing felt, folding it over the edges for added protection.
6. Insulate the roof:
 - Attach insulation to the underside of the roof.
 - Cover the insulation with plastic to prevent bees from chewing on it.