



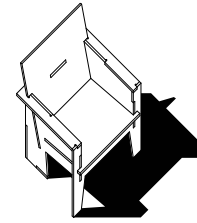
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Ninety Minute Chair

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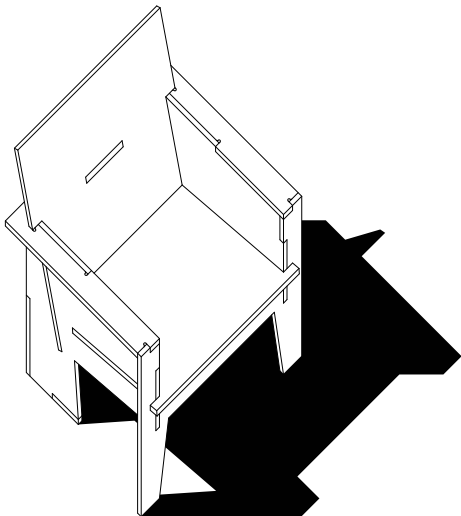
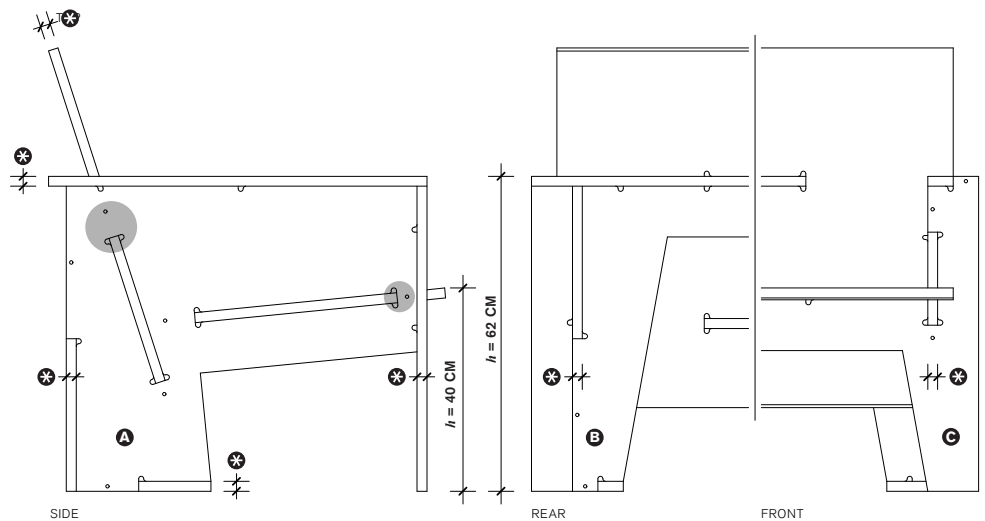
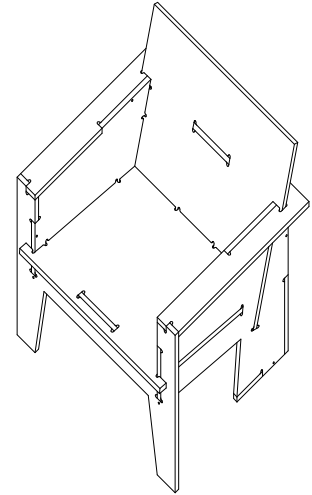
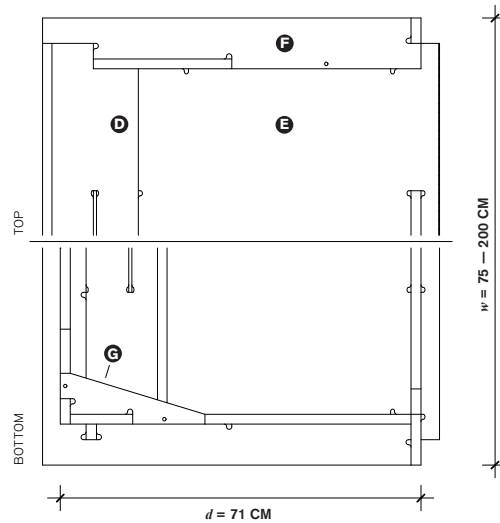
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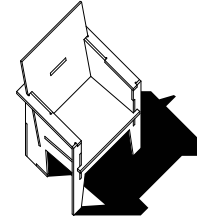
Ninety
Minute
Chair

The Ninety Minute Chair is a lounge chair comprised of 9 pieces. Loads are distributed across its interlocking seat, arms, and legs. It can be made of almost any material and finished as desired.

As shown, one chair can be milled from two sheets of 4'x8' material. The chair requires a set of 3D printed keys (shown at right) that simplify assembly and lock pieces into place. These are included in the files and can also be found at www.thingiverse.com/atfab.



AtFAB



Ninety Minute Chair

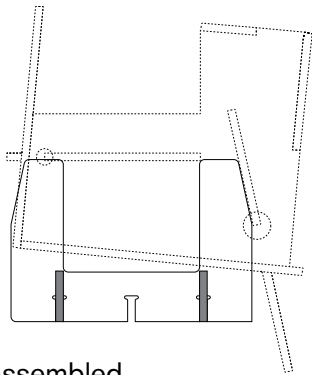
DIGITAL CUT FILE

Cut file provides 1 chair that can be cut from 2 sheets* of 18.5 (3/4") material.

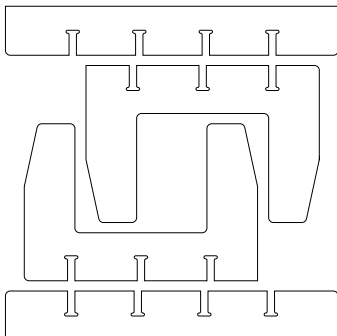
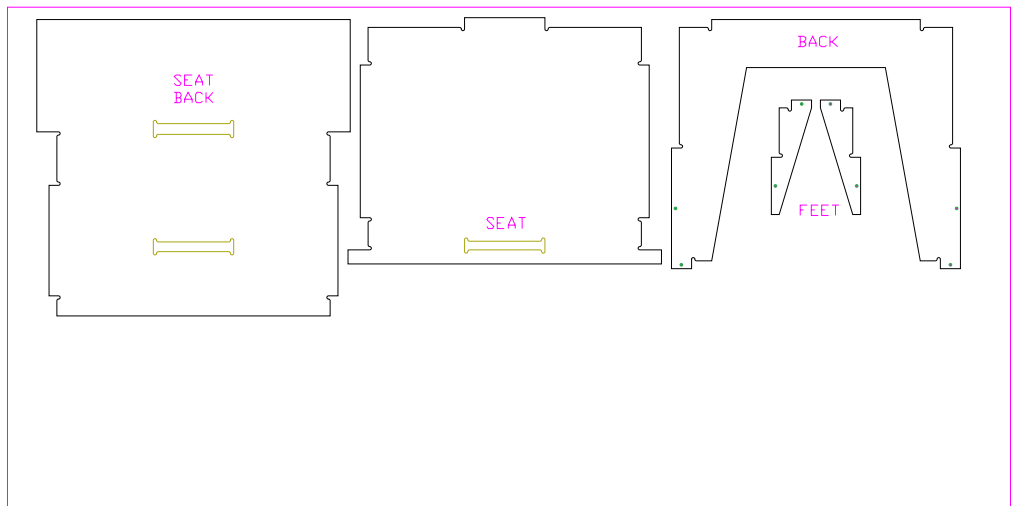
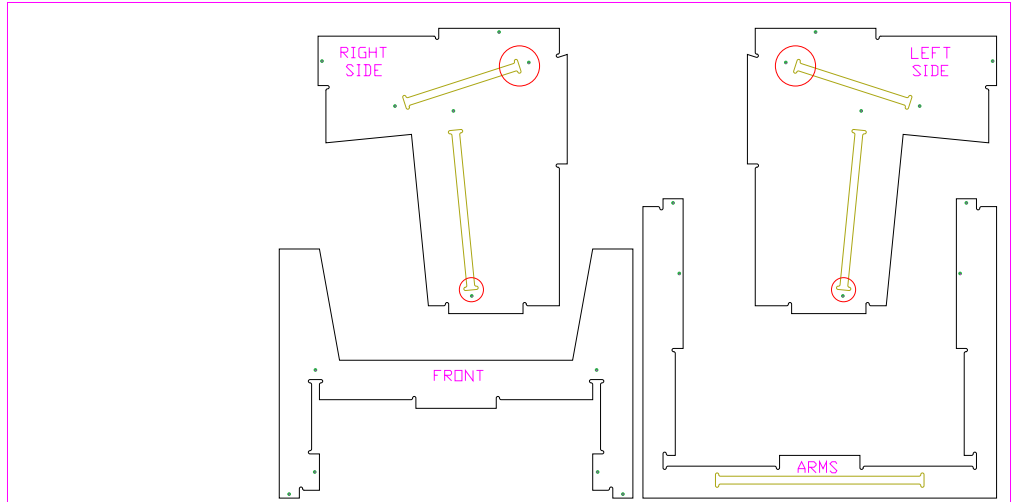
KEY

- White Lines = outside cuts
- Yellow Lines = inside cuts
- Red Lines = .375" pocket cut
- Green Circles = drilled holes (size to match your fastener)

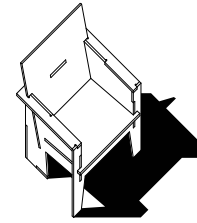
*In order to optimize sheet material, nest other AtFAB pieces onto the sheets, or widen the Lounge Chair. By adding a third sheet, profiles can be reconfigured to yield two chairs from 3 sheets of material. Jig can also be nested into sheets.



jig parts assembled



jig parts in atfab_jig.dxf



LOUNGE CHAIR ASSEMBLY INSTRUCTIONS

ASSEMBLY:

Assembly requires placing pieces together in the right order. The jig (atfab_jig.dxf) and/or a friend are very useful at this stage. With the jig assembled on a worksurface and parts A-G laid out within reach, working *upside down*:

- Place Seat (E) face down onto jig
- Slot tab of Front (C) into Seat (E) slot
- Slot Seatback (D) onto tab of Seat (E)
- Place Arm (F) around Seatback (D)
- Work parts C-F into one another so that matching slots and tabs interlock, have a friend loosely hold these parts together.
- Carefully rotate (like a DeLorean door) Left Side (A) inside of Arm (F) and into Front piece (C)
- At this point it seems impossible, but keep shimmying Side (A) slowly into place so side tabs of Seatback and Seat align and slot into Side (A).
- Do the same with Right Side (A)
- Slot Back (B) into Arm (F)
- Place Feet (F) onto Sides and Back

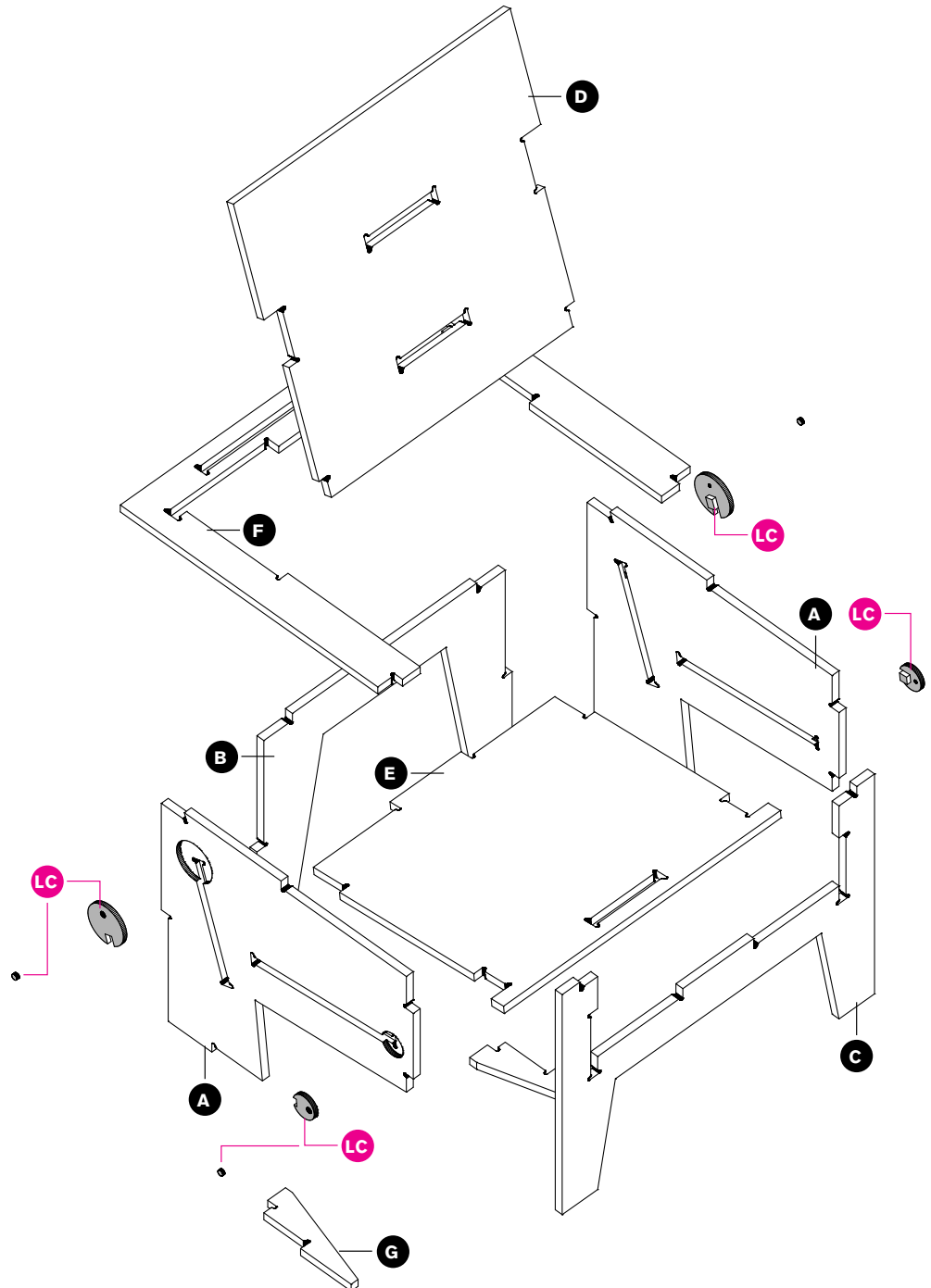
FASTENING

Drill through the pre-drilled holes and into the edge of opposing part, then add peg or fastener of your choice:

- Keeping chair upside down, work around chair to fasten back, front and sides
- Fasten feet and turn chair upright
- Fasten remaining holes
- Insert 3D printed LC Keys into pockets of sides, fasten and lock 3D printed Plugs into place, flush with Keys.
- Have a seat and enjoy!

STL files to 3D print the LC Key set, Large and Small LC Keys and plugs, are included and also can be found at thingiverse.com/atfab. These keys lock the seat and seatback into place.

Fit the Large LC Key and Small LC Key into the pockets of Sides (A), fasten Key through Sides (A) and into Seat (E) and Seatback (D). Fit a plug over the fastener. If Keys and Plugs fail to fit perfectly flush into the plywood, an adjusted STL file can be 3D printed to fit your chair perfectly.



These suggestions, which come from our research experience, are our best effort to share insights about the fabrication process. They are by no means comprehensive; we always welcome your feedback.

PLANNING YOUR MATERIALS

- Simpler AtFAB furniture objects require a single sheet, while the larger complex pieces require 6 or more. We advise purchasing a 20% material surplus for testing.
- Cut files provided are scaled for 18.5mm (3/4") Hardwood Veneer Plywood (we used Home Depot's PureBond successfully in many of our prototypes). Some objects will require 1/2" sheet material for infill parts, shelves and drawers.
- Consult sheet material supplier and manufacturer instructions for finishing prep. Different sandpaper grits for edges and for faces of lumber products is useful, and wrapping sandpaper around dowels is helpful to sand the inside of the curved sniglets.
- If sealing, coating, painting or finishing your furniture piece in some way, consult manufacturer instructions for finishing with oils, waxes, paint and sealers.
- AtFAB's design using slots, tabs and notches makes objects easy to assemble with a couple of people. Moving quilts to protect the pieces and your floor are handy.
- Blue painters tape is especially helpful in holding pieces together as you assemble your object.
- For increased durability, we recommend securing joints with dowels. The cut files provide these dowel holes for the CNC to pre-drill into the face of the furniture pieces.

- If securing joints with dowels, a hand drill and 1/4"x1 1/2" pre-cut hardwood dowels of oak, maple or walnut have worked well with our plywood prototypes. Ask your material supplier for recommendations.
- The pre-drilled holes can accommodate mechanical fasteners, and they can be eliminated altogether if you prefer to glue pieces together.
- CNC machines require their own supplies, consult your fabricator to find out recommended bit sizes for CNC routers, masking to protect your materials, and anything else the machines need.

FABRICATION HINTS

- DXF cut files are provided. After importing into the CNC Machine's proprietary CAM software, check that polylines remain continuous and closed, and inflected sniglet curves are consistent with the drawing included in this document.
- Every AtFAB object has inside cuts, outside cuts and drilled holes. These are separated by layers in the DXF file and noted on the accompanying sheet in this document. Cutting on the appropriate side of the line is critical to ensure tabs and slots fit together.
- Inside cuts (especially slots) may leave a piece of waste material that can be vibrated out of place and interfere with cutting. Secure this piece or pause the machine to remove it on the final pass.
- A lower cutting speed and greater number of passes produce a more refined edge that requires less sanding/filing.

USING THE TEST PIECE

Before proceeding with your entire job, test your sheet material and machine settings to ensure AtFAB pieces fit together as intended:

- Using your 20% material surplus, cut the test-piece provided in AtFAB_test.dxf
- Multiple settings can be evaluated by cutting multiple test pieces and "bracketing" toolpath offsets, cutting speeds, bit sizes, etc with each piece.
- Finish the test piece(s) as you would your furniture object. Evaluate how the slots and the tabs of the finished test pieces fit together.

A successful fit using 18.5 (3/4") plywood allows 1-3 business cards to easily pass between the joints. If not:

- Measure the thickness of your sheet material in several places to see if it matches the slot dimensions in the cut files.
- If your material thickness is greater than 18.5 (3/4"), CAD files can be scaled by up to 1-2% to adjust for your actual material thickness.
- Alternatively, you can incrementally increase bit diameter settings in your CAM software without changing your actual bit. This will enable the machine to remove slightly more material as it cuts on the same toolpath.
- Do not offset the CAD polylines to make fit adjustments. This will make AtFAB slots smaller and tabs bigger, ensuring ill-fitting pieces.



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TERMS & CONDITIONS

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