BLAKEWORX

SHOP SOLUTIONS THAT WORK.

BWP-P-001 SHEET FLIPPER

Build manual — preview

Six pages out of fifteen, from the 19 mm build manual.

Every word containing a digit inside the page body has been removed — no dimension, quantity, hardware size or coordinate survives. The drawings, part names, notes and structure are untouched, so you can judge the depth of the plan set before you buy.

Every dimension in the real manual is written by the same parametric model that writes the DXF cut files and the SketchUp model, so the drawings, the cut files and the model always agree.

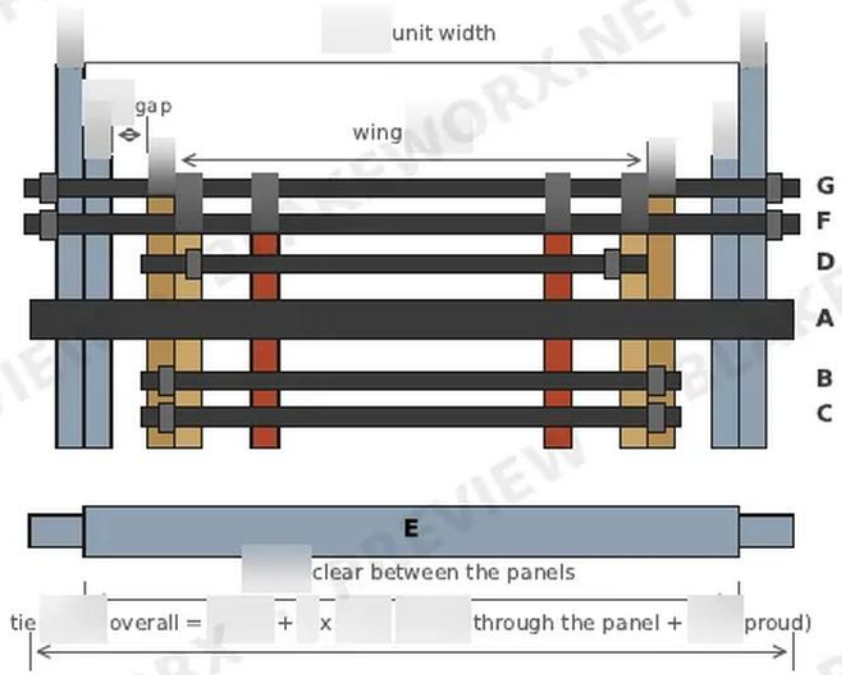
The full package: 17 part DXFs and nests in both 19 mm and 18 mm-class thickness, 48 × 96 and 48 × 120 nests, both 15-page manuals, the 3-D model, the hardware schedule and the Shop License.

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SECTION THROUGH ONE UNIT AT THE AXLE — THE STACK, LOOKING ALONG THE WING



	SIDE PANEL	ply
	AXLE DOUBLER	ply, screws to the panel's inside face, no glue - of bearing with the panel
	OVAL DOUBLER x	ply, on two dowels through the rail, no screws - of bearing; the dog cord runs over it
	RAIL	ply
	DOG	ply. on a bronze bushing on rod B
A	**AXLE**	ONE OD tube (wall >= x right through the unit; all four bores = OD + running fit: collar outside each panel. lb per end.
B	**DOG ROD**	all-thread x through both rails, nyloc + washer outside each rail; dogs bored for a ID x OD bronze bushing, located by jam nuts
C	**STOP PIN**	all-thread x through both rails, nyloc + washer outside each rail; carries the sheet, lb per dog
D	**LATCH PIN**	Grade all-thread x flush with the far rail, proud of the walkway-side rail to reach the pawl; a nut on the INSIDE face of each rail locates it
F	**PAWL PIVOT**	all-thread x outside of panel to outside of panel like the axle; nyloc + washer outside each panel; ply spacers (+ shim washers) set the pawl
G	**PAWL STOP**	all-thread x outside of panel to outside of panel nyloc + washer outside each panel, spacers. (F, G shown in this stack for length only)
E	**TIES**	three per unit, long, tenons each end, dry fit in dogboned mortises, one screw each

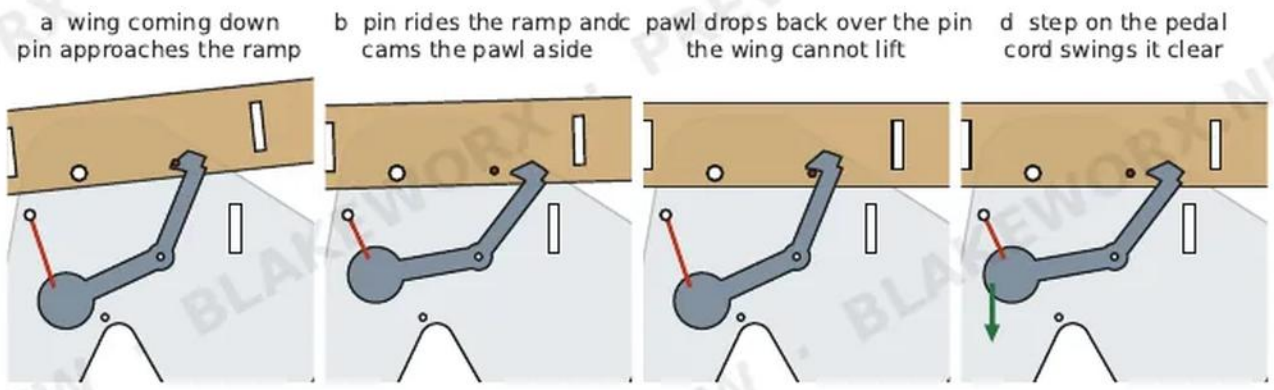
Bearing. Every axle end runs in two plies of = of wood: panel + doubler on the stand, rail + oval on the wing. Drill each pair together once the b line up. One axle runs right through. The gap bet oval and pa for the collar and the dog cord. Unit units apart on centres, clear walkway. Nothing here is nominal all stock is all slots and mortises are cut

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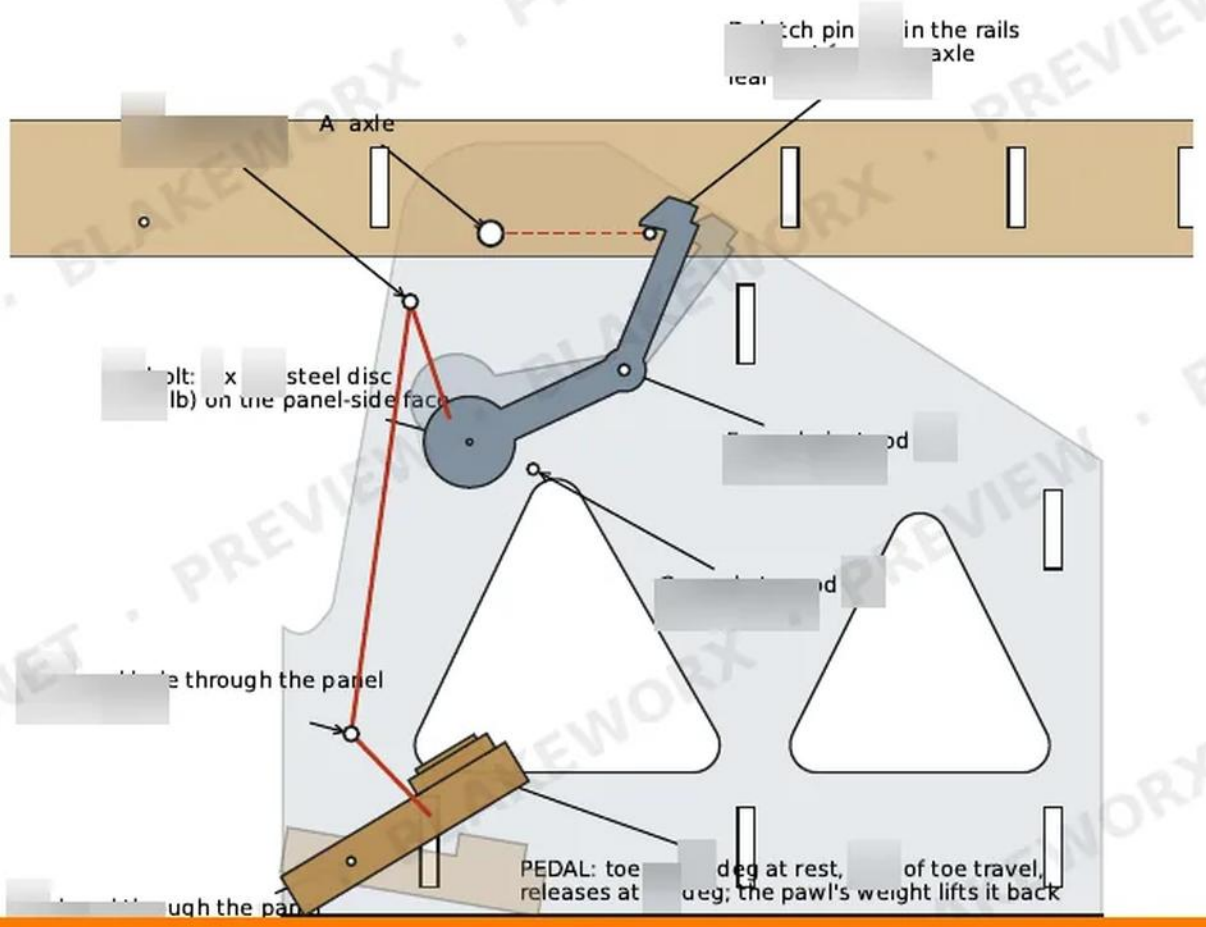
Section through one unit at the axle

Dimensions removed · full plan set at blakeworx.net/flipper

THE LEVEL LATCH — GRAVITY PAWL, SELF-CLOSING, FOOT RELEASE



Setting out on the walkway-side panel - rest position solid, released ghosted



Why the wing needs a latch

The sheet starts outboard of the axle and ends inboard of it. Once its centre crosses the axle it is cantilevered over the gap and tries to roll the wing backwards off its level stop: in-lb per wing at worst, against in-lb of wing weight holding it down. The level tie only stops the wing going down; the pawl stops it coming up.

How it works

The pawl hangs on rod F and gravity closes it against rod G. As the wing comes down, latch pin D lands on the ramp cut across the tooth's tip. The ramp turns the pin's push into a twist that swings the pawl aside, and the pawl falls back over the pin the moment it has passed. Any lift on the wing now pushes up on the tooth, which is outboard of the pivot, so the load drives the pawl further shut - the sheet cannot force it open.

With the sheet on the table the wing settles back on its stop and the pawl goes slack. Step on the pedal: of toe travel pulls of cord and swings the tooth deg clear. Raise the wing with your foot down until the pin is above the tooth (about) then step off: the pawl's counterweight pulls the cord back and lifts the pedal to its rest, so nothing can hold the latch open by accident. If a pawl ever sticks open the wing simply rolls back as it did before the latch - you feel it, nothing lets go.

Parts

PAWL: one r unit, ply, on rods F and G, off the walkway-side rail on ply spacers, tooth outboard, one D ts both, the second is turned over. Latch pin D Grade flush on the far rail, roud on the walkway side, located by nuts inside the rails. Pin load typical, lb design nd (whole unit share on the wing tip): ksi b nd in the pin psi bearing in the rail. Counterweight: a x steel disc lb) bolted flat to the panel-side face of the lope - it is what returns the pedal, and it is what the prototype runs.

d three washers per unit, all ply, on a l hole. Two washers behind the lever clear the front tie's tenon, one in front keeps it on; the pad drops onto the lever's

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The level latch — gravity pawl, foot release

Dimensions removed · full plan set at blakeworx.net/flipper

CUT LIST, FIT AND CAM NOTES

Part (DXF file)	Qty	Blank size	Notes
SIDE_PANEL		x	per unit. Axle bore gets the doubler behind it. The pedal dowel hole is used on the walkway-side panel only.
AXLE_DOUBLER		x	per unit, screwed to the INSIDE face of each panel screws, no glue) -> of axle bearing.
OVAL_DOUBLER		x	per unit, OUTSIDE face of each rail, long axis along the wing. On two dowels + the axle - no screws. of bearing.
RAIL		x	per unit. Axle, dog rod, stop pin, latch pin, cord hole, dowels; closed mortises for the rib tenons.
RIB		x	per unit at leaf x = Tenons pass through the rails and stand proud outside.
RIB_END		x	per unit at leaf x = Through-tenoned like the ribs, relieved where the dogs swing.
DOG		x	per unit. Bore for a ID x OD bronze sleeve bushing (light press); the dog runs on the bushing, not the threads.
PAWL		x	per unit on rods F and G. tooth OUTBOARD, lobe inboard; x steel disc bolted to the panel-side face of the lobe. Same part both units, one flip
GRAB_RAIL		x	per unit at leaf x = Through-tenoned like a rib. Flush on top, hangs below as a finger lip.
TIE_RESET		x	front tie. top at - the wing rests on it at deg
TIE_LEVEL		x	x = Top edge at IS the level stop - the rails land on it. Also the main shear tie.
TIE_REAR		x	rear tie, x = - closes the back of the stand
PEDAL_LEVER		x	per unit, outside the walkway-side panel on a dowel at toe outboard. Release cord ties to the hole.
PEDAL_PAD		x	per unit, drops onto the lever's tab; the slot is offset so the pad stands off the panel.
PEDAL_WASHER		x	per unit on the pedal dowel: two behind the lever as a standoff, one in front to keep it on.
PAWL_SPACER		x	on rod F and on rod G per unit, between the walkway-side panel and the pawl.
FIT_COUPON		x	Cut first. Four slots, narrowest at the label end: Pick the one that takes an offcut of the same sheet by hand with no pla

plywood parts from sheets of wide x tall x (nests on pages The package also has x nests and a full stock variant.

Fit - read before cutting the sheets

Slots and mortises are drawn wide for stock: thou nominal clearance, which is a snug slip fit by hand in true stock, not a press fit. Plywood varies by thou across a sheet and between sheets, so the slot width is a param (SLOT in mm) and FIT_COUPON.dxf exists to set it. Cut the coupon first from the sheet you will use: four slots, narrowest at the label end. Try an offcut from the same sheet in each. Acceptance: the tab enters by hand or with a light mallet, seats fully with no lateral play you can feel, and comes apart again without splintering. Set SLOT to that width, regenerate the DXFs, then cut. If two sheets differ, cut each sheet's parts at its own SLOT.

CAM notes

Geometry is part-outline (centreline of the finished edge) with no cutter compensation - apply your own. The corner reliefs are for a cutter: a dia lobe at every inside corner, as in the reference part, so any tool up to clears the corner and the mating square edge seats. Layers: CUT outside profile, INNER through cut-outs, HOLE bores at finished size (drill or interpolate), LABEL text and sheet outline - do not cut LABEL. Tabs, hold-down and ramping are yours to add; small parts (washers, spacers, dogs, pedal parts) want jigs or a vacuum. Every path in every file has been checked as a single non-self-intersecting path, and the nests have between parts and off every edge. This manual has not simulated cutting or certified a toolpath; prove the first sheet on your machine.

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Cut list, fit and CAM notes

Dimensions removed · full plan set at blakeworx.net/flipper

HARDWARE SCHEDULE

Rods (per unit; make two of everything)

A Axle OD thick-wall tube (wall >= DOM or seamless), long, one piece right through the unit. All four bores = OD + running fit the wing turns on the axle and the axle floats in the stand. Mic your tube and set AXLE_D before cutting. One shaft collar bore) outside each panel.

B Dog rod all-thread x (Grade / zinc), outside of rail to outside of rail. Each dog runs on a bronze sleeve bushing (oil-impregnated bronze sleeve bearing, ID x OD x long, faced to flush) pressed into its bore, and is located on the rod by a jam nut + washer each side; the bushing is faced flush so the washers bear on bronze, not ply.

C Stop pin all-thread x (Grade / zinc), outside of rail to outside of rail. Carries the sheet: lb per dog.

D Latch pin all-thread x Grade or (yield > ksi) - it carries the latch load in bending. Flush with the far rail's outside face, proud of the walkway-side rail to reach the pawl. Located by a hex nut + washer on the INSIDE face of each rail; nothing outside, so the pawl sits off the rail and the overhang is

F Pawl pivot all-thread x (Grade / zinc), outside of panel to outside of panel. From the walkway-side panel inward: PAWL_SPACER + shim washer(s) (stack = PAWL, washer, jam nut. Nyloc + washer outside each panel.

G Pawl stop all-thread x (Grade / zinc), outside of panel to outside of panel; PAWL_SPACER + shim washer(s) on the walkway side so the pawl's stop face lands on it. Nyloc + washer outside each panel.

Nut and washer schedule (per unit) - counts below are generated from this list

Rod	Item	Qty	Where
B	nyloc nut + washer		outside face of each rail
B	jam nut + washer		one each side of each dog, locating it on the rod
B	oil-impregnated bronze sleeve bearing, ID x OD x long, faced to flush		pressed in each dog's bore
C	nyloc nut + washer		outside face of each rail
D	hex nut + washer		INSIDE face of each rail - the pin is flush outside the far rail, nothing outside
F	nyloc nut + washer		outside face of each panel
F	PAWL_SPACER x + shim washers		between the walkway-side panel and the pawl (sets the pawl off the rail); shims as the schedule note says
F	jam nut + washer		wing side of the pawl, holding it against the spacers
G	nyloc nut + washer		outside face of each panel
G	PAWL_SPACER x + shim washers		between the walkway-side panel and the pawl's stop face, same stack as F
A	shaft collar bore (or cross-drilled hitch pin)		outside face of each panel

Both units: x nylon-insert lock nuts, x hex nuts, x jam nuts, x SAE flat washers OD), bronze bushings, shaft collars. Buy spare.

Thread engagement: every rod stands threads) past its outermost nut; nylocs need at least threads through the insert. Torque nylocs and hex nuts snug plus a quarter turn - the ply is the limit, not the steel. Jam nuts that locate a dog or the are set to a slip fit, not clamped. Rod lengths above include the nuts and washers in the stack they sit in and were checked against the model with every part in place.

Everything else (both units)

- Screws and dowels: x per axle doubler hardwood dowel per oval doubler light press. One x through the panel edge into each tie tenon x screws, per pawl cap Pedal dowels: x hardwood dowel x
- Pawl counterweights: steel discs dia x thick lb each one per pawl, bolted flat to the PANEL-side face of the lobe: x bolt + nyloc through the lobe centre, plus one x screw below it against rotation. Drill the disc at from its centre to pass the release line, or tie the line around the bolt. Steel only; do not change the weight without rerunning the pedal-return check.
- Glue: none anywhere - every tenon, slot and dowel is a dry fit so the machine can be knocked down.
- Dog reset lines: braided cord (braided polyester or nylon - braided mason line rd both work; braid runs over the oval without fraying or stretching). lengths of about ft plus screw eyes on the level ties at
- Pawl release lines: nylon monofilament 'wire', string-trimmer line or lb mono stiff, low-stretch and low-friction through the panel hole and over the screw eye, so the pedal's return is not lost in the line. lengths of about ft, x screw eyes at knot with a double overhand or crimp a loop at the pawl and at the pedal lever.
- Wear strips: UHMW tape x about ft - rail and rib top edges, and the level tie's top edge. Anchors: x lag shields. Optional: a rubber bumper where each wing lands at deg.

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Hardware schedule

Dimensions removed · full plan set at blakeworx.net/flipper

TEST PROCEDURE AND BUILD RECORD

VALIDATION

Everything in this manual is calculated from the model; none of it has been measured on a built machine, and the animation is not evidence. Do not put a full sheet on the flipper until every line below has been done, in order, and recorded. Sign and date the record; keep it with the machine.

Check	Procedure and acceptance	Record
Anchoring	Both stands lagged to the floor with x lag shields. Push the top of each stand sideways with lb by hand: no rock, no movement at the feet	pass / fail
Axle fit	Each wing turns freely by hand through deg with the sheet off, no bind at either end, no more than end float against the collars.	pass / fail
Rest position	Wing down on the front tie reads deg dog line out and up	measured: ___ deg ___ / ___ in
Level position	Wing level on the level tie: surface within of the table across a straightedge, both units the same.	measured: ___ / ___ in
Dog lock	Wing at rest, push down-slope on each dog tip by hand: it must lift into stop pin C and hold. Both dogs, both units.	pass / fail
Dog drop	Wing level, no sheet: lift each dog and release; it must fall clear of the surface on its own. Both dogs, both units.	pass / fail
Dog reset	Raise the wing from level to deg: the cords must return both dogs onto their stop pins before the wing reaches the front tie, and go slack at rest.	reset by ___ deg
Latch engage	Lower an empty wing: the latch pin rides the pawl ramp, the pawl swings aside and drops back over the pin without help. Then lift the grab rail with lb: the wing must not move. Both units	pass / fail
Latch release	Step on the pedal: measure the toe travel at which the pawl clears the pin (calc of The wing must lift freely with the pedal down	release at ___ / ___ in
Pedal return	Step off with the wing raised in: the pedal must rise to its heel-on-floor rest and the pawl must fall fully closed, times out of on both units. If it fails, add a second disc to the pawl (not a spring) and record it.	___ / ___ /
Latch load, static	Wing level and latched, no sheet: hang lb from the grab rail's underside (upward pull on the wing, i.e. lift with a scale). Hold minute. No movement, no cracking, pin returns straight. Design bound is lb at the pin from a lb unit share; lb at the grab rail is a test of that.	pass / fail
Half sheet, then full sheet	Full cycle with a half sheet x then a full x load, roll over, lower, latch, ease back (dogs drop), push across, release, raise. Watch that nothing on the stand touches the sheet at any point and that the wing does not lift as the sheet crosses.	pass / fail
Pinch and crush points	With the wing moving: hands clear of the rail tops at the level tie and the front tie, the pawl and latch pin, the pedal lever and the dog rod. Mark each with paint or tape. Two independent wings: operate one at a time, never reach across the walkway to the second wing while the first is moving.	marked: yes / no
Cord wear	After the first cycles inspect both cords at the screw eyes, the rail hole and the oval. Any fraying: sleeve the cord (heat-shrink or a short length of tube) at that point and record it.	inspected at cycle ___
Sign-off	No safe working load, one-person or no-lifting claim is valid until every row above is a pass and the record is signed.	name / date

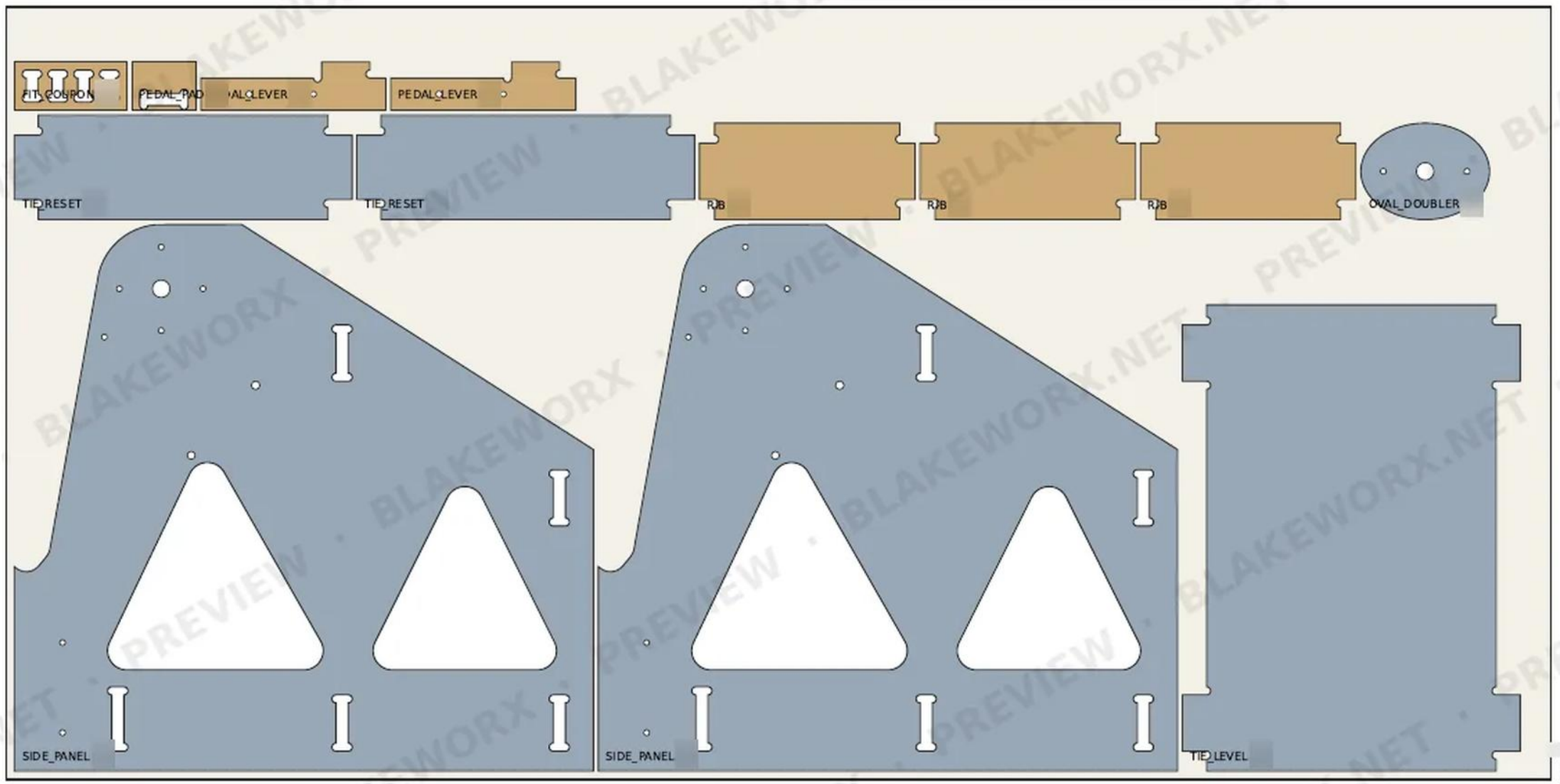
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Test procedure and build record

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NEST — SHEET [redacted] OF [redacted]

CUT FILES



this edge is X = [redacted] in the DXF

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Nest — sheet 2 of 3, 48 × 96

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