



◀ TOM PATSIS

Tom Patsis is a metal artist and owner of Cold Hard Art. After studying automotive technologies in high school and earning his degree in automotive, high performance and alternative fuels at the University of Northwestern Ohio, Tom moved to Indianapolis to work for Don Schumacher Racing. He spent six years with the Pro Stock team before he switched to working in the fabrication shop. It was there that he got started with metal art — later opening up his own shop to use as an outlet for his creativity.

Follow Tom on Instagram @ColdHardArt.

SKILL LEVEL: Advanced
TIME COMMITMENT: 3 days

TOOLS



Millermatic® 211
(or other
MIG welder)



Dynasty® 280DX
(or other
TIG welder)



1/16" MaxaTig®
4043 aluminum wire
(or similar filler metal)



**Pneumatic sheet
metal shears**
(or other cutting tool)



Stomp shear



Slip roller



Sheet metal brake



Band saw



Chop saw



Drill press



Belt sander



Lathe



Hand file



Clamps



Tape measure



**Hand tools for
the fasteners**



**Four shifter kart
wheels and slick tires**
(metric or American bolt
pattern)



**Four dual bearing
wheel hubs**
(matching bolt
pattern for wheels)

MATERIALS

4043 aluminum tubing (1" x .065" x 6')

Box tubing (1" x .065" x 15')

.065" thick 4043 aluminum sheet (4' x 8')

1/4" thick steel plate (12" x 12")

Steel tubing 1(3/4" x .125") and 1(7/8" x .065")

Aluminum strapping (1" x 1/4")

5/8" fine thread bolts 4(6" with lock nuts)

Delrin plastic (1-1/4" x 3.5")

Bar stock plate (3/4" x 12")

Misc. nuts and bolts

Optional

Magnets, Poster board, Marker, Scissors

WARNING: READ AND FOLLOW ALL LABELS AND THE OWNER'S MANUAL.

WAGON

A DIY metal wagon is a great welding project for the summertime. Learn how to make one with these steps.



STEP BY STEP

STEP 1



Create a blueprint of your wagon to determine the look you want and the dimensions for your materials.

STEP 2



Bend 1" aluminum tubing to the desired shape and tack weld the pieces together to create the outer edge of your wagon.

STEP 3



Trace the inside of your aluminum tubing onto a piece of poster board to create a template for the bed of the wagon. Then, using your template, cut the aluminum sheet metal to size with your pneumatic sheet metal shears. Be sure to include extra material for each of the four sides of the wagon. This design included 6" on each side. Once everything is cut out, bend each side at a 90° angle with a stomp shear.

STEP 4



Fit the aluminum sheet snug to the aluminum tubing and tack weld together.

STEP 5



Cut 3/4" steel tubing to create the steel support frame with three cross beams for under the bed of the wagon. Tack weld everything in place, then weld together.

STEP 6



Cut out five square tabs and drill holes in the middle of each using a drill press. Then weld the tabs to the steel frame in the four corners and one in the middle.

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Next, line up the steel frame with the bed of the wagon and drill five countersunk holes to align with the mounting tabs added in Step 6. By countersinking the holes, the bolts will sit flush on the bed of the wagon instead of sticking out. Use bolts to secure into place. This design used 3/4" bolts with nylon lock nuts and countersunk washers.



Use a piece of poster board to create a template for the four corner pieces, then cut out and bend each using a slip roller. Tack weld each piece into place before fully welding them in.



Take your four tires and mount the wheels to the wheel hubs.



Next, select your wagon width, making sure the front and rear are the same length — and fabricate the rear axle.



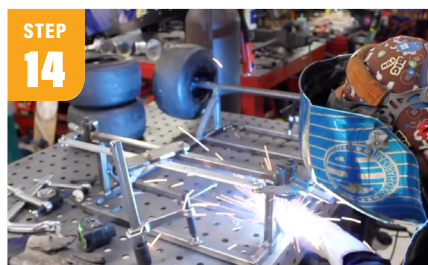
Cut and MIG weld four pieces of steel tubing (two vertical, two diagonal) to the rear axle and steel frame. This will support and hold the axle in place at the correct ride height.



Fabricate and TIG weld two steering knuckles with 1/4" thick, 1" wide steel plate. Note: The knuckles should fit inside the rim without touching. Once complete, MIG weld them to each side of a piece of box tubing, which will be your front axle. Then, MIG weld two pieces of box tubing to connect the front axle and steel frame, similar to Step 11.



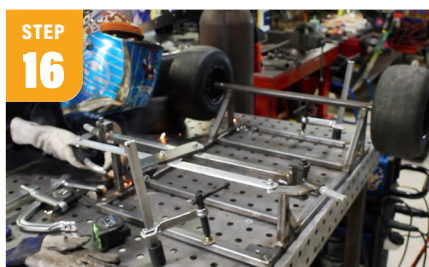
Use a piece of poster board to create a template for the brackets, then cut out two brackets using your steel plate. Sand down with a belt sander and drill a hole at the top. Weld the brackets to spindles for steering.



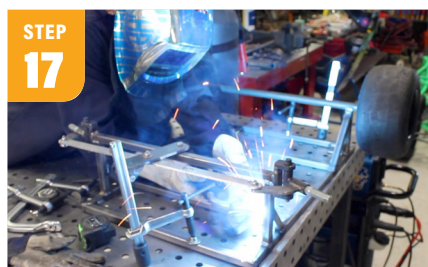
Locate and weld front spindles to match the rear axle height center line so the wagon will ride level and clear the bed when turning.



Mount the wheels and tires onto the frame.



Fabricate diagonal struts to support the steering axle and clearing the wheels when turned



Next, you can attach the bed of the wagon to the steel frame with bolts.



To finish, fabricate the handle and front clip. Weld the handle to the steel frame and the front clip to the front of the wagon, which will hold the handle in place. The handle should clear the bottom of the wagon and be straight up when not in use.



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