

What are roller skis? - Roller skis enable ski-specific training that is nearly identical to on-snow skate skiing (a cross-country skiing technique). Roller Skiing is the best way to improve your balance, conditioning and technique during the off-season. My skate technique experienced a significant breakthrough after a fall of V2 skating on roller skis.

Caution - Always wear PPE (personal protective equipment) consisting of at least a helmet & gloves when roller-skiing. Although you can slow down on steep hills by snowplowing, you can't stop quickly. You will fall when learning to roller-ski. Be careful and use good judgment.

Roller Ski Project Background: This is version 2 of our homemade roller skis. The significant differences of this version are:

1. The front wheels (originally 80 mm urethane) are now 70 mm in diameter and made of rubber. This is an attempt to slow the roller skis down to more closely duplicate the glide of a ski on snow. We would have preferred to use 80 mm diameter rubber wheels but could not find any. We used rubber wheels only on the front because of concerns with rapid wear (rear wheels wear out much faster than front wheels). We don't have any experience with the rubber wheels yet.
2. We are using aluminum inline skate wheel spacers now instead of multiple flat washers. This will be a big improvement.
3. We are now fabricating the fork spacers out of 1/8" aluminum flat bar.
4. We are now using 1/4" shoulder bolts for the axels.

Don't worry about these changes if you never saw the plans for the first version of the roller-skis.

Background. After a failure of a pair of factory-made roller skis, I was faced with the potential of a summer without roller skiing. I dusted off a partially completed pair of homemade roller skis and finished them (version 1). I put over 1000 km on the roller-skis without a problem (be sure to read the section about wheel selection below). They were comparable to factory-made roller-skis except that they were noticeably faster. The faster roller skis require less effort (fewer kicks per kilometer - a disadvantage) but they did help me keep from over-training on longer workouts. In order to slow the roller-skis down a little, the 2nd version of my roller skis use rubber front wheels (thanks to Ross McKinnon for the suggestion). We will see how version 2 works. Here is a picture of the original pair of roller-skis. These skis have about 500 km on the rear wheels.



Version 1 of the homemade roller skis (above) cost about 1/3 what factory roller-skis cost.

Notes:

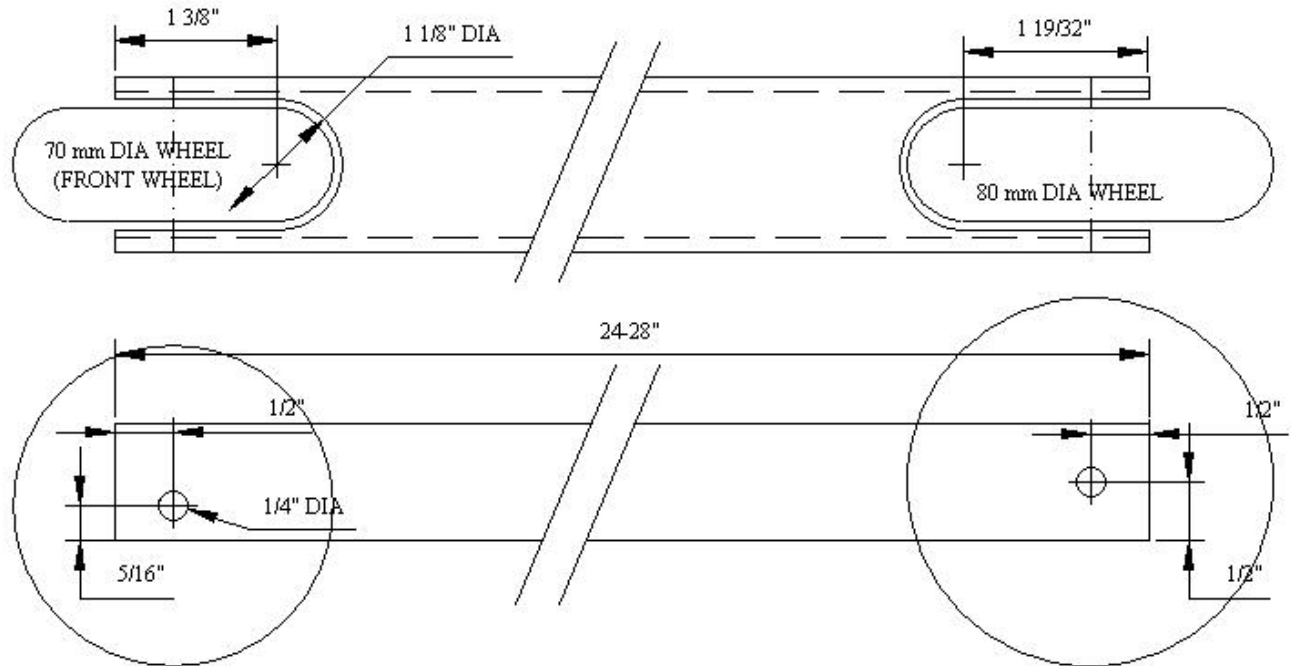
1. **Caution - Any aluminum frame will eventually fatigue and crack due to prolonged exposure to vibration** - I check the bottom of my roller-ski frames for cracks every time I take them off. I pay particular attention to the frame near the base of the rear "forks" and around the axles. I have not found any cracks yet (I have put over 1000 km on my roller skis). Note: One of my Pro-Ski rollerski frames cracked after about 2000 km of use.
2. **In Line Skate Wheels** - You want 75-80 mm diameter in-line skate wheels. Wheel hardness is critical. Although softer wheels absorb noticeably more road vibration, the vibration is converted to heat that can accumulate within the wheel and damage it. If the skating surface is rough and/or hot and/or the skater is heavy, wheels below about 92a durometer can fail in less than 20 km. You have to do some searching to find in-line skate wheels that are both large in diameter and hard. I am currently using Labeda Gripper Asphalt wheels on the rear of my roller

skis (80 mm dia, ~92a durometer (the sales rep had to call Labeda to find out the durometer of these wheels).

Send me a note via the SSNSA if you have any questions or suggestions. Happy roller skiing.

Rick Simmons - ssnsa@hotmail.com

Roller Ski Dimensions:



Roller Ski Bill of Materials:

Item	Quantity	Description	Source	Price	Total
Rear wheels (note 1)	1 pkg	Labeda Gripper Asphalt wheels on the rear of my roller skis (80 mm dia, ~92a durometer) (4 wheels per package)	The Inline Skate House (www.inlineskatehouse.com)	35.00/pkg (note 3)	35.00
Front wheels (note 1)	2	V2 Jenex 70mm dia rubber in-line skate wheels with bearings (part number V2-W701)	V2 Jenex (www.jenex.com)	\$17.95 each	35.90
Wheel bearings	8	Any in-line skate wheel bearing will do.	The Inline Skate House	~\$25.00 per pkg of 16 (note 3)	25.00
Axels	4	Shoulder bolts: #10-24 thread, 1/4" shoulder diameter, 1-1/2" shoulder length, alloy steel (part number 91259A546) (note 4)	McMaster Carr (www.mcmaster.com)	0.92 each	3.68
Axel washers	4	#10-24 flat washers (only used on nut side of axels)	Local hardware store	0.06 each	0.24

Axel lock nuts	4	#10-24 nylon lock nuts to fit shoulder bolts	Local hardware store	0.15 each	0.60
Axel spacers (note 2)	4	Shoulder screw shim - shortening: 0.020" thick, 1/4" shoulder diameter (part number 94773A710)	McMaster Carr	12.73/pack	*
Wheel spacers	1 pkg	BSB Aluminum Spacers (8 per package)	The Inline Skate House	\$12.00/pkg	12.00
Aluminum frame	4 foot length	1-1/2" x 1" x .125" 6063 square corner aluminum rectangular tube	Local machine shop	1.00/foot	4.00
Aluminum bar stock	1 foot length	3/4" x 1/8" 6063 aluminum flat bar	Local machine shop	0.50/foot	0.50
Total (note 3)					\$116.92

Notes:

- (1) The first version of these roller skis used 80 mm, 92 durometer in-line skate wheels on both the front and rear wheels. This worked well, but the rolling resistance of the roller-skis was significantly faster than skis on snow. In an effort to increase the rolling resistance, this version of the roller ski utilizes softer 70 mm rubber in-line skate wheels on the front (only). We would have preferred 80 mm rubber wheels but could not locate any.
- (2) We purchased a package of 100 spacers for \$12.73 (you cannot buy less than 100). You might try finding 1/4" ID or 7mm ID shims that are about 0.02" thick. You could also use a file to carefully thin a standard 1/4" flat washer.
- (3) Wheels and bearings typically come in packages with twice the needed quantity. You can cut costs significantly by pairing up with somebody else and building 2 pair of roller skis.
- (4) You could try using 1/4" machine bolts instead of the shoulder bolts. If you go this route, I would suggest that you use high-strength machine bolts.

Construction Details:

By far the easiest way to drill accurately located pilot holes for the axels and wheel forks is to use a jig. We have two jigs: one for 80mm dia wheels (right), & one for 70 mm diameter wheels (left). We drill 1/8" pilot holes.

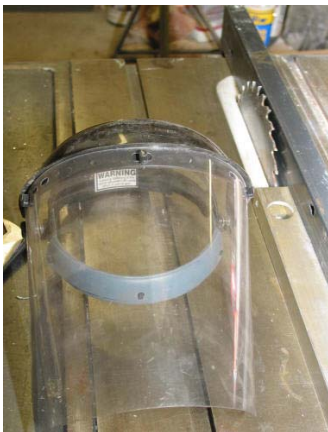
If you can't build a jig - just use a center punch and be very careful when drilling the axel holes.

Once the pilot holes have been drilled, it is time to drill the 1-1/8" diameter fork holes and the 1/4" diameter axel holes. We use a carbide-tipped Forstner bit for the fork holes.

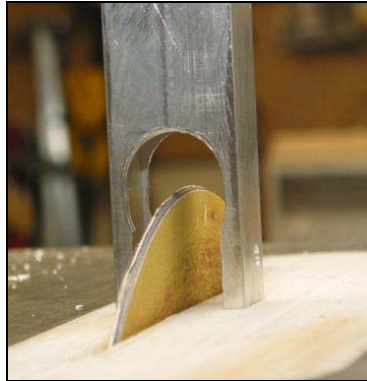
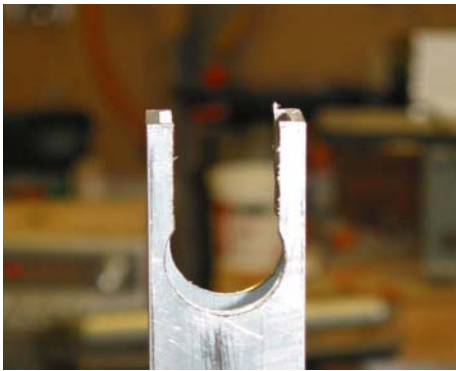
A regular Forstner bit would probably work fine for 2-3 pairs of roller skis.



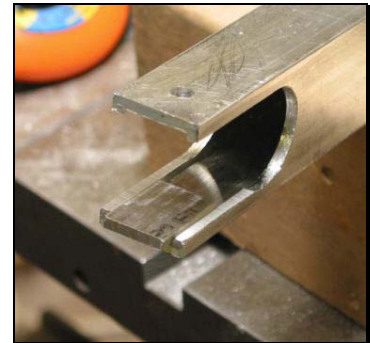
Next saw out the forks. Leave a little excess material that will be sanded away. Be careful not to cut into the rear of the lower fork hole. We use a table saw with a carbide-tipped saw blade. Always wear a face shield when doing this - hot flying aluminum bits hurt!



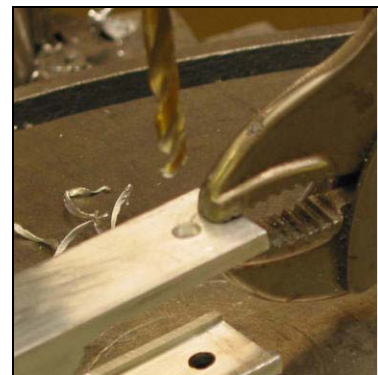
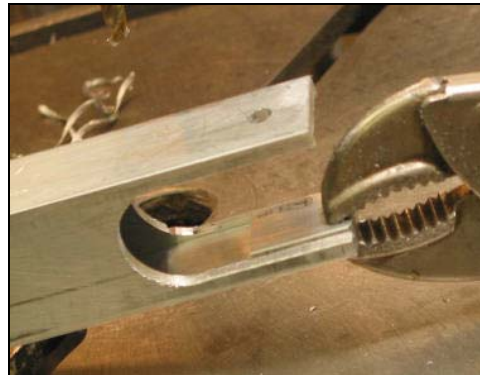
Replace the table saw blade with a sanding disk. Then carefully sand out the excess material on the forks as shown below.



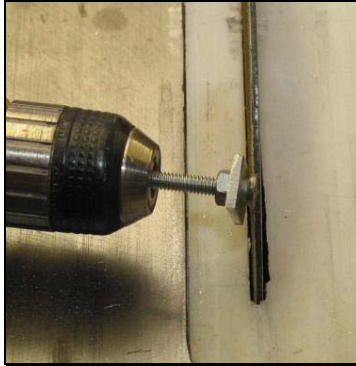
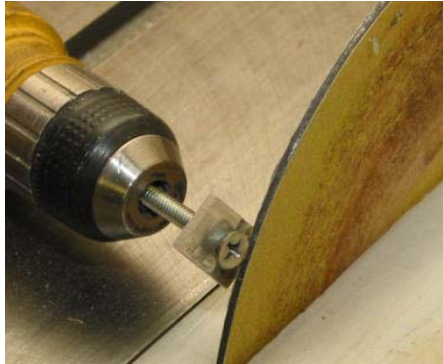
Spacers: Cut some 1" long coupons out of the 1/8" x 3/4" aluminum flat bar. Use the sanding disk to reduce the 3/4" dimension until the coupons will just fit inside the forks as shown in the right picture below.



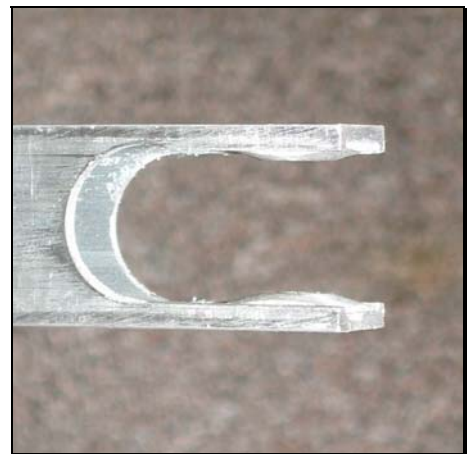
Using moderate pressure, clamp each coupon into a wheel fork using a vice-grip as show in the left photo below. Then flip the frame over and drill the axel hole through the coupon (right photo). You will need to mark each coupon to ensure that it can be "mated" with "its" fork later.



You will need to taper the edges of each spacer coupon so that the wheel bearings don't rub. To do this, thread a 1/4" bolt through the coupon and firmly secure the bolt with a nut. Then chuck the bolt into a hand drill (left photo). Use the sanding disk and the drill to taper the edges as shown in the middle photo. The finished coupon will look like the one in the right photo. Wear safety glasses!

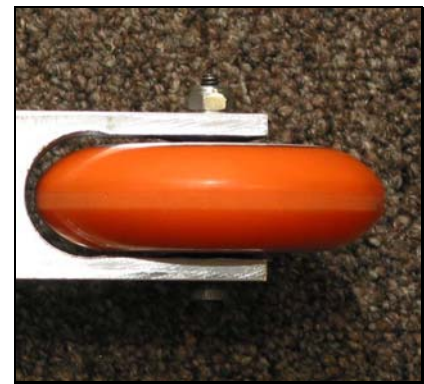


Here are pictures of the finished spacers in-place in the wheel forks.



Left: A picture of the axel bolt, wheel spacer and lock nut.

Right: A picture of the wheel in place on the roller skis.



Additional Information:

1. **Do not bend the forks when tightening the axel bolts!** The fork spacers should fit exactly - if you have to file down a fork spacer so that it is not as thick, take the time and do so (you might try buying some 1/4" aluminum flat washers for the fork spacers - they will be much easier to file down (if needed). The forks need to be absolutely straight and the axles need to be perpendicular to the frames for the roller skis to track properly.
2. If the wheel axle is not perpendicular to the frame you can "fix" it as follows: (a) go to a local hardware store and buy about a 18" straight piece of 1/4" all-thread; (b) remove the wheels and secure the roller ski frame in a vice (with the axle holes in a vertical orientation); (c) insert the all-thread through both axle holes on one end of the frame; (d) place a square on the top of the frame, adjacent to the all-thread; (e) use the all-thread like a rat-tail file to slightly elongate the axle holes such that the all-thread becomes perpendicular to the frame (as indicated by the square). Be careful not to bend the all-thread when doing this. The aluminum is soft enough for the all-thread to be an effective "file". Note: When the axle holes have been elongated in this manner, the wheels will have to be visually trued up before final tightening of the axle bolts.
3. Bindings should be positioned & mounted so that there is about 1/2" to 1" of clearance between the rear of your ski boot and the rear wheel. Leave a little more room if your boot is small and other's may need to use the roller-skis.