PINewood DERBY CARS

This is to discuss beginning preparations for Pinewood Derby cars. I recommend that these steps be taken before the pine wood block is chopped, cut or sanded. Then the smooth and hopefully square sides of the block can be used to make sure the axles are properly aligned.

Experience has taught that one of the most critical steps in building fast pinewood derby cars is axle alignment. Proper axle alignment means that the axles point straight out from the side of the car. This is something our boys can be taught to do with a little parental guidance, if they have a plan and know what to look for.

Axle alignment is made more difficult by the fact that the wheels have such a loose fit on the axles. The material that is provided in the kit includes nails to be used for axles. The very first problem you will discover is that these nails are not perfectly straight. The amount of bend is small but it is enough to affect the performance of the car.

STEP-1

The first step is to place a mark on the axle for how far it will penetrate into the axle slot in the car. Measure down 5/16 of an inch from the flat underside of the nail head and use a file to put a scratch mark on the axle. This file mark should be deep enough so that it will not be erased or removed when the axles are polished. The axles are inserted into the axle slots up to this mark but no further.

STEP-2

Put a single layer of masking tape or scotch tape over the axle slots so that it is flush with the bottom of the car body. Make sure that it goes on smooth with no wrinkles.

Insert the axles into the BOTTOM of the axle slots. Push the nails through the tape up to the scratch mark. The picture below shows the proper orientation along with some examples of what to avoid in this step.
STEP-3

Place a square on the bottom of the body and press it to the side. Align it as shown in the picture below. Hold the body and square up to the light. Check the gap between the square and the axle. It should be as thick near the side of the car as it is out near the head of the nail. If it is, then it's as perfect as you can get with this method. I've found that using a magnifying glass helps to see the gap better.

If the gap is not straight, you can use the slight bend of the nails to correct this. Use a pair of pliers to rotate the axle in the slot. Rotate the axle about 1/8 of a turn. Put the square back on and recheck the gap. Keep doing this until the gap is uniform. If you have done this eight times and cannot get the gap even, try a different axle. If none of the axles work, it probably means that the slot is not straight. Get another car body and try again.
STEP-4

Once all of the axles are in as straight as you can get them, you need to lock them into place. Epoxy resin or glue works great for this. It doesn’t take much. Each den might purchase some for their den to avoid waste.

Place the car body on its back on some newspapers with the axle slots pointing upward. Prepare the Epoxy according to the instructions that come with it. Use a tooth pick or Q-tip to apply epoxy into the slot. Fill the slot with epoxy. The tape should keep the epoxy from leaking out the sides of the slot. If does leak, wait until the epoxy sets up and apply some more. Wait for the epoxy to harden before going on to the next step. Do not remove the axles yet.

STEP-5

In STEP-3, you had to rotate the axle nails to get them into proper alignment. Before you remove the axle nails, you must mark them so that, when you put them back into the car body, they go in the same way. Use a file to make a mark on the outside of the axle on the nail head. If you place the mark as shown in the picture below, then when the axles are put back into the car, proper orientation will occur when the marks on the axles are all pointing downward. Do not remove the axles yet.

STEP-6

In this step you will mark the axles so that each axle will go back into its original hole when you put your wheels on.

Get a piece of cardboard and mark it like the picture below.

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LEFT-FRONT  O  O RIGHT-FRONT
I

LEFT-REAR  O  O RIGHT-REAR
II

III
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Before you start pulling axles, decide which end of the car body is going to be the front and which is the rear. Start with the LEFT FRONT axle. Use a pair of pliers on the nail head and carefully rotate the axle. This should break it free from the epoxy. Rotate the axle back and forth as you slowly pull it out from the side of the car. Use a file to make a single mark on the side of the axle between the depth mark and the point of the nail. Place the mark nearer the point of the nail. Then poke the axle nail into the cardboard at the hole marked LEFT-FRONT. In the same way, remove the LEFT-REAR axle. This time, file two marks near the nail point and poke the axle into the cardboard at the hole marked LEFT-REAR. The RIGHT-FRONT axle has three marks and the RIGHT-REAR axle has four. When you are done, your axles should be marked like the picture below.

Once you have completed STEP-6, you are ready to work on the rest of your car. A note of caution: Be careful when you file and polish your axles so that you do not erase or remove the markings. Also notice that you only have to polish your axles between the depth mark and the head of the nail.

When you are ready to put your wheels on your car, make sure that the axles go into the correct axle holes that you marked in STEP-6. Once the axles are in the correct holes, rotate them so that the file markings on the nail heads from STEP-5 all point straight downward. If you do this, your axles will be as straight and well aligned as you can make them.