Swirl Marks on Sanded Work – Why are they there?

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You've just completed building your project – you begin the finishing process – perhaps you apply some stain and "*There they are"!*

Swirl Marks, Pig Tails, Curlicues, those long spiral scratches that trail across, what only moments ago, looked like a perfectly sanded surface! Removing these marks at this stage will require a great deal of time and frustration, but preventing visible swirl marks is relatively easy. Once you understand the causes, you can take some simple steps to avoid them, reducing sanding time and producing a better surface.

"Orbital Sanders" create Orbital scratches, it is what they are designed to do, it is the action they use to remove material. The introduction of "Random Orbit Sanders" promised to free us forever from the curse of Swirl Marks" by producing a random scratch pattern that in theory is more difficult to see, but while this breed of sander is better at disguising these scratches it is not a magical cure.

The trick is to make these scratches as fine and consistent as possible and to overlap them enough to produce an even pattern that the eye reads as a smooth surface.

There are many factors that contribute to Swirl Marks, including the working environment and the quality of the tool being used, but for our purposes here I will assume a clean workspace and a quality sander and address what I believe to be the three main factors.

High Quality Abrasives

One factor that distinguishes quality abrasives is the distribution and uniformity of grit particles. Ideally these particles should all be the same size and distributed evenly on the abrasive. This way the grit particles work together, scratching over and over and on top of each other to produce an evenly scratched/sanded surface.

Imagine just one particle on a sanding disc that is larger/higher then all others. As the disc turns it will produce scratches that are deeper than the other scratches. These scratches cannot be removed with the existing abrasive.

Effective Dust Extraction

The dust produced as an abrasive cuts a surface is a mixture of the material being sanded and worn or broken off particles from the abrasive. If this material is not removed as it is produced it will heat up and adhere to the abrasive. This build up is higher than the surrounding surface and has abrasive particles imbedded in it! Any scratches created by this build up cannot be removed with the existing abrasive.

A tool that allows effective use of dust extraction will collect this material before it has a chance to adhere to the abrasive.

Proper Sanding Technique

Sanding is not the most exciting work and the temptation is to rush through this stage, but if you go slower and do it right you will save time in the long run and produce a far better surface.

Advance the sander across the surface in a slow, controlled motion. Give the abrasive time to do its work. A good rule of thumb is “One Inch Per Second”. Moving the sander quickly, in wide sweeping arcs will guarantee Swirl marks!
Try this graphic demonstration - Hold a pencil in your hand and draw very small circles while moving your hand very slowly across a piece of paper. See how all the circles blend into each other creating an even pattern. Now do the same thing, but move your hand quickly across the paper. What does this pattern look like? You got it – “Swirl Marks”!

Following these steps will not only help eliminating Swirl Marks - They will significantly improve overall finished surface quality and should be considered essential for achieving a superior surface.