

Confessions of a Roto Artist:

Three Rules For Better Mattes
by Scott Stewart

As a professional roto artist on feature films, my single greatest concern is consistency. Do my mattes keep a consistent look over the course of the shot or do their edges chatter? These questions rank right up there with, "Is there absolute good in the Universe?" and "Why is dry-cleaning so expensive?"

Consistency is important because our eyes are immediately drawn to elements of a shot that don't move in ways we'd expect them to. They stand out as somehow unnatural. For the roto artist, it's not nearly as important to create mattes that articulate every nook and cranny of an element, as is it for those mattes to move and change in a naturalistic and consistent way. The biggest giveaway that an element has been composited into a shot is if you can see its edges chatter. Our goal is to create mattes that don't distract the eye and that means keeping things consistent.

Over time, I've picked up a number of techniques to aid me in my quest for consistency. Most of them can be boiled down to three basic rules that if you stick to religiously, will help your work stand up to even the most scrutinizing eyes, namely, your audience's.

1) Think Like An Animator.

Why should you think like an animator? Because, essentially, you are one. You are animating 2D shapes (in the case of mattes) over a range of frames. This means you need to first analyze the motion of the element you wish to matte out, choosing frames representing extreme positions, the way an animator would for, say, a character walking. Once those frames are identified, you then draw your matte shape around the element in each of those frames. In the world of animation, this is called Keyframing.

By keyframing first, you let your digital roto tool do much of the work of automatically re-drawing your shape in-between your extreme positions. Most often, even after you've keyframed, your mattes will need quite a bit more tweaking. The next step is to correct the shape for a frame in-between each of your keyframes. Every time you do this, of course, your job gets a little easier, because with each additional in-between frame you set, your matte shape will be all that much closer to conforming to the shape of the actual element. What is the advantage of this matte making method as opposed to just rotoing straight ahead from frame one? Consistency! Your mattes will adhere to the motion of the element they were created for in a much more naturalistic and consistent way. In addition, because of the computer's ability to automatically interpolate between keyframes, it's less work for you. And that's always a good thing!

2) Use as Few Points as Possible, Then Try Not To Move Them Individually.

What is matte chatter? It's when a matte's outline changes inconsistently from one frame to the next. In this modern age of digital rotoing, chattering edges means you most likely started with more points than you needed, then moved those points inconsistently from frame to frame. Remember, you're making a shape that has to be redrawn in upwards of 30 times a second. If you change individual points along a path on every frame, you will ALWAYS get matte chatter.

To prevent this, make your start frame (the frame you draw your first shape on) the one where the shape of the element to be matted is at its most complex. For example, if you are drawing an articulated matte of a person, begin on the frame where his or her hands are open and away from the torso, revealing all of the fingers as separate shapes. This way, you can intelligently decide the minimum number of points necessary to adequately articulate the element over the entire frame range.

Once you've set your points, try not to move them individually unless absolutely necessary. This is more of a factor after you've set your keyframes and you are getting down to making changes on each and every frame. The better approach is to move a range of points. By doing this you will be able to better maintain the integrity of the shape over time and eliminate matte chatter.

3) Use Multiple Shapes.

When creating a matte for a complex element, draw a separate shape for each major component of that element. For example, when articulating a person, you should generally create a separate shape for the head, arms, hands, legs, torso, etc. In some cases, if the body is turning, you should even create separate shapes for the ears and nose. Why do this? Consistency!

Consider this: a forearm doesn't really change shape much. It moves, of course, but it's limited physically in how much it can actually change shape. The most likely type of change a forearm shape will go through is rotation. By setting an anchor point at the elbow, a forearm shape can often be rotated into the next key position without pulling a single point. Granted, there will be likely be other changes necessary, but the less you actually have to move individual points the better. By drawing separate shapes for things like a forearm, you will be able to easily maintain the integrity of those shapes over time, especially if they intersect with each other.

Need convincing? Imagine trying to animate with a single shape an articulate of a person running. When the arms cross over the body, what do you do with all those arm points you no longer see? Then when the arms extend back out, how well are you going to remember which points were points in the arm and which points represented curves in the torso? If you think it doesn't matter, think again! I guarantee you, the integrity of the forearm shape that entered the torso shape is going to be compromised when you try to reconstruct that shape after it has exited the torso. This WILL be noticeable, particularly in high resolution images.

So if you apply the above rules...

- Think Like an Animator (Keyframe)
- Use as Few Points as Possible, Then Try Not To Move Them Individually.
- Use Multiple Shapes

your roto mattes will not only maintain a consistent look over the course of the shot, but they will also be easier to create and take you less time. Now, if I only had a friend in the dry-cleaning business!