{youtube}laWiX-8MoB8{/youtube}

The last thing were going to talk about is the trusty surface gage. It is highly under rated. That's probably because you can't plug it into a computer, press buttons that light up on it or program it to do the animation for you. Also surface gages have been a tool for machinists since before the first automobiles were invented, so it's something your father or grandfather might have lying around in their work shops.

Stop motion animators learned how to use surface gages to keep track of where puppet parts were in a 3-D space before the time when Stop Motion Pro or other capture devices were invented yet. The reason why they are still a viable tool in the animators tool chest today is because even modern and convenient capture devices of today can't track a puppet in a 3-D space as reliably as the gage.

Why do I say this? It's simple. When you put a puppet on a video screen with your camera, it only sees everything in a two dimensional plane. When you move a puppets arm, the camera will see only the movements in an up, down, left and right axis. Any movement toward or away from the camera is not seen. If you animate a puppet walking using only a video monitor with a capture program, you will notice it won't look right. The moves will be smooth, but there will always be something strange and unprofessional that you can't put your finger on. The strange flicker is because your not using a gage to see how much wobble there is toward and away from the camera.

Using a gage is fairly simple. But first you need to buy one. A good place on the internet is http://www.ebay.com. Ebay usually has about 20 gages for sale each day on average. So you can always bid low, and if you don't win the bid you can just bid on another gage the next day. That's how I got my gage which is more then 65 years old. It still works great too! Other places to buy these gages are machine or welding shops near where you live.

Ok where were we? Oh yeah, so you want to know how to use a gage? As I said its extremely easy and will give you much nicer results as an animator. The first thing is that you want to set your puppet up for your shot. Pose it according to your story boards and plan on what the next pose will be. Figure out the time it will take for the next pose to be completed and figure out how

many frames of film this will require. You will have to figure this part out on your own as a lot of people animate at different frames per second. I like to use 24 frames per second personally, so for this example were going to say that for a puppets arm to move from one pose to the next will take 12 frames, or one half second.

If that sounds too complex for you to understand, you should check out a book called Timing for Animation by Harold Whitaker here .

Obviously that is a subject that took up an entire book to explain, so I'm going to teach just the basics. After-all, this book is called "Stop Motion Basics" :)

Alright so now we have a gage, a puppet and a camera. First you will snap your first picture of the puppet..

(CLICK) - 1 frame has been taken

Now place the gage on the tip of your puppets finger. Be careful if it's a clay puppet since you can accidentally smoosh the clay with your gage. Ok is the top of the gage on the finger? Alright, now move the whole arm by grabbing the puppets chest with your left hand to keep it steady, and carefully move the arm in the direction of the final pose. Except move it less then a

sixteenth of an inch. Or about the distance of the thickness of a pencil lead. This is called "easing in". If you didn't do this, the puppet arm will appear like it's been hit with a baseball bat. Then remove your gage.

(CLICK) - 2 frames of animation are now taken

Next, place the gage back in so the point is touching the point of the finger again. Repeat the first step, except move the arm forward so the distance between the tip of the gage and the finger is a little larger than the first move. Maybe 3 pencil lead widths. This completes the ease in move, giving the rest of the animation a fluid smooth look. Now remove your gage again.

(CLICK) - 3 frames of animation are taken and we completed the ease in move

Ok, to simplify things I will explain how to get an even motion. We've taken three frames of film and we know that our shot is 12 frames total. That means we have to move the arm 9 more frames, and the last 3 frames we will "ease out". It's the first process in reverse. So we need to subtract 3 moves for our ease out from the remaining 9 frames. That means we have to divide our arm move by 6 frames to get almost to the end of our next pose.

Using the gage we will try in our mind to assume the proper distances required. Hmm, it looks like six moves would take one quarter of an inch each to get to our final destination. So we'll place our gage next to our puppet and put the tip of the gage to the finger again and repeat the process. So using our eyes we will move the arm and hand up again approximately 1/4 inch in the direction of the final pose. Now remove the gage from the set.

(CLICK) - 4 frames of animation have been taken.

Repeat and move the arm the same exact distance and direction again.

(CLICK) - 5 frames of animation have been taken

Repeat this four more times...

(CLICK) (CLICK) (CLICK) (CLICK) - 9 frames of animation have been taken and were at the end of our pose

Now remember our shot will take 12 total frames? That means we need to ease out, or slow the arm down to a stop. If we skipped this process, the arm would look like it hit an invisible wall. We have 3 frames to do this, so for our 10th frame we will put our gage tip back on the tip of the puppets finger as our reference point and move it in the same direction only 3 pencil widths in distance to slow it down. Remove the gage.

(CLICK) - 10 frames of animation are taken and the arm is slowing down.

Place the gage in the scene and repeat, except move the whole arm and hand about 1 pencil width in distance. Remove the gage.

(CLICK) - 11 frames of animation and we have eased out almost completely.

Put the gage back in and move just the finger on the hand one pencil width in the direction for the final move. Now you have completely eased out. Remove the gage.

(CLICK) 12 frames of film are taken and your shot is complete.