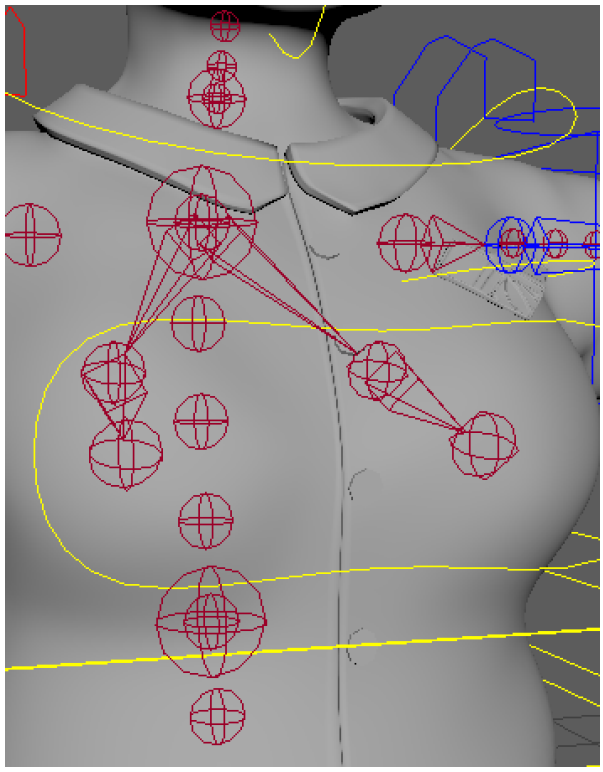
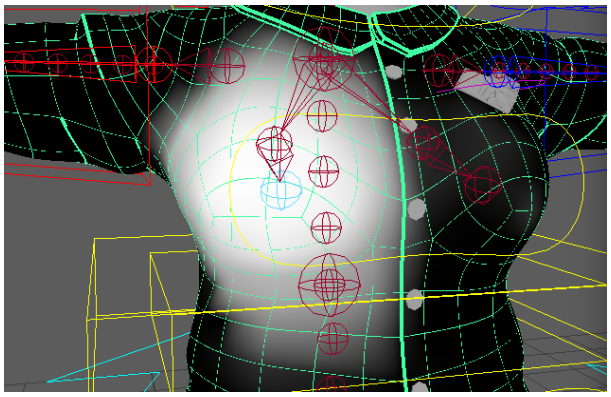
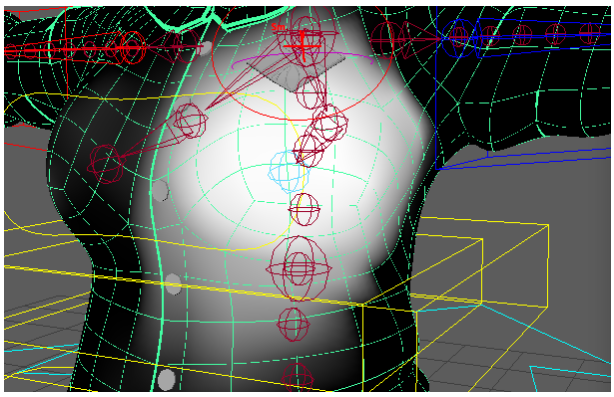
Rigging breasts. Now it's silly and maybe a little strange to discuss, but this was an area that genuinely gave me trouble. Larger breasts in particular pose a lot of clipping problems as well as the added complications of the deformation and where to include them in the hierarchy. I won't be going incredibly in depth, as most of the concepts i'll be discussing should be familiar by the time I would recommend coming to this step in production if you need to.

I chose to tackle the breasts after the rest of the rig had been established. I found that it was best for production to get a rig that is posable and capable of fulfilling rough animation was much more necessary and the secondary action and deformation/clipping problems could be addressed later. Once the main structure is in place, place in a new joint in each breast and two farther back into the chest, roughly where the lungs will be. From there, rename the two new breast joints then parent them underneath, underneath the "lung joints" with those underneath the top spine joint. Since this is where i have the rotation of the shoulder joint centered, they seem to follow most accurately from here. Once they're parented in place, create three nurbs curves, one overall breast control and two individual ones for extra control. After making sure they're in place and transformations are cleared, parent constrain the joints to each individual controller and then the individual controllers to the overall one.

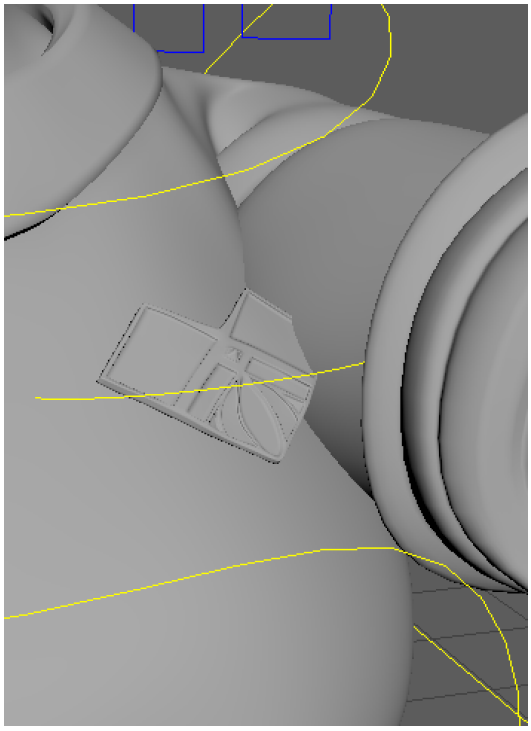


As far as skinning is concerned, just ensure that each joint is mostly only affecting the area directly around the breast and make sure it's feathered well. These weights worked out well enough for pauline, but may need to be adjusted on a per model basis. The drawback of painting weights in this manner is that it tends to create a harsh crease below the breasts as Pauline turned from the shoulders, but that was easily remedied by the middle_spine_anim (the inner yellow box) so make sure your animators are using it!

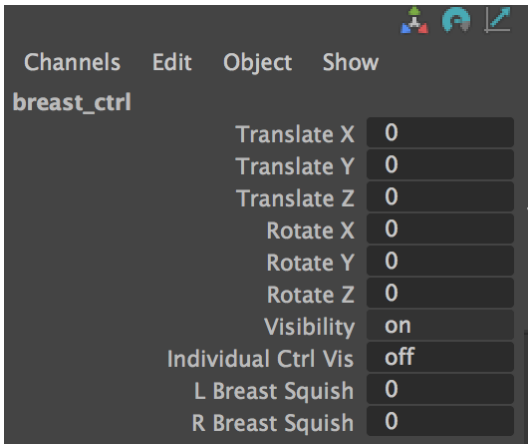




Now you're probably thinking to yourself, oh that's all pretty straightforward, and you'd be absolutely correct! We're not done just yet though folks. This setup as it is now will tackle any sort of secondary animation that you need covered but how about the clipping? What happens when we push her arms out in front of her?



Not too pretty is it? Originally I intended to have this problem solved by adding corrective blend shapes to the area surrounding the shoulder in hopes that it would take care of it. Boy was I wrong. Not saying that you shouldn't add correctives for your shoulders, it just may not be incredibly helpful in this particular circumstance. What ended up solving the problem for me was to add the correctives to the breasts themselves. This problem could probably be tackled more precisely with the use of colliders and clusters, but with time constraints being how they were, this method was a good compromise. I modeled in one blend shape per breast just for when the arms were directly forward. From there I added set driven keys so that the animators could manually adjust how much "squish" needed to occur. You could absolutely take this forward and create a more in depth by adding different blend shapes for different arm positions and using a slider system and blend nodes similar to how our facial blend shapes were done, but that's its own tutorial.



On the subject of corrective blend shapes, i found that it was incredibly important to take care when constructing the corrective blend shapes for Pauline's stomach as well. This was another area that was extremely prone to clipping any time that Pauline bent forward. Now this will vary wildly from character to character so remember these are just things to keep in mind, that may not even apply to the given model. With Pauline we had to ensure that the correctives were built in such a way that her stomach volume was preserved but not being pushed upwards, so I opted for down and out. Any last bits of clipping based on a unique position could then be adjusted just using the breast controller.

I know it isn't a ton, and a lot of it is contextual to the model you're rigging, but from one learning rigger to another, I hope it helps.