**Modeling Notes**

Paul mixes shading styles within a given mesh - on the bucket, for instance, the planks, hoops and rivets all are flat shaded, but the handle is smooth shaded. Characters are almost completely smooth shaded (since they don't have any hard surfaces). The shovel is smooth shaded since the blade curves - it has edges, but they're fairly gradual. The shovel blade is modeled really strangely though, it's a plane with a upper wedge section joined on to form a hole for the handle to fit in.

In general, when you use flat shading, the importer needs to duplicate the vertex at least a couple of times. *You'll have the same number of faces, however!* When you use smooth shading, the importer doesn't duplicate the vertex, since under that shading one vertex can only have one normal - to form a hard surface, however, you now need to include bevel edges, which will increase poly count. If you use smooth shading everywhere on a hard model, this means you'll have a vastly larger poly count! Expect the polys to double or triple if all edges include bevel edges.

From Polycount Wiki (<http://wiki.polycount.com/NormalMap>):

*Mechanical models usually need hard edges where ever the surface bends more than about 45 degrees.*

**Normal Mapping**

You won't get this far unless a project's gotten off the ground and into its endgame. However, if you do end up doing it, take note of the differences between spaces:

* Tangent-space is good for things that will be animated.
* Object-space is good for things that won't! A little faster to render, too, since you don't need to send tangent data with the mesh.

Either way, this is really good for poly performance, since using actual hard edges extensively can double vertex count. If you have a normal map, you can instead have the whole mesh soft shaded, save yourself the extra data. If you do purely soft shaded models, you'll encounter artifacts at UV seams, but it should usually be worth the saved time. If the problem's noticeable, however, you should use hard edges at the UV seam.