DIGITAL CHARACTER CREATION FOR VIDEO GAMES AND COLLECTIBLES

Samuel King

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Digital Character Creation for Video Games and Collectibles

This book covers the process of creating digital characters for video games as well as for 3D printing and collectibles. It looks at character asset creation for high-end AAA console games as well as asset creation for legacy devices and the ever-growing mobile gaming industry. Lastly, it covers creation of figurines for 3D printing and collectibles.

Digital Character Creation for Video Games and Collectibles provides a step-by-step walkthrough of creating these assets at an industry level standard. It includes the necessary theory that you need to understand how to be an effective character artist, but primarily focuses on the practical skills needed for creating character assets in the modern games and collectibles industries.

This book will be of great interest to all beginners and junior character artists currently working in the gaming or collectible industry and for those looking to enter these industries. There is also relevant content in the highly detailed examples for people currently working in the industry and looking to pick up a few new tips, tricks and knowledge.

About the Author

Samuel King is a Character Artist and Art Director with extensive experience in the games industry. He also has additional experience in collectibles and animation. He specializes in sculpting, designing, production design, art direction, and look-and feel-development. Sam has worked as an artist and project lead for clients such as Epic Games, Electronic Arts, Disney, Activision, BBC, Warner Brothers, Hero Forge miniatures and many more.

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1.0 Introduction

Welcome to digital character creation for games and collectibles!

This book is to be used as a creative and technical reference for those having an interest in the skill set of the modern character artist.

Firstly, a little bit of background on me; so I can give you an idea of my work history and what I will be covering going forward:

I am a working character artist and art director working in the modern digital mediums of character creation for computer games as well as figure creation for 3D print and toys.

I have worked in the industry for over 15 years for many companies such as Disney, BBC, Electronic Arts and Epic games. I have worked in increasingly senior roles up to a team lead, art director and production designer.

I hope to share some of what I learned over the years working in these industries.

With that covered, let's ask an important question:

1.1 WHAT IS A CHARACTER ARTIST?

Character art in the modern entertainment industry is the practice of making any form of character or figure representation. This can be in games, film or physical toys and collectibles.

As the modern entertainment industry matured, there was an increasing need for specialist artists. One of these specialist skill sets matured into focusing on the area of building characters specifically for production. This is the modern character artist.

Character artists are the people who build these characters, be they heroes, monsters, cute characters, zombies, animals or anything the mind can imagine.

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These individuals will work off concept art or even produce concept art themselves. They will then push this concept into 3D space by working in a variety of digital 3D programs.

As they work and build this character in 3D it will get details, textures and be prepared for animation, game engines or 3D printing. The end result will be the character you see running around in game, film or the figurine or toy on your desk.

If it is a figure, character or creature of any form for these modern entertainment art mediums, a character artist is the person who builds it.

In the early entertainment industry, people producing characters for entertainment used traditional media such as clay, wood, fabrics, silicone, pens, pencils and real paints to build the models seen on film and for toys. These skills are still the foundation of the skill set of the modern character artist.

The modern character artist is most likely working in digital media these days, and that is the focus of this book. That being said, the digital work can often find its way back into the real world in the form of modern fabrication techniques such as 3D printing and in print as illustrations in books. These digital 3D skills also have a strong grounding in the traditional arts of drawing and sculpture.

With that said, let's cover what content we can look forward to in this book.

This book covers four general areas. The first section will focus on some background and the artistic base of character art.

This will entail some setting of context and skills needed. It will also cover an explanation of many of the technical terms and processes that will be used in the industry and will be referred to in this book.

We will not only focus on technical aspects though. Creating characters for games, or otherwise known as character art, is an art form in itself.

With this in mind, we will spend some time on the theory of art and the fundamental foundations needed to be considered a strong artist working in this modern and dynamic industry.

These artistic fundamentals and techniques will be an initial look into subjects such as anatomy, form, silhouette, fabrics, colour theory and much more.

Knowledge of these skills will give you a grounding to become a strong character artist. Although there are almost limitless depths to learn in these areas, we will tackle some of them to get a good understanding of their importance.

The second section will be a detailed look at digital character creation for games. This will be a detailed overview of the process for creation character for modern gaming platforms and engines, from console to mobile.

There will be a series of in-depth and technical examples looking at creating characters for various platforms and in various art styles. As a primary focus, we will look at the technical process for creation of characters for modern games, looking at their creation and application in high-end AAA engines through to the more heavily budgeted and condensed assets for mobile and indie games.

The third section will be a detailed look at creating character sculpts for 3D print, collectibles and toys. This will be an example, from concept to sculpt, pose and then prepare for reproduction in physical media with the end result being an actual figurine.

Lastly, we will be tying up what was covered in this book. We will be covering softer skills such as preparing your portfolio, an overview of what kind of work is out there and what it is like doing that work.

We will also cover aspects of further study, timekeeping and what students can anticipate entering this industry, from junior artist to art director and production designer.

The intention of this book is to give the reader a broad overview of what character art is as well as a concept of how these characters for modern media are made.

Hopefully, I can supply a good overview of this skill set as well as a number of detailed technical examples.

I hope that after reading this, the reader has a good idea of the industry and the skills needed to become a successful artist working in modern entertainment fields.

With that in mind, let's get started!

2.0 Who is this book for?

This book will be for any person with an interest in the modern digital character creation, be that for games or collectibles and toys.

It would be preferred that the reader has some general knowledge of the games industry and possibly collectibles too as some terminology may be a bit technical, particularly in the detailed tutorials. Hopefully, in the initial chapters there will be good and clear explanations of these terms. There will also be a technical terms glossary for reference.

If you are very new to the concept of character art, I would encourage you to read the initial chapters of this book before the technical examples as they will give a good idea of the pipeline of creating character art as well as the art fundamentals that are needed to start tackling projects.

Students or even working professionals can jump to the technical example chapters if they feel confident in knowledge of the subject covered beforehand. I would encourage at least a brief read through.

So, the reader of this book can be anybody, but I expect many will fit into a few categories:

The first may be absolute new entries to this skill set, and this book may be the first look into this industry and the digital character-building process.

The next group may be students, currently studying 3D art or something more specific with the interest of working in games or film.

Lastly, the final group may be industry professionals looking to skill up in some new areas.

There may be many other readers who I cannot anticipate. But with these groups in mind, I will use these expectations to author this book with the aim to help in categories I would expect them to cover.

A basic to advanced knowledge of the tools used would be very beneficial as the examples that will be covered in the technical sections

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will be quite in depth, so I would encourage some basic knowledge of the techniques and 3D programs at use.

It would be best, if you have not worked with these software tools before, to take some entry level tutorials and get some confidence in them before diving into the technical examples of this book as we will not be doing any program introductions, assuming at least a novice competence in these tools and softwares.

The technical examples particularly will assume a decent level of confidence in the art programs used, although specific features and techniques will be pointed out and covered as the examples progress.

That being said, anybody with a curiosity of how modern games, entertainment and 3D printing are created will hopefully find a lot of interesting and valuable information in this book.

The ideal outcome of this book is a general overview of the skill set and role of character artists as well a good selection of technical examples for those who are interested and then an overview of the industry, expectations and the growth and day-to-day life of a modern character artist.

3.0 What is character art?

As we start in this process, it would be good to understand what exactly we will be making and where and how they are applied in games and also collectibles.

3.1 GAMING

For gaming, character models represent the characters seen in game. They can be controlled by the player or be non-player characters creatures and enemies.

Anything classed as a character will be made by the character artist. Clothes and outfit changes will also be the character artist's responsibility.

Props such as weapons and other items such as utensils may also be the character artist's responsibility but may be tasked to other 3D artists in other departments.

Environments, vfx and vehicles will not be made by character artists and will be the responsibility of other specialist 3D artists. We will not cover these skill sets here, focusing solely on the category of character artist.

These assets, character models, are created by a specific skill set of modern digital artist; the character artist.

Character artists are skilled digital 3D modellers and texture artists who focus on creating the 3D character model that is seen in game.

These artists work on the asset through its many iterations, from initial start of the 3D sculpt from concept, to blockout, through sculpting, modelling, texturing and to final application in engine and bug testing.

A character artist working on a full game production from pre-production to final shipping will most likely work on many character models, outfits, props and weapons. Modern games often require many character models and supporting assets to be made and a relatively

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small team of skilled character artists will be responsible for producing these.

So what exactly is a character model?

Character models in games are polygonal meshes that are optimized to run in engine.

By optimized we mean that these models have controlled polygon and texture map budgets so that they run well within an online real-time render environment such as a game engine.

These models have to render live, in engine, at 30 frames per second or more. So they have to be heavily optimized and specifically built to run well in such a demanding render environment.

Initially, the 3D character model is constructed out of polygons to create the character model. A projection of these polygons, flattened out, called a UV layout is created to project 2D texture images onto the 3D model.

These texture maps are not just colour but can represent complicated surface detail and properties.

Modern engines retain a lot of detail in these maps beyond just colour.

High polygon detail can be projected and held in maps such as the normal map, and PBR maps can store information such as surface qualities and different material types.

Modern texture maps such as physically based rendering (PBR) maps will work with the normal map to bring even more fidelity and detail in representing complex materials such as fabric, metals and skin.

With these modern techniques and tools, character art for games can be of a very high fidelity and detail as seen in many modern games.

The character art skill set is a fairly contained skill set, but the character artist does have to interact heavily with multiple departments in the game-development studios. These departments would specifically be concept, art direction, rigging, animation, engine and design.

The character artists core skill set is the creation of 3D character models for games, but they do need at least a simple understanding of where the character is initially created (2D concept) to its final integration to game (Rigging, animation and engine integration.) A working character artist in games should at least have a general idea of how these adjacent skill sets work and their needs. More experienced artists may even have some of these skills and strong secondary skills such as rigging or concept art so supplement their primary skill set as a character artists. It is not required but these extra skills and knowledge are a great supplement.

3.1.1 What is concept art, rigging and engine integration, you may ask?

Concept art is where the character design is developed. Drawn in 2D, the character is developed and refined until ready for 3D modelling or sculpting.

Rigging is the process of adding bones and deformers to a character mesh so that it can be animated by animators in game.

The engine integration stage is when the artist brings their work into a game engine and ensures that their work is functioning well, looking good and not causing any issues.

The character artist working in gaming is expected to take the 2D concept art and replicate it into a working 3D model. These models are made ready for engines and rendering and so are strictly controlled, with locked budgets to ensure that they run well and efficiently in engine or the studio pipeline.

The character artist will walk through the entire production with these models and ensure they work well, efficiently and looks as spectacular as possible!

3.2 COLLECTIBLES

Sculpting for 3D print and collectibles is primarily focused on the digital sculpting aspect of character creation.

As there is no rigging or animation needed, the character sculptor will be responsible for sculpting figure and them moving it into a dynamic pose and bringing forward an appealing result in the finished figurine.

There is a very unique set of requirements that one has to keep in mind as they design and create assets for this industry.

Collectibles, miniatures and general 3D printing require a good overview of the issues and needs of the machines that will be replicating your work into the real world.

A large part of design process while working in a digital space for physical production is planning and understanding the needs and limits of real world materials such as plastic, resins, metals and so on.

These materials have to work with gravity, load limits, a limited level of detail and may even need to be split up for easier reproduction.

As with games the artist will also need to be very aware of how to create art specifically for this pipeline, creating neat, efficient work that will be technically sound and that will not create issues as the asset reaches its final output.

4.0 The industry: Past, present and future

4.1 GAMING

First of all, I do not wish to approach this as a gaming historian, so my overview here will be brief so that we can get a general idea of the industry and then get going and move on to the technical aspects of creating character assets for games and collectibles.

That being said, it is good to have a general overview before we get started.

The gaming industry as a whole is a relatively young industry. It gained traction in the 1970s, but really began to develop into the entity that we see now in the gaming boom of the 1980s and 1990s. During that time, the majority of the companies that are now industry giants such as Electronic Arts, Nintendo, Activision and Epic Games were created or entered the digital game development arena in a significant fashion.

These new corporations matured and created a more streamlined industry with a more focused approach to creating games. The development pipelines were refined and focused. With this happening, a need for highly trained specialists within the game development pipeline began to develop.

With this process, the splitting of broad tasks and skill areas into more defined sub-sections started. Within this new framework, the role of the specialist character artist in modern games pipelines was born.

This skill set in particular seemed to be established individually soon after the transition from 2D pixel art to 3D in games and the need for specialist character modellers was established.

The gaming industry is beginning to mature, and the pure scale of the gaming industry these days is immense indeed.

Overall the gaming sector brings in more overall income in the modern day than film, literature and music combined!

Truly a modern day behemoth!

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With the scale of the gaming industry and the needs of the large game companies, it is important to see some aspects that are either parallel or are branches from the same core of the industry.

This means that there are many areas of the gaming industry to work in, as a character artist or a game developer in a more general sense.

Beyond what is seen as the primary drive; to make large-scale and scoped games for consoles and PC, there are many other sectors of the industry which are relevant and worth considering.

As the technology has become more powerful and off-the-shelf game engines are becoming more accessible, we are seeing more and more independent developers who are creating their own games with great success. These are known as indie game developers.

These developers are less focused on creating the next blockbuster game, but usually cater to a smaller audience with a unique and often quirky game idea and subject. Teams are often small, so there is often need for broader skill sets and input from all team members. It is a more loose work environment compared to working on blockbuster console games, but with more creative input usually.

Another aspect of the modern gaming industry that is often overlooked is mobile games. Although they can be seen as more simple than the larger console and pc games, this aspect of the industry represents very significant numbers as far as income, player base, output of games and people employed.

The ease of use and extremely broad appeal, as well as the easier entry for small developers into this part of the games industry, have led to this being a significant aspect of the modern gaming industry. Teams here can often be smaller too as these games are generally lighter on detail and fidelity than console, but the project turnarounds can be fast and if you enjoy working on small, faster projects with a fast turnaround, this is a good area to consider. Mobile games have a focus on lighter technical needs due to mobile platforms having less computing power, so artists need to be very efficient and work with less details than console to achieve the best results possible.

Lastly, areas such as VR, medical and military simulation provide even more opportunities and scope for game developers to be involved in. These are smaller, developing and lesser known areas of the games industry, but they are in need of skilled individuals and are worth considering for the recent graduate or skilled professionals.

With all these sectors growing, developing and maturing there is a constant need for skilled individuals to create these games and experiences.

The character artist is one of these skilled individuals who slots into the modern game creation pipeline.

So I hope I can provide some oversight and techniques for those looking to enter this exciting, creative, and dynamic new technology sector.

4.2 COLLECTIBLES

Sculpting figures has no doubt been something people have been doing for a very, very long time. These skills can be traced as far back as is wanted really, to the very beginning of three-dimensional artistic representation in sculpture using simple materials such as wax, clay and stone.

The modern commercial collectible industry however is a more recent development.

As modern entertainment fields developed, there was a need for character figurines and toys.

These could be figurines to support a new movie for example, a recent comic book or even to support board gaming. They may even be figurines that are not supporting another entertainment medium and are collectibles in their own right.

So a skill set was needed for a miniature modeller, a character artist, to create these figurines, collectibles, statues and toys.

Initially, these figures were created in more traditional media such as clay, wax and resins. A more recent development has been for these figures to be created digitally in digital 3D sculpting software and then moved to 3D printing machines and then produced as a prototype. Once this 3D print is produced, it will be in the same place in the production pipeline as the traditionally sculpted figure. These prototypes, in clay or 3D print will then be mass produced, replicated and painted.

Sculpting digitally has its own benefits, and this is the technique we will be covering here.

With sculpting digitally in 3D, changes are easily incorporated, changing scale is as easy as typing in a number and 3D printers are becoming more and more reliable with amazing amounts of details in the prints.

As the collectible industry embraces this new digital skill set, we will be looking at creating a collectible for 3D print within this book.

5.0 Core artistic skills

Before we get started with some in-depth technical examples of character creations for games, it is important to address some important artistic concepts every digital artist will need to consider before they get started with their career.

An important thing to remember is that the character artist working in digital media is first and foremost … you guessed it, an artist!

The modern character artist will certainly need to have a solid knowledge of digital character creation with all the complex tools needed.

Without a grounding as a competent artist though, they will often find themselves struggling and somewhat lost when it comes to producing appealing artwork. This is where the training as a traditional artist comes into use.

To construct appealing and beautiful characters, the character artist will need to invest time into learning some of the fundamentals of character representation in art and art in general. It cannot be avoided, so best to tackle it head on.

These foundations have a number of subjects that will need to be focused areas of study and development. These include: anatomy, proportions, fabrics, form, silhouette, value structures, colour theory and many more.

As well as learning the technical tools needed at the current time, the artists will in some respect future proof themselves by learning some classic art theory.

Think of it as the chassis to your art career, with a solid base of art fundamentals, you will always be on a solid foundation and a lot more creatively flexible.

The industry, techniques and tools may change, but these fundamental skills thankfully do not, so they will end up being a critical backbone to your career as a working commercial artist.

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So as an artist, particularly one interested in character art, spend some time life drawing and doing anatomical studies to solidify your anatomy knowledge.

Sketch, sculpt and study cloth to understand cloth dynamics and folds.

Do some colour theory tests or even some digital or classic painting to get an understanding of colour theory.

And study some machines, vehicles and aircraft, how they are constructed, so you feel comfortable designing and creating hard surface assets.

This artistic grounding does not have to hamper you diving into digital art at all, you can learn it at any time and in parallel to learning to technical skills, but as a character artist particularly, these fundamentals are very important and are best not avoided.

We will also do some preliminary coverage of these subjects here in this book in the following sub-chapters. These subjects are lifelong study material though, so these chapters will just be an introduction, the rest is up to you!

5.1 ANATOMY AND PROPORTIONS

As someone interested in creating character art, a good knowledge of anatomy and proportions will be absolutely pivotal for you creating strong character art.

There is no way to avoid this fundamental aspect of character design and creation if you wish to be involved in creating characters for entertainment media.

In character art, this is the most important core artistic skill to learn and develop. Even if you are working in stylized characters, animals or even monsters, a solid understanding of anatomy and proportions is absolutely required and will lead to a far richer and believable result.

Anatomy has many facets and is beyond just muscles.

For example, a good knowledge of the skeletal base and where it is visible through the skin, the ways skin folds and deforms, the overall large forms and shapes of the body and the different states of the human body such as fat, muscular, and even ageing effects. These are all important aspects of character building and anatomy that the character artist needs a solid knowledge of.

Anatomy can also not just be human; there is knowledge of animal anatomy too. We will be focusing on human anatomy and proportions for these examples, but it is good to keep these other aspects in mind.

Once the artist has a comfortable knowledge of anatomy, then they can start doing some really interesting stuff with it.

You can consider knowledge of anatomy and proportion as a core toolset. Once you get comfortable with these tricks and tools, you can start pushing and warping things, creating new stuff within this toolset. This is particularly useful and maybe an unexpected benefit for more stylized characters and creature design. With a solid base in anatomy, form and proportions, these characters will remain believable even if they are heavily pushed, stylized and simplified.

5.1.1 Proportions

The first thing and often overlooked aspect to consider when tackling the subject of anatomy is proportions. This is a key aspect of character creation to learn in order to be able to produce believable and appealing results.

Proportion represents how aspects of the human body are laid out and relate to each other.

The human body usually has a fairly well-known and defined set of proportions and although these can flex somewhat they are generally in a set layout and relations.

The human mind is programmed to read other human bodies fast and in detail. If proportions are wrong and not in good relation, this will quickly lead us to feel that something is not right, even if we do not know what specifically is wrong. In the case of artwork, this will lead to the viewer to feel uncomfortable looking at the artwork and they will detach from it.

So proportions and a solid knowledge of this vital aspect of character art is a vital skill to develop. I found that simple pencil drawing and studies for me helped me lock in to the vital aspects of using proportions on the human body well.

The master of human proportions in my opinion was the illustrator Andrew Loomis.

Loomis set up the rules for laying out the human body proportions for artists. These rules and tricks are still very relevant and useful today, so we will cover some of them here.

Loomis's books such as Figure Drawing for All Its Worth were published in the early 20th century and are now often free to view on the internet. I encourage you to find these and study them yourself as what we will cover here will simply be a brief overview. Physical versions of the Loomis books are also available at book shops.

5.1.1.1 Example 01: Proportions and splitting the body into measurements of heads

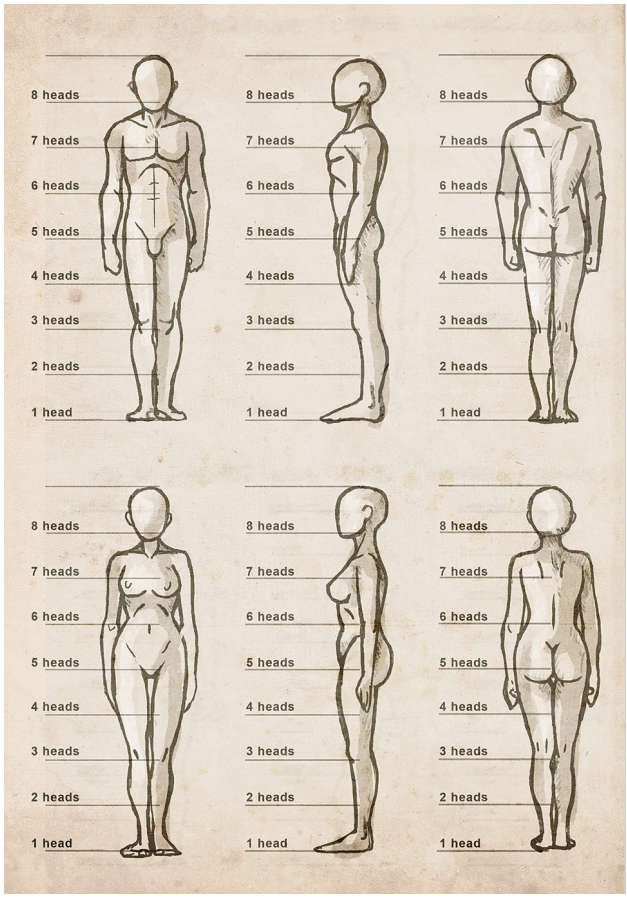
One of the techniques Loomis used is to split the body proportions and scaling of elements into heads. By using this technique the head is the unit of measurement, and then it is measured out against other elements of the body. This can also be used to measure the overall body height.

You may have heard in the art community a figure being referred to being eight heads tall. This is this technique at work.

The ideal adult human body will be measured at about seven to eight heads high. There will be some flex in this in adults and some shorter adults may even be six heads high.

Children can come out to about four heads high due to their shorter torso and limbs and bigger heads

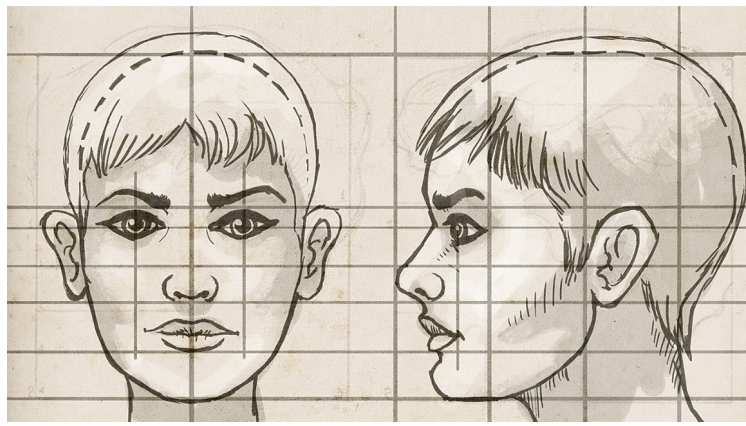
Let's take a closer look with the adult example that is most often used:



As you can see the head can fit nicely in the overall body layout eight times generally with an adult. Techniques such as this will help you initially learn and understand a believable layout of body features on your character art.

Let's look at some further examples of how to measure and lay out the body as to get realistic and believable results.

For the head we can consider these broad rules for construction:



From the middle of the cornea of the eye, we can draw a line down to the edge of the mouth.

The top of the ear lines up well of the inner arch of the eyebrow.

The inner corner of the eye will often create a straight line down to the edge of the nostril.

The bottom of the nose can often line up with the bottom of the ear.

5.1.2 Anatomy

Anatomy is often seen as the muscle layout of the human body. While this is the correct view, there are many other aspects to consider. There is the skeletal base and how that is visible in places on the body. Skin, fat and wrinkles are other aspects to study and understand. As you familiarize yourself with these unique aspects and features of the body, using them well and with a knowledge base will be vital for creating appealing characters, even if they are stylized.

While you should get a general idea of the muscle layout on the body, you don't really need to know every muscle group by its medical Latin name.

Just a good general understanding of the muscle layout and shapes will be enough for a start.

Then an ability to identify where the skeleton influences the shapes on the body and what is seen by the eye.

Anatomy for artists is very much a view of looking at the body as a collection of shapes and then focusing on the shapes that are visible to the eye and having an understanding of what those are and why they are visible. A medical level of understanding, down to sinews and minor muscles with their Latin names is not necessary, although nice to know if you wish to go that far.

We will be looking at primarily human anatomy here, although I would encourage you to develop your anatomy knowledge further and start tackling animal anatomy later on.

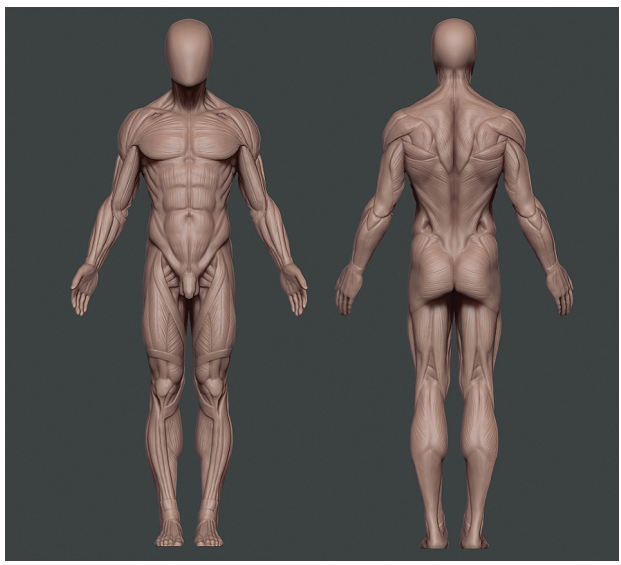
5.1.2.1 Anatomy – Muscles

We will be looking at primary muscles here or at least muscles that affect the forms of the body in a clear visual way.

There are many, many muscles in the human body to study and learn. For us at least, we will be focusing on the primary muscles that affect the visual forms on the body.

This narrows it down a lot thankfully as we focus on these muscle masses that affect the core form and silhouette of the body. There are many other smaller and more hidden muscles to study after you have these primary muscle masses figured out, but for now, we will be focusing on the most important ones for visual artists.

Let's cover some of the main categories of muscle, their location and what they look like:

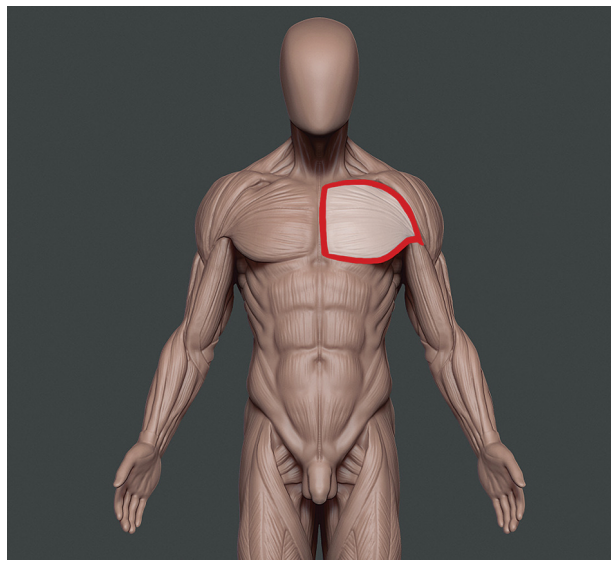


A key thing to learning muscles is to understand and learn the underlying shape that the muscle takes and how it wraps onto the body. For me this was a big step to memorizing the muscles and how they must look. Not so much the technical names or even the function.

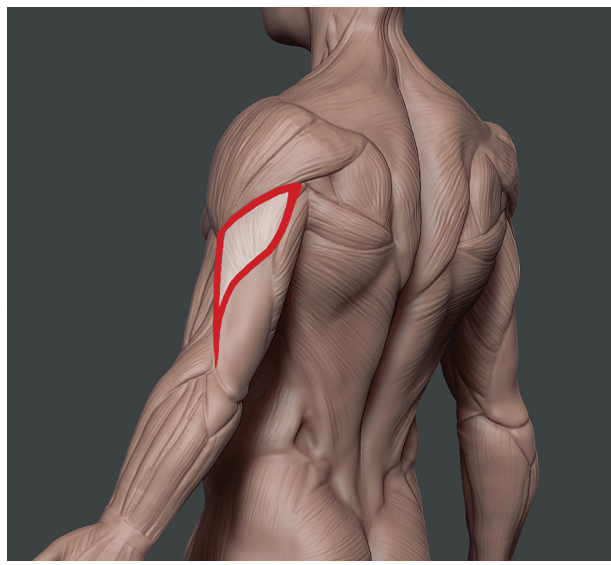
It was their shapes.

Here is an example of this:

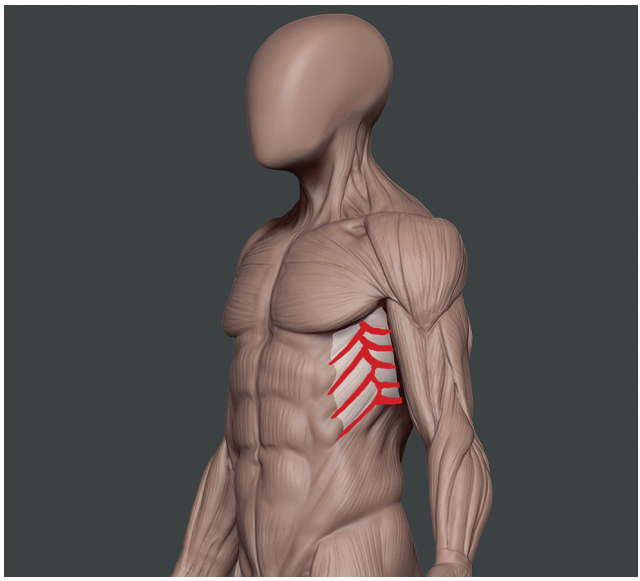
The primary chest muscle, the Pectoral muscle:



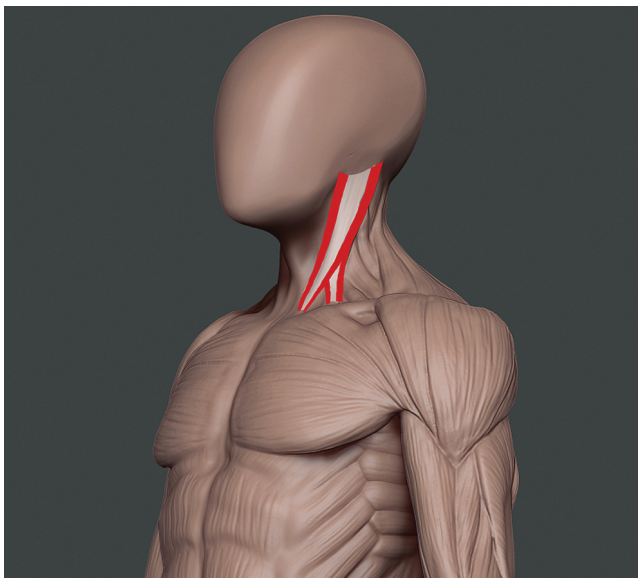
The muscles at the back of the upper arm, the triceps:



An interesting little set of muscles on the side of the ribcage, the serratus anterior:



The large supporting muscles and tendon from the clavicle, to the back of the ear, the Sternocleidomastoid muscle:



These muscles do have complicated and very different names. As long as you learn their core shape and location though, you are in a good place to start building believable muscle layout and anatomy on your character models. As you move from the large muscles and learning their shapes you can move to smaller muscles and muscles that are more hidden behind other muscles, bone or fat.

I found this technique a big help in learning the shapes and forms of muscles and how they lie on the human body. Give it a try!

5.1.3 Other tips and tricks to learn anatomy

There are other ways to learn anatomy and get the forms locked into your mind.

Number one is to draw. As a 3D artist it is not important to show anybody your drawings. Drawing and anatomy drawing is a fundamental way to learn and understand anatomy. Just draw, study from books and trace over masterworks. You do not have to show it, but you will be building a great foundation for your work in the future.

If drawing is not your thing, you can try painting a digital or physical sculpture to do your studies.

Another great aspect to learn anatomy is the often overlooked life drawing. Life drawing helps you understand and learn the odd forms and shapes the body takes in real life beyond what you think it 'should' look like. Studying the body in real life is a time honoured and a very effective way to get solid lifelong knowledge of anatomy.

Beyond just the muscle groups, learn to understand the way bone and fat influence the shape of the body.

Bones in anatomy can pass beyond the fat and muscle and influence the forms on the skin. Key examples of this are what are called the epicondyles of bones that jut out at the end of the wrist, at the elbow and what are known as our ankles.

Other examples, such as on the head, are where the forehead is flat against the skin with no fat and muscle in between. Elsewhere on the face we can find prominent bone landmarks at the bridge of the nose, cheek bones and chin.

Knowing where a bone is deposited or pushes forward against the skin will make your character art even more convincing and appealing. Master studies, life drawing and general practice will help you lock these elements down and start incorporating them into your artwork.

5.1.4 Conclusion

In conclusion, the knowledge of anatomy and proportions of the human body is one of the most important skill sets for any working character artist.

Training and getting skilled in this area is vital for success in the industry and for yourself as an artist, so take the time to do some life drawing, draw and study from anatomy books and tutorials and get creating your own characters and learn as you go!

5.2 FABRICS

Fabric is considered another of the artistic pillars of character art. As with anatomy knowledge, the skill of reading how fabric folds and forms visual shapes is another path to creating believable and appealing work.

Characters are almost always involved in some form of fabric.

Usually, these are in the form of clothes but can also be large draping fabric forms and capes.

Fabrics can also go into many types of surfaces, from very hard and limited in deformation such as leathers and chain mail to very detailed and fine fabrics such as satin and chiffon.

Fabrics and folding understanding cannot be avoided, so at least a basic form of understanding is needed.

There are many digital simulation tools such as Marvelous Designer that mimic the folding and deformation of fabrics. These programs do live simulations of fabrics from patterns and are very powerful and useful tools.

With that said though, it is very beneficial to have the underlying knowledge of how and why fabric deform and folds in the way it does.

This is not only useful when creating more realistic style fabric high polygon models, but becomes essential when dealing with any form of stylization of fabrics. Here, simulations cannot be used, so stylized character fabrics have to be sculpted by hand, therefore a solid knowledge of fabric folding and forms is vital.

Following on from this we are going to cover some of the fundamental construction rules of fabrics and fabric folding.

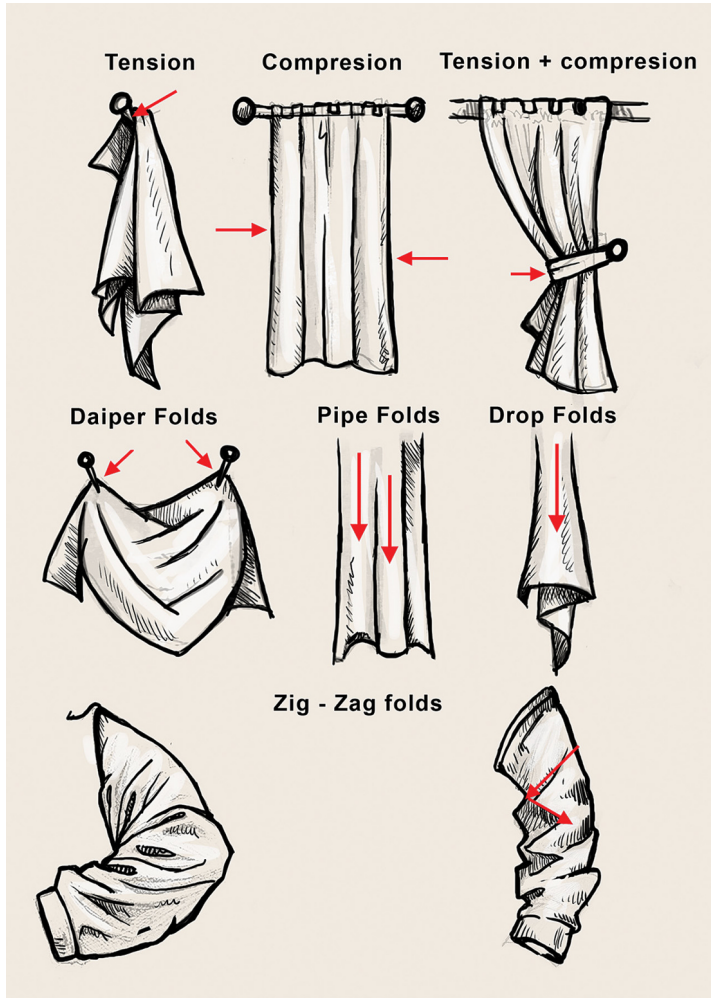
As with before, this will be an initial look. The artist is encouraged to do further studies in life drawing when they can.

When it comes to fabrics studies, it is really about how the fabric appears in tension and folding. As an artist, this is what we need to focus on. With that in mind, there are generally a few key types of tension and folds. Let's take a closer look at these now.

5.2.1 Cloth folds: The primary types of folds

When it comes to cloth folds, they can be broken down into a few primary fold types. Although these are the primary types of folds to learn and understand, there are others beyond this example, and further

fabric study and life drawing will help you understand these other less important fold forms.



It is a good idea to study and draw or sculpt these types of folds yourself to get a good understanding of them to commit them to memory. Often drawing or sculpting objects yourself is a very effective way of committing the subjects to memory rather than just viewing examples from other artists. Life drawing with clothes and fabrics is a fantastic way to practice this learning.

There is of course the simulation option for fabrics; unfortunately we will not cover this in detail in this book as it is a very large area to cover and very program specific. In this case, Marvelous Designer.

For myself, I do not use Marvelous Designer too much these days as I work more on stylized projects and artwork that lead to just sculpting the fabrics by hand. Having also put a lot of time into learning fabric theory as above, I find in just way more empowering to be able to lay each fold out exactly as I need it and not leaving it to a simulation that often does odd results.

So for any type of stylized work or heavily art directed work, these fundamentals and just sculpting it yourself are probably best.

For extremely realistic games and films though, such as military-style games, the simulation solution is the best technique. Even then though, you will often sculpt over the simulated result to get exactly what you want.

5.2.2 Application in digital sculpting

Let's look at some examples of sculpting fabrics in digital sculpting using these techniques and rules.

5.2.2.1 Example 01

First of all you can go pretty realistic:

This example used a simulation of fabric in Marvelous Designer as a base, but then I sculpted over the fabrics in Zbrush to get a more heavy and directed result to come through in the final sculpt. Here, we see a combination of tension and drop folds on the headdress and then zig-zag folds on the baggy trousers. This sculpt for collectibles is essential half simulation in Marvelous Designer as a base and then heavily sculpted on top of this base to get a more planar, stylized pushed look that will look good on the miniature.

5.2.2.2 Example 02

In this example, the fabrics are mainly sculpted by hand to get a very artistic and baroque approach and are intentionally less realistic. Saying that though, these fabrics and folds follow fold theory and are many drop folds and pipe folds in various states of compression and tension.

There was no simulation as a base here, I just started with a blob of digital clay and used the fundamentals of fabric theory to get something that is stylized and intentionally a bit overdone to survive miniature scale and 3D printing.

5.2.2.3 Example 03

Lastly, we have this sculpted example. I originally tried to simulate these in Marvelous Designer, but the result was too literal and I needed to have very specific shapes and forms. I found I could not art direct the folds specifically shape by shape, so I needed to sculpt the fabrics from scratch.

For this, it was mainly a combination of pipe folds and drop folds, but in motion this time.

The main challenge was to produce the look of motion in the folds and wind blowing in the form of the figure, blowing the fabrics backwards.

5.2.3 Conclusion

Fabrics, like anatomy are one of the pillars of knowledge of character art. Thankfully, the fundamental aspects of it are relatively simple and easy to pick up.

After that it is all about further application of these fundamentals and applying them to artistically complex solutions such as stylization and art directing folds to go specifically where you want them to go and make them look believable.

5.3 LIGHTING

Lighting is a vital part of presenting your art and making it appealing.

A specialist character artist and model builder may be tempted to think lighting is not too much a concern of theirs. To some extent this may be true, but you cannot escape the fact that good lighting and presentation is the most vital element top showcasing your work. Unfortunately, it cannot be avoided, bad lighting will have a terrible effect on your character presentation whereas good lighting will make it look excellent. Although you may be lucky enough for someone else to take it on, you should at least have a decent understanding of the process so you can light and present your work well when needed.

As stated, lighting cannot be avoided due to its huge impact on how you present models. Thankfully though for characters, the lighting systems used can be relatively simple and easy to set up. These techniques and terms have an added bonus of being transferable to digital and physical lighting and presentation of models as they have the same core theory and setup.

We will be covering some fundamentals of lighting setup and terminology as well as the default setup you will need to present your characters.

Lighting is a very broad category of learning and can get very complex, so we will be focusing on one area of lighting specifically. A type of lighting based on portraiture photography. This lighting technique is used often and is perfect for presenting character models and sculpts both digitally and physically.

This technique is broadly called **three-point lighting** and comes from classic portrait photography. This method works really well for lighting character models, and we will cover this here. The three points in the name simply refers to the use of just three lights to illuminate your character model. You can use more than this though; this is just the base to start from.

5.3.1 Lighting – Terminology

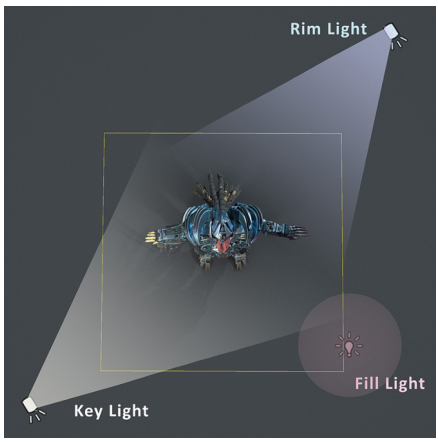
Lighting has some terminology to become familiar with as you begin learning it. Once again, we will not cover them all here, just the ones useful for us in presenting a character model in a pleasing way.

- **Key Light –** The primary light in your scene and often the most intense. This will often represent the sunlight or a primary spotlight in your scene.
- **Photon –** The ray of a light that is emitted from a source. More of a term for cg lighting, but from real lighting terminology, This is used to track the behaviour of light rays emitted from any type of light source.
- **Fill light –** This is used to fill in shadowed areas and introduce a little light. This type of light stops shadowed areas going to unlit or black and can help illustrate hidden details. Often placed opposite the key light
- **Kick light –** A smaller light used to highlight hidden areas of a character or model. Often placed opposite the key light.
- **Rim light –** An intense light often placed behind a model to kick its silhouette edge of the background. Multiple rim lights can be used.
- **IBL light or environment light –** A light used in the scene to represent bounced environmental light. Often used to fill the shadowed areas of the scene.
- **Hotspot –** The intense focused area of a light such as a spotlight. The brightest part of the light and its focus.
- **Falloff –** The part of the light where the hotspot begins to fade off to darkness.
- **Spotlight –** A type of light. Much like a traditional spotlight or torch with and intense hotspot or focus point with a gradual falloff to darkness.
- **Pointlight –** A type of digital light. All light photons are emitted from one point in space. Not a very complex light, but cheap and easy to use in production lighting.
- **Area light –** A type of light that emits photons from a defined surface area. Area light can well represent real-world lights such as panel lights and can produce excellent complex shadows. They can lead to long render times due to this though.
- **Global illumination –** A term used for lighting systems that represent accurate calculations of light photons behaviour and bouncing. Essentially, having this in your scene should lead to more realistic and fancy looking lighting.

- **Ambient occlusion –** A process you can include in your lighting where much occluded areas collect shadow by themselves and lead to very dark areas in tight crevasses on your model here the light photons cannot get to an illuminate.

We can go on forever on lighting, but this should be enough for us to consider initially and have enough general knowledge to light and present our models well, both digitally and physically.

Here is a quick overview of some three-point lighting in use illuminating a character model:



Here is a render from that setup:

Now let's look at a more detailed example of a three-point character lighting setup and analyse fully what is going on:

In this example, there are only three lights in play, the classic three-point lighting system, they are:

The key light is the primary light source and what is illuminating the majority of the model. This light is often close to white and slightly warm, mimicking daylight or a plain spotlight. The key light mimics sunlight or a strong spotlight and is to the front of you model and fairly high up.

The Rim light is behind the model on the right or left and illustrates the silhouette and removes the model from the background. This light is often white or a slightly cool colour to contrast the warmer key light.

The fill light is used to illuminate shadowed areas from the key light and shows details in those areas. It is also a complimentary colour to the overall scene for a bit of colour contrast.

Lastly, on this setup, there is global illumination and ambient occlusion. The global illumination allows light photons to be bounced about the scene, helping illuminate it further, particularly in very dark or shadowed parts. Ambient occlusion leads to richer shadows in the recessed parts of the character model.

Here is another example where the three-point lighting is pushed a little and used in a portrait:

In this example, I used two rim lights over each shoulder and made the key light less intense so the feeling of the model being lit by ambient flames at night could be stronger.

A different feel, but the system of the three-point character lighting can be added too, adjusted and adapted as needed as in this example.

5.3.2 Conclusion

Now we have a basic system of lighting under our belts and should provide a base to light and present the majority of our models well. The three-point light system is highly flexible and you can adjust it as needed by moving lights around, adding more lights and removing some if needed. It is a structure and open to amendments as needed.

Lighting is a good medium to play around in and find a solution for yourself once you have a basic system and understanding to work with. I would encourage you to try this out for yourself and play around some lighting and see what you can get!

5.4 COLOUR THEORY AND VALUES

The use of colour and values are very important areas of knowledge for any working character artist. The use of colours, their relations, temperature and underlying value structure is a very powerful toolset for you to have under your belt.

5.4.1 Value

What is value?

Value is the term artist used to define the brightness or darkness of something with no colour information attached.

Colour is removed and the value is judged, just in black and white. Essentially, looking at any image just in black and white to see where the dark areas and light areas are and how they contrast.

This is important as the values heavily direct how an object is read. It is an often unconsidered aspect of art, but is a very, very powerful tool for use.

One of the most important aspects of value to consider and use is value contrast. Value contrast is when a very light object is next to a dark object. This heavy contrast is immediately attractive to the human eye and is an excellent tool for the artist to use to pull the viewer's eye to areas where they want people to focus.

A good example of this would be the eyes on a characters face.

EG:

As you can see in the colour image, the eyes are very attractive. This is intentional though and a great side effect of them being high in value contrast. When you remove the colour as with the image on the right, you can see the value contrast around the eyes is very strong and the highest black to white contrast on the model, leading to their attractiveness.

These eyes have a natural excellent high level of value contrast in the face. Excellent! People naturally focus on the face first, so by using good value contrast with great natural high contrast items such as the eye, you can guide the viewers' eye to where you want them to focus on your art. In this case the eyes and the face. A success in the design and an intentional design aspect.

A failure of value construction on a character would be having high value contrast on somewhere of low importance, where you do not wish the viewer to look, like the lower legs, or the background, while neglecting to draw the viewers' eye to areas of importance like the face.

So it is a good idea to plan your value structure out as you build your character or at least be aware of it and the power in these tools. As you get experienced in building characters, you can start playing with value and saturation and pulling the viewers' eye where you want it to go. These are all very effective tricks of the trade for and artist to have.

5.4.2 Colour and saturation

Colour represents all the possible hues and also the saturation of those hues that are used. Hue simply means colour.

Saturation implies how intense the colour is. A very saturated colour is very rich, attractive and can be garish if not used well. A desaturated colour can be subtle, less attractive and progress to grey eventually.

The use of saturation can be another nice tool as well as value to guide the viewers' eye to where you wish it to go. A very saturated colour will be attractive, so you can place that where you wish the viewer to look at and focus on such as the face or a weapon. Less saturated colours can be used to be less interesting and divert the viewer eye over them to more saturated and high-value contrast parts of the artwork.

5.4.2.1 Hue and colour combinations

Hue relates to the actual colour in use. The important thing to consider beyond just picking your colours to use; you should consider your colours and how they relate, compliment or contrast with the other colours in you artwork or character build.

There are many aspects of colour, but we will focus on ones that I consider most important and elaborate a little bit from there.

These would be:

- Colour relations and combination.
- Colour; cool or hot.
- Colour temperatures.

So let's dig into colour!

5.4.2.2 Colour relations and combination

Colour relations may seem like and esoteric subject when first tackled, but they are really simple to learn and powerful tools once you get them under your belt.

The first thing that you need to consider is the good old colour wheel:

We are all familiar with this, and this thing is very, very useful. When it comes to using more than one colour, then you need to be aware how colours mix, blend or contrast. Some of the most used combinations of colour have names, these combinations are known and used often as they are powerful ways to combine colour in very effective ways.

Some of these colour combinations are:

Monochromatic
Complimentary
Analogous
Triad

There are many more, but let's focus on the few most used.

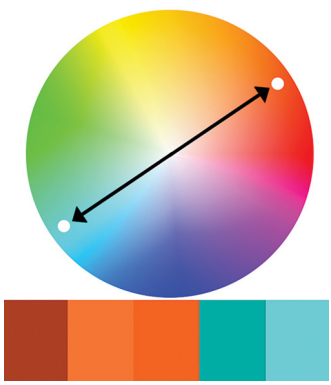
Let's break these down further:

I am going to tackle what I consider the most useful colour combinations first and then work through them in descending order. These are my thoughts on these uses of colour and I encourage you to experiment with them and come up with your own favourites.

5.4.3 Complimentary colour

This is a fantastically useful colour combination, and you will see it in use all the time in everyday life. Movies and modern entertainment use this combination all the time as it is so powerful. Perhaps too much even. The classic teal and orange you see in many modern Hollywood movies is this colour combination in use. It works, people like it, and it is very easy to set up.

Complimentary colour is the function of picking a colour and then using the colour across or close to across from the colour wheel to compliment that colour in this colour combination.



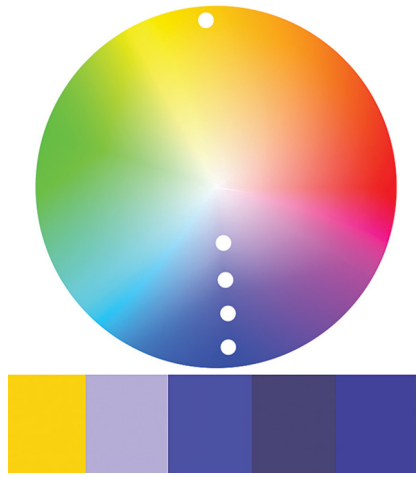
It is a very powerful combination and massively useful. Once you see other artists using this, you will never be able to ignore it!

It is a very powerful colour tool and in my opinion the most powerful. Don't shy away from using it too. It is a quick and very effective method for combining colours well and in a very effective way. Just be aware that it can be overused, particularity the blue/orange combination, so some creativity may be needed if you want to use this combination outside the much used defaults.

5.4.4 Monotone and more

Monotone simply means the use of similar colours in a colour range and nothing else. This for instance will be the use of a colour set of purple, but only purple, only variation in value (dark or light) and saturation. This is a simple concept, but can be stylistically very strong if done well. It can be a little monotonous (excuse the pun) to look at for long periods of time.

A solution to the potentially samey effect of just a monotonous colour setup is the use of another saturated colour as a colour hit on a monotone colour scheme. This is a very effective trick to draw the eye to certain parts. EG:



This unexpected colour is often most effective as something across the colour wheel to your monotone colour and is used in a very limited amount; otherwise, this will just become a complimentary colour scheme.

5.4.5 Analogous

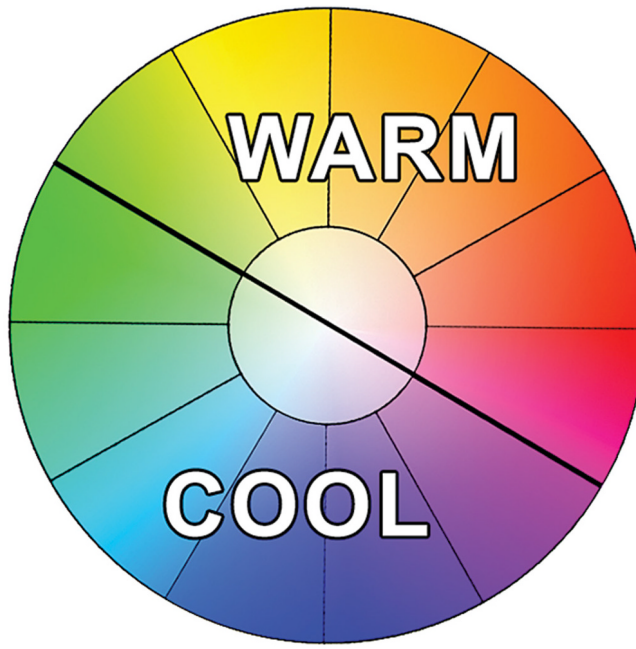
Analogous is similar to monochrome, but although the colours are visually similar, they are a series of similar neighbours on the colour wheel and not just one hue of varying value and saturation. Think of this as a little more flexible version of the monochrome combination.

These are three very useful examples, and there are many more. With this knowledge at hand, you can start to confidently combine and work with colours to get appealing combinations that will appeal to your audience.

There are many other colour combinations to use, this is just the beginning. These are some of the most often used and powerful, but I encourage you to look further into this as this is yet another powerful tool in the artists' arsenal.

5.4.6 Colour temperatures

Colours can be classed into temperatures. This is a useful definition as it splits colours into two broad categories: cool or warm.



The knowledge of cool and warm colours can be used for great effect to construct images and characters.

Warm colours tend to move forward on an image and be more attractive, so naturally attract the eye. Too many warm colours though and the artwork may seem very harsh and even too much, so they may need to be used in moderation. Cool colours tend to recess and be more calming to the eye. They can be a little static and less interesting though and may need a warm colour hit to help them out and provide some dynamism to the image.

Related to cool and warm colours is colour temperature.

Colours can also progress through value, from dark to bright and burn out to some extent, while doing this they can change colour. This is known as colour temperature and although complex, it is another aspect of colour to get comfortable with and understand.

The knowledge of colour temperature and how colours can burn from warm to white and then cooler colours are particularly useful as you get into lighting. All modern cg lighting system these days are built on physically correct systems mimicking real-world lights. As you use lights, they will follow colour temperature rules. It's also good to know for light sources on your character model such as any light emitting surface and burning light emitting surfaces such as neon's, fire, magma, lasers and even lightsabers!

5.4.7 Conclusion

The use of colours is yet another tool to learn as an artist and deploy as you need it to make more appealing artwork. Working with colours may seem as more of an aspect for concept artists to figure out. While this is true, a 3D character artist will not be able to avoid colours and figure them out. As you get more senior in your career, you should have some confidence with handling colours, mixing them, working with values and combining all these aspects to create a strong end result.

As you progress towards lead or art director you will absolutely need to have a solid understanding of colour theory and using colour and light to produce excellent visual results.

5.5 DESIGN PRINCIPLES

Design principles; once again a term we may have heard before, but what does it really mean?

For me core design principles are some of the foundations of art. Much like the understanding of anatomy and colour, they are areas as an artist you will consistently run into. Although some of the concepts at play here may seem a little esoteric, once you dig into them, they are at their core very simple and will serve you well in your career as a character artist.

Without delay, let's dig into them. Some of the core design principles we will look at here will be:

- Silhouette.
- Shape hierarchy.
- Level of detail, areas of detail and rest.
- The use of lines in composition and focal points.

5.5.1 Silhouette

Put quite simply is the shape a character or object has once all the internal detail is removed. Essentially, if you draw a line around a character or object as you see it, that is the silhouette.

The silhouette is important as it is one of the fastest functions the human eye uses to recognize and read an object. As an artist you must be aware of the power of this and design and build your artwork with this in mind.

You will often see concept artists working on silhouettes first before they get into the details of a design. This is precisely because this aspect of art creation is so important.

It's a simple concept, but very powerful. As you get used to reading and manipulating silhouettes, your art will become more attractive, flexible and appealing. So remember this important aspect as you are blocking out and sculpting your character, all the way to final texture or 3D printing. Be aware of the silhouette. It is particularly important for games where your characters may be small, obscured or far away. The silhouette and overall shape of your character will be very important to making it read when you need it to the most.

5.5.2 Shape hierarchy

Shapes are the primary building blocks of your character or really any art in general. Shapes can generally be broken down into three primary categories. These are primary, secondary and tertiary.

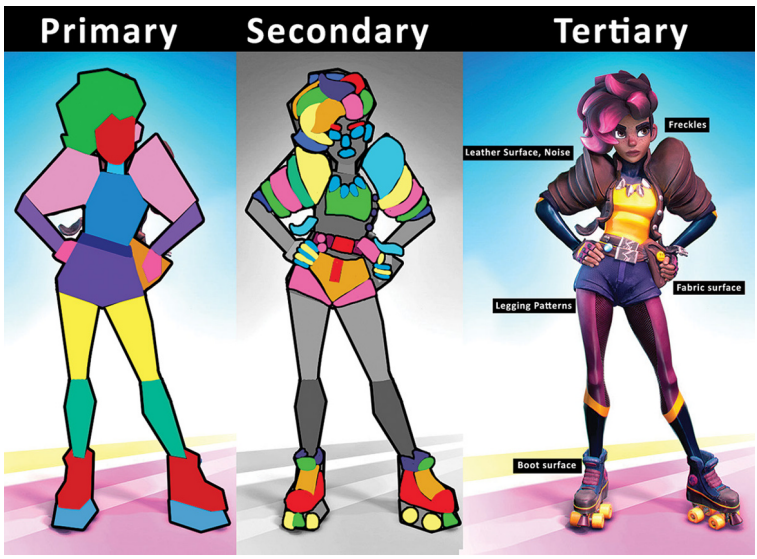
The primary shapes generally the largest shapes that you can break an image or character into. These shapes are often very simple, large primitives and have a simple clear read.

Secondary shapes are inside the primary shapes and are details that can be considered medium sized and still important features of construction and seen from far. Examples of these are eyes, nose, hair forms, large muscles and so on.

Tertiary shapes are fine detail towards noise and will often be classed as tight detail and even surface noise. Examples of these are surface details such as skin pores, fabric pattern, buttons, freckles, individual hairs and so on.

The reasons we break visuals into shapes are because this is a very effective way to analyse artwork and work through your shapes, from primary to tertiary, refining them as you go. As you focus on each stage of your shape hierarchy, it will help you focus on these elements and not rush to detail while your primary shapes are still weak. Setting up your primary shapes before you resort to detail is very important, particularly for design-heavy or stylized artwork.

Let's break down this character render for an example:



5.5.3 Level of detail: Areas of detail and rest

Detail is very powerful and very tempting to use.

The problem is that detail can be used as a crutch by many artists as it is fun and simple to focus on. An artist who is not sure how to make an artwork better will simply focus in on detail while a lot of the big structural aspects of the artwork still need attention such as forms, shape hierarchy and silhouette.

Focusing on detail too early and not resolving your core construction is a big problem. Too much constant detail can also be very noisy and even irritating to the viewer without breaking up that detail into islands with areas of rest in between.

So what is detail and areas of rest?

Let's have a look:

Areas of Detail: Red

Areas of Rest: Blue

As you can see here the areas of heavy detail are considered and pushed to certain areas of the character. Areas of detail are moved and

focused to areas that you want the viewer to look at as they will draw attention.

In between the areas of detail are areas of rest. The areas of rest are used to rest the viewers' eye as the eye tends to move around areas of detail in a busy way, so the area of rest is a break for the viewer and a space to move to the next area of detail or interest.

If you want to break it down further and use some terminology from earlier chapters, areas of detail will often not just be a collection of high detail but will often be a cluster of secondary or tertiary shapes with a high-value contrast.

Too much consistent high detail over a piece of art with no interruption can lead to a very busy aggressive look that is hard to visually digest and can even be seen as upsetting to the viewer.

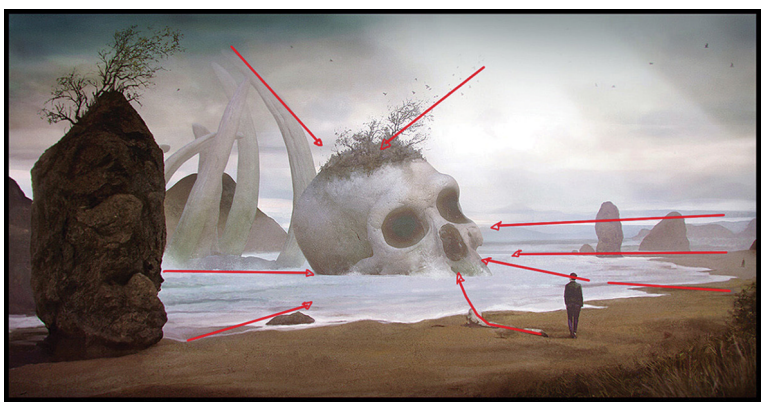
By focusing the detail into areas that you want the viewer to look is a very powerful tool.

In between these areas of detail you can place areas of lesser detail or rest to let the viewers' eye rest and move onto the next area of detail.

5.5.4 Lines in composition and focal points

Composition and the use of lines is something worth considering as composition is a very powerful tool. Lines are naturally attractive to the viewer, so they can be used to guide the viewers' eye to where you want it to go. Line work is often a very effective tool with the use of value contrast and using both to direct the eye.

Let's take a look at a quick example.



As you can see here lines are pointing to the area of focus. The areas of high contrast are the natural focus of the image, and the leading lines push the viewers' eye towards this.

Let's take another look at this in effect, but this time on a character model:

As you can see many lines on the body push the eye along to the area of main interest, which is the face and arms.

These leading lines do not have to be heavily planned, and you can lead some of this to chance.

Saying that though, you should be aware of their usefulness and if you are constructing a character it would be a smart move to nudge any construction lines that are popping up in your design to point the viewers' eye towards areas that you wish them to focus on.

5.5.5 Conclusion

Many character artists see themselves as simply builders of characters. Be that for games, collectibles or film. They will often leave the consideration of design principles as a problem that will be resolved by the concept art team or art directors and is not their primary concern.

This is true to some extent, and as you are early on your career as a character artist, this aspect will be resolved before you get a concept.

More senior artists though will be expected to resolve some of these aspects themselves. As you move towards a lead, art director or production designer in your career, you may often end up leading a concept team as well as having to review work, where these principles become vital in correcting and pushing the team's quality of art.

These design principles can be avoided to some extent, but not forever. Eventually, you will need at least a rudimentary understanding as you progress in your career and the more you know, the more it will benefit you and your team in creating appealing artwork and stunning visuals.

5.6 MATERIALS

This chapter will cover the subject of materials on your character models. This theory is more focused on modern physically based rendering materials for modern character models in games and less of a consideration for miniatures or collectibles.

This chapter will explain why mixing materials and creating a good tempo of different materials is a great trick to make your character models look richer and more appealing.

Lastly, there will be a brief example of this theory in use on an actual character model that is set up in the physically based rendering asset creation pipeline.

When we refer to materials in terms of computer-generated artwork, we refer to the types of surface that is applied onto the polygon mesh of the artwork. These materials can combine to mimic real-world materials and surfaces in a very convincing way.

These days we have very advanced materials in use in modern production. These materials are based on a PBR model. PBR means physically based rendering. This means the models are close to accurate to the scientific breakdown of real-world materials. Combine this with lightning models also working along PBR guidelines, and we have materials that can replicate almost every type of material in a realistic and believable way in many lighting conditions and in many environments.

The PBR method also standardizes the pipeline and terminology of creating cg material, so it is a lot easier for teams and individuals to work along a sanitized and standardized method that generally produces consistent results.

Beyond the technical aspects of creating modern material as seen on characters for games engines and films, there is the creative aspect of creating materials for an appealing result.

The terms we will be looking at here with this in mind will be accurate material representation, and very importantly material variation.

Accurate material representation is fairly obvious, and with modern PBR toolsets, very achievable. There can still be room for error though and cg surfaces can often default to a plastic look. Some material such as fabric, hair and other microfibre or fluffy surfaces and even water can be harder to achieve. These surfaces usually require more effort to look accurate and need to be pushed harder away from the default cg plastic look.

Material variation is more on the design side of things, but leads to appealing results. This term refers to getting a good tempo of materials in your artwork or character so that they are broken up somewhat and not all one type of material. There can be too much material variation for sure, leading to a busy visual result, so you will often want to have a few materials in your design and then break them up and variate as needed to get a nice and interesting layout of your materials at use.

Here is a character as an example:

Let's break this image down further:

As you can see here, the character has a good selection of materials. The materials are of certain groupings though and not too much. They are then set out on the character at certain intervals to produce an interesting layout for the viewer.

If you have scope to work with quite realistic materials, it is a nice effect to have a wide variety of materials on your character, from very shiny materials such as metals, glass and ceramics, thorough mid shine or gloss materials such as skin and leather to materials that are close to matte such as fabrics and dirt.

With this good level of variation in shine, gloss or roughness in your materials and also variation in types of materials such as metals to fabrics, you can generally achieve quite an appealing result with good material variation.

5.6.1 Conclusion

Material variation, although a powerful trick to consider, is not as important as getting the big stuff right like anatomy and proportions. With that being said, it's best not to ignore it as it's a valuable tool.

As you develop though and are looking for new tricks to get your character looking just right, this is another aspect to look at, develop and manage to get your art moving towards the next level.

6.0 Tools!

The modern digital artist toolbox

6.1 SOFTWARE

The tools used by the modern digital artist are flexible and many.

The modern character artist is expected to learn many modern digital art creation tools and keep up to latest industry developments and trends. This may seem daunting at first, but we can just focus on the few primary programs initially that are used to build characters. Later, we can move on to secondary and support programs once the core toolset is familiar.

The modern character artist should be prepared to learn many complex software programs, with an expectation to learn more as the industry continually develops.

Artists ideally should have their few chosen programs that they specialize in, but they should also be willing to drop tools learned if they are no longer efficient or relative to the industry.

That being said some of the industry standard tools have been around for many years, so artists can be confident in investing time into learning them and becoming masters of these tools.

Generally, these programs are a complex set of tools that will have the artists working from conceptual stage through to final implementation.

6.2 FOR GAMES

To break it down further and to put the process of building character art for games in focus, we can consider these stages of 3D character creation for games:

- To start off, the first stage will be receiving 2D concept art. This can be provided an image reference found or produced by a concept art team, working in Photoshop. Rarely, the concept could also be developed by the character artist themselves.

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- After that the artist will start working in modelling programs such as Maya, 3ds Max, Blender and Zbrush to block out the model.
- When referencing a blockout, this means the artist will begin to rough out the primary elements of the character build such as major forms, silhouette, primary shapes, and proportions and making sure these read well and feel good before moving onto detailing the character model further. This model will often be in a neutral 'A' pose or 'T' pose for rigging later on in the production pipeline.
- Once the blockout is complete, this is the time to start working into the model and moving the high polygon sculpt to completion. All detailing and polish is heavily applied here until the high polygon model or sculpt is complete and retopology is ready to start.
- After the completion of the high polygon model, the retopology model is started, this is the low-resolution mesh used inside the game engine.

  This can be done in standard 3D software such as 3ds Max and Maya or specialist retopology programs such as 3D-Coat and Topogun.

  The low ress mesh is a low-resolution polygon model that matches the dimensions of the high polygon sculpt. This mesh runs efficiently in game and will have the texture maps as well as the projected detail maps on the model to represent the high polygon model. A lot of detail in these texture maps will be projected from the high polygon model. This process is what happens in the stage after the UV map creation.
- Next up is UVs. This means laying out the polygons of the low-resolution game mesh onto a flat layout so that a flat texture can be projected onto the model. This process can be done in all the standard 3D programs such as Maya, Blender, 3ds Max and there are also specialist UV unwrap programs such as Unfold3d.
- The next stage, once UVs are complete, will be creating mesh maps that will project and bake details needed from the high polygon model to the UVs in preparation for texturing. This stage, called the baking stage, is done in baking and texturing programs such as Substance Painter, Marmoset Toolbag and Xnormal.
- The next stage is texturing and PBR materials setup. Substance Painter, Photoshop and 3D-Coat are what is needed here. The baked maps are used heavily in this process to use all the detail from the high polygon model in the process of creating textures and materials for the low resolution in game model.
- The last step will be importing the asset into a game engine or game asset viewer such and Unreal Engine, Unity or Marmoset

Toolbag. A process of iteration, tweaking and bug fixing will then occur as the model is checked in engine and refined further as needed. Things like the materials that will hold the created texture sets will be made here and also applied to the model.

- Here is a recap of some of the programs used in the process of creating a model to be used in game engines:

  3D-Coat – (retopology, texturing)
  Blender (modelling, UVs)
  Autodesk Maya (modelling, UVs)
  Autodesk 3d Studio max (modelling, UVs)
  Pixologic Zbrush (highpoly, sculpting)
  Marmoset Toolbag (baking, game viewer)
  Marvelous Designer (modelling – fabrics)
  Substance Painter – (texturing, materials)
  Topogun – (retopology)
  Unity – (game engine)
  Unreal – (game engine)
  Xnormal – (baking, map editing)

There are many other programs that can be used in the process of creating character models for games, this is not set in stone though and just a selection. Artists will often use many other programs and tools to create the models for games; this is just a selection of some of the most common.

6.3 FOR COLLECTIBLES

For collectibles and toys the toolsets will be somewhat the same, but the process will be a little different, particularly towards the end of the character creation pipeline, once the initial sculpting is coming to completion.

For 3D sculpting, specifically to 3D print, you spend the majority of your time in a digital sculpting program such as Zbrush.

You will not need to use as many programs as you do when creating character models for games. With that said you will have to be very proficient at the digital sculpting aspect and very confident in this area as all your sculpting will be done in the digital sculpting program. Preparing the meshes for 3D print and manufacture will also be done in your digital sculpting programs, so you should be a master of this area. Then a knowledge of programs that prepare the model for print, supports and reproduction will be needed.

To break this down further:

- To start off, much like in game art, the first stage will be receiving 2D concept art. This can be provided an image reference found, produced by a concept art team or even developed by the character artist themselves.
- After that the artist will start working in modelling programs such as Maya and Zbrush to block out the model. When referencing a blockout, this means the artist will begin to rough out the primary elements of the character build such as major forms, silhouette, primary details and proportions and making sure these read well and feel good before moving onto detailing the character model further. This model will often be in a neutral 'A' pose or 'T' pose.
- Once the blockout is complete, this is the time to start working on the model and moving the high polygon sculpt to completion. All detailing and polish is heavily applied here until the high polygon model or sculpt is complete, usually in a symmetrical pose.
- The next step is where we start to deviate from the game art character-building process.
  This is where you will usually break the symmetrical neutral 'A' or 'T' pose which you would not do in game character art.
  Here you can start moving the character into pose, thus breaking symmetry. From here you can work on the sculpt further and progress to final polish and detailing.
- Now when the model pose is complete, we can start preparing it for 3D printing and reproduction. We will cover these aspects more, but the model needs to be checked for things such as a watertight exterior mesh, any bad concave areas, bad overhangs and so on that can lead to serious print and manufacture errors.
- Once these aspects are cleared up, the model is collapsed to one watertight mesh and prepared for splitting and keying. This process as well as the process of adding keys can all be done inside of your digital sculpting program such as Zbrush.
- Splitting and keying is next. This is the process where if the model is too big; it is split into parts to fit on 3D printers. Keys are added so that the pieces can be glued back together again after printing and the keys add as guides for reconstruction as well as locking the parts together again.
- Finally, the meshes are checked in programs such as Netfabb to make sure they are print ready, such as filling any missed mesh holes, removing ngons and bad mesh parts and making sure the sculpt is the correct scale for physical print. Lastly, supports can be

added if you plan to go straight to a 3D printer, in programs such as Chitubox and Preform. Supports are what will hold your sculpt onto the print bed of the printer.

- Now you are ready to print and see your work in the real world! This is the first step to mass reproduction in other materials and sizes.
- Here is a recap of some of the programs used in the process of creating a model for 3D printing and collectibles:

  Blender (modelling)
  Autodesk Maya (modelling)
  Autodesk 3d Studio max (modelling)
  Pixologic Zbrush (highpoly, sculpting – primary program)
  Marvelous Designer (modelling – fabrics)
  Netfabb and other 3D print prep programs (final model preps, cleanup, supports and slicing for 3D print)

I hope this gives a good overview of the tools used by modern game character artists and digital sculptors.

This is by no means a definitive list. Individuals are free to use their own preferred tools and come up with their own processes and pipelines to some extent.

I am simply revealing some of the industry standard softwares and practices.

The games and collectible industry does expect its artists to be proficient in some of these standard tools, and there is often not much variation in these I am afraid when working in larger studios with established pipelines.

That being said, if your focus is less on larger studios and very established pipelines then the artists have more flexibility to choose their own tools.

I would say, for personal work this is the area where you are really free to use your own techniques and tools. You should use whatever tools you want, experiment with new tools and techniques and just use what seems best to get the result that you want.

6.4 HARDWARE

For hardware, you will mostly be working off a PC platform.

You can use Apple design platforms too, but some software may not be available on Apple.

You will generally need a large graphics workstation or pc. Laptops are possible to use, but due to their limited computing power and

smaller screens they are not often used by graphics professionals. If it is mobility you want and don't mind sacrificing a little power then they may be worth looking into.

A piece of hardware that is specific to digital artists and used extensively is the modern graphics tablet or stylus. This can take many forms but is often in the form of a flat rectangle or drawing pad in front of the monitor screen. Some more expensive variants can have the drawing surface in the screen so that they are very close to a drawing board or paper.

With this comes a digital stylus that records your brush strokes on the screen or drawing pad. With this tool you can sketch, paint and sculpt in a very free form way and it is all recorded immediately and digitally.

Graphic artists tend to work with fairly large resolution screens, over 30 inches and often with more than one monitor. I routinely work with two large monitors. One to do the work on and view the art program and a second to hold references, notes and anything else I need.

The specifications of your actual computer are somewhat important, but not vitally so. Generally, the faster the better, but we can be a bit specific here.

Graphics cards used to be a bit less important, but modern gaming engines and texturing programs such as Unreal, Unity, Substance painter and Marmoset toolbag run primarily on your graphics card, so you do need something decent to substantial here these days. Mid-level to high end graphics cards are advisable here.

For RAM, you will need a lot. You don't have to go crazy here as this is not a gaming PC, but a work station. A decent amount of ram is good, generally 32GB to 64GB or more, if needed. You don't need to go crazy here.

For processing power, you will need a fair amount. If you are planning to do offline rendering, then a lot of processors is good. If not, a few good cores on you processor will probably be enough. Programs like zbrush use your processors a lot, so something at least decent here and fast will need to be considered.

Storage is the last aspect and it should generally be substantial. You should have a lot of storage for your working files as projects these days with big digital sculpts and large textures need a lot of space. You will need a lot of space on your primary drive outside of your work storage drive as programs such as Photoshop use this drive for virtual memory, so if there is not much space, these programs will start to falter.

Lastly...backup!

This is very, very important, particularly if you are running your own business or are a freelancer. If you have no IT team covering this, you will need to do it. Even just for personal work it is highly advised. Hard drives do fail and you will loose stuff, so back it up! Believe me on this one.

With the core workstation, work drive and backup, you should be looking at terabytes of storage, as much as you can get.

6.5 CONCLUSION

I hope this gives a good overview of all the tools, digital and hardware that you will need to consider as you enter this industry.

There are many more and its about finding the toolset that is comfortable for you, but this provides at least an overview of the common tools uses and the general setup you will need to consider to get working.

7.0 Technical Example 01

High-detailed PBR game character

Let's get started with the first technical example. This example is of a high-detailed character created for use in consoles or PC platforms. This character will have some stylization to it, so will not be an attempt at pure realism. The focus will be on getting an appealing look with a slightly stylized game art look but still achieving a high amount of detail.

We will be building this character model for game engines and will have final presentation in Marmoset Toolbag, a modern game model viewer.

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7.1 CONCEPT

For this character model, I will be designing and building the character as I go with the client. This is not normal though and usually you will be delivered a finished 2D concept from the concept team.

This 2D concept can take many forms, but at the minimum you will get a good character mood drawing in some sort of posed view. Ideally, any props and add ons will be split off on the concept of independent modelling.

If you are lucky you will get the front and back view too in concept as well as the character in T – pose. This is unusual, but nice to have.

Often you just get a single-character concept in 2D with some pull outs of specific areas and items for further clarification. A pull out on a concept is an area separated and defined further for the 3D artist.

Ideally, with the concept you get some form of colour wash and some idea of the colours and materials on the character as you will be building those characters in 3D.

So yes, you will need a concept to start. In this example, I am concepting the model live in 3D with the client. This is unusual process and can take some time. The more efficient process for a production pipeline is for the 3D artist in the 3D team to receive an approved 2D concept and start building off of that, a little bit different here as we are doing it all on model. A risky approach, but I am happy to do this here.

So the concept is done and we will work the look out on the model.

With that all defined…..let's get started!

7.1.1 Sculpting – Which method is best?

There are two ways to start sculpting a character in Zbrush.

The first and more regimented way is to receive a mesh with defined topology to work on. This topology is standard across the production and technically sound for later rigging and animation. With this mesh you will slowly work it up, add layers, resolution and detail until completed in Zbrush. The bonus of this method is that you get a locked mesh with set topology to work on and is very favourable if working in a tight pipeline with lots of detail and technical requirements. In a more regulated and controlled and mature studio, you may be working with this method. It is somewhat creatively limiting, but way more secure for technical building of characters as you work on a stable, consistent and defined base mesh.

The second method is more free form and loose sculpting. This is less regimented and controlled but allows for more artistic freedom and flexibility. This method is essentially like taking a blob of clay and taking

it from there, defining, molding and adjusting on the fly as you go. Much like traditional clay sculpture.

This is my preferred way of sculpting. If I have the ability to do this, then I definitely will, so we will be covering this method here.

7.2 BLOCKOUT SCULPTING

The first stage is blockout sculpting.

Blockout sculpting is the effort of blocking in your character, addressing the big issues, so it is in a good space before any detailing begins.

The purpose of blockouts is to focus your art on the most important aspects of your sculpt. These most important aspects of your 3D model are the primary forms, proportions and silhouette. Here you are focusing on the big shapes, silhouette and proportions before you get anywhere near detailing.

With these core art aspects in a good place and looking excellent, you are in a very strong place to move onto detailing and polish. With these aspects locked in and appealing you are ensuring that you are creating a very strong framework to push your character further.

If your core art fundamentals are not strong before detailing, you may be struggling for a long time to address a character build with fundamental problems. No amount of details and nice materials will fix these core problems. A blockout is one of the key ways to address these problems before moving too far ahead in the process.

The blockout is also a good stage for a lead artist or art director to check your work to see if it is heading in the right direction. This will usually be a required stage for them to review your work and add notes or move it on to the next stage.

Here, I used a female base mesh as a starting point to save some time. A generic female base mesh is used with very low details, just some good proportions. As a cg artist you will most likely build a library of useful 3D assets and base meshes, and I have done this. To save time, I have a number of good humanoid base meshes, and I start with one here.

With this base in place, I start working on this further, defining the large forms and silhouette.

The brushes I use the majority of the time in Zbrush for this and all my sculpts is:

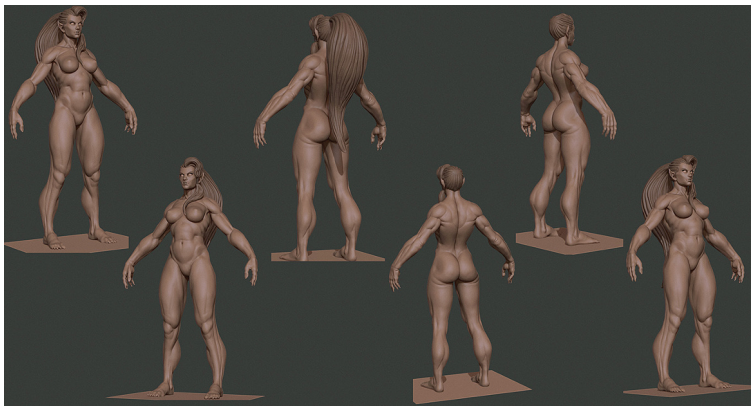
- ClayBuildup for all form creation.
- Standard brush with Alphas loaded for some details.

- Clay brush to flatten and smooth.
- Dam_Standard for folds and wrinkles with the Slash3 Brush.
- Move and snake hook for moving the mesh around.
- Flatten, Hpolish, Spolish and TrimDynamic for flatten and hard smooth surfaces
- Finally Orb_Cracks for big crevasses in the mesh.

I build most sculpts out of just these, rarely needing to use much more.

Here is the first pass of the blockout sculpt. The focus here is to start throwing elements together. There is no real detail, the aim is to get some of the big landmarks in, get proportions in and start working on the general look.

7.2.1 Blockout sculpt



Here is the final blockout sculpt. Overall all the proportions and big shapes are in place. The silhouette is defined, and this sculpt is now ready for some refinement and detailing.

All the fine aspects of the sculpt do not need to be in place. This is all about getting the big shapes of items in place and sorting out the overall proportions and layout of your character.

7.2.2 Final blockout sculpt

You can see here that the character and armour did evolve beyond this blockout later on as the concept was still being defined live on the 3D model. Ideally, the blockout would have all large shapes and silhouette layed out and approved here, but since there is live concept going on in 3D here, it does change a little. The body at least, stays the same and the blockout does its job here.

Before we move past the blockout and head further with the organic sculpting in Zbrush, let's take a quick look how I handle modelling hard surface items such as the armour.

7.3 A METHOD FOR CREATING HIGH POLYGON HARD SURFACE ARMOUR

Hard surface modelling refers to the process of creating solid and hard objects like metals, ceramics, masonry, stone and architecture. It is generally a different method to organic sculpting such as you do in Zbrush, so let's cover that here quickly.

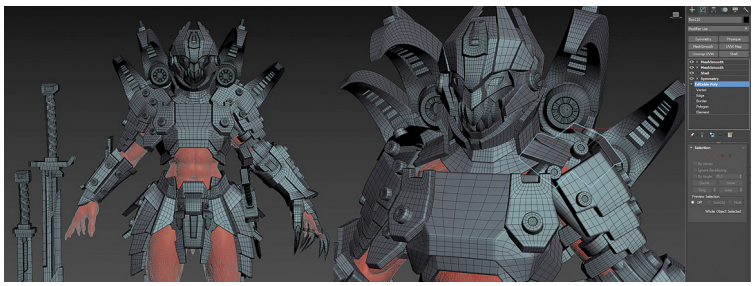
I still find it easier to make hard surface high polygon meshes outside of Zbrush. You can do it in Zbrush, but I like my method. For this hard surface modelling I used 3ds Max, but you can find similar methods in other 3D modelling programs.

This is the method I use:

I model the armour in low polygon as it is far less detail to deal with and very flexible with just a few vertices to control. Then I add a series of 3ds Max modifiers on top of that mesh that adds resolution and symmetry while following the underlying shape.

So we have a base low polygon mesh that is the shape of the hard surface armour part. Then I add a meshsmooth. The important part is

that I click on the 'Smoothing Groups' box. With this checked the meshsmooth adds hard edges according to the smoothing groups applied to your low polygon mesh. Smoothing groups can be found in you editable polygon rollout. This is an essential step.



Now I add a variety of modifiers on the simple polygon mesh to build it up to a usable high polygon mesh.

- A symmetry modifier completes the mesh shape.
- The shell modifier adds a uniform thickness or edge.
- The first meshsmooth modifier adds resolution while retaining the hard edges of the smoothing groups.
- The second meshsmooth adds further resolution and smoothing.

Now I simply repeat this process for all the armour pieces.

The strength of this method is really the simplicity. Here you are only working on a basic low polygon mesh, modelling and defining. Through stacked modifiers you are automating the simple low polygon mesh to a high polygon mesh that has lots of resolution and is primed for export to Zbrush, where final dents, details and wear pass is added.

Once the armour high polygon modelling is complete, I export it as a high polygon mesh, .obj in this case, and import it into Zbrush for further work and detailing.

7.3.1 Refining sculpt and detailing

At this stage, all the large elements are in Zbrush. Now it is time to move to tertiary detail and start working on all the fine detailing such as small patterns, skin detail, wrinkles and small fabric folds. Projected alphas on the standard brush are helpful for this level of detail, but it is good to hand sculpt a lot of this detail too for the strongest visual result. As I am figuring out the design of this character as I go, some details like the armour change as I try out different design options.

Lastly, I add a final wear and tear pass in sculpt to all the hard surface elements that I made in 3ds Max. In Zbrush I finally add dents, wear and detail, bevelled edge dents and large-scale scratches, damage and lastly bolts and rivets.

7.4 COMPLETION OF HIGH POLYGON AND PREPARING FOR RETOPOLOGY

Now at this end stage we polish all aspects of the sculpt in preparation for baking. This is when we condense subtools together and make sure hidden areas of the sculpt are also in decent condition in preparation for baking.

Here is the final sculpt, but final wear and dents are needed to be added to the armour

Here is the final sculpt rendered in Redshift with armour dents, wear and details:

7.5 RETOPOLOGY

Retopology is the process of building a low-resolution mesh that is ready for game engines. This mesh follows the shape of your high-resolution mesh exactly and will carry the details of the high-detailed mesh to UVs and baked maps. Your high-resolution mesh or sculpt is way too heavy to be used in engine and animation, so it needs to be projected across to a lower resolution mesh.

This is what we will create now.

You will generally build your game resolution mesh to a budget that will be defined by the technical needs of the projects and which engines, consoles or other platforms it will be eventually on.

For this example we are aiming for a relatively high resolution used by powerful consoles, so we will be aiming for the one hundred thousand to two hundred thousand overall polygon or triangle budget. A high and healthy budget to work with. Very nice.

As an example, very low detail mobile games may use characters with a polygon count of around five to ten thousand triangles. Large console games with massive budgets can use character with up and over two hundred thousand triangles! A big gap, so it's good to define your character build budget before you start building you in game low-resolution retopology mesh.

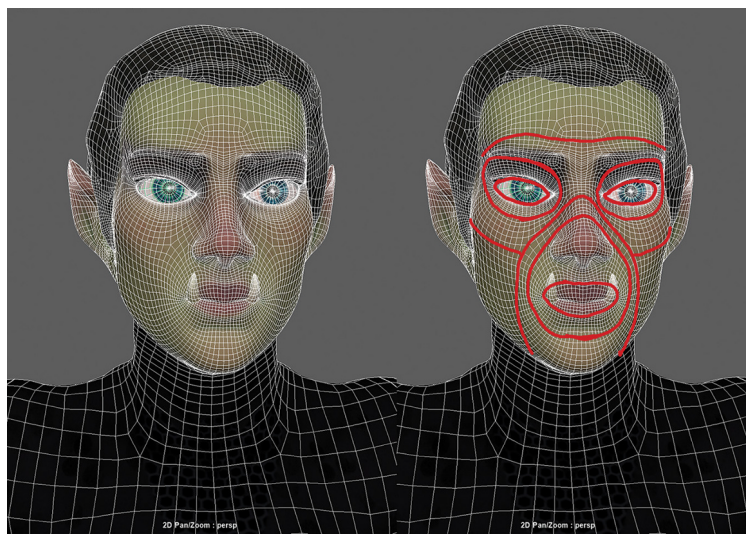
We have our budget now, so let's start building out retopology or game resolution mesh.

Here I have used 3ds Max, Maya Zbrush and 3D Coat to create my retopology mesh. You can use many programs to do this as it is simple polygon modelling, so I use my favourite modelling functions from many modelling programs to get to a good end result as fast as possible.

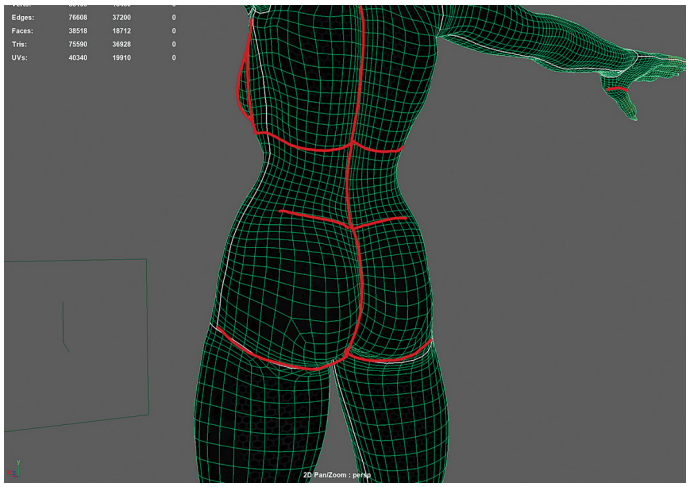
One of the most important aspects to remember when making a character retopology mesh is creating good topology and flow for rigging and animation. This means creating topology flow that supports deformation according to anatomy in a believable way. Generally, more loops are put in high deformation areas so that the topology does not become too low resolution and stretched out when the rig pushes it to extremes.

Here are some examples of supporting topology on the game resolution mesh that will support deformation, animation and still retain general anatomical believably.

Here the loops on the face are flowing around musculature and skeletal shapes. These loops reinforce core anatomical forms, so as they stretch, animate and deform, they will look more believable as they follow the forms and flow of the actual muscles and skeletal forms of the face.

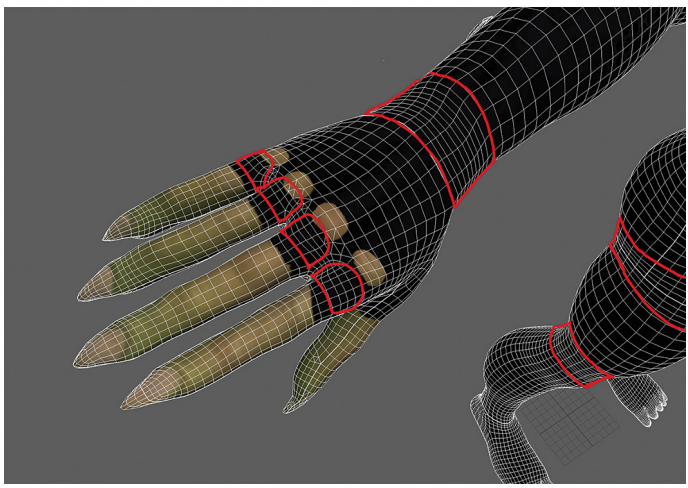


Here the general topology retains a nice regular grid structure that is good for animation deformation and rigging. With this topology the loops flow and follow large muscular forms such as the buttocks and important skeletal landmarks such as the rib cage.



Here the topology follows and flows around the wrist and knuckles.

In theory this does not have to happen, but it is a fantastic way to support your anatomical shapes as they go through deformation and animation. If you want to make a really good retopolgy mesh, please do this.



The way loops are laid out on a retopology mesh are somewhat streamlined and universal.

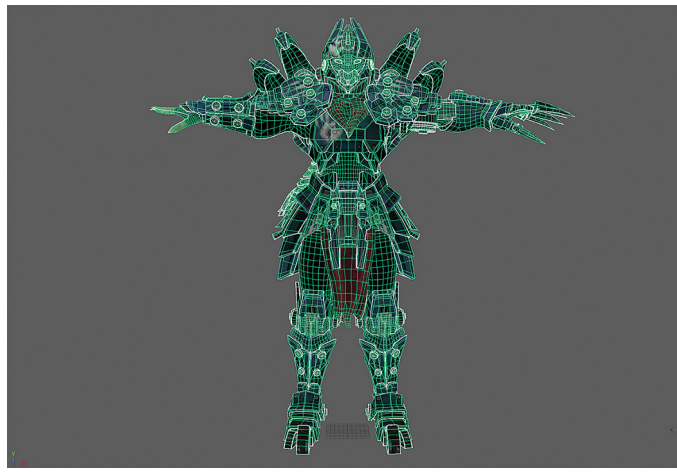
The focus is to create regular loops around the model and loops that support deformation and animation. The mesh is mostly regular quaded polygons but can have triangles sometimes where needed.

Triangles are ok to use as any mesh going to a game engine gets auto triangulated anyhow, so triangles are not a problem in game engines.

Polygons over four sides are called N-GONS and are specifically to be avoided as they are very unfriendly to game engines and can lead to some chaotic results.

So once you learn the general expectations you can follow the same process every time, even using the same base retopology mesh for many characters!

Our retopology mesh is complete:



7.6 UVs

UVs are the process of laying the mesh flat out onto a 2D plane so that 2D textures can be applied to the UVW map and then wrapped back onto the character model.

Ideally you have some idea of the process here as this is one of the fundamental aspects of computer graphics.

The trick for UVs in game resolution models is to be as efficient and neat as possible. For games models you generally want to use almost every pixel on the texture map to be efficient since wasted space on your unwrap is wasted data loaded live into the game engine. Not the best practice.

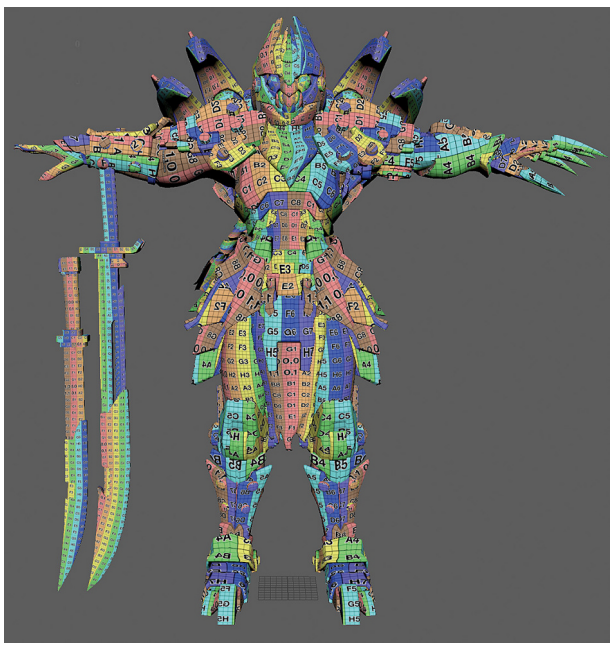
Game UVs are also usually in one UDIM, not spread over multiple UDIMs as game engines generally, particularly in the past, did not read UDIMs.

UV padding is the process of adding a small buffer of space around each UV island to allow for pixel blurring when MIP mapping occurs in engine.

Planning out your UVs for game models is like modern Tetris. If you plan your UVs out well and stack them accordingly, you can have very neat manageable textures that use up almost every pixel of the texture maps. You want to use up every bit of space up on your UV map as every pixel loaded uses memory in a game engine. So pixels that are loaded and not used are not good at all. The process of organizing your UVs is called UV packing.

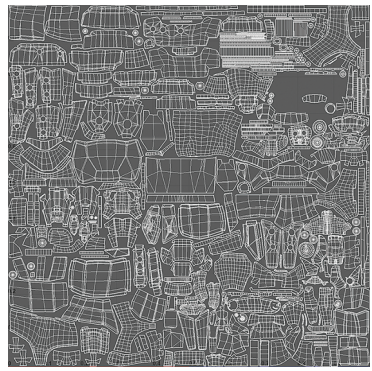
As you plan and lay out your UVs, it is good to put a checker pattern material or grid image onto your model to judge how the UVs are looking. This is to check the UVs are in good resolution in relation to each other and to see if there is any bad unwraps or stretching. You really do not want differences of size on the grid indicating the islands are not of the same general scale. Bad stretching is also to be avoided where your UV checker grid is not a series of squares as it will lead to ugly stretched textures. Both of these problems in your UV map are to be avoided.

Here is an example of the character model with a UV check material put on it to see if there are any issues with the finished UV unwrap.



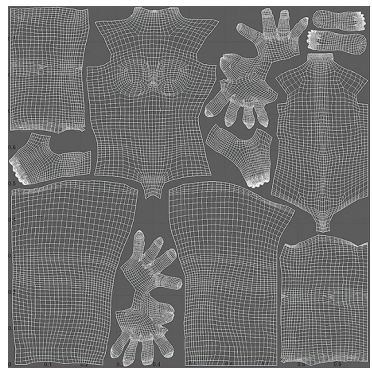
Here are out UVs for the character laid out on six separate UV sheets:

Armour UV unwrap 01

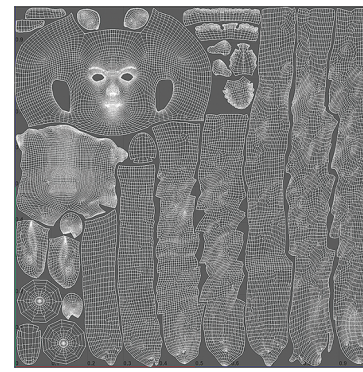


Armour UV unwrap 02

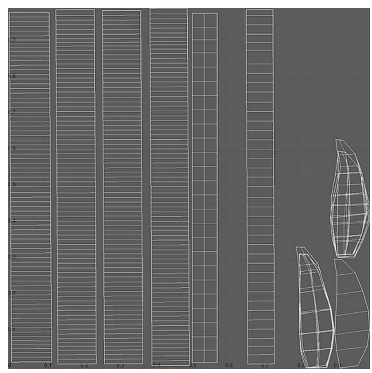
Body UV unwrap 01



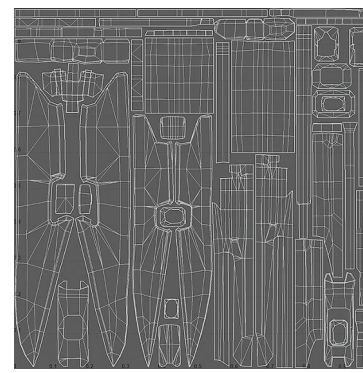
Body UV unwrap 01



Hair cards UV unwrap 01



Weapons UV unwrap 01



As you can see, this character has six UV unwraps that will hold six full PBR material texture sets.

The packing of the UV islands is pretty tight and neat. I try to use all the space available as that is best practice. The only open space I have, which is not good, is on the hair UV layout. This is there in case I wish to add more hair textures in the future, but big unused spaces like this are generally to be avoided.

Generally, I make sure to put all metals and hard surface items like the armour and weapons on their own texture sheets for the PBR texture creating process. I then put organic textures on their own unwraps to keep those types of materials on their own sheets and not mixed in with metals.

Textures of the same type of material type are moved to a new map set once space has run out, that is why there are two armour texture sets instead of one to keep the texture resolution uniform.

One last little trick to use often in games is to stack similar UVs. So for instance on this model, for the leg armour specifically, the left and right leg use the same UVs, so the PBR texture maps are used by both meshes. This saves space and memory as each element does not have a unique unwrap, but the texture is shared. This is best done away from the centre line of your character as the duplication can be noticed if you use symmetry to construct your character. Arms, feet, legs hands and repeating armour are prime candidates for this method.

We will be authoring the textures at 4096 by 4096 pixel dimensions or 4k.

7.7 BAKING

Baking is the process of projecting all your high-resolution details from you high-resolution mesh onto a series of texture bake maps that are wrapped onto your retopology model. This may seem a difficult process to understand, but I encourage you to try it yourself and you see it's a pretty straightforward process once you get going.

These maps record the information and details from the high-resolution mesh and project them via maps, for the texturing process onto your game-ready model.

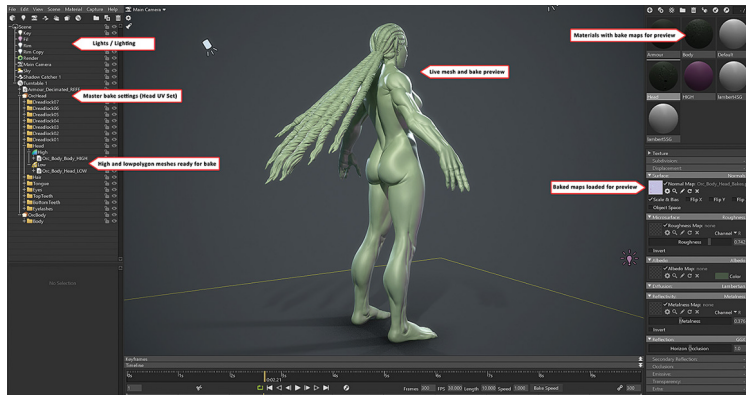
Good bake maps create good looking game models and good textures, so it is important to get them looking just right. Best not to rush this. These baked maps are used directly in the game engine and are extremely important in texturing programs such as Substance Painter.

For the texture baking process of this character model we will be using Marmoset Toolbag, but you can use other programs such as Substance Painter or Xnormal if you prefer.

Before we get baking we need to check we have all low polygon retopology meshes ready with UVs. We then export them as.obj or.fbx meshes to be used as the low-resolution mesh that the bakes will project onto.

Then we make sure we have all high polygon meshes ready and that they are in the identical space as the low polygon meshes. The two meshes being in the same space is VITAL as any large difference may lead to your projection not working and lead to bad errors in the bake.

Let's go through our baking setup in Marmoset Toolbag to see what is going on:



For the bake in Marmoset Toolbag, we create one baker node for each UV set we are baking.

We can do all bakes in one file with multiple bakers or one marmoset bake file per UVs set bake. It's really your call on this.

Under each bake tab we stack the relevant meshes in their own folders.

Each folder has its own high and low polygon slot where you need to place your exported high and low polygon models. Meshes are split and grouped as high and low. So for instance we have the high and low polygon body mesh stacked on top of each other in a group. The teeth high and low are stacked and in a group too and so on.

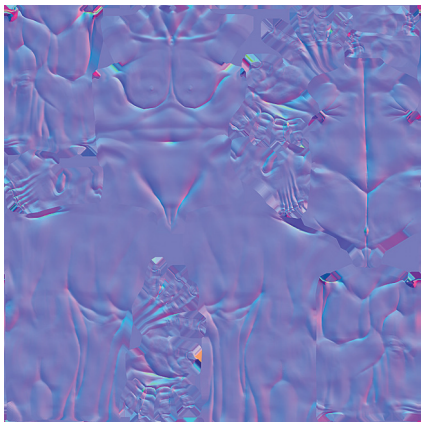
When this is all done you can start doing some test bakes. I usually just test bake the normal map as it is a fast map to bake before adding any other bake maps. If you have errors in your bake, ensure your high and low mesh are really close together, and then adjust the cage

distance on your bake. It is best to sort out all errors before you bake at large resolution with all maps as these errors will haunt you through the texturing process if not sorted out early.

These are the bake maps we will need to create for this game-ready character model:

7.7.1 Normal map

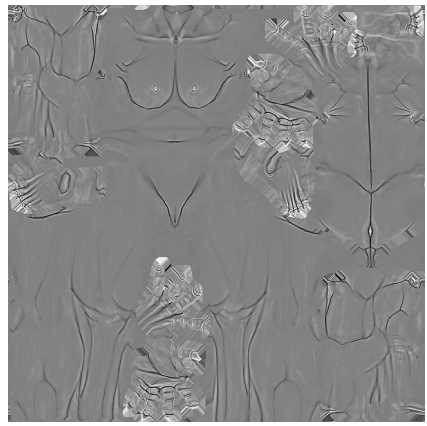
This map stores projected detail from the high-resolution mesh in three RGB channels. These channels record projected light from three directions in these channels. It is essentially a very powerful bump map. This is your primary map for recording detail from a high-resolution mesh and approximating that detail on a low-resolution mesh. **This is a very powerful and important map**.



7.7.2 BentNormal map

This is a type of normal map that cannot be used often, but we will pull it apart to use elements of it for our texturing process.

7.7.3 Curvature map



This map records where the high-resolution mesh has any hard changes in face direction or detail. It is a good map to control such things as edge wear in texturing.

7.7.4 Cavity map

This map bakes wherever there is a deep cavity and deep shadow on the high ress mesh.

7.7.5 Ambient occlusion map

This map records local shadows on the mesh. Where light photons get stuck in dark crevasses on the high polygon, this is recorded on this bake map. This makes it also very important for fake lighting used in stylized texturing. It is also useful as a control map for bringing texture elements like dirt into you PBR texturing process.

7.7.6 Position map

This records the potion of each UV island according to where it is on the model. This map is useful for filters and layers that apply themselves according to how high or low on the model the UV islands are. Like dust on high areas of the model or mud coming up from below.

7.8 TEXTURING

Now we can start texturing our five texture sets for this character!

We will be heavily using the maps we baked to create the base textures.

Since this model will be somewhat stylized I am going to construct the Albedo or base colour texture in 3D Coat and Photoshop before we go to Substance Painter.

Technically, an Albedo for PBR texturing should not have any lighting or model shape information in it. For these textures at least, it is a fine line to add some of that shaping and support that I want. So I am breaking the rules a little, but I find for characters that have stylization, I often do this a little to add more work and appeal to my base colour textures.

So here I have grabbed the BentNormal map, Cavity Map, AO map and curvature map from the bakes to start creating the base Albedo.

Here is the base created in Photoshop.

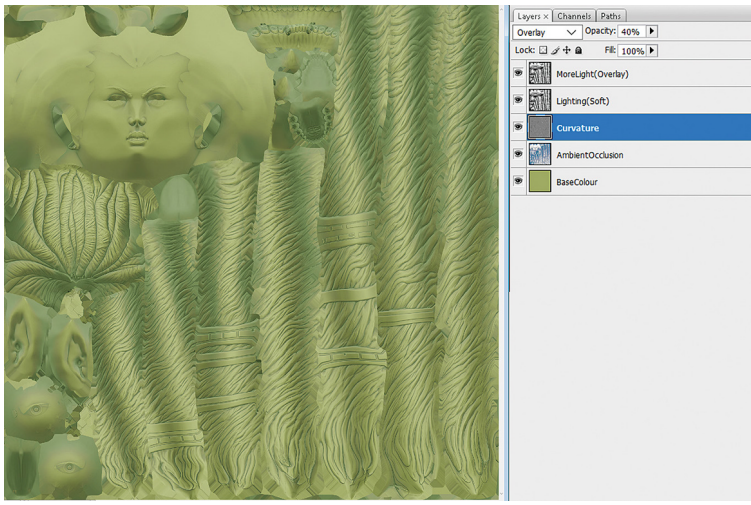
To create this texture, I grabbed the green channel from the bent normal map. The green channel is the top down light bake in a normal map, so this channel is useful for constructing textures. I used this as a soft light and overlay layer for a little shape support in the Albedo. I reduced the soft light to 20% opacity and the overlay to 10% opacity.

For the ambient occlusion map I put it as a multiply and reduced it to 20%. I also added a lighten layer with colour to add some colour to the black areas of the ambient occlusion layer.

The cavity map is added on top of the ambient occlusion map as another multiply layer and reduced to 15% opacity.

Lastly, the curvature map is added as an overlay and reduced to 25% opacity to provide some very subtle edge shaping.

Here they are ready to go:



Once again traditional PBR texturing should not have this lighting information in, but I like to do this to create a little bit of a stylized look in the texturing. So it is breaking the rules a bit, but with intent.

Now I take this PSD and import it into 3D Coat as a base.

From here I start playing around in 3D Coat and creating the base stylized Albedo further.

Here is the final 3D Coat texture, it will be developed further in Substance Painter, but this is a good base to work on top of.

Here is the completed base Albedo texture created in 3D Coat. I have painted in all the details like the local colours of all the body items, added eyes, teeth and details like freckles. More detail is added by painting soft hue variation and nice soft details to add interest.

This is not the final Abeldo or base colour texture though as we will be taking this into Substance Painter next and adding further detail and fidelity there. As you can see here I used two texture sets to create the body and skin. For the armour I used two texture sets for all armour and another texture set for the weapons.

7.9 MATERIALS

Now we are going to take the Albedo we have created as well as all our original bake maps and retopology mesh into Substance Painter. We will start creating the full PBR maps set for out character now. This is one of the most fun areas of character creation as the character can start to really look amazing as all the maps start working together and indicating the end result.

Here we set up the new project in Substance Painter:

For this project we are just going to work in a default PBR map set. This will include Albedo, Ambient occlusion, metalness, roughness and normal maps. You can work in more specific PBR project setting that create maps specifically for game engines such as Unreal and Unity, but to keep things simple we will just be working in a default PBR work space.

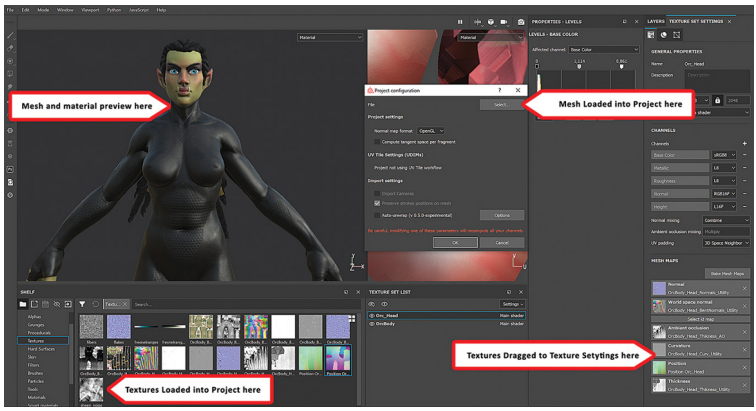
The low-resolution mesh is loaded in the PROJECT SETTINGS > FILE slot.

The baked maps as well as the custom painted Albedo are loaded below in the TEXTURE SETTINGS rollout.

As our model has two UV sets, Substance Painter will read this and create them for you. These texture sets, found in the texture set rollout at the bottom of your screen will read the material name that came with the mesh from your 3D program. You can rename them though and I named the Orc_Head and Orc_Body accordingly.

Once the project is loaded with the mesh in the 3D view we need to apply the loaded bake maps to the model. The baked maps are now found in the texture panel at the bottom left of Substance Painter, and they need to be dragged to the texture setting rollout and added to the corresponding mesh map slots.

The bake maps are added to the maps loaded with the mesh as they assist a great deal in creating your full PBR texture set in Substance Painter. Without these maps your textures will be a lot more difficult to work with and of a far lesser quality.



Once these maps are loaded, we are ready to start creating materials!

One thing I do specifically in Substance Painter is bake the position map here. I prefer to bake my maps in Marmoset, but the position map is a simple map and easy to do here.

To do this simply hit the 'BAKE MESH MAPS' button in the mesh maps tab.

Then uncheck all your other maps that you have loaded in, but keep the tick next to position map.

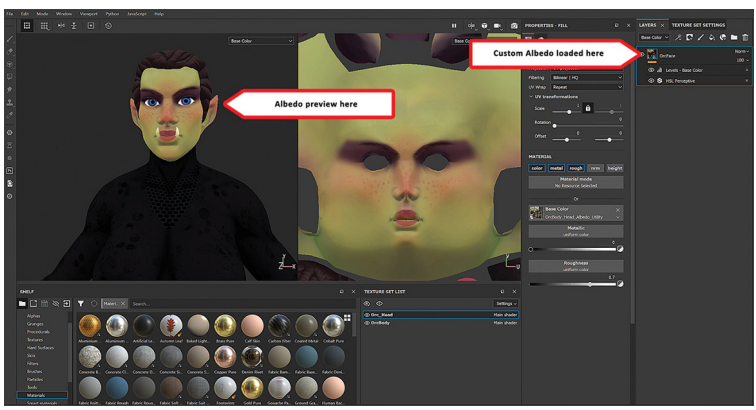
Hit bake.

That new position map will now auto load into your mesh maps rollout. Great!

First of all let's load in that custom Albedo map we painted:

We can make a new fill layer in Substance and load that Albedo into the fill layer.

This fill layer can have all base settings switched on.



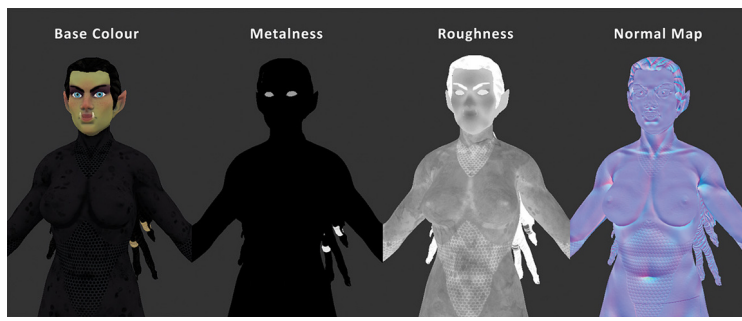
Now we start building the materials:

For these materials that are being made, standard materials and smart materials in Substance are used as a base and then built upon to get the desired look. The constructed Albedo at the bottom is the base with the Substance PBR material layers adding on the top. Additional Albedo work is added in Substance to augment the base constructed Albedo.

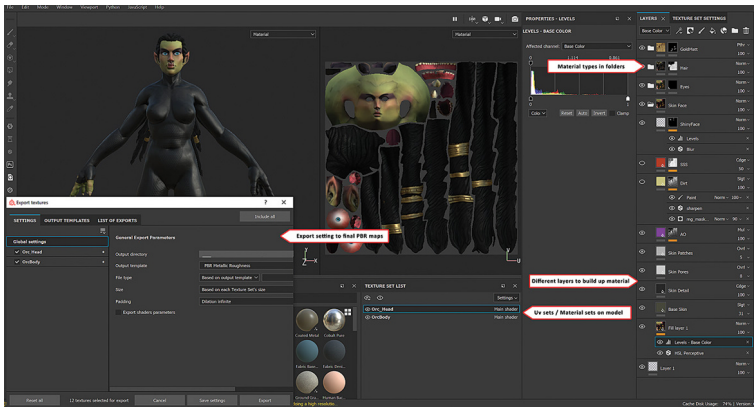
Beyond the base colour layer, a lot of attention needs to be applied to your other map channels. These maps combined create your entire material, so they need just as much attention as your base colour.

You can cycle through these channels in Substance Painter by pressing 'C'. As you add new layers and colour, ask yourself if they will effect the roughness channel, metalness channel or bump (Normal map). Some layers may not need a roughness function for example like the nose when I painted it a little redder. Some layers may need a little bump like some mud you paint on to a boot. Some layers may need a metallic value as they may have some metal feature, so you need to activate the metal PBR flag and get to work in that channel.

Here you can see the four channels being used to create the PBR material:



So with an eye on these channels we start building up PBR layers to create out end material for each texture set.

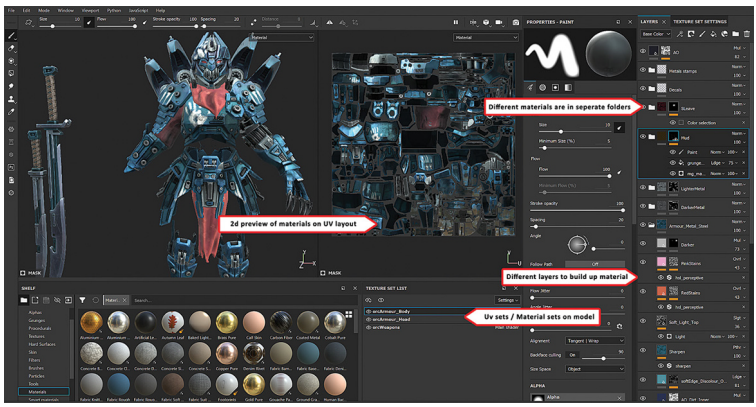


Now we start layering aspects onto the texture set as we need. We can add metal layers, skin layers, mud, dirt, skin pores and so on until we get a full PBR texture set. When we need we can switch to the next UV set on the mesh we just go to the texture set list and click on the next texture set.

I also have a separate Substance Painter setup for the armour and weapons.

I could add it to the body and texture it all in one file, but to keep the file size smaller and to be able to work faster I separated the character out into organics and hard surfaces for texturing.

So here is the Substance Painter setup for the armour and weapons:



Once again we layer up the materials on the armour to get a complex and layered metal material set.

To start off, the base metal is built. Then other detail metals are created on top. Then we can add other lesser materials in the set such as fabrics and then lastly we can add general wear and tear, dust and mud.

As the texture set is created, cycle through your maps you are creating to check what is going on. You Albedo or base colour can be pretty flat for BPR, but ideally there is some nice hue variation, complexity and gradients. Not just pure flat colours.

For your metalness channel, all you need to remember is one question:

Is this surface metallic or not?

If not, the surface is black, like the fabrics. If the surface is metallic then it is white.

Materials on top of the metal can be shades of grey sometimes such as mud on the boots. The mud is slightly transparent; some of the white value comes through the mud that is black, leading to a mixed grey metalness control colour.

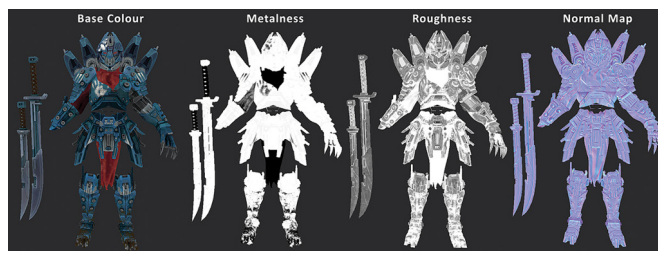
The roughness channel controls how shiny a surface is. If the map surface is black, it is very shiny and if it is matte it is white. This channel is a very important channel and often ignored a bit. If you really want to make your materials look great then a complex roughness channel with a lot of unique details will do the job for you. This channel is as important as the base colour for PBR materials. Don't forget about some TLC for this channel!

Lastly, there is the normal map channel. This will be mostly information from your normal map bake. You will be adding additional bump detail in with substance though that will augment your normal bump map channel.

7.9.1 Checking your textures

As the character materials are being built up, it is best to continuously export your textures and check them in engine or render. For this character, I would often export the PBR materials for the set I was working on and check them in Marmoset Toolbag. For more refined renders, I may also check them in an offline render engine that is not a game engine like Redshift.

With this regular back on forth, checking as you go you can work and improve your textures.



Once you are happy and you are close to done it is time to export your final textures at a high resolution.

In game development you would be exporting these material textures for final import into engine. Here though we will be exporting for final renders in a game viewer or an offline render engine.

To set up the render of the completed character, we set up a classic three point light setup. This lighting system is covered in depth in Chapter 5 (section 5.3).

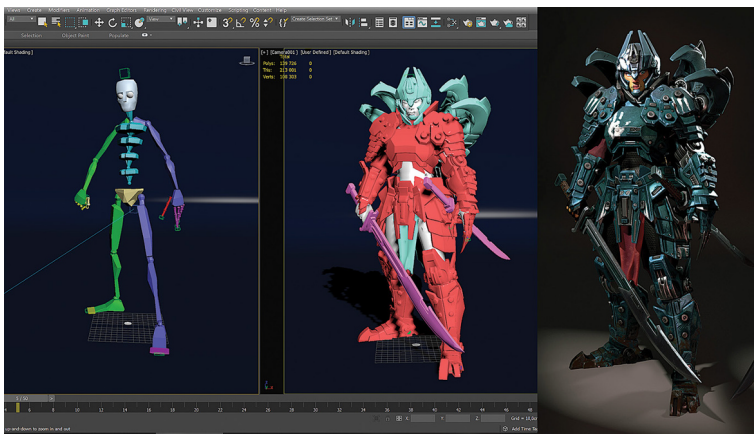
To keep it short, in your game engine or render scene, you can set up just three lights initially to get a good lighting scene on your character. The Key light, Rim light and Fill light. You also may use a form of ambient light or environmental image-based Light to fill your character lighting out.

The next thing to consider is posing your character. There is no denying it, having your character posed is way more appealing that having it in a rig pose such as A pose or T pose. It's best to find a way to resolve this. You can learn some rudimentary rigging or even just model your mesh into a pose. Either way it is well worth finding a solution to get a pose that helps make your character more attractive.

For this model, I made a very quick rough pose rig in 3ds max:

Nothing special and this rig would fall apart if you did any serious animation with it, but it's just to get some poses for render out.

This uses the default rigging system in 3ds Max, biped, but you can use any pose/rigging system that suits your need. We just need some fast presentation poses.



Once I have some good poses, I export the whole posed mesh out to Marmoset Toolbag and get some nice live engine grabs.

7.10 PRESENTATION

Lastly, it's about posting it up and letting people see what you made!!

If you are looking to show valuable work for art directors or recruiters to see, don't just show nice renders or engine grabs.

Show your retopology and wireframes; show the technical building process behind you nice character renders. This is important and shows that you can work neatly and well. It shows you understand how to make neat meshes for game engines and for animation. For games particularly, it is vital to show that you can make stuff that runs well in engine, it is in some ways as important as a nice grab or render.

Show you high polygon sculpts so that the person looking can see how much texturing you did once the high polygon was complete.

Show texture flats and material breakdowns. This shows you can pack us sets well. Plan your textures well and can make good textures in a hand-painted or PBR manner.

Here are some final renders of the character as well as images showing the underlying mesh construction, UVs and textures:

Some nice final renders of High Polygon work:

This was rendered in Redshift. Good Zbrush BPR Renders, Keyshot, Vray or any other offline renderer will do though. Not essential, but a nice extra bit of presentation.

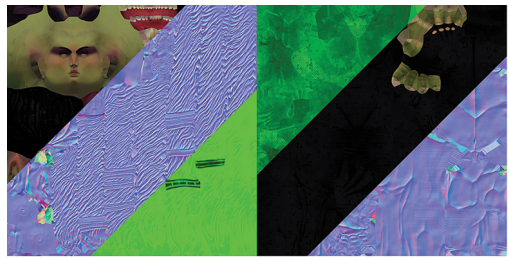
Final PBR Texture flats used:

Here I have presented the Albedo (base colour), normal maps and metalness/roughness maps.

For the metallic and roughness maps, I have combined into a combo map. This is one single map with different maps loaded into the RGB channels. This saves on memory for the game engine as you load one map, but essentially get three!

So here, on this one map, I have the metalness map in the Red Channel, the roughness map in the Green Channel and the Emissive

map in the Blue Channel. This is common in the Game Industry, it is a big memory saving as textures are expensive in games engines.



So we are done!

7.11 CONCLUSION

We now have covered the creation of a high-end character model, from concept to engine integration. All of this created for game engines in a modern physically based rendering solution!

Hopefully, this gives you a good, detailed idea of how to create these character models now. The next step is to try the process yourself, many times, until it becomes like second nature and you can churn out great 3D character models.

8.0 Technical Example 02

Hand-painted character prop

In this technical example, we will look at a different method of creating an asset for games. This method is known as hand-painted texturing or diffuse-only texturing. The purpose of this method is to use very limited resources; just one texture map and mesh to produce a full prop or character model.

This technique has its own look and can look very attractive. Using just one map puts a lot of focus on intense painting and art skills as it is all in that one painted texture map. This is in many ways the closest you get to traditional painting in the world of character modelling and 3D art.

With just one map for a game engine to load, and not many textures like a physically based rendering map set, this asset is very cheap to use.

These hand-painted assets with one map are then often used for engines and platforms with limited resources. You will often see this technique in use for mobile games, indie games and large-scale massive multiplayer online games where many players need to be on screen and bandwidth is an issue.

We will be making a prop here, this time a sword.

Character props in games are also the responsibility of the character art team, so we will tackle this aspect of the pipeline here.

Here is the finished hand-painted prop asset that we will be building:

DOI: 10.1201/9781003178057-8

A stylized hand-painted gladius.

So, we will start with a sculpt and get that through blockout to a nice finished sculpt.

Then we will bake maps and use these as a foundation to start building out hand-painted diffuse texture.

We will be using 3D-Coat as the primary program for authoring these textures.

From there we will augment these baked maps and start hand painting on top of this base.

Then we will add multiple layers of paint and washes, all on one map to get the final look.

Lastly, we will present the prop in Marmoset Toolbag with no lighting and just one map.

This asset will be very simply made with just one map, a simple mesh and not much else. This is wonderfully cheap to run in game engines, but all the appeal will come with the techniques and skill we use to create a great hand-painted texture. This is what we will do here, so let's get started!

8.1 CONCEPT

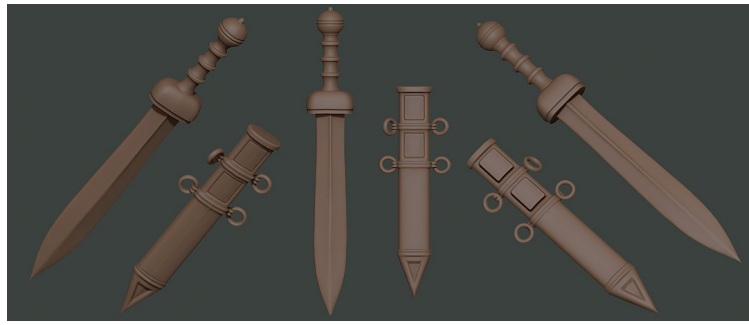
Once again, we will not have a concept here. We will just do some fast concept work on the sculpt to get what we need. In a production environment though, you would get a concept that you would need to work on to create the sculpt.

For this prop weapon, we will make a simple roman style gladius with some detailed embellishments.

8.2 SCULPTING

With a clear direction, the roman gladius has a very classic shape: a thick triangular blade that we will stylize a little into a slight leaf shape; a heavy wooden handle and pommel; and then a leather sheath decorated with brass details.

So with that in mind I quickly blocked out the base sculpt mesh in Maya and Zbrush.



Now we have a decent blockout. In a studio environment you would have to get this approved by your lead or art director before going forward. For me, I am happy here with this simple structure. It is a good base, so I am happy to move to the next stage that is detailing.

Since this is such a simple sculpt, I move to final polish and detailing pretty fast.

Here is the final sculpt mesh in Zbrush:

I have added general detailing as well as pushing the proportions around.

For the proportions I accentuated certain shapes so it would read well from far. The hilt and pommel were made bigger to force that read.

The blade was made a little more leaf shaped and I added details and trims on the handle and guard to force those horizontal lines.

For detailing I added metallic looking detailing and decoration. I added four cherubic faces as primary details as this is an aspect you may see on Romanesque type items such as this. For the cherubic face I simply sculpted it once in an independent ztool and then duplicated it out across the model three more times once done.

A lot of the above-mentioned work was done with symmetry on the sculpt. So, lastly it is time to switch off symmetry and start breaking that effect. General distortions and differences are good to lightly break the symmetry. Lastly, I add light wear, scratches and denting. The Orbs_Cracks brush in Zbrush if good to add scratches and the Trim Dynamic brush is good to use to add dents and hammer patterning.

Now our gladius prop sculpt is complete in sculpt and we can move across to retopology and even start planning out texturing, a very, very important part of this style of asset building.

8.3 RETOPOLOGY

For the retopology of this asset, I collapsed all of the sculpt to one piece. In Zbrush you can do this by clicking on the 'merge visible' button in the ztool rollout.

Then I run quick decimation function on this sculpt as it is very dense and it will need to be lighter for me to work with it in other 3D programs.

To find the decimation master, look at zplugins roll out at the top of Zbrush and the decimation master. Preprocess the sculpt and then go with a low decimation level, something like 10% so you get a high polygon model of under a million triangles to work with.

Export this decimated high polygon and then load it into the program you wish to do retopology in. This can be Topogun, 3D-Coat, Maya, Max or Blender. It does not matter really as retopology is very simple polygon modelling essentially, so any standard 3D program is good. It is your choice.

For the retopology, I sued 3D-Coat retopology tools and then finished the mesh off in Maya. The fastest process for me.

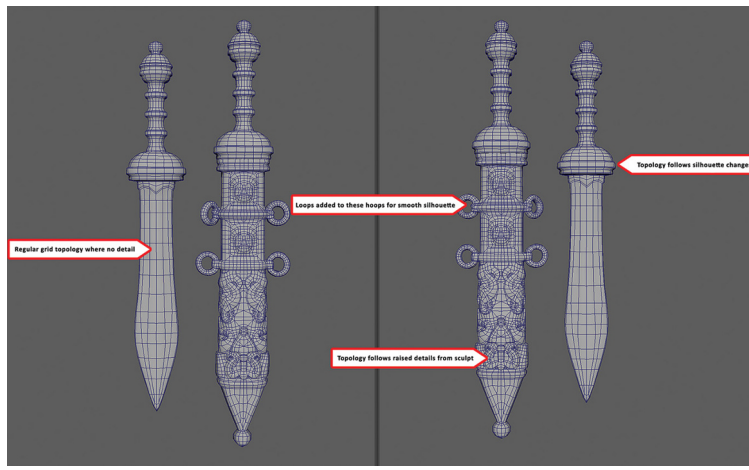
For the retopology, I do not need to have to worry about animation and deforming as this is a hard surface weapon. It will not deform. I do want nice regular topology though as this makes the mesh easy to handle in 3D programs and in engine. So I focus on a regular topological grid, and then make sure to run the topology over and around and

distinct landmarks on the models to help them pop out and provide a nice model silhouette.

You must remember to also add loops in the model to make sure your model does not look too low polygon. So any curved areas of the silhouette that start to look jaggy, add some more supporting loops. Essentially, extra loops are added to the silhouette to ensure these items look smooth and not of low resolution. Extra topology is also added where details of the sculpt become large and require support from the low-resolution model.

For example, the cherubic faces rise off the mesh quite a bit and have some complex big shapes in them. Extra topology is added here and extruded out to retain these bigger shapes and forms that texture alone will struggle to do. With this idea, the topology must be added to the model to retain the silhouette and large shapes from the sculpt as needed.

Where there is no detail or large silhouette changes, the model reverts to a more simple grid pattern.



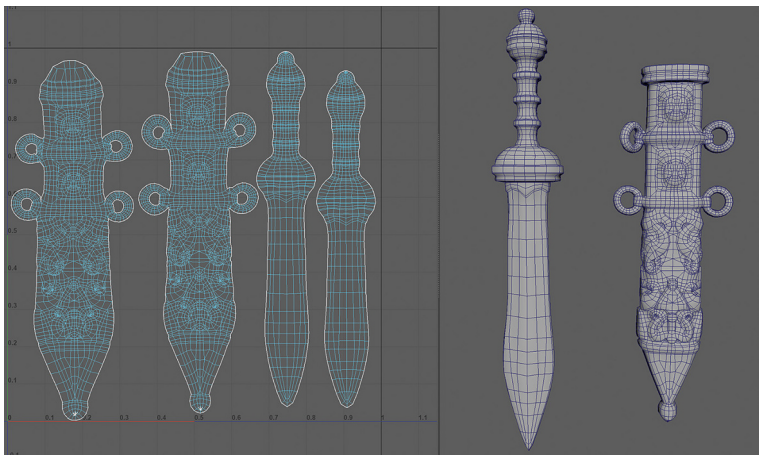
8.4 UV UNWRAP

For the UVs, it is really simple here. This is a very simple asset and all the hard work is going to go into the hand-painted texture.

So just one simple unwrap laid out in a row. A temptation with game assets it to duplicate UV map islands to use the same texture space. This is very good practice, as it essentially makes your textures have more resolution by reusing parts of the texture. I considered mirroring the front and back of the scabbard and sword sides as they are

essentially the same. A smart move, but as this is such a small item though I decided to do a unique unwrap for the whole thing and not duplicate anything. I have the space, so might as well use it.

Here is the final retopology model with the final UV unwrap.



8.5 BAKING

Now the sculpt is complete and the retopology mesh is complete with good UVs.

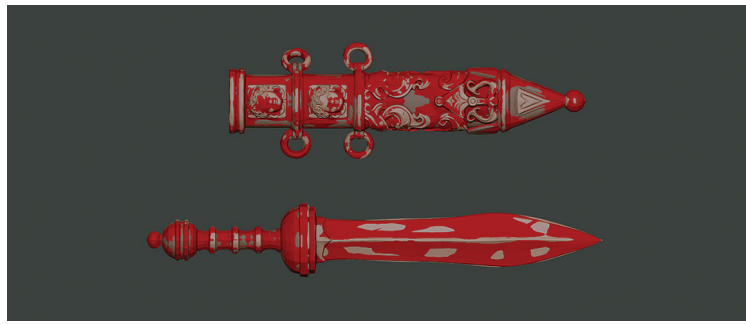
We can now start prepping these two meshes for the bake. The bake is a very important part of this process as we will be using these baked maps as the foundation of out hand-painted texture, and this hand-painted texture will be doing all the work to make this asset look good.

Firstly, we need the high polygon mesh. Since this is a pretty simple asset, looking at it we do not need to split it up. It should bake well as one big chunk. In that case we can use the high polygon mesh we exported earlier as the high ress bake mesh. To be sure though, I do repeat the process of decimation the collapsed high polygon mesh with a little more resolution to make sure I can catch every detail.

With that done we have our single high polygon bake mesh.

Now as a little trick, I import the low polygon retopo mesh into Zbrush and load it as a ztool under the high polygon sculpt. I them make sure the low polygon mesh really matches and follows the high polygon. I use the move topology brush in Zbrush to do this. This may seem unnecessary, but I know the closer these too meshes are, the better your bakes will be in the end, so I usually do this.

Here is the high polygon mesh and the low polygon mesh together in the same space to make sure they match. Adjustments are made as needed to get them closer, mainly on the low polygon mesh and then exported for bake.



With this done, I know the two meshes are very close which will lead to nice bakes, so I export the retopology mesh with UVs to a.obj, and this will be out 'low' mesh for baking.

Now it is time to set up the bake file.

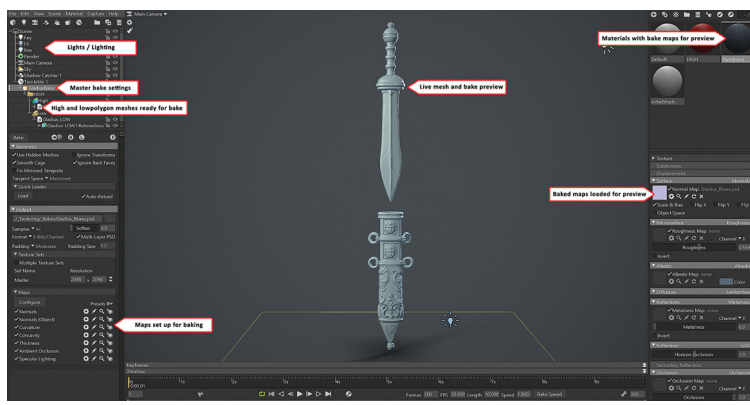
For baking once again, I will be using Marmoset Toolbag. You can use Xnormal and Substance Painter to do this too, but I prefer Marmoset as it adds lots of control, visual feedback and flexibility to your baking process.

I set up the scene with some simple lighting. Three-point lighting once again.

Then I add just the high and low of the gladius assets.

A baking node is added and in the sub folders of high and low I add the high and low gladius meshes.

Here is that set up so far:



With the step of checking the high and low polygon meshes really matched, there is not much that can go wrong as this is such a simple mesh. So, the bakes come out clean a looking nice on pretty much the first pass.

We can set up the maps now in the maps tab and also set up the output directory in the output tab.

The maps we will need to set up and using will be:

- Normal map – this is mainly to check the bake but may be useful at some stage
- Bent normal map – We will use this to pull the green channel or top down light for texturing
- Curvature – to define edges.
- Concavity – To accentuate deep crevices.
- Thickness – If we take this to substance this map may useful.
- Ambient occlusion – for more fake lighting.
- Specular lighting – for more fake lighting and to push the metal look.

To check the mesh, I can set up a simple material and load just the normal map in the normal channel of the material and put it on the low polygon model to check the bakes. The high polygon model is hidden as it visually gets in the way. You can do this by hitting the 'H' when selecting the baker node and that will toggle the visibility.

We will not use the normal map as this will not be a PBR asset, but I use it to visualize the bake results in Marmoset as it is a fast map to bake and easy to read for errors. Now I need to extend some cages on the bake as we do have some small bake errors that I need to fix. To do this simply, click on the 'Low' node in the baker of the object with the errors. Then extend the cage out a bit so that it covers the high polygon mesh. This way the rays shoot from this low cage will record what is inside that cage for baking. If the high polygon asset is not covered by that cage, you will get an error or naked area in your bake map.

Continue looking at your live 3D preview or even looking at your baked maps directly in Photoshop to make sure you are fixing all the errors. Correct your meshes if needed and reimport or adjust the cages until all is fixed.

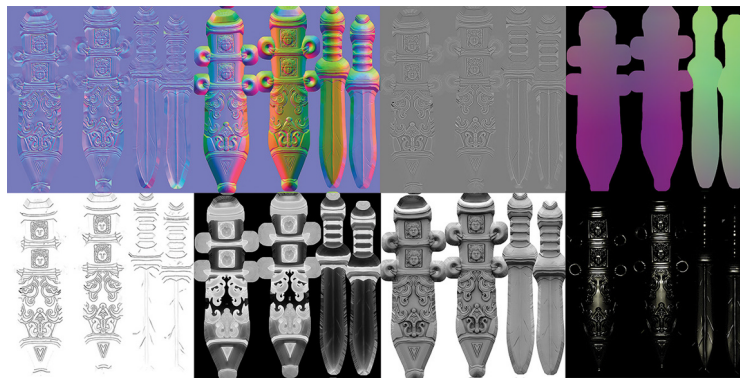
Once this is done, we can set up the final bake settings.

Push your map resolution high for this as it is always good to work at a high resolution for presentation and rendering and if you have to size down for engine later then it is relatively simple.

So for this asset we will author at an original large size of 4k.

Set up all your bake maps as needed by clicking on the cog symbol next to your map's name in the maps rollout. I only set the ambient occlusion to a lower ress and add a floor plane and then ress down the thickness to around 128 rays as I like a little noise in those base maps for this style of texturing.

Now Bake!!



If there are no errors and all come through well, we will end up with these maps.

In order, these are: normal map, bent normal map, curvature map position map, cavity map, thickness map, ambient occlusion map, specular map.

Now we can start ripping these apart and constructing our single diffuse hand-painted texture base.

Let's get started!

8.6 TEXTURING

The texturing of this asset is very simple, but it has to be very controlled and extremely polished as we have just one map as the final result. No PBR, no lights, no normal maps, nothing, just one texture.

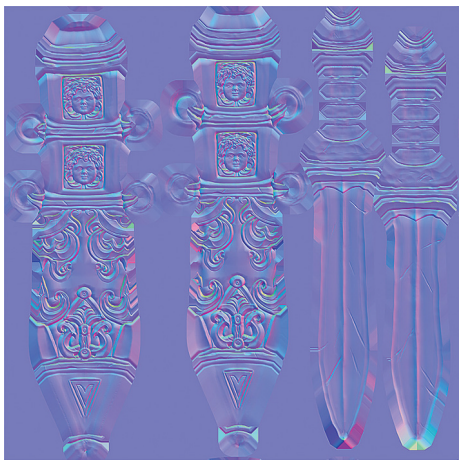
So it all happens here. Initially, it is a complicated process of ripping your bake maps apart to get what is needed, but later on we revert to freeform painting and the process gets a lot less controlled and more creative.

To pull the maps apart we will be using Photoshop to create a good base. We will then take this base over to 3D-Coat and start tweaking, eventually just outright painting on the 3D asset. 3D-Coat is the default program for hand-painted textures. It has a great feel and is very easy to

learn, it is essentially Photoshop in 3D, and the two programs link up and you will be jumping between the two in the process.

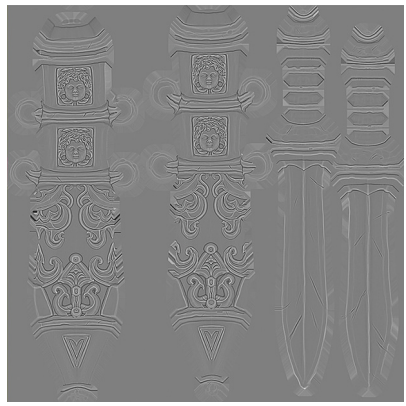
So let's start constructing our base texture from the baked maps:

Normal map – This will probably not be used in this texturing process, but it's a good map to have just in case we wish to make a custom curvature map. Normal maps can be used for this.

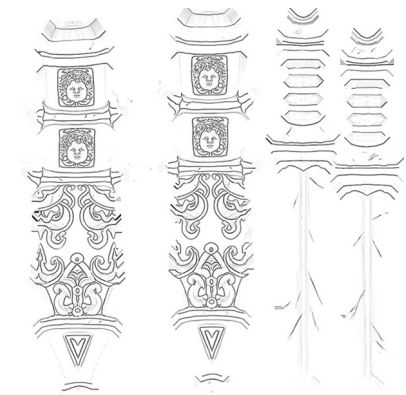


Bent normal map – We will be using the green RGB channel of this map for top down lighting in out hand-painted texture.

Curvature – This map will be used for edge detailing in the diffuse texture. Also, an essential map for any work done in Substance Painter

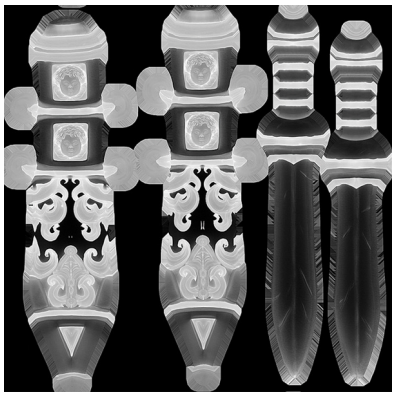


Concavity – Or cavity map. We will use this do accentuate deep shadow areas

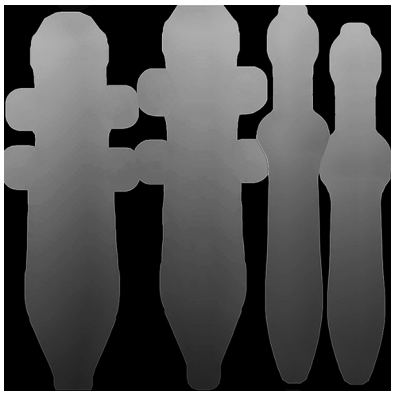


Ambient occlusion – This map will be used to introduce shadows, gradients and shading.

Thickness – We may not use this map directly in the diffuse construction, but it may be useful, so it has been baked anyhow.

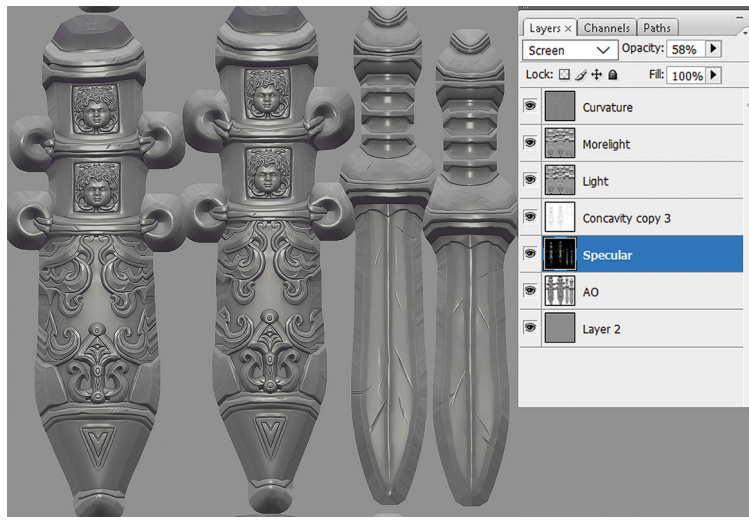


Position – This represents the model position on the Y-axis



Specular – This map records the specular highlight.

Now we take all these maps and start constructing the base of the diffuse texture in Photoshop and construct this type of initial texture created from the bake maps.



To break it down:

- I load the curvature map in and set it to overlay at about 30% opacity to highlight edges.
- I load the bent normal map in and go into the channels tab next to layers in Photoshop. In there I grab the green channel, the top down bake light and put it in the layers as a new layer. I set this to soft light and have it as a base baked lighting layer. It is set to 30% opacity.
- I duplicate this layer and set it to overlay of about 10 opacity to pump the lighting a little further.
- Next, I grab the ambient occlusion bake and set this as a layer with multiply on. What I often do is pop a new layer above this and colourize it. Maybe a bluish purple and set it to lighten. I play with the hue saturation and value until the ambient occlusion is nicely colourized. Once that is done, I collapse the lighten layer onto the ambient occlusion, set it to multiply with opacity of about 40%.
- Lastly, I add the concavity bake to add some dark detail in the really recessed areas. I set it to a multiply layer of about 15% opacity.

Now this is all done, we are ready to import this setup into 3D-Coat and really start texture painting! Save this as a PSD Photoshop document, we will be importing this.

8.6.1 3D-Coat

Make sure you have your low resolution mesh with UVs ready as to be loaded in. Fbx or Obj exported models are fine here and you can use the low ress meshes that you used for your bakes here.

When 3D-Coat is loaded, select import and then click 'import model for pixel painting'.

Set your document size to reasonably large. You can always size this down later; these types of hand-painted textures size down nicely, but let's go large so that we can get some good resolution for renders. I make this texture at 4k initially, a resolution of 4096 by 4096.

Now we are going to import the PSD file from Photoshop. Go to the textures tab at the top, click import, and then click 'import layers colour'. Select your PSD file with all your set up layers now.

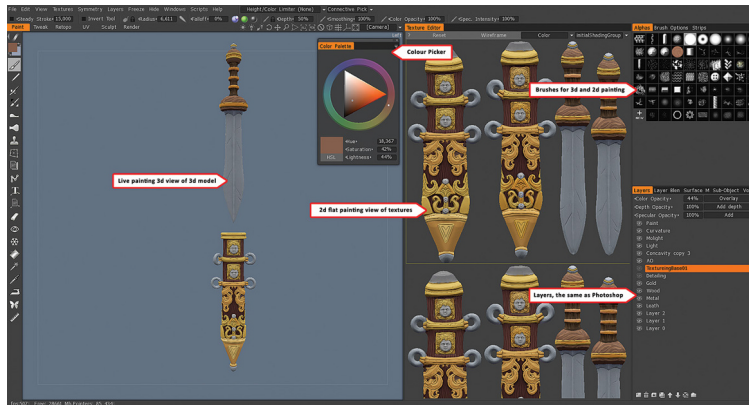
The PSD should load into 3D-Coat now as layers, just the same as in Photoshop. If all works well, 3D-Coat and Photoshop are linked now and you can paint live in 3D on your model!

Before we hop to painting make sure in 3D-Coat to set your view to unlit flat lighting so you just see the diffuse texture only. Go to the view tab at the top and select flat shading.

You can paint in 3D now on the model. The layers imported retain the setting from Photoshop, so multiply at 40% opacity will be the same in 3D-Coat and painting on that in 3D will have the same results as Photoshop. A great trick to remember is that as you work in 3D-Coat, at any time you can hit CTR+P and your work will be sent to Photoshop. Here you can do more refined work and more complex texturing operations. When you have done that, you can just hit CTRL + S (save) and when you hop back to 3D-Coat, your work in Photoshop will update on the 3D model. Excellent! Use this a lot. It's really a great workflow.

So we are all set up now and we can start building and painting our one hand-painted diffuse texture. First thing to do is to block in your base colours. Make a new layer in 3D-Coat and in 3D-Coat or Photoshop, fill in your islands of colour. So here I made a layer for the wood, a layer for the leather scabbard and then a layer for the metals.

Here is the model in 3D-Coat with the base colours blocked in:



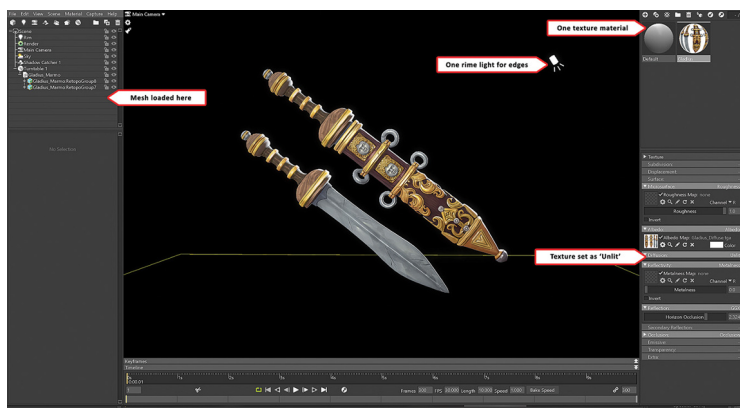
Now you can just start working away. Jumping between 3D-Coat and Photoshop. You can tweak layers, opacity and directly painting in layers.

I immediately started working in the specular map as this is an important map for this diffuse-only style texturing. I erased some areas and blurred, smudge and repainted over certain areas.

Then I went to the wood and leather base layers and hand painted in some leather detail and wood grain. Large and chunky, stylized, not realistic for this type of texturing.

In the meantime, I created a simple marmoset scene to start viewing the texture on the model. I made sure to set the material to unlit and removed all lights except for one rim light for presentation.

Here is the presentation scene:

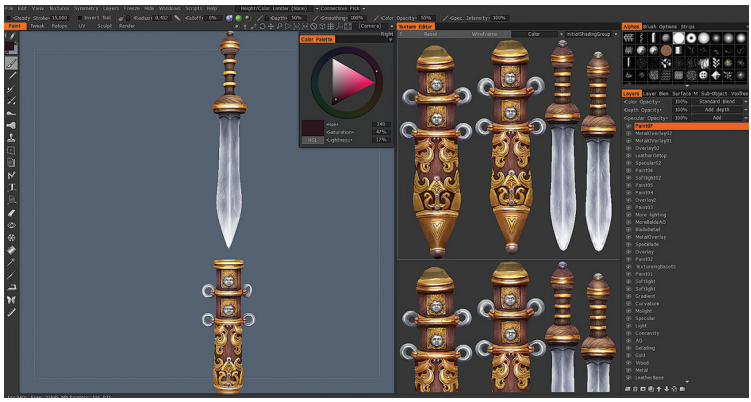


Marmoset and most modern engine will reference your files as you work on them.

So as you update the textures they will update live in the viewer or engine. This is great, as you work you can simply save and export and quickly check how things are going. Do this a lot, rotate around your model, look for issues and errors and keep on polishing. At the end of the project, we can use this scene to render out any final images and videos.

Now all the base paint layers are in I can start adding detail and finish to the hand-painted textures.

The focus now comes to pure 3D painting. The bottom layers are still in use, but now I add additional lighting and painting layers as I need to reinforce the look of the painted object in 3D. I don't really mind how many layers I add now. It's just paint, check it in Marmoset, paint, lighting layer, tweak, paint some more and so on.



With this technique of free form hand painting now and adding layers as needed, we eventually come to the final hand-painted asset.

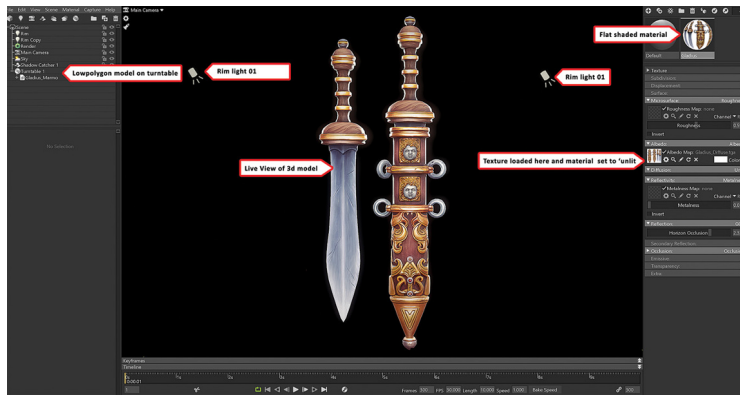
A lot of focus now is not so much on working with layers and bake information, but just on hand painting the details you want with a simple paint layer and hard brush directly onto the model. This is the final step and the finishing touches.

Now you just hand paint in 3D-Coat or Photoshop, adding layers as needed and checking your results in an unlit scene in Marmoset. Once you are comfortable, you are done. You have added the last layer and painted the last stroke. It's time to prepare your work for final renders.

8.7 FINAL PRESENTATION

Now it is time to set up the Marmoset presentation scene for final renders.

Make sure your material is set to unlit and you have no lights in your scene besides a rim light if you need it. What I often do is put the model on a turntable in Marmoset so that you can capture multiple views of it. This is done here.



Now you can grab a series of images from Marmoset by hitting F11.

Once you are done capturing images, you can load them in Photoshop and do some light adjustments to get some nice final images and combine renders.

Ideally, you don't do too much work here in Photoshop as your raw renders should really be the true representation of you modelling and texturing work. A game engine will show the model as it is with not much post processing, so it is an honest approach to just show your model and texture results and not augment it too much in a post-production program.

Here are the final presentation images of our hand-painted gladius.

It is best practice to add some wireframe grabs of your model to show that you know how to make nice clean topology for game art. A good idea is to put you final textured model next to the wireframe to show how much work has gone into the texturing.

Then you can also include flat textures to show your textures in more detail.

Once again you can put this next to your fully textured 3D model to show what the texture looks like on your final 3D model.

Now you are done!

8.8 CONCLUSION

I hope this gives a good overview of diffuse-only texturing and its strengths.

It is a very efficient way of texturing as there is just one texture to load, not a whole set of textures so that makes the assets very efficient and game engine friendly.

The downside is that it may not have the flexibility and depth of true physically based textures.

You can get a very specific visual treatment, and in some ways this is the closest you can get to traditional painting or drawing in 3D. It is a very creative and less technical way of texturing in 3D.

Overall, it is a very creative and cheap way to make nice looking assets for lower tier engines and devices. Definitely worth considering.

9.0 Technical Example 03

Figurine sculpt for collectibles and 3D printing

In this technical example, we will be designing, sculpting and building a character for collectibles and 3D print.

We will not have a concept but will reference one of the classic board game characters as the direction for this character build. This creature will be a giant frog troll. There is plenty of artwork out there as this is an established fantasy character, so I will be looking at those, choosing the best bits and then building my own version.

Here is the frog troll sculpt in final form and we will cover the creation of this character now.

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So let's get started and cover the creation of this character for collectibles and 3D print!

9.1 CONCEPT

For this character build at least, I do not need a concept to get started. This is a well-known character from the universe of board games and fantasy.

There is plenty of artwork covering their look and interpretations. So for me, I looked at a lot of these established interpretations and chose some good bits and then went ahead with my own design.

What I wanted to add is to make the Frog Troll creature more physically grounded in flesh and anatomy. I also wanted to make them larger, more physical and imposing than a lot of the art I was seeing. I want it to look heavy, big, muscular and a bit fat. So with that direction in mind I started sculpting, ready to figure out the look as I went. I had a very clear idea of how this monster needed to look in the end, so I did not need a concept and was happy to resolve any issues on the sculpt.

I must say it is way safer and efficient in timing if you have a good 2D concept to work off. It's a risky strategy to resolve design in 3D without a concept. Working out a characters design in 3D is generally a lot more lengthy process than working it out in 2D. For this character at least, I had a very clear idea of what I wanted it to look like in the end, so I took the risk and started in 3D sculpt without concept. Not advised, but this time it was faster for me as I had a clear plan and direction.

9.2 BLOCKOUT SCULPT

To start off, we sculpt this character in a symmetrical pose to save time. This time it is an A-pose.

Towards the end of the detailing of the sculpt, I will move the sculpt to an unsymmetrical pose, but initially it is way faster to work in a symmetrical pose.

For this sculpt, I did not use a base mesh, but simply started with a blob of digital clay as it is an unusual body shape, and it is easier to make and odd and expressive sculpt with no underlying structure holding you back.

First, I started extruding limbs, adding forms and sculpting away.

So we start sculpting, using dynamesh. Low resolution and rough. Just aiming to lay out a rough blockout.

The main drive here is to figure out all the proportions, layout and primary shapes. I also need to figure out how that frog head sits on the bipedal body in a believable way, so I continue sculpting rough and fast, figuring out the large-scale problems such as the physique and proportions.

The brushes I use the majority of the time in Zbrush for this and all my sculpts are:

- ClayBuildup for all form creation.
- Standard brush with Alphas loaded for some details.
- Clay brush to flatten and smooth.
- Dam_Standard for folds and wrinkles with the Slash3 Brush.
- Move and snake hook for moving the mesh around.
- Flatten, Hpolish, Spolish and TrimDynamic for flatten and hard smooth surfaces.
- Finally Orb_Cracks for big crevasses in the mesh.

I build most sculpts out of just these, rarely needing to use much more.

So after an hour or two of fast, rough sculpting we get this:

Now we have a good general blockout. It's time to start working on the proportions and construction. There are issues that need to be resolved here though, the head feels a little squashed and small on the torso, and he does not feel as big, heavy and ugly as I want him to look in the end. Stuff to work on.

9.3 SCULPTING

With this next stage, I have started working on the forms, mass and secondary details further. Muscle shapes have been worked in, wrinkles and some fat has been added. The head sits better on the body now.

I feel a lot more happy with the layout of the body now and feel a lot of the big issues have been addressed. Now a lot of the big challenges are answered. We have good primary shapes, a nice look and the details are lining up, and it is clear what is going on. Now I can start working in the details.

Now we are in a good place with the body, before we go further and start the detailing, I want to move to one of the other unresolved issues….the base!

Since this is a frog monster, I made a swamp base with some mushrooms, a water pool and a skull. I made sure to have a nice flat base for the figure to sit on a surface; in this case, I added a squashed cylinder beneath all the ground sculpting.

For the rocks, I modelled the larger ones independently and then placed them on the base. For the smaller pebbles and stones, I used and alpha projected through the standard brush. I used alpha projections for smaller detail like this.

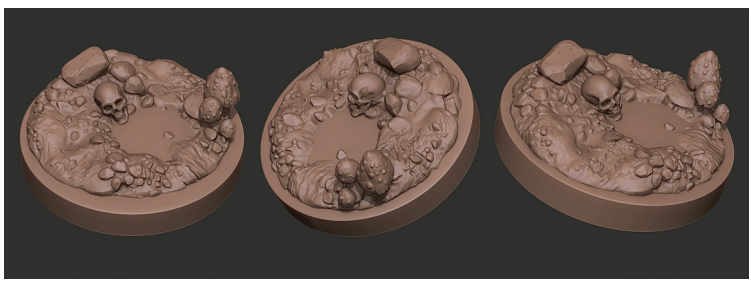
Here are some of the rock projection alphas I used while using the standard brush:

Here is the finished sculpt of the base without the figure.

The rocks and pebbles were modelled as above.

The skull was simply chopped off an older anatomy study I did years ago, so I reused it.

The mushrooms were modelled from scratch with dynamesh

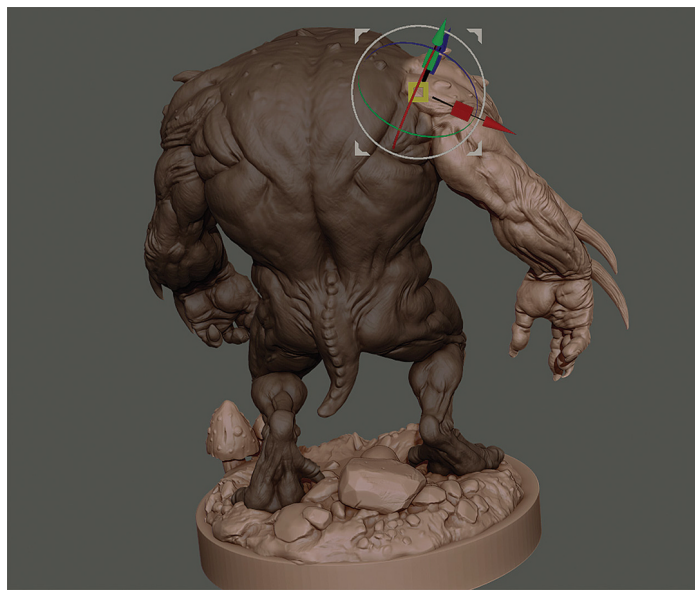


After further work refining the forms adding details, I am pretty happy with the symmetrical A-pose. I will start dropping symmetry in the sculpt and moving the creature into a simple walking pose.

To move the figure into pose, I now switch off symmetry. For the arm, for example, I mask the arm that I want to move. You can apply a mask by holding control in Zbrush and drawing on the mesh or suing the marquee tool.

After I have painted the mask, I invert the mask and use the transpose tool to move the limb into place. Using this mask and transpose technique, I start moving the limbs and body into place. For smaller parts that need to be moved, I simply use the move tool.

Here is an example on positioning one of the arms using masks:



Here is the frog troll with most primary and tertiary details locked in place, as well as first pass on the walking pose.

Now, I want a fairly simple walking pose, but it does help accentuate the creatures large forms and to help it look like it is plodding along. The pose is coming along, but I have to keep working it in.

Next I work on the pose further and start adding further detailing. Now the pose is looking good, we can get to really getting to the final detailing.

Now I have added final details to the sculpt. This includes wrinkles on the skin, final small proportion adjustments, small horns and warts, as well as a fully sculpted base in a swamp theme.

At this point, I am happy with the pose and detailing. With all this sculpting work done, it is time to start preparing this model for 3D printing. As I want this model to be printed from small to large, I need to split it for the larger prints and figurine builds.

9.4 SPLITTING

Splitting entails splitting up the model so that the parts can fit inside the limited build space or build volume of a 3D printer. In the process of splitting, parts that naturally separate off from the core of the body or central mass such as arms, legs and the head are always good candidates to be split. Bases are often needed to be split off too.

Another good thing to look for is natural separation lines on the model that can be used to hide your split line when your model is put back together again as a physical build.

Here I have marked where I plan the splits to be and a look at the final splits:

With these splits planned, we can go ahead and start splitting up the model. The keys will come later once we have completed all the splitting needed.

Let's split one of the arms off as an example of how to split a model for 3D printing.

To explain what is happening in the image above, let's step through it:

A: Here we collapse and combine the body sculpt together. This means using the merge function in the subtool rollout in Zbrush to merge items such as the teeth and eyes into your body mesh.

Then I run a dynamesh on this collapsed mesh. I use dynamesh a lot for 3D print sculpts as it creates a uniform topology that contiguously runs over the model form. This function creates a watertight mesh surface with no holes and deletes intersections. It is perfect for 3D printing, as 3D printers hate non-uniform meshes with holes or crashing geometry.

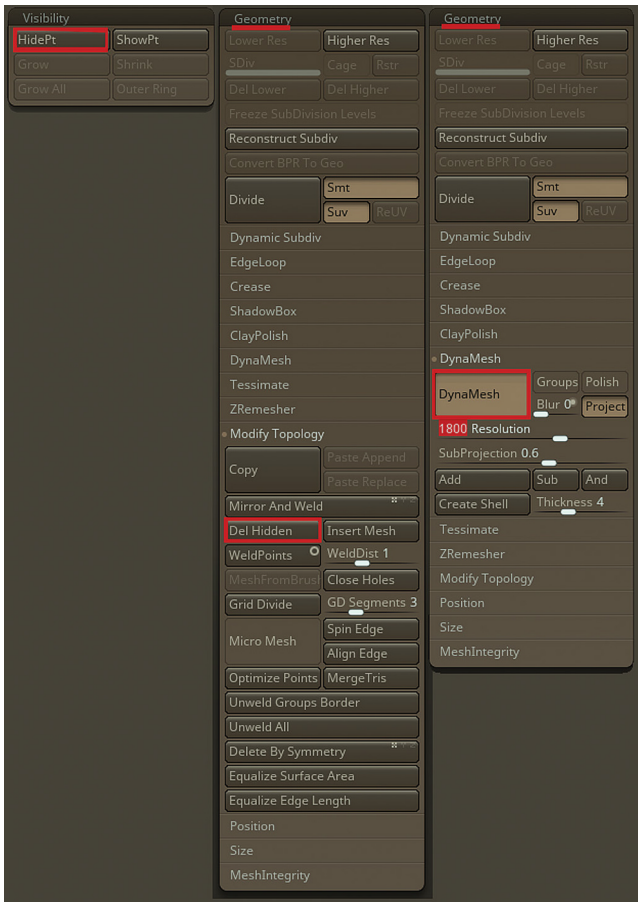
B: Now I use the mask tool by pressing the control button and drawing what I want split off in Zbrush. In this example, the Slaad's right arm.

C: Now I hide the part of the mesh that is not in the mask. This function can be found in the visibility tab in the tool rollout:

Hide > Hide Pt (part).

Then use the delete hidden parts function to delete any hidden parts of the mesh. This function can be found in the geometry tab of you tool in Zbrush. Look for the modify topology sub rollout and then hit Del Hidden. This removes the hidden part of the mesh completely.

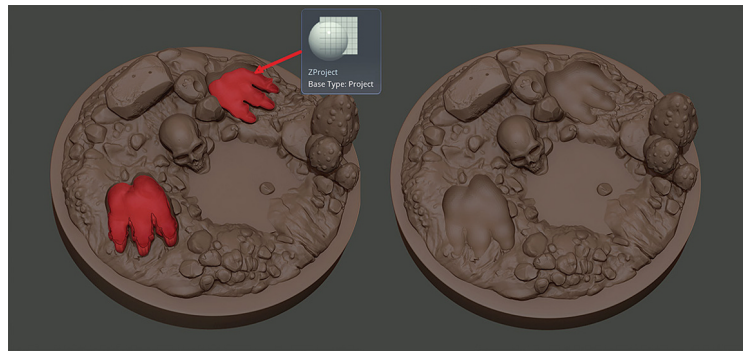
Lastly, run the dynamesh function again. This is found in the geometry tab of the subtool to ensure the new parts create a nice watertight mesh again. A nice benefit of dynamesh is that it accurately fills in gaps at the end of the arm and body we just created. Due to it being a mathematical calculation, the new cap mesh created is the same shape as the cap on the other side so the two parts fit nicely together. A lucky thing and very useful! Great Stuff!



Using this process, I continue to split off all the limbs and base. For the base, I make sure there are some nice foot shaped holes for the character to stand on. I can do this using the zproject brush, projecting the bottom of the feet to the base sculpt and deforming it to follow the feet.

To do this, I make the whole of the body except for the bottom of the feet disappear by suing control Shift and alt on the keyboard.

With just the soles of the feet visible I go back to the base sculpt and then use the zproject brush to project the foot shape onto the base.



With the base sculpted, ready for the feet and all the limbs split off and filled with the dynamesh function, we should end up with split character parts like this:

Now we have all the splits, we need to create keys!

9.5 KEYS

Keys are inserted into a sculpt to assist when you put it back together again in the physical world. These keys direct how the element is meant to be orientated as well as adding a more sturdy connection for the split parts to rest on and eventually be glued into place.

Keys on a model usually have a male and female part that fit together to create a solid piece once glued. Much like puzzle pieces. The keys can take many forms such as pegs, triangles, rectangles and so on, all as an idea to provide a sturdy fit for the model to be fitted together.

Here I took a tapered rectangle of two similar parts and then merged the male part to the arm and Booleaned out the female part into the body. The merge function is found at the bottom of the subtool tab (merge down or merge visible)

The Boolean function can be found in the 'make Boolean mesh' button in the subtool rollout. The merge mesh function can be found below the merge function on the subtool once again. The subtract Boolean function is used to make a hole in the body mesh that has the same dimensions as the peg in the arm.

Here are the key meshes used before being merged or Boolean subtracted, respectively.

Now we know the method of creating keys, we can add (and subtract!) them from all our splits and end up with a final split and keyed model such as here:

9.6 PREPPING FOR 3D PRINT

Now as the model is all split and ready to go, we need to decimate it so that there is a less dense file for 3D printers to handle.

Decimating entails running a script in Zbrush called the decimation master that will run over each of your split meshes and reduce the resolution of the mesh, while retaining details. The decimation master is an amazing tool and is vital to use for figure design in Zbrush.

You can find the decimation master in in the Zplugin tab at the top of Zbrush.

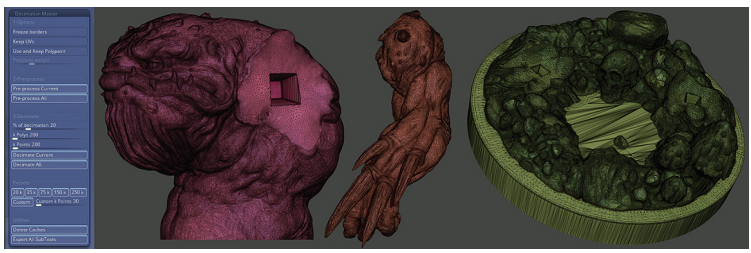
Click on decimation master and open its rollout. Now for each of your splits, select the part and then press pre-process current.

That operation will take a while; once it is done, select a decimation level such as 10% and hit decimate!

The goal here is to export your mesh as a Stereo Lithography file or STL. STL files are what you send to a 3D printer to print. It is specifically a 3D printing format. Each STL is ideally less than 50 mb in size on your hard drive as 3D printers struggle or even reject files than have more size and resolution.

Keep on trying a different decimation level of resolution until you get a small-enough exported STL with good resolution.

Here you can see some final split and keyed meshed, decimated to a good level with Decimation Master:



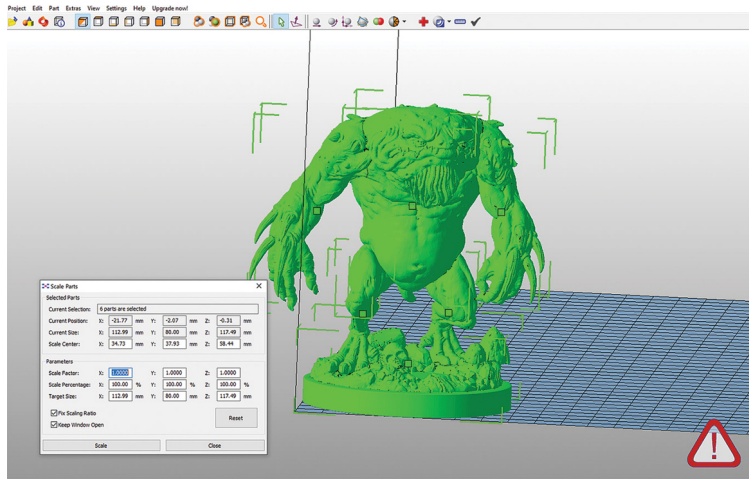
Now export your Split meshes as individual STL files by going to file, export, and select STL as the file format.

Once this is done, we need to scale it to the size we want to be printed at as well as check it further for any errors or issues that may be issues when it comes to 3D printing.

For this, we are going to use a free bit of software called Netfabb. There are many other variants out there though that do similar things; this is just one that I use.

So we open Netfabb. Load in your exported STL files from Zbrush into Netfabb. They should come into Netfabb in the position you exported them.

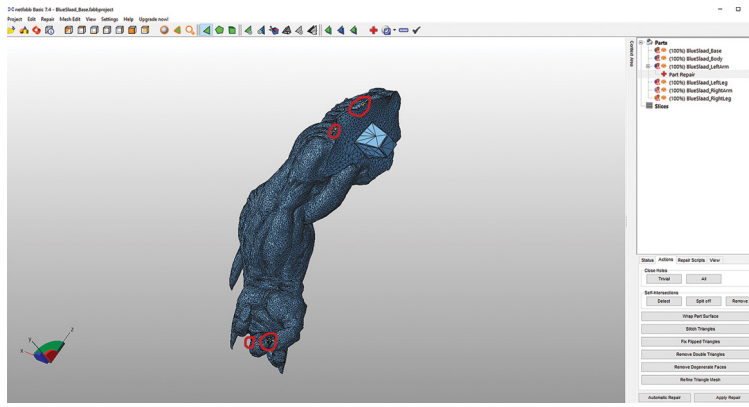
For this figure sculpt, I want it to be 80 mm tall once printed, so I select all parts and go to the menu and hit Menu > Scale and make the Y scale to 80 mm High



Next, we need to check the mesh splits for any errors, broken polygons and ngons.

To do this, select the mesh in the right panel and then hit the red cross (Fix mesh) button at the top of the program menu.

Here, you can see that we have some holes and errors on the mesh.



To fix these go to the far left panel and go to 'Actions' tab.

For close halls hit 'all'

Then at the bottom hit automatic repair.

Once these are done hit apply repair and replace the old mesh with this fixed one.

Finally, you can do this fixing action to all imported STLS. Then you can export the fixed and resized STLS by clicking on the STL name on

the far left, in the dialogue that pops up then click export part and choose 'as STL'.

Now you have some fixed and correctly scaled STL's and you can send them to the 3D printer.

9.7 FINAL RENDERS AND 3D PRINTS

We are done! Now to wait for the print….

Finally, here are some prints of the Slaad that I have done myself or have been created by other people:

We now have digital files that we can convert to physical figures! Great stuff!!

Don't forget it is always a good idea to do some nice renders of your sculpts to put them online.

Here, I took the final sculpt and put it in Vray in 3ds Max. I built some simple shaders and once again built a three point lighting character light rig setup.

Here are the end results for presentation online. I also rendered this image large and printed it out for my office at home.

9.8 CONCLUSION

In this example, we have taken a sculpt through concept to final sculpt. In this process, we have moved it out of the symmetrical pose and posed the model accordingly to produce an appealing figurine.

We also developed a base for our figurine and made sure it stood on it well and was not off centre.

Lastly, we have gone through the process of preparing out digital sculpt for physical production. This is a very important process and in many ways as important as the actual sculpting process.

You have to make sure that your figure has a good centre of mass and stands well. If your figure is large, you need to split it up to fit on 3D printer. Then you need to add keys to make sure it fits back together nicely.

Lastly, you have to clean your meshes and make then as neat and printer friendly as possible. 3D printers and fussy machines, so the less reasons you give them to produce a print error, the better.

I hope this chapter gives you a good overview of creating a collectible from start to finish using digital tools.

By all means get out there and start making your own figures, collectibles and toys now. The technologies available in 3D printing are amazing and quite easily accessible now, so give it a go!!

10.0 Your portfolio

10.1 AN OVERVIEW

The technical examples are complete; you have built a couple of character models and are feeling confident.

So what next?

Well, you need to show your work! You need a portfolio of course! Now we will cover what you need to do to set up a portfolio and how to make a successful one that brings you work at that.

Your portfolio, particularly as an artist entering the industry is the most important aspect for any artist to create. Work history, connections, relevant skills, all come second to your portfolio and the quality therein.

So then it is important to ask the question; what is a portfolio exactly?

In the past your portfolio may have been physical, in a folder you carried about, on a tape or even a CD. In these days when all is digital, you portfolio is on a website. Sometimes these websites may be art collectives such as Artstation, even Instagram and possibly your own personal website.

All recruiters and art directors expect to find your work online now in some digitally curated space.

Curated is a good word to use here, so let's explore this further.

10.2 CURATION

You portfolio will need to be very much curated by you.

You will need to show only your best work and then remove all other works that may display any weaker aspects. Your whole portfolio is only as strong as the weakest link.

A challenge as an artist that you should be aware of is that you may become attached to some of your work as it has a personal connection

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to you. You may have struggled and achieved some technical obstacle, or you may be trying out a new style with a certain piece. The issue here is that these reasons are not considered when viewing your portfolio. Only the overall quality and appeal is how your portfolio is finally judged.

If a piece of work is weak and pulling your portfolio down, regardless of your personal connection to it…it has to go.

Another thing to consider with you portfolio and how you curate it is the overall impression it makes and what kind of message you want to send.

An art director or recruiter would ideally not have to get in contact with you initially. They should get a good read on what you like, where you are aiming and what you are looking to do by just looking at your portfolio.

With this in mind you should curate your portfolio with the intention of communicating what you like to do and maybe more importantly, what you want to do in the future.

For example, a portfolio with a bunch of monsters, then a skyscraper, then some cartoon animals and then a soldier is very confusing for a recruiter or art director to look at as we will have no idea what you really want to do. So create a strong overall visual direction with your portfolio of what you want to do and what area of art you wish to work in.

On a similar subject, portfolios, particularly of more junior artists that I see are a bit too broad and unfocused. What I mean with this is they often have multiple areas of study in their portfolios. They may be still learning multiple skill sets or even unsure what area they wish to focus on. This is a problem though as an art director will have no idea what you want to do and where to place you.

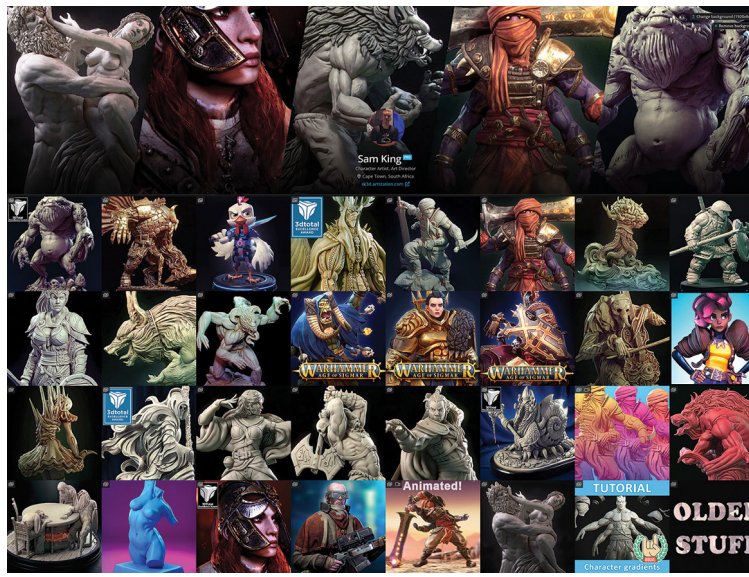
If a portfolio has some character work, a building or two, a car and maybe some concept art, then what are you aiming to work as? Very confusing and a bit of a worry as an art director.

The best bet is to communicate very clearly by the visuals and what is in your portfolio what you like to do and what you wish to be doing. Recruiters and art directors ideally can get a great initial read on your skill set and aspiration just by looking at your portfolio without ever even talking to you. If they like what they see and have a good idea of your skill set and direction, then, they will make contact.

So remove confusing pieces from your portfolio that do not show the direction you want to be heading in. No matter how attached you

are to these pieces, if they are weak and pulling down your portfolio quality, they have to go.

Let's look at my portfolio on Artstation and Instagram for an example. These are the only two places I have my portfolio, and they are both created to represent a certain look and feel to get me the work that I want. I am not saying this is perfect, but it does seem to push a fair amount of work my way with jobs and projects that match my portfolio look and perceived skill set.

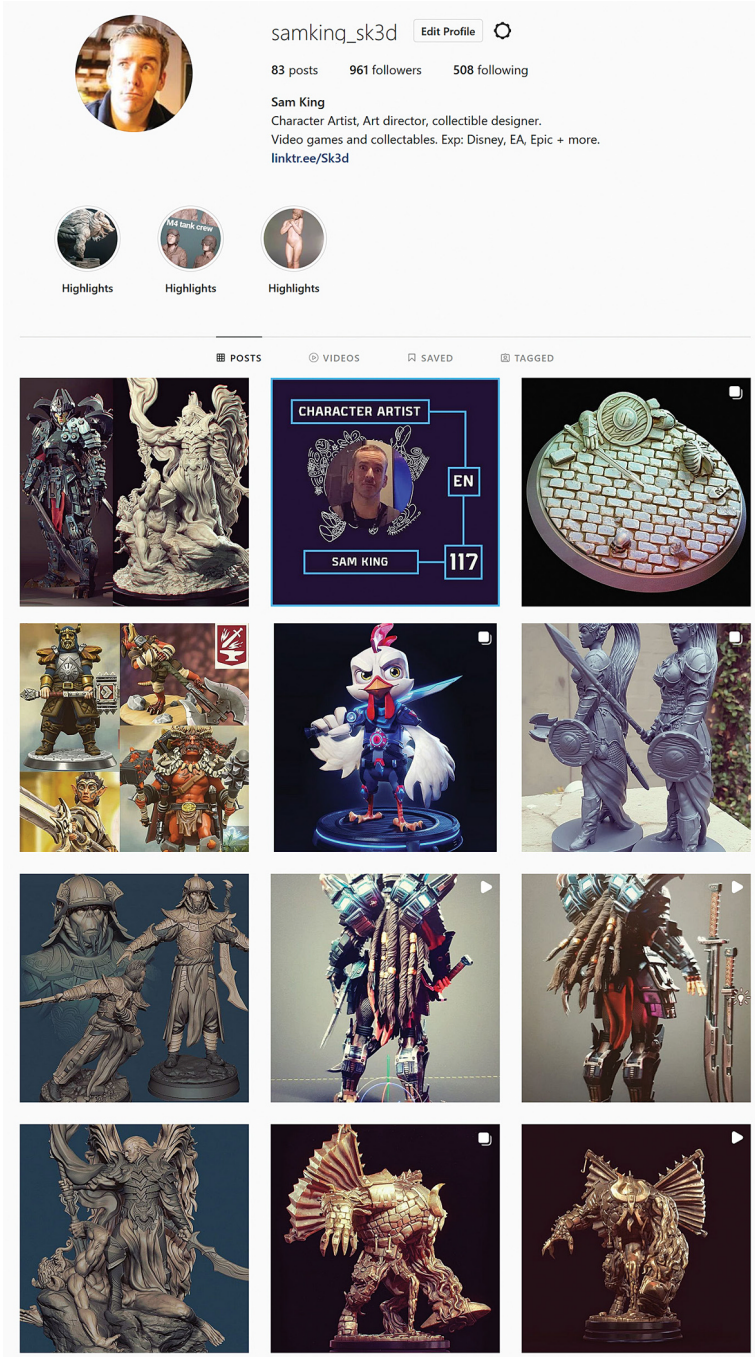


I hope you can see a certain theme in all the thumbnails representing all my work.

I like character work, large expressive forms, monsters and stylized work in games or figurines. I also include examples of projects where I have worked as a project art director or production designer, as that is the roles I want to do. There is nothing else. That is what I like, can do well, and the work and contact I am looking for.

No cars, military stuff, environments or realistic work as that is not what I am after. It is up to you what you want to do, but if it is not in your portfolio… then it communicates you do not want to do such work and on the other hand of course what is in your portfolio does communicate what you want to do. Just don't muddy the waters, be very direct here.

Here again on Instagram:



I make sure not only to represent the theme and look of stuff I want to make, but I also remove any work that may confuse the message. So for me, I spent many years working on Disney products. I could add that to my portfolio, but I generally don't as that would communicate that that is the style of stuff that I want to work on, which for right now is not, so I remove that work from my portfolio.

For me, at least right now, I really want to work as an art director/character artist in games and collectibles. So this type of work is the only work I show.

I have done concept work in the past, environment work, kids shows, advertising, and live action films in my career, but as that is not what I want to do right now, that stuff is not visible.

So somebody looking to hire, they see very directly what I want to do just by looking at my portfolio, without even talking to me. Great stuff, and when I hire as an art director, I like to see this consistent signal of what an artist wants to do as well. It really helps me get an idea of the person and what direction they are heading in and love to do.

So as you can see, the majority of your portfolio can be on publicly hosted forums, galleries and social media. You do not have to build your own website, but you can if you want to. It is really easy to put your work out there as there are many large forums and social media. Just take care to curate your work to present clearly what you like and want to do.

10.3 WHAT DO I NEED TO SHOW IN MY PORTFOLIO?

When it comes to the specifics of what is wanted to be seen for a character artist, there are a couple of things you can show for character art for games and also collectibles that you can show that recruiters and art directors would like to see. So let's take a look at some of those points now:

10.4 YOUR PORTFOLIO: CHARACTERS FOR GAMES

You should pose your character models.

For figure sculpting this is a given, but for game art it is an extra step.

When you are building characters for games, you will usually have to build the character in a default pose for rigging such as an A-pose or T-pose. These poses are necessary for the pipeline, but not very nice to look at in display. An extra step to take is to pose your models and bring in a little appeal. I do this with all my game models by default.

You can do a quick pose rig yourself if you can rig a little. It can be very rough as no one will see this rig. You can also model the character

into place if you cannot rig. You can also ask a colleague or friend who can rig or animate to make a pose or animation for you. Either way, a good trick to get more appeal on you character model.

You should find or create a good simple light rig to present and render your work well. You can build this yourself a simple three point light setup should be enough. You can also use this light rig as a setup for any other models in the future. Some good lighting and presentation with a nice pose will work wonders to sell your character models even more; it is way nicer to see a well-lit, posed and rendered model than a screen grab of a T-pose model from some software.

Recruiters, and more particularly the development team, such as the team leads and art directors for games really like to see how you built your models. This aspect is very, very important. You do not only have to make nice looking art, but it is essential to create assets that integrate into an engine nicely and run well.

This means you should show the wireframe of your model to show how it is constructed.

A wireframe is a visual representation of you polygonal mesh that you have built. This gives the development team a good idea if you can create neat low-resolution animation and game-friendly meshes. A very important skill!

Another aspect of your model build to show would be your texture flats. This shows that you understand material and texture creation. It will also show if you can create neat, well packed UV layouts.

Here is an example of a render of a character with example texture flats alongside to show how the textures were laid out and created.

10.5 YOUR PORTFOLIO: CHARACTERS FOR MINIATURES AND FIGURINES

For figures, collectibles and 3D prints, it is always nice to have a nice rendered image of your figure sculpt in its final sculpted pose. This is best rendered in an offline 3D program renderer such as Keyshot, Vray or Redshift.

Here, I have rendered the frog troll figurine project in Vray.

Here, I have rendered another figurine commission in Keyshot.

You should also include some images of the figure in the real world if you have them. Be those images from a production line or 3D print.

Here are some physical prints of the frog troll and Fenris projects:

After these nice renders and photos of real figures or prints, it is good to show some of the technical builds of your figure such as pure sculpt shots and prepping you did for 3D print such as splits and keys.

After that some grabs directly from your 3D sculpting program are nice as they show even more aspects of your model.

10.6 FINAL THOUGHTS

So we now have an idea of what we can do to start building our portfolio.

Remember, less is more. Only a few pieces, well displayed are needed to represent yourself well. Early on in your career, you may only need two or three pieces to represent well.

Remember to pose your models, get a good light rig and present them well, don't just show screen grabs from a 3D program of your character model in T-pose.

Show breakdowns and your process if you can of how you build the models for game or physical production. This is a big bonus to see and shows that you know how to create a technically sound asset that will work well in production and not something that just looks nice.

11.0 Work life

11.1 INTRODUCTION

There are many ways for you to work as a modern character artist. You may work for a studio, you may work for a studio full time but offsite, you may work as a freelancer or you may own your own business. There is a broad variety of ways to earn a living, so let's look at some of these options to get a good idea of what they entail.

11.2 WORKING IN A STUDIO

As this is the most common way to work and often the first aim for graduates, let's cover what to expect when working in a studio.

So, how do you get a job in a games studio? For a mid-size games studio, for example, you will most likely look for them to advertise a position and then you can apply online. You may get a recruiter from the company contacting you, but that is rare, so let's assume it is you applying to a position.

Most positions are advertised online on art hubs such as Artstation, on LinkedIn by specific people or on some social media accounts such as a studio Facebook page. If you have a particular studio you are following and wish to work at, you can find their website and check current open positions and apply there.

Once you have found an open position at the company you like and applied, you may get contacted back by the HR department, you may also get contacted by an art director or lead artist. If you don't get a reply, don't worry, your portfolio may not match what they are looking for, or they may have filled the position already. There are many reasons. Don't take it personally, just move on and work on your portfolio more, maybe apply again in the future or just try somewhere else that you like.

Let's assume you were successful and you get an interview lined up. Great stuff, well done!

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The interview will most likely, for a character artist position, involve an art director or a lead artist on the project. There may also be someone from HR or a producer joining the call.

In this interview stage they may ask you some specifics on how you technically build things and some items in your portfolio. The focus though is mostly on meeting you and finding your availability and what you are like as a person.

One thing that may happen is you may be asked to do an 'Art Test'. This entails giving you a small task relative to their pipeline to see how you work and if you can hit the quality bar. For characters, it is often a character head bust or something relatively small. You will have a technical description to work with, a deadline, and will ideally be paid for this. These art tests are relatively rare these days, but if you are more junior and your work history is not able to back you up, you may be asked to do one. The only advice I can give on this is be sure to match the style of the studio of the test. Don't do your own style and take. Most successful art tests I have seen or approved have been very close to the studio or game visual style and then technically sound after that.

They may ask you about your past work experiences and just be honest here and don't be negative. We have all had some bad work experiences, but don't bring them up here as it just makes you look bad.

Be assured if you get to this stage, the person-to-person interview, your work is good enough. Your work has got you in the door, now it's more an issue to see if you can technically do the work that is needed and what you are like as a person. Essentially if your personality and demeanour fits with the team.

After this initial stage, you may have following interviews with other project stakeholders or the same people again. This will be a mix of art directors, producers, leads and maybe HR in the background.

Assuming you are successful, you will get an offer of either a locked time contract or a full-time position. They may ask you what you expect to earn or it may be locked to the position. Either way ask around to people who work in the industry if this is fair for your portfolio and experience level.

So let's assume the pay is fair and the offer is good, now what?

Once you accept you will need to give notice to where you are working. This could be anywhere up to a month notice or even more for lead or director roles. At your new work you will often go on a probation or trial period for a certain amount of months to see if you can do the work and integrate into the team. This trail period is usually around three to six months.

This probation period is not as bad as it sounds and I have honestly not known any one to fail them. At this point the company is pretty set on you; they love your work and want to work with you, so only if some crazy stuff comes up like you can't do the work or have a major fallout with the team will you be failing the probation period. Like I said, it just doesn't happen, so do the work and integrate as best you can and the job is yours.

Once you are in and working, it's all about getting accustomed to the studio dynamics and integrating into the work tempo of the team.

In an art team as a character artist or junior character artist you will be reporting to the lead character artist. You may have a character art director after that or just an art director for the entire project who will be reviewing your work with the game director or creative director.

As a mid-level character artist or junior character artists, you will be creating work that will be reviewed by your lead and then the art director.

Your lead will often be more technical and make sure the characters are built neatly and well, whereas the art director will focus more on if the art fits into the overall look and style of the game.

As a junior character artist, you will initially be given simpler tasks to get used to the quality needed, the pipeline and working with other team members. As you get more experienced and efficient you will look to be moving towards a character artist position.

After a few good years of experience, you can start considering full character artist position, then a senior character art position or a principal character artist. These are individuals with a very high skill level of the creative form. They are technically proficient, talented and very reliable in their work output. These individuals are truly the workhorses of the character art team.

After this comes the lead title. The lead title brings its own dynamics though it's not all art any more. You need to start being a people manager and a conduit for information flows between teams. The lead is in many ways the touch point for the team. Planning, negotiating, delegating. A very strong and experienced artist, they are almost more valuable though for their leadership and planning skills.

Lastly, in your career as an artist is the position of art director, character art director or production designer. In this role, you very much hold the artistic vision of the game or product. You will be a guide for the whole art team as well, strictly maintaining quality control and maintaining an efficient and happy team.

The art director will have a background from 2D or 3D art but will be able to cross many artistic disciplines. They will be able to work or

guide a concept team, have good knowledge of how the 3D assets are made for game such as characters and be able to work with animators, VFX and programmers. The art director will be leading the entire art team, ensuring the best quality possible while being able to hire new team members as needed and hold their own with studio stakeholders such as the game director or creative director. This is the most senior position for an artist to hold in a studio and you usually only get there after many years of hard work.

So that is it, a general overview of the art team, particularly a character art team working in a modern game studio.

It is worth covering the benefits and detractors of working in a game creation studio, let's do that:

So, working in a studio has a lot of benefits, especially as a young artist looking for security and mentorship. The studio will provide regular pay and provide the projects for you to work on. It will also provide mentors and peers for you to work with and learn from.

So, overall, a studio provides a lot of stability, guaranteed projects and a chance to learn and advance in a team. Another positive is the opportunity to be deeply integrated in a team and work as one creative force to make large and complex projects come to fruition. Something you would not be able to create yourself as an individual.

As for the down sides of a studio, there may not be too many, but there are a few. Firstly, you may be limited by the studio structure and the team dynamics.

For instance, you may be looking for a promotion, more pay, different projects or just to do your own thing and those can often not be possible. You also have no control generally over which projects you work on. Essentially, you will be a very small cog in a large machine creating large entertainment projects. For some, this aspect will be relaxing as you are part of a greater whole, but for some it will be frustrating and restrictive.

This really depends on the individual and what they want to get out of their work life.

The studio at least provides a lot of security and a great place to learn from senior and more experienced artists.

So there are plusses and minuses as with many things. I would say for people initially entering the industry, working in a studio is a good idea as you will have a great recourse of more experienced artists to learn from, and it provides a stable atmosphere for you as you learn the ropes of the trade.

11.3 THE INDEPENDENT ARTIST: THE FREELANCER

Working as a hired gun or a freelancer has its own benefits and drawbacks as does working as a studio artist. There is no best option; it's just what you prefer as an individual, and many artists tend to variate between studio work and self-employment often throughout their career.

As a freelancer you will get a lot more freedom, the ability to choose your projects and clients and potentially the opportunity to earn a lot more as you can set high rates. The drawback is that there is no real guarantee on work. You have to find it yourself and maintain good relations with multiple clients to ensure some security and a good flow of work.

You also need to be good at marketing yourself and your skills as well as becoming confident in negotiating rates and terms. For some, this may seem intimidating but can be liberating according to your attitude and capability here as you can negotiate some healthy rates and very favourable terms if you are in demand.

The freelancer is on a personal level a more solitary life. You may be lucky enough to be included in a team now and then, but often you will be working alone. This is something to prepare for, if you are a more social person, you may find this more solitary existence a bit more difficult. I do find that most artists are by default fairly introverted, so often the freelance life suits them quite well, but it is something to consider.

Another aspect of being a freelancer is having multiple clients, maybe in different industries or areas. This can be stimulating as you may not be on one project for years, but multiple projects at once with different visual treatments and technical needs.

One of the primary things to get as a freelancer is about three or four long-term clients that you enjoy working for. Nice projects, good communication and good pay is what you want. Once you get some quality clients, a few of them, you are in a good place and things should go smoothly. Initially though, as a freelancer you may have issues finding clients or may come across bad clients. These are two different problems, but there are solutions!

For difficult clients it is much like finding the right life partner. This may sound funny, but the reasoning does apply. You will find some clients and the projects and relationship may not just work.

Best to let these go and move onto other work. As you get more experienced and trust your gut, you will be able to sense this dynamic

before even starting the job and turn down the work if you sense it may not be right. On the other hand, you will come across clients where the work is just what you want to do and the relationship is excellent and always a pleasure to communicate with them. These are the great relationships you want and can become your long-term clients who you work with for many years.

As for finding work as a freelancer, it is all about visibility. In this modern world there are many platforms where you can display your art and communicate that you are a freelancer, a gun for hire. Instagram, Artstation, Facebook, LinkedIn, get posting your art, display your skills, add the right hashtags, get going!

Another thing to remember, much like your portfolio, is to cater the art and content that you are posting to the clients you want to work with and the style of work they make and may need making. So follow teams and individuals, let them see your work. Get in contact, communicate and be visible to the right people. Hang out where creators and clients of the work you want to make hang, you will be surprised in what opportunities pop up!

11.4 RUNNING YOUR OWN BUSINESS

A subject to cover here too is that as a freelancer you are a business owner. You are the business. You may even extend to create your own business relating to creating character art. I have done this lately, and it exposes many new areas that you have to consider as you manage yourself and the needs of a small business.

As an individual or a business you will have to manage your own finances. You will have to invoice work done and find more work and clients in the future. You will have to do your own tax and be your own IT manager. Many things that automatically happen in a studio are things you will have to consider now.

This may seem overwhelming, but if you are somebody who enjoys learning new things and being in control of your trajectory in life, it can be very liberating and exciting.

As with being a freelancer, running your own business is very much being visible and having good communication with your clients. Your work should be good and offer something enticing and worthwhile. Some portion of your day will need to go to business management, client feedback, invoicing and other stuff beyond just making character art though.

Lastly, as the freelancer there is the personal aspect and the organizational aspect.

As a freelancer, you will often be working alone and you have to manage your own time. You will have to govern how much you work and control any distractions. There is no boss or even colleagues in the studio with you to make sure you are working and not getting distracted by internet, games or movies. Although, your clients still expect the work done, and the more you work as a freelancer, the more you earn!

So uninstall games on your work pc, throttle social media and distraction sites, remove all these distractions as you are your own boss, and only you will pay if you are your own bad employee!

As stated above, you will have to dedicate some time to the needs of the business, but it is worthwhile if you enjoy setting your own path and being in control of your work life.

Starting your own business is a very difficult route and not for the faint-hearted, but the reward that can be gained in your personal life, freedom and even monetary gain can truly be amazing if you manage to do it right.

12.0 The industry

12.1 GAMING

12.1.1 What to expect – From entry level to art director

So, a lot of focus is going into creating well built and appealing art for your portfolio, but what is the industry like once you finally get in and working? What is it like working in a junior artist in a large studio? What is it like working as a team lead or an art director on large long-term productions? What is it actually like working as a freelancer or building your own business? We can try to cover some of that here now so that you can get an idea of what it is actually like working as a professional character artist in the entertainment industries.

Before we get started, we will cover character artists working in video games studios first. These roles tend to be permanent placements or long-term contracts, generally staying at the same studio for multiple productions.

Character artists working in collectibles, miniatures and 3D print tend to be freelance artists or business owners. This is the general outlook, but not the rule of course.

12.1.2 Entering the industry – Life as an entry level or junior character artist

So you have landed a position as a junior artist or junior character artist in a games studio. Now what?

Well, you will most likely be signing a contract with a defined end date or it could be a permanent position. Your portfolio will be strong to land this position and show a lot of promise.

As well as the contract you will need to sign an NDA. An NDA is a Non-Disclosure Agreement that you sign for most projects. This document endures that you will not reveal or share any details of the project with people outside of project or company.

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Initially, as you enter the project you will be introduced to the rest of your team, your leads, the creative directors and get some early visual documentation on the project.

You will usually have a lead artist running your team. This lead artist will be the person who will quality check your work, be able to answer any questions and will be responsible for training you. They will also be able to answer all technical questions for you and provide a connection point to other teams on the production.

You may have some other more experienced members in the team such as senior artists. The senior artists will not directly be checking your work, but they will be available to help, answer questions and assist when available. They will be responsible for training you up too.

Beyond your lead, you may have an art director or creative director. These people will ensure the overall vision, look and quality of the production stays consistent and high. You may have reviews directly with your art director or your lead may take this in and send any feedback to you. Art directors may not be as technically knowledgeable as your lead or seniors even, but they are very good at seeing the grand vision of a project and may be creatively and artistically very strong in some area of art, so they can give good feedback on how to make something look better.

You will also be introduced to production people such as producers or art managers. These people will monitor and track all tasks going into a project. As a junior you may not interact with them heavily, but it is good to have an idea of what they do.

Game development is a long and complicated process. At best you are looking at least a year and a half to create one game. This is very fast though, and it can take many years, sometimes as much as five to create a large-scale game. You are generally in this for the long run. There are many technical challenges and inter team challenges to conquer, just to get a game out and done, and this is even before it is considered good or bad!

12.2 THE PROGRESSION TO SENIOR AND LEAD ARTIST

As you get more experienced, you may start to feel comfortable with the process and the tools. As you get more relative skills you may find yourself in the place where you may be training junior artists and be involved in pipeline and process discussions or meetings. When you have developed a solid, relevant and useful skill set and become a core of the team, you are most likely progressing to a senior artist.

Senior artists are solid core individuals of the team. They know the process well and can do most tasks given to them well and on time. Senior artist may also be tasked with developing new parts of the pipeline and often training less skilled team members of the team. They are highly skilled specialists of the trade.

As you progress forward, you may want to become a lead artist. Lead artists are much like senior artists. They are specialists and highly skilled, often one of the strongest artists on the team. Where the branch into management occurs though is that they are willing to become organizers, planners and people managers.

Lead artists are very strong and experienced artists, yes, but their most valuable skill sets and addition to the team is communicators between teams, estimating and delegating tasks and building effective pipelines for the team to work on. They may not be the rock star artists, but the figurehead of the team who keeps the pipeline smooth and moving forward at a good pace.

12.3 ART DIRECTOR OR PRODUCTION DESIGNER

As you get quite far into your career, and ideally have been working as a lead for quite a few years, you may wish to start considering the position of an art director.

Art directors are the principal artists in the team. They are often extremely skilled artists with a very strong portfolio and experience completing many projects over many years.

The art director is the figurehead of the entire art team and may be the head of multiple art teams; such as the concept team, character team, environment team and maybe even the animation team. One thing to consider is that the art director is a central part of management of the creative team. They are stakeholders of the project and in many ways they are responsible entirely for the quality output of the game as well as controlling and sanitizing the look and feel of the production.

This is a central role and not for the faint of heart. The art director or production designer has nobody above them creatively, so they are the last step and quality controller for all the art produced in a game production.

With all the stress and responsibility comes the great knowledge that you can mentor and develop an art team to do great things. You are not the star, but you are the person who pushes other to do great things. If you also wish to earn high and well, director-level positions are what you need to aim as your career matures.

12.4 ARE YOU IN THE RIGHT SKILL SET? MOVING TEAMS

One thing to consider is that it is often easy and needed to change your skill set a little and move to different teams and working environments. I, for example, started in architecture, and then became an environment artist in games. I was happy and successful in this role and got my first lead position.

The thing is as I got more experienced, I got a bit bored and always wanted to try characters out. Luckily for me, I had a producer where I worked who was happy to move me to the character team of another project. I even took a small demotion from lead to standard character artist to do this. It was worth it for me though to learn a new skill set and skill up in a new area. In a few years I was moving up to an art lead and then art director.

Lastly, as I got used to these roles I decided to take on learning how to make figurines, collectable art and starting my own business.

So as you can see, you do not have to be stuck in one skill set for your entire career. If your passions change as you get older and more experienced, feel free to change, pick up new skill sets, you can never really see where you may end up, so keep on making and learning. Change is good!

12.5 KEEPING UP WITH TECHNOLOGY AND TECHNIQUES

As you get used to the industry and get working, you will notice that the industry constantly keeps on updating with new tools, techniques and programs. With games and collectibles being a technology-based skill set, this is definitely the case. Due to the tools being digital and evolving fast, you really have to put some effort into keeping up with the latest developments.

In some ways, there is no way to avoid this; you just have to come to terms with it. Ideally, you enjoy learning new tools and techniques. You can view it as a direct way to make your art more relevant and better quality.

Some tools like gaming engines and sculpting software can take a long time to learn well and become efficient, so don't get frustrated if you don't get great at them straight away, but yes, this is a technology-based job, so the skills and tools keep on having to be updated and upgraded to keep up. Hopefully, this is something you are okay with and happy to do.

12.6 GAME PROJECT CANCELLATIONS

Since game development is so hard, you are in it for the long haul. Another thing to consider working in development is that projects often get cancelled. This cancellation of a project can actually happen quite often. The reasons for this may be many, but the usual reason is that the project would be started in good faith with the hope that it will get good traction and sell well. Sometimes though the project may not have the end result that is wanted, or may be taking too long, be too difficult for the team or just may be the wrong direction. So project cancellation occurs. It may seem a rare thing, but it is really quite common. I have worked on multiple projects in my career for big and small companies that have been cancelled or canned.

This is something that just happens. The major downside is that you may end up working for years on a project and it may be cancelled or 'shelved'. When this happens, almost always you will not be able to put the work done on your portfolio as the project is still under NDA and not in public release. So unfortunately you may end up working for years on a project and not be able to show what you have done! This is quite common, particularly in games and I have had quite a few projects that I have worked on and been cancelled. Something to be aware of, the first time it happens may be a bit of a shock but just realize that it can happen quite often.

12.7 BURNOUT, KEEPING MOTIVATED AND HAVING A LONG CAREER

One thing that is often not discussed is stress, burnout and keeping motivated.

Burnout is something I would say for sure that you will encounter in your career. This is generally the process when you work so long and so hard that you start to lose your motivation for doing the tasks and the thing you loved in the first place.

The big thing I found as I started to work into my second decade in this industry is to focus on the art, what you love doing and forget the office politics, prestige of whatever project or worrying too much about the future.

If you love the stuff you are making, no matter how weird it is and keep your passion for the work alive, you can do this for a long time. Worrying about projects, broad team dynamics, overworking, climbing the ladder and things you cannot control will stress you out and lead you to detach from what you are passionate about and lead to burnout.

If you always focus on the thing that made you love this work initially then you are somewhat protected from external factors and can indeed have a long and happy future in this industry.

12.8 COLLECTIBLES

Working in collectibles is functionally quite different to working in games.

The collectibles industry is smaller and less established than the game industry. There are some advantages to this as well as some disadvantages. This industry is a lot more agile and able to move fast, it is also a lot more casual and arguably a lower stress environment to work. The downside is that it is a younger, smaller industry, so the pipeline is not so established and as smooth running as the more mature games pipeline. The income can also be lower, but this depends very much on the projects and clients.

Most likely as somebody working in collectibles, you will be a freelancer or small business owner. There are no big studios with hundreds of employees and a hierarchy structure as in games.

Figurines and collectibles is usually a smaller sized business in comparison to games, not a studio of tens or even hundreds of people.

It is a lot more flat system, dynamic and you will most likely be working directly with the owner or creative director of the product if not even being that person yourself! To some extent there is a less structure, so you may not get a lot of guidance and have to feel comfortable making your own way and course correcting as needed. As a more junior artist, looking for mentors and peers, this may be a more daunting prospect as this is still very much a freelancer-dominated space. You will rarely get to collaborate with other miniature designers and almost never be on site to learn form more experienced artists.

12.8.1 Working small, then moving to big

As you start working in collectibles, you can start on some of the smaller scales such as 32 mm to learn the ropes. Due to the smaller scale you will work with less detail. Due to this scale you will often not have to do too much splitting and keying too.

As you get more confident with the process you can move up to more and more complex sculpts and bigger scales. Eventually, you can aim for very large scales up to 300 mm plus. These sculpts require a ton of detail and design. They often have very complex needs of splitting and preparation for production.

Lastly, a new aspect and indeed possible are massive scales such as statues, arcade floats and grand cultural statues. There are a few examples of these that have been initially deigned in digital sculpting, so who knows, you may make something of truly epic scale one day!

12.9 WORKING ALONE, BEING YOUR OWN BOSS AND DEVELOPING SKILLS

As stated, if you are working in collectibles or figurines, you will most likely be an individual freelancer. You will probably be working alone and will not have many colleges to work with and lone from.

So you very much have to rely on yourself to get the work done and skill up as needed. One of the key things to consider in getting better at figurines and collectibles is to get a 3D printer and start printing your own work and learning what the printer needs to get to create successful 3D prints. This is a big step, and as you start to better understand what makes an excellent 3D print, the closer you are to making excellent collectibles that not only look nice but also print well.

12.10 POSE, APPEAL AND PHYSICALS

So as you get digital sculpting, learning anatomy, detail and sculpting away, there are some things that are unique to collectibles, miniatures and figurines that are very important and quite different to making characters for games.

Pose. When you work in games you really never get to pose your characters, the rigging and animation team do this. For collectibles though, this is an extremely important skill set. Getting a good pose, a feeling of movement is one, if not the key way to make your figure appealing.

Combine this pose with a sense of storytelling and character representation as well as movement and weight, you can see that it is important to think almost like an animator or a traditional figure artist to get your pose and storytelling really singing.

The next aspect to always remember as you build is that your end result will be physical in the real work, not digital. With this in mind you will have to build with foresight of the limitations of the materials and capabilities of manufacturing such as 3D printers. We will cover these considerations in detail in the technical example, but just be reassured, you cannot just build as you want in the digital space here. Some limitations and control need to be considered.

13.0 Other skills

13.1 TIMEKEEPING, FOCUS, COMMUNICATION AND MORE

As we get to the end of this book, let's cover some subjects that are easily forgotten or not covered. These may be considered as soft skills, but they are still vitally important to your development as an artist and as a working professional.

13.2 COMMUNICATION

First and foremost is communication skills.

As a junior artist or freelancer working by yourself you may not need to use these too often, but as you develop and become a lead artist, art director or business owner, you will need to use these skills every day and they may even become essential, your primary skill set, outside of just making nice artwork.

I found this a big transition for myself to deal with.

In the early part of my career, I focused entirely on getting the skill set down and getting better. I spent years just making stuff, learning tools, focusing on skills and not really having to communicate with other members of the team, just getting better.

Then I moved up to a lead position.

I had to start communicating with other artists, seeing how they are doing. I needed to have meetings with production and find solutions to problems with other team members outside my team. It was a big, big transition moving from just doing the art to becoming a communicator, a leader and problem solver.

As I moved on to roles such as art director or production designer, I found that almost all of my day would be taken up with communication, managing people, feedback, making sure my team excelled, hitting estimated deadlines and making other departments were aware of what we were doing. On some productions, the majority of my day was

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facilitating, helping people, problem solving and greasing the production wheels. Some days I may not even do any art, just all communication, team dynamics and meetings!

I mention this to illustrate how important communication is. A lot of artists can be introverted and prefer to focus on the craft. This is understandable, but if you have any inclination to leadership roles or even a business owner, communication is an absolutely vital skill; you will have to get out of your comfort zone here if you wish to get beyond the art and try other skills sets and leadership.

13.3 TIMEKEEPING

A fairly straightforward topic, but let's elaborate this a little:

If you work in a studio you will have a structure and a set time to work in your days. Leads, producers and art directors will estimate your tasks, track your progress and make sure you are on time. Your work day is locked and hopefully your day starts and ends at a set time and does not follow you home. This is not to say you will not be responsible for tracking your time and keeping on schedule; you will need to do this, and to some extent you will be responsible for this.

Where timekeeping becomes an issue and a lot more complex is when you become self-employed or a business owner. This is where we can elaborate a bit further.

As an independent freelancer or business owner, there is often no one tracking your work; distractions can become a problem and there is no clear beginning or end to your day. All of this can lead to confusion in your tasks that you need to do, taking on too much work, working too long and not have clarity on what you need to work on and what to tackle next.

After 15 years of working in studios, I recently went freelance and started my own business.

This was a big transition as I had to find my own work, set up my own tasks, track them and manage my working day and time completely. There was no one tracking my time and supplying me work, it was all up to me.

For timekeeping and tracking tasks, I found an online timekeeping app. There are many variants in there, so just find a good one for you. The app is not important, what is important is the tracking of tasks, clients, as well as how much time per week I am actually working. Before I got a time tracker, I was assuming I was doing a lot of work, but I was not, I was often easily distracted. A time tracker helped me make sure I put the hours in. Due to this visibility of what was going on, less

distraction happened and I also made sure I did not work too much and had a definite end to my day.

Another aspect is to try and lock off certain times of your day that are not for work. Working from home or by yourself, the barrier between work and normal life may begin to blur a bit, so having some locked time for lunches, recreation, exercise and just the end of the day is really important to remain healthy and in a good healthy state to keep on working.

13.4 FOCUS AND SELF-LEARNING

Something you will have to get used to is some form of focus and dedication to self-learning. There are many distractions out there, often right on the workstation you are working on!

Games, streaming series, videos, social media, it goes on and on….

The most successful artists I have worked with are those who are so focused that these things do not consist of a large, or any part of their day. It is a constant battle for sure, but if you can have solid time to focus on your work without distractions, then the better you will get faster.

Ideally, for you the focus on the work and learning becomes a joy, a more attractive activity than all the many time sinks such as games and social media. This way you spend even more time levelling up, having fun, doing your own projects and getting better along the way, investing in a worthwhile activity that can have some really great payback for your time invested in learning and getting better.

So focus and some self-discipline are critical. The amount of time, learning and focus you put into something is a direct indicator of how good you will get eventually. Distractions and non-productive (although fun) activities will derail you from where you wish to be. So be very aware of these distractions. Lock them off and away if they become an issue and make your work, learning and getting better an enjoyable activity so you will naturally do it and progress in skill and abilities.

This brings up the subject of learning and self-study.

In the beginning, as you learn it is important to find mentors, learning institutions and work peers to help you learn the tools and techniques that you will need to know. Essentially, you will need to find people and institutions to train you for the majority of your day. This will become less and less as you get more skilled, but you still need to learn. As you get more experienced, the amount of people you can learn from will become less and you have to grow an ability to self-direct your studies and critique your own work as needed.

This is a skill that will become more and more important as you progress in your career.

You are never done learning.

You will have to keep up with new tools and learn them. You will need to see if there are people who know something you do not, no matter how experienced you are and learn from them. If there is no one to critique your work, you should become skilled at reviewing your own work, finding weak areas and setting up tasks to help you become excellent in these weak areas so that they are no longer an issue.

So for me, as I progress in my career, I find it difficult to find mentors with more experience, but I still want to learn and get better. So I find released tutorials from well-known industry-experienced artists whom I follow, collect those and then study and learn from them. I have a circle of friends in real life and online who are around my experience and ability level that I can get tips from and ask for critique. Then lastly there are artists who will always be better than me, I will never be close to them and these are the classic artists, the grand masters. This may sound fanciful, but doing master studies, in pencil, paint, digital studies and sculpt replication studies in Zbrush; all of it has really helped me become a better artist. There are mountains of artistic knowledge there, so it is an amazing resource.

So once again, self-learning is vitally important. What you learn in University or the skills you learn initially to get in the industry are only the beginning. Ideally, you enjoy learning and incorporate this into enjoyable personal projects and goals to keep up to date with the industry and your skill developing in a nice upward trajectory.

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How do you thank your mother for making you a reality in the first place? I don't know, but thanks to my mother, Jaquie King, who as an academic and author herself gave me lots of great advice on how to write a book. For letting me know the importance of simple things like an annotated table of contents!!

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honest, but the one thing I always treasure is the people I meet along the way.

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Lastly….to you! Thank you all for buying and reading this book.

All I can hope for is that I helped someone out there who is new to this process and provided a solid introduction to this exciting and ever-changing industry and art form.

If I did, then it is all really worth it.

Thank you to all once again!

– Sam

Glossary

This is a reference list explaining technical words used throughout this book.

3d artist An individual who uses 3d software to create art, games and animations.

3D-Coat A 3D texturing program used to paint directly on 3D models.

3d Studio Max A modelling and rendering program. One of the core 3D programs used by digital artists.

Albedo The albedo is a technical term for the base colour of a material with all other material properties removed. It is just the materials local colour, nothing else.

Alpha Alphas in games generally refer to transparency textures and the polygon cards that hold them. This is often hair, fur and thin clothes.

Ambient occlusion A texture map, part of a physically based rendering map set that represents the occluded light on a surface.

A-Pose This is a symmetrical pose for a character model with the arms out to the sides of the body at a 45 degree angle. This pose is created in this way for rigging.

Bake The process of transferring details from a high-resolution mesh to texture maps.

Bent Normal Map A type of baked map that holds high topology information in its RGB channels.

Bevel The process of making a hard edge into a softer rounded edge. A common function in 3D modelling.

Blender A modelling and rendering program used by many. This program is free.

Blend shapes A set of shapes on a mesh that blend in between states to create poses or animation.

Blockout A mesh created to figure out and lock down the fundamental forms and silhouette.

Bones In the process of rigging a set of bones are placed inside the character model to aid in deformation and animation later on.

Boolean A function in polygon modelling of combining or removing intersecting parts of two meshes.

Bounce A term used in lighting to calculate how many times a light ray bounces before the calculation ends.

Brush A digital brush used to paint or sculpt in 2D and 3D.

Budget The process of working in games where assets are created with a set and limited budget of polygons and textures.

Canned or cancelled. A colloquial term in game development for a project that is cancelled or halted development before completion.

Cavity Map A type of bakes map that holds deep crevice information from a high polygon mesh.

Checker A UV checker map. Applied to a model with UVs, this map assists in making better, more uniform UVW unwraps.

Clipping When two polygons collide and clip though each other, often leading to odd visual results.

Collision A low-resolution mesh in a game engine that objects collide with.

Concept Artist The person who creates and completes a 2D painting or sketch that a 3D artist will work from to create a 3D model.

Corrupted A mesh or file that is broken or has errors.

Cut Polygon cut or slice – The process of splitting a polygon. A common function in 3D modelling.

Curvature map A type of baked map that records angle changes in a high polygon mesh.

Decimation The process of reducing resolution on a mesh while retaining detail. A plugin tool often used in Zbrush.

Developer The term for the team that develops a game.

Diffuse A texture. Much like an albedo texture, this is the colour texture. An albedo may carry some lighting and form information though and is used for hand-painted texturing.

Dilation A process in a texture program where the pixel edges of UV islands are extended out to the edges of the UV map.

Dynamesh A function in Zbrush that retopologizes a sculpted model to a new uniform mesh and removes intersections and some errors.

Edge A line that connects two points or vertexes. Can be used in polygon modelling.

Emissive A texture map, part of a physically based rendering map set that represents a glowing surface.

Extrude A technique in polygon modelling top extrude a face out from a polygon surface. A common function in 3D modelling.

Face An abbreviated term for polygonal faces.

FBX A format for exporting meshes for use in other 3D programs and games engines. This format can hold a number of things beyond the mesh such as materials and animation.

Grab The process of grabbing an image from a live game engine or game viewer.

Hardsurface A method of modelling man-made surfaces such as vehicles, armour and weapons using high polygon techniques.

Island A UVW map island. A collection of contiguous polygons split off to individual islands or mesh groups in the process of unwrapping your 3D model.

JPEG An image format. Ideally used for Web. This format can come with heavy compression and artefacts, so is ideally not used in game development or 3D.

Key A mesh that is added to a split off part of a sculpt that will aid in the physical reconstruction process once the mesh is 3D printed.

LOD Level of detail. Meshes in game will be lodded or reduced in detail in multiple models according

	to how close they get to camera. This saves on memory as lower LODS are used.
Loop	A line of topology on a mesh that wraps around the model and goes in a linear direction.
Maya	A modelling and rendering program. One of the core 3D programs used by digital artists.
Mesh	A polygonal mesh consisting of points and polygons.
MipMap-Mipping	A process in game engines where textures are forced by the engine to reduce in size and detail the further away from the camera they are.
Non-Uniform	A type of polygon that is broken or malformed and therefore not ideal for game engines or rendering.
Ngon	A non-uniform polygon, often consisting of more than four sides.
Optimization	The process of optimizing and asset in preparation for a game engine. Retopology is a part of this process.
Padding	The process of leaving a certain pixel amount free between UV islands to allow for dilation of the texture to extend the texture boarder out when mip-mapping occurs.
PBR	Physically based rendering. The term for physically correct lightning and materials leading to better results and performance of assets through diverse lighting situations.
Photon	The term in lighting for the article of light that is emitted from a light source.
Point	A point located as one of the three points or more that encapsulates and creates a 3D polygon face.
Polygon	The base of all 3D modelling, the surface drawn between points or vertices.
Projection	This is the process of projecting images or detail from a high-resolution model onto another mesh. Often the low polygon game model.
Push	A useful function to use in digital modelling, pushing the vertices out on a mesh according to their vertex normals.
Render	The process of rendering your 3D models to finished images with lighting and materials applied.

Retopology	The process of taking a mesh unsuitable for render or game engine and making a neater, limited and animation-friendly mesh over this reference model.
Rigging, Rig	The process of creating a bone system and controls on a character model for animation.
Marmoset	Marmoset Toolbag. A live game viewer used to view game models and meshes. Lately this program also supports a map baker and has some texturing functions.
Marvelous Designer	A program specializing in fabric simulation.
Meshsmooth	A function in 3D programs, also called smooth of adding more resolution on a mesh.
Metallic Map	A texture map, part of a physically based rendering maps set that represents the metallic value of a surface.
Mip Mapping	A process in a game engine when textures are reduced in resolution as they get farther away from camera.
Ngon	A polygon with more than five sides. A polygon with concave sides or irregularities that leads to problems and errors in engine or in render.
Normal	This dictates the direction a polygon is facing.
Normal Map	A type of baked map that holds high topology information in its RGB channels.
OBJ	A simple mesh format. records just the mesh normals and a few other simple aspects. An older format but fast and reliable.
Orthographic	A view mode in 3D programs with no depth or perspective.
Perspective	A view mode in in 3D programs that has perspective.
PNG	An image format. high resolution and not much compression, so often used in game engines. It comes with default alpha map and can be quite large in data storage.
Publisher	The term for an organization that takes a developed game from a development team, then sells and distributes it either physically or digitally.
Realtime	A term for game engine and live viewers where the models and assets are viewed in real time and not rendered at an earlier time.

Retopology The process of creating an organized and often lower resolution mesh over a very dense or messy mesh, not suited for animation.

Retopo Abbreviation of retopology.

Roughness A texture map, part of a physically based rendering maps set that represents the reflection intensity of a surface.

Rig A series of bones applied to a polygon mesh that is used to move it into pose and animate.

Simulation The process of simulation something in cg for use in render or production. For character artists, cloth simulation is the most often used form of simulation.

Skin A process used in rigging. This is the process of binding the character mesh or 'skin' to the rig bones.

Split and Key The process of splitting a collectible figure up into parts for easier 3D printing and reproduction to be put back together again later with the use of keys as a construction guide.

STL Stereo Lithography file. A file that holds mesh information and is used by 3D printing machines.

Subtool Minor tools stored within a master ztool in Zbrush.

Substance A modern set of texturing and material tools used to create PBR materials for modern game engines.

Substance Painter A 3D program focused on texturing and creating texture and material sets.

Symmetry A function used in 3D where you only have to work on one side of a model and the work is copied symmetrically to the other side of the mesh.

Texture map Or simply a 'map'. A set of textures projected onto a game model to represent colour, detail and material values.

TGA An image format. An image format that can record large resolutions with not much compression. Alpha channel is optionally added. An older format, but quite reliable.

T Pose This is a natural symmetrical pose for a character model with the arms out to the sides of the body at a 90 degree angle. This pose is created in this way for rigging.

Translate The process of moving an element in 3D program on the X, Y or Z axis.

Triangles This refers to the base polygon data recorded in a game engine. All meshes and polygons are reduced to triangles on import to a game engine and so the triangle count or tris is the true method for recording mesh polygon density.

UDIM The process of pushing multiple UV unwraps on one model outside of the 1–0 UV range.

Unwrap The process of unwrapping 3D model UVs to a flat UV layout.

UVs An unwrapped representation of a 3D model presented in a 2D plain.

UV map An unwrapped representation of a 3d model, put on a 2D plane for textures to be projected upon.

Vertex A point on a polygon. The base of all 3D modelling.

Weights The process of painting influences weights on meshes for rigging, determining the influence of bones on a mesh.

Xnormal A small free program used specifically for baking maps from meshes.

Zbrush A modern digital sculpting software.

Ztool A polygon mesh stored in a Zbrush file. Each Zbrush ztool can have many subtools.

Zproject A full Zbrush project, saving your ztool and all other settings.

Zplugin A selection of useful tools and plugins for use inside Zbrush.

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