

Erik Irwin

FORZ



Jötunn

[Yaw - toon]

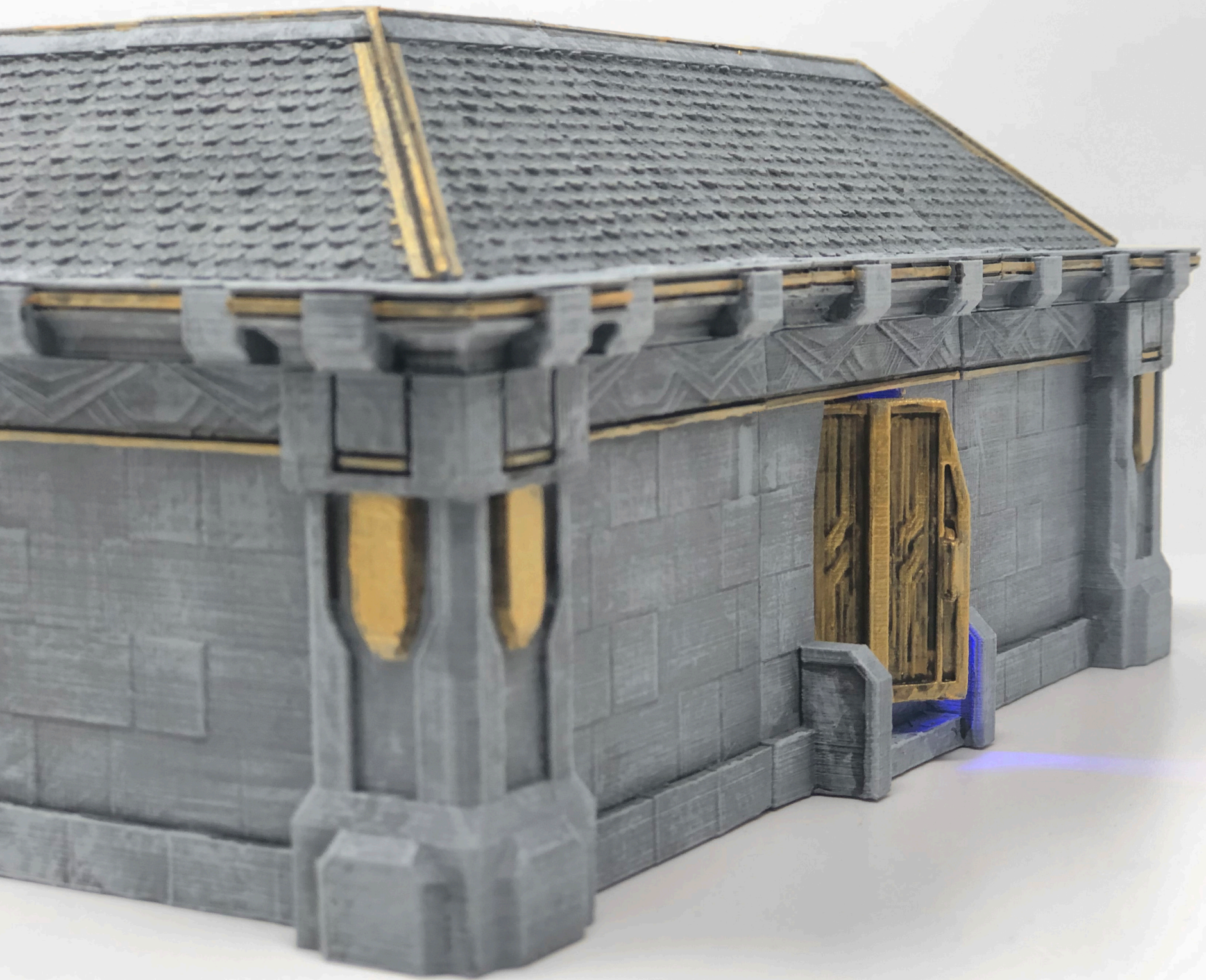
noun. Scandanavian Mythology.

Any race of giants frequently in conflict with the gods.

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INTRODUCTION

Connection

For as long as humans have had culture, we have had games, and various activities we partake in to help relax, ease our minds or even just to help us connect with friends and strangers. Play is a fundamental part of the human experience, and one that a lot of people forget about as they get older and busier with their lives.

Recently, the world experienced a pandemic, and for a lot of us, we were forced to take a step back. To slow down and pause for a moment, as circumstances beyond our control derailed the rhythms of our lives. One of the biggest impacts was the social isolation created by quarantine. The loss of those everyday connections with friends and co-workers that so many of us take for granted.

Throughout quarantine, I was able to use this social play to stay connected with my friends and fulfill that inherent need for social interaction. We would meet every week, to continue playing our favourite tabletop role playing game, Dungeons and Dragons.

This is something we've been doing for several years as a group, and myself even longer, and while it is true that we have been able to find ways to play online, we all miss the energy and connection of sitting around the table and playing it live in person. For this reason, I've decided to focus my capstone project on developing an aid to help with playing tabletop games in anticipation of the return to in-person socialization.



DEFINITIONS

Tabletop Games

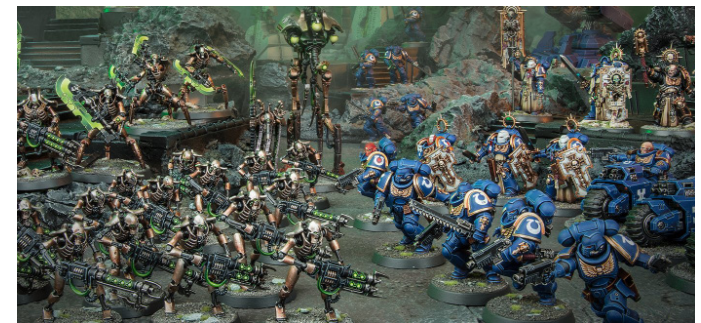
Tabletop games, or hobby games as they are otherwise known, is a large industry comprising board games, card/ dice games, miniature based games, collectible games and role playing games(ICV2, 13). This encapsulates any board game you can think of, standard playing cards, collectible cards such as sports or Pokemon, as well as a multitude of table top based war games.

Miniature Wargames

Consists of two separate armies fighting across a battlefield with the armies being represented by miniature figurines. Usually these games are played by two players one for each army, however several games exist that allow for multiple armies or players.

Role Playing Games

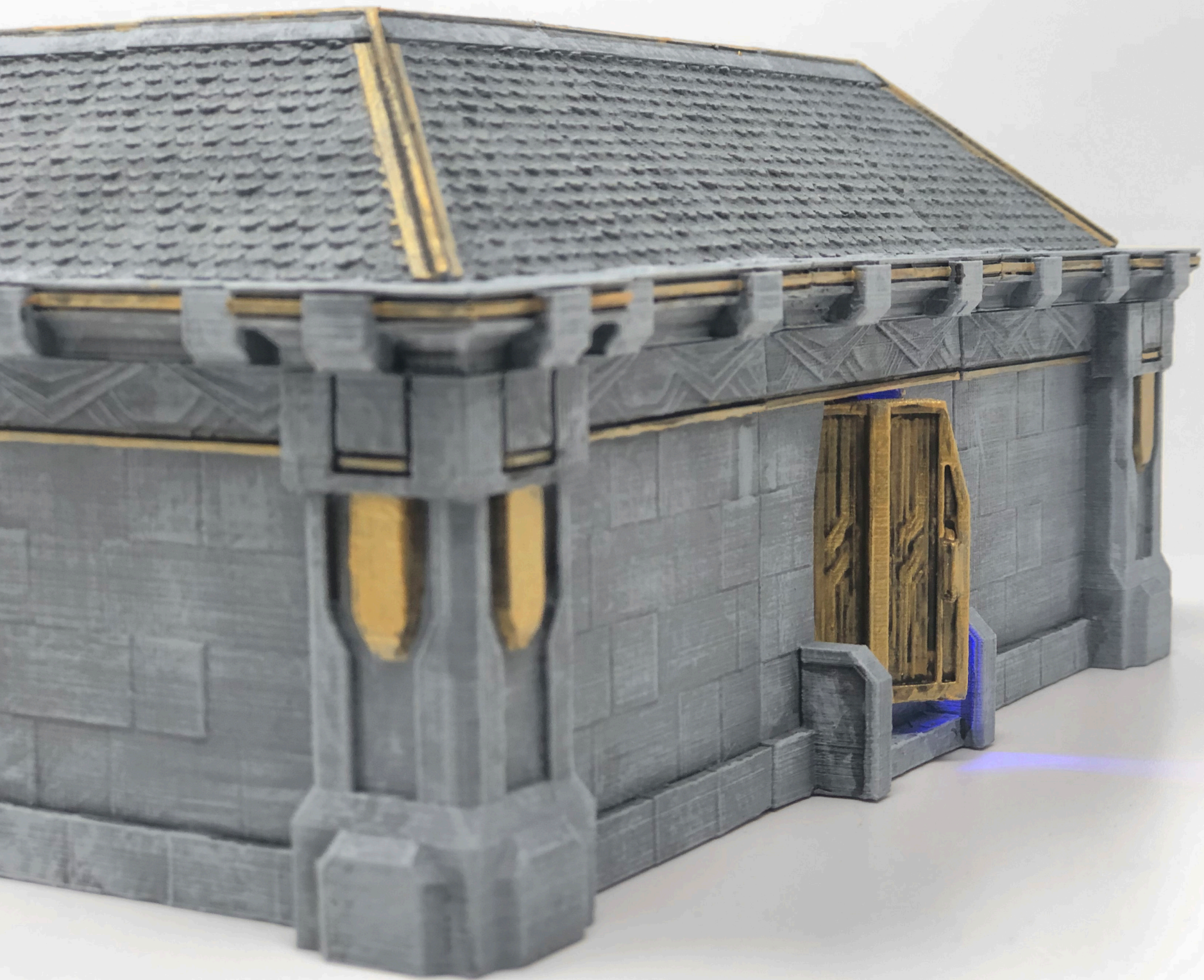
Evolving out of miniature war games, role playing games or RPG's focus more on the individual actions of a single soldier or player character controlled by an individual user. These games are often played by 2-9 players, with one of the players acting as the Game Master. This individual acts as a storyteller and referee, who determines the outcomes of the other players actions.



OPPORTUNITIES

Looking at the state of tabletop gaming today, you can see that there has been a recent surge in popularity for tabletop gaming over the last decade, and there are more and more people entering the hobby everyday. This is especially true with role playing games as online usage has actually increased thanks to the ongoing pandemic creating an environment where people have more time and more desire for social interaction.

While board games make up a large portion of this market, it is by no means the largest (Morrus), which is one of several reasons why a focus on role playing games and the closely related miniatures war games, can provide potential avenues of exploration. With the end of the pandemic in sight, we can look forward to the eventual return of in-person game play. Thus, the opportunity exists to provide solutions to help new players transition to in person play, and provide new forms of immersion for veteran players.



RESEARCH

METHODOLOGY

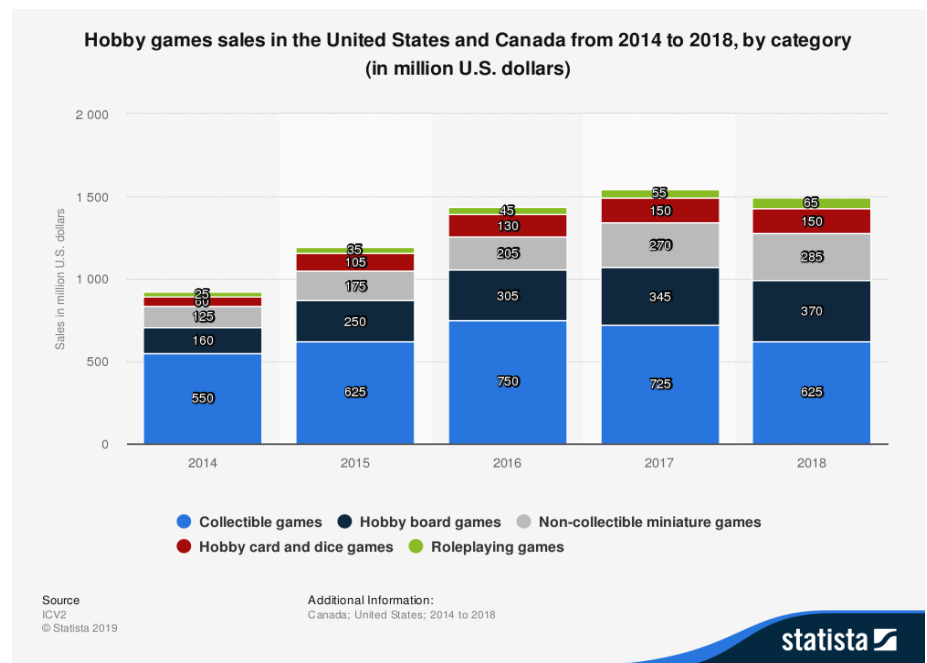
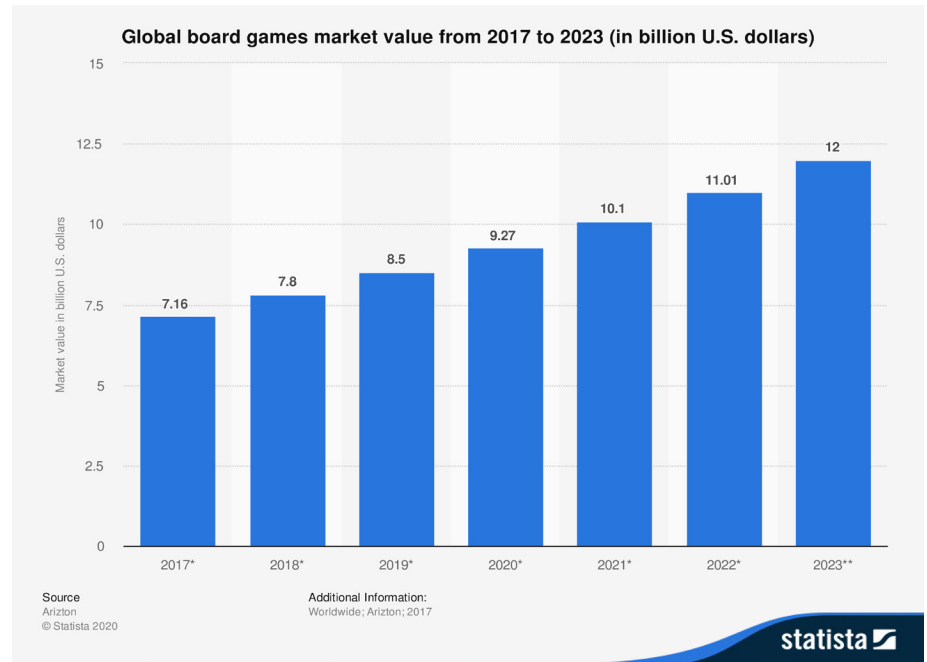
In order to find opportunities for how I might enhance the play experience of wargamers and role players, I must first get a better understanding of the broader market of tabletop gaming, and where miniatures and role playing games fit into this larger picture. Look at what products are already available on the market and what purposes they fulfill, exploring the origins of the hobby to help further contextualize my findings.



MARKET ANALYSIS

The worldwide tabletop gaming market had a value of 7.2 billion in 2017, with estimates of it increasing to 12 billion by 2023. Of the 7.2 billion in sales worldwide, the North American market alone was worth 1.5 billion in 2017. There has been a continuing growth trend over the last decade, which is reflected in the growth seen across the entire North American market, which saw a 12% growth to US \$1.675 billion in 2019.

The largest growing sector is the role playing games market thanks to the continuing success of the Dungeons and Dragons RPG. According to the president of their parent company Wizards of the Coast, 2018 was their 4th straight year of over 30% sales growth. And while the pandemic has caused an initial dip in their sales, it has soared ever since thanks to more and more people turning to D&D as a way to deal with the ongoing pandemic, facilitated through online platforms such as Zoom or Roll20.



HISTORY

Wargaming first became popularized thanks to a game called Krigsspel and was used by the Prussian army for the training of military officers. When the Prussian army won the Franco-Prussian war in 1871, much of their victory was attributed to their army's tradition of wargaming (HMGS).

However it was still only really known in military circles, so it wasn't until famed science fiction author H.G Wells published his game Little Wars in 1913, that wargaming reached a larger audience. It is considered the first widely available commercial wargaming system, and was designed for use with the common toy soldiers that were popular at the time. It's also the first wargame to use models of terrain, trees and buildings to represent actual environments and 3 dimensional battlefields.

After WW2 miniature wargaming blossomed thanks to advances in technology which allowed for the creation of cheaper, more detailed miniatures. Combined with the development of newsletters, periodicals and conventions, community networks began to develop and greatly expand the player base. The popularization of fantasy works such as Lord of The Rings in the late 60s led to the diversification of the hobby as new fantasy based games were developed, bringing gaming to an even wider audience.

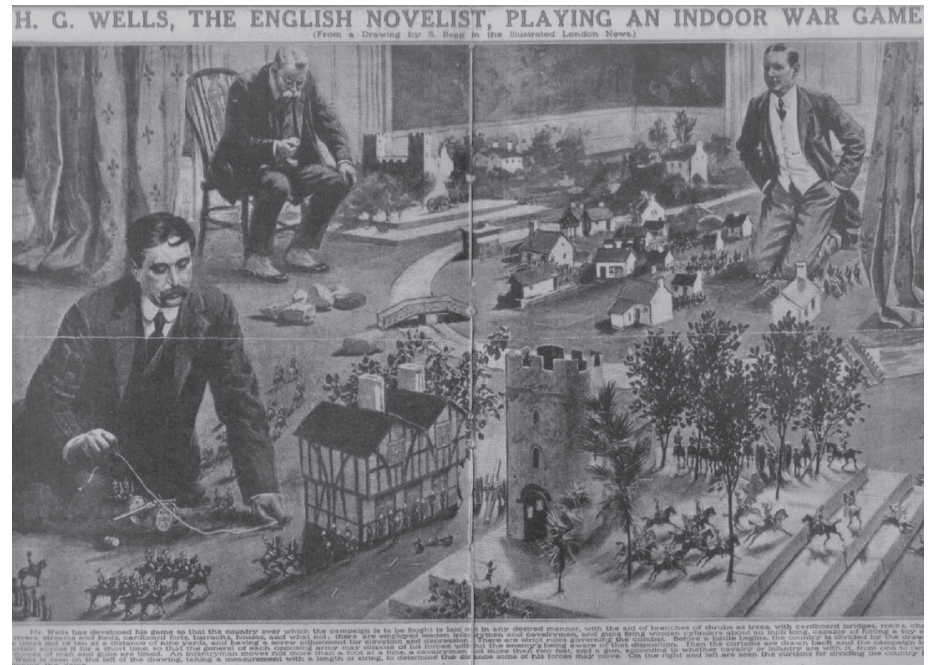
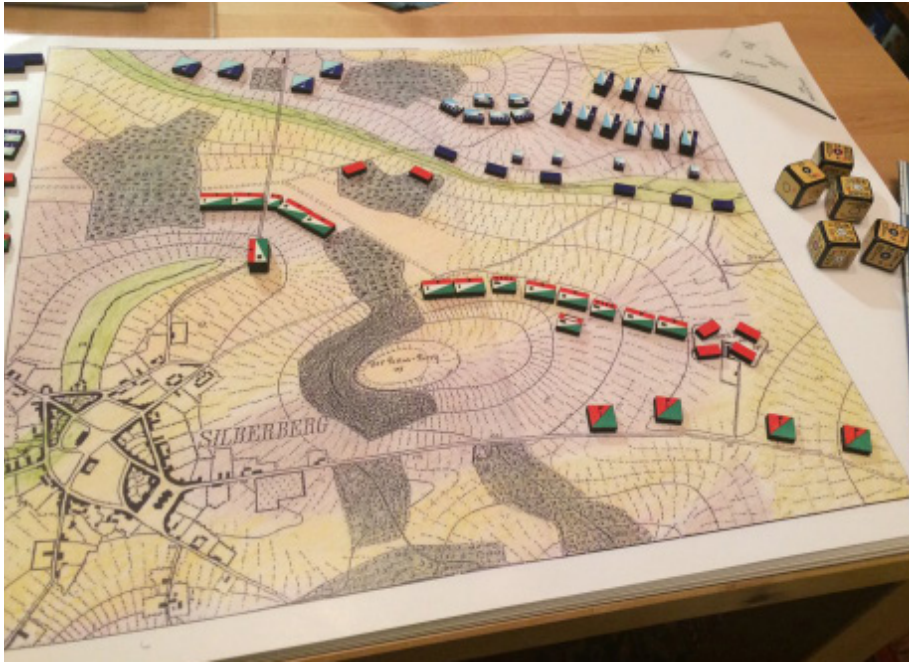
One of these games was Chainmail. Co-created by Gary Gygax, it would eventually lead to the development of Dungeons and

Dragons, creating the genre of Role Playing Games, which often still relied upon many of the miniatures and terrain techniques used for wargaming.

Because wargames and RPG's have their roots in the collecting and painting of model soldiers, one of the more unique features of the hobby is that they have to be built and painted by the players before the game itself can be played. This has led to them being quite distinct from other hobby games, and instilled a unique DIY (*Do It Yourself*) ethos in the community. This is evident from this quote regarding H.G. Wells's Little Wars:

"Mr. Wells has developed his game so that the country over which the campaign is to be fought is laid out in any desired manner, with the aid of branches of shrubs as trees, with cardboard bridges, rocks, chalked-out rivers, streams and fords, cardboard forts, barracks, houses, and whatnot;" (Bard)

This attitude has carried on until the modern day, although most hobbyists use model railroad terrain now instead of actual plant materials to create more natural scenery. Much of this DIY information and techniques were shared between community members and published as tutorials in dedicated hobby magazines.



Categories	Sub Categories	Product Types				
2D Terrain	Play Mats	Terrain Mats	Battle Maps			
	2D Scenery	2D Terrain Pieces				
	Digital Interactive	Projected Play Surfaces	Videp Display Play Surfaces	Portable Video Display Surfaces		
	2D Tiles	Graph Paper	Cardstock Tile Systems	Gridded Dry Erase Surfaces		
3D Terrain	3D Tiles	Cardstock Tile System	Resin Cast Tile System	Injection Molded Tile System	3D Printed Tile System	
	Buildings	Cardstock Buildings	Resin Cast Buildings	Injection Molded Buildings	3D Printed Buildings	Laser Cut MDF Buildings
	3D Scenery	Hard Sculpted Scenery	Flocked Model Rail Scenery			
	Expanding Systems	MDF Expanding Walls Systems				
Accessories	Play Aids	Combat Templates	Combat Tokens	Play Organizers		
	Tables	Custom Gaming Tables				
	Dice Paraphernalia	Custom Dice	Dice Towers	Dice Trays	Dice Storage	

PRODUCT AUDIT

Looking at a large cross section of what was available on the market that I could discover, I then broke them down into related categories for analysis. The most fundamental differences between the categories of terrain are two dimensional terrain versus three dimensional terrain, with 2D terrain being the simplest representation of the battlefield or game area, and 3D representing a higher level of detail and immersion as well as expense for the players. Most players start off playing with 2D terrain, eventually upgrading as they continue with the hobby and investing more time and money, with many players using a combination of 2D and 3D depending on their own needs and budget.

Two dimension terrain is most often used to represent the actual playing area which the miniatures would traverse, and 3d terrain is used to supplement this by representing various natural fauna or man made objects and buildings. Most 2D terrain consists of battle mats that are designed as generic environments such as grasslands and swamps etc. and battle maps which are intended for more specific locations such as areas, or buildings.

The next distinction is designed objects such as buildings, and various kinds of structures and naturally occurring scenery such as trees, fauna and rocks or other natural obstacles. While there are a small variety of plastic or resin pieces you can buy to represent natural scenery, the DIY community has a long history of using model railroad products to design and build natural envi-

ronments themselves, which coincidentally tends to also be the more affordable option. The majority of pre-made terrain that already exists on the market is focused more so on man made objects, and especially so with buildings in a variety of architectural styles both historical and fantastical.

The final major distinction I've observed is how various terrain systems interact with each other or don't and the biggest single category are tile systems designed for modularity and adaption. These are especially useful for RPG's as they allow the Game Master to recombine a single set in multiple layouts to create a large variety of possible scenarios. Tile systems are available in both 2D and 3D and are produced by several companies, In addition to being made by DIY crafters designing their own. This area of terrain has seen a lot of activity thanks to the recent affordability of 3D Printers, and there are several competing as well as open source tile designs available on the market. There are connector sets that connect or click into each other or a game board, as well as modular buildings that can connect with each other as well as being standalone.

SCALE

Unlike most tabletop games, the connected origins of RPG's and wargames has resulted in them both using the same scale for their miniatures and terrain. The most popular scale used is 28mm or 1:58 scale. This number loosely represents the height from the base to the model's eye level, and can vary anywhere from 25mm to 32mm between product lines and manufacturers.

This is partially due to there being no standardized sizing, in what is essentially a small batch cottage industry, and the tendency for the models to have larger weapons and hands than would be realistic as to increase their resilience for repeated handling and create more heroic proportions.

Due to these size constraints, miniature scenery and buildings are often slightly smaller than they would actually be, but the game designers keep the proportions of building windows and doors within scale of the figures in order to maintain the illusion of a consistency.



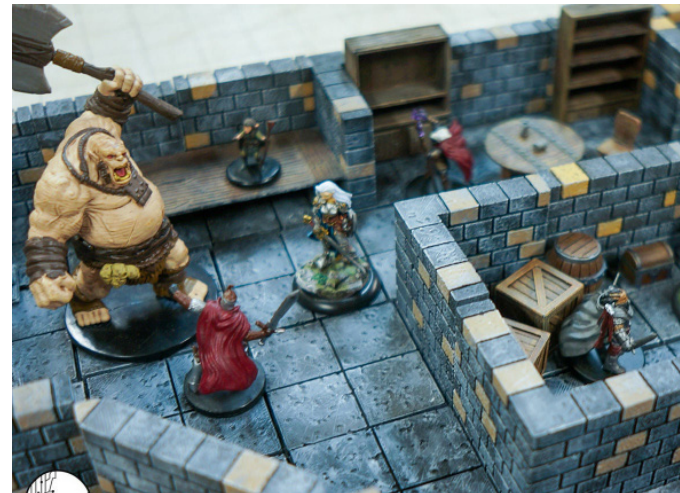
Foundry 25mm on base Reaper 28mm Rackham 30mm GW 28mm Rackham 30mm monster

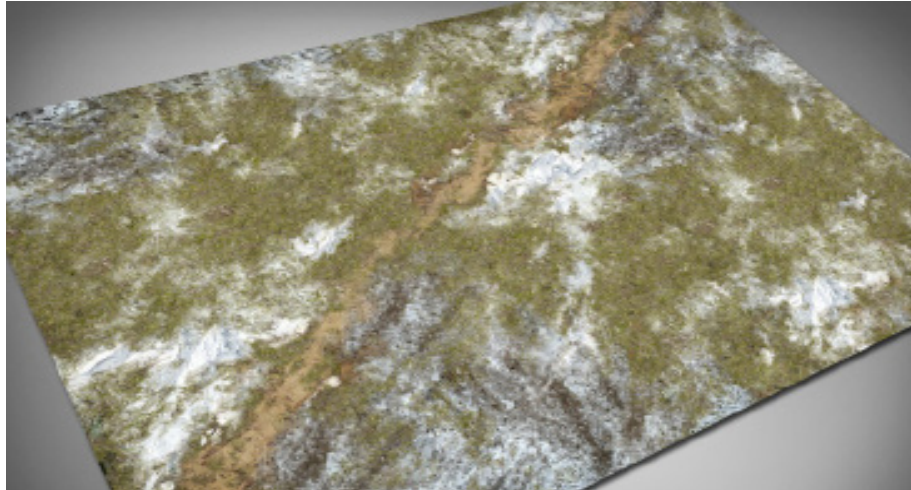
2D VS 3D

Due to the nature of most wargames and RPGs revolving around combat, they usually involve grids or forms of travel for pieces representing individuals or units across an area based on various parameters. Because of this, most of these games can be theoretically represented two dimensionally, but are preferably represented three dimensionally to increase game immersion.



The way this plays out most often is with players buying the miniatures that represent their characters or armies, since they are usually the cheapest most essential pieces, and then creating or representing the terrain or game area with simpler 2D representations, or everyday objects. This has led to multiple alternatives for representing terrain that show a mix of both 2D & 3D designs.





PLAY MATS

Terrain mats are large representations of a specific terrain types, such as grassland, desert, city streets, ruins, etc. And can be meant for small RPG encounters around 2x2 feet or large war-game encounters such as 4x6 feet. These maps are printed on a variety of materials, are generic in design and used in conjunction with select 3D terrain pieces in order to help enhance the immersion of a specific environment.

Battle maps on the other hand are found across many RPG's and occasionally wargames, and represent specific scenarios and layouts for unique fights or challenges. Some people also enhance these maps with flat representations of objects, allowing for more modularity while still maintaining the affordability of 2D representation.

DIGITAL SURFACES

Digital boards can be played on using either a projector or displayed on an actual screen, and then run through a laptop. While the actual play pieces can be displayed and manipulated digitally as well, users will often play with 3D miniatures on top of the digital play area, creating a unique form of mixed media interaction.

One of the more advanced features possible with this style of gaming, is the use of animation to create a sense of movement within the map adding an additional layer of immersion.



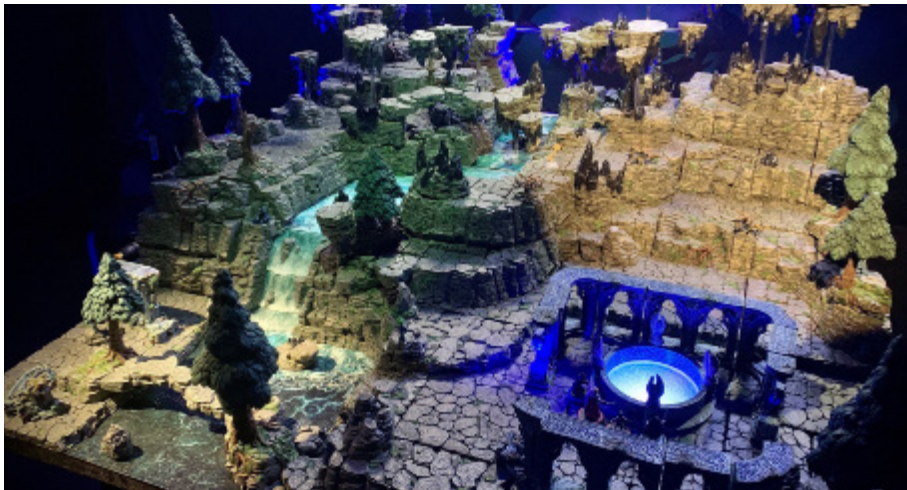
TILE SYSTEMS

Tile gaming is one of the biggest areas of terrain in RPG's as it's often used to create modular areas of exploration and create a more immersive environment then would be found with simpler 2D tiles. While it holds less utility in larger army battles, it is ideal for smaller, more individual based tabletop games.

This area of gaming terrain has started to see more growth recently with the expansion of the 3D printing market and people selling cheaper 3D printed systems that people can print themselves. The most popular of these use the Openlock, an open source system for connecting modular tiles together. The most recent entry in the Tile market is the Warlock Tiles from Wizkidz, which is one of the largest companies in tabletop gaming, pro-

ducing the officially licensed miniatures for D&D, with their system being advertised as compatible with openlock.

For players who prefer the modularity of tile systems but still want the added affordability and easy storage offered from a 2D printed material. 2D tiles can be used on their own, or also combined with select 3D objects to create a sense of space and create a hierarchy of interaction or importance within the scenario.



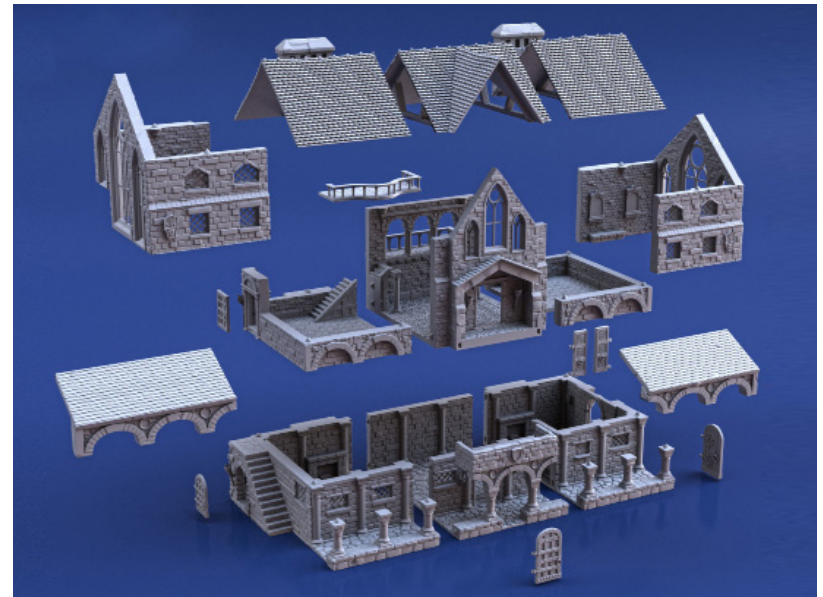


LANDSCAPE SCENERY

This type of scenery is used for re-creating natural environments such as forests, rivers, jungles, and other biomes found in the real world or imagined alien environments. This scenery is one of the oldest and more affordable types, with players often repurpose products intended for the model railroad market. In the last several decades, landscape scenery has been made specifically for gaming markets, such as small scale hills or terrain features, which are often combined with battle mats. In addition to a healthy market for general miniature scenery, many gamers make it themselves using specialized products made by companies such as Woodland Scenery, and combine it with shaped polystyrene to create unique landscapes and terrain features. There are also more sculptural forms of landscape scenery being made both for commercial sale and also digitally as 3D print files for home printing.

BUILDINGS

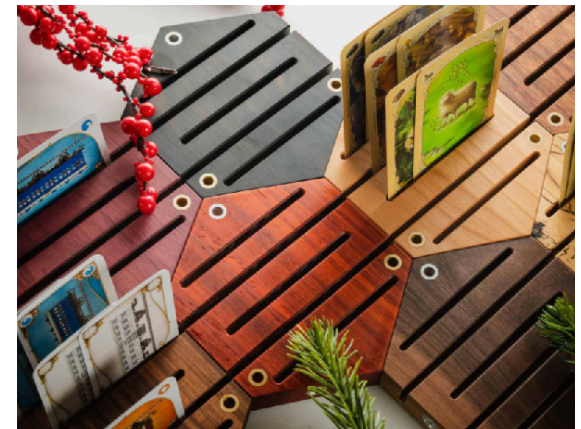
Popular with both wargames and RPGs, buildings function as both terrain obstructions and exploratory obstacles, which can be opened to reveal interior environments. This is especially common in RPGs where the game style is more geared towards this form of exploration, rather than battlefield tactics. In wargames, buildings are primarily used as cover, leading to the popularity of building ruins that fit the war zone aesthetic.



Older building terrain were often ceramic castings, repurposed from holiday scenes or railroad buildings, while more modern buildings are produced using resin, injection molded plastics, or are available in laser cut MDF kits, which make them expensive individual pieces with small production runs. Many hobbyists craft their own out of cardstock and cardboard or buy cheap kits for assembling simple cardstock buildings. In recent years, the affordability of home 3D printing, has created a huge explosion in the market as both sculptural and modular buildings you can print yourself have become available.

ACCESSORIES

In addition to the actual terrain and scenery used for play with the miniatures, other popular aftermarket products are game accessories. This includes the tokens, position or condition markers, and other game aids that help with recording and organizing the game area. Some of these can be more aesthetic, such as fog machines and specialized lighting rigs and pods. Some are play organizers for the actual players, like dice, dice towers, drink holders, playing card organizers, gaming screens etc, and some companies even produce specialized tables to enhance the gaming experience.



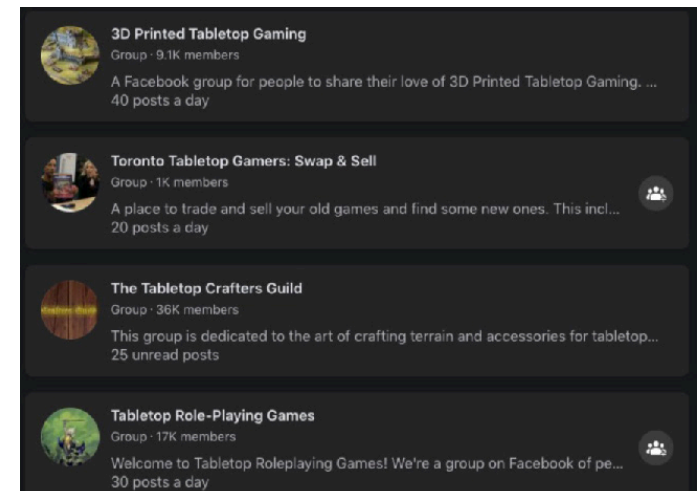
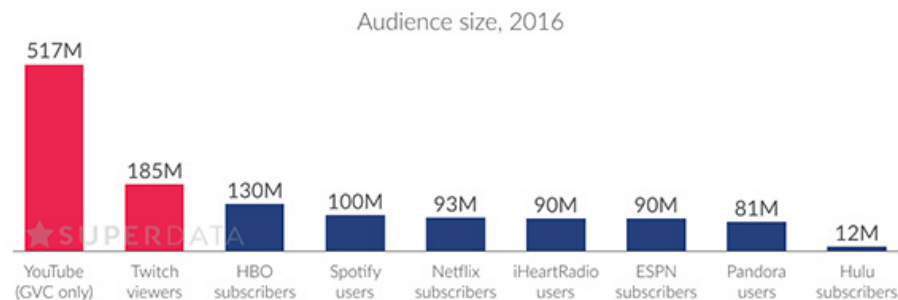
COMMUNITY



Unlike many other hobbies such as collectibles, and the similar model railroading, Interpersonal connection has always been an essential part of the tabletop gaming hobby. Less of an isolated pastime, tabletop gaming requires meeting in person with like minded individuals that share the same interest and passion for the game, and while board games are relatively popular and common across demographics, tabletop wargaming and role playing games are a more rarefied hobby, requiring a steeper entry cost in both money and time investment. Because of this, hobby enthusiasts have always sought out how to connect with one another and build communities.

DIGITAL FRONTIER

With the proliferation of the internet, it became easier to access these communities and to find other hobby enthusiasts thanks to message boards and dedicated forums. In recent years with the rise of Facebook, most message boards and forums have migrated over and become Facebook groups as the internet continues to evolve. This has been especially advantageous for role playing games, which can be played with people online, and this trend has recently increased further thanks to the popularity of Lets Play videos amongst younger demographics on platforms such as YouTube and Twitch. Lets Plays are videos of people playing games, and while it started out as part of the video game community, they have gained traction in the RPG community and brought new audiences over thanks to the success and popularity of live stream games such as Critical Role.



DIY ETHOS

Unlike board games which tend to be smaller, more compact and unchanging, the gaming surface involved in war gaming and role playing tends to be larger and almost always different or unique every time people play. These challenges coupled with the more crafty and small scale production of the commercial products for these hobbies have left a healthy DIY spirit within the communities since their inception. Indeed much of the original literature and communication of early periodicals evolved around rule adjustments, painting advice and tutorials for scenery and terrain building. These ethos have continued into the digital age with the wide popularity of YouTube channels and twitch streams dedicated to painting and scenery tutorials, such as the popular Black Magic Craft YouTube channel.

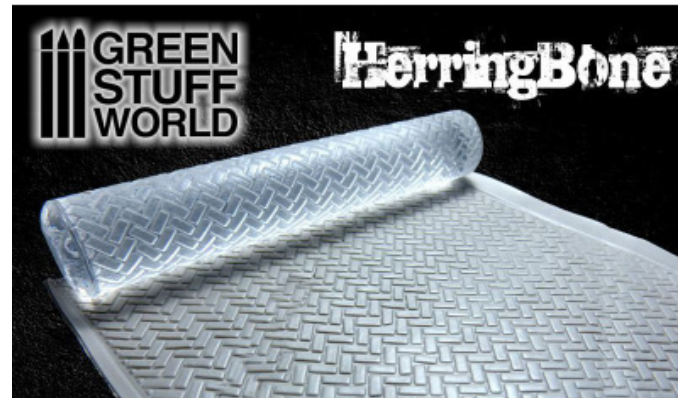
• Luke Towan	1.07M
• Plasmo - Plastic Models	565K
• Black Magic Craft	304K
• Squidmar Miniatures	204K
• Midwinter Minis	176K
• Real Terrain Hobbies	157K
• Geek Gaming Scenics	127K
• Scale-a-ton	106K
• Miscast	83.6K
• Wyloch's Armory	83.5K
• TheDMsCraft	74.4K
• Bard's Craft	72.2K

Based off Youtube Subscribers Nov 2020

DIY INDUSTRIES

Because of how prolific the DIY community is, and how most tabletop games excluding board games require the player to paint and assemble their own miniatures, An entire small industry has sprung up around the hobby. Small companies and people sell custom equipment and supplies for painting & crafting terrain as well as modifying the figures themselves. One such example is Hirst Arts, which has been around for several decades and who make and sell mold

kits and tutorials, allowing for the user to cast and create their own terrain at will. Companies such as Green Stuff World, named after a popular two part putty mix, sell textured rollers and tools for creating realistic buildings and man made terrain. Other companies sell specialized workstations where much of the hobby is carried out, allowing hobbyists to organize and expand their supply storage and crafting space.



AESTHETIC

Within the tabletop terrain market, the scenery itself is used to represent a number of environments through their representation in playable scenarios. This more natural scenery can often be used across all games to depict forests, desserts, jungles, swamps, tundra and many other types of biomes. The terrain however becomes more stratified when it's used to represent Urban environments and intelligently created objects or structures.

While there are several unique or unclassifiable terrain styles, almost all of them can be broadly broken down into 3 time periods based off architectural stylings, and the sub genres within.



PAST

Medieval/fantasy period

One of the largest genres, this period takes inspiration from medieval to renaissance historical architecture and styling, and mixes it with similarly era appropriate fantasy conventions. People freely mix chronologically close but anachronistic styles together. They will also often use culturally unique, specific designs and aesthetics to represent different fantasy races, such as elves and dwarves.

Colonial/ Age of Sail

There are many colonial based war games and RPGs, with the most popular being high seas adventures or pirate based. The few games that do use 28mm ranged miniatures and scenery will often get by using medieval period buildings and share ship models with fantasy medieval games as well, which look to this period for ship designs already.

Western

Not a very popular genre for tabletop gaming, westerns are represented by some terrain, but are mostly seen in cowboy and gunslinger miniatures.

Victorian/ Steampunk

A much less popular setting, early industrial victorian is often used for horror games, and fantasy technology based rpgs.

PRESENT

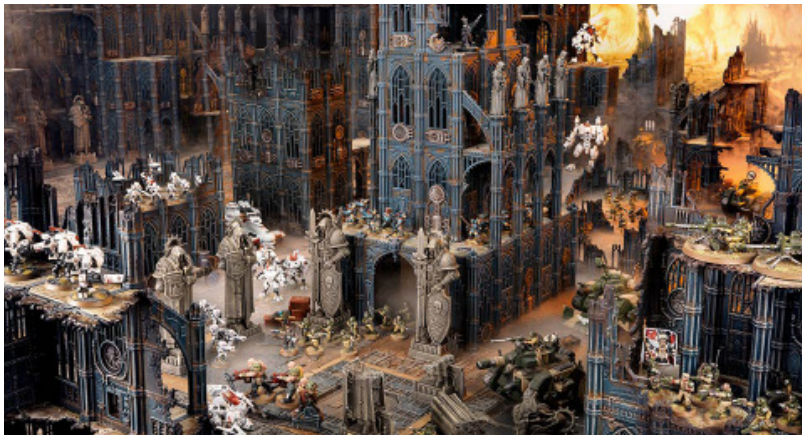
Modern Urban

While not as popular as historic or futuristic terrain, modern terrain is popular with superhero based miniature games, and modern settings tend to focus on contemporary style buildings and technologies such as cars, ATMs, vending machines etc. Stylistically the architecture floats in an indistinct period between the 1920s - present.

Post Apocalyptic

More popular than just straight modern settings, apocalyptic settings are often used for survival and zombie based games and revolve around people living amongst the ruins of our current society. This also allows for them to mix in older period terrain as representative of a devolution in construction techniques and technology.





FUTURE

Warhammer 40,000

The single largest miniature war game and one of the most popular settings, warhammer 40,00 has its own unique setting, based on a technological dark age set in the future, the setting is represented through gothic architecture and religious iconography mixed with heavy industrial overtones, worn down by endless war and centuries of neglect.

Cyberpunk

This future aesthetic is more in line with the heavy technology and corporate aesthetic found in films such as blade runner. There are several RPGs and miniature games of varying popularity which use this type of setting, and it is generally intended to represent a closer approximation of the real world's trajectory.

Post Apocalyptic

There are several games which blend apocalyptic settings with future technology to create unique hybrids and allow the players to mix terrain from a variety of sources to create their amalgam worlds.

Star Wars

There are several Star Wars based miniature games and RPGs, and as such they tend to rely on a very specific aesthetic pictures throughout the movies and other forms of media.

MATERIALS

PAPER

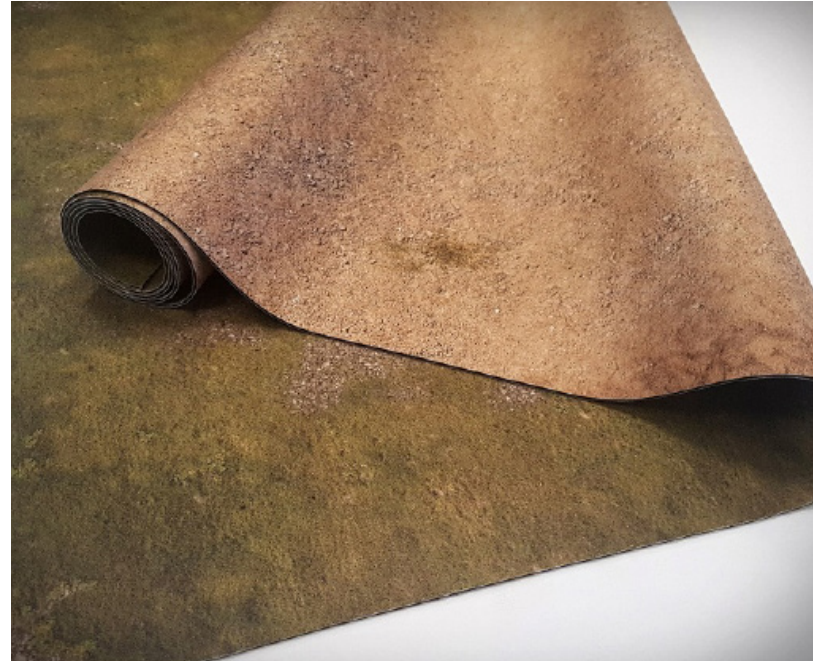
Consisting of flat images printed on cardstock, which are then cut out and assembled into 3D buildings. These terrain types are generally very light weight, fairly structurally stable and relatively easy to produce. The cardstock terrain market is primarily geared towards home printing, and many small publishers and artists sell the files with instructions, leaving it up to the user to print and assemble.

A higher end versions of cardstock terrain printed on thicker cardstock or cardboard and pre-cut-out, making them more expensive due to the higher manufacturing requirements. However, this allows for more complexity, structure, and a higher standard of quality, while still maintaining a low price point. This style of gaming terrain is also popular with constructed buildings, as well as for use with 2D tile systems.



FABRIC

This category broadly represents the variety of materials used to create playing mats and gaming surfaces. While there are a variety of gaming mats and battle grids printed on paper surfaces, it often has issues with maintaining its shape memory from being rolled up for storage. That is why alternative fabrics and mouse pad style material composites are a popular alternative for large flat gaming surfaces, allowing easy storage without the rolling corners issue so often found with paper like materials. In addition these materials are also more durable and damage resistant, and offer more surface grip for improved playability and stability. This style of terrain is only really used for gaming mats to represent different terrain types and battle maps, as their storability makes them ideal for creating large playing surfaces.



MDF



MDF is used primarily to produce buildings and man made objects as they best fit the angular flat nature of the material. Designed digitally, the shapes are cut out of MDF using a laser and then sold in flat packed kits for home assembly, and while some of the kits come painted, many are just sold in their raw wooden form. While select people share their own files for making



the terrain, the more commercial nature of the technology has made the selling of laser cutting files on their own virtually non-existent. This also appears to be one of the most popular forms of terrain kits sold, as it strikes a balance between affordability and quality, while still allowing the DIY oriented hobbyists opportunity to paint and tailor the kits themselves.

HARD FOAM



Used to create light molded scenery, hard foam terrain is made from castable rigid urethane foam. After creating a flexible mold, usually from silicone, it is then filled with an expandable foam that sets into the shape of the mold. Though it is not as widely used in the industry as other types of terrain, it does provide light, resilient, well detailed terrain pieces for a reasonable price.

Most producers cast and sell the terrain itself rather than the actual molds. While Hard Foam is good for producing large terrain pieces, especially outdoor scenery such as rocks, obstructions, ruins and building exteriors, the restraints of its production prevent it from being useful for making explorable buildings with interiors and delicate small parts.



PLASTICS

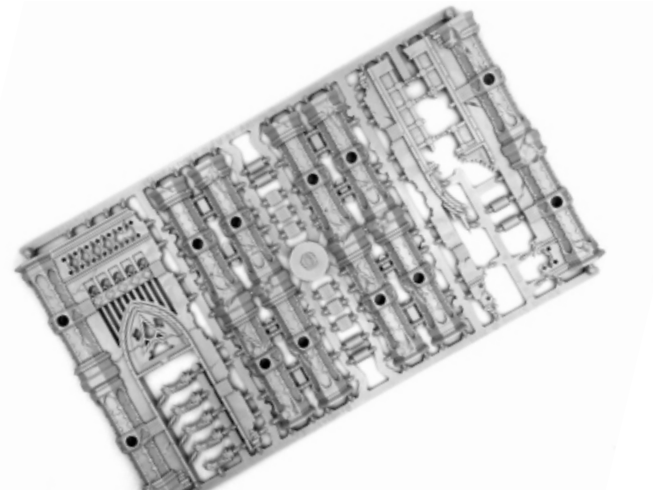
Plastic (Polystyrene)

These forms of terrain are only produced by the largest companies in the tabletop gaming industry due to the large initial investment in the solid steel molds required to deal with the intense pressure from the injected plastics. Because of this, very few companies make injection molded terrain, and usually only do so with the broadest appeal in mind for selling their kits. This does end up being advantageous to the customers when they do however, because this process allows for comparatively large scale mass production, bringing down the per unit cost, resulting in very high quality terrain for reasonable prices.



Resin (Polyurethane)

Some companies use resin rather than plastic for their injection molded products. Resin has the advantage of offering higher detail and creating better quality models, but tends to be more brittle



3D PRINTING



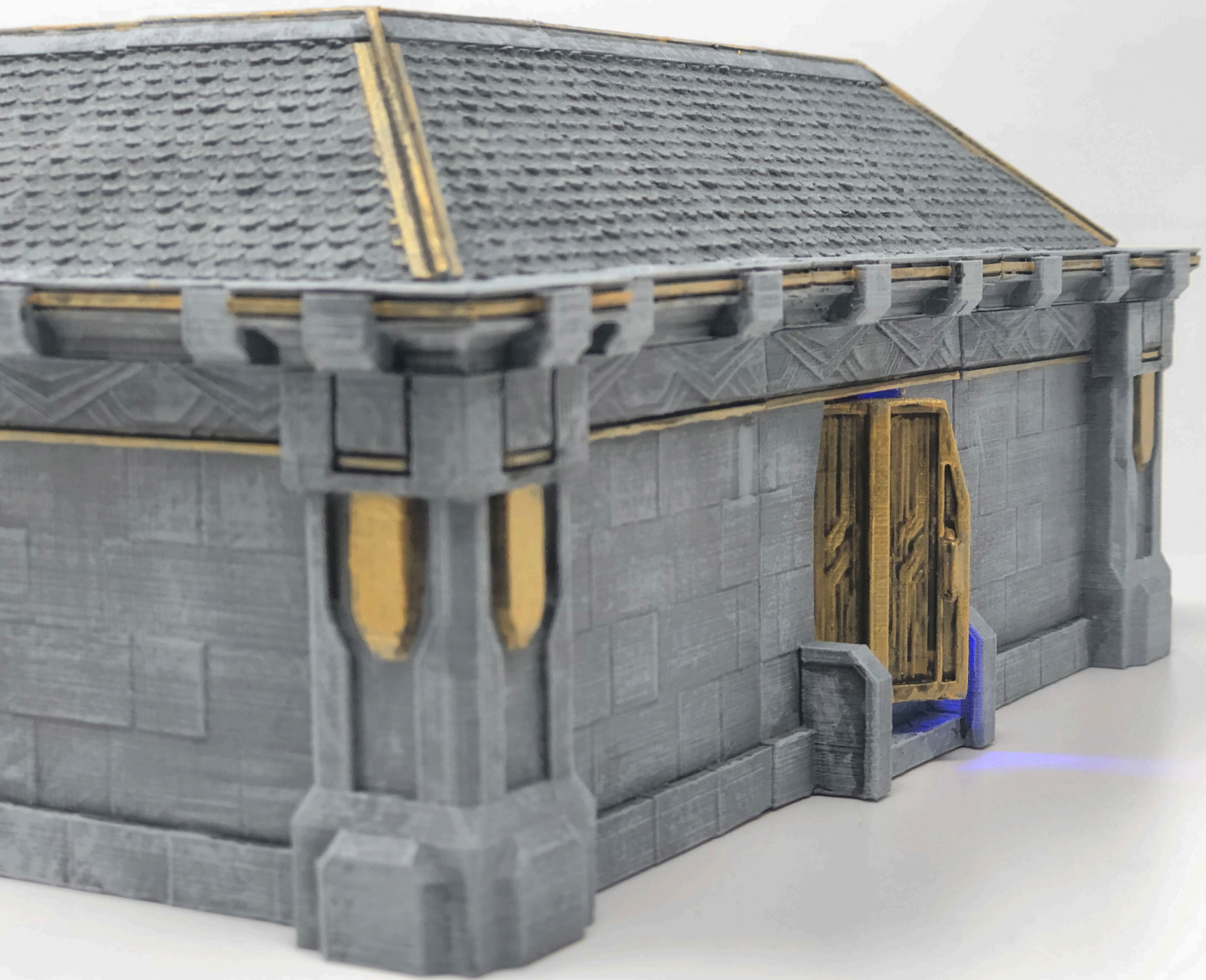
FDM Printer

FDM stands for Fused Deposition Modeling and involves heating up liquid plastic filament which is then built up layer by layer to create a form. The drop in the price of 3d printing has allowed for more and more people to afford the initial investment cost, and begin to create their own terrain at home. This has been led by FDM printers, which are the most popular and cheapest printers to run, making them especially affordable for the already existing DIY market of tabletop gamers.



SLA Printer

SLA stands for Stereo lithography, involving using UV light to harden liquid resin layer by layer to build a form. SLA printers have only become affordable in the last couple years and represent the first time consumers can produce models of comparable quality to cast models. However, SLA printers are primarily used for miniatures as they are more expensive, time consuming and complicated to run, making them less appealing than FDM printers for large scale terrain production.



SYNTHESIS

IMMERSION

Through my research on role playing games and miniature war games, it became clear that they not only share a scale and history, but a similar narrative ethos. These are games about stories. They are about sitting down with your friends or family and living out a narrative that you collectively created together. Even when you are fighting each other, you are working together to weave a tapestry of imagination, and immerse yourselves in a unique story of your own creation. But that is the key right there, Immersion.

Immersion is important when you plan to spend several hours sitting down and playing these games with your friends, and while most miniature war games and role playing games can be played without the use of any peripheral products, using them enhances the immersion of the game and allows for greater realism when playing through various environments and scenarios.

It helps draw you into the story, and can keep you captivated during the less engaging parts of the game, such as another player's turn, or when you're just rolling dice and doing math. It became clear that the easiest way to do this is through the use of various types of gaming terrain that mimics natural scenery, environments and places.



ANALYSIS

Within the tabletop gaming market, the major manufacturers of RPGs and wargames maintain their market focus on their proprietary gaming systems and the production of the miniatures themselves. Most efforts put in towards the manufacture of actual terrain is minimal at best and always secondary, creating a terrain industry that has seen very little growth on a mass market scale.

This has led to a large aftermarket of products geared more towards the production of DIY terrain rather than selling the terrain itself. For most players, terrain and scenery is a tertiary concern, first you buy the game system and rulebooks, then you buy the miniatures, then comes the terrain, after the rest of the purchases are already made. It's the last step made by the core user group, becoming more of a focus for entrenched long term hobbyists.

Of the large companies, Games Workshop produces some terrain, but it's primarily buildings and simple obstacles. The biggest recent development is the release of Warlock Tiles, made by Wizkidz, the manufacturing arm of Wizards of the Coast who control the Dungeons and Dragons intellectual property.

As one of the largest companies in the industry, this would show that they feel the market is worth investing in as this is the first real mass produced system made for the market and certainly the first tile based system. Warlock Tiles come standard with adapters for both the open source Openlock system and the Dragonlock system, the two most popular clip based tile systems available, which are both exclusively 3D printable. This would indicate not so much an intention to take over the market share, but rather to produce a system that is complementary to what is already available on the market.

This brings us to one of the main reasons why DIY is still the most popular way to create gaming terrain, price. Investing heavily in any one gaming system is expensive, especially with terrain which is usually produced in small batches. This is part of the reason why Terrain is a long term investment to many players, as many game systems can already be expensive, and it takes years to build up a large assortment of products for use.

With a user base whose primary concern is price, and a community with a long history of DIY and knowledge sharing, it would make sense then why 3D printing has become so popular and so widely accepted by gamers as a whole. For the cost of 3 Warlock Tile sets, you could buy a 3D printer, and effectively be printing for pennies on the dollar after your initial investment, being able to generate for more unique products than the simple tile sets produced by Wizkidz.

Thus with the recent surge in popularity amongst RPGs and to a lesser extent wargames, it seems best to focus on producing a modular system of terrain with the intention of 3D production in mind. This will allow for the already established customer base of DIY crafters to partake, as well as making terrain that is ultimately easier to produce for newer community members, who may not have the years of crafting experience, but who's entry into the hobby involved watching other players play on elaborate immersive game tables made with beautiful scenery and terrain.

Finally, in terms of aesthetics, it is clear that focusing on medieval/ fantasy would be the ideal direction, as it would be usable across the widest cross section of game systems, and therefore the most compatible with other terrain products as well.

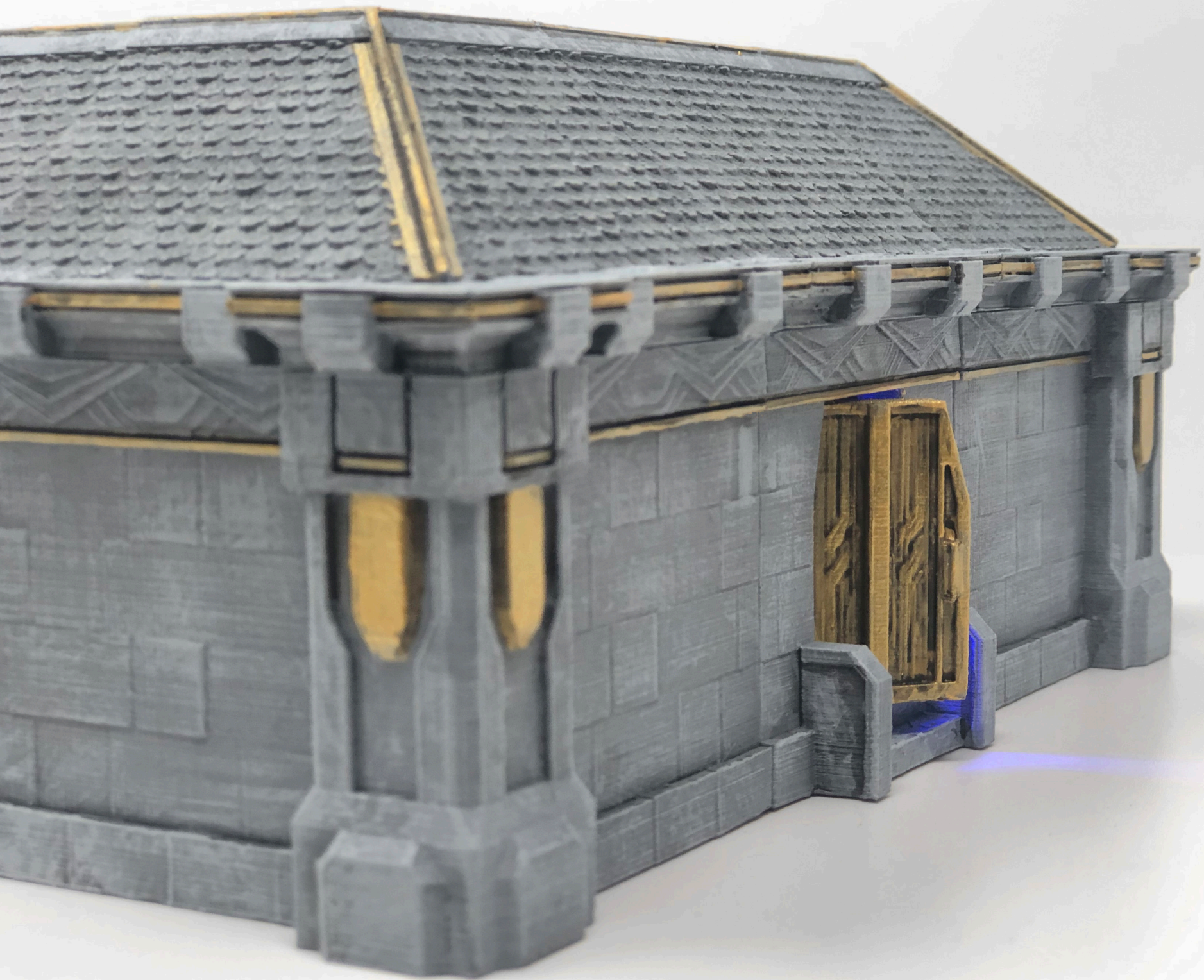
BRIEF

To design a family of modular terrain pieces that can be reconfigured to fulfill a variety of play scenarios. It will be a set of tools that can help both the players and the game master to create scenarios and environments that increase their immersion in the game, to really feel like their characters are exploring that building or fighting through the alleys of that town.

It would be designed with cross platform adaptability in mind, allowing it to be used for both miniature war games and role playing games since they both share the same scale, and can

interchangeably use much of the same terrain and scenery. It will be primarily designed with a medieval fantasy aesthetic and setting in mind, and be receptive to old as well as new customers entering the market.

In addition, because 3D printing is the most affordable option for producing large quantities of gaming terrain, my product should be designed with this production method in mind, and my marketing strategy will focus on Kickstarter and other common methods of distribution for digital print files.



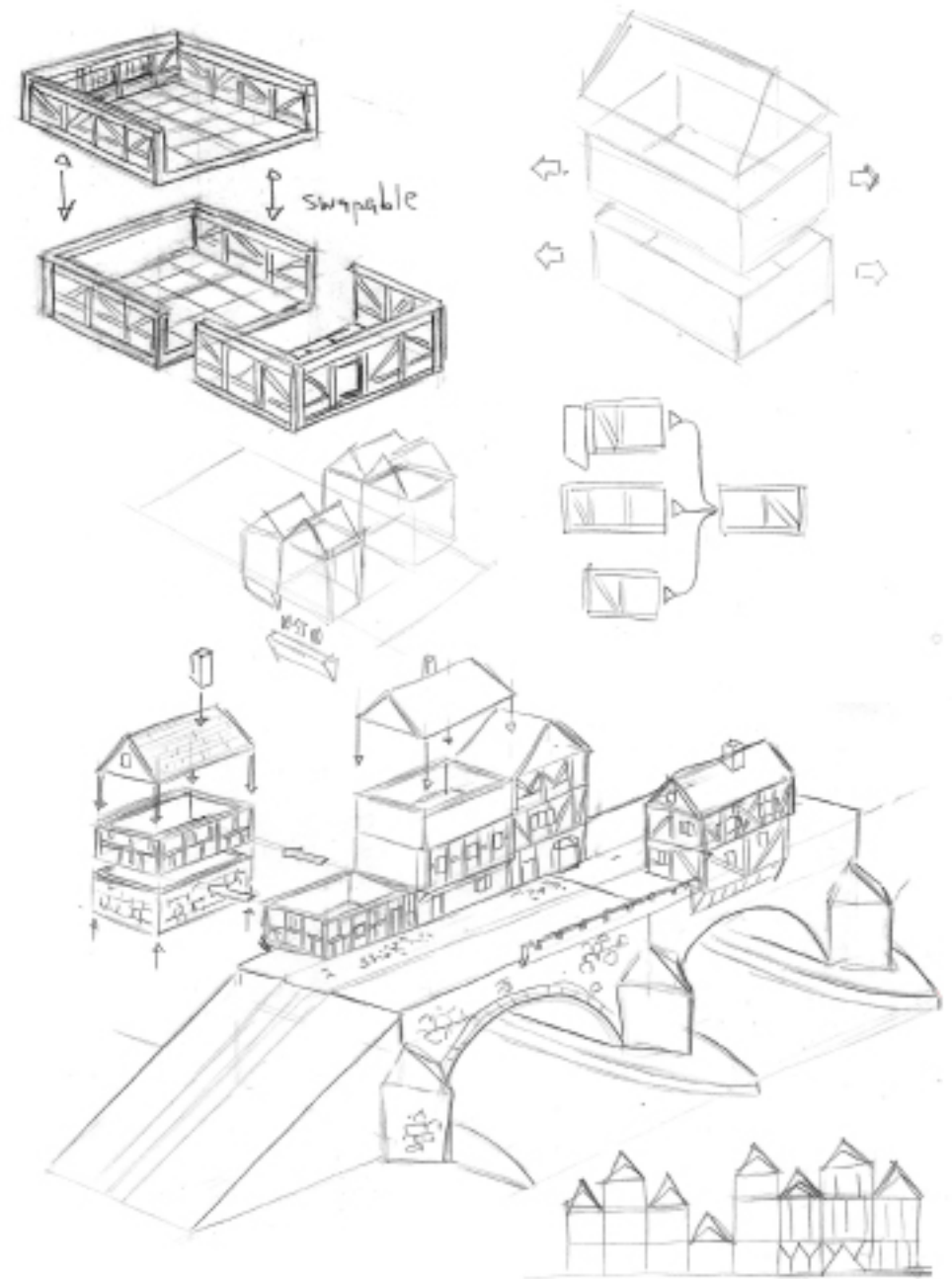
IDEATION



INITIAL IDEATION

I started with concept exploration based around the medieval architectural practice of timber framing. This was a prevalent method for building houses and structures in the medieval era throughout much of northern and central Europe, and is also known as the tutor style due to its popularization during Tutor era England.

I was particularly enamoured with the idea of the medieval London Bridge, which was paid for through the sales of real estate on the bridge itself, leading to the entire bridge being covered with houses from end to end.



Form Development

At the same time I also began to play with form development, and figuring out the sizing and scale of my buildings in relation to the actual miniatures that are used for playing the various games.

A key consideration was the stackability of the different layers of my building concepts and to what degree they would be modular. I also experimented with how I might be able to integrate my designs with pieces from other products on the market.



CONCEPT IDEATION

Alternative Aesthetics

While my initial instinct was to explore historically medieval aesthetics, it became apparent that developing along these lines would put me much more in competition with the variety of other systems and products which use the popular Tutor style. This led me to consider alternate aesthetics, branching away from the historical as I explore the fantastical. This would allow me to take advantage of more under represented styles to create a more unique product.

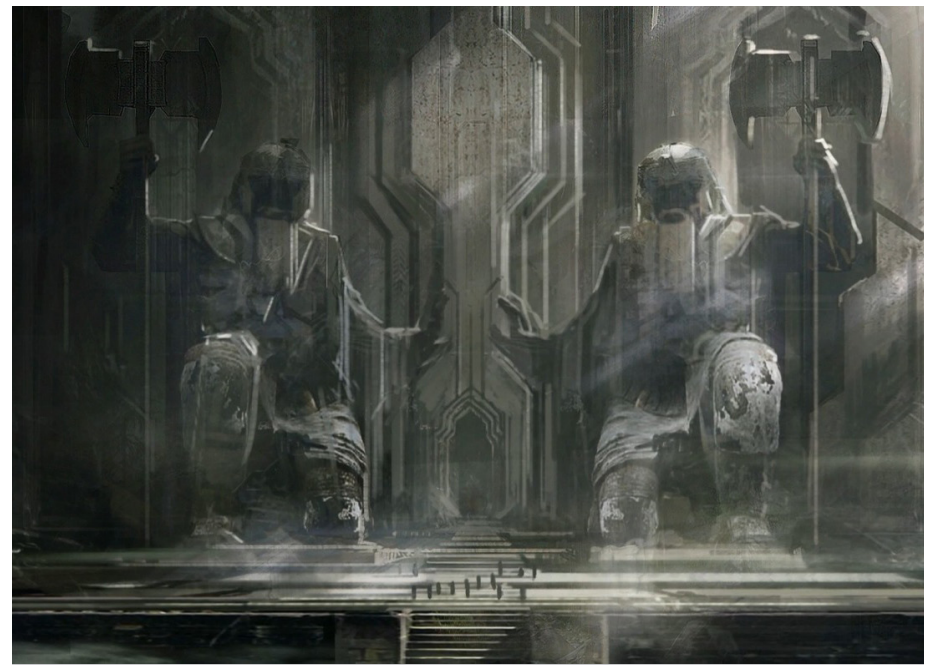
Cultural Influence

A unique part of wargames and RPGs is their basis in fantasy literature, and how that allows for the development and exploration of peoples and cultures that don't exist in our own world. A good example of this is the Elves and Dwarves of Lord of the Rings. While they were initially inspired by Norse folktales and legends, through Tolkien and other writers, they've developed into uniquely distinct peoples with a cultural identity and aesthetic design that draws from far different references than the historical. Thanks to pop culture these concepts have become recognizable and ubiquitous across the majority of wargame and RPG systems.

DWARVES

A mainstay of pop culture and fantasy literature, these short but powerful people were popularized by Tolkien in the *Hobbit* and the *Lord of the Rings*. Many similarities can be drawn between previous conceptions of dwarven styles and art deco.

They are known for their unparalleled skill and craftsmanship with both metal and stone work, are master engineers and are commonly shown to be living in mountain environments and underground caves, where they shape their world to their whims.



ELVES

A mainstay of pop culture and fantasy literature, these short but powerful people were popularized by Tolkien in the *Hobbit* and the *Lord of the Rings*. Many similarities can be drawn between previous conceptions of dwarven styles and art deco.

They are known for their unparalleled skill and craftsmanship with both metal and stone work, are master engineers and are commonly shown to be living in mountain environments and underground caves, where they shape their world to their whims.



PIXELATION

While not a people, pixelated art is nevertheless a popular and unique style in gaming culture owing to its roots in the early video games of the 80s and 90s. Many of these original video games drew their inspiration from RPG and wargames, and created a unique aesthetic through representing it with the limited technology of the time. Now, long after video game technology has moved past pixelation, its influence still remains, being enjoyed for its own merits rather than due to technological limitations.



AESTHETIC CONCEPTS

Competition Analysis

Because my new aesthetic direction was partially driven by market representation, it was important to understand what was available on the market for my proposed aesthetic concepts.

Looking at what was available online, it seemed that there were few elven and dwarven designs when compared to the amount of tudor based products available, and In general there were more elven building designs available then dwarven.



Abstraction VS Realism

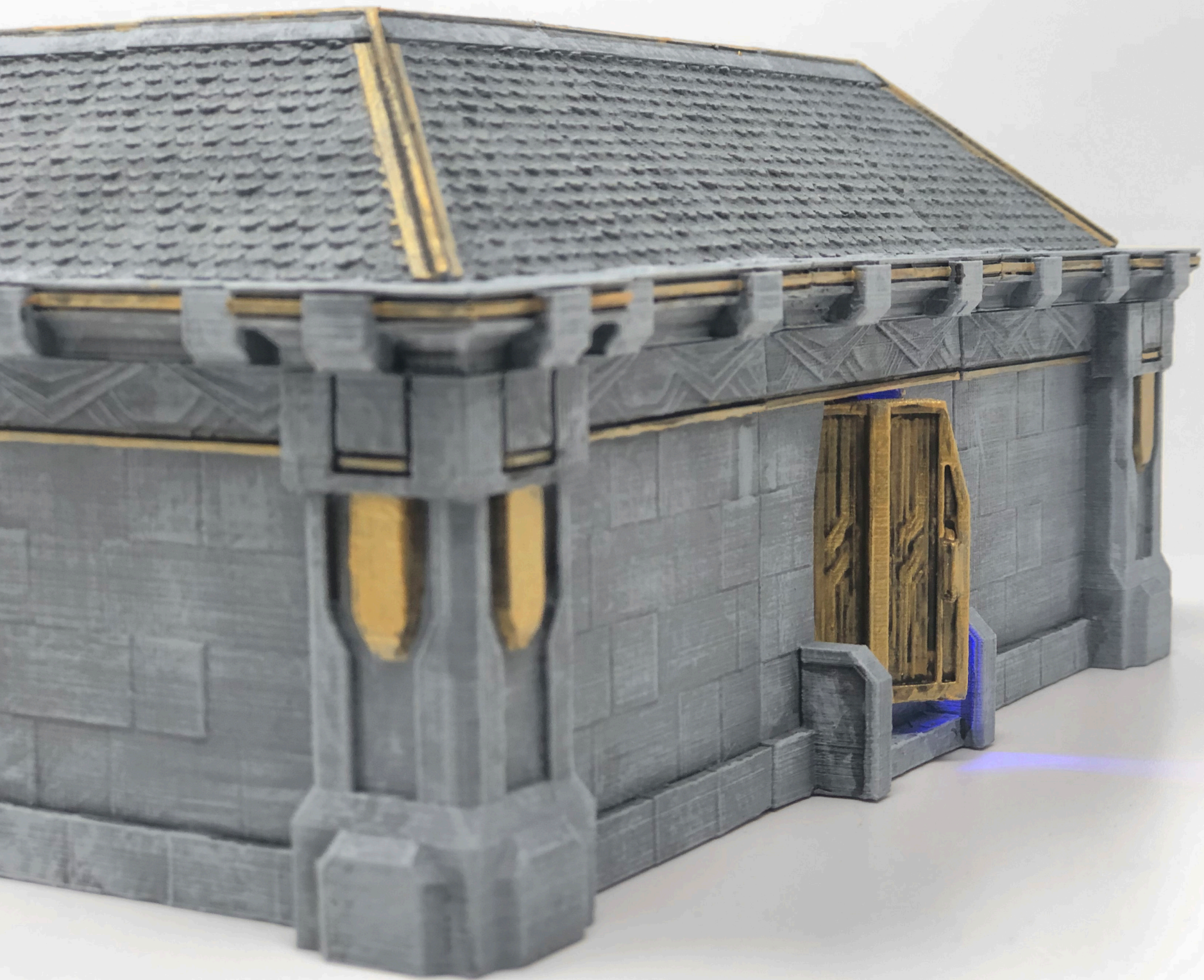
While Pixelated terrain is almost non-existent on the market, this ultimately proves more of a hindrance than an opportunity. One of my focus points is being able to develop a product that can function alongside other systems in the entire terrain eco-system. This would prove quite difficult for a pixel based design, as it wouldn't mesh aesthetically with any of the more realistic or natural looking forms and designs used by other products. Ultimately, pixelation clashes with the ethos of almost the entire miniature market, with a focus on miniature realism as opposed to abstraction.



Process Influence

Another important factor is the medium of production, as I've already selected 3D printing as my ideal development process. In light of this, the angular more geometric designs of the dwarven aesthetic make more sense than the organic flowing elven designs, which may be hindered by the materiality of 3D printing.

Finally, I took into consideration the fact that organic designs are more sculptural by nature and would require a steeper learning curve to create using 3D software.



DEVELOPMENT

SYSTEM CRITERIA

Throughout my ideation I hit upon several key factors that were important to consider when developing my terrain system. In order to ensure my terrain building system was fully capable of being used for both RPGs and wargames, it was important to keep in mind the scalability of its modularity. This way it could fully meet the broader scenarios required for these two distinct game categories.

Small Scale Skirmish

RPG's are about small groups of unique individuals and when the game enters combat, it tends to be closer to a small-scale skirmish. This means that terrain required for RPG's will be more focused on exploring single buildings with multiple levels or the immediate environment of a small handful of buildings.

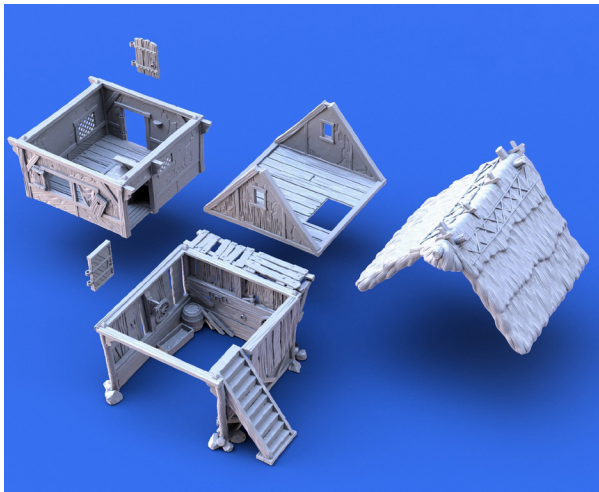
Large Scale Battles

Wargames on the other hand, involve large volumes of figurines representing full armies, fighting large battles across huge tabletops. This means that the terrain requirements for wargames will be more focused on exploring entire towns, or even cities and will require dozens of buildings that can project a facsimile of variety.

Limited Complexity

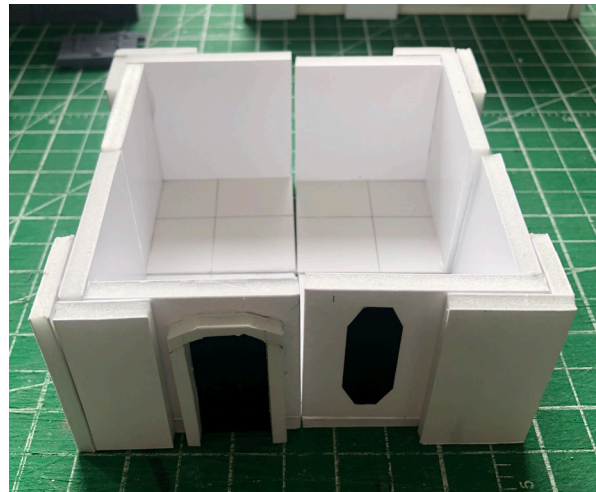
In consideration of scaling between those two extremes, another important factor for the modularity of my terrain building system is limited complexity. By keeping the amount of parts needed to create variety to the minimum, I can create the greatest amount of versatility, while keeping set up time and effort to a minimum.

The ideal is to strike a balance between the simplest sculptural buildings where all the choices are already made, and set up is minimal, and the more complex systems where each possible building part is individual and modular.



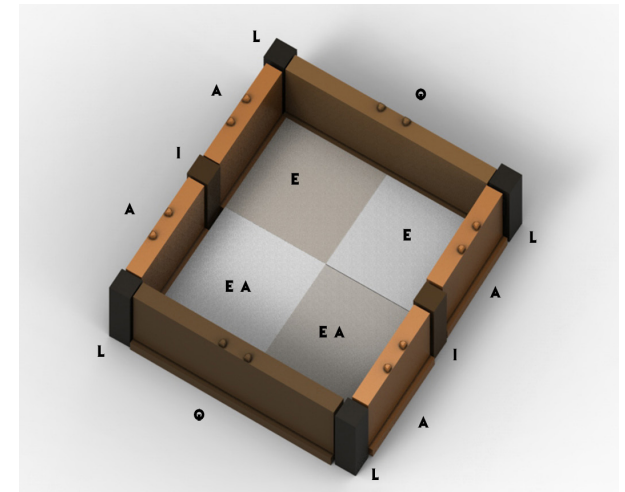
Infinite Dimensions

1 parts to make one 4x4 room
No connector clips



Jötunn

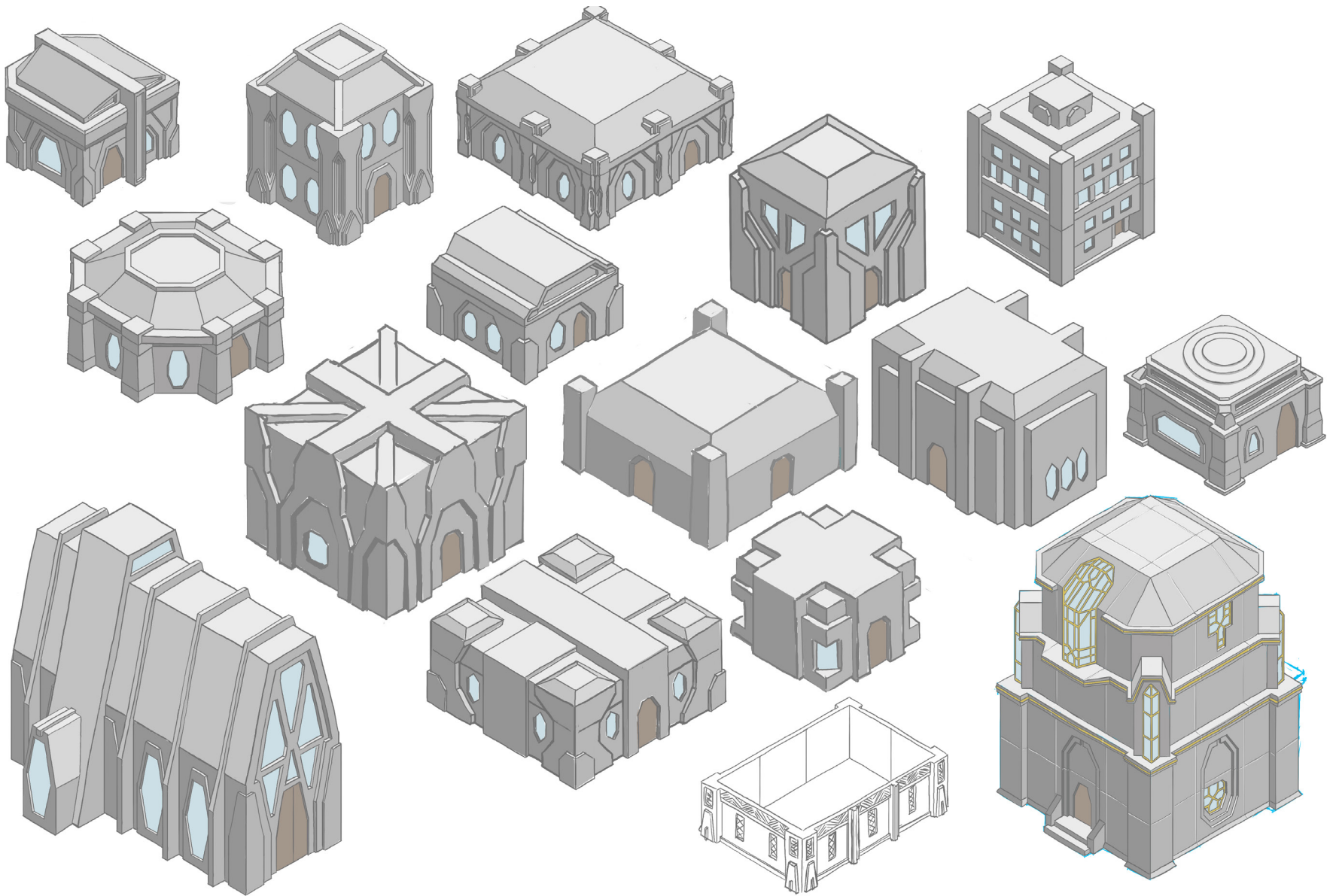
4 parts to make one 4x4 room
Not including connector clips



Openlock

15 parts to make one 4x4 room
Not including connector clips

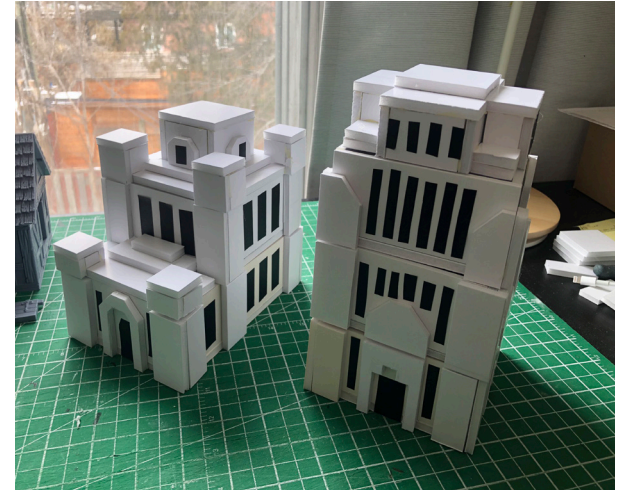
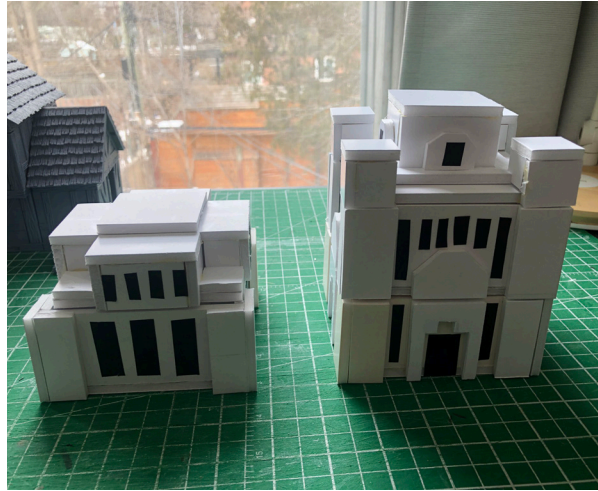
CONCEPT DEVELOPMENT



INSPIRATION

Taking cues from concept art for video games and movies, I also looked for inspiration from Art Deco architecture, and found forms and patterns which I felt could lend itself well to the aesthetic I was trying to create.



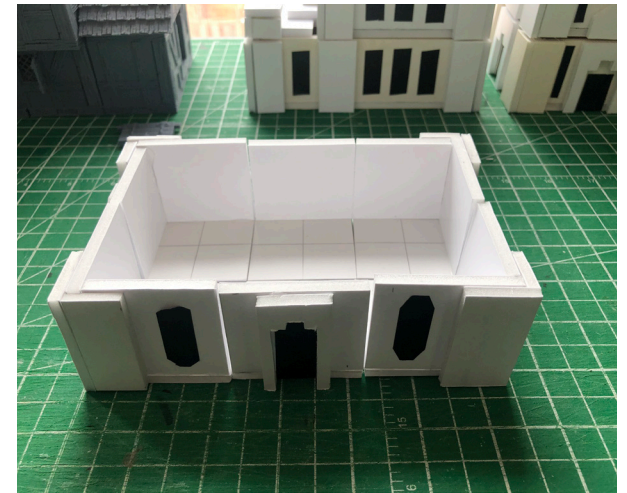
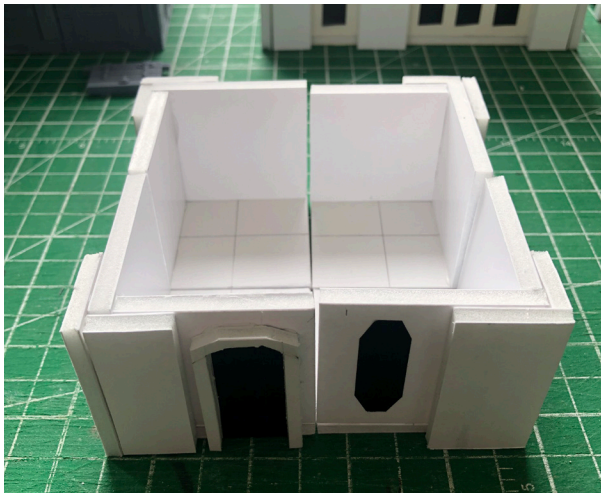


VERTICAL MODULARITY

This form exploration focuses on developing simple, modular layers that are easy to assemble and can combine in multiple ways to create unique building silhouettes. Idea for large scale battles that would require a lot of buildings.

HORIZONTAL MODULARITY

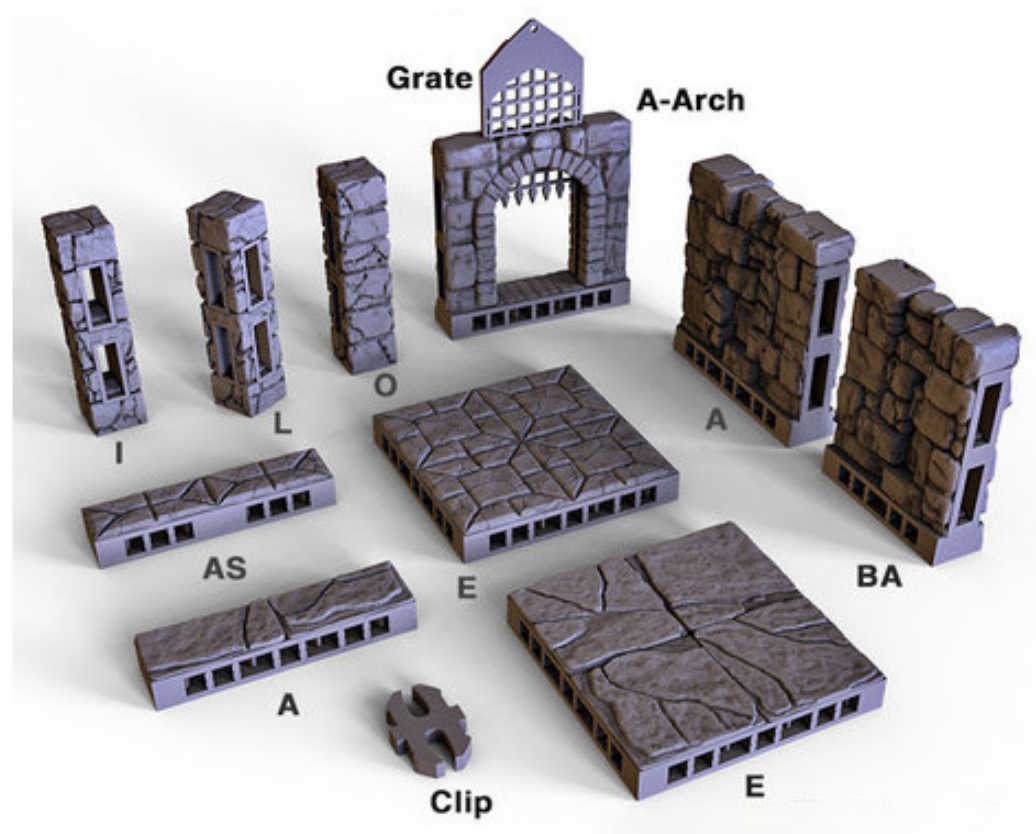
Here I focus on the layout of a single layer, breaking it down into further parts that can be recombined to alter the total footprint of each individual layer. This is ideal for small scale skirmishes and customizable building exploration.



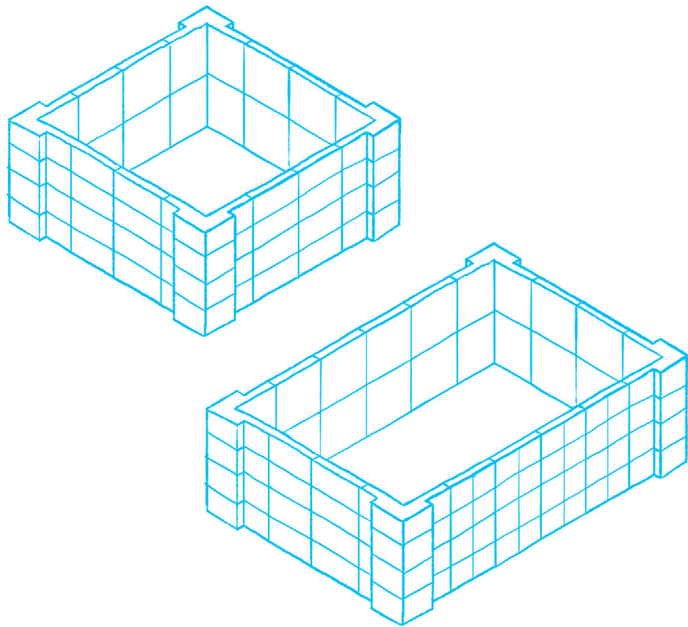
COMPATIBILITY

The Openlock system by Printablescenery is an open source connector system that allows a variety of pieces to connect together using a specially designed clip. It is one of the most popular systems on the market, thanks to it being released into the commercial commons and is used widely by a variety of different gaming companies.

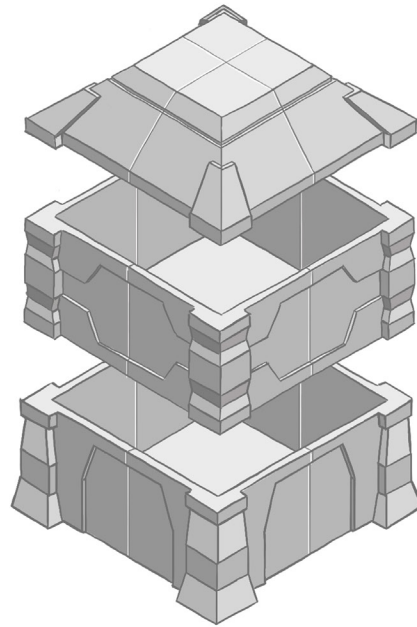
By using the Openlock system, it will be easier for Jötunn to interact with other terrain systems, allowing the user to more easily integrate my pieces into the variety of terrain that they already



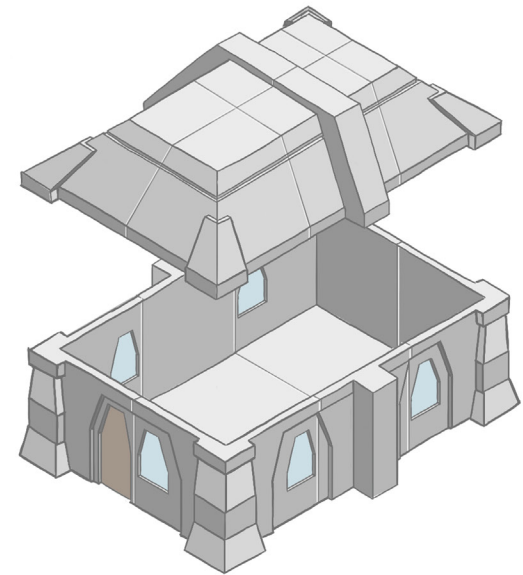
Rampage base pack using Openlock



Established Footprint structures form and allows for consistency between layers

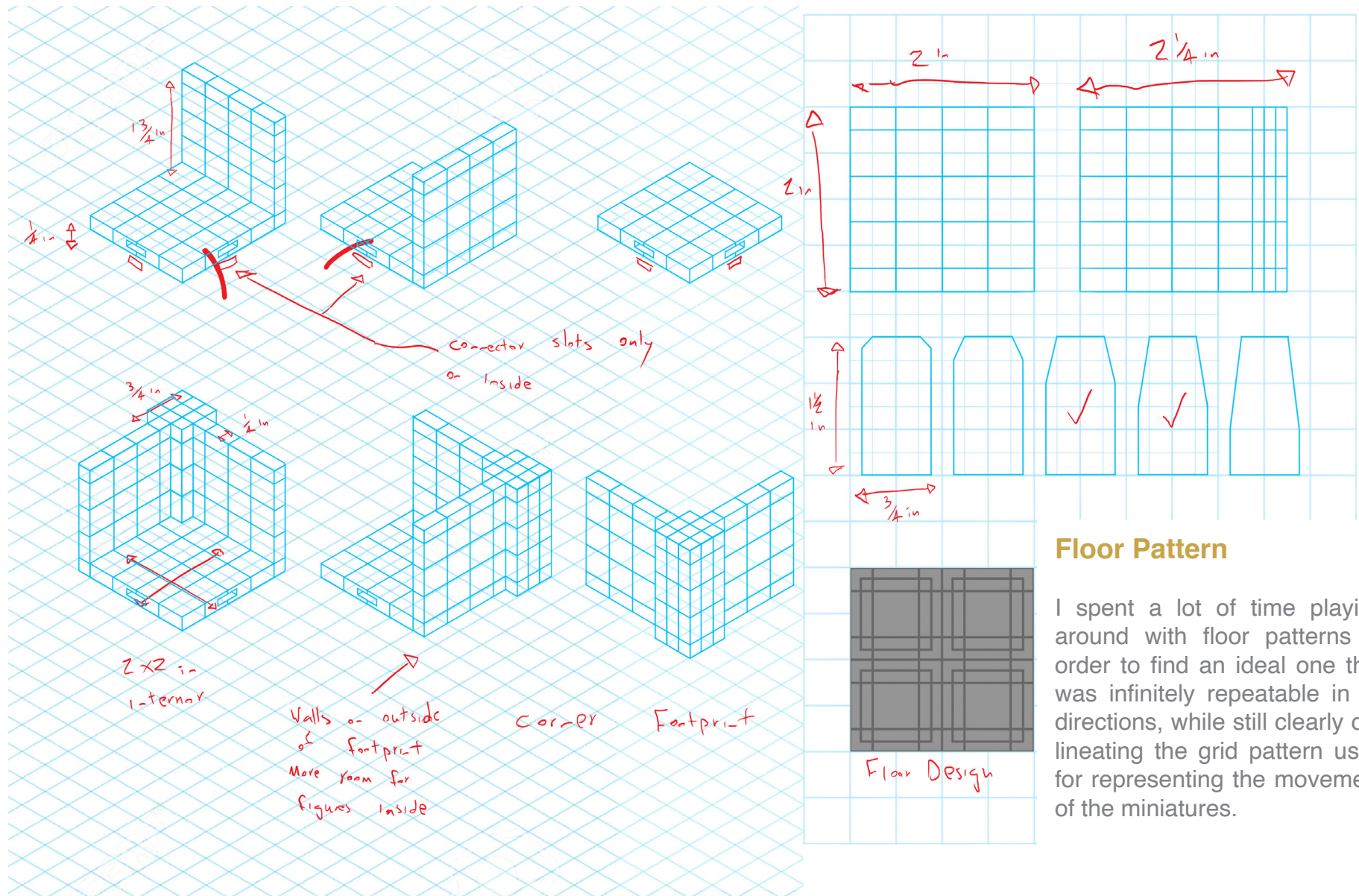


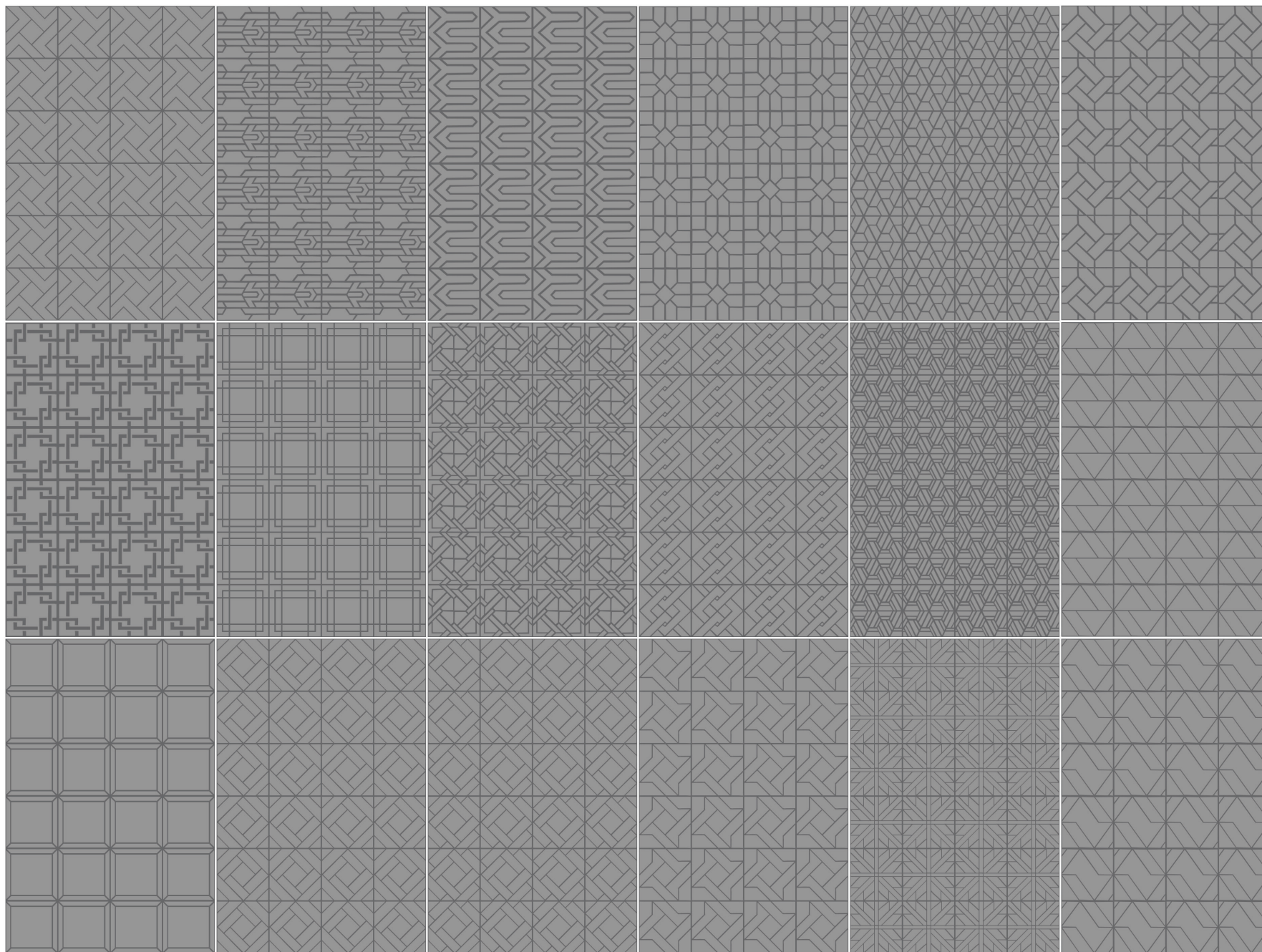
Only bottom pieces can break the vertical footprint allowing for more unique base options.



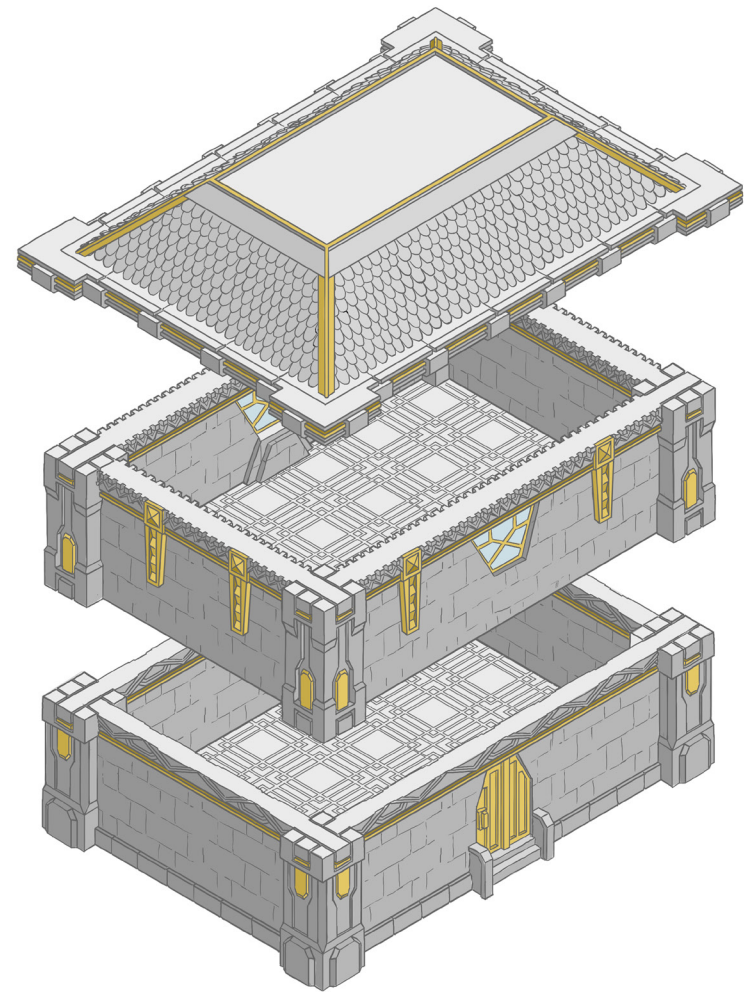
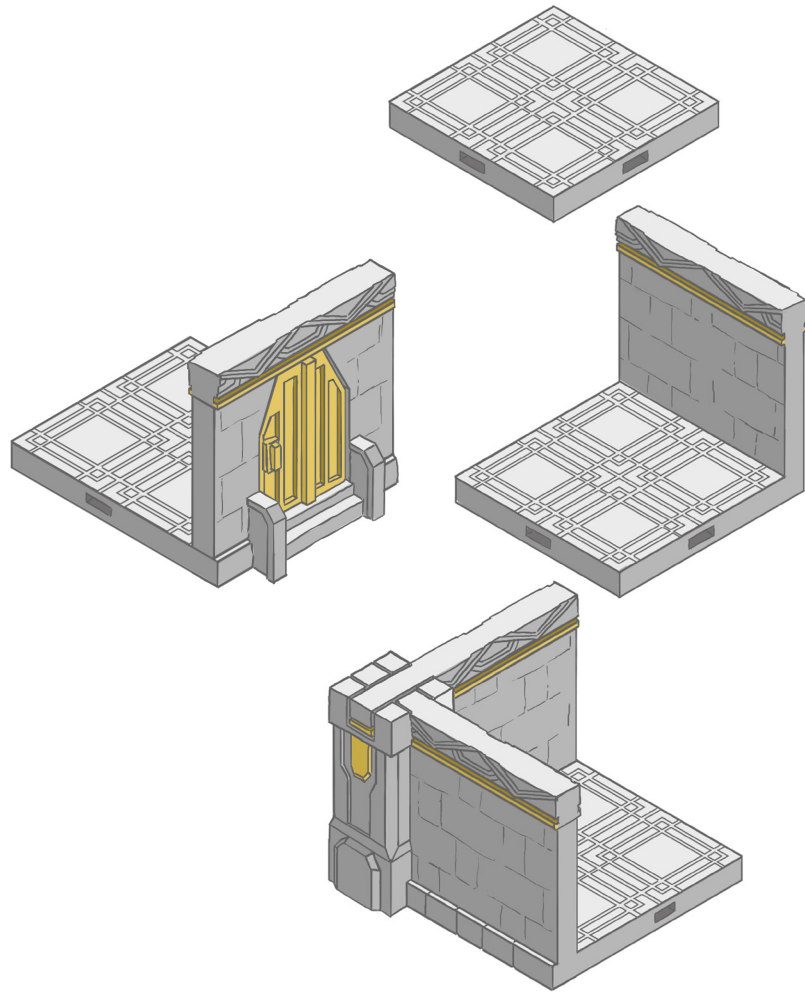
Insert pieces can be added to expand and alter the design, and alternative versions of pieces can be swapped out.

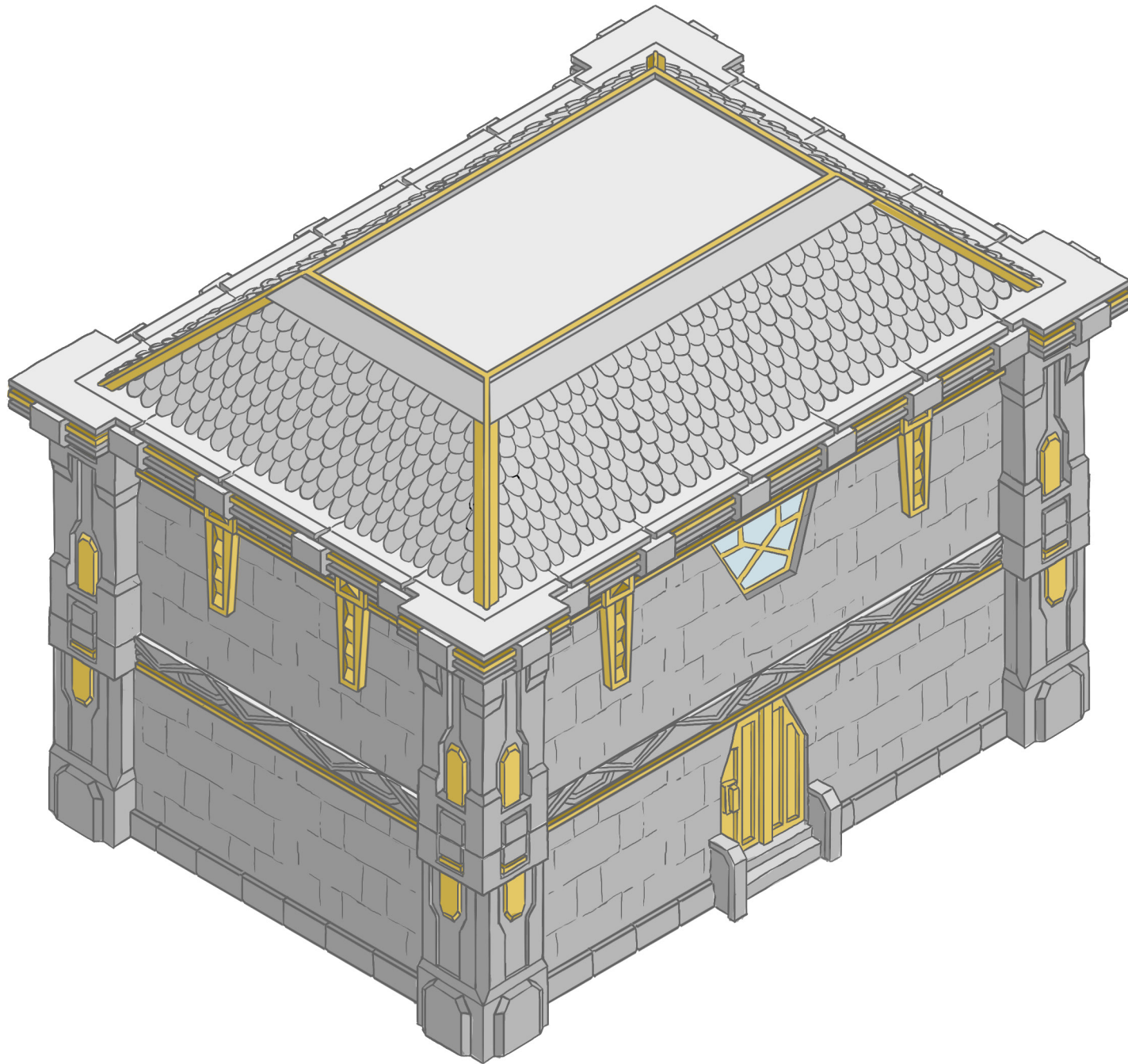
PROPORTIONS & FLOOR DEVELOPMENT





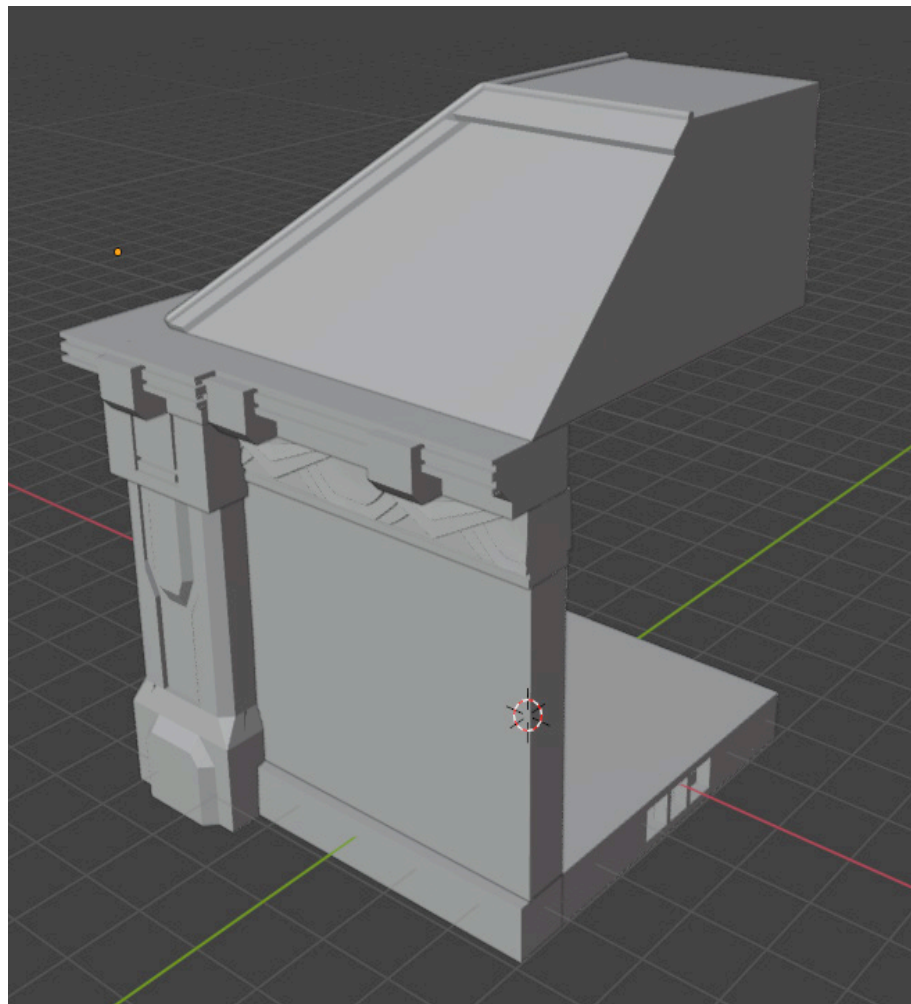
FINAL CONCEPT

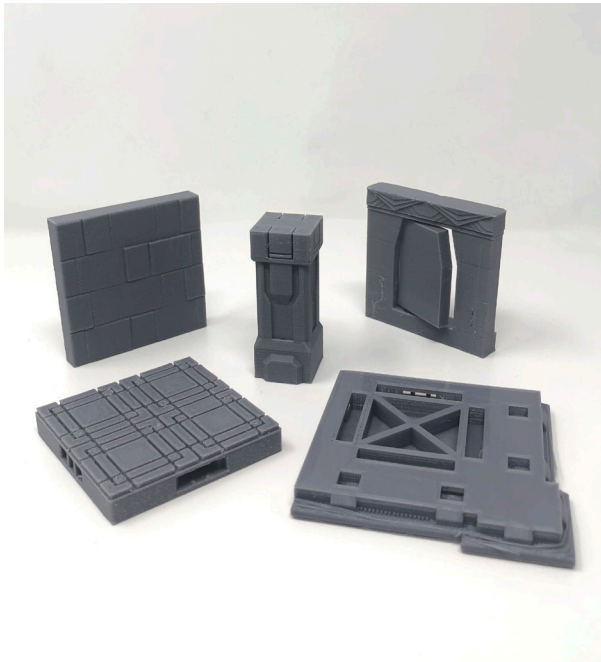




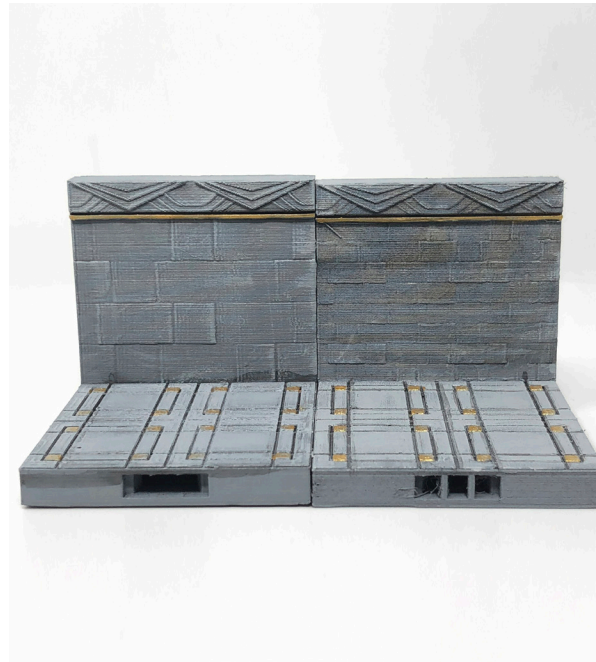
DIGITAL DEVELOPMENT

Once the concept had been fully designed for the prototype pieces, I then began the digital development using the program Blender. This involved several iterations of designing the piece, printing it out and measuring and testing it to ensure that it printed to my original specifications, or that the proportions I intended actually translated once in hand.





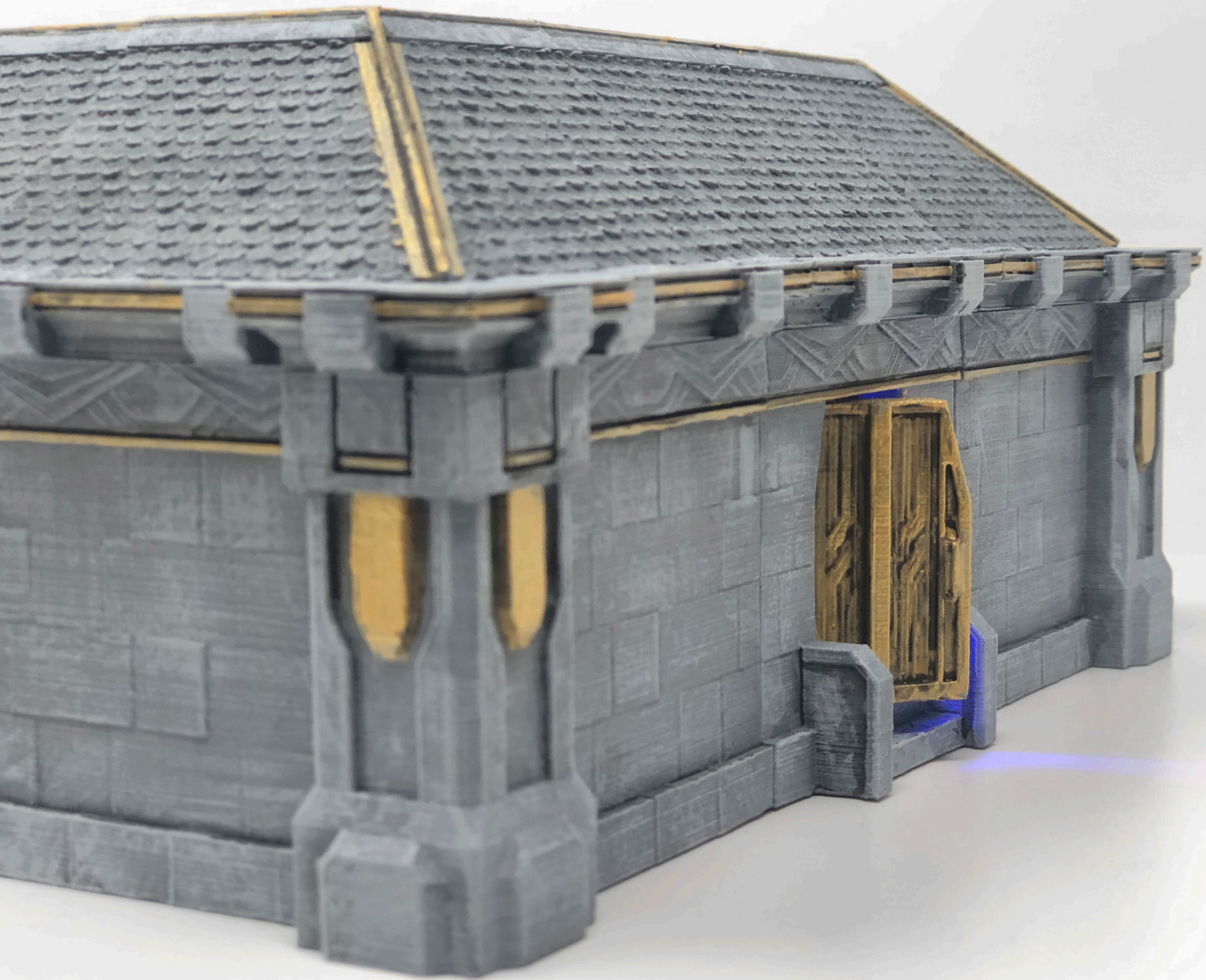
Various test pieces from the printing development process



Comparing two different brick sizes, revealed that oversized proportions will often look more realistic at small scales.



Ensuring that the buildings feel accurate in relation to the miniature figures used to play these games.



FINAL DESIGN

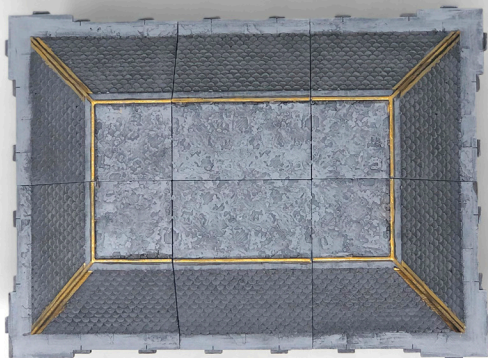
JÖTUNN

Jötunn is a tool set designed to help players of both role playing games and wargames to enhance their sense of immersion and provide for them a wider range of gaming terrain options than is currently available on the market. It uses the open source Openlock connector system, which allows it to easily connect with other connector based gaming systems, leading to easy integration with other terrain systems.

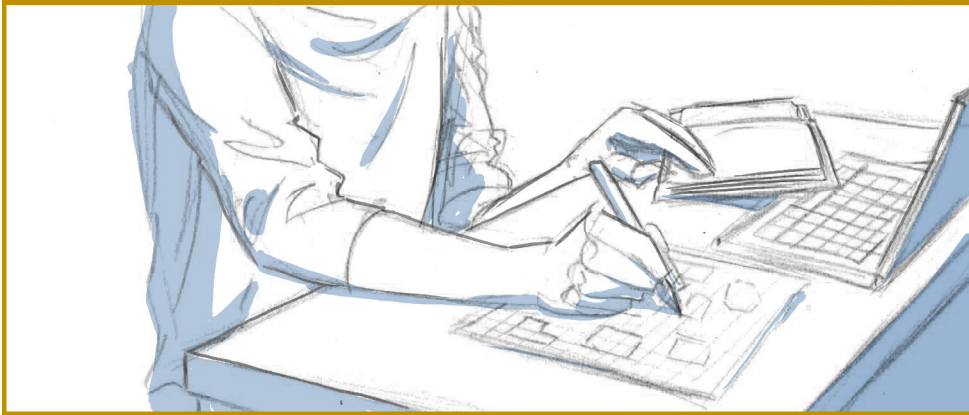
Through modularity, it allows the user to quickly set up their tabletop gaming area with simple easily connectable pieces, and the variety of pieces will allow the user to adjust the layout of the Jötunn terrain to meet the specific needs of their scenario. Because all the pieces are modular, it can be used to create a single unique building for an encounter in a role playing game, or create a large quantity of distinct buildings to represent a town or city for the large-scale battles found in wargames.

Finally Jötunn is designed for 3D printed production, which puts the power of creation in the hands of the user. They can print however many parts they want or need to fulfill their gaming requirements on their own timeline. 3D printing also makes Jötunn very affordable for budget conscious gamers, as once the initial investment is made for a 3D printer, the production costs become dramatically lower than any other commercially available plastic terrain set on the market.



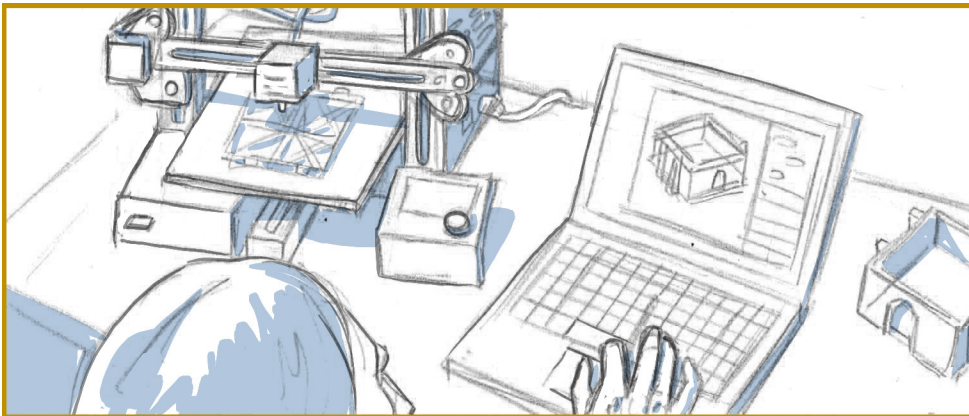




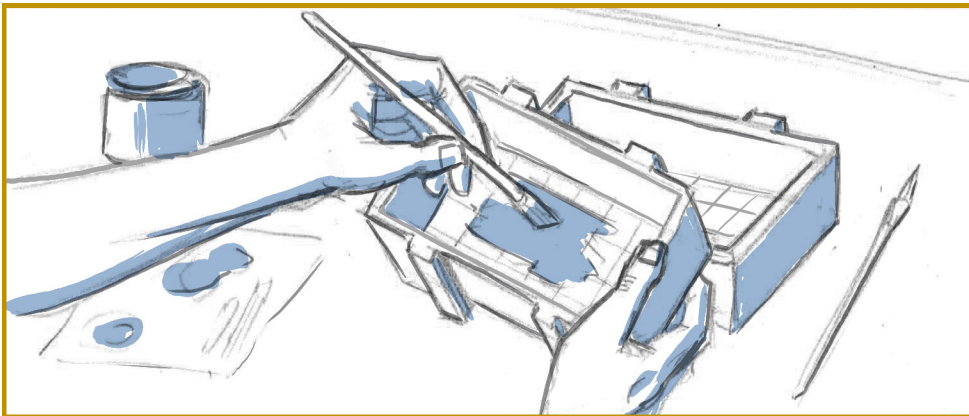


IDEAL SCENARIO

The user designs their gaming scenario and selects the necessary pieces from my system to accomplish their goals.



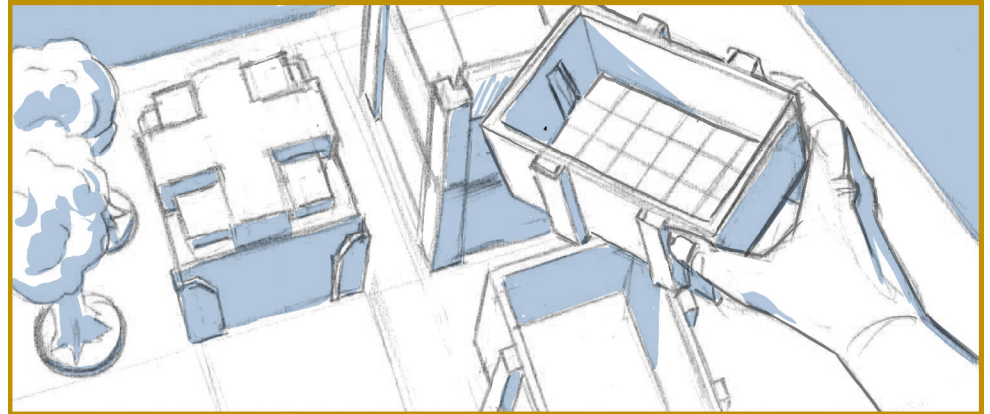
The user then loads the corresponding parts into an appropriate software such as Cura or Slicer and can begin printing them on a 3D printer.



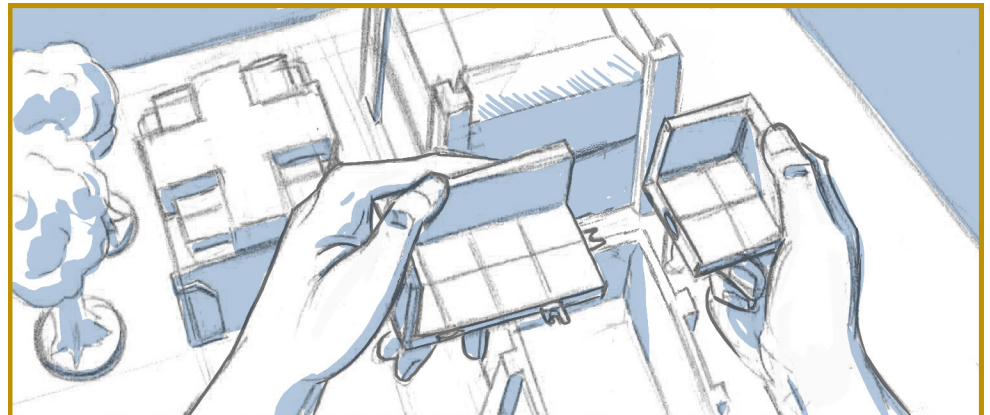
Once printed the user can complete any necessary assembly or clean up, followed by painting the parts using their preferred tools and methods. I.e. brush, spray can, airbrush.

With the pieces assembled and painted, the user can now set up the game table. Combining the system with any other gaming accessories to create the most immersive design.

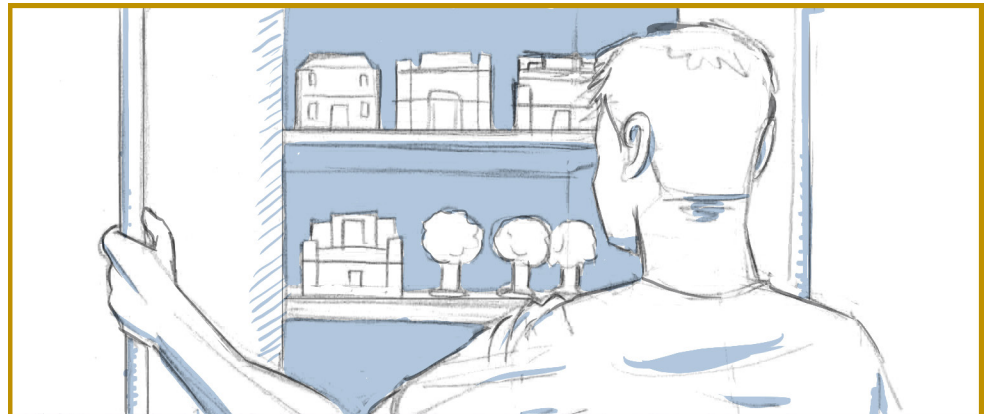
By using a modular Layer approach, complexity is reduced, but set up time becomes much faster.



If the gaming scenario changes unexpectedly, the user can adjust their terrain build at any point, by using the tile system to add, swap or remove pieces from ones they've already assembled.

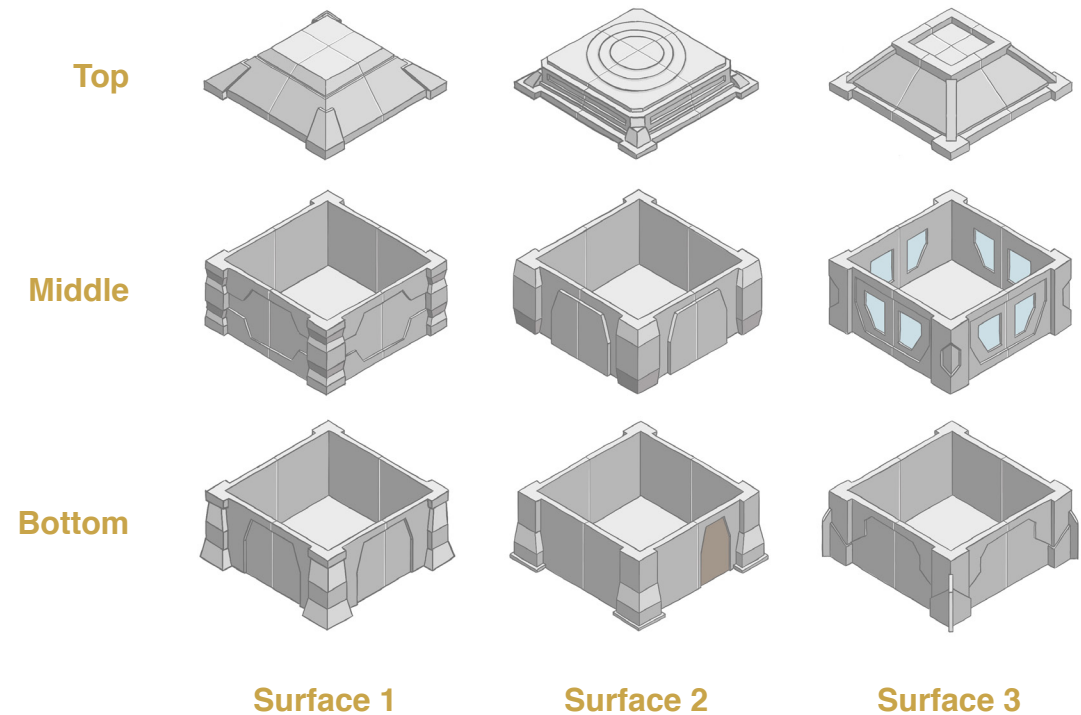


Over time the user can now build up a library of pre-built terrain that they can easily grab and use as their gaming needs require.



THE SYSTEM

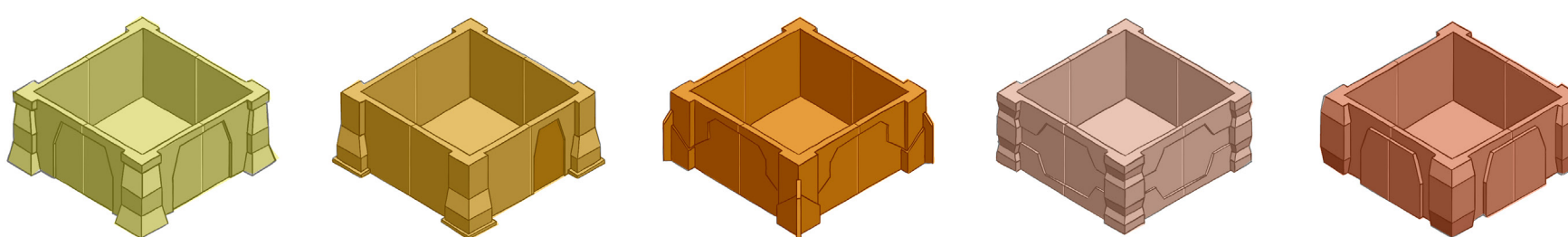
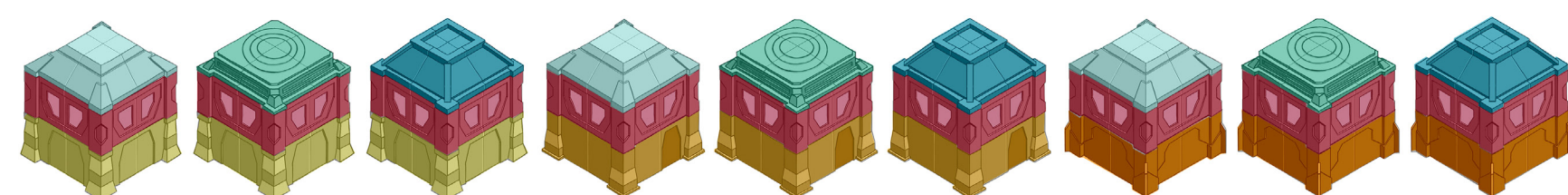
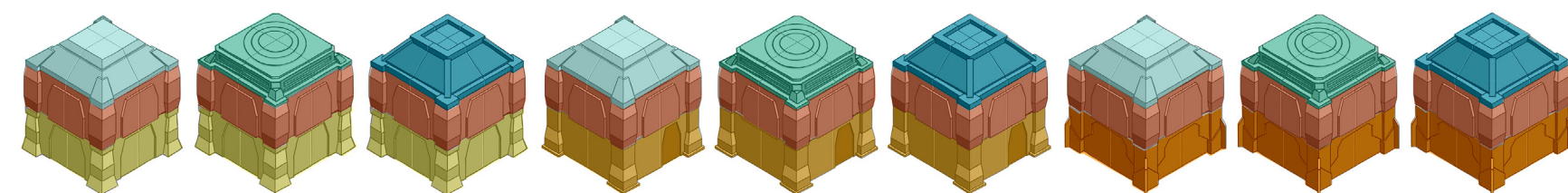
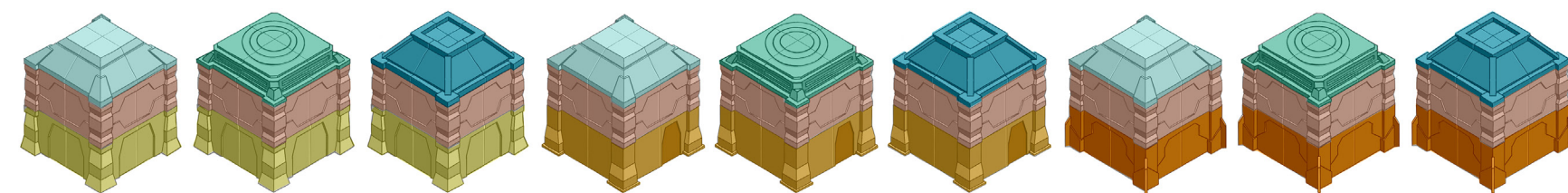
- 3 Levels, each with 3 unique surface designs
- Structured footprints allow modularity and consistency between levels
- Each surface treatment is interchangeable amongst its own level
- With these 9 groupings you can combine them to create 27 unique combinations



The Jötunn game system is about variety through modularity. Here we can see a building created through 3 separate levels, a top, a middle and a bottom, each of which would have 3 unique surface designs that can be mixed and matched to create a larger variety of options.

This is accomplished by designing each level with a specific footprint that stays true across all the surface designs, allowing each level to interact with the other levels consistently, regardless of the surface design.

For example, you can stack multiple middle levels to increase building height, but you can't stack bottom levels, and similarly the top



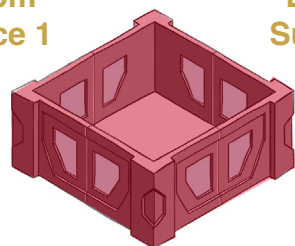
Bottom
Surface 1

Bottom
Surface 2

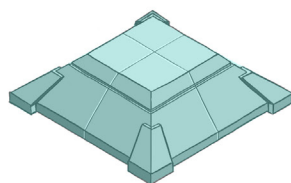
Bottom
Surface 3

Middle
Surface 1

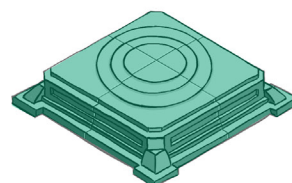
Middle
Surface 2



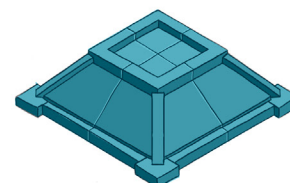
Middle
Surface 3



Top
Surface 1



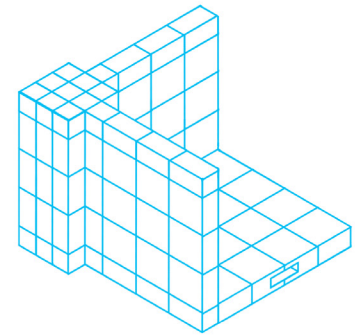
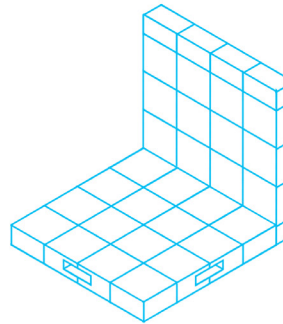
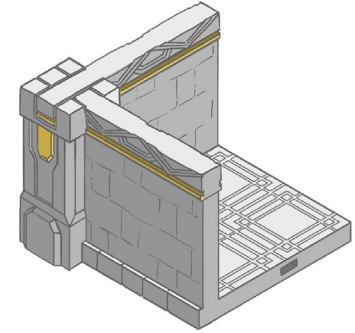
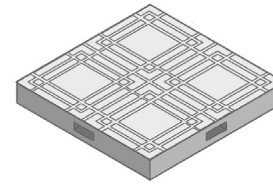
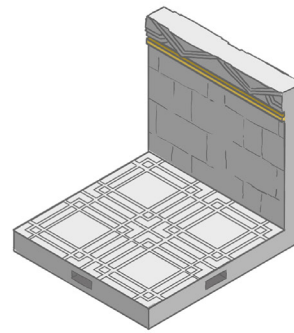
Top
Surface 2



Top
Surface 3

ELEMENTS

- Each of the 9 groupings is composed of 3 basic Tiles
- Each tile set follow the specific footprint of its level
- Uses the popular 1/28 scale
- Various tiles will have alternative versions that can be swapped out to add more variety and uniqueness to each build



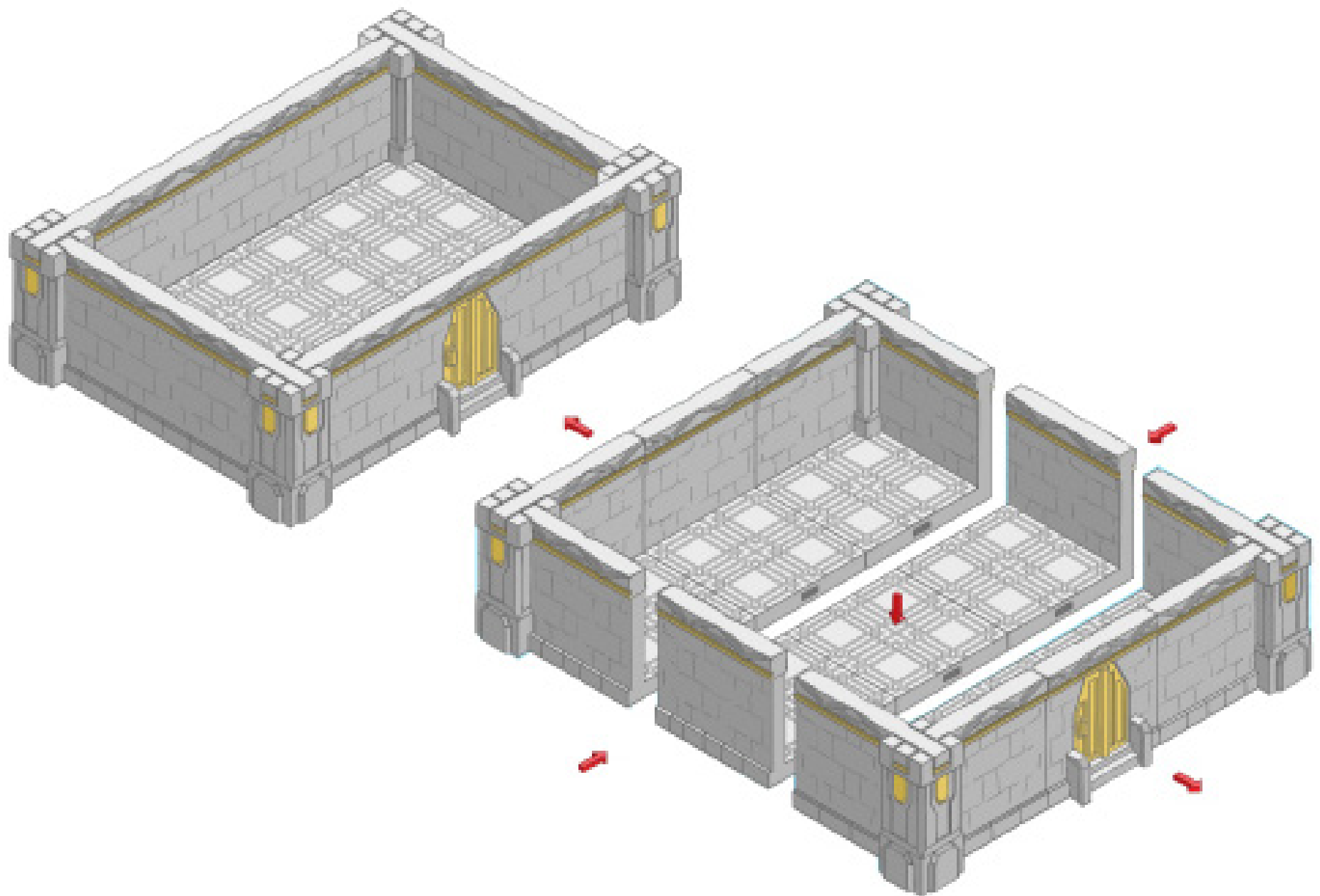
H 2" x W 2" x L 2. ¼ "
Wall Tile

H ¼ " x W 2" x L 2"
solo Tile

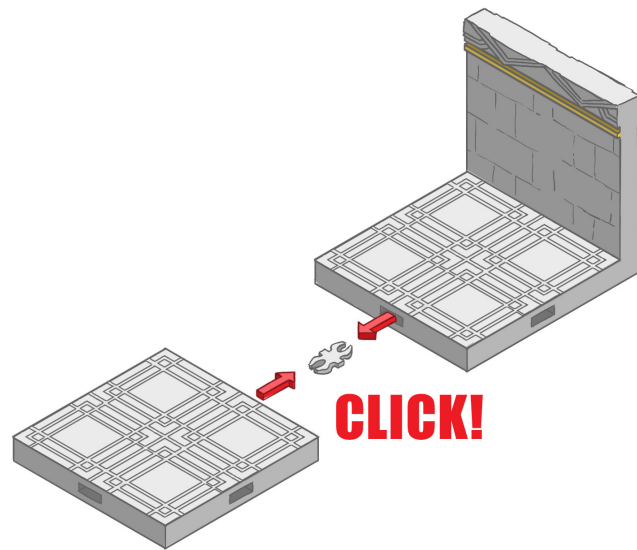
H ¼ " x W 2 ½ " x L 2 ½ "
Corner Tile

Now breaking down these groups further, we can explore their constituent elements. Each of these 9 groupings is composed of 3 basic tiles, the wall tile, the solo tile and the corner tile. Just like the levels, these tiles follow a specific footprint, which allows them to consistently interact amongst their groupings. So that you can have a small building composed of only 4 corners, or you can increase the building's size by inserting wall tiles and solo tiles in between the corners.

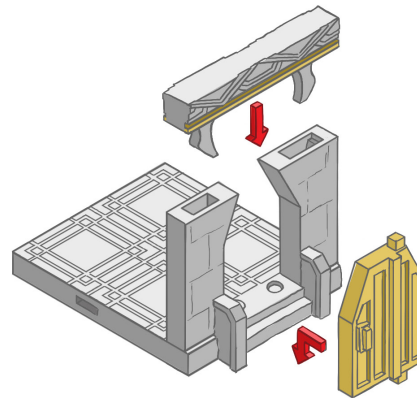
All the tiles are designed with the 1/28 scale which is the most popular scale used across miniature systems, with 1 inch roughly representing 5 feet of space.



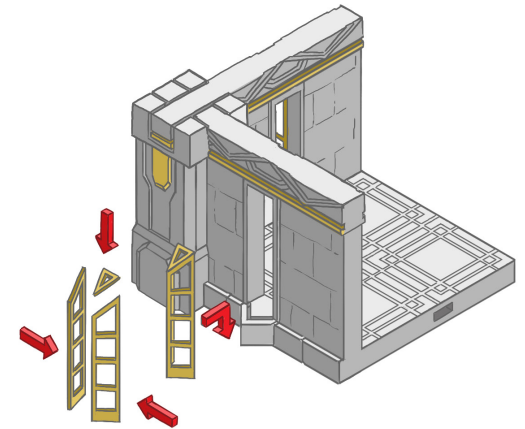
MODULARITY



All the various pieces can be swapped and connected using the open source OPENLOCK connector system.

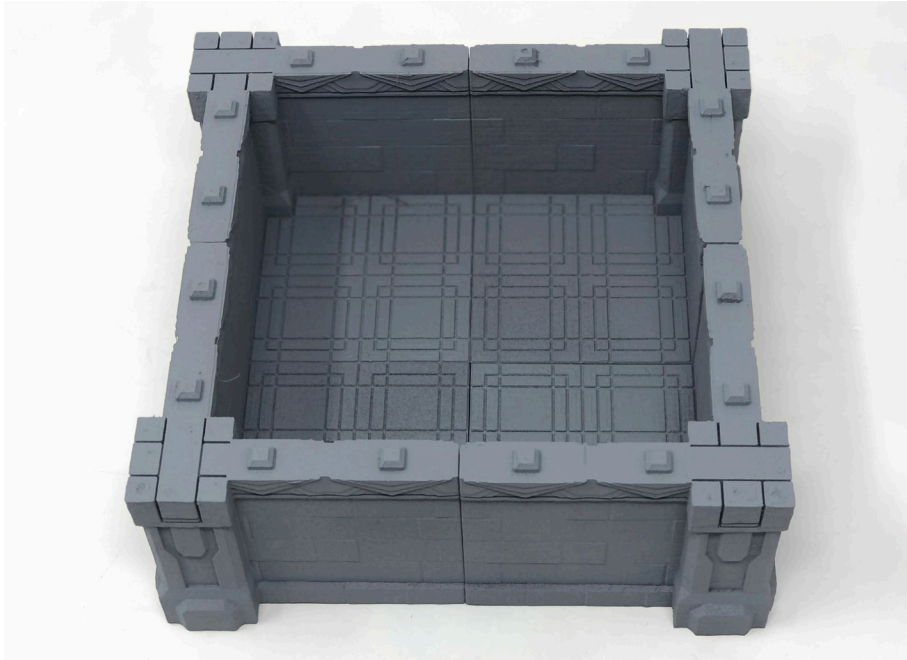


Removable top caps will allow doors and similarly designed pieces to slot into place.



Windows can be printed separately and assembled before being slotted in, taking into account the unique challenges of 3D printing delicate pieces.

FEATURES



Limited Complexity

4 Tiles create a 4x4 room

The Jötunn system combines the individual parts found within the Openlock system to create a more simplified design. 14 parts become 4.

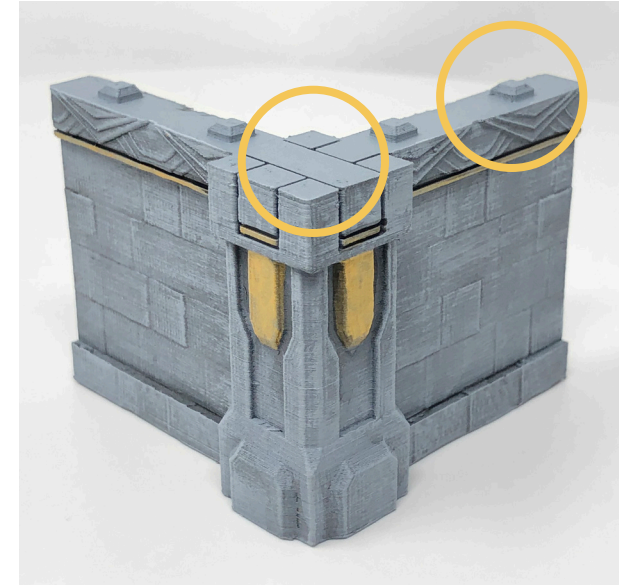
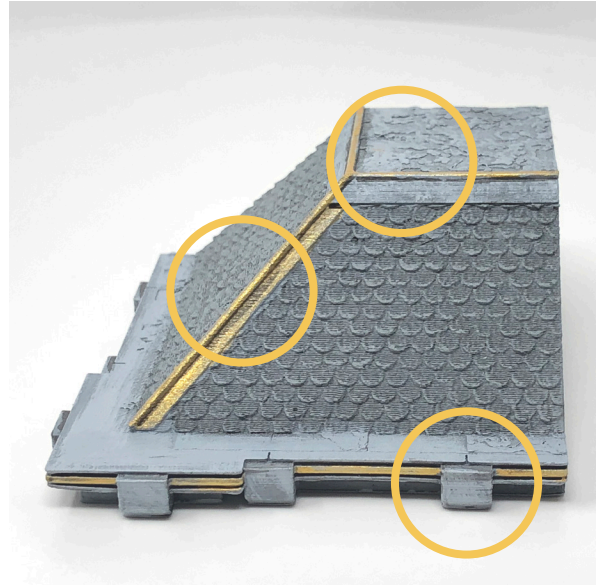
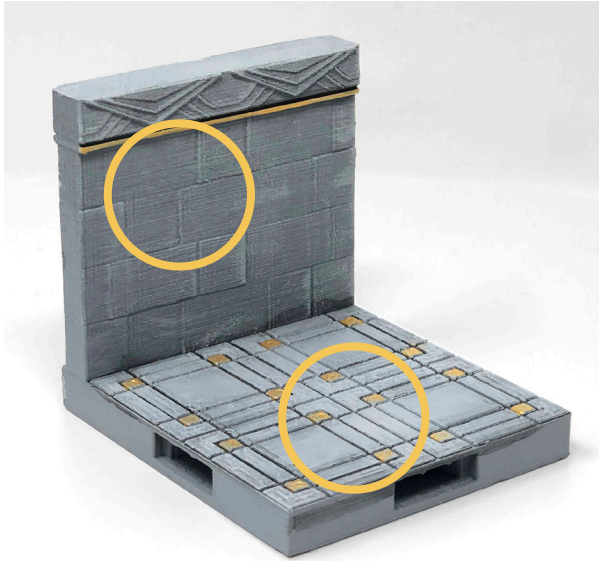


Compatibility

Jötunn connected with the Rampage system

By using the opensource Openlock system as a base, the user can more easily integrate Jötunn into their catalogue of terrain pieces.

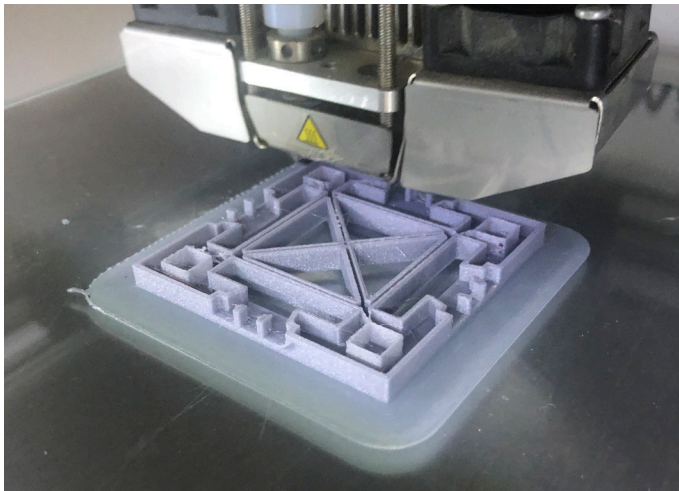
DETAILS

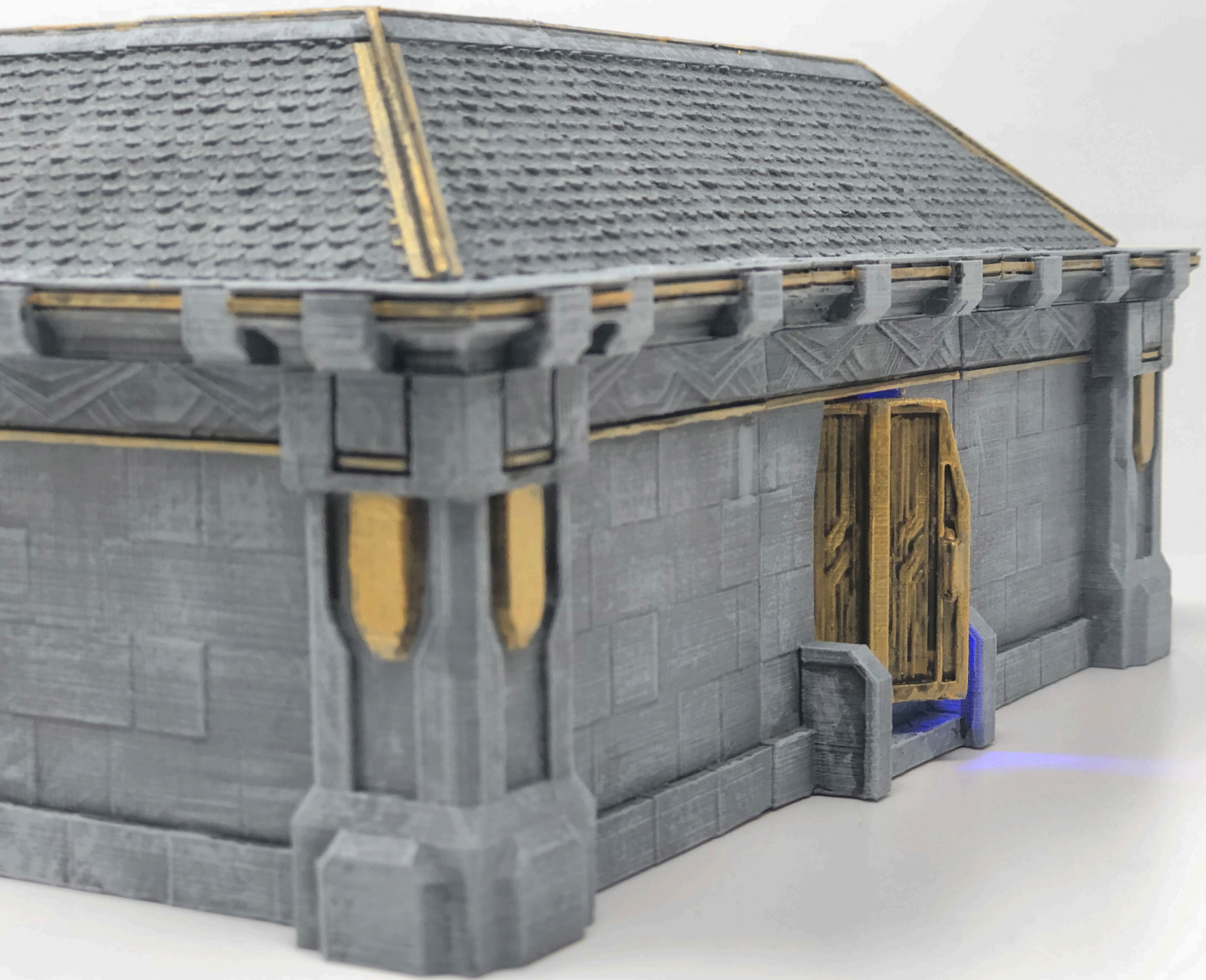


- Larger wall pattern more easily reads as stone compared to the small pattern which feels more like brick.
- The tiled floor pattern allows for the user to customize the basic pattern with different paint applications.
- Roof edge detail mimics the flashing found on real world slate roofs.
- Stone roof top implies added protection against falling boulders and rocks.
- Jutting support beams gives a facsimile of realistic roof construction techniques.
- Crisscross pattern implies stone joinery techniques developed by the dwarven people.
- Raised bumps lock into slots on the bottom of middle and top layers.

MATERIALS

- Designed for printing on FDM printers as they are the cheapest and most popular personal printers on the market
- Most people print using PLA or ABS plastics
- Allows the user to determine what pieces they want to use





REFLECTIONS

NEXT STEPS

From nearly the beginning, my vision for Jötunn was to eventually kickstart it, and put it out into the world for others to enjoy. With the conclusion of my capstone I feel that I have built a good start towards this goal, and plan on spending the next few months preparing for the next phase of this project.

While I have been able to print out two layers of the system as a prototype, I will need to have more done in order to fully show people what Jötunn is capable of. My plan is to fully finish the initial design of 3 layers and surfaces and have enough printed to show off in real world situa-

tions the full scope of it's modularity in effect.

In addition to this, I will need to do further concept development to create a variety of potential stretch goals for this project, as this is a big part of kickstarter projects. This basically means proposing additional elements and designs to be conditionally created when funding reaches certain goals beyond the initial goal post.

Finally I will be putting together better quality pictures and a professional video package with which I can advertise and use to promote my designs.

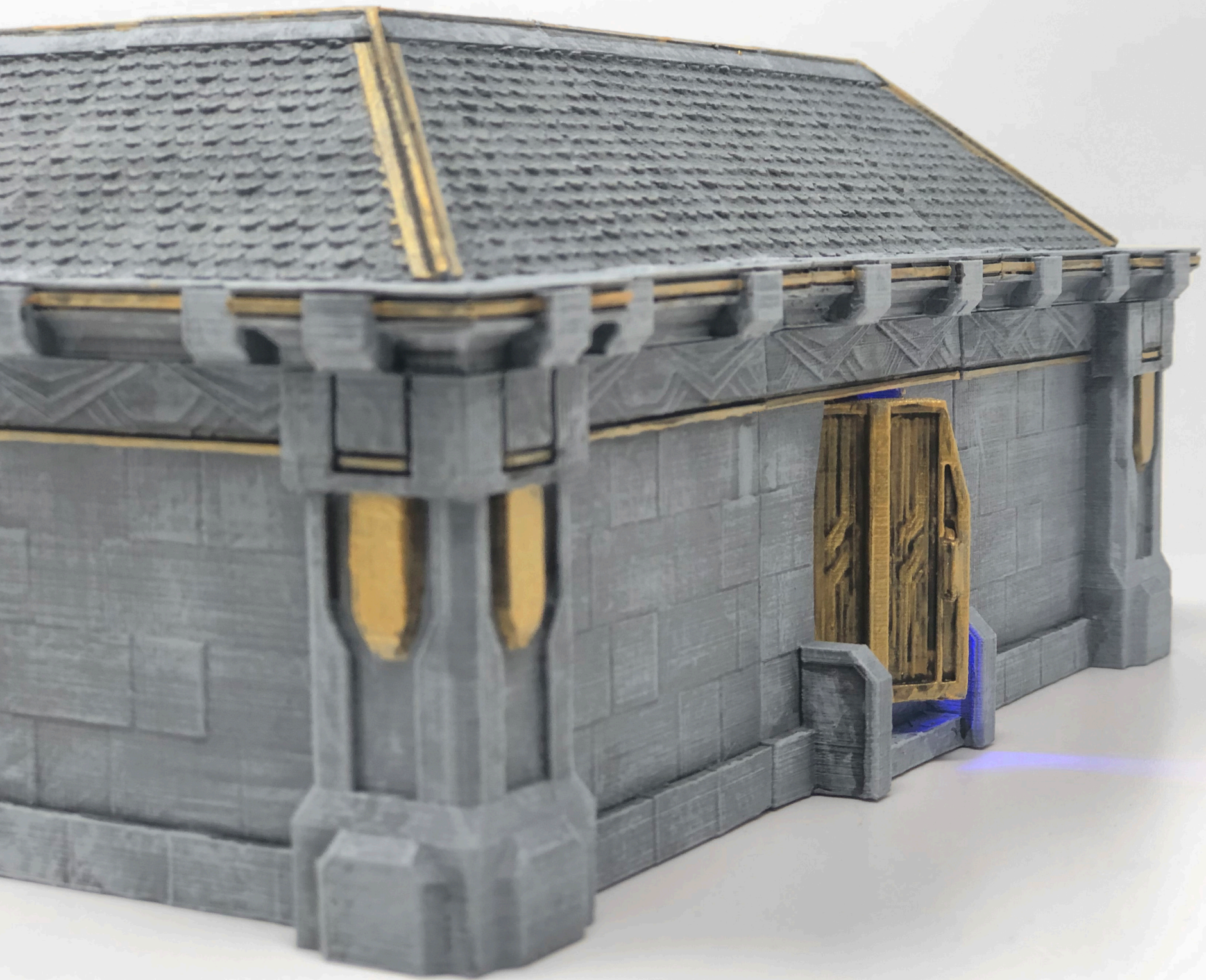
SELF REFLECTION

This past year has been a real world wind, with the pandemic, quarantine, online classes, getting covid, and even changing my capstone topic half way through as well. Part of the reason I chose this topic is because it's something that matters to me. Playing RPGs online with my friends has been a constant reassurance throughout the chaos of the world, and working on something you love will always make it that much easier.

It's been a unique experience taking such an in-depth look into something you spend so much time doing, and analysing every facet of it. It's been especially gratifying learning how to use

blender, and becoming more capable with sculptural modeling in addition to the geometric modeling of Soldiworks, and I hope to continue honing these skills as I grow as a designer.

This project has helped me to look forward to a point in the future when people can once again game in person, and experience that unique camaraderie that comes from sitting around the table as you create and tell a story together. I am excited to share this with other people too, and hope that it will bring them and their friends as much joy as it has brought me.



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IMAGE APPENDIX

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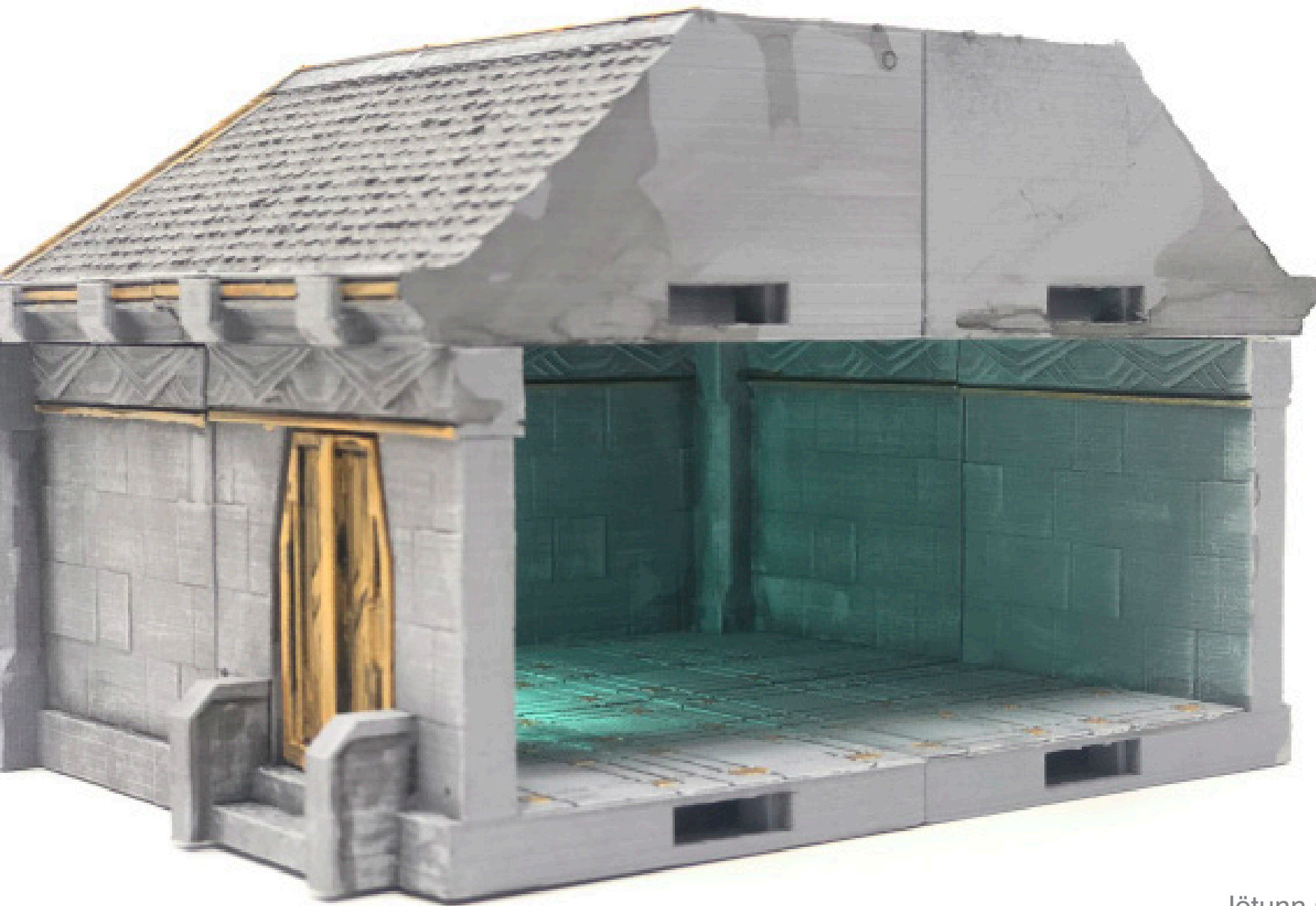
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Jötunn Gaming Terrain
Final Capstone Project
2020/2021