Creating a Model:
Methods and Materials

Written by Marina Guglielmi
Edited by Tyler Balko

In these modern times, art medalists have more resources available for sculpting, in both material and methods, than ever before. This, of course, can be both exciting and liberating to an artist, or, completely overwhelming. Whether you are new to medallic art, or an established medallist with preferred media and technique, it is beneficial to know what is available.

Today, traditional sculpting (hand modelling in a soft material and/or carving), as well as new technology (digital modelling and rapid prototyping), are both being used by artists to 'sculpt' an a original model for further mould making and subsequent casting, usually in bronze. Both methods hold merit and have their own advantages and shortfalls. Artists often find they have a natural affinity for one and perhaps, even a disdain for the other. Both classic and modern methods are relevant today however, regardless of personal preference. Knowing what possibilities are available in traditional and digital technologies; or an exciting combination of both, may come in handy for your professional practice, or may just be interesting to know about or even try!

As an art medallist and art foundry owner, I have experience with most of these techniques and have compiled a brief overview of traditional sculpting media and modern methods that are being used by medallic and relief sculptors today.

TRADITIONAL
Art medalists have always used two methods of creating their artworks, incorporating a plethora of materials. One approach is the modelling method, or additive sculpting, the other practice being sub-tractive sculpting used during carving. The most common traditional medias for additive works are wet clay, plasticine and wax, though mashed potatoes have been known to be a popular material for aspiring young artists. As for carving, wood or stone have always been the "go-to", with fall and winter fairs throwing butter or ice into the mix to spice options up a bit. No matter the media, traditional sculpting is done by hand and the material physically formed into an actual object you can see and hold in real life. The artist goes back and forth, adding, or taking away; scraping a bit here, pushing a little there, until the media they are working with reflects their concept. Very different from today, where, using a computer, one can create an artwork digitally; manipulating it on the screen until ready to have another machine print or carve it, only then making it an actual physical creation.

For the purposes of bronze casting a medal we most often have anartist supply us with a sculpture created utilizing the additive method in a soft material such as water or oil based clay (plasticine), or wax. They usually use a flat board, and sculpt their medal in relief. The board gives them something to hold onto and gives structure to the art so they can work safely. In this case, they would have to sculpt the obverse and the reverse (front and back) separate, which would then be assemble together later in the process. For this method mould making is required.

Those who sculpt directly in wax, often using a combination of the additive and subtractive techniques, are able to work on their artwork in the round; on both the front and back, eliminating the use of sculpting on a flat surface. In this case, mould making is not required, but only if a single casting is needed.

In either case, few tools are needed by the artist, just a board, their material of choice and a few sculpting tools.

In rare cases an artist will present me with a medal that they have carved in stone or wood. While it is possible to create a bronze in these instances, a mould is almost always required.

Traditional sculpting methods are sometimes considered less accurate and too time consuming by those who prefer digital creation methods, however, traditional methods and media have something no digital processes can replicate: human touch. Many artists feel that there is a quality in a hand sculpted surface that can create a strong emotional connection between the artwork and the viewer that digitally manifested work cannot.

Example of plasticine model in progress on acrylic board. Sculpt by Marina Guglielmi

Clay Shaper (rubber) and Metal tools great for traditional sculpting

Example of bronze casting originally derived from a CNC milled rubber plate from a custom stamp manufacturer

Bronze medals by Elaine Jaques in the process of mould making. These medals were sculpted in wax and cast directly. Moulds are being made to cast multiples.

TRADITIONAL CHART

MATERIALS	METHODS	TOOLS	PROS	CONS
Oil Based clay (plasticine)	• additive sculpting • hand modelling • requires mould making for continuation to lost wax bronze casting	BEST - Metal or rubber tools OK - plastic or wood tools	• different hardnesses available • finest detail can be achieved • reusable • will never dry out	
	TIPS - • heat up for malleability, cool down to increase hardness for fine details or carving • choose colours like terracotta or grey. They show the best light and dark tones when relief sculpting.			
Water Based Clay	• additive sculpting • hand modelling • requires mould making for continuation to lost wax bronze casting	• any modelling tool will work (wood, clay, rubber, plastic, metal, etc.)	• inexpensive • readily available • medium to high detail can be achieved • could potentially be fired into a ceramic medal	• must be kept moist for the duration of sculpting • can be dusty • less control over consistancy than oil based
	TIPS - • use a fine clay (like porcelain) for fine details and a smoother look • use a clay with grog for a more natural, textured finish • don't make your sculpting board out of wood as it will warp, often even when sealed. Try acrylic sheet, or even an old tile. • store works in progress in Tupperware with a lid and a moist sponge inside.			
Wax	• additive sculpting • hand modelling • could be cast directly for a single casting (a mould would be required for multiples)	• you should use medal tools for wax. They are the only tools you can completely clean the wax off of, plus you can heat them up to manipulate the wax	• different hardness available • can be uysed for direct sculpting, or casting into a mould • fine detail can be achieved	• requires more technical skill and care in prep for direct casting
	TIPS - • get to know your wax types: use a hard wax for casting and a soft wax for touch ups of direct sculpting • use a solvent for smoothing NEVER USE OIL OR VASELINE! (a citrus based cleaner or natural turpentine works well)			
Carving Material	• reductive sculpting • usually requires mould making	• tool choice is material dependant • usually chisels, hammers, files, pneumatic tools etc.	• a hard model is created	• requires more tools and space • knowledge of wood or stone carving required
	TIPS -	• try specifically a gunsmithing vice for holding on to small art objects while carving. The vice grips are stong, but are also curved and felt padded.		

DIGITAL

Digital technologies have changed the world in which we live, as well as the way we make art. Medalists now have the ability to enhance a hand sculpted work, or to create a medal for production without physically making anything. Pixelated mashed potatoes or butter if you will.

Those of us that are into such things now have an abundance of digital sculpting tools and rapid prototyping methods available. There are many programs and apps that allow the artist to 3D sculpt (digital sculpting or modelling) using the software to manipulate a digital object as if it were made of a real life substance such as clay. The final design can then be made physical by rapid prototyping; 3D printing and other computer aided manufacturing process like milling and turning.

Relief work can be very effective using these programs. In fact, The U.S. Mint hired their first full time, fully digital sculptor Joe Menna way back in 2005 and in 2019 he became the U.S. Mint's Chief Engraver. Even the traditional sculptors there now utilize digital technology to enhance their work.

If fully sculpting something on the computer does not sound appealing then perhaps enlisting digital technologies as an assistant would be more suitable. The majority of medallist are looking for computer aided techniques for enhancing work, and most often for adding text. Almost all the digital manipulation we see in medal art or relief sculpture is in incorporating text. Most artists despise sculpting text, and others are restricted to using computers to assist, as their commissioners require a certain font or style. In either case, the artist can create, or hire someone to create, a digital file of the text they would like to include on a medal, have that rapid prototyped in a hard material, then sculpt on top of that hard material. Essentially one is creating a 'blank' with the text already on it and then traditional sculpting over the empty area to create a hybrid model for mould making and casting. This can be as simple as creating a design in a word processor (Microsoft Word or Apple Pages) then exporting it as a vectorized PDF file and sending it to a laser cutter for direct cut out.

Of course, it can also be much, much, more complicated than that depending on the equipment available and design requirements of the artist.

Rapid Prototyped Flexography plate. Work In Progress by Lorraine Wright.

Traditional Sculpting in plasticine over a digitally executed 'blank' with text. Work In Progress by Lorraine Wright
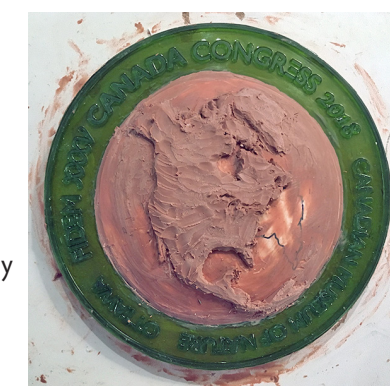
Final bronze sculpture (from hybrid traditional and digital sculpted model)

Digital technologies are skill based and require someone knowledgable to execute. If you are doing something simple, there are ways to train yourself the fundamentals through free online tutorials and training (YouTube), but if you don't understand the basics of this language, it is best to find someone to assist. A little research is required on the artist's part if this process is new to them. Equipment is required, so if you don't have it you will have to find someone who does. Get in touch with the person or company who will be creating your physical model (a lasercutter,

3D printer, CNC shop, etc) and see what they require in terms of a digital file first. Keep in mind most of these companies will make the file for you for a fee, which is a very helpful resource. Don't fret if you're in an area with little access to such technology. One work-around for that is to find someone locally that makes custom rubber stamps, lithographic printers, or carved signs. There is most likely a company like that near you. The sign carvers usually use CNC technology to carve in high density urethane foam or wood, and stamp makers do as well to create rubber or flexography plates for stamps and litho printing.

The possibilities are endless in the digital realm and it's worth knowing or experimenting with these new and exciting possibilities. But don't feel that you have to stick with them if you don't care for them; you can always go back to the basics...mashed potatoes!

3D print from a file created in Tinkercad by Lorraine Wright

DIGITAL CHART

STEP	PROCESS	THE BASICS	EXECUTION	MATERIAL
1. Digital File	3D file	• A **3D file format** is used for storing information about **3D** models. • 3D file is used to rapid prototype something in 3 dimensions. • This is required if you're sending an entire relief with multiple levels or a dimensional sculpture for rapid prototyping. • If you're 3D modelling, this is the file you will create • Each industry has its own popular **3D file formats** for historical and practical	Software required For digital sculpting try: - ZBrush - Blender - Sculpris - Tinkercad	dependant on rapid proto-typing choice
		TIPS - • take a class to get the basics of these programs (in class, online, free tutorials etc.) and utilize the software companies free trials.		
1. Digital File	Vector or 2D file	• this would be best used for creating a medal blank with text. • can be as simple as a vectorized pdf or as complex as a **2DCAD** file	Software required For real 2D files you need a CAD program	dependant on rapid proto-typing choice
		TIPS - • find your rapid prototyper first, and find out what kind of file they require to create your blank. • Custom stamp makers, signage companies, and lithographic printers may be willing to do this		

DIGITAL CHART con't

STEP	PROCESS	THE BASICS	EXECUTION	MATERIAL
2. Rapid Prototyping	Lasercutting or etching	• uses a laser to cut through hard materials medal blank with text. • can also engrave a surface instead of cutting • usually requires vector file types (.ai, .eps, .svg)	Lasercutting machine required	Material options depends on laser company and their usually include: • wood, acrylic plexi, foam, linoleum, hardboard (MDF)
		TIPS - • choose a hard material like acrylic in a solid colour (nothing translucent, it is distracting for sculpting on).		
2. Rapid Prototyping	CNC (milling or turning)	• a router-like tool carves out a flat plane • can carve in layers or straight through • usually .dxf file	CNC machine required	Material options depends on CNC company and their equipment, but usually similar to the lasercutter
		TIPS - • if you have fine details, always get two blanks made at the same time in case something happens to one. It is less expensive to get two made at once than to have to go back for another.		
2. Rapid Prototyping	3D Printing	• prints out an object in 3D dimensions • usually an .obj or .stl file	3D printer required	Material options include PLA, resin or lost wax, castable wax
		TIPS - • chose the highest quality print, and the lowest cost material. • the castable wax is not always the best option for direct metal casting, talk to your foundry first. For some reason it is also crazy expensive at this time.		