

Establishing a System of Green Sand Casting

Tori Christgen (Faculty Sponsor- Neil Lawley)

Art 450: Independent Study-Sculpture

ABSTRACT

Green sand* casting is a method of reproducing items in bronze and aluminum. The purpose of this research is to institute a system of green sand casting at MWSU. It is predicted that this system will be a more environmentally and fiscally responsible method with a higher production rate than the current lost-wax system*. Through observations at local foundries and the gathering of information from books, videos and Internet sites I hope to obtain the knowledge needed to construct the materials necessary to begin sand casting. It is predicted that sand casting will be more efficient, have a lower toxicity, and allow for re-use of materials over the traditional lost-wax investment method.

INTRODUCTION

Green sand casting is a casting process of making metal copies from a master pattern. Molten metal is poured into a hollow cavity in a mold made of a mixture of sand, water, and bentonite clay. Unlike in the lost wax investment process currently in use at MWSU, the materials in green sand casting can be re-used. Green sand casting involves less material, time, and money than other casting methods. I attempted to reproduce an original wood sculpture in aluminum and bronze using the green sand casting method.

The information for this study was obtained through internet and library research, a visit to the University of Kansas sculpture foundry, as well as hands on experience.



METHODS & RESULTS

Green sand casting involves the use of a furnace, metal, a pattern, and a sand mold. The metal is melted in the furnace and poured into the cavity of the sand mold. To create a mold the original item one wishes to cast is put into a flask* filled with sand and placed on top of a backing board for support. First, talcum powder is used to dust the pattern to avoid sticking. Second, the sand mixture is sifted and compressed (rammed) around the original item creating a mold. Now that the sand is firmly packed the pattern is carefully removed. Molten metal is then poured into the mold and allowed to cool. Once the metal has cooled the cast is removed and the sand is saved for future use.

I built the flask out of scrap 2x4 wood boards and a sheet of plywood was used as a backing board. The ramming tools used were dowels and scraps of wood found in the wood shop.

The sand mixture was created by mixing 90% masonry sand with 10% bentonite clay, per volume. The sand was fairly damp so very little water was added. The masonry sand was obtained from a local sand and gravel company. I mixed the sand with the bentonite by hand as well as with a cement mixer that was purchased specifically for this purpose.

CONCLUSION

The sand mixture successfully molded around the original item and created a usable mold. Three aluminum cast were successfully poured as well as one bronze. Even though a final cost comparison has yet to be conducted it is clear green sand casting is faster, cheaper, and less labor intensive than the lost-wax system current at use. This method of casting will be taught in future sculpture classes at MWSU.

GLOSSARY OF TERMS

Green sand- A molding sand that has been tempered with water and is employed for casting when still in the damp condition.

Lost-wax investment system- A casting process in which wax is used. The pattern is invested (surrounded) by a mixture of water, plaster, and silica. After the mold is dry, the pattern is melted out of the cavity, and molten metal is poured into the cavity.

Flask- A metal or wood frame used to hold the sand of which a mold is formed.



REFERENCES

- Ammen, C.W. The Complete Handbook of Sand Casting. New York: TAB Books, 1979. Print.
- Gingery, David J. The Charcoal Foundry. Rogersville: David J. Gingery Publishing L.L.C., 1983. Print.
- "How to Build Wood Foundry Molds" eHow. Demand Media, 2011. Web. 30 Nov. 2011. <http://www.ehow.com/how_7943678_build-wood-foundry-mold>.
- Hurst, Steve. Metal Casting; Appropriate technology in the small foundry. Warwickshire: Intermediate Technology Publications, 1996. Print.
- "My First attempt at Building a Flask and a Flask Pattern" Marksworx. Digital Data Transfer, n.d. Web. 30 Nov. 2011. <<http://www.marksworx.com/furnace/MarksWorxMiniFoundry>>.
- "Sand Casting." Simpson Group. Beardlsey & Piper, 2001-2010. Web. 30 Nov. 2011. <<http://www.custopartnet.com/wu/Sandcasting>>.
- "Step-by-Step Sand Casting" Foundry 101. Lost & Foundry, 2011. Web. 30 Nov. 2011. <http://www.foundry101.com/new_page-7>.

