Mould Making and Casting – CON 1180: Student Theory Guide

Different Types of Materials

What is...

1. Clay slip
2. Concrete
3. Polystyrene beads
4. Plastisol
5. Model Metal

**DESCRIBE below (with pictures and words) the common process of casting/moulding clay, concrete and plastic (\*video\*)**

What is the difference between hardening by…

COOLING CURING DRYING

Making Patterns and Moulds

What type of materials can moulds be made out of?

What types of materials can patterns be made out of?

What type of method is used to make a pattern for a moulded/casted product?

Factors Affecting Quality of Cast or Moulded Product

Describe FOUR factors that can affect the quality of a casted or moulded product and WHY these affect the product:

1.
2.
3.
4.

Health and Safety Hazards

What are the health and safety hazards associated with heating plastic and firing ceramic products? List 4 and describe them below:

What PPE should you wear while using equipment related to casting/moulding? List 3 items below:

***Mini-Project: First Aid Plan of Action***

1. List 4 accidents that could happen in the casting/moulding module:
	1.
	2.
	3.
	4.
2. CREATE a first aid plan of action (step by step) of how you would react to ONE of the accidents you listed above.

First Aid Plan of Action for .

1.
2.
3.
4.
5.
6.
7.

1.

Calculating Quantities of Materials

Estimating the amount of rubber needed to make a mold can be a difficult task. However, having enough rubber or having too much rubber left over is not only frustrating, but costly. Successfully mastering this task is not that complicated and, like most things related to mold making, the more often you try it the better you become.

There are a number of variables to consider including complexity of the model (varying dimensions, configuration, undercuts, draft, etc.), type of mold being made (2 piece poured block vs. 3-D brush-on), type of mold rubber being used, etc.. The following will serve as a rudimentary way to mathematically estimate your material requirements for making molds using rubber that is poured and rubber that is brushed on

**Making a Mold Using Rubber That Is Poured over A Model**

To illustrate, we will assume that our model is a cube measuring 3" wide by 3" long and 3" high (7.62 cm X 7.62 cm X 7.62 cm).

* To hold both our model and the rubber, we will need a containment field or box that measures 4" wide, 4" long and 4 " high (10.16cm X 10.16cm X 10.16cm).

**Pouring Water Method:**

* The easiest way to estimate your rubber requirements (by volume) is to place the model in the containment field and pour water up and over the model. The amount of water used represents the amount of rubber you will need. Be careful to remove all water and thoroughly dry model and containment field before pouring rubber.

**Calculating Requirements By Weight**:

* To estimate the amount of rubber needed, we will calculate the volume (cubic inches) of rubber needed to make the mold. This value, using the specific volume for the type of rubber used, will then be converted to mass or weight of rubber required.

A) Calculate volume of box holding the mold: 4" x 4" x 4" = 64 cubic inches (1,048.76 cubic centimeters).

B) Calculate volume of the cube: 3" x 3" x 3" = 27 cubic inches (442.45 cubic centimeters)

C) Subtract the volume of the cube from volume of the box to get total volume of rubber that you will need to make the mold: (B - A) = cubic inches to make mold. 64 cu. In. - 27 cu. In. = 37 cubic inches (1,048.76 - 442.45 = 606.31 cubic centimeters). 37 cubic inches (606.31 cm3) represents the volume of rubber needed to make the mold.

D) The next step is to convert the volume value (37 cu. in. or 606.31 cm3) to a weight value - pounds or kilos. To do this, you need to know what your mold rubber will yield on a cubic inches per pound (cm3/kilo) basis. The "value" you need to do this is called the "Specific Volume" and is included on every Smooth-On product technical bulletin under the "Technical Headings" section. For PMC- 121/30, the specific volume is 27.7 cubic inches per pound (963 cm3/kg.). This means that a pound (kilo) of PMC-121/30 will occupy 27.7 cu. in. (963 cm3) of space.

E) To figure the weight, the next step is to divide the volume of the rubber needed to make the mold by the specific volume yield of the mold rubber: 37 cu. in. / 27.7 cu. in = 1.34 lbs. (606.31 cm3 / 963 cm3 = .630 kg.) 1.34 lbs. or .630 kg. is the total weight of rubber that you will need to make the mold (Part A + Part B).

*Practice:*

Major Project:

1. Calculate the quantities of materials required to make a casting (your product plan)
2. Prepare a detailed STEP BY STEP set of procedures that you will use to make a casted or moulded product
3. Design or prepare a mould for a ceramic or plastic product
4. Measure and Mix quantities of materials needed
5. Pour, cure and finish a cast and/or moulded product