Embossing

Technical Data Sheet

COLUMBIA
MARKING
TOOLS

Summary

Other marking methods may be inadvertently called embossing. Embossing or Coining techniques require a paired set of dies. The marks can only be made in sheet metal not solid pieces. The following technical paper is on the process of embossing, or debossing, metal pieces. The paper covers the definitions, details of the process, the tooling required. Additional information is provided on design, build, and force requirements.

Contents

Introduction

Embossing of metal parts coveys both a quality of the part and a permanence. Embossing in general, enhances the original image and or designs, making it appear richer, more expensive, more eye catching, more appealing, and so forth. Embossing and good design can make even the most basic product become a piece of art. However, the appearance of the embossed image is very dependent on the quality of printing and embossing. Poor quality embossing can destroy the appeal of the product. However, good quality embossing can make a product positively breathtaking.

The technical data sheet includes definitions of embossing types, an outline of the tooling and process, detailed information about the dies and the die shoe. Elements of the design are also reviewed including items to consider, force required, and issues and solutions.

Definitions

emboss

/ɪmˈbɒs,ɛmˈbɒs/

verb

gerund or present participle: **embossing**

1. carve, mold, or stamp a design on (a surface or object) so that it stands out in relief.
   "they used special tools to emboss the leather"
   - carve, mould, or stamp (a design) on a surface or object.
     "a dull gold casing with the logo embossed on the front"

deboss

/diːˈbɒs/

verb

gerund or present participle: **debossing**

1. stamp (a design) into the surface of an object so that it is indented.
   "you could deboss the team name on the inner side of the bracelet"
   - stamp a design into the surface of (an object).
     "The exterior can be debossed with your logo or message"

coin

/kɔɪn/

verb

past tense: **coined**; past participle: **coined**

make (coins) by stamping metal.

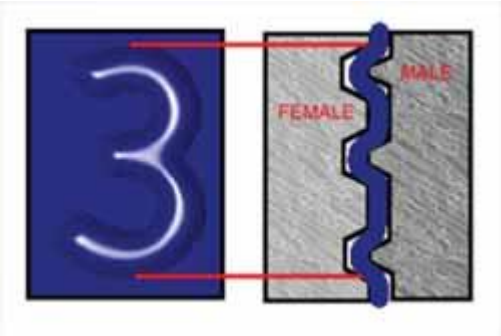
"Guineas and half-guineas were coined."

invent (a new word or phrase).

"He coined the term ‘desktop publishing’"

Embossing Terms for Marking

Embossing:

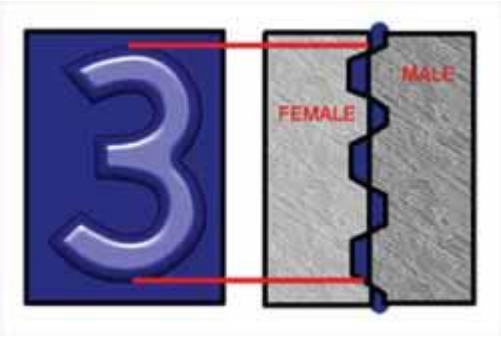


Raised round face characters or designs produced on sheet metal having a thickness of 1/8” the character or less.

The example to the right shows the final embossed mark, a raised three on the left-hand side.

The right-hand side shows the two dies required to make the mark: a female die for the top of the part, and a male die under the part.

Semi Coining:



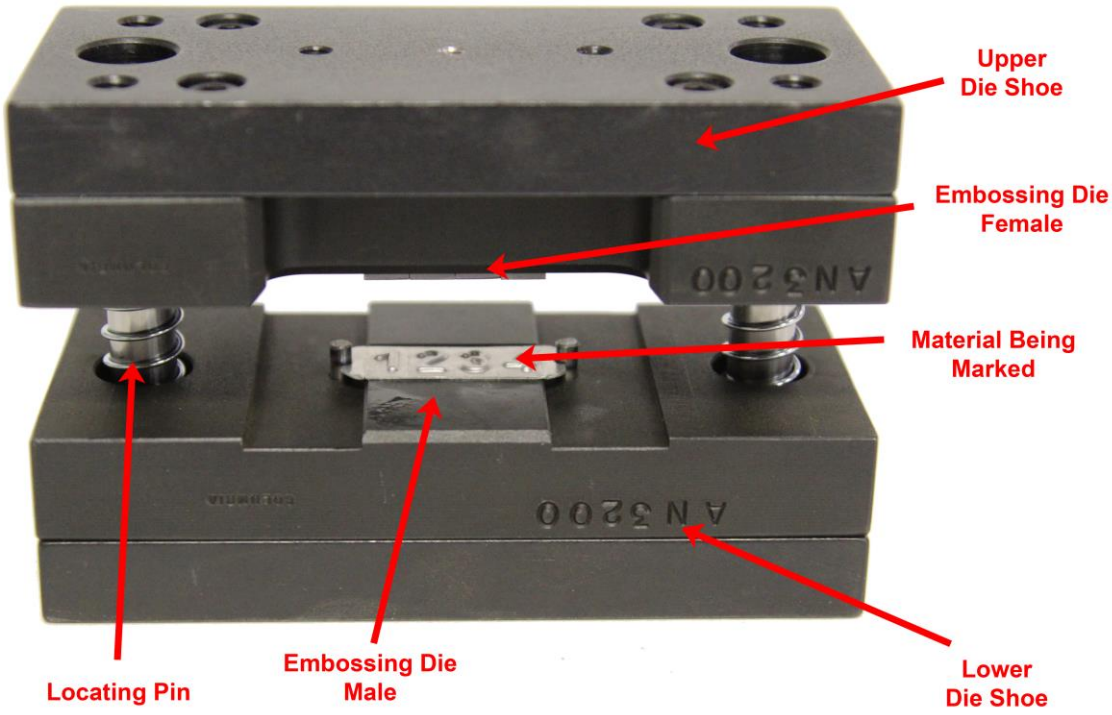
Produces raised characters or designs on the sheet metal having a thickness exceeding 1/8” the character height. Finished effect is comparable to coining.

The example to the left shows the final embossed mark, a raised three on the left-hand side.

The right-hand side shows the two dies required to make the mark: a female die for the top of the part, and a male die under the part.

Process

Sheet material is pressed in a die shoe between an embossing die pair. The sheet material may be made of any malleable substrate including (but not limited to): metal, paper, plastic and leather. The embossing die pair consists of one male and one female die. The die pair is perfectly positioned using a die shoe. The die shoe has an upper holder and lower holder attached by one or more locating pins. The pins assure that the male and female dies will intersect perfectly during the marking/pressing process. The locating pins must be designed to be larger than the marking piece.



A well-designed tooling setup for embossing will provide the clear formed characters that will last for the duration of the material.

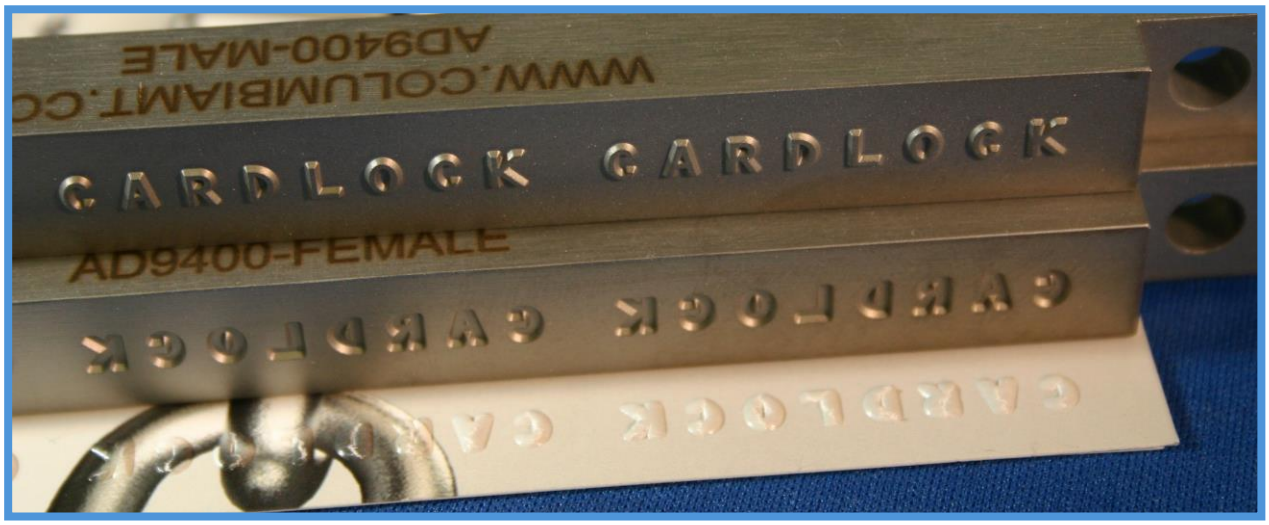
Tooling Design

Embossing tooling is always custom designed per application. Every application has different designs and variables. The most important aspect of an embossing application is the mark. The process of embossing limits the detail because the metal must flow/bend around the elements of the design. The thicker the metal the less detail in the design is possible.

Marking Layout

The marking layout is the logo or design for the embossing. The layout may also be a serial number or part number. Due to the cost of the embossing method the most common elements embossed include company logos, brand names, warnings, serial numbers. For the tooling design a line drawing of the logo must be provided or a description of the alpha/numeric reading.

For an alpha/numeric reading the character size and number of characters is required. The alpha/numeric sequence can be made of interchangeable type or an embossing numbering head. The individual type is more economical than the numbering head. Numbering heads are selected for serial numbering where cycle time speed is required.



Material

In any design of embossing tooling understanding the material is required. There are two important aspects of the material being marked needed to design a successful embossing set.

1) The thickness is needed to design sufficient room between the male and female dies to allow the material to move. At the same time not too much space to be

able to form a clear character. While some customers choose to have one embossing set for all thicknesses this is not recommended.

2) What the material is made of also effects the pressure required and the die design. The stronger the material the more force is required for the embossing process, as shown in the pressure chart.

Part dimensions

The part dimensions are important in the tooling design because the locating pins must connect the top and bottom embossing dies and leave room for the part. The locating pins must also leave room for part loading and unloading.

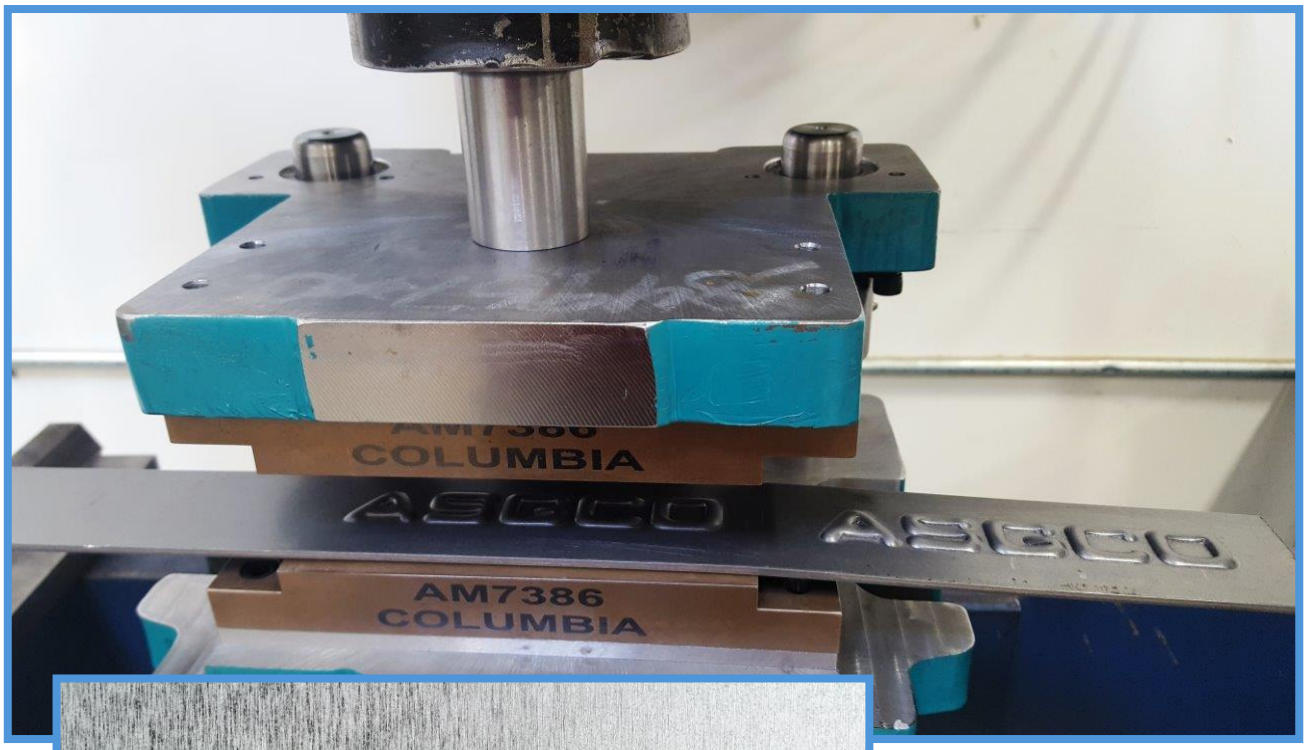


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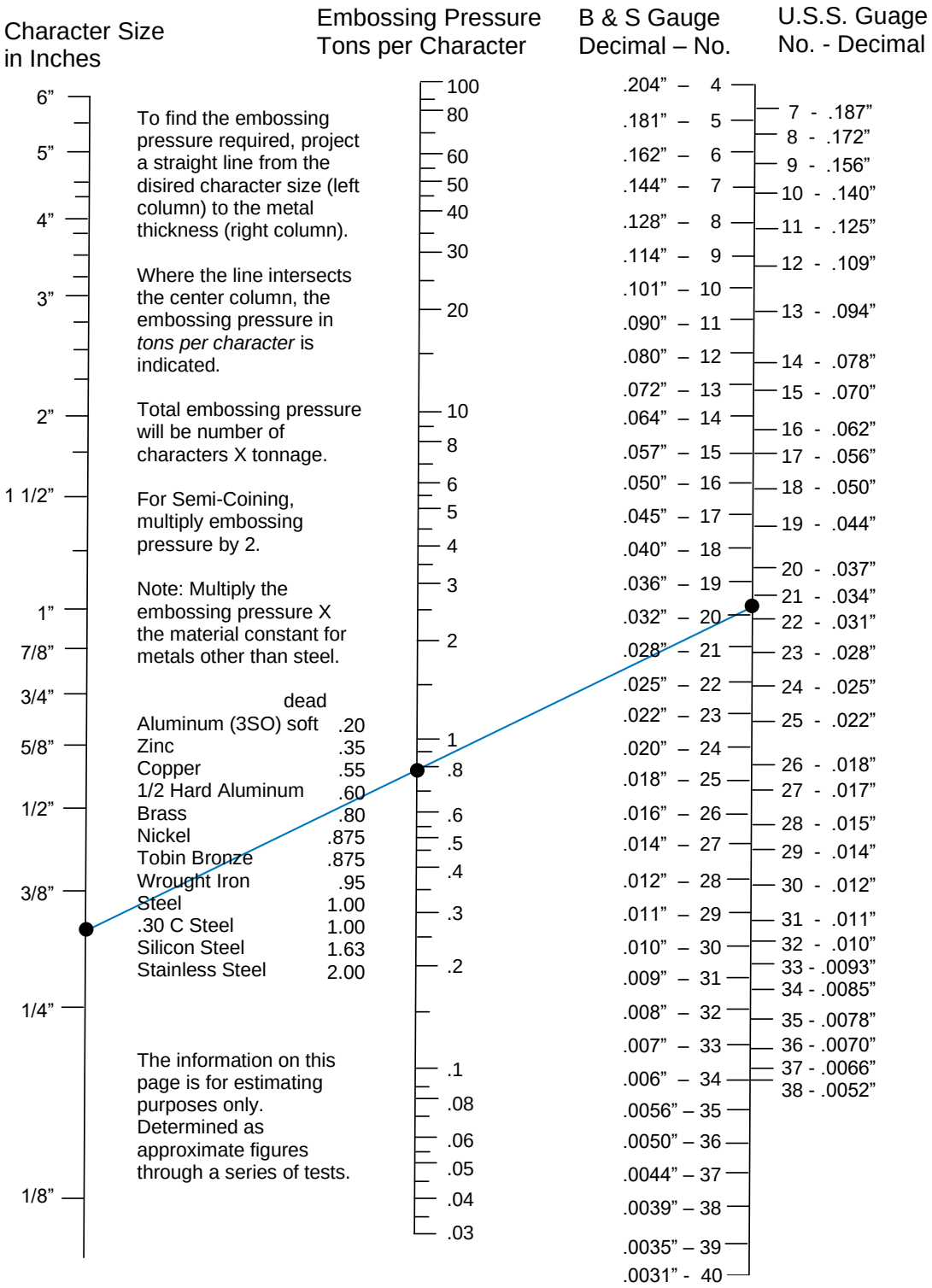
Chart

Embossing Pressure Chart
For Male and Female Dies



To find the embossing pressure required, project a straight line from the disired character size (left column) to the metal thickness (right column).

Where the line intersects the center column, the embossing pressure in *tons per character* is indicated.

Total embossing pressure will be number of characters X tonnage.

For Semi-Coining, multiply embossing pressure by 2.

Note: Multiply the embossing pressure X the material constant for metals other than steel.

	dead
Aluminum (3SO) soft	.20
Zinc	.35
Copper	.55
1/2 Hard Aluminum	.60
Brass	.80
Nickel	.875
Tobin Bronze	.875
Wrought Iron	.95
Steel	1.00
.30 C Steel	1.00
Silicon Steel	1.63
Stainless Steel	2.00

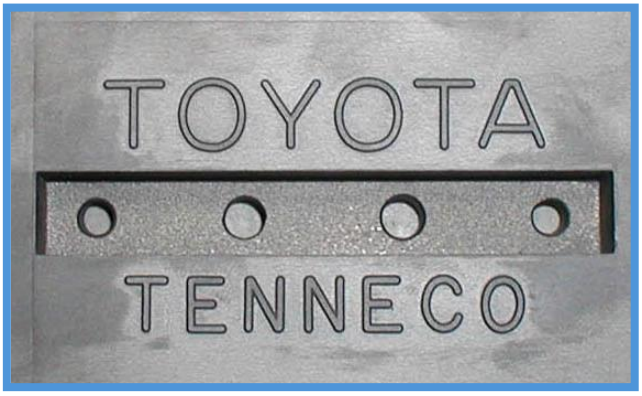
The information on this page is for estimating purposes only. Determined as approximate figures through a series of tests.

Items to Consider

- **Investment**
    - The cost of the tooling makes the decision to have well designed and double pass engraved dies a must. EDM and low-quality dies will not provide the return on investment to make the decision to emboss profitable
- **Design**
    - While detailed logos look well in printed literature, simple and bold is best for embossing. The decision to emboss a part is a strong statement and clear clean logo/symbol is best.
    - Characters are best in a Sans Serif font. See example below.

- **Pressure**
    - The embossing pressure chart will provide the force required to successfully mold the marking legend. The press should have 150% of the force required for the mark.

Combination: Logo and Individual part number. Inserts below – go into die at right.



Issues and Solutions

- Press does not have enough force.
    - Reduce material thickness.
    - Reduce character or logo size.
- Material being cut during embossing process – this is the most common issue.
    - Die designed for thinner material, re-work die.
    - Reduce material thickness.
- Weird double looking mark.
    - Die shoe not properly designed. Re-work die shoe.
    - Locating pins not positioned properly.
- Embossing die wearing too fast.
    - Use of EDM dies results in pre-mature wear. Purchase double pass engraved dies for the longest life.

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