

CIRCLE SIZE VS. WALL THICKNESS

SOLID SHAPES

These values are for average shapes. Extruders are always talking about a mythical "average shape". If we ever run across one you'll let you know. In the mean time these are good approximations.

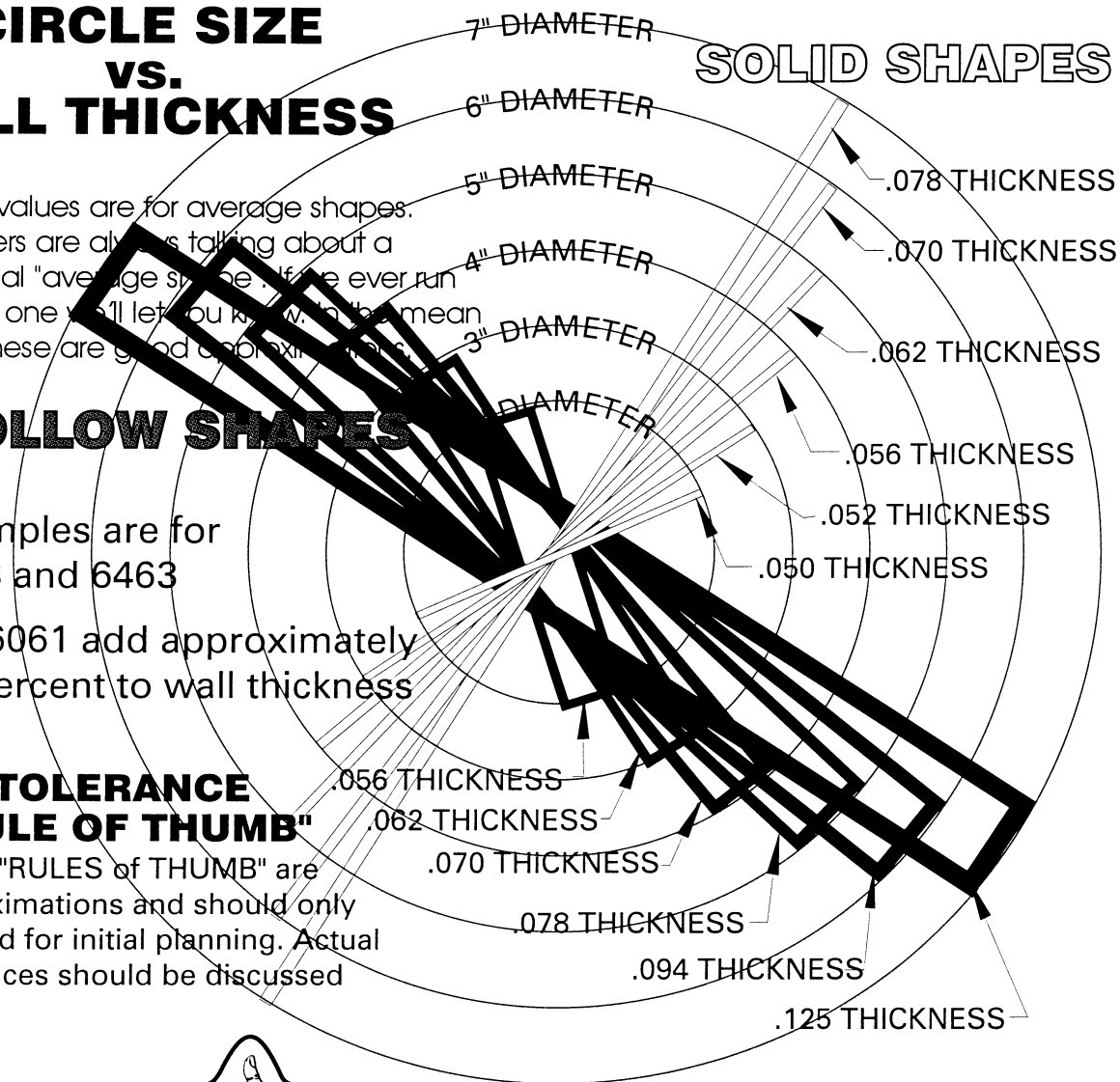
HOLLOW SHAPES

Examples are for 6063 and 6463

For 6061 add approximately 15 percent to wall thickness

TOLERANCE "RULE OF THUMB"

These "RULES of THUMB" are approximations and should only be used for initial planning. Actual tolerances should be discussed



TOLERANCE THUMB RULES



Dimension	+/- Tolerances +/-
Cross section or profile dimensions	.008 per inch of measured dimension
Cutting lengths	parts: .015 inches lengths: .062 inches
Straightness	.0125 inches X length in feet
Twist	0.5 degrees X length in feet
Flatness	0.004 X width in inches
Wall Thickness	ten percent

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Metal Casting Design

Die Casting

Description: Molten metal is injected under pressure into hardened steel dies, often water cooled. Dies are opened, and castings are ejected. Cycle times are usually about 2 minutes. Aluminum die cast parts may be injected at up to 20,000 psi and over 1100° F.

Diecasting, considered another precision casting process, is a form of permanent molding and is used for producing small to medium sized castings at high-production rates. The molds are made of metal and are coated with a mold surface coating and preheated before being filled with molten metal. A premeasured amount of liquid metal is forced under extreme pressures from a shot chamber into the permanent mold or die. Castings of varying weights and sizes can be produced. Nearly all die castings are produced in nonferrous alloys with limited amounts of cast iron and steel castings produced in special applications.

Die castings and the diecasting process are very suitable for a wide variety of applications where high part volumes are needed and among its benefits are the following.

- ?? The process produces excellent mechanical properties and surface finish.
- ?? Dimensional tolerances of + 0.005 to + 0.010 in are possible.
- ?? Machining allowances of 0.010 to 0.030 in are recommended.
- ?? Very thin section castings can and are regularly produced.

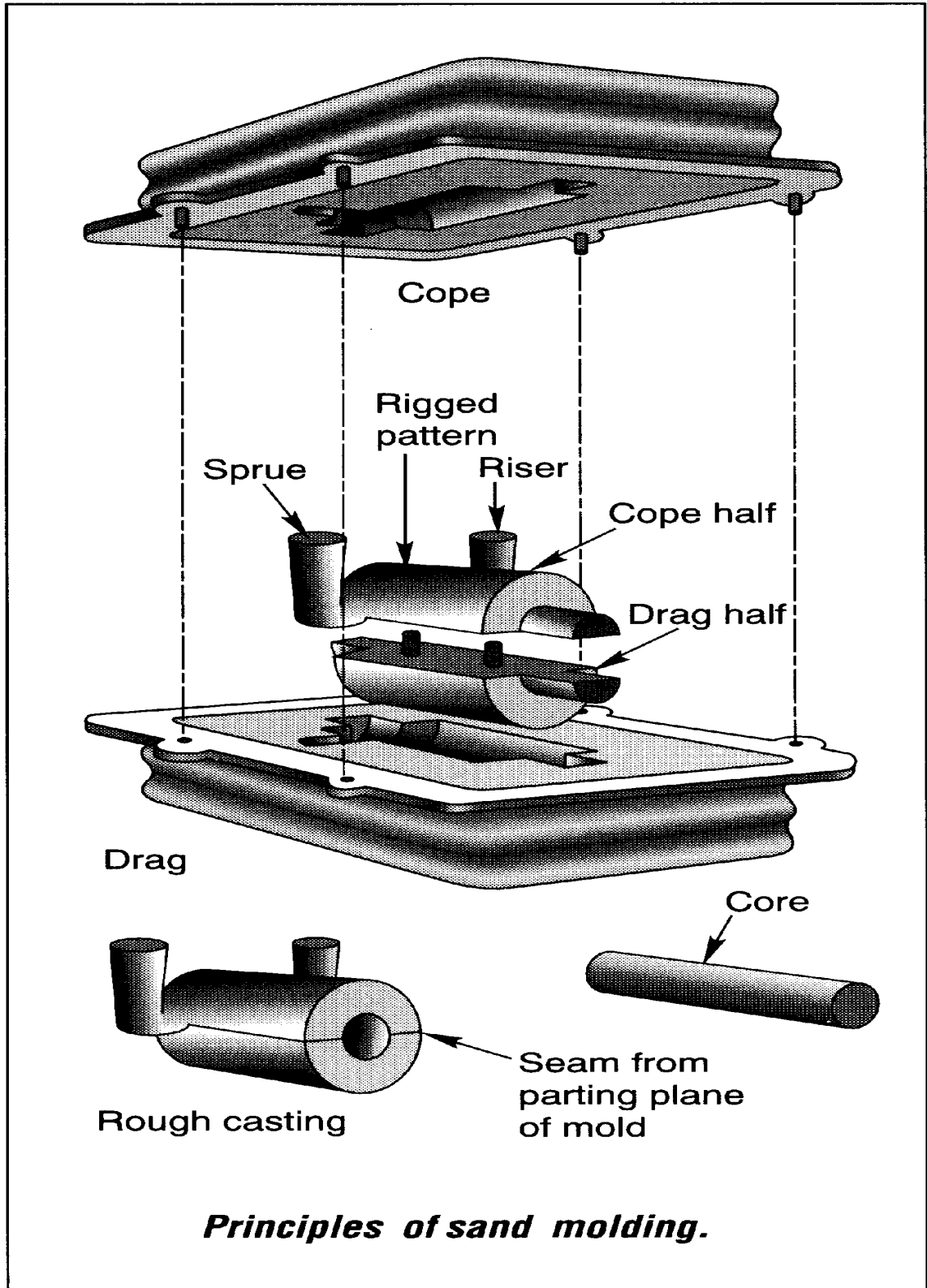
Work continues to reduce the extreme metal turbulence during die filling where air can be entrapped causing gas and reoxidation difficulties. As new developments are implemented to control this turbulence, applications for die castings will increase.

The diecasting process is used widely for high production of zinc, lead, tin, aluminum, copper, and magnesium cast components of intricate design. Molten alloy is poured manually or automatically into a shot well and injected into the die under pressure. An important factor in diecasting machine operations is the locking force (in tons), which keeps the die halves firmly closed against the injection pressure exerted by the plunger as it injects the molten metal.

There are two basic types of diecasting machines - hot chamber and cold chamber. The hot-chamber machines makes shots automatically and is used for low-melting point materials, such as zinc alloys. The cold-chamber method, for higher melting point materials, such as aluminum and magnesium, holds molten metal at a constant temperature in a holding furnace.

Metals: Aluminum, Zinc, Magnesium, and limited Brass.

Size Range: Not normally over 2 feet square. Some foundries are capable of larger sizes.



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Metal Casting Design

DESIGN REQUIREMENTS

The Design Engineer's project is ripe for failure if the part or product design requirements are not clearly defined by Marketing, Management, or the Client. Most design requirements are related to environment, but others such as annual quantity, may qualify one casting process method over another.

The design should be evaluated for its expected performance to the applicable design requirements that apply.

TYPICAL DESIGN REQUIREMENTS

- ?? Ambient Thermal + Solar Loading (Operating & Storage)
- ?? Shock
- ?? Vibration
- ?? Stress Loads (Static & Dynamic)
- ?? Corrosives (Including Solvents & Dissimilar Metals)
- ?? Fungus & Micro-organisms
- ?? Hydrocarbons
- ?? UV Exposure
- ?? Dirt & Dust
- ?? Moisture & Emersion
- ?? EMI, RFI, & Static
- ?? Storage Environment
- ?? Shipping Environment
- ?? UL, CSA, Etc. Requirements
- ?? MTBF Expectations
- ?? Annual Quantity
- ?? Finish

GUIDELINES FOR CASTING DESIGN

Good metal casting design coordinates the requirements of the component end use with those of processing.

Specifying a metal casting production process depends on the metal or alloy selected, casting size and complexity, surface finish, dimensional tolerances, production quantities, and cost constraints.

Before an engineered cast metal part can be properly designed and produced to satisfy its application function in a reliable manner, its geometric shape must accommodate the closely interrelated characteristics of the metal alloy specified and the metal casting process selected.