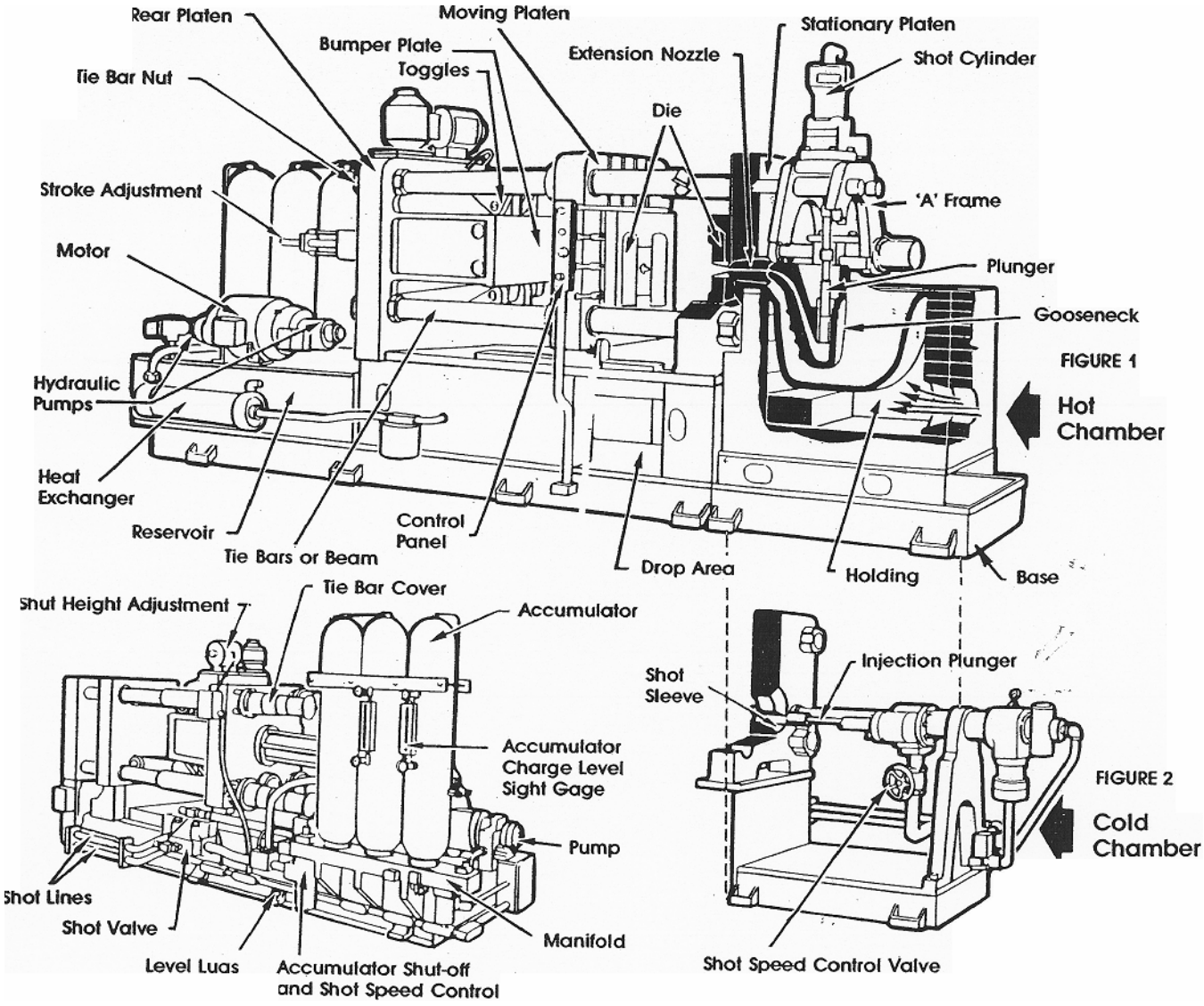
DIE CASTING PROCESS

DIE CASTING

This process if for high volume, high detail, and value added economically priced cast parts.



HOW IT WORKS

- A metal tool is built and attached to a furnace of molten metal
- Then molten metal is mechanically poured or injected into the metal mold
- The mold cools for a brief time
- The mold is opened
- The parts are ejected
- The process repeats over and over again

DIE CASTING

HOT CHAMBER PROCESS

The metal for casting is maintained at an appropriate temperature in a holding furnace adjacent to, if not part of, the machine. The injection mechanism is located within the holding furnace and a substantial part of it is therefore in constant contact with the molten metal. Pressure is transmitted to the metal by the injection piston, which forces it through the gooseneck and into the die. On the return stroke metal is drawn into the gooseneck for the next shot. In this process there is minimum contact between air and the metal to be injected, thus minimizing the tendency for turbulent entrainment of air in the metal during injection. Due to the prolonged contact between the metal and parts of the injection system hot chamber is restricted to zinc-base alloys. The Zinc alloys are the most widely used in the die casting process. They have very desirable physical, mechanical and casting properties. They also have the ability to be readily finished with commercial electroplated or organic coatings.

Some applications of Zinc Die Castings:

- Automotive Industry
  - Fuel Pumps
  - Carburetor Parts
  - Valve Covers
  - Handles

- Household Appliances

For more information or a competitive quote please contact:
TOM CLARK
McCann Sales, Inc. Ph: 207-439-3747
E-mail: tclark@maine.rr.com

DIE CASTING

COLD CHAMBER PROCESS

The essential feature of this process is the independent holding and injection units. In the cold chamber process metal is transferred by ladle, manually or automatically, to the shot sleeve. Actuation of the injection piston forces the metal into the die. This is a single-shot operation. This procedure minimizes the contact time between the hot metal and the injector components, thus extending their operating life. However, the turbulence associated with high-speed injection is likely to entrain air in the metal, which can cause gas porosity in the castings. The cold chamber process is used for the production of aluminum and copper base alloys and has been extended to the production of steel castings. Next to zinc aluminum is the most widely used die-casting alloy. The primary advantage is it light weight and its high resistance to corrosion. Magnesium alloy die-castings are also produced and are used where a high strength–to–weight ratio is desirable.

The mold has sections, which include the “cover” or hot side and the “movable” or ejector side. The die may also have additional moveable segments called slides or pulls, which are used to create features such as undercuts or holes which are parallel to the parting line. The machines run at required temperatures and pressures to produce a quality part to near net-shape.

Some application for Aluminum Die Castings:

- Automotive industry
- Home Appliances
- Communication Equipment
- Sports & Leisure

VACUUM ASSIST

The action of voiding the die casting die of gasses during or prior to the flow of molten metal to form the casting. By controlling the vacuum, the pressure differential between the die cavity and the molten metal can be varied. This results in very close control of the rate of fill of the die cavity, which also directly influences the soundness of the casting. Voids, shrinks and gas pockets can be eliminated from practically any casting.

For more information or a competitive quote please contact:
TOM CLARK
McCann Sales, Inc. Ph: 207-439-3747
E-mail: tclark@maine.rr.com

DIE CASTING

ADVANTAGES

The ability to produce castings with close dimensional control

The ability to produce castings with a good surface finish

The ability to produce castings with thin walls, and therefore of reduced weight

The ability to produce castings at a high rate of production

DISADVANTAGES

High tooling costs

Alloys restrictions on castable alloys

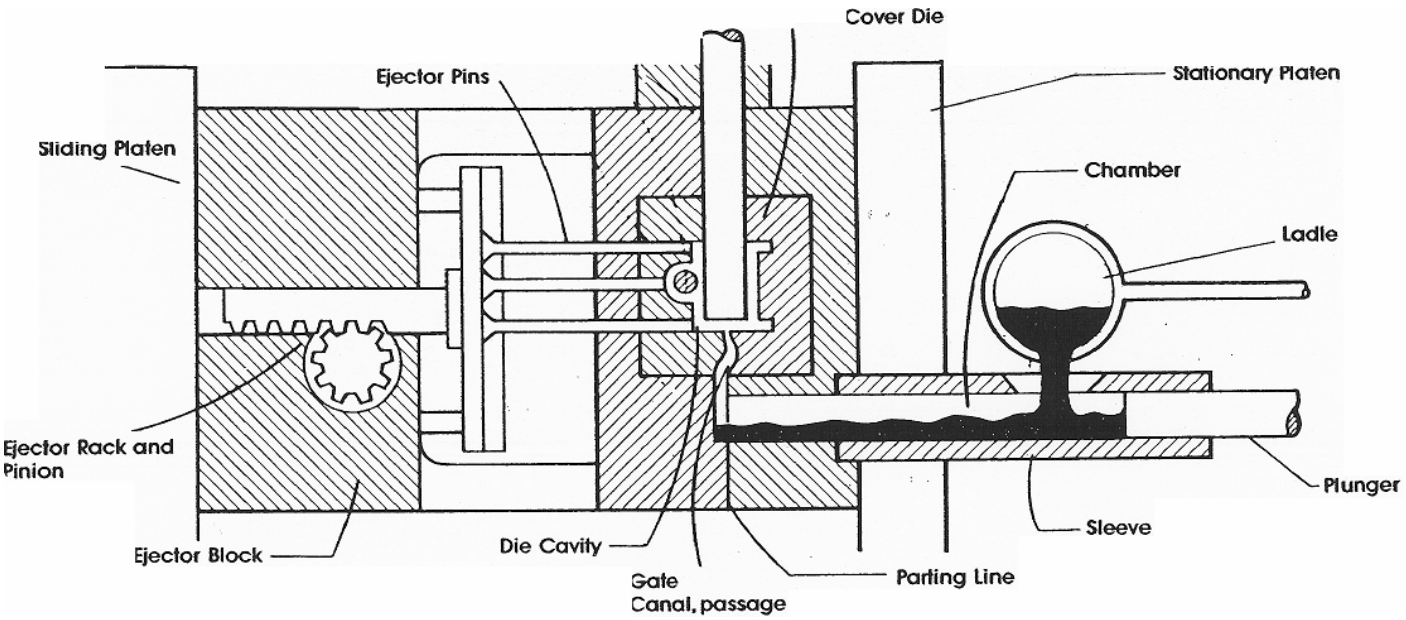
Size restrictions of castings that can be cast

Volume restrictions

For more information or a competitive quote please contact:
TOM CLARK
McCann Sales, Inc. Ph: 207-439-3747
E-mail: tclark@maine.rr.com

DIE CASTING

DIAGRAM OF THE DIE CASTING PROCESS



DEFINISIONS

COVER DIE - The stationary half of a die-casting die, which forms the exterior or appearance surfaces of the casting.

DIE CAVITY – The impression in a die into which pattern material is forced.

LADLE – Metal receptacle frequently lined with refractories used for transporting and pouring molten metal.

GATE - The passage connecting a runner or overflow with a die cavity.

GATE RUNNER - The runner in a die-casting die that is directly adjacent to the gate. The runner feeds the injected metal to the gate.

PLATEN - Portion of a casting machine against which die sections are fastened, or of trim presses against which trim dies are fastened.

PLUNGER - Ram or piston that forces molten metal into a die.

PARTING LINE - The joint between the cover and ejector portions of the die or mold. Also, the mark left on the casting at this die joint.

PARTING LINE, STEPPED - A condition on a die-casting where the parting line changes abruptly from one level to another.

SLEEVE - The molten metal chamber of a cold-chamber die-casting machine. This is a hardened steel tube through which the shot plunger moves to inject the molten metal into the die.

EJECTOR PINS - A pin actuated to force the casting out of the die cavity and off the cores.

EJECTOR PLATE - Plate to which the ejector pins are attached and which actuates them.

MECHANICAL PROPERTY LIMITS FOR COMMONLY USED DIE CASTING ALLOYS

Alloy	Temper	Ultimate (ksi)	Yield (ksi)	% Elongation	Hardness
		1000 PSI	.2% offset		Brinell
Zamac 3	F	41	32	10	82
Zamac 5	F	48	39	7	91
ZA-12	F	59	48	7	105
ZA-27	F	62	55	3.5	122
360	F	46	23	3.5	75
380	F	46	23	3.5	80
413	F	42	19	9	80
Magnesium	F	32 - 34	20 - 23	3	50 - 75

Note: The above properties are believed to be correct, but are not warranted in any way by McCann Sales, Inc. “F” as cast condition

GENERAL DESIGN DATA

SIZE RANGE: Ounces to 50 lbs.

METALS: Al, Magnesium, Zinc

TOLERANCES: +/- .002” for 1” then add +/- .002 inches/inch

PARTING LINE SHIFT: +/- .015”

AVERAGE TOOLING COST: $ 5,000 to $ 100,000

TYPICAL ORDER QUANTITY: 2,500 +

AVERAGE TOOLING LEADTIME: 12 weeks

SURFACE FINISH: 32 to 63 RMS

MINIMUM SECTION THICKNESS: .060 “ premium / .080 “ average

MINIMUM DRAFT REQUIRED: 1 to 3 degrees

Note: The above information is meant to be a basic guideline for comparison purposes only.

For more information or a competitive quote please contact:
TOM CLARK
McCann Sales, Inc. Ph: 207-439-3747
E-mail: tclark@maine.rr.com