

Considerations to Take When Buying a Die Casting Machine

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Introduction to Die Casting

Die Casting Explained

In the die casting process, a mold (called the die) is required. The die is constructed from very high-quality steel specially made for dies. The dies are reusable and are made of two halves. During the process of die casting, molten metal is injected into the closed die under very high pressure through a relatively small hole in one half of the die. When the molten metal has solidified sufficiently, the two parts of the die are opened to expose the actual casting inside. The casting is then removed from the die, cooled further and then finally trimmed. The trimming separates the gates and runners from the casting. The gates and runners are incorporated into the die design as a way to distribute molten metal to the various parts of the die. The trimmed gates and runners are then usually re-melted with new metal also being added. After trimming, further operations can be performed such as drilling and tapping, powder coating and assembly of finished components, etc.

How to Select and Buy a Die Casting Machine

There are many things to take under consideration when buying a die casting machine. This section has been designed to simplify the process of sifting through all the options and selecting the right machine for your needs.

NEW OR SECONDHAND?

This is the age-old question that most people have. However, most people do not realize that when it comes to die casting machines (as with many other products), manufacturers of these machines produce several “export versions” depending on which “region” of the world they will be sold to. For example, die casting machines produced for the North American market will vary greatly in the quality of materials and technical capabilities when compared to machines produced for “developing” countries.

The reality of the matter is that the North American market is much more “mature” and generally speaking has much greater requirements and expectations than other developing markets do. In addition, the level of sophistication, the product technology and budgets for equipment acquisition is greater as well. As such, many die casting

machine manufacturers who have been relatively successful in producing machines for developing countries have had almost NO success in developed countries like North America, Europe and other developed markets.

In the world market, these machines have become known as “disposable” machines (possibly the term came from disposable shavers). Whereas a machine made in North America or Europe can be rebuilt many times over and over due to superior quality steel, such disposable machines have a very short lifespan of only a few years. After that, it is very hard, if not impossible, to rebuild them properly since the quality of the metal is very poor.

High Pressure Die Casting Machine Types

There are 3 basic types of high pressure die casting machines.

1) Cold Chamber

Used primarily for aluminum castings (occasionally specialized machines for brass and magnesium)



2) Hot Chamber

Used primarily for zinc and lead (occasionally specialized machines for brass and magnesium castings)



3) Multi-Slide

Used for zinc (occasionally specialized machines for magnesium castings)



Which Size is Right for You?

Die casting machines are classified based on locking tonnage. For example, an 800-ton machine has a locking tonnage of 800 tons. Machine specifications vary from brand to brand and even sometimes from year to year. The following chart shows some basic average specifications gathered from several brands over a period of time. Of course, some manufacturers have produced sizes of machines which fall in between the sizes shown below (for example 500 ton) however, the chart is just for basic reference.

Each machine size has a flexible shot range (low and high). The shot range can be switched by changing the diameter of the shot sleeve and plunger hence the shot weight below shows a range that is usually possible with each size of machine. A small number of machines larger than 2500 ton have been manufactured, however these are very rare and extremely expensive.

Since a die casting machine is selected based on a combination of die size and shot weight, the following tables show some basic guidelines in selecting the correct size of machine for your needs. The “distance between tie bars” is the maximum size of die that will fit into the machine. The die can be single cavity or multiple cavity.

Which is the Right Size for Your Specific Project?

Most die casting projects fall into one of these two categories. This is a simplified explanation, but it covers most projects you will encounter. This table explains how to find the right machine for a specific project.

Project Categories	
PROJECT TYPE	HOW TO FIND THE RIGHT SIZE OF MACHINE
New Die	If it is a new project and no die has been made yet, then a local die maker will be the best person to tell you the shot weight and size of the final die. Once you have that information, he will be able to suggest to you the size of machine needed OR you can use the charts on the previous page.
Existing Die	If the die has already been made and has been run by someone else, the owner of the die can tell you the size of machine that was used. If not, then perhaps you can look at the drawing of the die and then consult with a local die maker OR you can use the charts on the previous page.

What is the Estimated Production Output?

This question is a somewhat more complicated question to answer. But there are guidelines which help greatly. Most die casting machine manufacturers (not all) provide “dry cycle” times for their machines. A dry cycle is the amount of time needed for the machine to perform the whole casting process from bringing to end WITHOUT molten metal being added and WITHOUT cooling time of the casting. Generally speaking, the larger the machine the slower the dry cycle time. The reason for this is that larger castings are made on larger machines. The smaller the casting, the less time it needs to solidify and so the “cooling time” (also known as set time in some parts of the world) become less of a factor. With very small castings it is not a factor at all. It all depends on the casting size and weight.

It is not possible for die casting machine manufacturers to give figures for “actual cycle” time without sufficient information about each proposed casting and the amount of cavities in the die.

However, these figures are obtainable from either a die maker or by using “die casting simulation software” and vary greatly from project to project. Such figures are important because they will tell you how much time it would take for the casting(s) to solidify in the cavity(s) after injection and before the machine can open the die and the casting(s) can be removed. So, as you can see, at best, die casting machine manufactures can only provide dry cycle times.

To calculate the “actual cycle” time you will need to add “cooling time” to the dry cycle time provided by the

machine manufacturer. Here is a simple way to calculate “Estimated Production Output” using only dry cycle times, (but be sure to add “cooling time” to get a “Final Production Output” figure).

Examples:

The following examples are based on a die casting machine which has a 4 second dry cycle. Keep in mind this is only “theoretical” and does NOT include “cooling time”.

ESTIMATED PRODUCTION OUTPUT CALCULATION (Dry Cycle) - SINGLE CAVITY DIE

60 sec. (1 min) divided by 4 sec. = 15 castings per minute
 15 x 60 minutes = 900 castings per hour
 900 x 8 hours = 7,200 castings per 8 hour work day

ESTIMATED PRODUCTION OUTPUT CALCULATION (Dry Cycle) - 4 CAVITY DIE

60 sec. (1 min) divided by 4 sec. = 60 castings per minute
 60 x 60 minutes = 3,600 castings per hour
 3,600 x 8 hours = 28,800 castings per 8 hour work day

Which is the Right Brand?

There are many manufacturers of die casting machines in the world. However, our many years of experience have shown, over and over again, that the best quality machines are recognized brand names manufacturers and originate from North America, Europe and Japan. As well, do not be too focused on the age of the machine. Due to their construction, and unlike most machines, die casting machines last a very long time. In addition, the technology has not changed too much over the years.

Unless you plan to make very high-end castings, most well-made used machines should be sufficient for most applications. There are some good deals to be had slightly older machines.

What is a Realistic Budget?

While of course, everyone would like to spend the least amount of money on capital equipment such as a die casting machine, generally speaking, you can use the follow basic guidelines when it comes to comparing prices of new and used machines. The reason for the price range of secondhand machines is the age and the condition.

Price Comparison (Secondhand to New)		
SECONDHAND MACHINE TYPE	NEW MACHINE TYPE	PRICE OF SECONDHAND COMPARED TO NEW
Secondhand Machine Brand Name - Good Quality	New Machine Brand Name - Good Quality	10% to 30% of new price
Secondhand Machine Brand Name - Good Quality	New Machine Offshore - Low Quality - Disposable	40% to 60% of new price
This comparison takes under consideration the cost of machine plus cost of automation equipment and shipping.		

Where Should You Buy a Used Machine?

When considering the purchase of a used machine, ultimately you have two basic choices.

Buying Privately

The first choice is to buy privately from a die casting company. However, when you think about it, this choice is very often limited, actually more so then you would expect. First of all, by calling from die caster to die caster it is hard to locate the right machine for your needs.

Secondly, there are used machinery dealers like my company, in which it is their “business” to call and keep in contact with all die casters on a regular bases and find out if they have machines for sale.

For example, our company is in touch with just about every die caster on the planet. When we do find a good machine, we snatch up before it even sees daylight. Therefore, your chances of finding a “good machine” just “phoning around” becomes very remote.

Buying From a Dealer

The second choice you have, is to buy from a die casting machine dealer. There are two types of dealers in the world – stocking and non-stocking. No-stocking dealers accumulate lists of machines available for sale. They offer these for sale to everyone and they usually make about 10% as a selling commission from the owner of the machine. There are 3 problems with this type of business model:

1. Non-stocking dealers sell machines that they have not purchased with their own money. As such, they take no responsibility for these machines. They basically “sell and run”.
2. Non-stocking dealers have no stock on hand and so they can “disappear” very quickly. They have no big, heavy machines to move which takes time, effort and money.
3. Non-stocking dealers offer machines that a stocking dealer like my company already passed up or refused to purchase. When we pass on a machine there must be a very good reason. Non-stocking dealers usually offer the “leftovers” after stocking dealers pick over the good ones.

