

An engine block with aluminium and magnesium die castings

Die casting is a metal casting process that is characterized by forcing molten metal under high pressure into a mold cavity. The mold cavity is created using two hardened tool steel dies which have been machined into shape and work similarly to an injection mold during the process. Most die castings are made from non-ferrous metals, specifically zinc, copper, aluminium, magnesium, lead, pewter and tin-based alloys. Depending on the type of metal being cast, a hot- or cold-chamber machine is used.

The casting equipment and the metal dies represent large capital costs and this tends to limit the process to high-volume production. Manufacture of parts using die casting is relatively simple, involving only four main steps, which keeps the incremental cost per item low. It is especially suited for a large quantity of small- to medium-sized castings, which is why die casting produces more castings than any other casting process.[1] Die castings are characterized by a very good surface finish (by casting standards) and dimensional consistency.

Two variants are pore-free die casting, which is used to eliminate gas porosity defects; and direct injection die casting, which is used with zinc castings to reduce scrap and increase yield.

Die casting equipment was invented in 1838 for the purpose of producing movable type for the printing industry. The first die casting-related patent was granted in 1849 for a small hand-operated machine for the purpose of mechanized printing type production. In 1885 Otto Mergenthaler invented the linotype machine, an automated type-casting device which became the prominent type of equipment in the publishing industry. The Soss die-casting machine, manufactured in Brooklyn, NY, was the first machine to be sold in the open market in North America. Other applications grew rapidly, with die casting facilitating the growth of consumer goods and appliances by making affordable the

production of intricate parts in high volumes. In 1966, General Motors released the Acurad process