



Glossary of Terms Used in Plastic Injection Mold Manufacturing

Acceptable Runner/Cavity Ratio: Runner systems designed for high pressure drops to minimize material usage and increase frictional heating in the runner.

Annealing: The process of relieving internal stresses of molded plastic articles by heating to a predetermined temperature, maintaining this temperature for a predetermined length of time, and slowly cooling.

Antistatic Agent: Additive used to improve the electrical conductivity of the plastic part so that any charge can readily go to ground and not remain in the part.

Aspect Ratio: Ratio of total flow length to average wall thickness.

Assembly: The process of joining parts by any of several methods.

Back Pressure: The resistance of the molten plastic material to forward flow. In molding, back pressure increases the temperature of the melt, and contributes to better mixing of colors and homogeneity of the material. As back pressure increases, so does cycle time.

Backing Plate: A plate used as a support for the mold cavity block, guide pins, bushings, etc.

Balanced Runner: A runner system designed to place all cavities at the same distance from the sprue.

Blister: An imperfection on the surface of a plastic article caused by a pocket of air or gas beneath the surface.

Boss: A raised feature of a molded part designed to add strength, facilitate alignment during assembly or for attachment to another part.

Cavity: A depression, or a set of matching depressions, in a plastics-forming mold which forms the outer surfaces of the molded articles.

Charge: The amount of material used to load a mold at one time or during one cycle. The measurement or weight of material necessary to fill a mold during one cycle.

Clamp: The part of an injection molding machine incorporating the platens that provides the force necessary to hold the mold closed during injection of the molten resin and open the mold to eject the molded part.

Clamping Pressure: The pressure applied to the mold to keep it closed during the molding cycle.

Clarifiers: Additive used in resins to improve transparency or translucency.

Co-Injection: Simultaneous or near simultaneous injection of multiple materials.

Cold Flow Lines: Imperfections within the part wall due to thickening or solidification of resin prior to full cavity fill.



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Compression Molding: A method of molding in which the molding material, generally preheated, is placed in an open heated mold cavity, the mold is closed with a top force, pressure is applied to force the material into contact with all mold areas.

Core: A protrusion, or set of matching protrusions, in a plastics forming mold which forms the inner surfaces of the molded articles.

Cycle: Complete, repeating sequence of operations for injection molding a part.

Cycle Time: The time required by an injection molding system to mold a part and return to its original position.

Degassing: The momentary opening and closing of a mold during the early stages of the cycle to permit the escape of air or gas from the heated compound.

Delamination: When the surface of a finished part separates. Strata or fish-scale-type appearance may be visible where the layers may be separated.

Density: Mass per unit volume of a substance.

Design Review: A review of a blueprint, of an application, to be molded in a plastic material, with recommendations given for design, material, processing and tooling.

Dimensional Stability: Retention of the precise shape of the part.

Direct Gate: A sprue that feeds directly into the mold cavity.

Draft: A slight taper in a mold wall designed to facilitate removal of the molded object from the mold.

Drying: The removal of moisture from the resin pellets by exposure to certain time and temperature.

Edge Gate: Entrance to the part from the runner located on the parting line.

Ejection Pin: A rod, pin or sleeve that pushes a molded part off of a core or out of a cavity of a mold.

Ejection Pin Marks: A residual mark on the part caused by the profile of the ejection pin.

Ejector Return Pins: Projections that push the ejector assembly back as the mold closes. Also called surface pins or return pins.

Ejector Rod: A bar that actuates the ejector assembly when the mold opens.

Elastic Memory: A characteristic of certain plastics evidenced by their tendency to revert to a previously existing shape or dimension.



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Elasticity: The ability of a material to quickly recover its original dimensions after removal of a load that has caused deformation.

Extrusion: The process of forming continuous shapes by forcing a molten plastic material through a die.

Fabricating: The manufacture of plastic products by appropriate operations. This includes plastics formed into molded parts, rods, tubes, sheeting, extrusion and other forms by methods including punching, cutting, drilling, tapping, fastening or by using other mechanical devices.

Family Mold: A mold that produces non-identical parts simultaneously from multiple cavities.

Fan Gate: A gate used to help reduce stress concentrations in the gate area by spreading the opening over a wider area. Less warping of parts can usually be expected by the use of this type of gate.

Fill: The packing of the cavity or cavities of the mold as required for parts that are free of flash and porosity.

Filler: A relatively inert substance added to a plastic compound to reduce its cost and/or to improve physical properties, particularly hardness, stiffness and impact strength.

Fill Pressure: The pressure required to fill the cavity.

Fill Time: (also known as Injection) Time required to fill the cavity or mold.

Finish: The surface texture and appearance of a finished article.

Flash Gate: Wide gate extending from a runner which runs parallel to an edge of a molded part along the parting line of a mold.

Flash: Any excess material that is formed with and attached to the component along a seam or mold parting line.

Flow Pattern: The contour the melt takes sequentially as it fills the cavity.

Flow Rate: The volume of material passing a fixed point per unit time.

Gate: The channel through which the molten resin flows from the runner into the cavity.

Hardness: The resistance of a material to compression, indentation and scratching.

Heat Stabilizers: These additives increase the ability of the material to withstand the negative effects of heat exposure. They are used to increase the overall service temperature of the material.

Hot-Runner Mold: A mold in which the runners are insulated from the chilled cavities and are kept hot. Hot-runner molds make parts that have no scrap.



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Injection Molding: The method of forming objects from granular or powdered plastics, most often of the thermoplastic type, in which the materials is fed from a hopper to a heated chamber in which it is softened, after which a ram or screw forces the material into a mold. Pressure is maintained until the mass has hardened sufficiently for removal from the mold.

Insert: A removable part of the mold imparting increased resistance to wear, heat transferability, or changeable part shape to that area of the mold.

Insulated Runner: A mold in which the runners are insulated from the chilled cavities and are kept hot.

Jig: A tool for holding parts of an assembly during the manufacturing process.

Knockout Pin: A pin that ejects a molded article from the mold.

Linear Mold Shrinkage: The difference between the size of the part and the size of the mold cavity. Values given are often the average of a range.

Machine Shot Capacity: Refers to the maximum volume of thermoplastic resin which can be displaced or injected by the injection ram in a single stroke.

Memory: The tendency of a plastic article to revert in dimension to a size previously existing at some stage in its manufacture.

Mold: 1(n): A hollow form or matrix into which a plastic material is placed and which imparts to the material its final shape as a finished article. 2 (v): To impart shape to a plastic mass by means of a confining cavity or matrix.

Mold Frame: A series of steel plates which contain mold components, including cavities, cores, runner system, cooling system, ejection system, etc.

Mold Release: In injection molding, a lubricant used to coat the surface of the mold to enhance ejection of the molded article or prevent it from sticking to the tool.

Moldability: The characteristics of being easy to mold without developing flaws.

Molding Cycle: The period of time occupied by the complete sequence of operations on a molding press requisite for the production of one set of molded articles.

Multi-Cavity Mold: A mold having two or more impressions for forming finished items in one machine cycle.

Multi-Shot Molding: The injection of two-or-three materials, in sequence, into a single mold during a single molding cycle.



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Non-Return Valve: Screw tip that allows for material to flow in one direction and closes to prevent back flow and inject material into the mold (check valve).

Nozzle: Hollow metal hose screwed into the extrusion end of the heating cylinder of an injection machine designed to form a seal under pressure between the cylinder and the mold.

Opaque: Not able to transmit light.

Orange Peel: A surface finish on a molded part usually caused by moisture in the mold cavity or poor heat transfer properties.

Over Molding: A process in which a mold cavity is first partially filled with one plastic, then a second shot is injected to encapsulate the first shot.

Packing: The filling of the mold cavity or cavities as full as possible without causing undue stress on the molds or causing flash to appear on the finished parts.

Parting Line: Mark on the part indicating where the two halves of the mold met in closing.

Pigment: (Colorant) A plastic compound which contains a high percentage of pigment, to be blended in appropriate amounts with the base resin so that the correct final color is achieved.

Pinpoint Gate: A restricted gate of 0.030 in or less in diameter, this gate is common on hot-runner molds.

Plastic: A material that contains as an essential ingredient one or more organic polymeric substances of large molecular weight, is solid in its finished state, and, at some stage in its manufacture or processing into finished articles, can be shaped by flow.

Plasticity: The ability of a material to withstand continuous and permanent deformation by stresses exceeding the yield value of the material without rupture.

Platens: The mounting plates of a press on which the mold halves are attached.

Prototype Tool: A preliminary mold built on which the final mold will be based.

Pulled Gate: Area where the part was connected to the sprue or runner that has been drawn out or stretched from the surface.

Purging: In extrusion or injection molding, the cleaning of one color or type of material from the machine by forcing it out with the new color or material to be used in subsequent production, or with another compatible purging material.

Raised Ejector Site: Where the ejector site is either heightened or raised above the surface of the component.



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Recovery Time: The length of time for the screw to rotate, create a shot, and return to original position.

Regrind: Waste material such as sprues, runners, excess material and reject parts, which has been reclaimed by shredding or granulating. Regrind is usually mixed with virgin compound at a predetermined percentage for remolding.

Reinforced Plastic: A plastic composition in which fibrous reinforcements are imbedded, with strength properties greatly superior to those of the base resin.

Release Agent: A material sprayed on the mold which facilitates removing the part.

Resin (Synthetic): The term is used to designate any polymer that is a basic material for plastics.

Restricted Gate: A very small orifice between runner and cavity in an injection mold. When the part is ejected, this gate readily breaks free of the runner system. Generally, the part drops through one chute and the runner system through another leading to a granulator and scrap reclaim system.

Retainer Plate: The plate on which demountable pieces, such as mold cavities, ejector pins, guide pins and bushings are mounted during molding.

Retractable Cores: Used when molding parts in cavities not perpendicular to the direction in which the part is ejected from the mold. The cores are automatically pulled from the mold prior to the mold opening and reinserted when the mold closes again and prior to injection.

Rib: A reinforcing member of a molded part.

Ring Gate: Used on some cylindrical shapes. This gate encircles the core to permit the melt to first move around the core before filling the cavity.

Robot: Automated devices for removing parts upon ejection from an open mold rather than letting the parts drop. Also see parts picker. Robots also can perform secondary functions, such as inspection, degating, precise placement of parts on a conveyor, etc.

Rockwell: (Hardness) A measure of the surface hardness of a material. A value derived from the increase in depth of an impression as the load of a steel indenter is increased from a fixed minimum value to a higher value and then returned to the minimum value. The values are quoted with a letter prefix corresponding to a scale relating to a given combination of load and indenter.

ROMOLD, Inc.: American mold builders in Western NY, with cutting edge equipment, excellent technical skills, and unique abilities in design and manufacturing of plastic injection molds and die cast tools. ISO 9001:2008 quality management system, ITAR registered.



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Runner: In an injection mold, the feed channel which connects the sprue with the cavity gate. The term is also used for the plastic piece formed in this channel.

Runner Balancing: Developing a runner system which delivers the required amount of melt to each cavity with the correct pressure to finish filling all the cavities simultaneously at the correct temperature for the part.

Runner Design: Using the runner as a flow control device by positioning the gate and using the size of the runner to control the filling pattern within the cavity, in addition to getting the melt into the cavity.

Runner System: This term is sometimes used for the entire resin feeding system, including sprues, runners and gates, in injection molding.

Runnerless Molding: (also see Hot-Runner Mold or Insulated Runner) A mold in which the runners are insulated from the chilled cavities and are kept hot. Hot-runner molds make parts that have no scrap.

Scrap: Any output of a mold that is not usable as the primary product.

Short Shot: Failure to completely fill the mold or cavities of the mold. Edges may appear melted.

Shot Capacity: The maximum weight of plastic that can be displaced or injected by a single injection stroke. (Generally expressed as ounces of polystyrene)

Shot: One complete cycle of a molding machine.

Shrinkage: The dimensional allowance which must be made in molds to compensate for shrinkage of the plastic compound on cooling.

Slide: Projection in the mold used to form the geometry of the part, which is not in the direction of the closing of the mold and must be withdrawn before the part can be ejected.

Solvents: Substances with the ability to dissolve other substances.

Sprue: The feed opening provided in injection molding between the nozzle and cavity or runner system.

Sprue Bushing: A hardened-steel insert in the mold that accepts the nozzle and provides an opening for transferring the melt.

Sprue Gate: A passageway through which melt flows from the nozzle to the mold cavity.

Stress: The force producing or tending to produce deformation in a body measured by the force applied per unit area.

Stripper Plate: A plate that strips a molded piece from core pins or force plugs. The stripper plate is set into operation by the opening of the mold.



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Tab Gate: A small removable tab about the same thickness as the molded item, but usually perpendicular to the part for easy removal.

Thermal Shut-Off: Material freezes causing blockage.

Thermoplastic: Material that will repeatedly soften when heated and harden when cooled.

Tie-Bar Spacing: The space between the horizontal tie-bars on an injection molding machine. Basically, this measurement limits the size of molds that can be placed between the tie-bars and into the molding machine.

Toggle: A type of clamping mechanism that exerts pressure by applying force on a knee joint. A toggle is used to close and exert pressure on a mold in a press.

Tonnage: The measure by which injection molding machines are typically categorized, representing the clamping force of the injection molding machine.

Tool: In injection molding, the term sometimes used to describe the mold.

Undercut: A protuberance or indentation that impedes withdrawal from a two-piece rigid mold.

Unidirectional Flow Pattern: Plastic flowing in one direction with a straight flow front throughout filling.

Valve Gating: A type of gate where a pin is held in the gate or channel by spring tension. As the injection stroke moves forward, this gate compresses the plastic in the runner. When this pressure build-up is sufficient to overcome the spring tension, the pin is then pushed back and the fast decompression of the melt fills the cavity at extremely high speed.

Vent: A shallow channel or opening cut in the cavity to allow air or gases to escape as the melt fills the cavity.

Vertical Flash Ring: The clearance between the force plug and the vertical wall of the cavity in a positive or semi-positive mold. Also, the ring of excess melt which escapes from the cavity into this clearance space.

Viscosity: Resistance to flow of a liquid.

Void: An unfilled space within a solid material.

Warpage: Distortion caused by non-uniform internal stresses.

Weld Line: Where melted material flows together during molding to form a visible line or lines on a finished part that may cause weakening or breaking of the component.