3D PRINTING GLOSSARY

A RESOURCE FOR ADDITIVE MANUFACTURING, BROUGHT TO YOU BY PADT

Welcome to PADT's online 3D Printing Glossary. A place to find definitions for the terms used in the Additive Manufacturing industry.

It is by no means authoritative nor complete, but we hope you find it helpful. It is our take on the words used in the industry, based on our activity in that industry since the mid-1990s. We hope it will serve as a starting point for a larger and more comprehensive glossary as time passes.

Visit the online version at www.3dprinting-glossary.com.

3D File
A computer file with three-dimensional information stored inside that defines the shape of a physical part or parts. 3D files are used in additive manufacturing to define what geometry the printer will print. Many formats are available.

3D Manufacturing Format
An XML based file format used in additive manufacturing to define a part to be printed. As an alternative to STL format, it still uses facets to describe the part surface but also has support for color and texture specification, a way to efficiently describe lattice structures, and support for multiple materials. It is also extensible and other part characteristics can be included.

3D Printer
A common term for an Additive Manufacturing System. Originally defined as a lower cost, smaller, and less capable class of Additive Manufacturing systems, the term is now used more often outside of engineering and manufacturing.

3D Printing
The act of creating a part using Additive Manufacturing. Originally 3D Printing referred to the user of smaller, less expensive, and less capable additive manufacturing systems. It has now become a synonym for Additive Manufacturing and has become the more common term used by the general public and non-industry media.

3MF
Abbreviation for 3D Manufacturing Format.

4D Printing

The creation of parts that change shape over time. The shape change is often activated by a change in temperature or moisture. Such parts are sometimes called self-assembled parts.

Abrasive Blasting
A process where small particles are propelled through a nozzle with compressed air over the surface of a part to smooth a rough surface.

ABS
Abbreviation for Acrylonitrile Butadiene Styrene

Accuracy
A measure of how true or correct something is. In additive manufacturing, it is usually a measure of how closely the resulting dimensions on a part match the desired dimensions. It can also refer to the deviation of the tool path used to deposit, solidify, bond, etc... from the ideal path.

Acetone
An organic chemical with the formula (CH3)2CO. It is a solvent that is used in additive manufacturing in a process called vapor smoothing to remove stair steps on polymer parts.

ACIS File
A 3D file format used by the ACIS geometry kernel, one of the most popular commercial kernels used in CAD systems. Considered a neutral file format, it is a boundary representation of the geometry. It uses the .SAT (ASCII) and .SAB (Binary) file extensions.

Acrylonitrile Butadiene Styrene
Acrylonitrile Butadiene Styrene is an opaque thermoplastic polymer. Acrylonitrile Butadiene Styrene is easily machined, sanded, painted, or glued. It has a high strength, stiffness, and melting temperature. It also has good chemical resistance. Because it can be easily melted and formed, it is popular with injection molding and additive manufacturing. For additive manufacturing, it is most commonly formed into a filament, wrapped onto a spool, and used in FDM/FFF machines. Abbreviated as ABS.

Additive Manufacturing
Additive manufacturing is the industry-accepted term (ASTM F2792) for all manufacturing processes that make physical objects by adding material, as opposed to subtractive manufacturing where material is removed. It is a subset of free form fabrication. Abbreviated as AM.

Additive Manufacturing File Format
A file format used in most additive manufacturing processes. It is a faceted representation of the geometry that is easy to slice. The format was developed as a replacement of the STL file format. Like STL files, it uses a faceted representation of triangles to define the surface of a part. Unlike the STL format, it can specify a curved triangles and can include material and color information. Defined by ISO/ASTM 52915. It is abbreviated as AMF

Additive Manufacturing Machine
A machine used to produce physical parts using additive manufacturing.

Additive Manufacturing System

A machine used to produce physical parts using additive manufacturing.

Aerogel
A family of ultralight and porous materials made from a gel that is infused with gas before it hardens, resulting in a complex structure that is mostly porous. They can be made from a variety of chemical compounds.

Alumide
A polymer material consisting of nylon with aluminum dust filler. It is used in selective laser sintering additive manufacturing systems. The resulting parts have high stiffness, better thermal conductivity, and higher temperature performance when compared to other nylon-based materials.

AM
The abbreviation for additive manufacturing.

Anisotropic
Refers to material properties that are different in every direction. As opposed to isotropic, the same in all directions; or to orthotropic, different along orthogonal directions.

ASCII
American Standard Code for Information Interchange (ASCII) is a standard that assigns numbers to text characters. It is how text is stored in computer files. In additive manufacturing, it refers to a text file, as opposed to a file where data is stored in binary format.

Assembly
A collection of parts that are connected to one another in some way.

Ballistic Particle Manufacturing
A type of material jetting additive manufacturing where melted polymer or wax is jetted from an inkjet nozzle onto the build layer. Abbreviated as BPM.

Bead Blasting
A form of abrasive blasting where small spherical particles are propelled through a nozzle with compressed air to smooth a rough surface. Gentler than grit blasting because the particles are smooth and softer.

Beam Diameter
The diameter of the laser or electron beam used in additive manufacturing methods. The beam diameter is the smallest feature size in the X-Y plane. It also determines the amount of material melted or solidified as the beam moves over the build layer. The term may be apply to other additive manufacturing methods that utilize a beam of some kind.

Bed
In non-powder based additive manufacturing systems, the surface that the part is created on, another term for build plate. In powder-based systems, the flat volume of powder that the part is built within.

Binary

The representation of data as ones and zeros. In additive manufacturing, it usually refers to a file that cannot be read by humans. A binary file is not a text file.

Binder
Material used to chemically bond particles together. The binder may be sprayed, jetted, or activated with heat or light.

Binder Jetting
Any additive manufacturing process that uses a binder to chemically bond powder where the binder is placed on the top layer of powder through small jets, usually using inkjet technology. One of the ASTM defined standard categories for additive manufacturing processes.

Biomimicry
Utilizing the structures, processes, and growth found in nature to inform and influence the design of man-made objects and systems.

Biopolymer
Polymer materials that are created by living organisms or from raw materials that are created by living organisms. In additive manufacturing, PLA is a biopolymer made from fermented plant starches.

Bioprinter
An additive manufacturing system that produces parts which contain living tissue or tissue-like structures. Bioprinters can use a variety of additive manufacturing processes and sometimes include simple actuated syringes that deposit biomaterials with a range of viscosities on polymers.

Bioprinting
Using additive manufacturing to produce parts that contain living tissue or tissue-like structures.

Boundary Representation Geometry
Boundary representation geometry (B-Rep) is a method for representing shapes that defines the limits of the shapes. Solids are represented as a collection of connected 3D surfaces that sit on the boundary between solid and non-solid. B-Rep geometry also usually includes 3D curves that define the edges of surfaces and points that define vertices.

Bounding Box
The smallest rectangular prism that a given part can fit. It is usually aligned with the parts coordinate system or the additive manufacturing machines axis.

BPM
Abbreviation for Ballistic Particle Manufacturing.

Breakaway Support Material
A type of support material that is rigid and separates from the build material by applying a gentle force through a manual process.

Brim

The first layer of material in a build that is solid and extends outside of the part, but not under the part. It is used in lower-cost systems where the part is attached to a build plate to improve adherence of the part to the build plate. An alternative to using a raft or a skirt.

Brown Part
In sintering, a part that is made of chemically bound and compressed powdered material is called a green part. A brown part is created when a green part has been heated and/or chemically treated to remove the binder that previously held the powder together. The brown part is then further heated to fully sinter the part.

Build Area
The area on a build plate, the top level of a vat, or the top layer of powder where parts can be safely built.

Build Chamber
The enclosed volume within an additive manufacturing system where the part is constructed.

Build Coordinate System
The coordinate system the defines the orientation and build volume in an additive manufacturing system. May be aligned with or defined relative to the machine coordinate system.

Build Cycle
A single run of the build process in an additive manufacturing system from start to part removal.

Build Direction
The direction on a part perpendicular to the layers.

Build Envelope
The maximum physical size of a part that can be built in a given additive manufacturing system. Usually specified as the maximum length, width, and height. Also called build volume.

Build Height
The maximum dimension of the part perpendicular to the build plane. The build height determines the number of layers.

Build Layer
The layer of material that is being constructed by an additive manufacturing system at any given time. The build layer is the layer of material is being cut, deposited, bound, etc.

Build Material
The material that the part is built from. Other materials used may be considered binder or support material.

Build Origin
The reference point in the build volume where the build coordinate system is centered. It is defined by the additive manufacturing systems software and can be moved in most systems.

Build Parameters
The set of process parameters used for a particular build in an additive manufacturing system

Build Plate
A horizontal plate that is used in many additive processes where the first layer is attached. May also be called the build platform.

Build Platform
A horizontal plate that is used in many additive processes where the first layer is attached. May also be called the build plate.

Build Space
The area within an additive manufacturing system where parts are constructed. A volume within the build chamber for enclosed systems or on the build platform for non-enclosed systems.

Build Surface
The surface upon which the current build layer is created on. It is usually the previous build layer or, for the first layer, the build plate or an existing part for direct energy deposition.

Build Time
The amount of time used to create a part from the start of the first layer to the completion of the last layer. Usually preceded by warm-up time and cool-down time.

Build Volume
The volume of a part being built including any additional geometry added to the desired final part. Does not include the support volume if supports are made from a different material.

CAD
The abbreviation for computer aided design.

CAD File
The computer file that stores the digital definition of a single object or multiple objects.

Cartridge
A sealed container used to hold material used in additive manufacturing. A cartridge can hold a spool of filament, liquid, or powder. Cartridges are used to easily add material to a system instead of loading a spool, pouring liquid, or adding loose powder.

Chord Height
When using faceted geometry, the maximum distance from the planar surface of the facet to the actual curved surface defined in the CAD geometry is the chord height. It is a measure of the precision of the faceted representation.

CNC
The abbreviation for computerized numerical control.

Compressed File
A computer file that has been reduced in size through an algorithm that can be reversed to recreate the original file.

Computer Aided Design
Computer aided design (CAD) refers to the digital definition of single objects or multiple objects. CAD software is used to define geometry, topology, and non-geometric attributes for objects.

Computerized Numerical Control
Computerized numerical control refers to the control of a manufacturing machine by a computer. A program or a script tells the machine what to do over time. The opposite of computerized numerical control is manual machining. Abbreviated as CNC.

Cool Down
The length of time that it takes for an additive manufacturing machine to reach its recommended safe temperature to access the build area and remove parts. This could be the temperature of the build plate, the air in the chamber, the powder bed, or various components.

Cross-Link
A chemical bond of one polymer chain to another.

Cure Temperature
The temperature at which a temperature cured polymer resin cross-links to form a hard material.

Curing
A chemical process where the molecules in a liquid resin cross-link to create a hard polymer. Many additive manufacturing processes use the curing process to convert a liquid to a solid on a given layer. Curing can be caused by light in a photopolymer, heat, chemical reactions, or time.

Datum
A plane, axis, or point on an object that is used as a reference location for measuring distances or angles to other features on the object and the tolerance of those distances or angles.

De-Binder
A device that is used to remove binding material from a part. Heat or chemicals are usually used.

Delamination
When the layers of an additive manufacturing part separate from one another.

Desktop 3D Printing
A subset of additive manufacturing that refers to smaller, less expensive machines that are small and light enough to operate on a standard table.

Digital Light Synthesis
A type of vat photopolymerization additive manufacturing where a projector under a transparent build plate shines ultraviolet light onto the build layer, which is against the transparent build plate. The part is then pulled upward so that a new layer of liquid fills between the build plate and the part, and the process is repeated. Digital light synthesis is a continuous build process that does not create distinct layers. Abbreviated as DLS.

Digital Material
The material in a part that is created by mixing multiple base materials as each layer of the part is created. The mix of materials, and therefore the material properties, can vary across a given layer from layer to layer. Digital materials allow the creation of very specific material properties when a part is being built.

Digital Sculpting

The manipulation of CAD geometry by pushing, pulling, or cutting surfaces in a way that replicates the manual sculpting of material in the real world. Some feel this is a more intuitive and artistic way to modify geometry compared to bottom-up, feature-based, or Boolean geometry creation and manipulation.

Direct Laser Melting

A type of powder bed fusion additive manufacturing where a laser beam is used to melt powder material. The beam is directed across the top layer of powder. The liquid material solidifies to create the desired part. A new layer of powder is placed on top, and the process is repeated. Also called laser powder bed fusion, or metal powder bed fusion. Abbreviated as DLM

Direct Metal Deposition

A form of directed energy deposition where a laser is used to melt metal powder that is ejected at high velocity from a heated nozzle. The nozzle traces a path and deposits the melted metal on the current build layer. Abbreviated as DMD.

Direct Metal Laser Melting

Another name for direct laser melting. Abbreviated as DMLM

Direct Metal Laser Sintering

Another name for direct laser melting. Abbreviated as DMLS

Directed Energy Deposition

An additive manufacturing process where metal powder is jetted or wire is extruded from a CNC controlled three or five axis nozzle. The solid material is then melted by an energy source, usually a laser or electron beam, such that the liquid metal deposits onto the previous layers (or build plate) and then cools to a solid. One of the ASTM defined standard categories for additive manufacturing processes.

Distortion

Distortion is the deflection of a part from the shape created by the additive manufacturing process. The distortion can be caused by a variety of loads placed on or inside the part by the additive manufacturing process or the surrounding environment.

Distortion Compensation

A mathematical process where the distance from the as-built geometry to the CAD defined geometry is subtracted from the build geometry to create a new part definition that, when built, will more closely represent the desired dimensions.

DLM

Abbreviation for direct laser melting.

DLS

Abbreviation for digital light synthesis.

DMD

Abbreviation for direct metal deposition.

DMLM

Abbreviation for direct metal laser melting.

DMLS
Abbreviation for direct metal laser sintering.

DOD
Abbreviation for Drop on Demand.

Drop on Demand
A material jetting additive manufacturing process that deposits droplets of material on the current build layer. Although most forms of material jetting are technically drop on demand, the term usually refers to systems that use larger droplet sizes to make molds and patterns. Abbreviated as DOD.

EDM
Abbreviation for electrical discharge machining.

Electron Beam
A focused energy source consisting of a tight stream of high-energy electrons. In additive manufacturing, it is used to melt powder or wire metal, often used as an alternative to using a laser.

Electrostatic Discharge Materials
Plastic materials that reduce static electricity. Abbreviated as ESD material.

Encrypted File
A computer file that has been encoded into a format that can only be accessed by authorized parties. An algorithm uses a process to encode the file and then decode it by someone with a key or password, called decryption. In additive manufacturing, files used to describe geometry may be encrypted and need decryption to be pre-processed. Build files can also be encrypted after pre-processing and decrypted on the additive manufacturing system.

End Part
In additive manufacturing, end part refers to the object created after all post-processing and finishing is completed.

Epoxy
A polymer that starts as a liquid and turns into solid when cross-linking of the molecules in the material occurs, a process called curing. In additive manufacturing, polymers are deposited as a liquid as build material or binder.

ESD
Abbreviation for electrostatic discharge materials.

Extruder
The device in a material extrusion system that heats and forces out the material being deposited. Sometimes referred to as an extruder head.

Extrusion

A manufacturing process where material is forced through a nozzle or die to create material in the shape of the nozzle or die.

Facet
A polygon, usually three-sided, the vertices of which sit on the desired surface of an object. STL files, the most commonly used way to define a part in additive manufacturing, use facets to define the part's surfaces.

Faceted Geometry
Part geometry defined with facets as opposed to spline surfaces.

FDM
Abbreviation for fused deposition modeling.

Feature
A collection of surfaces on an object or in the CAD representation of an object that define a recognized topology. As an example, a cylindrical hole, a pocket, a boss, a rib, or a keyway.

Feed Region
For powder bed fusion additive manufacturing systems, the region of a system where the powder is stored and from which material is moved to create the current build layer before fusing.

Feeder
In FDM/FFF, the motor and gearbox that pushes the filament towards the nozzle.

Feedstock
Bulk raw material used in an additive manufacturing system. May be liquid, powder, filament, sheets, etc.

FFF
Abbreviation for fused filament fabrication.

Filament
A long thread of material, cylindrical in cross-section. In additive manufacturing the filament is how the polymer material in FDM/FFF is delivered, usually on a spool or in a cartridge.

Fixture
A physical part or assembly used in manufacturing to hold a part or check the shape of a part.

Front
The side of the machine that the operator faces to access the user interface, the primary viewing window, or both.

Fully Dense
A volume of solid material with no significant or detectible voids within the volume. In additive manufacturing, it refers to a part made with an additive manufacturing system that either has no voids from the process or that has had its voids filled or removed.

Fused Deposition Modeling

A type of material extrusion additive manufacturing where a continuous filament of thermoplastic material is fed into a heated extruder and deposited on the current build layer. It is the trademarked name used for systems manufactured by the process inventor, Stratasys. Fused filament fabrication is the generic term. Abbreviated as FDM

Fused Filament Fabrication

A type of material extrusion additive manufacturing where a continuous filament of thermoplastic material is fed into a heated extruder and deposited on the current build layer. It is the generic name used for systems not manufactured by the process inventor, Stratasys which used the term fused deposition modeling. Abbreviated as FFF.

Fusing

To combine or blend through melting. In additive manufacturing, fusing is used in several additive manufacturing processes to create parts where material is melted in a pattern or deposited in a pattern to create the build layer.

Fusion

Any process where two or more separate volumes of material are converted into a single volume. Often done with heat and melting the separate volumes or melting the material where they touch. When the material solidifies it creates a single volume.

G-Code

A common computer language used to control the motion of machines, most commonly CNC machining systems. Also used in additive manufacturing to describe the motion of deposition or extruder heads.

Generative Design

A process where the design of an object or objects is programmatically varied until the behavior of the object best meets the objectives set by the designer. Geometry, topology, material properties, and other attributes of the object are varied. Many methods can be used, including topological optimization, genetic variation, machine learning, goal seeking, or Monte Carlo.

Geometry

The mathematical definition of an object. Usually in a CAD file.

Geometry Kernel

The library used in a CAD package to manage the creation, modification, and storage of geometry. The kernel can be proprietary to the CAD package or a third-party library that is used by many CAD programs. ACIS and Parasolid are the two most common kernels. In additive manufacturing, the kernel is important because geometry can be stored and transferred between programs in the native kernel format, avoiding translations.

Granular Materials Binding

A term for both powder bed fusion and binder jetting additive manufacturing processes. Referring to a building process that either fuses or binds a granular material in a powder bed to form a layer.

Green Part

In sintering, a part that is made of powdered material that has been compressed and held together with a binding material. A green part is delicate. It is heated and/or chemically treated to remove the binding material, producing a brown part.

Grit Blast
A form of abrasive blasting where small angular particles are propelled through a nozzle with compressed air to smooth a rough surface. More aggressive than bead blasting because of the use of hard material with angular shapes.

Hardening
In metallurgy, a metalworking process where a part is chemically or mechanically treated to increase the yield strength, usually on the surface. In additive manufacturing, it may also refer to the solidification of a part from liquid or highly flexible to rigid.

Heat Affected Zone
In laser powder bed fusion, the volume of material that is adjacent to the area which is melting when the energy beam, usually a laser or electron beam, moves across the top of the build powder. The heating can cause material property changes and will contain thermal stresses.

Heat Deflection
A material property of a thermoplastic that is used to understand the impact of temperature on the flexibility of the material. In additive manufacturing, once a part cools to below the heat deflection temperature it is safe to handle.

Heat Treat
A group of processes used to alter the physical properties of a material. In additive manufacturing, it refers to using heat to relieve residual stresses. It can also be used to increase the strength or hardness of the metal by modifying the microstructure of the material, and there fore changing the macro properties.

Heat Zone
In FDM/FFF, the portion of the head where the filament is heated from room temperature to the printing temperature.

Heated Bed
A build platform that is heated to avoid uneven cooling of parts as they are being built. Usually used in material extrusion systems where the build material requires a relatively high temperature to extrude properly.

High Impact Polystyrene
A thermoplastic material used in lower heat applications that is commonly used in thermoforming. In additive manufacturing, it is used as both a build and support material. As a build material is holds paint and adhesives well. As a support material that is used with ABS, it dissolves in d-Limonene leaving the build material unharmed. Abbreviated as HIPS.

HIPS
Abbreviation for high impact polystyrene.

Hot End

A term often used for the heated portion of a nozzle in a material extrusion system.

IGES
A vendor-neutral file format for CAD data known as Initial Graphics Exchange Specification (IGES). Created in 1976, IGES became an ANSI standard in 1980. The standard was last modified in 1996 and has been replaced by the ISO STEP standard in many cases. Almost all CAD tools output IGES. It uses the .igs or .iges file extension.

Inert Gas
A gas that does not chemically react with other substances. Most commonly Nitrogen and Argon. Can be made from an element (noble gasses) or a compound of several elements. Used in additive manufacturing to create an atmosphere in the build chamber or inside a material storage container that is free from oxygen to avoid oxidation, including fire and explosions. Highly reactive powdered materials like titanium and aluminum require Argon.

Infill
A cellular or lattice structure used to fill the volume of a part with something other than solid material. Usually, a 2D repeated pattern extruded in the build direction. An infill reduces material use and weight of parts while keeping strength.

Inkjet
A liquid deposition process that propels (jets) very small droplets of material from a print head onto a surface. Many small jets are arranged on the printhead to deposit larger amounts of material at the same time and can be turned on and off to create a pattern. When multiple heads with different materials in each are used together, colors can be created, or materials can be mixed. In additive manufacturing, inkjet methods are used across processes to deposit material that can be the build material, support material, binder, or some other chemical used in the manufacturing process.

Insert
More correctly called a threaded insert, it is a cylindrical bushing with threads on the inside that can be inserted into a plastic part. It replaces threaded holes in metal parts. In additive manufacturing, holes can be designed into parts, and inserts added after manufacturing to allow parts to be screwed together.

Investment Casting
One of the oldest known traditional manufacturing processes, investment casting starts with a pattern that has the same shape as the desired part. The pattern is coated with ceramic to create a hard shell, and then the pattern is melted or burned away, leaving a hollow mold that the desired material, usually metal of some kind, is poured into. The shell is then destroyed to retrieve the cast part. Traditionally the pattern is made from wax. In additive manufacturing, the pattern is created using almost any of the common processes, as long as the build material can be removed from the shell. The most common are FDM/FFF machines that extrude wax and stereolithography machines that use a photopolymer that can be burned out.

Isotropic
Refers to material properties that are the same in every direction. As opposed to orthotropic, which is different along orthogonal directions. Or to anisotropic, which is different in two or more

directions.

L-PBF
Abbreviation for laser powder bed fusion.

Laminated Object Manufacturing
A type of sheet lamination additive manufacturing where successive sheets of paper, coated with adhesive, are glued together using a heated roller, and each layer is cut to shape with a laser or knife. Abbreviated as LOM.

Laser
A device that emits light in a concentrated beam and common wavelength and phase. In additive manufacturing, lasers are used to draw a defined path on the build layer to solidify, sinter, melt, or cut the built material. The energy, beam size, and frequency are all critical parameters for the given additive manufacturing process being used.

Laser Cusing
Another name for direct laser melting.

Laser Engineered Net Shaping
A type of direct energy deposition additive manufacturing where a powder is directed into a high-energy laser beam and melted before it is deposited on the build layer. Also called laser powder forming.

Laser Powder Bed Fusion
A type of powder bed fusion additive manufacturing where a laser is used to melt material on the top layer of a powder bed. Also called metal powder bed fusion or direct laser melting. Most often used to melt metal powder but is used with plastics as with selective laser sintering. abbreviated as LPBF or L-PBF

Laser Powder Forming
An alternative term for Laser Engineered Net Shaping. Abbreviated as LPF.

Lattice
A structure made of connected beam elements, usually in a uniform pattern. In additive manufacturing, lattice structures are used to reduce weight and provide stiffness and mass that vary spatially.

Layer
A horizontal thickness of material. In additive manufacturing, each layer is constructed completely before the next layer is created. In most processes, the layers sit on the same plane as the build plane.

Layer Count
Same as number of layers.

Layer Height
An alternative term for Layer Thickness.

Layer Thickness

The thickness of material on a given layer within a build. The number of layers in a given build is the Z-height of the part divided by the layer thickness.

LDM
Abbreviation for low-temperature deposition modeling.

LENS
Abbreviation for laser engineered net shaping.

Lightweighting
The process of removing material in a part to reduce the weight of the part. May be accomplished with a lattice structure, infill, or removing unneeded material through topological optimization.

LOM
Abbreviation for Laminated Object Manufacturing.

Low-Temperature Deposition Modeling
A form of material extrusion additive manufacturing that does not heat the material for extrusion. Chemical reactions or light are used to solidify the deposited layers. Usually used in tissue printing. Abbreviated at LDM.

LPBF
Abbreviation for laser powder bed fusion.

LPF
Abbreviation for Laser Powder Forming.

Machine Coordinate System
The Cartesian coordinate system that defines any location inside the build volume. Usually, the Z direction is up from the build plate, X is from left to right on the build plate, and Y is usually away from front to back on the build play. The origin varies from system to system.

Machine Origin
The reference point in the build volume where additive manufacturing system manufacturer established the machine coordinate system.

Manufacturing Lot
A set of parts that were created with the same feedstock, build parameters, production run, additive manufacturing system, and post processing.

Material Extrusion
Any additive manufacturing process where a viscous material is extruded through a nozzle whose position is computer controlled to lay down a bead of material to create a layer. Fused deposition modeling is the most common form of material extrusion. One of the ASTM defined standard categories for additive manufacturing processes.

Material Jetting
Any additive manufacturing process where build or support material is jetted through multiple small nozzles whose position is computer controlled to lay down material to create a layer. One

of the ASTM defined standard categories for additive manufacturing processes.

Material Supplier
The company or organization that supplies the material used in an additive manufacturing system

Maximum Layer Thickness
The largest thickness that a given additive manufacturing machine can create.

Melt Pool
In laser powder bed fusion, the volume of material that is melting when the energy beam, usually a laser or electron beam, moves across the top of the build powder. The size of the melt pool determines many characteristics of the material once it solidifies.

Melting
A process where a solid material is heated in some way so that its phase changes from solid to liquid. In additive manufacturing, material is often melted to convert a powder into a continuous solid.

Melting Temperature
The temperature at which a given material transitions from solid to liquid.

Metal Powder Bed Fusion
A type of powder bed fusion additive manufacturing where a laser is used to melt material on the top layer of a powder bed. Also called laser powder bed Fusion or direct laser melting. Abbreviated as MPBF.

Minimum Layer Thickness
The smallest thickness that a given additive manufacturing machine can create. The minimum layer thickness is also the smallest feature size in the Z direction.

MJF
Abbreviation for Multi Jet Fusion

MJS
Abbreviation for multiphase jet solidification.

Mold
A single part, or an assembly of parts, used as a pattern to shape material into a desired shape. When the parts are assembled, they create a cavity of the desired shape of the part. Material can be poured or injected into the cavity as a liquid. Once the material hardens, the part is removed from the cavity.

Molding
One of the traditional manufacturing processes where material is injected under pressure into a cavity that is the shape of the desired part.

Monomer
A molecule that can form bonds with other molecules to form polymers. In additive manufacturing monomers are often joined to form polymers using light, heat, or other

chemicals to form a layer of material.

MPBF
Abbreviation for metal powder bed fusion.

Multi Jet Fusion
An additive manufacturing process that is a hybrid of powder bed fusion and binder jetting. Multiple inkjet print heads deposit material that either reflects or absorbs heat on the top layer of a powder bed. Then heat from a lamp is used to fuse the material where the absorbing chemicals were deposited. It is faster than selective laser sintering and creates stronger parts than binder jetting because the powder is fused and not bonded. Abbreviated as MJF.

Multi-step Process
Any type of additive manufacturing where parts are created in more than one step. Most multi-step processes start by creating the basic geometry shape and then additional steps modify the shape, consolidates the material, or changes the material properties.

Multiphase Jet Solidification
A type of material extrusion additive manufacturing where the extruded material consists of metal or ceramic powder with a binder. It is used to create metal or ceramic parts in multiple steps, or phases. After the part is built, the binding material is removed with chemicals or heat, and a green part is created that can then be sintered. Abbreviated as MJS.

Native Format
Refers to a CAD file that stores geometry in a format defined to a specific CAD system. A native file format may be proprietary or published. Opposite of a neutral file. Many CAD tools can now read native files from other vendors, and many additive manufacturing software tools can read the more common native files.

Near Net Shape
Refers to a part that is manufactured to dimensions that are close to or larger than the desired final dimensions. Further post-processing is used to achieve the required dimensions.

Nesting
Packing multiple parts into the build volume of a machine to create the fastest and most efficient build or fitting as many parts as possible in the smallest build volume possible. Parts are often placed inside the cavities of other parts.

Neutral File
Refers to a CAD file that stores geometry in an agreed-upon and documented common format that most software tools that work with CAD geometry can read and write. The two most common neutral file formats are IGES, STEP. STL files are also considered a neutral file.

Nozzle
A device that is used to control the direction and characteristics of a fluid material that passes through the device. In additive manufacturing, nozzles are used to deposit material on a layer, and their position is numerically controlled in the horizontal and vertical directions. additive manufacturing systems may also use a heater to convert material from solid to liquid in the nozzle.

Number of Layers
The number of layers in a given build. This value is often used to display the progress of a build, and it can be the dominant factor in determining the build time of a given part. Same as layer count. The number of layers is the Z-height divided by the layer thickness.

NURBS
Abbreviation for non-uniform rational B-spline. A mathematical model used in CAD to represent an arbitrarily shaped 3D curve or surface. NURBS are the most common way in which geometry is defined in CAD. In additive manufacturing, NURB surfaces are usually converted to facets to simplify slicing to calculate tool paths for each build layer.

Nylon
A family of synthetic polymers made from polyamides. Nylons are usually made up of heavy molecules linked in repeating patterns. It is a common material in many additive manufacturing processes.

OBJ
An ASCII text neutral file format for faceted geometry. It was developed for computer rendering and animation and, therefore, contains a faceted definition of the outside surface of an object plus information on how to texture/color each facet. OBJ files use the .obj file extension.

Orientation
The rotational position of an object relative to a specified coordinate system. In additive manufacturing, orientation usually refers to how the part is rotated in the build volume with respect to the build direction. Because additive manufacturing is a layered manufacturing process, the orientation of a part determines how the part is converted into stacked layers of material. It, therefore, has a significant impact on the supports needed, the build time, the strength of the resulting part, and the surface finish.

Orthotropic
Refers to material properties that differ in each orthogonal direction. As opposed to isotropic, which is the same in all directions, or to anisotropic, which is different in two or more directions. Many additive manufacturing parts come out of their process with orthotropic properties with the material stiffness and density in strength in the build direction different than the properties orthogonal to the build direction.

Overcure
A process that uses a photopolymer, when the material cures more than desired. This can cause the resulting material to be more rigid than desired or to not bond to the layers above and below, or to the build plate.

Overflow Region
For powder bed fusion additive manufacturing systems, the region of a system where the excess powder from adding a layer of material is stored during a build.

Overhang
A portion of geometry that has no build material underneath it. Overhangs must be supported with powder or support material. The first layer of an overhang must have something to be built

upon.

Overlap
The common area between two parallel paths of material deposition, melting, hardening, binding, sintering, etc., where the material processing is done with some sort of linear process.

Packing
Arranging multiple parts into the build volume of a machine.

Parasolid File
A native CAD file format for the Parasolid geometry kernel. It is a published format that many programs can read, even if they do not use the Parasolid geometry kernel.

Part
A single physical object. In additive manufacturing, a part is the object being created.

Part Bed
Another term for Powder Bed

Part Cake
For a powder bed fusion additive manufacturing process, the block that remains after a build that contains powder that is lightly bonded by the high temperature in the build chamber. The built parts are contained within the lightly bonded powder.

Part Consolidation
A design process where an assembly made up of many parts is redesigned to be made with fewer parts by combining multiple parts that would otherwise be bonded, welded, brazed, or fastened together into a single part. This is often done by using additive manufacturing processes to create parts that would need to be made in multiple parts because of the constraints of traditional manufacturing. Welded assemblies are a common type of assembly that can benefit from part consolidation using additive manufacturing.

Part Location
The location, in the build coordinate system, of the origin of any given part in a build.

Photocure
The use of light, usually of a specific frequency range, to cure a photo-responsive material. Many additive manufacturing processes use photocuring as a way to convert a liquid into a solid or to harden a viscous solid.

Photopolymer
A liquid resin that turns into a solid when exposed to ultraviolet light. This process is used in several additive manufacturing processes, including stereolithography, PolyJet, and binder jetting, where a photopolymer is used as the binder.

Photopolymerization
The process of converting a liquid monomer molecules into long chain polymer networks.

PJP
Abbreviation for Plastic Jet Printing.

PLA
Abbreviation for polylactic acid.

Plastic
A material made of polymers that can be made soft and molded into a desired shape.

Plastic Jet Printing
Another name for fused deposition modeling. Abbreviated as PJP.

Polyamide
A natural or synthetic polymer where the monomers are linked by peptide bonds. Various types of Nylon are a type of polyamide used in additive manufacturing.

PolyJet
A type of material jetting additive manufacturing that jets a photopolymer from multiple inkjet print heads to form a layer of material. A UV lamp is used to cure each layer after it is deposited. PolyJet systems can deposit one material per head, allowing for as many materials to be deposited on a given layer as there are print heads in the machine. The small droplet size also allows materials to be combined to form new materials with unique stiffness, transparency, or color.

Polylactic Acid
A polyester thermoplastic derived from fermented plant starch. Usually referred to as PLA. Because of its relatively low glass transition temperature and low cost. It is used in low-cost material extrusion systems.

Polymer
A type of material made of long chains of organic molecules, where the chains are made of repeating combinations of atoms. In additive manufacturing, polymer usually refers to plastic materials. Polymers are ideal for additive manufacturing because their molecular structure allows them to be softened with heat to a viscous state that can be extruded, formed by curing liquid polymers with heat or light, or even sintered when in a powdered form. Once fully solidified and/or cured, polymers can be very strong and can be engineered to have a wide range of physical characteristics. Abbreviated as PLA.

Porosity
A measure of the amount of voids in a solid part.

Post-Processing
Operations done on a part after being created in an additive manufacturing machine. They may include removing supports, changing the surface finishes, modifying the color of the part, curing, heat treating, creating features with traditional manufacturing, or a variety of steps to convert the part to the desired final configuration.

Powder Batch
The powder used in a powder bed or binder jetting additive manufacturing system that is loaded at the same time. It may contain virgin or used powder.

Powder Bed

For a powder bed fusion or binder jetting additive manufacturing system, the region of the system where the powder is deposited in the build volume, one layer at a time. Each subsequent layer in the powder bed is fused or bonded to create the build parts.

Powder Bed Fusion

A class of additive manufacturing process that use a thin beam of energy, usually a laser or electron beam, to draw on the top layer of a bed of powder. The powder is melted as the beam traces over the top layer, and when the energy is moved to a new location, the melted material solidifies and fuses with the solid material underneath or with adjacent fused material on the layer. After a layer is created, the build plate descends by the layer thickness and a new layer of powder is spread over the just created layer. This process is repeated for every layer in the part. One of the ASTM defined standard categories for additive manufacturing processes.

Powder Blend

A collection of powder used in powder bed fusion or binder jetting additive manufacturing systems that came from multiple powder lots or from the addition of used powder to one or more lots of virgin powder.

Powder Lot

A volume of powder produced by a given manufacturer in a single manufacturing process cycle. The material produced must be traceable and in a controlled environment.

Pre-Processing

Converting the desired part geometries, contained in geometry files, for creation in an additive manufacturing system. The part or parts for a given build must be oriented in the build volume, packed or nested, support structures added (if needed), and compensation applied for expected distortion during the build (if needed). The parts are then sliced, and the tool path, mask, or deposition pattern calculated for each layer. Pre-processing often also includes determining the build parameters to be used. In many cases, it also involves repairing the geometry files to be robust enough for slicing. Many other tasks such as creating special holes for material drainage, splitting parts to fit, and adding special features needed for post-processing are done.

Process Parameters

The system settings and operating values that the user can specify or modify in an additive manufacturing system.

Process Simulation

Using numerical simulation techniques to virtually simulate a given build. The goal of process simulation is to allow a user to predict and avoid failures during a build. It is also used to optimize the build parameters, part orientation, and compensate for distortion caused by the build process. It can also be used to optimize support geometry.

Product Definition

The collection of information that fully defines an object. This includes the geometry as well as geometric tolerancing information. Desired surface finishes, other post-processing steps, and any additional information needed to ensure that the part produced is exactly what is desired.

Production Part

A part created through additive manufacturing that is not a prototype, tooling, or a fixture. Production parts are used for the intended purpose of the part.

Production Run
All of the parts created in an additive manufacturing system using the same feedstock batch and process parameters.

Prototype
In manufacturing, a part or assembly that represents a production part. It is used to test the fit, form, and function of an object before it is manufacturing in production.

PTFE
A synthetic flouropolymer material whose full name is polytetrafluoroethylene. It is often referred to by the brand name Teflon. It has one of the lowest coefficients of friction of any solid material. In additive manufacturing, it is used as a material in machines where low friction is required and can also be used as a build material.

PVA
Polyvinyl Alcohol is a synthetic polymer that is soft, biodegradable, and dissolves in water. In additive manufacturing, it is used as a support material because of its ability to be water soluble.

Raft
Layers of material, usually in a lattice structure, that are printed under a part as a foundation made of build material that the part will be printed on. Most commonly used in FDM/FFF to improve adhesion and decrease warping. An alternative to using a brim or a skirt.

Rapid Prototyping
A model of a physical part that is created using additive manufacturing. Applied as a synonym for additive manufacturing because the original use of additive manufacturing was to create prototypes quickly. Abbreviated as RP.

Rapid Tooling
Manufacturing tooling such as jigs, fixtures, molds, and patterns that is created with an additive manufacturing process. Abbreviated as RT.

Raster Pattern
In LPBF, the path a laser takes, or scan pattern followed, as them beam travels across the top layer of powder. Raster patterns consist of parallel lines drawn back and forth across a build layer. The orientation of the lines can vary in patches or be uniform for an entire layer. In FDM/FFM it refers to the pattern used to sparsely fill the interior of a given layer.

Reactive Material
Material that chemically reacts with oxygen, often generating significant heat. Reactive materials can become dangerously hot, starting fires or exploding. When converted to a powder form, the surface area of reactive materials increases and the rate and heat generated can greatly increase.

Reactive Metals
Metals that are considered reactive materials. Titanium and aluminum, which are common materials in metal additive manufacturing, are reactive metals.

Recoater Blade
A horizontal bar that spreads and smooths liquid polymer in vat photopolymerization or powder for powder bed fusion and binder jet processes to create a uniform and flat layer before the build material is solidified, sintered, melted, or bonded.

Residual Stress
The stress present in an object in the absence of any external load or force. In additive manufacturing, residual stresses are caused by uneven solidification, thermal gradients, and chemical reactions during the build process. Significant residual stress can cause part distortion and warping.

Resin
A highly viscous or solid organic material that can be converted into a polymer. In additive manufacturing, resins are usually liquids that are converted into a solid polymer through the application of light, heat, and/or other chemicals.

Resolution
The smallest increment of a given value that can be measured or produced by a device. In additive manufacturing, it is the length of the smallest feature size.

RP
Abbreviation for rapid prototyping.

RT
Abbreviation for rapid tooling.

Scan Pattern
The path a laser or electron beam traces.

SDL
Abbreviation for Selective Deposition Lamination.

Seam
A visible line in the build direction that appears on a part, usually in FDM/FFF, where the start and stop of the outside surface trace is the same for every layer.

Selective Deposition Lamination
Another term for sheet lamination. Abbreviated as SDL.

Selective Heat Sintering
A powder bed fusion additive manufacturing process where the powder is sintered using a thermal print head instead of a laser. Abbreviated as SHS.

Selective Laser Sintering
A type of powder bed fusion additive manufacturing that uses a laser to fuse a polymer powder into a solid one layer at a time. The laser used is powerful enough to cause the polymer particles to sinter, but they do not melt and solidify. Abbreviated as SLS.

Self-Assembly

A process where a disorganized system of components are organized into a structure with no outside direction. In additive manufacturing, self-assembly can refer to chemical processes where a material changes from a random to a structured state. It can also refer to components made with the additive manufacturing process that then assemble themselves into a new, more ordered shape.

SGC
Abbreviation for Solid Ground Curing.

Sheet Lamination
A class of additive manufacturing processes where thin, solid sheets of material are stacked and cut one layer at a time. The layers may be bonded through heat, chemical reaction, or adhesives. One of the ASTM defined standard categories for additive manufacturing processes.

Shell
The outer surface of a solid object.

Shrinkage Compensation
Modifying the shape of an object to be printed so that when the part completes the additive manufacturing process, the dimensions are the desired values. Shrinkage compensation removes the impact of thermal or chemical distortion created by the manufacturing process.

SHS
Abbreviation for selective heat sintering.

Single-step Process
Any type of additive manufacturing where the part is created in one processes, resulting in the desired geometry and material properties. Support removal or traditional machining additional features are not considered additional steps.

Sintering
A manufacturing process where particles of a given material are fused together when the atoms on the boundaries between particles diffuse into each other where they are touching. Heat, and sometimes pressure, are used to further fuse and compact that material. In additive manufacturing, sintering can be the process used to produce a part or as a post-processing step that creates a denser part that bonded with a material on the surface of the particles.

SLA
Abbreviation for stereolithography apparatus.

Slice
A planer cut through a part. A slice defines the boundaries of the material in a build layer. Pre-processing software creates the slices from the solid model, calculates the boundary for the slice, and then how the layer will be created.

Slicer
The portion of the pre-processing software that slices a solid model into layers to be created.

SLS

Abbreviation for selective laser sintering.

Solid Geometry
The CAD definition of a part that describes a solid object. Because additive manufacturing processes create solid parts, the geometry provided to the pre-processing software must be a valid solid.

Solid Ground Curing
A vat photopolymerization additive manufacturing process that cures the photopolymer layer with UV light that has been shaped with a digital mask rather than with a laser or a projector. The process includes multiple steps for each layer, beginning with the solidification of the layer with UV light. After that, excess liquid is removed with blown air, melted wax is spread over the layer to fill voids, then a milling head is used to flatten the surface. Abbreviated as SGC.

Soluble Support Material
A type of support material that can be dissolved with a liquid that does not damage the build material, avoiding the manual removal of supports.

Spool
A cylindrical object around which film, thread, or filament can be wound. In additive manufacturing, a spool is used for FDM/FFF to store filament and then dispense it into the system.

Stair Steps
A surface feature created by the representation of a curved surface with layers. The offset between where the slice plane intersects the surface on two adjacent layers determines the outside surface of each layer. The difference creates a staircase like feature on the surface.

STEP
An ISO defined neutral CAD file format. It uses the .stp or .step file format.

Stereolithography
A type of vat photopolymerization additive manufacturing where a laser is used to draw a path on the current layer, converting the liquid polymer into a solid. Stereolithography was the first commercially available additive manufacturing process. It is often abbreviated as SL or SLA.

STL
A file format used in most additive manufacturing processes. It is a faceted representation of the geometry that is easy to slice. The format was developed for stereolithography but is used across technologies.

Subtractive Manufacturing
The classification of traditional manufacturing processes that involve removing material in a controlled way from raw stock to produce a final shape and size. Machining is the most common application.

Support Material
Material used in an additive manufacturing process that is different from the build material and is used to create supports. Support Material is usually a soluble support material or a breakaway

support material.

Support Volume
The volume of support material in a build.

Supports
Geometry added to an additive manufacturing build to support overhangs and constrain thermal distortion. Supports may be created from the build material or a different soluble support material or breakaway support material. The geometry and removal of supports is a significant challenge in additive manufacturing.

Surface Angle
The angle of a surface on a part relative to the build plane.

Surface Finish
A measure of the roughness of the surface of a part.

System Set-up
The process of setting up an additive manufacturing system for a build.

Teflon
Common or brand name for PTFE.

Text File
A human-readable computer file. Also called an ASCII file.

Thermal Stress
Stress in a part caused by differences in temperature or differences in coefficients of thermal expansion. Many additive manufacturing processes create thermal stress.

Thermoplastic
A subset of polymers that become viscous or liquid when heated and harden when cooled. The process of liquification and solidification is repeatable.

Thermoset Plastic
A polymer material that irreversibly hardens through curing. Many additive manufacturing processes utilize thermoset plastics to convert a soft or liquid material into a rigid solid.

Tip Diameter
The diameter of the extrusion head in an FDM/FFF system. The tip diameter determines the width of the bead that the head deposits on a layer, as well as how quickly a given layer can be built.

Tool Path
The computer-controlled movement of a tool in a manufacturing process. In additive manufacturing, it is the path of the laser beam, extruder head, or cutting tool.

Tooling
Parts that are used in manufacturing processes to hold, support, or mold the parts being made.

Topological Optimization
A shape optimization process that modifies the topology of a part to achieve a goal given a set of loads. Topological optimization often creates geometries that can only be created with additive manufacturing.

Topology
The shape of an object. Specifically, how the various surfaces of an object are connected and arranged regardless of the size of a given surface.

Traditional Manufacturing
A term used to refer to manufacturing processes used before the widespread introduction of additive manufacturing. The full spectrum of subtractive and casting processes are considered traditional manufacturing.

Travel
When a print head moves while not extruding or depositing material.

Tribecular
A porous structure of material that is used in medical implants to encourage tissue and bone growth. In additive manufacturing, it is created on electron beam powder bed fusion systems.

UAM
Abbreviation for Ultrasonic Additive Manufacturing

UC
Abbreviation for Ultrasonic Consolidation

Ultrasonic Additive Manufacturing
A type of sheet lamination additive manufacturing that uses ultrasonic energy to weld thin layers of metal together. A mill is then used to cut the shape of each layer. It is unique because each layer can be made of a different metal material. Abbreviated as UAM. Also called Ultrasonic Consolidation.

Ultrasonic Consolidation
Another term for Ultrasonic Additive Manufacturing. Abbreviated as UC

Ultraviolet Light
Electromagnetic radiation that is at a higher frequency than visible light. Its wavelength is absorbed by organic molecules and change the chemical properties of polymers. This is leveraged in additive manufacturing to turn liquid resins into solid polymers through exposure to ultraviolet light. Also referred to as UV light.

Used Powder
Powder material that has been used at least one time in a powder bed fusion or material jetting additive manufacturing system, but was not fused or bonded. The powder can be recovered from the machine and used as part of a Powder Blend in future builds, or must be disposed of properly.

UV Light

Abbreviation for ultraviolet light.

Valid Solid Model
A CAD part definition that has no errors. Most additive manufacturing pre-processing tools require a valid solid model.

Vapor Smoothing
A post-processing method where the outer surface of a polymer part is dissolved with vaporized acetone, removing stair steps and creating a smooth, glossy surface.

Vat
A large container that holds liquids. In additive manufacturing a vat refers to a container for resin that is to be cured.

Vat Photopolymerization
A class of additive manufacturing processes that utilizes the hardening of a photopolymer with ultraviolet light. A vat of liquid is filled with liquid photopolymer resin, and an ultraviolet light is either traced on the build surface or projected on it. Stereolithography is the most common form of vat photopolymerization. The build layer can be on the top of the vat of liquid or the bottom. One of the ASTM defined standard categories for additive manufacturing processes.

Virgin Powder
Powder material used for in a powder bed fusion or material jetting additive manufacturing system that has not been used in any way in any process.

Viscosity
A property of a liquid material that measure the resistance to flow, caused by the magnitude of internal friction. In additive manufacturing the viscosity of a material impacts how a liquid or powder material is dispensed or how quickly it spreads when it is deposited.

Voxel
A cubic volume with an assigned value or values in a regular three-dimensional Cartesian grid. Analogous to a pixel in 2D images, voxels are used in 3D space to define properties like color, density, and material fractions. In additive manufacturing, voxels are used to define properties inside an object.

Wall Thickness
The thickness of a thin area of material on a part. In additive manufacturing wall thickness is a key-value because most processes have a minimum thickness they can make. Minimum wall thickness is a design parameter that should be observed when designing parts for additive manufacturing.

Warm Up Time
The length of time that it takes for an additive manufacturing machine to reach its recommended operating temperature. This could be the temperature of the build plate, the air in the chamber, the powder bed, or various components.

Warping

Deformation in a part that occurs during or after manufacturing. Usually caused by thermal or residual stresses.

Watertight Solid
A solid model where there are no gaps in the surface. If the part was real and filled with water, nothing would leak out. Additive manufacturing pre-processing software requires watertight solids in order to create an accurate boundary for each layer and to know which side of a surface is inside of the part and which is on the outside.

Wire Arc Additive Manufacturing
A type of material extrusion additive manufacturing where an electrical arc is used to melt the end of a wire. The liquid material is then deposited on the layer being built as the print head is moved in the X-Y direction.

Wire EDM
A form of electro dynamic machining where a part is cut with a metal wire that serves as the consumable electrode. Current traveling between the electrode and the part erodes material from both sides, cutting the part. The wire moves along its length so that it does not erode enough to break.

X-Y Plane
An imaginary plane that is perpendicular to the build direction. Also referred to as the build plane. The build layers are parallel to the X-Y plane.

Z-Direction
The direction perpendicular to the layers being created in an additive manufacturing process. It starts at the first layer and points in the direction that material is being added.

Z-Height
The maximum dimension of a part in the build direction. The Z-height determines the number of layers needed to make a part and has a strong influence on build time.

Zipped File
Shorthand for a file that has been compressed to create a smaller file size. A standard format referred to as ZIP is used. The software to compress and un-compress ZIP files is included in most operating systems. Many service providers ask customers to provide them with zipped versions of their STL files to reduce upload time.

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