

ABS-CF10

BS-CF10 (acrylonitrile butadiene styrene-carbon fiber) is an ABS thermoplastic with 10% chopped carbon fiber by weight. ABS-CF10 provides a strong, stiff material for the F123™ platform.

ABS-CF10 is currently available on select F-Series printers (F170™, F370®, F190™CR, F370®CR) with 0.005 inch (0.127 mm), 0.007 inch (0.178 mm), 0.010 inch (0.254 mm), and 0.013 inch (0.33 mm) layer heights. It requires a dedicated ABS-CF10 head denoted by a dark green housing, or a hardened head denoted by a light grey housing, for all layer heights for the model material, except the 5-slice layer height, which requires the T14H head. It is compatible with QSR Support™ as a soluble support system and requires a standard extrusion head (black) for all layer heights for the support material. ABS-CF10 and QSR are available in a standard F123 90-cubic-inch spool.



Part Design

Designing parts for ABS-CF10 follows a similar process for designing other FDM® parts, and design for additive manufacturing guidelines (DFAM) should be followed (e.g., utilizing self-supporting angles where possible, observing minimum wall thicknesses, allowing proper clearance for assemblies). A general list of DFAM guidelines can be found in the [FDM Design Guidelines document](#).

For ABS-CF10 and other low-temperature FDM materials, the soluble support system is used to support the model material in areas of overhang to prevent sagging. While the support can be removed by hand, it is also soluble in P400SC WaterWorks™ cleaning solution. The designer should take this into account when designing the part, allowing for more complex geometries that could not otherwise be made if the support had to be removed by hand. Self-supporting angles (angles greater than 43 degrees from the build platen) should be used whenever possible to reduce the need for support material.

Part Processing

This material is available in Insight™, GrabCAD Print™, and GrabCAD Print Pro™ software.

Support removal is the main consideration that should be taken into account during part processing. In areas where support cannot be eliminated by part design, the part must be oriented so the support is accessible for removal or dissolution. Perforation layers can be added to the support structure to aid in removal of large areas of support. ABS-CF10 does not bridge as well as ABS-M30™. The user should take care when deleting automatically generated support material to avoid failure.

Parts should be oriented as flat as possible. The user should try to avoid placing parts starting on a point. This can cause adhesion and part quality issues. Increasing the bottom model layer thickness can help increase the adhesion, especially in 0.007 inch (0.1778 mm) layer height. If model-to-support adhesion is still an issue in 0.007 inch (0.1778 mm) layer height, run a manual tip calibration and aim for a Z measurement of 0.0105 inch (0.2667 mm).

When using a 0.005 inch (0.127 mm) layer height, pay special attention to the surfaces printed over support material. To achieve optimal visual quality, it is recommended that the surfaces printed over support material are as flat as possible. To improve quality of fine details using a 0.005 inch (0.127 mm) layer height, decrease the contour width using the Toolpath Setup in Insight. Use care not to decrease the contour width too

much, as that can lead to problems with adhesion.

Unlike FDM® Nylon 12CF, no additional considerations for balancing raster orientations to avoid warp and curl need to be considered.

Default processing parameters should be used unless the user is sufficiently advanced in Insight or GrabCAD Print and has determined that the changed values produce better results for a specific geometry.

Adaptive slice can be used on ABS-CF10 0.010 inch (0.254 mm) and 0.007 inch (0.1778 mm) layer heights. Adaptive slice varies the layer thickness based on the part geometry. The goal of adaptive slicing is to use thicker slices where the part walls are closer to vertical to increase build throughput while preserving feature detail, appearance, and strength. Adaptive slicing will use two distinct layer thicknesses: the selected slice height and a thicker slice. When the selected slice height is 0.007 inch (0.1778 mm) adaptive slice will use 0.010 inch (0.254 mm) thick layers as the part slope approaches vertical. When the selected slice height is 0.010 inch (0.254 mm) adaptive slice will use 0.013 inch (0.3302 mm) thick layers for the more vertical regions of the part.

Part Packing

Multiple ABS-CF10 parts can be packed together in the same build. This often reduces build time and should be used to increase system utilization by eliminating downtime when operators are not present. For example, add another part to the pack so the build will finish in the morning rather than at night, or pack multiple parts together for a longer build over the weekend.

For higher quality seams and a reduced potential for purge material in the part, a purge tower should be included in the pack, up to the full height of the parts. Refer to the **Options > Purge tower** menu in Control Center™ software.



System Preparation

The systems should be set up using the heads and build trays mentioned in the system overview section of this document. A tip calibration must be performed when switching from a different material to ABS-CF10, when replacing the head at the end of its recommended life, or anytime the model or support heads are removed from the system. The head life for the dark green dedicated ABS-CF10 head is 700 hours. A warning will be displayed at 600 hours. The head life for the light grey housing hardened head is 1500 hours. A warning will be displayed at 1200 hours. It should be noted that many short toolpaths are harder on the head than longer toolpaths. When building parts with many short toolpaths, it is recommended to change the head when the head warning is displayed to prevent a potential decrease in print quality. It is not recommended to use other materials, especially Diran™ 410MF07, in the same head after printing ABS-CF10 due to decreased part quality.

Support Removal

Parts are easily removed from the build tray by first removing them from the machine and then flexing the tray. Once parts are removed from the build tray, support material can be broken off by hand or submerged into P400SC WaterWorks cleaning solution at 70 degrees Celsius to be dissolved.

Post Processing

ABS-CF10 can be sanded, painted, media blasted, bonded, machined, drilled, receive inserts, etc., similarly to other FDM thermoplastics.



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MATERIAL GUIDE FDM

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