



Agilus30

Rubber-Like Materials

Overview

Agilus30™ materials have properties that simulate Shore A 30 rubber. With this family of rubber-like materials, you can print flexible full color 3D prints.

Agilus30 materials include:

- Agilus30 Clear
- Agilus30 Black
- Agilus30 White
- Agilus30 Cyan
- Agilus30 Magenta
- Agilus30 Yellow

Agilus30 printing materials offer improved mechanical properties, tactile quality, vivid colors, and ease of use. The following results were obtained from parts printed on PolyJet™ 3D printers.

Tests	CMY (High Mix mode)	Other Agilus30 materials
Tensile Strength (Mpa)	2.3 – 2.8	2.4 – 3.1
Elongation at break %	300 – 340	220 – 240
Shore Hardness (A)	28 – 34	30 – 35
Tear Strength (Tear Resistance) (Kg/cm)	4 – 6	2.4 – 3.1
Polymerized Density (g/cm ³)	1.14 – 1.15	
Water Absorption (%)	2.7 – 3	

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The following sections provide guidelines for printing with Agilus30 materials and recommendations for achieving optimum quality, color performance, and mechanical properties.

- A. Shore A levels for Agilus30 Digital Materials
- B. Agilus30 Applications
- C. Supported Printers
- D. Printer Settings
- E. Preparing the Printer
- F. Preparing for Printing
- G. Printing Tips for Agilus30 CMY
- H. Reducing Surface Stickiness
- I. Painting parts
- J. Removing Support Material
- K. The Effect of Temperature on Elasticity

A. Shore A levels for Agilus30 Digital Materials

Rubber-like digital materials with varying Shore values and colors are fabricated by combining Agilus30 materials with rigid materials. The following table shows the Shore A values of digital materials fabricated from Agilus30 and Vero™ materials.

Hardness Selection	Shore A in Printed Part*
FLXA-xx40	40 – 45
FLXA-xx50	50 – 55
FLXA-xx60	60 – 65
FLXA-xx70	70 – 75
FLXA-xx85	80 – 85
FLXA-xx95	90 – 95

*Values obtained using the ASTM D-2240-03 standard, at Time 0.

For more information, see material specification sheets for Digital Materials on stratasys.com.

B. Agilus30 Applications

Practical applications for Agilus30 materials include:

- Realistic simulation of rubber parts —
- knobs, grips, seals, gaskets, hoses, footwear, handles, etc.
- Soft-touch parts and non-slip surfaces
- Rubber-like surrounds and overmolding.



Figure 1: Gasket for car window.

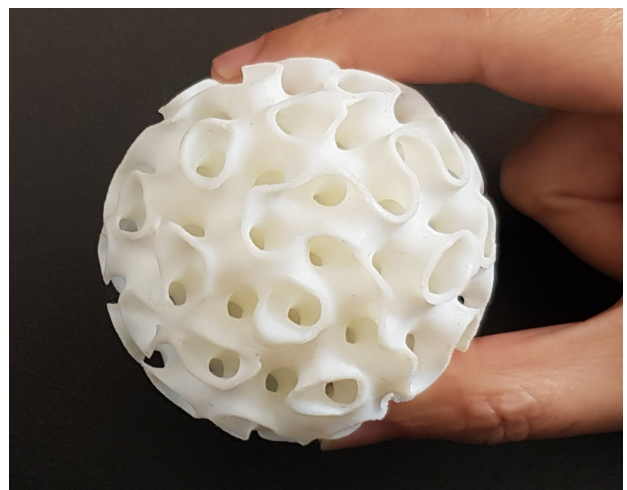


Figure 2: Rubber-like hollow model.

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C. Supported Printers, Materials and Modes

Agilus30 materials can be used as follows:

Printer	Material Type	Printing Mode	Objet Studio™/ GrabCAD Print™	Support Material
Objet260/350/500 Connex1™	Agilus30 Clear Agilus30 Black	HS	Objet Studio version 9.2.11.6785 and above GrabCAD Print version 1.18 and above	SUP705™/ SUP705B™ SUP706B™
Objet260/350/500 Connex2™		DM		
Objet260/350/500 Connex3™		HQ is not supported.		
J750™/ J735™ J750 Digital Anatomy™ J826™ Prime J835™ Prime J850™ Pro / Prime	Agilus30 Clear Agilus30 Black Agilus30 White	HS HM HQ is not supported.	GrabCAD Print version 1.18 and above	SUP705/ SUP705B SUP706B
J750™/J735™ J750 Digital Anatomy™ J826™ Prime J835™ Prime J850™ Prime J850 Digital Anatomy™	Agilus30 Cyan Agilus30 Magenta Agilus30 Yellow	HM HS & HQ are not supported.	GrabCAD Print version 1.63 and above Note: Agilus30 Clear, White, and Black are available on J850 Digital Anatomy printers with GrabCAD Print version 1.63.	SUP705/ SUP705B SUP706B
J4100™	Agilus30 Clear Agilus30 Black Agilus30 White	HS HM HQ is not supported.	Current version of GrabCAD Print and above	SUP705/ SUP705B SUP706B

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D. Printer Settings

When printing with Agilus30 (including Digital Materials fabricated with it), the following printer settings are automatically adjusted in to ensure optimum part quality:

- Roller velocity
- Activation of only one UV lamp in High Mix and Digital Material and printing modes.

Note: When the tray contains only digital materials with the prefix RGD (for example, RGDXXX-DM), two UV lamps are activated.

E. Preparing the Printer

Stopping and resuming the print job may adversely affect model quality and color uniformity (Figure 3). Therefore, before printing with Agilus30, ensure that the print job is not interrupted. Check that the waste container is not full and that there is sufficient printing material loaded.

F. Preparing for Printing

Material configuration, material assignment to parts, their arrangement on the build tray, and other factors affect part quality, the Shore A level of the printed part, and print job duration.

- To print in full color with Agilus30 materials and to enable their color profiles in GrabCAD Print™ (Figure 4), load the materials using one of these options:
 - 4 materials – Agilus30 CMYW (Cyan, Magenta, Yellow, and White). This configuration enables you to work with 4 color profiles.
 - 5 materials – Agilus30 CMYWK (Cyan, Magenta, Yellow, White, and Black). This configuration enables you to work with all 8 color profiles.



Figure 3: This model has a “seam” where the print job was interrupted.

J8-7xx Smooth AW AgilusCMY (Absolute...
 J8-7xx Smooth AW AgilusCMY (Perceptu...
 (*) J8-7xx Smooth AW AgilusCMY (Relati...
 J8-7xx Smooth AW AgilusCMY (Saturatio...
 (*) J8-7xx Smooth AW AgilusCMY (Re... ▼

J8-7xx Smooth AW AgilusCMYK (Absolut...
 J8-7xx Smooth AW AgilusCMYK (Percept...
 (*) J8-7xx Smooth AW AgilusCMYK (Relat...
 J8-7xx Smooth AW AgilusCMYK (Saturati...
 J8-7xx Smooth AW AgilusCMY (Absolute...
 J8-7xx Smooth AW AgilusCMY (Perceptu...
 J8-7xx Smooth AW AgilusCMY (Relative ...
 J8-7xx Smooth AW AgilusCMY (Saturatio...
 (*) J8-7xx Smooth AW AgilusCMYK (... ▼

Figure 4: Agilus30 CMY profiles without black (top); Agilus30 profiles with black (bottom)

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Figure 5 below shows the recommended material loading options when printing with Agilus30 CMY.

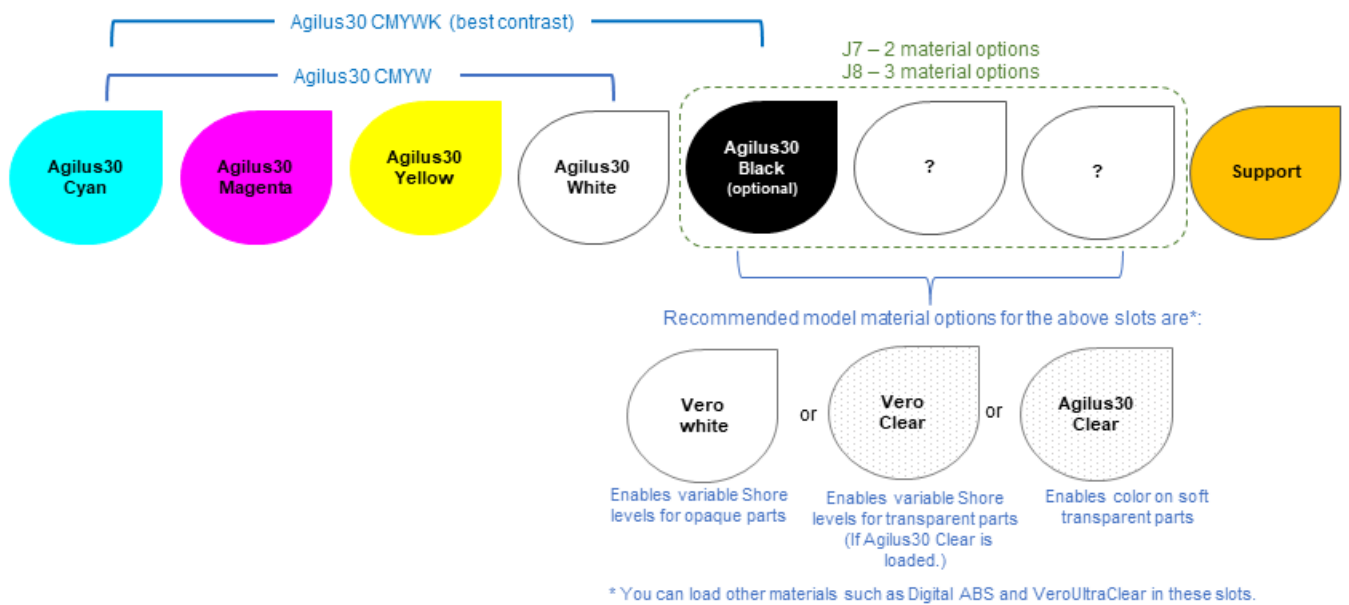


Figure 5: Material options with Agilus30 CMY on J7 and J8 printers

- When printing with Agilus30 CMY materials, in addition to the color capabilities, you can also set different Shore A levels for the part. To enable this option, you need to load a Vero white or clear material (see Figure 5). See section G below for more details.
- When printing with Agilus30 CMY materials, use the Color Picker to assign digital materials and different shore hardness. Color assignment using Digital Material, Pantone, and CMYK Input material are not available for Agilus30 CMY materials.
- Digital Material assignment is available for Agilus30 Clear, White, and Black with Digital ABS Plus™.
- Printing full trays with Agilus30 materials may cause leakage from the roller waste collector. To avoid this, split trays or only partially fill the build tray.

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- Internal stress may cause parts to curve downwards and detach from the tray.
To reduce this occurrence, use one of these solutions:
 - Prepare relatively short print jobs (by partially filling the build tray).
 - For parts that have a high aspect ratio (X:Y), position the longer edge along the X-axis (Figure 6).
 - Use a support core, as described in the section on Printing Tips for Agilus30 CMY below. Note that this affects the shore value.
- For Agilus30 Clear, White, and Black, when printing in High Speed (HS) mode, arrange the parts on the tray so that they do not exceed three printing passes (Figure 7). This ensures that the ambient temperature in the printing chamber required for maintaining part quality, remains stable.
- Position thin and delicate parts so that recesses in the surface (hollows, drill holes, etc.) face upwards. This improves their resistance to tear.
- Print with a glossy surface finish, especially for delicate and thin parts. If possible, position vertical walls parallel to the X-axis (Figure 8). This reduces the impact of the roller on the walls.

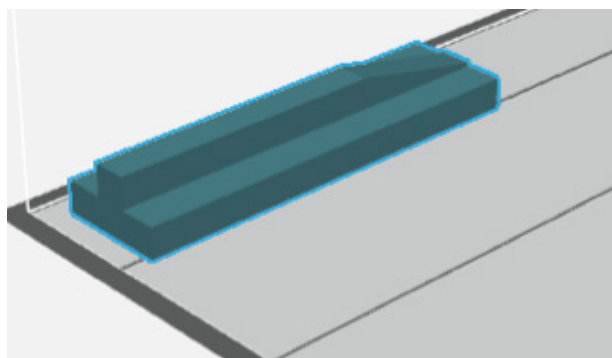


Figure 6: Long edge along the X-axis.

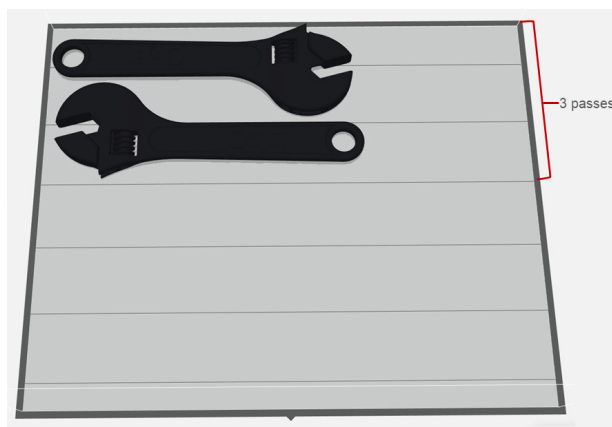


Figure 7: Tray arranged for three printing passes.

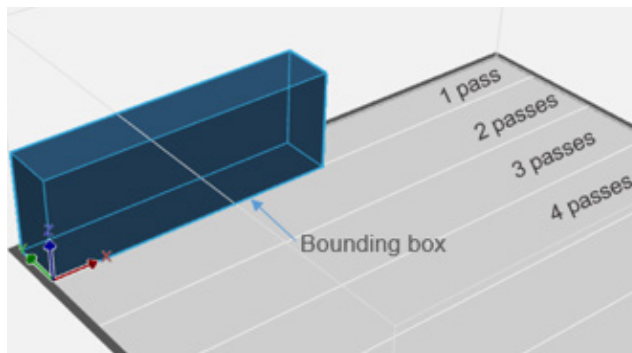
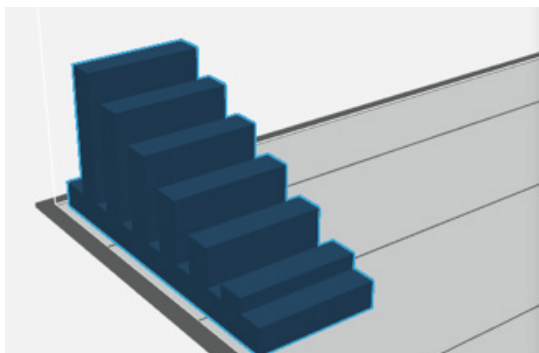


Figure 8 and 9: Walls parallel to the X-axis.

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- The default and recommended grid style is *Heavy*. However, when printing hollow and delicate parts, and parts with thin walls, select the *Lite* grid style. This enables easier removal of support material from printed models.

Note: For available digital materials only, when assigning colors using digital materials that include Agilus30, the color of printed parts might vary from the selected color.

- J7, J8, and J4100 printers only: In solid or bulky parts, the recommended height (Z-axis) depends on the part's dimensions along the X- and Y-axis. To ensure optimum quality, make sure that the part height along the Z-axis does not exceed the following dimensions in High Speed (HS) and High Mix (HM) modes:

▼ More Settings

Support Options

Strength Heavy ▼

Material

Lite

Standard

Heavy

No Grid

Figure 10: Heavy support grid

J7, J8, and J4100 Printers (HS and HM modes)

	X = 250 mm	X = 375 mm/X = 350 mm	X = 490 mm
Y = 45 mm (1 pass)	100 mm Z axis	80 mm Z axis	40 mm Z axis
Y = 110 mm (2 passes)	50 mm Z axis	40 mm Z axis	30mm Z axis
Y = 110 mm (3 passes)	30 mm Z axis	25 mm Z axis	20 mm Z axis
Y = 220 mm (4 passes)	30 mm Z axis	20 mm Z axis	20 mm Z axis

- For improved dimensional stability when printing bulky Agilus30 CMY parts that are larger than described in the above table and to prevent deformations, assign the Support core (Figure 13) option instead of a white (or clear) core.

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G. Printing Full Color with Agilus30 CMY

• Printing opaque parts and setting Shore A levels –

The default structure of an opaque part is as follows (Figure 11):

- The *external* layer is 1 mm of texture/color (Shore A 30).
- The *next layer* is 4 mm thick and made of a mixture of Agilus30 White and Vero white materials and a Shore A value can be selected.
- The core is made of a mixture of all Agilus30 and Vero white materials that are loaded. This mixture does not affect the part's surface color.
- Adding Vero material enables Shore A level value selection.

To print opaque parts and control the Shore A level, the following tray materials must be loaded:

- For full color: Agilus30 CMY, Agilus30 White, and Agilus30 Black
Note: If you use the color profile that does not include black, part color is affected.
- For Shore hardness: VeroUltraWhite or VeroPureWhite.

When the white material is loaded, from the *Base & Core Options*, select the **White** and use the slider to select a Shore A level.

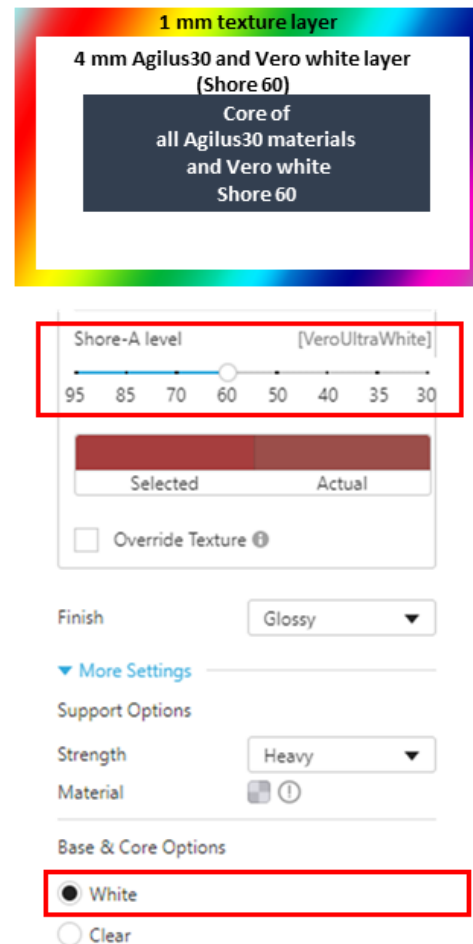


Figure 11: White core and shore hardness assigned

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- **Printing parts that require transparency and setting Shore A levels—**

The structure of a transparent part is as follows (Figure 12):

- The *external layer* is 1 mm of texture/color (Shore A 30).
- The core is made of a mixture Agilus30 Clear with VeroClear.
- Adding Vero material enables Shore A level value selection.

To print transparent parts and control the Shore A level, the following tray materials must be loaded:

- For full color: Agilus30 CMY, Agilus30 White, Agilus30Clear
- For Shore hardness: VeroClear

When VeroClear material is loaded, from the *Base & Core Options*, select the **Clear** and use the slider to select a Shore A level.

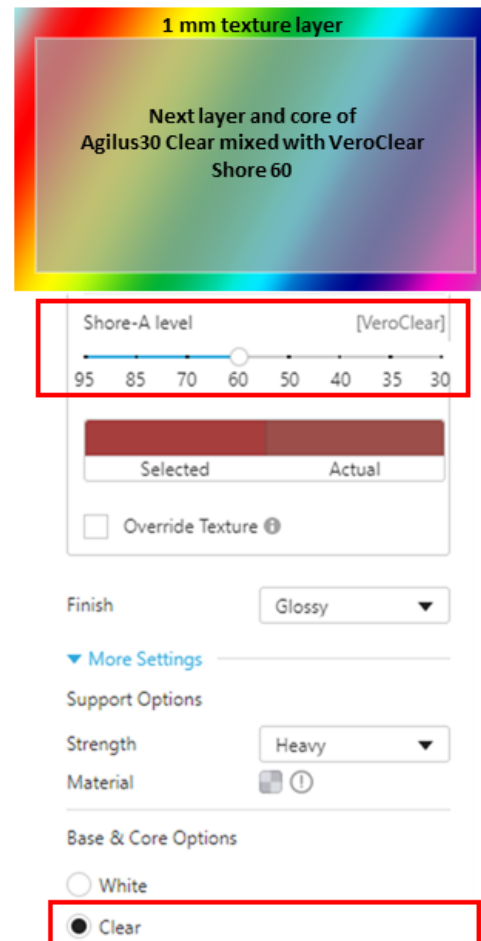


Figure 12: Clear core and shore hardness assigned

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- **Printing softer parts that simulate a silicone feel —**

The structure for softer parts is as follows (Figure 13):

- The *external* layer is 1 mm of texture/color.
- The *next* layer is 1 mm of Agilus30 White (This is the recommended thickness, but it can be adjusted).
- The *core* is made of support material with an internal grid made of Agilus30 White or Clear depending on the opacity/transparency of the part. This mixture enables a soft, silicone feel.

Note: When using a Support core, the Shore A level is 30 and cannot be adjusted.

When selecting the Support core (from the Base & Core Options section), the thickness of the layer that surrounds the part's core is adjustable. The recommended thickness is 2 mm. This results in a 1-mm texture layer, and 1-mm Agilus30 White layer (Figure 13). Changing the layer thickness, affects the thickness of Agilus30 White layer that surrounds core and affects the softness of the part. The texture layer remains 1 mm.

Note: In an assembly, the value you set for the Support core is applied to all shells in the assembly.

To print softer, silicone-like parts, the following tray materials must be loaded:

- Agilus30 CMY and Agilus30 White
For a broader color gamut, load also Agilus30 Black.

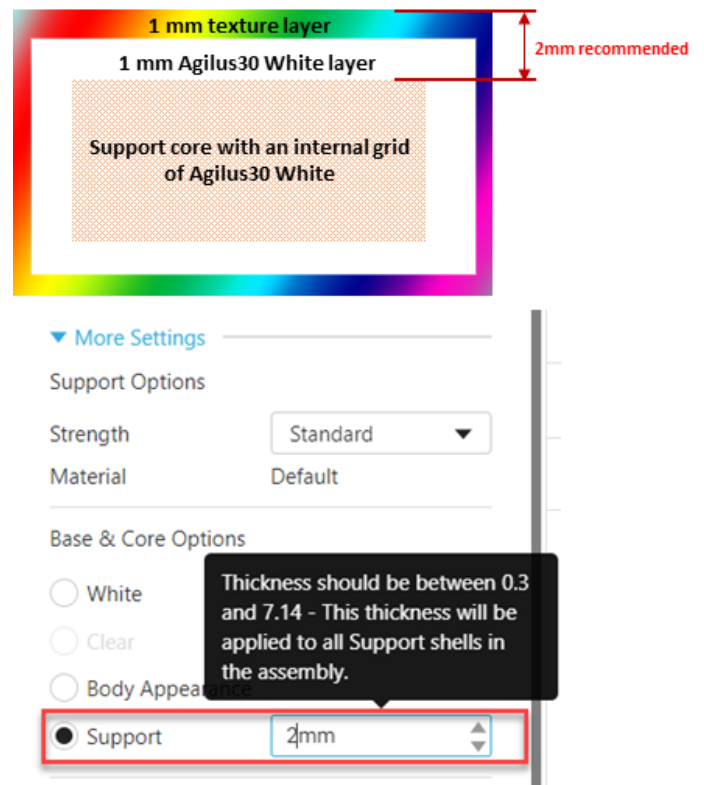


Figure 13: Support core set to 2 mm (recommended)

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H. Reducing Stickiness

Agilus30 parts printed with a glossy surface tend to have a stickier surface than when printed with a matte finish. To reduce surface stickiness, leave the part to dry for 12–24 hours. For immediate improvement, apply WD-40® or baby oil to the surface, leave it to dry and then wipe the part.

I. Removing Support Material

For best results, clean parts printed with Agilus30 (including Digital Materials fabricated with it) as follows:

- Remove as much support material as possible by hand to prevent scratches and the tearing of delicate parts.
- Use the waterjet cleaning station to remove the remaining support material.

Note: Using the DT3 or CSIIP cleaning station to dissolve SUP706B support material may cause model deformation due to water absorption.

- Adjust the water pressure in the waterjet to the minimum required.

TIP: After rinsing in water, Agilus30 parts (mainly dark colored parts with a matte surface finish) may initially have a milky-colored surface, due to water absorption. To resolve the color issue, leave the part to dry for 12–24 hours (as shown below). You can accelerate the drying process using an air blower.



Immediately after
removal from water

After 3 hours

After 20 hours

Figure 14: Color improvement overtime after rinsing in water

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J. Painting Parts

Painting parts enhances their look, feel and functionality. Apply flexible lacquer (acrylic or water-based) to give parts a realistic look, protect them from cracks, and reduce surface stickiness.

To achieve best results with painted parts:

- Print parts with a glossy finish
- Sand areas that have a matte surface finish

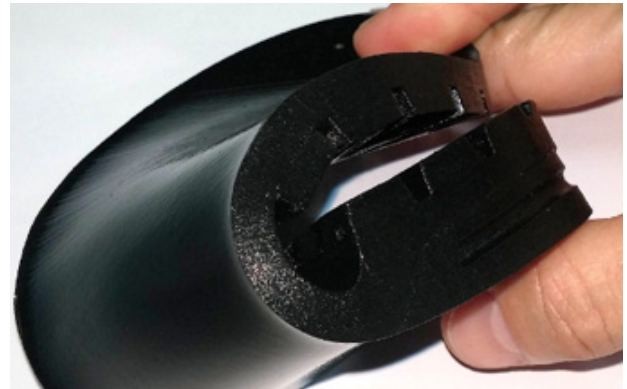


Figure 15: Painted prototype of a shoe sole

K. The Effect of Temperature on Elasticity

At room temperature, parts printed with Agilus30 have optimum elasticity. At very low temperatures, parts might become stiff and brittle. Therefore, care and adequate precautions should be taken when packaging parts and models for shipping. Parts regain their original elasticity when warmed above 5°C.



Figure 16: Rubber-like toy duck

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