



**Enabling sustainable 3D printing for
makers, education and industry**

March 2021

E: info@filamentive.com
T: +44 (0) 333 366 0020

filamentive.com

Environmental Solution ←



Committing to high-percentage **recycled materials** where possible - declared in accordance with ISO 14021



Using **100% recyclable cardboard spools** to reduce packaging waste



Planting trees to offset CO2 from production & transport, becoming **climate positive**

Environmental Problem

90%

90% of plastic is produced from feedstock obtained from non-renewable fossil oil and gas
Plastic Atlas, 2019

>400 million

More than **400 million tons** of plastic produced each year
Plastic Soup, 2020

<10%

Less than 10% of plastic is recycled
National Geographic, 2018

3D Printing Plastic Problem

"Material sustainability is an issue that can no longer be ignored due to wide adoption of 3D printing"

Zhao et al., 2018

99%

99% of the market is non-recycled filament
Elizabeth Sensky, medium.com

168,000

168,000 3D printers installed in the UK
Ultimaker, 2020

24%

24% is the forecasted average annual growth of the 3D printing market
3D Hubs, 2020

24kg

24kg is average annual filament usage
Filamentive, 2020

2.8 million

2.8 million kilograms (2800 tonnes) of filament needed to sustain market growth
Filamentive, 2021

Whilst at its core 3D printing is fundamentally less wasteful than traditional, subtractive manufacturing methods, the use of plastic as a feedstock has the potential to exacerbate the **global plastic epidemic** unless we can find a **sustainable solution...**



Market Acceptance

98% of current customers rate us as 'very high quality' or 'high quality'

"A fantastic filament, worthy of printing in your printers"

Joel Telling, 3D Printing Nerd

"A very good solution for those who want to recycle but don't have the time or resources"

Joe Larson, 3D Printing Professor

"It's a really good filament... if it wasn't any good I'd tell you"

Chuck Hellebuyck, CHEP 3D Printing

"Well priced and looks fantastic"

Angus Deveson, Makers Muse

"Quality recycled filament that is truly reliable, very forgiving and easy to print with!"

Joe Casha, 3D Maker Noob

"The colours are really good compared to most others"

Anton Månsson, 3D Print Tech Design

Reducing Environmental Impact

To mitigate against the global plastic problem, and specifically, the growing demand for plastic in 3D printing - we commit to:



Provide a sustainable source of raw materials to 3D printing users



Minimise the amount of plastic being sent to the diminishing landfill sites



Avoid consumption of the Earth's oil stocks



Lower energy demand compared to producing new, virgin polymers



The Benefits of Sustainable 3D Printing

- Reduce the environmental impact of your production
- Increase the value of your product / service
- Comply with sustainable procurement policies
- Differentiate from the competition with Unique Selling Point
- Risk Management against future taxation policies discourage virgin plastic use

Growing Green Consumerism

A 2019 Filamentive survey sent to 200 industry professionals found that:

97%

97% consider plastic pollution a problem

98%

98% of current customers believe it is important to behave sustainably

69%

69% perceive the rise in plastic use in 3D printing to be a problem

Production

Where possible, recycled materials will be used to produce our 3D printer filament, in accordance with ISO 14021:2016;

Post-consumer recycled material: Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

Pre-consumer recycled material: Material diverted from the waste stream during a manufacturing process.

Material sourcing

A careful selection criteria is in place in order to guarantee quality, consistent waste streams. We use both post-consumer waste – for example recycled PET bottles to produce our ONE PET filament, as well as post-industrial waste such as material diverted from the waste stream during a manufacturing process which is how we produce our PLA filament, for example.

Manufacturing

This process starts by feeding plastic material from a hopper into the barrel of the extruder. The material is melted by the mechanical energy generated by turning screws and by heaters arranged along the barrel. The molten polymer is then forced into a die, which shapes the polymer into the shape of filament – either 1.75mm or 2.85mm.

Quality assurance

During extrusion, filament is measured by lasers from 2-axes, with an alarm bell sounding if the diameter falls outside our high standards. Filament is then wound onto bulk spools for visual inspection before it is put onto the individual spools to be packaged. Each batch produced undergoes a rigorous 3D printing test; if we're not happy with the print quality then it won't leave the factory, simple as.

Declaration of Recycled Content

Filamentive has made a commitment to continually **improve its environmental footprint and the sustainability of its products.**

Recycled materials are used in the production of our 3D printer filament products, in accordance with **ISO 14021:2016**. A careful selection criteria is in place in order to guarantee single-source waste streams - this includes both **post-industrial** and **post-consumer** sources of recycled material.

The table details the use of recycled material. Note that numbers provided are calculated as an **average of all colours per material (%)**.



Product	Material Composition	Recycled Content (%) ¹	Material Source ²
PLA	100% PLA + masterbatch	55	Post-industrial
PLA Matte	100% PLA + masterbatch	70	Post-industrial
ePLA	100% PLA + masterbatch	50	Post-industrial
PLA Cosmic	100% PLA + glitter flakes + masterbatch	10	Post-industrial
Wood PLA	60% PLA + 40% wood fibres	81	Post-industrial
PETg Black, White, Transparent	100% PETg + masterbatch	89	Post-industrial
PETg Grey, silver, blue, red, orange, green	100% PETg + masterbatch	99	Post-industrial
Carbon Fibre-PETg	80% PETg + 20% carbon fibre powder	100	Post-industrial
ABS ¹	100% ABS + masterbatch	64	Post-industrial
ASA ¹	100% ASA + masterbatch	50	Post-industrial

Recycled content can vary due to new guidelines, operating conditions, suppliers and material availability.

¹ Based on 2018-2019 waste recovery and recycled material usage in production. Calculated as total average across all colours per material.

² As defined by ISO 14021:2016.

Becoming Climate Positive

As with any business, our production, transport and employee activities generate CO2, exacerbating the greenhouse effect.

To mitigate our environmental impact, we're proud to work with Ecologi, enabling us to work towards being **Climate Positive**.

Our donation enables:

- **Planting trees to sequester CO2**
- **Funding of climate projects**
- **Employee carbon footprints offset**
- **All business travel offset**

Impact

1kg of CO2 removed for every 1kg of material produced



Ecologi

3D printed façade for adidas

Produced by: Proto21 3D Printing LLC

Location: adidas flagship store, The Dubai Mall, UAE

Our UAE-based partner, ^, 3D printed 1,008 individual pieces to form the 32-meter long modular facade for the adidas flagship store in *Dubai Mall*. Each of the 1,008 pieces measures 200x200x180 mm, and the entire project required 20,000+ hours of continuous printing. An in-house Prusa 3D print farm was fed by **450kg of Filamentive rPLA**. 3D printing was the ideal production method even for such a large number of components since it only required 2016 kWh of energy.



450kg of Filamentive recycled PLA was used to 3D-print more than 1000 pieces



The 32-meter long façade is the largest 3D-printed model in the Middle East



Ultimaker Material Alliance

Filamentive is pleased to announce our participation in The Ultimaker Material Alliance Program

Filamentive materials will be listed in the Ultimaker software and all 3D printing settings will be provided to allow:

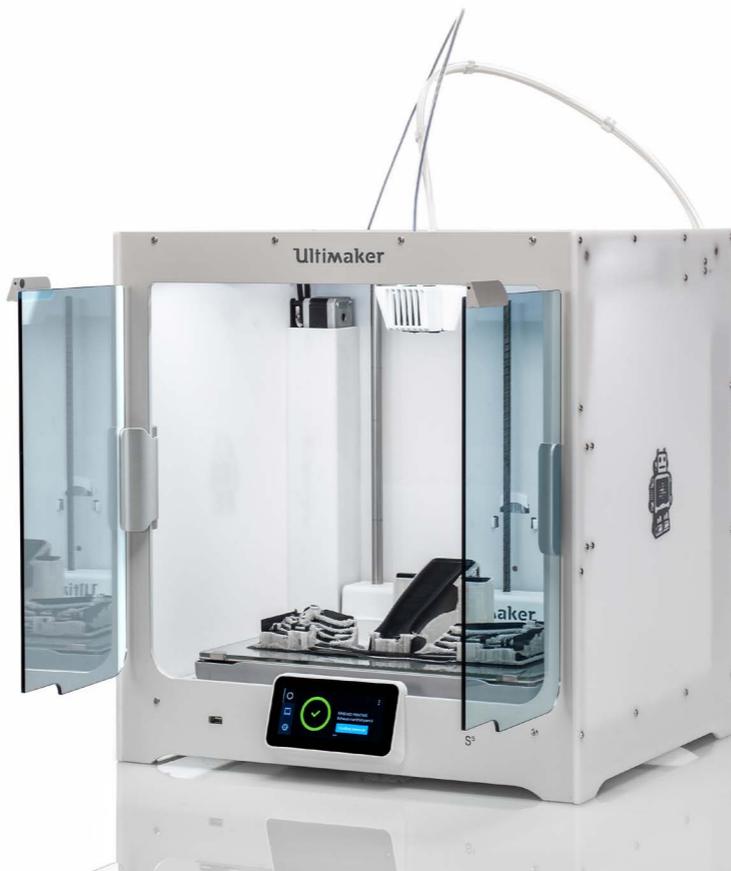
- **Hassle-free printing**
- **First-time-right printing**
- **Increased printing reliability**
- **Improved printing quality**

“With more than 100,000 Ultimaker users in the professional market and 3 million Cura users worldwide, the availability of Filamentive material profiles will increase the awareness, credibility and ultimately use of recycled materials to further reduce the environmental impact of FFF 3D printing.”

Ravi Toor, Managing Director at Filamentive

“3D printing professionals worldwide can now use FFF technology to print with a recycled material in order to achieve beautifully designed results printed in 3D.”

Bart van As, Product Manager Materials, Ultimaker



3D Print Farms Made Sustainable

3D printing farms bridge the gap between prototyping and production

Offering their customers:

- Zero tooling costs versus Injection Moulding
- Design flexibility
- Faster time to market

Filamentive supply some of the largest 3D print farms in the UK & beyond; with large quantities of filament required, our offer of recycled materials helps to ensure that scaled production can also be sustainable - ensuring high quality parts, yet low environmental impact.

“The benefit of using Filamentive filament is that it is made from recycled plastic... their competitive prices, high filament quality and eco-credentials make using their filament as our default material a no brainer.”

Thomas Constant, Founder and Managing Director, BeoBia



Clockwise: Lancashire3D, ProdPoint, BeoBia, Proto21

Materials Guide

Material	Summary	Printing Temperature (°C)	Heated Bed Temperature (°C)	Print Speed	Fan Speed (%)	Adhesion	Special
PLA	Easy to print and low warp - ideal for general prototyping	205 ±10	0-60	Medium-High	50-100	hairspray, bluetape, glass, PEI	
PLA Matte	Matte-finish and textured feel	205 ±10	0-60	Medium-High	50-100	hairspray, bluetape, glass, PEI	Hardened steel nozzle advised
ePLA	Engineering-grade PLA with mechanical properties and heat resistance of 95°C+	235 ±10	0-70	Medium-High	75-100	hairspray, bluetape, glass, PEI	Drying advised
PLA Cosmic	Featuring non-toxic metallic flakes for that extra sparkle	215 ±10	0-60	Medium-High	50-100	hairspray, bluetape, glass, PEI	Nozzle: ≥0.4mm
Wood	PLA-based; looks, smells and feels like wood	210 ±10	0-60	Medium-High	50-100	hairspray, bluetape, glass, PEI	Nozzle: ≥0.4mm
PETg	Easy to print and durable - also food contact acceptable	215 ±10	60-80	High	50-100	hairspray, bluetape, glass, PEI	
Carbon Fibre	PET-based filament featuring 20% carbon fibre powder for extra rigidity	235 ±10	0-60	High	50-100	hairspray, bluetape, glass, PEI	Hardened nozzle; ≥0.5mm
ABS	High impact strength with minimal warping	250 ±10	80-100	Medium	0-25	hairspray, bluetape, glass, PEI	
ASA	Strong, minimal warping and UV resistant so perfect for outdoors	245 ±10	80-100	Medium	0-25	hairspray, bluetape, glass, PEI	

Please note: these ranges should work for most printers, but feel free to experiment to get the best results

Product: PLA

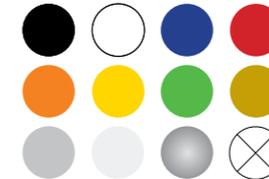
Recycled origin. Unrivalled quality

Short for polylactic acid, PLA is a bioplastic derived from plant-based sources. PLA is the easiest polymer to print and is used by the majority of 3D printer users. Whilst more sustainable than fossil fuel plastics, it's important to note that PLA is not biodegradable in soil, home compost or landfill – refuting claims by some marketers of PLA filament.

To reduce usage of virgin polymers, we work with industry partners to recycle post-industrial PLA waste materials that would otherwise be sent to landfill.

All users of rPLA can be satisfied that they are 3D printing sustainably, without compromising on quality.

Colours available:



Product: PLA Matte

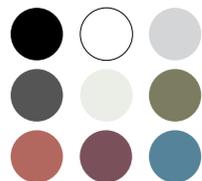
Magically Matte. Terrifically Textured

Based on our acclaimed PLA, this matte PLA has been especially formulated to provide a texture finish, with the visual impact of reduced layer visibility. PLA Matte is easy to print with and is available in a wide variety of colours to suit application.

Akin to our other PLA filaments, PLA Matte is also made from recycled materials (70%) where possible, and is supplied on a 100% recyclable cardboard spool.

PLA Matte filaments can be more abrasive than regular PLA, as such we recommend the use of a hardened / steel nozzle.

Colours available:



© 3dnorth.no



Product: ePLA

Harder. Better. Faster. Stronger.

ePLA is an engineering-grade PLA filament.

Comparable in performance to ABS, featuring 95°C heat resistance (after annealing) and the ability to print at speeds above 120mm/s.

It has a semi-matte finish.

Colours available:



Product: PLA Cosmic

Out of This World!

Based on our acclaimed PLA, PLA Cosmic is a Glitter PLA filament, which has been specially formulated with non-toxic metallic flakes for that extra sparkle.

PLA Cosmic is easy to print, tougher and less brittle compared to regular PLA and not abrasive – no need for any special nozzles!

The surface finish also reduces layer line visibility for that added magic – perfect for those aesthetic prints!

Colours available:



© 3DMakerNoob



Product: Wood

Smells like wood, looks like wood, feels like wood.

Wood PLA is a PLA-based composite 3D printer filament – a specially formulated, unique blend of 40% of the formula is made from recycled wood fibres, 60% being recycled PLA. As the name suggests, Wood PLA filament provides a realistic wood colour, finish and even smell!

Wood PLA is easy to print and very low warping. For efficient 3D printing, we do recommend ≥ 0.5 mm nozzle size.

Post-processing Wood PLA 3D prints is also possible – such as sanding, varnishing and coating.

Colours available:



© Tom Jackson / Filament Frenzy



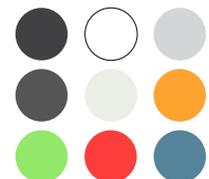
Product: PETg

Prints like PLA, strong like ABS.
Perfect hybrid

Polyethylene Terephthalate Glycol – or PETg for short – is an increasingly popular 3D printing filament, offering ease of printing akin to PLA, and strength comparable to ABS, without the downsides. PET(g) plastic originates from non-renewable sources, and recycling rates remain low. To reduce the consumption of virgin plastic, our PETg is made from recycled PETg plastic where possible.

Overall, rPETg is durable, does not warp, and is odour-neutral during 3D printing. A perfect all-rounder, recommended for functional prototypes and end-use parts.

Colours available:



Product: Carbon Fibre -PETg

3D print with real carbon fibre.
Without the footprint.

Carbon fibre is known for being strong, yet lightweight – and now you can 3D print with it!

Carbon Fibre-PETg (CF PETg) is a composite filament – 15% recycled carbon fibre, 85% PETg. This is a dimensionally stable material, which means no warping!

3D printed parts made from CF-PETg feature an attractive, matte black surface finish, with reduced layer visibility for enhanced visual effect. Features of this material include: extreme stiffness, impact resistance, and heat resistance of 75-80°C.

This is an abrasive material, so we recommend the use of a hardened / steel nozzle.

Colours available:



© Tom Jackson / Filament Frenzy



Please note: A hardened/steel nozzle is recommended as carbon fibre is inherently abrasive

Product: ASA

The perfect filament for the outdoors

ASA is an engineering-grade filament, featuring many of the same properties as our rABS – including high strength – with the added benefit of UV resistance to withstand outdoors environments.

This filament has been modified to ensure zero warping and excellent adhesion – both interlayer and to the bed – to ensure efficient 3D printing.

Recommended for functional prototypes and end-use parts, particular those which are to be positioned outdoors / exposed to the elements.

Colours available:



Product: ABS

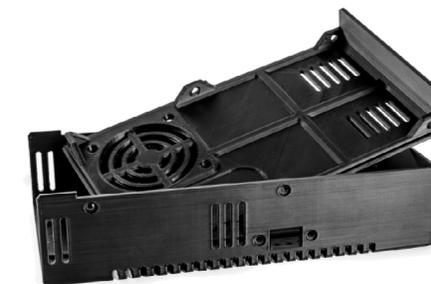
Recycled. Redefined. Revolutionary.

ABS is a common 3D printer filament, famous for its strength. However, ABS is also infamous for warping and being generally environmentally unfriendly.

We have changed this. Our rABS is an engineering-grade filament, made from >60% recycled materials to reduce the use of virgin ABS and lower energy demand. We have also ensured that the material features minimal warping, as well as excellent adhesion – both interlayer and to the bed.

Filamentive rABS has enhanced strength compared to regular ABS making it ideal for functional prototypes and end-use parts.

Colours available:



© Lancashire3D

Product: XL Spools

Did you know we offer XL spools of our 3D printing filament – in sizes up to 8.5 kg?

Why Use XL Spools?

Large volume prints - The bigger the prints, the more filament you need!

Hassle-free - Reduce spool changes and ensure your printer doesn't run-out of filament!

Reduce cost - winding large spools is more efficient for us and we can therefore pass-on the cost savings!



1kg



2.3kg



8.5kg

Sustainable 3D-Printed Coral Reef Cafe

A giant Coral Reef was 3D-printed for the Sky Ocean Rescue cafe, using >200 kg of Filamentive recycled PLA filament

Produced by: Beautiful Wonder

Location: SkyUK HQ in London



Case Study

Used by **thousands** of makers, 3D Hubs, businesses and universities, Filamentive has become a **main player** in the 3D printing materials market. Our material are used globally - from prototyping and development applications to end-use products.

Here is one example use-case for our materials.

“Filamentive’s filament prints beautifully and they always deliver on time, the customer service is always excellent. On top of their filament being recycled, they’re the only supplier we know that uses cardboard spools which massively reduces our waste given that we order in bulk. We love their eco-friendly efforts and fully support their focus on and development of filaments that are 100% recycled.”

Samantha Payne, COO, Open Bionics

Open Bionics uses Filamentive materials to create stunning aesthetic covers for their ‘Hero Arms’, - a 3D printed bionic limb for amputees and people with limb differences. Open Bionics champions diversity, inclusion, and celebration of personality. Filamentive enables them to reliably build beautiful designs that their users love.

Open Bionics uses filamentive materials to print their 3D printed robotic hand, The Brunel Hand. The Brunel Hand is an affordable robotic hand for researchers to perform and test dexterous tasks. <https://openbionics.com/>



Technical Data

Product	Specific Gravity (g/cc)	MFI (g/10min)	Tensile Strength at Yield (MPa)	Elongation-Strain at Break (%)	Tensile (E) Modulus (MPa)	Vicat Softening Temp. (°C)	Heat Deflection Temp. (°C)	Glass Transition Temp. (°C)	RoHS Compliant	REACH Compliant
rPLA	1.24	9.56	70	20%	3120	60		57	✓	✓
PLA Matte	1.38	9.56	70	20%	3120	60		57	✓	✓
PLA Cosmic	1.24	9.56	70	20%	3120	60		57	✓	✓
ePLA	1.27	6	N/A	47%	4000		95+ after annealing	60	✓	✓
Wood	1.2	5	70 MPa (MD) 100 MPa (TD)	170% (MD) 110% (TD)	1900 MPa (MD) 2300 MPa (TD)	45			✓	✓
rPETg	1.27	6.4	50	23%	2020		70	77	✓	✓
Carbon Fibre	1.19	N/A	53	8%	3800		80		✓	✓
ABS	1.1	41	44	34%	2030	97			✓	✓
ASA	1.11	26.6	48	15%	2020	98			✓	✓

For Technical and Material Data Sheets, please see: filamentive.com/downloads

ALUMINA - A 3D Printed Moving Light Sculpture



This is a sculpture about light, water and sound. Taking ephemeral moments found in nature then deconstructing and assembling them as precise elements in a gallery setting.

Produced by: Algorithm

Location: Royal Hibernian Gallery,
Dublin, Ireland

"We chose to use recycled PLA from Filamentive, as it was not only the most economical material to print with, but also lessened the footprint created by the sculpture in the long run"

algorithm.ie/alumina



(CISCO)



Nate Petre, SHIELD

Impact

PPE supply - during the COVID-19 pandemic, Filamentive supplied filament to thousands of shield-maker volunteers to address the global PPE shortages.



Felix, ProdPoint



“One of the world’s
most impactful start ups”



Finalist



Head Office

Bradford Chamber Business Park
New Lane
Bradford
West Yorkshire
BD4 8BX
United Kingdom

Enquiries

Email us at: info@filamentive.com
Call us on: +44 (0) 333 366 0020
For list of resellers in the UK & beyond,
visit: filamentive.com/resellers
filamentive.com