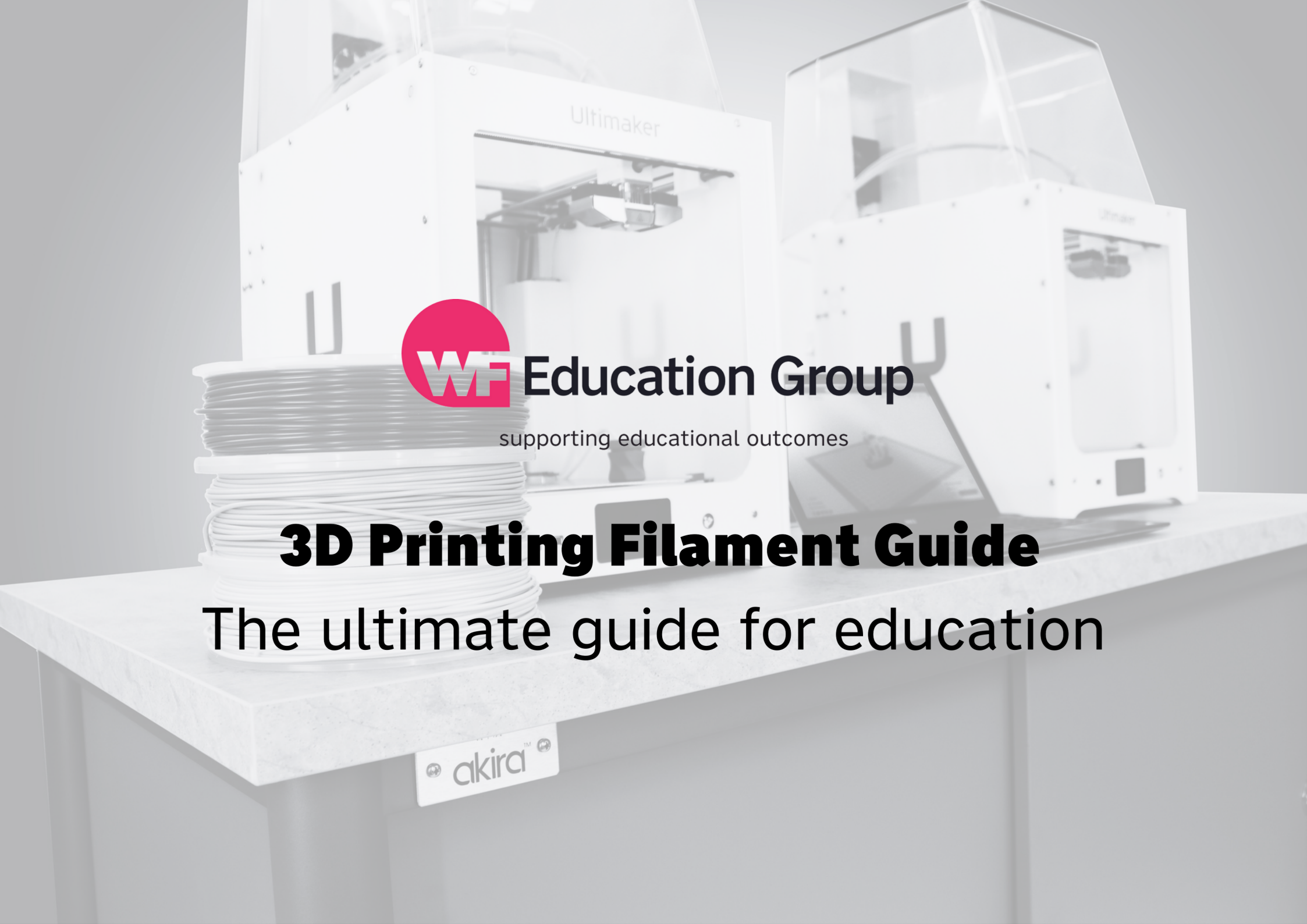

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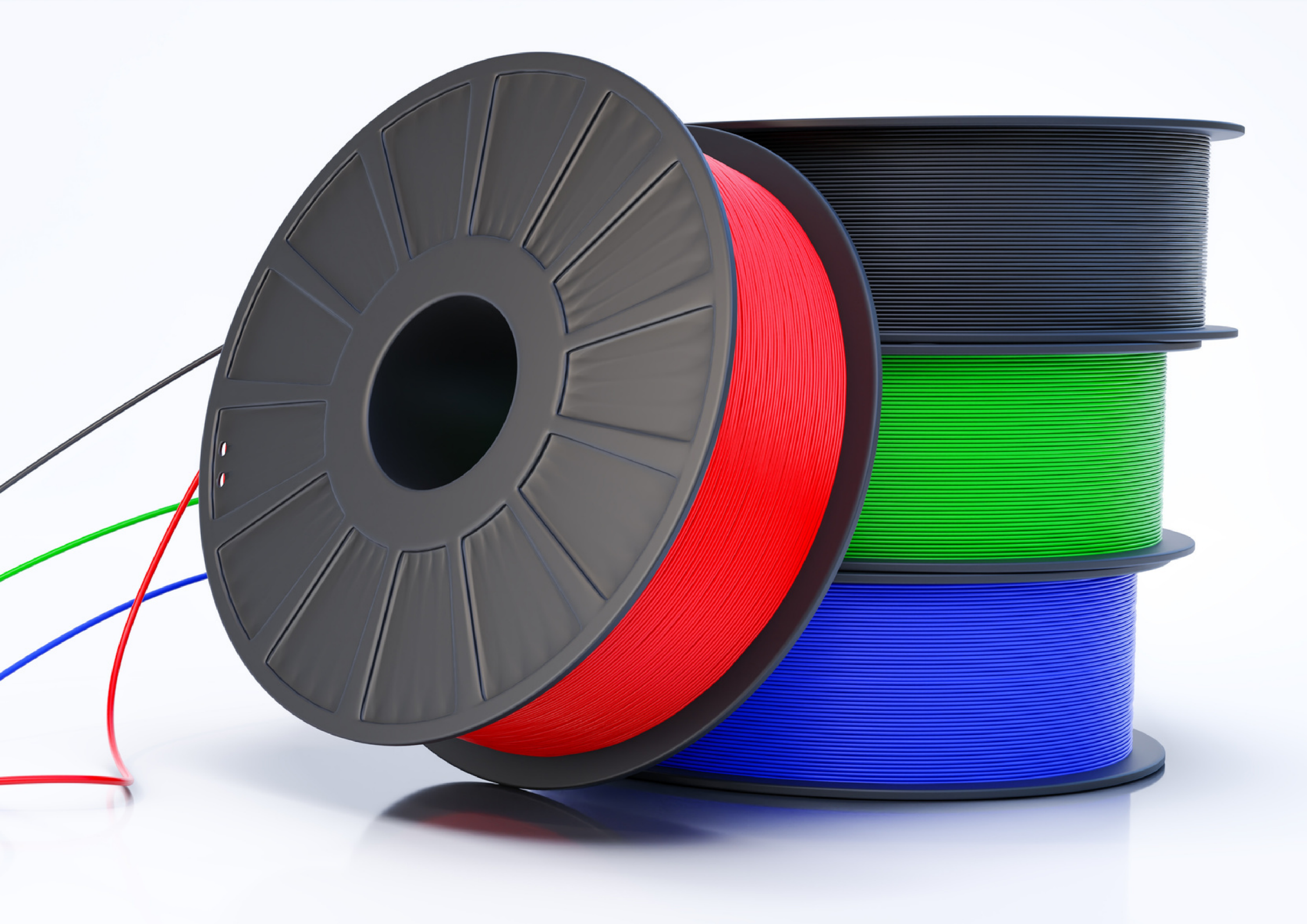
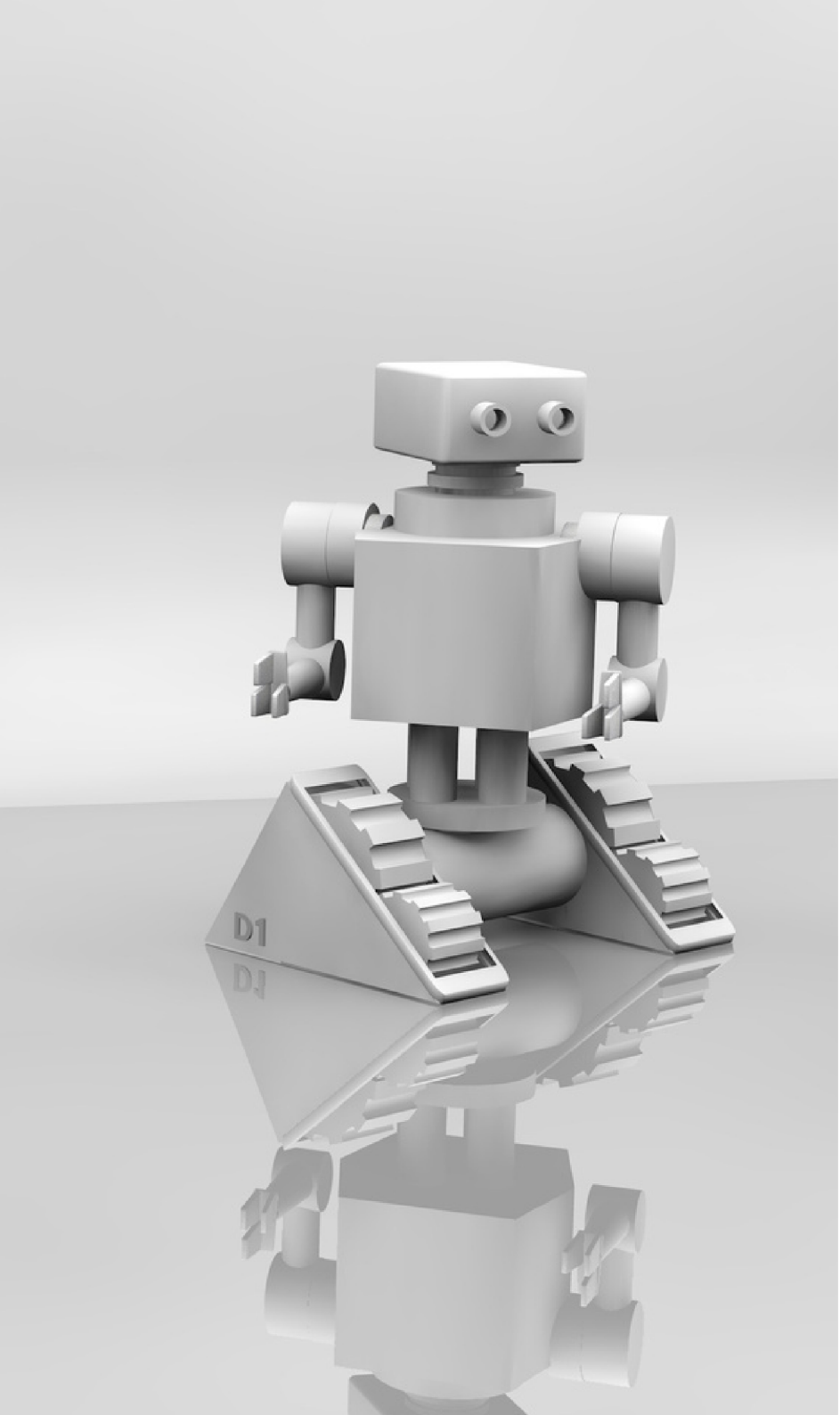
3D Printing Filament Guide

The ultimate guide for education





The STEM skills shortage is reported to be costing the UK economy £1.5bn a year as employers struggle to recruit people with the right qualifications in science, technolog y, engineering and maths.

With STEM roles expected to double in the next ten years, as the technological revolution continues apace, it's crucial that we bridge this gap.

It has always been a key feature of research and development within industry. Various factors have led to an explosion in interest in 3D Printing in education, including advances in equipment and software design, widening demands for its use, and descending machinery prices.

Students who look to progress in careers based on STEM-related subjects, for instance, engineering, will gain several advantages from a range of digital technologies being combined with lessons.

We have a range of 3D Printing Solutions, WorkStations, equipment and filaments, avalable from TSL.

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The filament types listed below are not a comprehensive list of 3D printing materials available within the 3D Printing market.

However, here are some of the more commonly used filaments with FDM/FFF 3D Printers:

PLA Polylactic Acid	**ABS** Acrylonitrile Butadiene Styrene	**HIPS** High Impact Polystyrene	**PVA** Polyvinyl Alcohol
✓ Affordable & easy to print with ✓ Widely available & compatible with many machines ✓ Great for a range of education projects & prototyping ✓ Made from corn starch - it's biodegradable and environmentally friendly ✓ Doesn't require a heated bed	✓ Affordable ✓ Heat resistant ✓ Very durable, tough & impact resistant ✓ Less stringing giving a smooth finish ✓ Widely available & compatible with many machines	✓ Relatively low-cost support material ✓ ABS compatible ✓ Very rigid, durable & impact resistant ✓ Easy to dissolve ✓ Lightweight ✓ Dissolvable with d-Limonene ✓ Recyclable	✓ Excellent support material for complex structures ✓ Water soluble ✓ Easy to use
✗ Can be a rougher texture than other materials ✗ Prints degrade over time so not great for finished product development ✗ More brittle than ABS	✗ High melting point ✗ High odour so good ventilation required ✗ Prone to warping ✗ Prone to shrinkage	✗ High print temperatures required ✗ Requires a heated bed ✗ Heated chamber recommended Ventilation required	✗ Can be expensive for good quality produce ✗ Sensitive to absorbing water, therefore, needs a sealed container when not in use ✗ Not very compatible with ABS, PETG or Nylon

Top Tip!

When your 3D Printer is not in use for several weeks, remove all material and place in a sealed bag along with a packet of dried silicon. This will not only stop the filament absorbing moisture, prolonging its quality and longevity but will reduce the risk of any heated element blockages.

PET-G Poly-Ethylene Terephthalate Glycol	**Nylon** Polyamide	**Glow-in-the-dark** PLA or ABS	**PC** Polycarbonate
✓ Very flexible & resistant to warping & shrinkage ✓ Highly durable ✓ Wide range of print usage ✓ Widely used in manufacturing ✓ Non-toxic, food safe properties ✓ Easy to sand ✓ Exceptional layer adhesion	✓ Relatively inexpensive ✓ Very flexible when thin & solid when thick ✓ Low odour & food safe ✓ Heat resistant ✓ Incredibly strong & durable ✓ Can be machine drilled ✓ Great for printing living hinges, tools & parts ✓ Great if your considering industrial, mechanical & engineering application in your classroom	✓ Great for demonstrating the phosphorescence process ✓ Engaging material for students ✓ Fairly strong & durable ✓ Fairly flexible	✓ Incredibly durable & strong ✓ Great optical clarity ✓ Heat resistant up to just over 110 °C ✓ Flexible
✗ Limited brand options ✗ Requires a high print temperature ✗ Requires a high bed temperature ✗ Reported stringing issues due to its sticky consistency ✗ Not great for printing support structures ✗ Not very scratch resistant	✗ High print temperatures required ✗ Heated bed required	✗ Can be difficult to spot print issues due to its translucent colour when not glowing ✗ Cheaper Glow in the dark materials can be really poor quality so to get good outputs you'll need to buy more expensive brands ✗ Limited colour range, especially in PLA. Some colours glow brighter than others	✗ Can be very challenging to print with ✗ Extremely high print heat required ✗ High bed heat required ✗ Enclosed machine highly recommended ✗ Severe fumes ✗ Prone to warping & layer splitting ✗ Moisture absorbent, airtight packaging required

PET (CPE) Polyethylene Terephthalate	**PMMA** Polymethyl Methacrylate	**ASA** Acrylonitrile Styrene Acrylate	**Flexible** Thermoplastic Urethane / Polyurethane (Bioflex)	**Conductive** PLA or ABS
✓ High tensile strength above ABS ✓ Very flexible ✓ Fairly easy to print ✓ Chemical & heat resistant ✓ Excellent layer adhesion so no delamination ✓ Less shrinkage ✓ Low odour	✓ Very durable ✓ Fairly strong ✓ Shatter & scratch resistant ✓ Excellent clarity & translucency ✓ Easy to use	✓ Very durable ✓ Fairly strong ✓ Fairly new to market, specialist material. ✓ Resistant to UV light unlike ABS – perfect for outdoor use	✓ Extremely flexible material when printed thin ✓ Great for elastic parts or wearable technology projects ✓ No shrinkage ✓ No heated bed required ✓ Keeps it shape when printed thick	✓ Excellent for electronics projects ✓ Fairly strong ✓ Fairly flexible ✓ Easy to use ✓ No heated bed required
✗ High print temperatures required ✗ Can be expensive ✗ Deforms at 70 °C	✗ Not the most flexible filament available ✗ High print temperature required ✗ Heated bed required ✗ Not food safe	✗ High print temperatures required ✗ Heated bed required ✗ Not the most flexible filament available ✗ Needs to cool slowly or it will crack – can be controlled by turning fans down ✗ Enclosed machine recommended for best outputs	✗ Can be difficult to use ✗ High print heat required ✗ Not a strong material ✗ Can clog & jam – check your printer is compatible ✗ Needs a slower speed to print	✗ High print temperatures required ✗ Not the most durable of filaments available ✗ Expensive to purchase

Top Tip!

We are experienced suppliers of 3D Printers and packages for educational use. We offer a comprehensive range of products, backed up with our in-house expert knowledge and technical support.

View the range

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akira™

By WF Education Group

Akira™ 3D Printing Duo Workstation

The ultimate mobile solution for educators and students alike. Enhance your projects with digital printing technology, effortlessly relocate the WorkStation to meet your needs.

We have integrated two 3D printers with an Akira™ Workbench, to create a compact workstation for two students, that as one of its many advantages, is a space saving mobile set-up.

Akira™ mobile workstation with storage and integrated power. Supplied with:

- 2 x Ultimaker 2+ Connect 3D printers
- 2 x Air Managers
-

Dimensions (with 3D printers): HxWxD: 1430 x 1500 x 750mm

Available in: Onyx Grey, Kiwi Green, Smoke Blue

View the range

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By WF Education Group

Akira™ 3D Printing Duo Workstation

Plug and Play

A ready to use solution, preassembled by WF engineers which includes an Akira™ Workbench and two Ultimaker 2+ Connect 3D Printers.

One plug powers the WorkStation, making the set-up process fast and user-friendly. The unit can be moved between locations quickly and with ease, allowing for time to be dedicated to teaching and learning instead of prolonged set up and assembly each time.

Teach 3D Printing anywhere

A convenient and efficient solution for teaching 3D printing - in any space, at any time.

The mobile Akira™ WorkBench eliminates the need for dedicated workroom spaces and allows flexibility in setting up temporary learning environments.

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Uncompromising quality

All Akira™ frames carry a 25 year guarantee.

Coupled with a modular design, where individual components can be replaced at end of life, not only does the Akira™ system have an excellent lifetime value, but also provides a sustainable option for your spaces.

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Other services

Design Consultancy & Installations
From all-encompassing ‘Innovation Spaces’ to Design & Technology and Library installations including FF&E; our projects team offer a comprehensive, bespoke service from design consultancy and planning through to installation and training covering refurbishments and new builds. We have a team of experienced, in-house designers and education specialists offering a consultancy, design-led solution that will equip your school with next generation, innovative learning environments for your pupils.

Servicing & Maintenance
We also offer comprehensive servicing and maintenance contracts carried out by our qualified engineers on all workshop equipment, including laser cutters.

D&T Supplies
Every year in the UK, 3.5 million pupils are taught using consumables that have been sourced from TSL. We have everything you need for Design & Technology with thousands of products across materials, engineering, electronics, graphics and more.

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