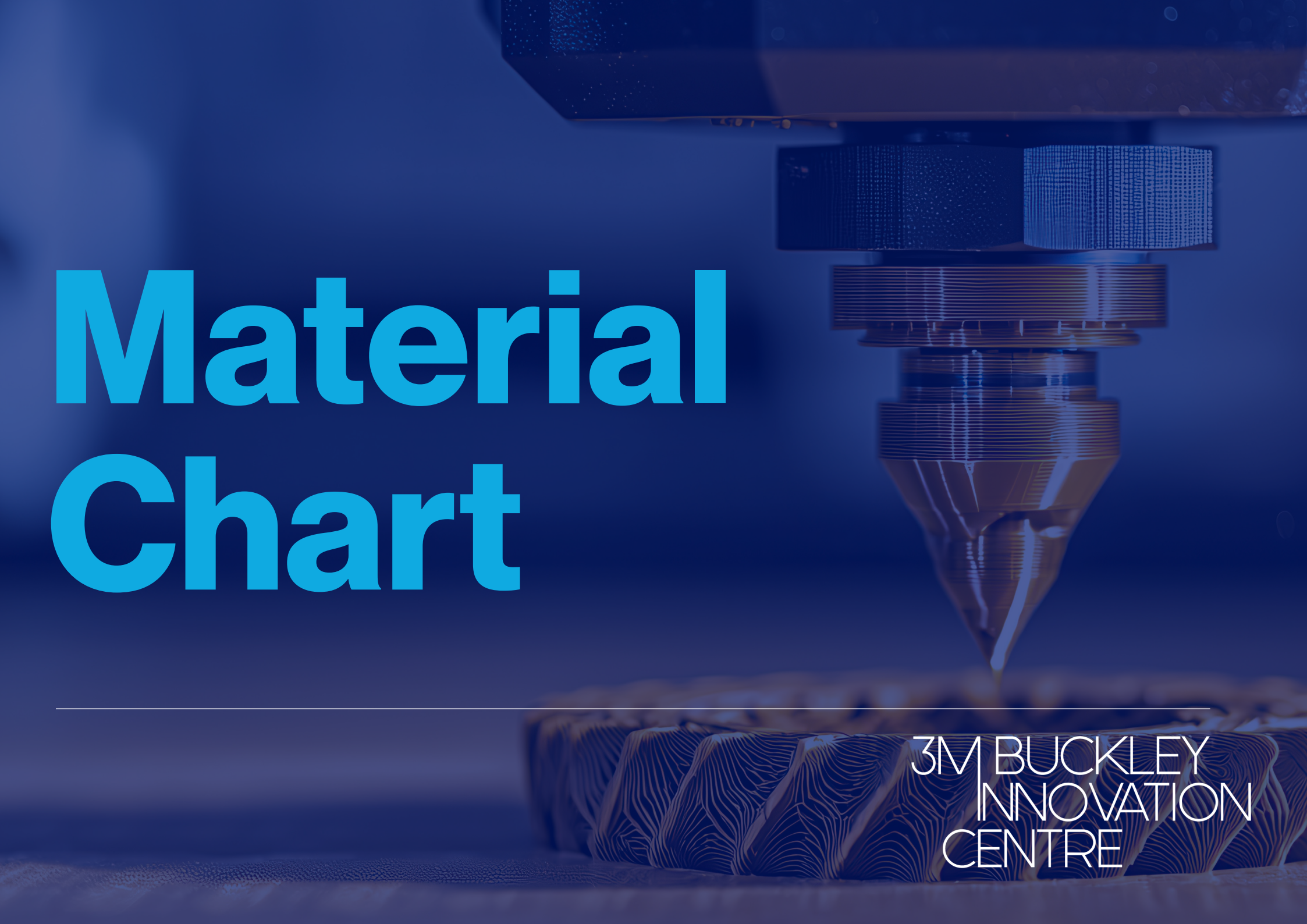
Material Chart



3M BUCKLEY INNOVATION CENTRE

In-house Materials	Key Features	Applications	Ultimate strength	Impact strength -kJ/m² Shore hardness Tear strength- kN/m	Density	Heat Deflection temp @0.45mpa Melting point Glass Transition temp	Compatible printer
PLA (Polylactic Acid)	• Renewable • Biodegradable	• Prototyping • Tooling	76 MPa	26.6 kJ/m²	1.24g/cm³	57 °C (@0.45MPa)	Bambu (Filaments)
ABS	• Tough • Durable • Good heat and freezing resistance • High impact resistance • Excellent water resistant performance	• Prototyping • Functional parts • Standard engineering components	62 MPa	39.3 kJ/m²	1.05g/cm³	87°C (@0.45MPa)	
ABS-GF	• Enhanced mechanical and aesthetic properties • Good strength and stiffness • Good temperature resistance • Dimensional stability • Durable with good wear resistance • Good water resistance	• Mechanical and decorative parts • Load bearing and bend resistance parts • Intricate mechanical assembly parts • Geometric components	68 MPa	14.5 kJ/m²	1.08g/cm³	99°C (@0.45MPa)	
PETG -HF	• Superior water resistance • Superior UV resistance • Higher temperature resistance to standard PETG	• Ideal for out door items to withstand impact and collisons	64 MPa	31.5 kJ/m²	1.28g/cm³	69 °C (@0.45MPa)	
PETG-CF	• Improved strength • Good toughness • High performance • Good impact strength • High flexibility	• Drone parts • Racing models • Functional parts	70 MPa	41.2 kJ/m²	1.25g/cm³	74 °C (@0.45MPa)	
PETG Translucent	• Easy to print • Good impact resistance • Excellent resistance to UV • Good light transparency • Good range of colours	• Parts for use outdoors • Functional prototypes • End use parts	33 MPa	37.4 kJ/m²	1.25 g/cm³	74 °C	
PA6-CF	• High performance engineering plastic • Exceptional strength • Exceptional durability • Exceptional dimensional stability • Good thermal properties • Good chemical resistance	• Prototypes • Functional parts • Components, ideal for demanding industries • Automotive applications	151 MPa	40.3 kJ/m²	1.09g/cm³	186 °C (@0.45MPa)	
TPU	• Tough • Good flexibility • Good durability	• Impact resistant parts • Durable components • Protective casings • Flexible components • Sports equipment • Automotive parts	0.8 MPa	124.3 kJ/m²	1.24g/cm³	183 °C (melt temp)	

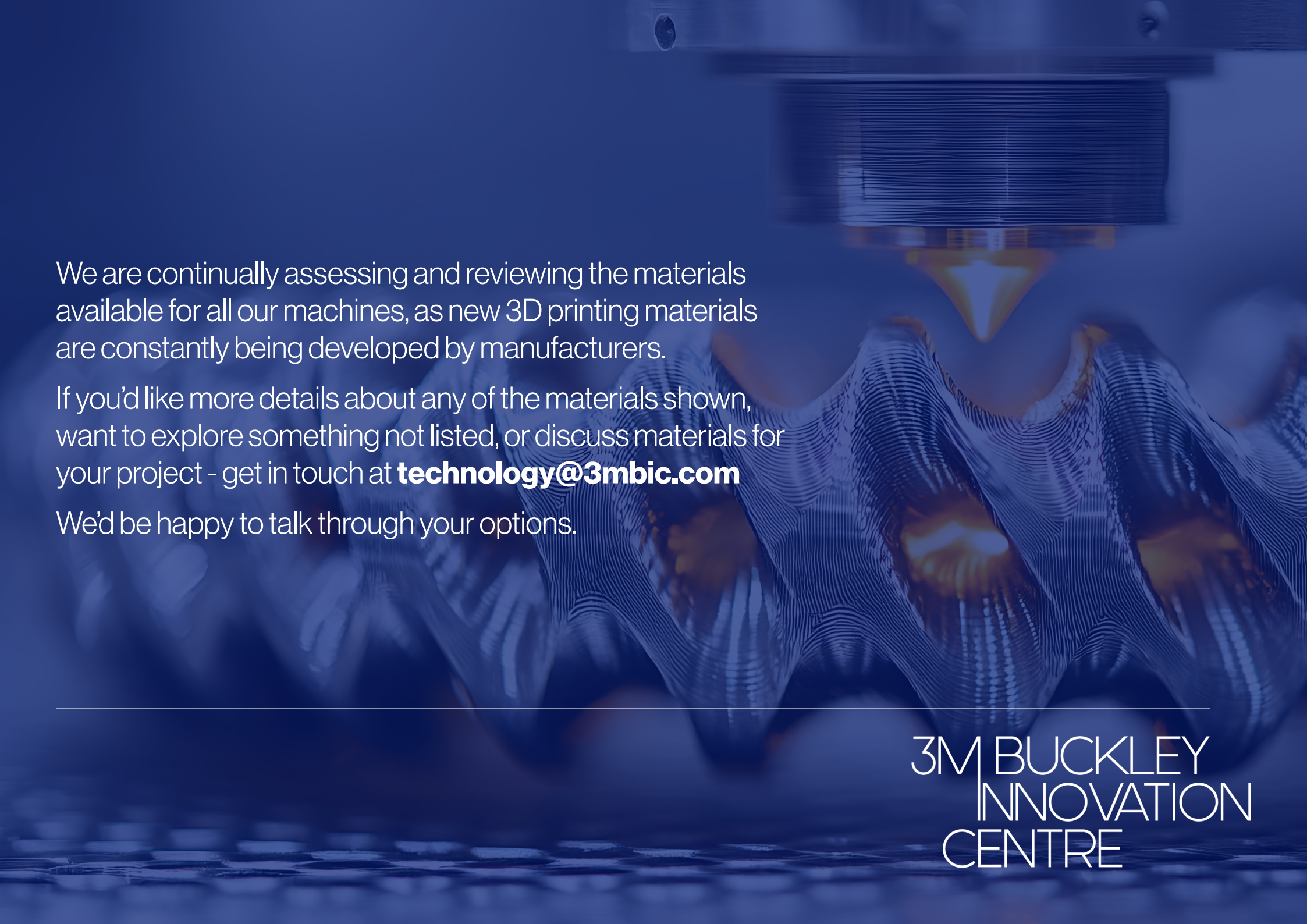
In-house Materials	Key Features	Applications	Ultimate strength	Impact strength -kJ/m² Shore hardness Tear strength- kN/m	Density	Heat Deflection temp @0.45mpa Melting point Glass Transition temp	Compatible printer
Bio Med Clear	• Biocompatible • Sterilizable • Long term bodily contact • Mucosal membrane contact	• End tools • Instruments and devices • Medical devices • Device components • Ventilator and PPE components • Drug delivery devices	52 MPa	78 shore D hardness	1.09g/cm³	67 °C (@0.45MPa)	Form Labs
Bio Med White	• Biocompatible applications • Long term skin contact • Short term mucosal contact • Disinfection and sterilisation compatible • Opaque material	• Pharmaceutical and drug delivery applications • End use devices • Device components • Cutting and drilling guides • Anatomical models • Jigs and fixtures • Moulds	45.75 MPa	80 shore D hardness	1.15g/cm³	67 °C (@0.45MPa)	
Bio Med Durable	• Biocompatible • Strong impact resistant • Clear	• End use devices • Components • Single use instruments	29.1 MPa	75 shore D hardness	1.05g/cm³	46 °C (@0.45MPa)	
Bio Med Elastic 50A	• Soft elastic medical grade material • Long term skin contact • Short term mucosal membrane contact	• Biocompatible elastic devices • Soft tissue models • Wearables, such as straps • Compressible buttons • Stretchable enclosures and casings	2.3 MPa	50 shore A hardness 11kN/m	1.01g/cm³	36 °C (Tg)	
Bio Med Flex 80A	• Biocompatible • Good durability • Flexible • Long term skin contact • Short term mucosal membrane contact • Transparent	• Flexible devices • Flexible parts/components • Models	7.2 MPa	77-80 shore A hardness 22 kN/m	1.05g/cm³	37 °C (Tg)	
Silicone 40A	• 100% silicone • Excellent chemical resistance • Excellent thermal resistance • Withstand repeated cycles of stretching, flexing, and compression	• Fabricate soft, pliable and durable parts • Highly functional parts and components • Fine detailed features and parts	5.0 MPa	12.0 kJ/m 40 shore A hardness	1.02g/cm³	-107 °C (Tg)	
ESD	• Tough • High modulus • High impact strength • Static- dissipative	• Anti-static prototypes • End use parts • Housing for sensitive electronics • Tooling, jigs and fixtures • Production tooling • Engineering, parts and components • Prototyping	44.2 MPa	90 shore D hardness	1.116g/cm³	62.2 °C (@0.45MPa)	

In-house Materials	Key Features	Applications	Ultimate strength	Impact strength -kJ/m² Shore hardness Tear strength- kN/m	Density	Heat Deflection temp @0.45mpa Melting point Glass Transition temp	Compatible printer
Flame Retardant	• Flame retardant • Heat-resistant • Stiff • Creep-resistant • Can handle post-fabrication operations such as tapping, trimming, and drilling • Excellent surface finish	• UL 94 Blue Card certified material for creating self-extinguishing and halogen-free parts • Heat resistance parts and components for long-term in indoor and industrial environments with high temperatures or ignition sources • Engineering, parts and components • Protective and internal consumer or medical electronics components • Interior parts in airplanes, automobiles, and railways	41 MPa	1.05-1.11 kN/m	1.25g/cm³	55-111 °C (@0.45MPa) 101-144 °C(Tg)	Form Labs
High Temp	• High thermal stability	• Precise prototypes • End use parts • Moulds and inserts • Parts exposed to hot air, gas and fluid flow • Heat-resistant mounts, housings and fixtures • Engineering, parts and components	49.0 MPa	33-17 J/m	1.14g/cm³	238 °C (@0.45MPa)	
Grey V5	• High accuracy • Strong mechanical properties • Fine feature performance • Appearance of injection-moulded parts	• Form and fit prototyping • Presentation-ready models with fine features and intricate details • General dental models • Jigs and fixtures	62.0 MPa	36-32 J/m	1.11g/cm³	62 °C (@0.45MPa)	
Grey Pro	• Tough • Some heat resistance • Low creep • Fine detail • High precision	• Concept models • Look alike prototypes • Functional prototypes • Form and fit testing • Jigs and fixtures for manufacturing	61.0 MPa	18.7 J/m	1.08g/cm³	78 °C (@0.45MPa)	
Black V4	• Intricate and precise detailing • Matte surface finish • Opaque appearance	• General-purpose prototyping • Design models with intricate details	48.0 MPa	16-25 J/m	1.09g/cm³	73 °C (@0.45MPa)	
Clear V4	• Rigid material • Polishes to near optical transparency	• Clear prototype parts • LED housing windows • Fluidics • Moulds • Optics • Lighting and any parts requiring translucency • Showcasing internal features, see-through models and devices	53.0 MPa	29-27 J/m	1.08g/cm³	65 °C (@0.45MPa)	

In-house Materials	Key Features	Applications	Ultimate strength	Impact strength -kJ/m² Shore hardness Tear strength- kN/m	Density	Heat Deflection temp @0.45mpa Melting point Glass Transition temp	Compatible printer
visijet M2R-WT	• High strength and modulus • High accuracy • Moisture resistance • Opaque white	• General purpose models • Functional prototypes • Jigs, fixtures and tools • Patterns, dies and moulds	35-40 MPa	77 shore D hardness	1.6g/cm³	50 °C (@0.45MPa)	ProJet 2500 (Resin)
visijet M2R-BK	• High strength and modulus • High accuracy • Moisture resistance • Opaque black	• General purpose models • Functional prototypes • Jigs, fixtures and tools • Patterns, dies and moulds	45-55 MPa	81 shore D hardness	1.6g/cm³	59 °C (@0.45MPa)	
visijet M2R-CL	• High strength and modulus • High accuracy • Moisture resistance • Transparent clear	• General purpose models • Functional prototypes • Jigs, fixtures and tools • Patterns, dies and moulds	35-40 MPa	77 shore D hardness	1.6g/cm³	44-50 °C (@0.45MPa)	
PEEK 450 -Natural	• High thermal resistance • High chemical resistance • High stress resistance • Bio inert • Low weight • Post treatment possible	• Food industries • Medical and drug applications • Electronical components • Tools and fixtures • Engineering parts • Chemical resistant parts	98 MPa	7.7 kJ/m²	1.3g/cm³	343 °C (melt temp)	Apium P400 (Filament)
PEEK CFR	• High stiffness • High thermal resistance • High chemical resistance • Bio inert • Low warping • Light weighting	• Industrial application • Engineering, parts and components • Prototyping • Research and development projects	190 MPa	45 kJ/m²	1.38g/cm³	343 °C (melt temp)	
PA6-CF (Black)	• High stiffness • Good strength • Excellent thermal properties • Excellent mechanical properties • Excellent impact resistance • Good lightweight characteristics	• Automotive components • Mechanical and structural parts • Industrial and consumer products • Sports equipment • Machinery components • Suitable for items that are subjected to regular mechanical stress • Hand tools	81 MPa	10.0 kJ/m²	1.17g/cm³	219 °C (melt temp)	Landr (Filament)
Polyterra PLA	• Bio plastic • Good rigidity • Good mechanical properties • Easy processing	• Models • Fixtures	23.2 MPa	6.7 kJ/m²	1.31g/cm³	163 °C (melt temp)	

In-house Materials	Key Features	Applications	Ultimate strength	Impact strength -kJ/m² Shore hardness Tear strength- kN/m	Density	Heat Deflection temp @0.45mpa Melting point Glass Transition temp	Compatible printer
Stainless Steel 316L	• High hardness • Excellent toughness • High corrosion resistance • Good machinability • Can be highly polished and post processed	• Plastic injection, pressure die-casting moulds and extrusion die • Surgical tools • Maritime components • General engineering, parts and components • Prototyping • Research and development projects	706-667 MPa	Contact for further information	8g/cm³	1371 °C - 1399 °C (melt temp)	Renishaw (PBF*)
Titanium Ti6Al4V	• High specific strength • High corrosion resistance • Excellent biocompatibility • Good osseointegration • Low thermal expansion • Low thermal conductivity	• Medical and Dental • Aerospace and Defence • Motorsport • Jewellery and art • Maritime applications • High-end sports equipment • Engineering, parts and components • Prototyping • Research and development projects	1054-1031 MPa	Contact for further information	4.4g/cm³	1635 °C - 1665 °C (melt temp)	
Inconel 625 (svbp)	• High creep resistance • Very high corrosion and oxidation resistance at high temperature • High fatigue strength in seawater • Excellent welding characteristics • Non-magnetic	• Automotive • Aerospace and Defence • Chemical process industry • Marine engineering • Oil and gas industry • Nuclear • Seawater heat exchanger • Engineering, parts and components • Prototyping • Research and development projects	864 MPa	Contact for further information	8.4g/cm³	1290 °C - 1350 °C (melt temp)	
Tungsten (svbp)	• High heat resistance • High tensile strength • High density • Exceptional electrical conductivity	• Aerospace and Defence • Medical • Nuclear • Energy industries • Industrial applications	Contact for further information	Contact for further information	10.0-10.60 g/cm³	Contact for further information	
Copper Alloy CuCrZr (svbp)	• Moderate to high conductivity in heat treated conditions • Good mechanical properties • Electrical conductivity • Thermal conductivity	• Rocket engine parts • Heat exchangers • Induction coils	345-510 MPa	Contact for further information	8.84g/cm³	Contact for further information	

In-house Materials	Key Features	Applications	Ultimate strength	Impact strength -kJ/m² Shore hardness Tear strength- kN/m	Density	Heat Deflection temp @0.45mpa Melting point Glass Transition temp	Compatible printer
PA2200 - polyamide 12	• Good mechanical properties • Biocompatible with ISO 1099-1 certified for use with food • High detail resolution • High long term constant behaviour	• Functional parts/end products • Ideal for fully functional parts under high mechanical and thermal load • Vacuum casting pattern • Illustrative models • Spare parts	48-40 MPa	32.8 kJ/m2 75 shore D hardness	0.45g/cm³	172-180 °C (melt temp)	EOS (PBF*)
PLA (ECO) 2.85mm	• Non-toxic • Biodegrable • All round PLA	• Prototyping • Models • Decorative parts	45 MPa	Contact for further information	contact for more info	155 °C (melt temp)	Ultimaker (Filament)
rPLA -2.85mm	• Bio plasic • Low warping • Quality print	• Prototyping • Models • Decorative parts	69.8 MPa	3.4 kJ/m²	Contact for further information	74-146 °C (melt temp)	
PETG	• Easy to print • Good impact resistance • Excellent resistance to UV	• Parts for use outdoors • Functional prototypes • End use parts	33 MPa	37.4 kJ/m²	1.25 g/cm³		
TPU A95	• Easy to print • Tough • Flexible • Good chemical • UV and water resistance • Can be used for functional prototypes and end use parts	Contact for further information	55 MPa	80 to 95 shore A hardness	Contact for further information	190 °C	
PP (polypropylene) -2.85mm	• Lightweight • High chemical resistance properties wear • Abrasion resistance • Fatigue resistance • Semi flexible • Durable • Excellent interlayer adhesion	• Multi-functional material • Dishwasher safe • Microwave safe • Food containers • Liquid containers • Functional engineering parts • Prosthetics • Orthopaedics • Medical	12 MPa	50 shore D hardness 30 kJ/m²	0.9g/cm³	170 °C (melt temp)	



We are continually assessing and reviewing the materials available for all our machines, as new 3D printing materials are constantly being developed by manufacturers.

If you'd like more details about any of the materials shown, want to explore something not listed, or discuss materials for your project - get in touch at **technology@3mbic.com**

We'd be happy to talk through your options.

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