

(DM3) ABS – 3D Printing Filaments



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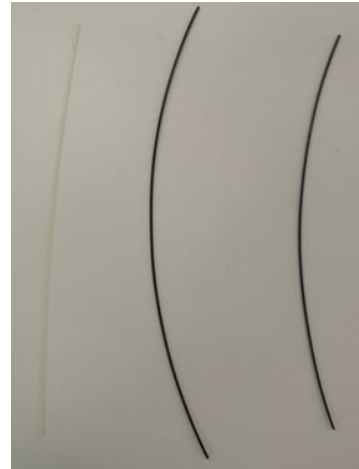


Figure 3.1 Target Demonstrator (for Illustration). Pictures from Amazon.com

Figure 3.2 Samples of extruded filaments and 3D printed testing bars obtained after trials validation trials (TRL4) in AIMPLAS

Responsible Compound Formulation	Processing Small Scale	Demo pilot scale	Target/Final TRL	Demonstrator	Material Concept	Application	Key CTQs	PCR Origin/Recycling/Purification
AIMPLAS	AIMPLAS (XT+3DP)	-	4/6	3D Printing Filament [Multipurpose]	<ul style="list-style-type: none"> • CE friendly materials • Non-Food Grade PCR in Foodgrade Parts applications • Design from /for Recycling 	Applicable to: Consumer goods	Charpy Impact Young Modulus MFR Processability (Fil XT,3DP)	Main Origin: ABS WEEE / SR/ Creasolv® Alternative: ABS WEEE / MR/ EXTRUCLEAN

*Picture from Amazon.com



Upgrading of Recycled ABS



Upgrading concept:

- CreaSolv® process selective polymer dissolution and extraction
- ExtruClen extrusion reprocessing and stripping with sc-CO₂ after melt filtration and stabilization



Figure 3.3 Grinded ABS from WEEE

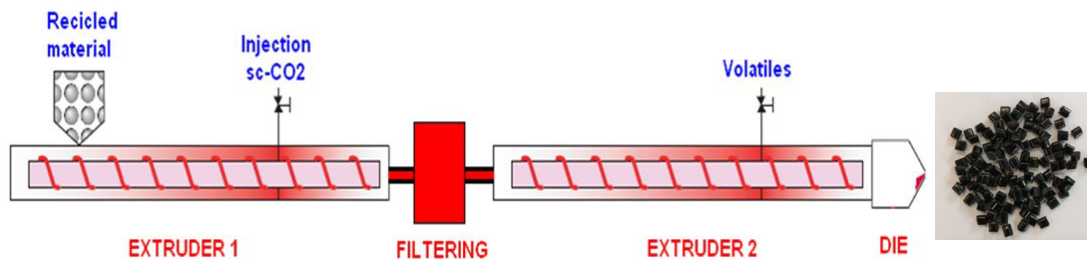


Figure 3.4 ExtruClen extrusion recycling process stripping with sc-CO₂

Synergistic combination of sc-CO₂ plus vacuum degassing allows a reduction in total VOCs content up to 80%

Pilot plant demonstration :

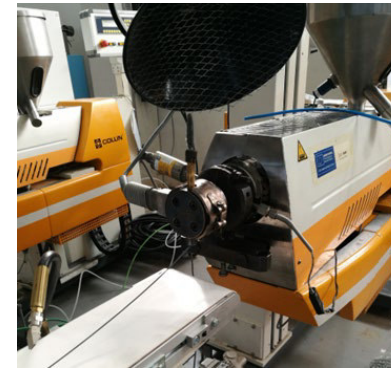


Figure 3.5 Filament extrusion pilot plant AIMPLAS

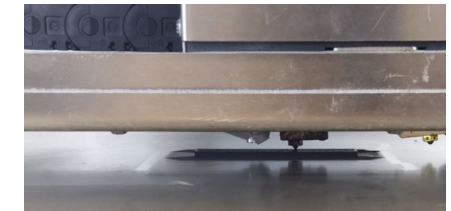


Figure 3.6 AIMPLAS lab 3D printing trials

Printing temp 220-240 °C
 ABS recycles run smooth flow and good layer adhesion
 avoiding nozzle clogging or volatiles generation

Compound	MFR (g/10min)	E (MPa)	Tensile Strength (MPa)	Charpy Notched (kJ/m ²)
ABS CYCOLAC MG47F	18± 0	2180± 244	45.7± 0.3	17± 1
ABS KR2123 CreaSolv®	13.1± 0.3	2180± 259	41.0± 1.3	16± 2
ABS Coolrec 20_01 Re ABS Coolrec 20_01 ExtruClean	31.6±1.2 33.0± 1.0	2140±183 2170 ±196	39.2±0.7 42.7±0.2	17± 2 16± 1
ABS Stena 20_01 Re ABS Stena 20_01 ExtruClean	27.5±0.6 28.4± 0.7	2350±525 2160 ± 213	40.3±0.3 39.6± 1.0	26± 1 27± 6
ABS Galea 20_01 Re ABS Galea 20_01 ExtruClean	26.7± 1.1 27.5±0.8	2260± 283	40.8± 0.3	21± 3

