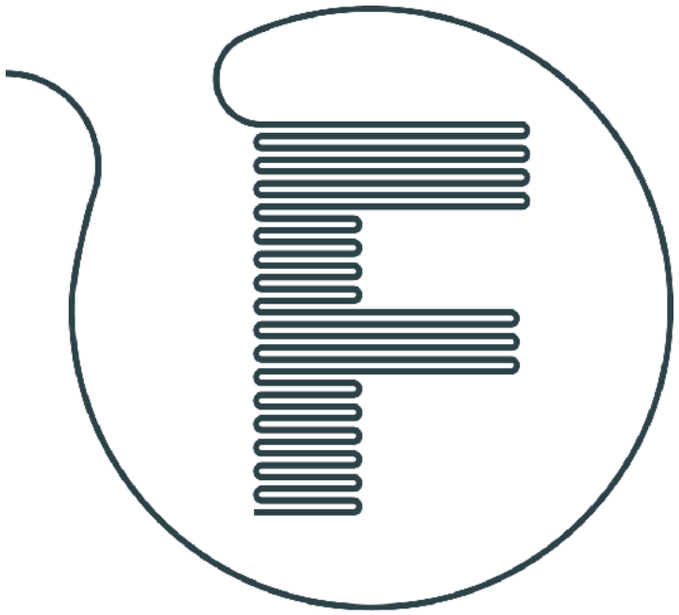
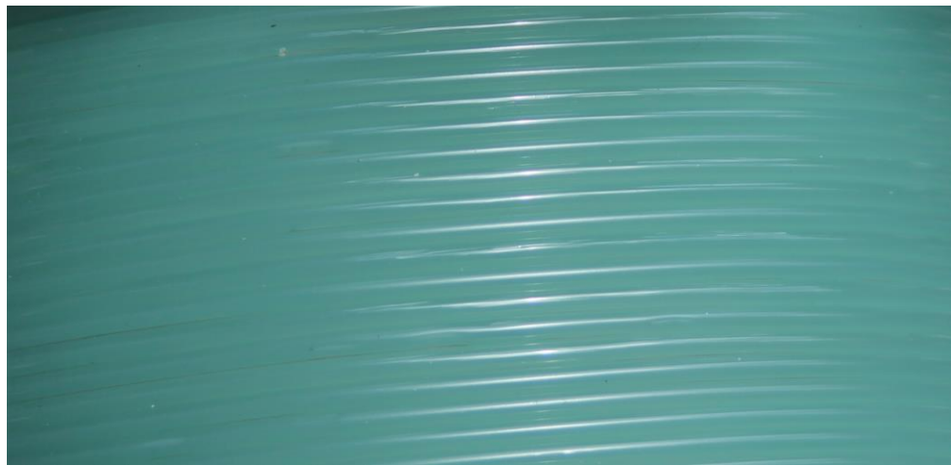
Innovating process, operations and funding to address fishing industry waste





Fishy Filaments

Circular Ocean Ålesund,
18th April 2018

Fishy Filaments

Fishy Filaments Ltd (FFL)

Limited company based in Cornwall, UK

2017- raised total of £210k by crowdfunding

407 shareholders, 19 countries

Ian Falconer – Founder/CEO

Experience – Ops & Technical in oil & gas, nation-scale IT&T, quarrying, mining and C-Level business analysis in City of London finance.

Overview

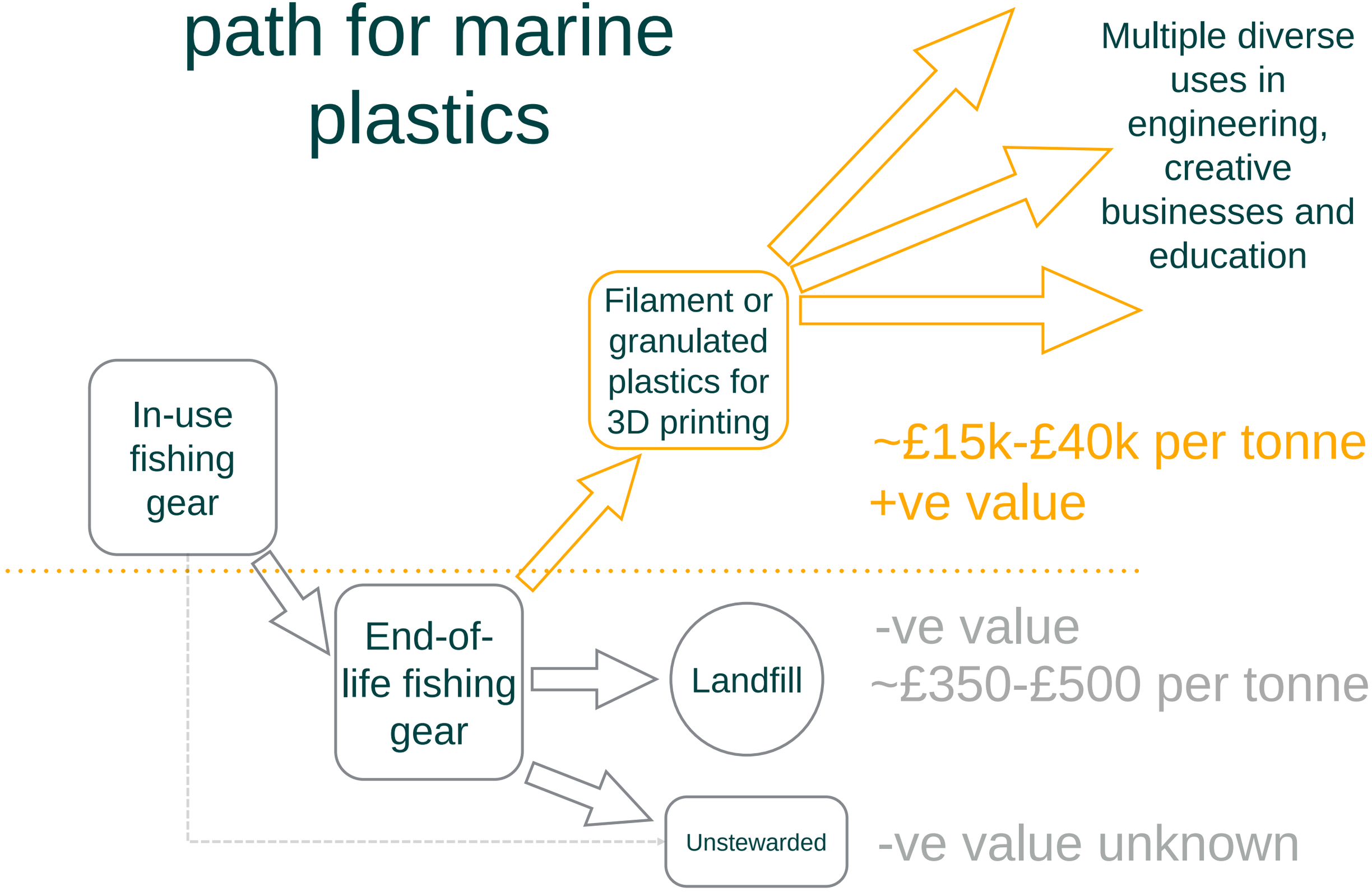
FFL’s Mission - To convert polymers reclaimed from used fishing gear into supplies for 3D printing

Technical Innovation - Novel net washing & shredding process

Operational Innovation - Distributed processing model

Business Innovation - Funding model

Realising a new value path for marine plastics



Material Flow

Fishing Fleet

Hand-line

Gill net

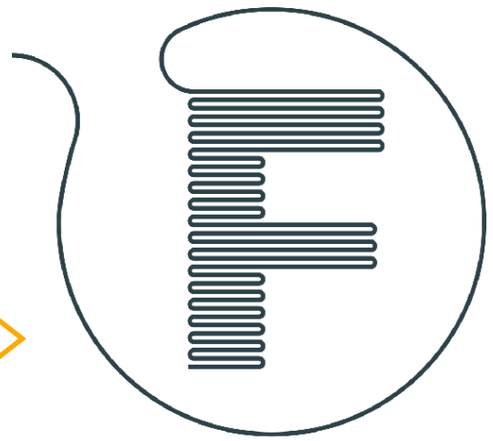
Beam/ Trawl

Crab & Lobster

Collection Schemes

Harbours

Nets



Fishy Filaments

Filament

Granules

Filamen t

Closed Cycle for Printing Materials

Retail

Wholesale

Full Service

Creatives

Hobbyists

SMEs

Education

Corporates

Distributed operational structure

Regional Harbours

Regional
Shredding &
washing

National
Extrusion,
packaging &
distribution

International
Sales & end-use

Nets

Fishy
Filaments

Recyclate

Filament

Nets

Fishy
Filaments

Recyclate

Granules

Fishy
Filaments

Nets

Fishy
Filaments

Recyclate

Filament

Containerised production units

Insulated, heated & ventilated

Built to light industrial and office standards

400V 3-phase mains, 240V 2-phase internal ring, CAT5 network

Distribution & Administration

Recycling & Extrusion

Functions spilt by occupational health risk profiles and utility requirements

Social and economic benefits of distributed processing model

- Lower transport cost (both nets and 3DP filaments)
- Removes the cross-border admin costs (traceability)
  - Removes the need to insure the waste while in transit
- Economic diversification for fishing communities
- Skills location matches the decentralised ethos of 3D printing
- Better security of 3DP materials supply
- Brings responsibility for waste ‘home’

Environmental benefits of FFL's distributed processing/manufacturing model

- Smaller emissions footprint for both recycling of nets and production/use of filament
- Efficient process - low water & reagent use, low emissions
- Processing plant is scalable to use on-site renewables or off-grid
- Processing used nets at source reduces biosecurity issues
- Plant can be built as a modular solution, moved on demand or operated seasonally

Business benefits of FFL's model

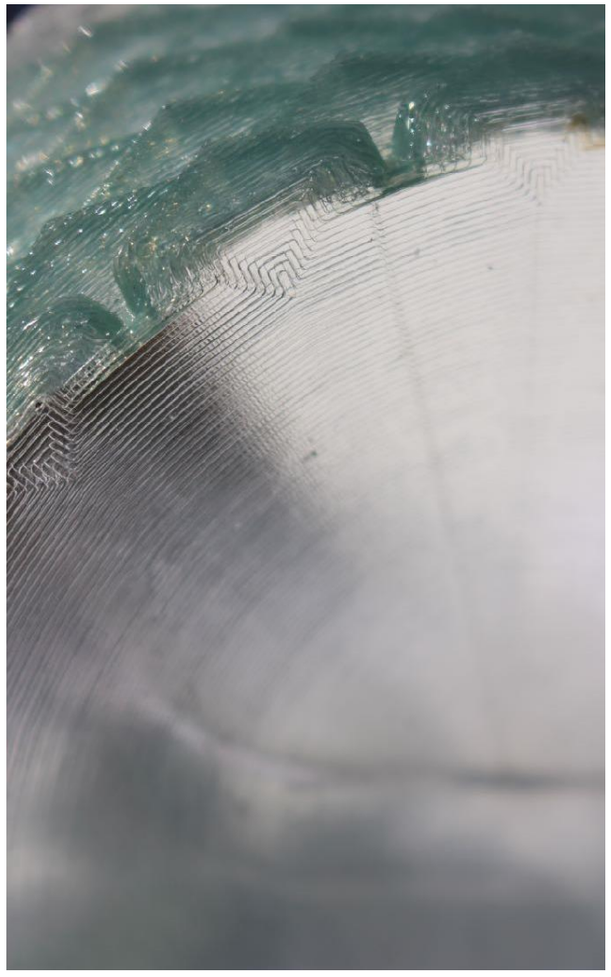
- Smaller capital cost footprint
- Scalable & modular solution (flexible and expandable)
  - Localised plant & process tailored to fit local scale and net types
    - Localised plant to fit local demand for end-product or export revenue
- Low impact solution WRT regulatory/planning permissions
- High value, high tech end product easier to market than a semi
- The start of a manufacturing eco-system, not the end

Progress ?

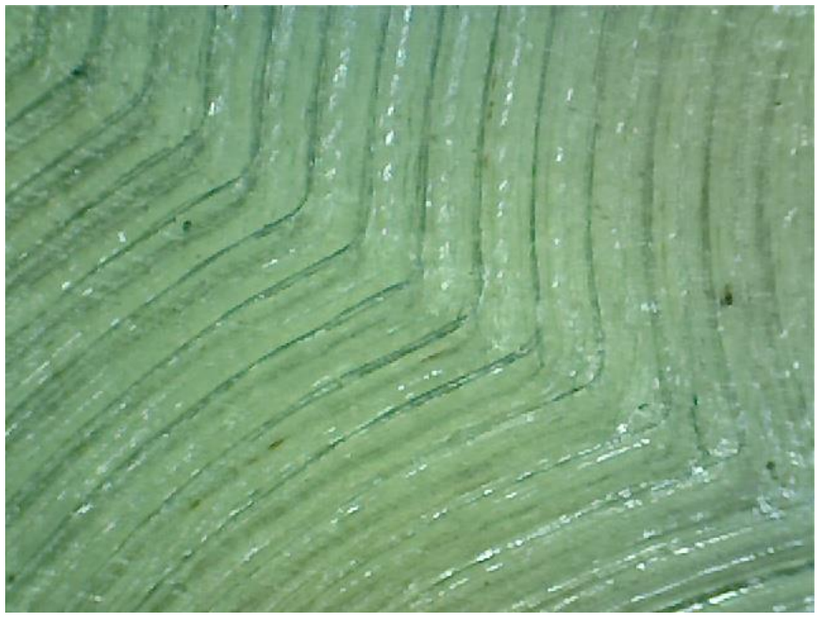
- July 2016 - Fishy Filaments™ concept born from 3 yrs prior work in 3DP materials
- Sept 2016 - Project broke cover
- Oct 2016 - World's First demo of full cycle 'Harbourside nets to 3D printed body'
- March 2017 - Completed small crowdfund campaign to fund pilot plant operation
- Oct 2017 - Raised £205k via Crowdcube to go into production
- March 2018 - £33k grant win, equipment orders and first job offer
- Site preparation under way
- Production expected Q2 2018

On-going Pilot/Development Plant Output

All samples 3D printed by Fishy Filaments Ltd from 100% recycled nylon



Technical Test Results



60x zoom on 3D printed form

SMITHERS RAPRA

Confidential Technical Report
61344

Total regulated metals content <34.29ppm

Testable minimum ~28ppm

EU ‘Packaging’ (safe for food contact) standard plastic requires <100ppm

Mechanical and chemical testing carried out on the ‘Longships’ blend
(95% oldest material:5% newest)
Considered the lowest saleable quality

Fishy Filaments

R-NYLON

Technical Data

Test	Standard	Unit	Measured Value	std
Tensile	ISO 527-2			
Strength @ Break	ISO 527-2	Mpa	52	4
Elongation @ Break	ISO 527-2	%	45	19
Modulus	ISO 527-2	MPa	2852	114
Flex (3 Point)	ISO 178			
Stress	ISO 178	MPa	57	5
Modulus	ISO 178	MPa	1760	197
Impact (Notched)	ISO 180	kj/m2	7	2
Melt Flow	ISO 1133	g/10min	15	-
VICAT	ISO 306/B120	C	190	1
Volatiles	TGA Method	%	2	-
Ash	ISO 3451-1	%	0	-

impact solutions
independent plastic experts

Downstream Product Development Plans

Short Term 1-2yrs

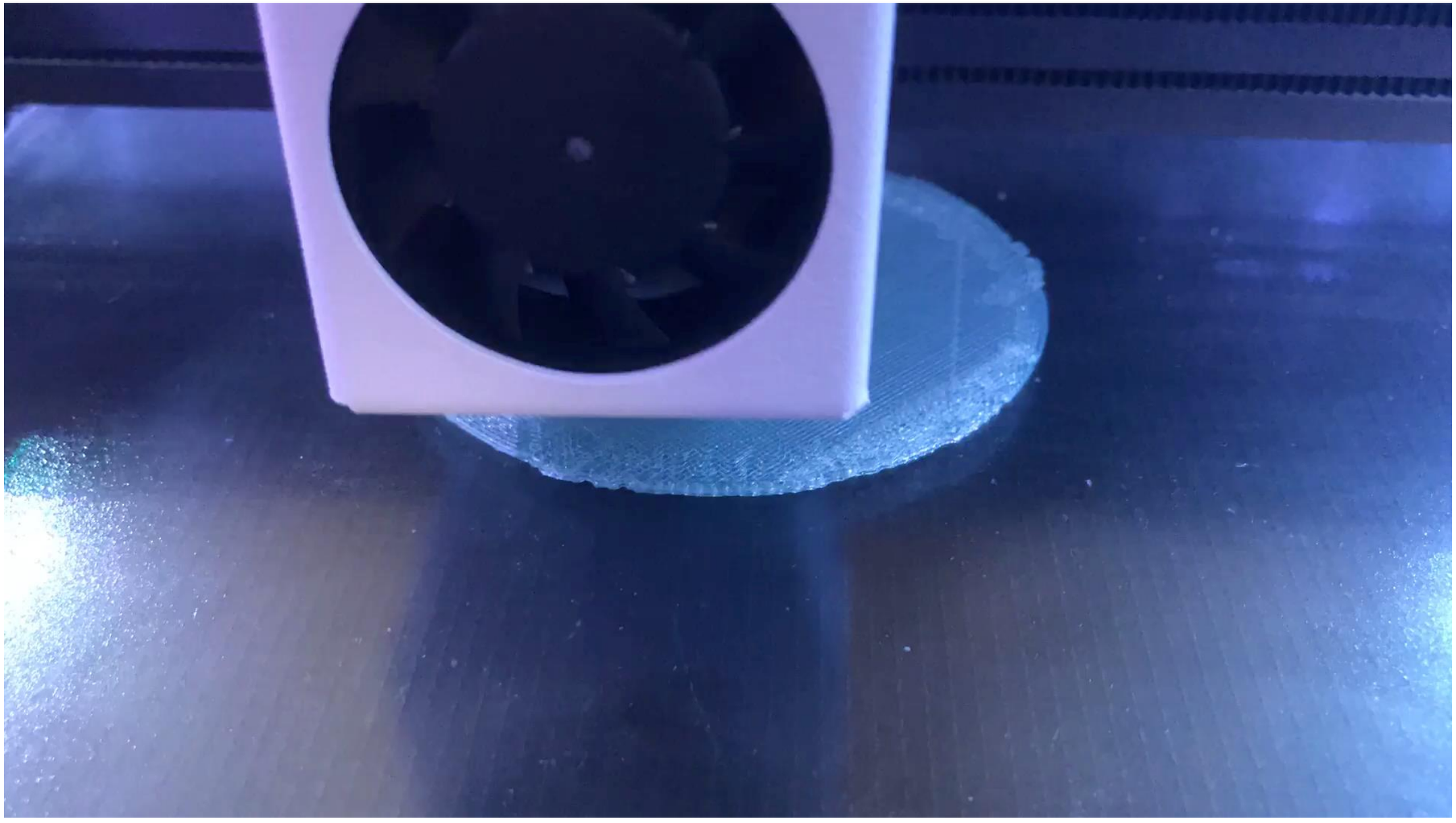
- 2-3 additional blends of nylon from the same supply of monofilament
- Waste carbon fibre addition to basic nylon filament product

Mid Term 2-5yrs

- Development of PE/PP co-polymer granule or filament and separation for single polymer filaments - source trawl nets

Long Term 5+yrs

- Dissolvable 3DP support material derived from chitin (shellfish waste) or alginate (farmed seaweed)



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