

End-of-Life fishing gears pyrolysis for “Plastic2Plastic” strategy



Fishing gear waste represents a major source of marine plastic pollution. Mechanical recycling is often used to repurpose End-of-Life fishing gear, but it cannot be used for a significant portion of the waste material. To address this, SEARCULAR is investigating the feasibility of using the chemical technique, pyrolysis, to treat non-recyclable gear.

Background

End-of-Life (EOL) fishing gears are often collected at ports and processed within dedicated facilities, to sort and direct specific materials through the relevant recycling schemes. However, a significant fraction of EOL fishing gear is not suitable for conventional mechanical recycling. To address this issue, SEARCULAR has investigated how pyrolysis, a thermochemical process, can be used to create value from the non-recyclable components of fishing gear.

During the pyrolysis process, the plastic materials are broken down into different compounds, one of which is pyrolysis oil. These oils, referred to as TACOIL[®], can be used as feedstock to produce new plastic materials, supporting a “Plastic2Plastic” strategy for EOL fishing gears.

Correct processing of EOL gears to remove impurities is integral to ensure high quality TACOIL[®] that is suitable for use in remanufacture. To understand how we can scale pyrolysis of EOL gears to an industry-level, attention must be given to the processing and conditioning of this post-consumer waste and the subsequent TACOIL[®] content.



Above Left: EOL gears at port. Above Right: an example of the TACOIL[®] produced from pyrolysis in laboratory trials.

Our Research

Our goal was to understand the suitability of using pyrolysis to create value from non-recyclable fishing gear components. To assess this, our work consisted of three main stages:

1. Laboratory-based analysis to determine the composition of gear components
2. Conversion of EOL gear into TACOIL[®] under pyrolysis conditions at lab-scale
3. In-depth assessment of the TACOIL[®] to evaluate the suitability of EOL fishing gear for chemical recycling

After overcoming initial challenges due to deposit formation during laboratory-scale processing we optimized the process, in particular focusing on the conditioning of EOL gear. Our results demonstrate that the TACOIL[®] produced in these tests is of high quality and shows promise as a feedstock for the production of new plastic materials, indicating strong commercial potential.

Next Steps

This research demonstrates the feasibility of using pyrolysis to process non-recyclable components of EOL gear. To understand how this could be scaled up for industry, further laboratory processing of TACOIL[®] and an industry-scale trials are being undertaken.

SEARCULAR aims to reduce marine litter and microplastic pollution originating from European fisheries. This report presents the work and outcomes of Work Package 4 (Deliverable D4.2). More information about our work on port solutions for EOL fishing gear can be found [on our website](#).