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Mechanical recycling of fibers from offshore decommissioning

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The textile business collaborates to create textiles from polymeric fibers, which may be synthetic or natural, recycled or not. Both synthetic and natural recycled fibers can be mechanically reprocessed to create yarns and fabrics, helping to decrease the environmental impact caused by the textile industry. To introduce initiatives that encourage ecological awareness and contribute to sustainability, the recycling of offshore decommissioning drives the development of incentives for the recovery of waste produced. Polyethylene terephthalate (PET) fibers are a solid waste generated by the naval sector without a proper disposal method. PET is a significant polymer utilized in various industries, particularly in the textile industry for manufacturing different products. Recycling PET fibers could reduce the environmental impact of decommissioning offshore platforms. Therefore, by repurposing offshore solid waste for the textile industry, it can be utilized in mechanical recycling processes, which are environmentally friendly as they do not involve reagents or emit harmful gases. For mechanical recycling to produce textile yarn from recycled polyester fiber, the fiber will first be cut using a cutter to reduce it into medium- or short-fiber sizes and then opened by a shredder. The open fibers will be fed into the carding machine, initiating the alignment of the fiber mass. Card produces a blanket that is fed onto a frame where the fibers are further aligned. During the draw frame process, the blanket is elongated to decrease its dimension and provide a more consistent tape diameter, resulting in the creation of draw frame tape. Finally, this tape will be fed into the ring spinning machine to create the textile yarns. The objective of this project is to create textile yarns using recycled PET fibers from commercial sources and from decommissioning offshore. A cutter, shredder, card, draw frame, and spinning machine were employed in mechanical recycling to create yarns with varying proportions of PET fibers from decommissioning: 60% to 80%. Once recycling has been carried out, the material produced will be evaluated by analyses such as SEM, TGA, DSC, FTIR, and tensile tests. This project seeks innovation by promoting the reuse of PET fibers from decommissioning offshore in the textile sector. Sustainable technologies will be used to produce a thread through the usual mechanical process of textile spinning.