Final Year Project Showcase Batch 2022
Year 2022

Department: Polymer & Petrochemical Engineering Programme: Polymer & Petrochemical Engineering		
1	**Project Idea**	Recycling of Post-Consumer High Density Polyethylene and Reuse in FMCG Product.
2	**Process**	Recycling of Plastics involve following processes 1. Collection of waste 2. Washing 3. Crushing 4. Pelletization Pelletization was done by using twin screw extruder and then sample for testing was manufactured on hot press.
3	**Outcome**	The outcome of the project is to recycle high density polyethylene and re-use it cosmetic bottles. This will reduce the debris from landfill and plastic pollution
4	**Evidence (Theoretical Basis)**	The main objective of our project is to recycle post-consumer high-density polyethylene and reuse it in FMCG products. High-Density Polyethylene (HDPE) bottles are extremely used for manufacturing of different bottles. HDPE is safe to continue with its recycling. But when we use recycle material for bottles manufacturing the process involve the expansion of plastic by using air. The bottles having recycled HDPE with some composition of virgin HDPE the bottle gets bursts and does not blow. Recycling can be done either by chemical method or mechanical method. Mechanical recycling method was selected for this project. The processing steps of mechanical recycling was already mentioned in section 2 of this documents. The tests include Tensile Strength, Elongation, Yield Point, Modulus, Flexural Strength, Izod/Charpy Impact Test, and Melt Flow Index.
5	**Impact on Sustainability of Urban Regions or SDG-11 "Sustainable Cities and Communities"**	Plastics are one of the widely used materials around the world because of its low cost and easy processing. Though plastic have many advantages over traditional material like wood and metal but this material is adversely affecting the environment. According to the study of Dr. Christian Schmidt of Germany, around 95% of the plastic waste which is polluting the ocean comes from 10 rivers and Pakistan's river Indus is one those. Karachi is the largest city of Pakistan and consume a huge of plastic products. Different private firms in Karachi is producing many different plastic products. Most of the products are used as disposable items like in food packaging and shopping bags etc. The United Nation (Economics and social commission for Asia and the pacific) and UNHABITAT has done a research on

		"Baseline study for solid waste management-Karachi". According to the study results plastic waste is the second largest waste produced in Karachi after food waste. Most of the waste is either go for landfill or still polluting the environment. This waste should be properly manage and recycle to reduce the hazards of plastic pollution. There are many products that can be easily manufactured from plastics waste like dust bins, benches, children toys and etc. The waste can also be used in many engineering application after modification of the waste material. In this final year design project the plastic waste utilized in shampoo bottles. The focus was to set the ratio of waste and virgin material to get the optimum property required for the manufacturing of shampoo bottles. The project as initiated in collaboration with Unilever Pakistan. After the project findings around 25% of the waste material is incorporated in virgin material for the manufacturing of shampoo bottles.
6	**Competitive Advantage or Unique Selling Proposition** (Cost Reduction, Process improvement, Attainment of any SDG (Sustainable Development Goal), increase of market share or capturing new market or having superior performance over a competitor. In summary, any striking aspect of the project that compels the industry to invest in FYP or purchase it. Some detailed description is required in terms of how, why when what. You can select one or more from the following dropdown and delete the rest of them). Please keep relevant options, delete the rest of them, and correct the sequence	
a	**Attainment of any SDG** (e.g. How it is achieved and why it is necessary for the region)	As discussed in Section 5, the properties of the waste is enhanced by blending it with virgin material so that it can be useful for manufacturing of engineering or different commodity products. Due to large amount of plastic waste that is produced in Karachi, it is extremely needed to use that waste in manufacturing of some good products.
b	**Environmental Aspect** (e.g. carbon reduction, energy-efficient, etc.)	Reduction in Plastic Pollution by using recycle material in FMCGs Product.
c	**Cost Reduction of Existing Product**	Cost reduction is not a part of project but by using blend of virgin and recycle material, overall cost of the product will reduce because recycle material normally available at low cost
d	**Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process** (e.g. What is the issue is current process and improvement you suggests)	There isn't any issue related to process. This project is based on development of material. Recycle material loses its strength due to re processing. The idea is to set suitable composition of recycle material to be used with virgin material without compromising the quality of the product.
7	**Target Market** (Industries, Groups, Individuals, Families, Students, etc) Please provide some detail about the end-user of the product, process, or service	The project is initiated in collaboration with Unilever Pakistan. Unilever Pakistan is using the results for manufacturing of shampoo bottles.
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