

Design and Development of Plastic Waste Recycling Apparatus

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According to the Sri Lanka Customs, 1600 tons of plastic are imported to Sri Lanka per month. From that, 480 tons (30%) are exported as products and the remaining 1120 tons (70%) of plastic are disposed within Sri Lanka as waste. From that waste, only 400 tons (35%) are being recycled, and the rest which amounts to approximately 720 tons (65%) is burned, or just disposed to the environment. There are many recycle methods and different kinds of recycling organizations in Sri Lanka which produce value-added products from plastic waste. Eco Spindle (Pvt.) Ltd is a one of the plastic recycle factories in the country which produces a special type of yarns from PET bottles. Still, they do not use the Lid of these PET bottles, and an average of 4-5 tons of lids per month are being disposed. The aim of this study is to design and develop a mechanical apparatus/machine to recycle specifically the Lids of PET bottles and produce plastic sheets. Other than PET, the designed machine is capable of recycling three type of plastics (PP, HDPE, and LDPE). Once the processed plastics is fed to the machine it heats and melts the plastics and presses it to produce sheets with the required thickness (approximately around 1 mm). These sheets can be used to make items such as fancy bags, table mats, pencil cases, hand wallets, and files. A fully automated sheet-making machine was designed and developed successfully. Even though the prototype consists of some deviations to the designed machine, the results of the tests/trials proved the accuracy and the appropriateness of the design parameters and the mechanism. The machine was tested by changing the temperature, and keeping it at 1300°C for 10 minutes has given the required output paper quality as required. The total cost incurred to fabricate the prototype is around 46,500.00 LKR, and the forecasted cost for a fully automated machine is calculated to be around 64,000.00 LKR. This product can be recommended for the use of plastic recycling industries, and also to small scale family businesses to recycle the waste plastics and make fancy products.

Keywords: *plastic recycling machine, PET lids, plastic sheets.*