

# Plastic Dryer Mechanism and Its Application In Plastic Recycling Industries

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**Abstract—**Plastics are used widely everywhere in our life and without plastic, modern civilization would indeed look very diverse. This paper describes about the experimentation of plastic dryer mechanism for drying the crushed plastic that we get from the waste plastic such as bags etc. The main aim of this process is to completely dry and remove the moisture after washing the crushed plastic, so as to get best quality plastic mould and better plastic material. But the earlier process that is natural drying of crushed plastic by the help of sunlight was highly time taking and could be mainly carried out only during summer season. So our purpose behind of making plastic dryer machine is to minimize the time taken during the drying process, make it cost effective and finally increase the production rate.

**Keywords—**plastic dryer, plastic recycling, waste plastic, toxic plastic

## I. INTRODUCTION

Plastic has changed our everyday life we are in world with plastic made products in various ways. Plastic plays an important part in our life. Plastics are used widely everywhere in our life. Plastic make our life feature and better. They are composed of a network of molecular monomers bound together to form macromolecules of infinite use in human society. Day by day people are becoming more and more dependent on the use of plastics because of the characteristics of plastic such as inner, durability, flexibility and personality and so on. The durability of plastics and their potential for diverse applications, including widespread use of disposable items, were anticipated but the problem associated with waste management and plastic debris were not.

With increasing quantity of plastic waste earth suffer from various problem of plastic material. It is non-decomposable material and it take long time to decompose, it is polluting earth soil and water. It produces harmful gases after burning. The quantity increase that much in the earth. It was in the 1970s that the now developed world struggled with its massive waste problem. But then cities cleaned up litter. There is no plastic waste on the streets or in the rivers. The problem of garbage has been managed. It is today perhaps the most ubiquitous and necessary material that “humankind” has created. The biggest increase in the use of plastic has come in the packaging industry—from water bottles to plastic layers in tea bags to plastic straws, glasses, plates and just about all that we package for our consumption. But we also wear it; we sleep on it; we build our homes with it and we pipe our water and oil in it.

The first shock has come from studies that show that plastic generated on land is filling up and polluting our oceans. Plastic recycling is important is because it can put to good use rather than unnecessarily ending up in landfill. Recycled plastic can be used to create items such as shampoo bottles, oil funnels, floor tiles and traffic cones among many other products. Moreover, there are many innovative ways to use recycled plastic. For example, recycled plastic can be used for creating construction decks, sports clothing, vehicle interiors and other products.

Plastic dryer machine play an important role in plastic recycling industry. It help to continue the recycling process without any seasonal gap or any environmental issue. The plastic dryer machine dry only wet plastic. Plastic getting wet during cleaning process. The process help to increase the quality of recycled plastic. In old and traditional type of plastic drying process take time of 24 hr and days because they dry with help of solar ray. The modified machine minimize the time require to dry the plastic scrap. The dyer machine operating temperature is 105° C and it can be change as requirement. Mainly the plastic use have different density material such as polyethylene of high, medium and low density material when it pass through 30 m long steel pipe with the velocity of 4m/s and hot air up to 105°C with plastic scrap so the wet plastic dry up 90 to 95% it store in the storage room.

## II. WORKING OF PLASTIC DRYING MACHINE

The thermal dryer is an excellent way to remove moisture through dehydration. Specially designed for our PE and PET washing lines, this continues drying apparatus is strategically placed after the dewatering machine. The thermal dryer attached with a cyclone separator is an essential final step in reducing moisture levels to below 3%. Thermal dryers use hot air to dry the plastic material, much like a hair dryer. After dewatering, the plastic material is vacuumed out by a transport blower and mixed with hot air traveling through a long set of stainless steel tubing that winds back and forth.



As the plastic material mixes and spins around within this lengthy transport tunnel, moisture is effectively dehydrated. Ending with a cyclone separation apparatus, where cool air is mixed in, residual moisture is further reduced. The cyclone separator is the last stand against any dust and fines within the material stream.

Conveyer system

## III. RECYCLING OF PLASTIC

A plastic is a type of synthetic or man-made polymer; similar in many ways to natural resins found in trees and other plants. Webster's Dictionary defines polymers as: any of various complex organic compounds produced by polymerization, capable of being molded, extruded, cast into various shapes and films, or drawn into filaments and then used as textile fibers.

Many common plastics are made from hydrocarbon monomers. These plastics are made by linking many monomers together into long chains to form a polymer backbone. Polyethylene, polypropylene and polystyrene are the most common examples of these. Below is a diagram of polyethylene, the simplest plastic structure.

Even though the basic makeup of many plastics is carbon and hydrogen, other elements can also be involved. Oxygen, chlorine, fluorine and nitrogen are also found in the molecular makeup of many plastics. Polyvinyl chloride (PVC) contains chlorine. Nylon contains nitrogen. Teflon contains fluorine. Polyester and polycarbonates contain oxygen.

## IV. CATEGORIES OF PLASTIC

### Type 1 - POLYETHYLENE TEREPHTHALATE OR STOMACH PLASTIC

Stomach plastic is usually used to make disposable water bottles. Apart from this, stomach plastics are used to make different utensils or containers used for various types of juice, soft drinks, butter, salad dressing, vegetable oil, mouthwash, cosmetics etc. The stomach plastic weight is thin, transparent and smooth. Due to being fully liquid and anti-inflammatory, the stomach is very popular among plastic water and another food packaging. Being anti-air, the stomach plastic prevented the entry of oxygen. Drinking or liquids are not easily washed inside the stomach bottles. Type 1 plastic bottle does not have any harmful bacteria or thalates, but its use is used in antimony trioxide. Antimony acts as a possible carcinogen in the human body. Antimony is emitted from the container for long periods of contact with drinking water. As long as the beverage is in contact with the container, the likelihood of antimony excretion increases. It has been found in the study that the use of long-time heat is toxic antimony from the stomach bottle. So it is vital to keep these stomach bottles away from high temperatures. Note that type 1 or stomach plastic is prepared for 'once use only' (one time use only). The stomach bottle is relatively safe in the 'once used' field.

### Type 2 - HIGH-DENSITY POLYETHYLENE

Polyethylene is the most used plastic in the world. High-density polyethylene made from petroleum, a type of heat-resistant plastic. Type 2 plastic is used in making milk containers, detergent bottles, refrigerators, toys, various types of plastic grocery bags, etc. High-density polyethylene is relatively strong, irritable and 'heat-prone' in nature. It does not contain harmful BPA or thalates. There is no known health risk for this type of plastic use. Although some studies have shown, if the sunlight is kept in a long time, then the nanalifenal is extracted from type 2 plastic to ultraviolet rays. Compared to type 1, type 2 container is considered safer for food and drink.

### Type 3 - PLASTIC CONTAINERS

They are used for fruit juice, cooking oil etc. Polyvinyl Chloride (PVC) is a type of 'heat-resistant' polymer. Depending on non-plasticization, type 3 plastic is flexible and unobtrusive. Normally the thalates are used to make PVC flexible, which is harmful to the human body. Plasticized PVC pipes and siding also have thalates. PVC contains many toxic chemical substances such as BPA, thalates, led, dioxin, crater, and cadmium. The whole life cycle of PVC, production, use and disposable is related to severe health risks and environmental pollution, due to which PVC use has reduced considerably. However, because of the cost-effective and versatile use, PVC is still very popular in the case of consumer products. Due to poisonous use of PVC plastic due to health risk and environmental pollution. It can cause cancer, birth defects, genetic changes, chronic bronchitis, ulcers, skin diseases, deafness, vision failure, indigestion, and liver dysfunction. 2.4.

### Type 4 - LOW-DENSITY POLYETHYLENE

A type of 'heat-resistant' polymer made of type 4 plastic petroleum, which can be both transparent and opaque. Low-density polyethylene is flexible and rigid but fragile. These plastic are used in packaging of frozen foods and preparation of juices and milk car- tons. There is no loss of contact with the container or bottled fluid. Because the type 4 plastic containers do not contain any harmful components of the human body, their use is safe for food and bev- erages.

### Type 5 - POLYPROPYLENE POLYPROPYLENE

It is a type of plastic polymer, usually strong and semi-transparent, strong, high in heat and hydrophobic. They are stronger and heavier than polyethylene. Polypropylene is com- mainly used for packing yogurt, medicine, beverage, ketchup etc. It should be noted here that no harmful substances are found in food or water from polypropylene plastic. Most polypropylene plastic is microwaveable and washing with dishwasher, but they do not cause any harm. Like type 4 plastic, polypropylene con- tainers are not harmful, they are considered safe for the human body for food and beverages.

### Type 6 - POLYSTYRENE POLYETHYLENE

It is one type of petroleum-based plastic. 'Benzene' is used in the preparation of polystyrene, which is known as a car- cinogen for the human body. Polystyrene is widely used in making packaging materials and insulating. Styrene is very risky for health. Studies have shown that, due to long exposure, steroid also pro- vides neurotoxic, hematological, cytogenetic and carcinogenic effects. The International Agency for Research on Cancer (IARC) identified Styrene as the human carcinogen.

### Type 7 - POLYCARBONATE

Except for the type mentioned, all plastics are labeled as Type 7 plastics. Polycarbonate container is made of BPA. So, the bever- age or food stored in them, the BPA is released from the container. Due to the BPA's health risk being proven in multiple studies, the use of type 7 or polycarbonate plastic has recently decreased greatly. Polycarbonate is basically used for packaging consumer goods. Type 7 plastic is used in baby bottles, 3 and 5 gallons of bottles (reusable) etc. Due to health risk type 7 or polycarbonate plastic use is unsafe.

## V. SCOPE OF PLASTIC INDUSTRIES

Toward a new manufacturing landscape for the plastics industry

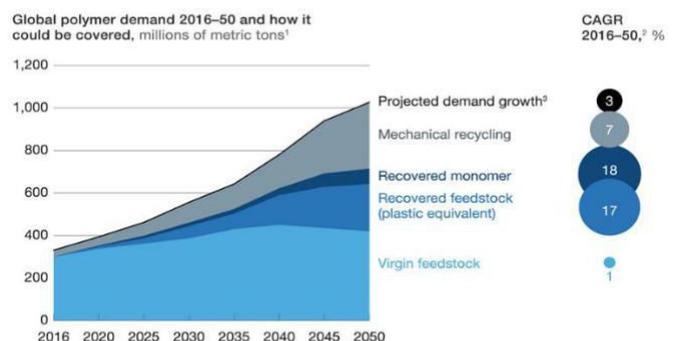
A reuse level of this kind would also profoundly affect new plastics production. By 2030, up to almost one-third of plastics demand could be covered by production based on previously used plastics rather than from "virgin" oil and gas feedstocks. This estimate is based on a high-adoption scenario, comprising a massive increase in mechanical recycling volumes, a take-off in pyrolysis, and oil prices at around \$75 per barrel.

### Sidebar

#### A new relationship to oil?

Projecting to 2050 suggests that nearly 60 percent of plastics demand could be covered by production based on previously used plastics (Exhibit 4). This will substantially reduce the amount of oil required to cover global plastics demand, with projections suggesting oil demand running 30 percent lower than a business-as-usual scenario. This outcome would require revisions of recently published forecasts that show petrochemicals making the largest contribution to oil demand growth over the next two decades (see sidebar "A new relationship to oil?").

By 2050, nearly 60 percent of plastics production could be based on plastics reuse and recycling.



<sup>1</sup>Scenario based on a multi-stakeholder push to boost recycling, regulatory measures to encourage recycling, consistent progress on technologies, and \$75-per-barrel oil price.  
<sup>2</sup>Compound annual growth rate. Mechanical recycling limited by downcycling and applicable materials, monomerization limited by applicability to condensation polymers only, pyrolysis limited by likely rise in input costs.  
<sup>3</sup>After demand reduction, assuming annual global GDP growth of 3.1%.

## VI. CONCLUSION

The plastic dryer machine and plastic recycling industry is described in paper is state that the plastic dryer is beneficial than the sun drying techniques, solar dryer do have shortcoming. They are little use in cloudy weather and useless in rainy season as well the plastic recycling industry get maximum benefit from plastic dryer and in the future plastic dryer demand will increase as varying plastic wastage. It ecofriendly in use and it also are faster safer and more efficient than traditional sun drying techniques.

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