HYDRAULIC SEPARATOR FOR PLASTIC WASTE

KEYWORDS

- ❑ PLASTIC WASTE
- ❑ HYDRAULIC CHANNEL
- ❑ MECHANICAL RECYCLING
- ❑ DENSITY SEPARATION
- ❑ MANAGEMENT COSTS

AREA

- ❑ CIVIL, CONSTRUCTION & MECHANICAL ENGINEERING

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Patent Type
Patent for invention

Ownership
Sapienza University of Rome 100%

Inventors
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Industrial & Commercial Reference
The device is suitable to be included into mechanical recycling plants, in the sorting stage of the process

Time to Market
The Technology Readiness Level reached is TRL4

Availability
Research, Development, Experimentation, Collaboration and Start-up

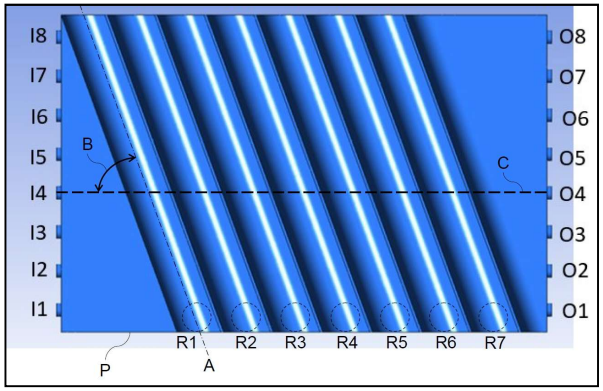

Fig. 1 Top view of the hydraulic separator.

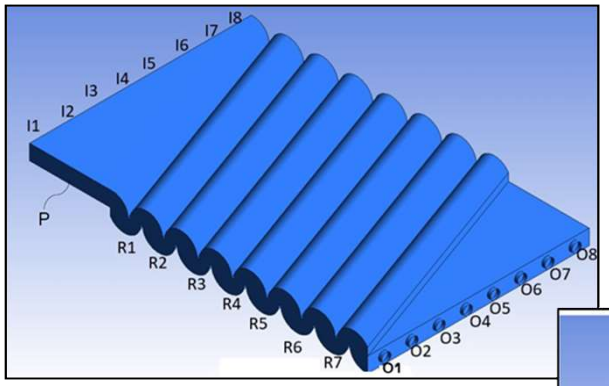

Fig. 2 Perspective view of the hydraulic separator

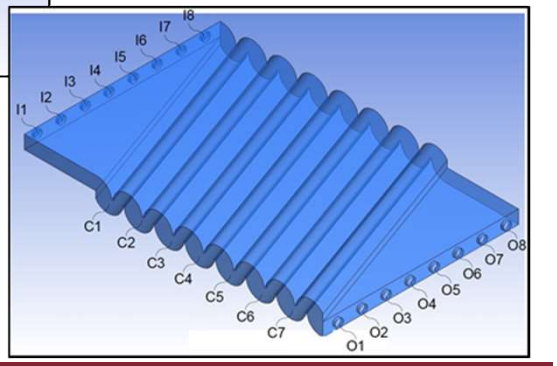

Fig. 3 Similar view to Fig. 2 but in transparency

Abstract
The hydraulic separator is a device for plastic sorting, which can be employed within mechanical recycling plants. It processes two-polymer mixtures and produces two products, one collected within the instrument and the other one expelled through its outlet ducts. The device uses water of low-quality standards. The sorting process in recycling plants plays a major role for the production of high-quality secondary raw materials and the reduction of extensive waste disposal in landfills. The market value of recycled plastics is considerably affected by their purity, degree of decontamination, and homogeneity, which are strictly related to the effectiveness of the separation step.

HYDRAULIC SEPARATOR FOR PLASTIC WASTE

Technical Description

A hydraulic separator suitable to sort a two-plastics mixture comprises two horizontal opposing plates formed by a plurality of contiguous semi-cylinders so as to form a plurality of parallel and contiguous chambers (C1-C7), housing collection ducts (R1-R7) which are located at the bottom of the camera (C1-C7), with a plurality of input ducts (I1-I8) and output ducts (O1-O8) distributed in a symmetrical and aligned position. The axis (A) of the chambers (C1-C7) forms an angle (B) of approximately 70° with a line (C) that connects an inlet duct (I) with the corresponding outlet duct (O), so that the Plastic particles that settle in the separator will accumulate on the side wall (P) adjacent to the collection ducts (R1-R7).

Technologies & Advantages

Nowadays the most common techniques employed in mechanical recycling plants to sort plastics are based on optical, fluorescent and infrared properties, electrostatic forces, flotation by hydrophilic character, thermal treatment, and density differences. All processes present drawbacks related to cost, performance and environmental hazards such as the influence of moisture, surface status, and low feeding speed of particles in electrostatic separation; the need for an additive in separation by flotation; the wide range of density values for the same typology of plastic materials makes the choice of the density for sink and float separation challenging. Conversely, the hydraulic separator allows the effective separation of homogeneous plastic fractions complying with the most restrictive standards in the secondary raw materials market. The sorting process taking place in the device employs plain water without chemical additives, thus simplifying the handling of wastewaters, and low management costs are expected due to the mechanism responsible for the separation of polymers of different physical characteristics.

Applications

The sector of interest is the recycling of plastics and specifically, but not exclusively, the separation of Waste electrical and electronic equipment. The device may be of interest for companies whose main core business is the design, construction, operation & automation of plastic recycling facilities. The sorting process within a mechanical recycling plant plays a major role in the context of the production of high-quality secondary raw materials and the reduction of extensive waste disposal in landfills. The expected applications are medium-term because the experimentation conducted on the device was at a laboratory scale and further investigations on a bench scale and on an industrial scale are therefore necessary.

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