# Health and Safety Engineering Ltd

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## Major Project Completed For Recycling Plastic Granulate In Food Packaging Firm

Huhtamaki PLC has recently consolidated its production onto one site. The company specialises in the manufacture of cartons, plastic cups, micro wave-able trays and high quality packaging in general for the food industry. The project involved moving machinery, equipment and all the ancilliaries from one factory and consolidating it onto another site which was already in production. In all, ten moulding lines were relocated into the factory where there were already ten lines operating.

**Turnkey Project for Granulate Processing**

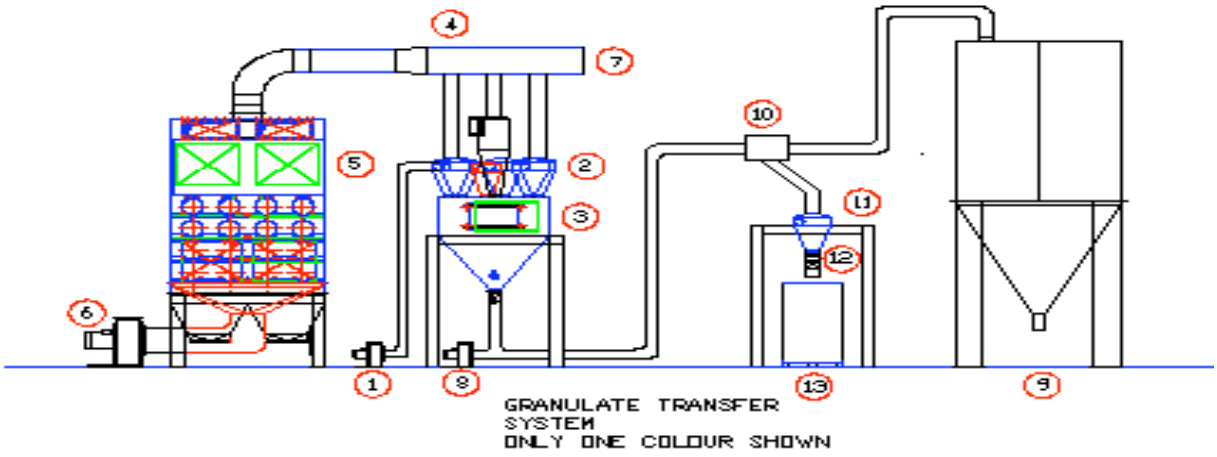
Health & Safety Engineering Limited have been closely involved with the company in supplying a turnkey solution to the problem of handling the granulated waste plastic produced during the moulding process and returning it to the storage silos so that it can be re-used. This involved two different grades of product, one of which was also produced in two different colours.

At the end of each moulding line, the waste plastic sheet produced after the moulding has been punched out is granulated. This can be as much as 40% of the flat sheet. It was necessary to convey the plastic back to the regrind silo where it would be mixed with virgin plastic to create new sheet for moulding. There are five lines on each of the systems all located in different parts of the factory floor which resulted in the granulate being produced at the opposite end of the factory to where the silos were located. It was soon realised that if each of the granulators were to be piped individually to the storage silo it would involve having miles of pipe-work and much larger granulator blowers with high energy consumption.

In granulating the plastic a significant amount of dust was generated in the product which had to be contained as it was a health hazard and would cause contamination of the product if it escaped into the factory.

**The Main Problems To Be Resolved**

1. To convey the granulate from each of the production lines with the minimum amount of transfer pipes and as cost effectively as possible.
2. To separate the conveying air from the granulate with no dust being released into the factory.
3. As with most plastics a large amount of static can be generated during the process. This could lead to an explosion of the finer dust particles which are generated when the plastic is broken down. Sufficient measures were required to prevent any explosion from occurring and to safely vent it if one did occur.
4. On one system it was necessary to handle two different colours of product. Each of the 5 moulding machines could produce product of either colour. It was important that the granulate handling system could accommodate the two colours without mixing and contaminating the wrong silo.
5. The new granulate handling system had to be installed into an already cramped factory without interrupting the existing production.
6. Once up and running the plant was to be capable of running for 24 hours a day 364 days per year.




**Planning**
It was obvious early on in the planning stages that in order to keep the transfer pipe-work to a minimum and to allow the maximum flexibility of operation it would be necessary to collect the granulate from all the machines centrally in the factory in storage hoppers. From this point it could then be transferred to the storage silos at the other end of the factory through single transfer lines.

As the plant produced two different colours of product it was necessary to have a black and a white hopper plus an additional hopper to collect contaminated or mixed product when a production line is being converted from moulding black products to white or visa versa.

**Transfer to Storage Hoppers**
Each granulator has its own blower **(1).** Next to each of the eight granulators are 3 separate pipes :- black, white and mixed, the blower discharge is connected to whichever product is being granulated. The blower transfers the granulate to a cyclone **(2)** on top of the storage hopper **(3)** in the centre of the factory. In all there are eight cyclones on each storage hopper, one for each granulator. The granulate is separated from the airstream by Kongskilde cyclone separators and it falls into the hopper.

**Extraction of The Dust**
The dust laden air is extracted in a common manifold **(4)** and collected in a Health & Safety Engineering 32 cartridge reversed pulsed dust collector **(5)** with a 37 kW fan **(6).** The total design flow for the dust extraction system is 19,500 m³ / hour. Balance within the system is achieved by an air break in the common manifold **(7)**. This allows effective extraction whether one or eight granulators are in operation without the danger of extracting granulate.

**Explosion Prevention**
Due to the explosive nature of the dust a number of measures were adopted to satisfy ATEX regulations. These included antistatic cartridges, all ducting being fully earthed and explosion vents on the dust collector and the hoppers which are vented outside the factory.

**Discharge To Silos**
On each of the hoppers are three level sensors:- low level, high level and high/high level alarm. When the high level is reached a rotary valve beneath the hopper, discharges the granulate into a blow line, where a Kongskilde high pressure 11 kW blower **(8)** conveys it 100 metres to the external storage silos **(9).** When the low level is reached the blower is switched off thus giving considerable savings in energy.

In the event that the silos become full the product can be diverted by an automatic diverter valve **(10)** to a cyclone separator **(11)** fitted with a rotary valve **(12)** from which it can be decanted into bulk storage bags **(13).** A central PLC control panel ensures that there are sufficient purge times between each change in operation to prevent the blow lines from blocking. A second smaller dust collector extracts dust from the silos and bulk bag filling cyclone.

**Project Completed On Time**
Health & Safety Engineering Limited completed the turnkey project on time and the plant has now been successfully in operation for 8 months on a 24 hour production cycle with excellent results. The intermittent operation of the transfer blowers have resulted in considerable energy savings helping the company to achieve its aim of competing with other European producers.