maag
a DOVER company

gala automatik
underwater
pelletizers

GALA CRYSTALLIZATION PROCESS TECHNOLOGY

Pellet Processing Systems for the Plastics Industry

One of the most exciting process developments for the Plastics Industry and specifically for PET polymers has been the recent release of the Direct Crystallization Process. This process avoids the use of expensive precrystallizers and crystallizers prior to taking the PET pellets into the SSP process or other downstream aftertreatment processes. The Gala CPT process complements this process and is superior in method of operation.

Advantages and savings

- Small scope of supply = reduction in installation costs
- Reduction in energy to deliver and maintain heat transfer medium
- Utilization of internal pellet heat going into the SSP process
- Elimination of pre-crystallizer and crystallizer

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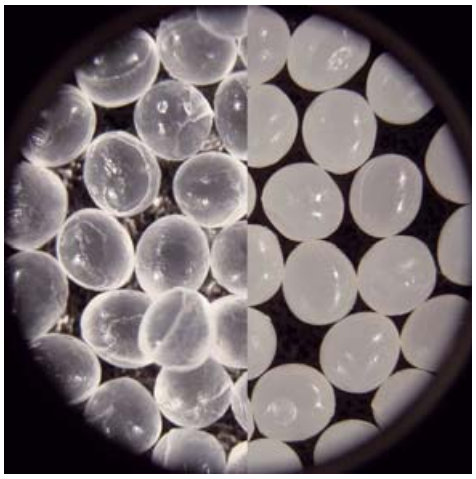
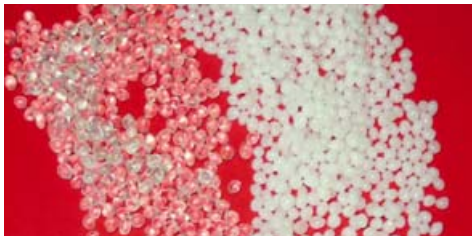


PLA Pellets: amorphous (left) compared to Crystalline (right)



Amorphous pellets (left) compared to Crystalline pellets (right)

The goal of the direct crystallization process is twofold. First and foremost is to retain sufficient heat in the pellets to cause the polymer to crystallize without any additional external heat required, which greatly reduces energy consumption. Another goal of direct crystallization is to allow the free-flowing pellets to go directly into either packaging or downstream after-treatment processes, such as the SSP process. The ability to go directly to the downstream after-treatment processes is where direct crystallization provides significant energy savings because the pellets have retained a significant amount of internal heat. This internal heat and the subsequent pellet temperature greatly reduce the time and energy needed to effect crystallization.

Gala's direct crystallization process, or CPT process, uses high-velocity gas injection to increase the velocity of the water and pellet slurry and to create a water vapor mist that separates the pellets from the water. The vapor mist insulates the pellets from the cooling effect of the water and further enhances the internal heat to crystallize the pellets. Gas injection produces a much lower and safer process water temperature and flow rate. Typically, the water temperature does not need to be above 70 degrees Celsius and the process water flow rate need not be increased above standard underwater pelletizing guidelines.

A recent theoretical analysis, done by Bepex Corporation, looked at a 600 t/day PET plant (2 lines each processing equals 12.5 t/h). The analysis compared a plant using strand pelletization, conventional crystallization and SSP to a plant using Gala underwater pelletization and CPT process going directly into the Solid State Polymerization (SSP) Process. The study showed that by using the Gala underwater pelletization and CPT process, the plant could realize approximately a 50% reduction in capital cost and a 30% reduction in energy consumption.

If Bepex's theoretical plant ran for 8,000 hours per year, the energy savings from using the Gala underwater pelletization and CPT process would equal nearly $1,400,000 in the US.

Using direct crystallization processes improves the crystalline structure of the PET pellets. Conventional crystallizers produce a pellet that is densely packed at the edges but less uniform toward the center. On the other hand, direct crystallization produces a pellet that exhibits more uniform density from pellet edge to the center and shows a 26% reduction in heat of fusion over pellets produced using the conventional crystallization process, saving more energy costs.

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