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A more efficient process to create polystyrene packaging

An innovative production process for polystyrene packaging considerably reduces emissions and is poised to exploit the new markets which will open up once more stringent anti-pollution legislation comes into force.

Polystyrene foam is widely used in a variety of applications, including building insulation, packaging and drinking cups. These different types of foam are all commercially produced from a single starting material high-density spherical beads of expandable polystyrene (EPS).

The beads are expanded and moulded by the end product manufacturers using a blowing agent. Currently, pentane is used, but it is an inflammable, volatile organic compound (VOC) and up to half remains in the EPS after processing and is slowly released to the atmosphere during storage and use.

Concern is growing throughout Europe and the USA about increasing pentane emissions and legislation to limit it is already planned in Switzerland, Austria and Sweden, says Wolfgang Teubert, Managing Director of the German partner Teubert Maschinenbau GmbH.

EUREKA project E! 2683 VOC FREE EPS met these concerns by producing a VOC free alternative in the worlds first water-blown expandable polystyrene bead. The partners may take the unusual step of commercially launching in the USA first, taking advantage of stricter legislative controls on VOC release. This results in a better market for VOC free products and processes which is estimated at two hundred kilo tonnes per year.

The new patented process creates a molecular bond encapsulating starch in a shell of polystyrene. The chemically bonded starch absorbs micro-drops of water, which becomes a safer, more environmentally friendly blowing agent inside the beads, explains Willem van Liemt, EPS R&D team leader at the Dutch lead partner Nova Chemicals and technical project leader for VOC FREE EPS.

The project achieved a considerable reduction in VOC emissions resulting from polystyrene foam, an improvement in productivity for foam moulders and improved safety during production of the foam. Increasing VOC emission reduction targets will necessitate the installation of pentane capture and destroy systems. These will

require significant investment and will reduce the problem but will never solve it completely, says van Liemt.

While Nova Chemicals developed the new expansion process for VOC free EPS, the German partner Teubert GmbH designed and built the new EPS expansion machine. A well chosen external partner allowed us to take a completely new concept and convert this into an actual machine within a much shorter time frame than if we had done it in-house, says van Liemt.

The EUREKA programme has been vital in facilitating the international collaboration required for this project. It provides a framework for collaboration, and gives the financial support to enable smaller, innovative partners to play a major role in these large projects, says van Liemt. EUREKA is... A European Network for market-oriented R&D, - strengthening European competitiveness, - promoting innovation in market-oriented collaborative projects, - involving industry, research centres and universities across Europe, resulting in innovative products, processes and services.

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