

STREAMLINE

Paratherm Application Series

Plastics extruder finds heat transfer fluid provides superior heat distribution

APPLICATION SERIES

Company: **PolyVISIONS Inc.**
Location: **Manchester, PA**
Application: **Plastics Compounding**
Heat Transfer Fluid: **Paratherm NF®**

PolyVISIONS Inc. is a specialty plastics company located near York, Pa. which has a wide range of extrusion and mixing capabilities. Because the company processes over 25 generic resin products with a wide variety of custom additives, they need a heat transfer fluid with consistent thermal stability and minimum impact from oxidation. Eight years ago they selected Paratherm NF® and they have continued to use this non-fouling, non-toxic heat transfer fluid ever since.

The current manufacturing facility in Manchester, Pa. was opened in 1996. There are 13 employees and the company generates annual revenues of \$2 million from its production of more than one million pounds of polyolefin and polyester compounds. These specialty additive compounds are supplied to a wide range of manufacturers of end use compounds which enhance production processability and product properties.

Specialty additives are supplied in pellet concentrate form. The exceptional performance of these specialty pellets stems from the intimate, intensive mixing of ingredients. The company is able to integrate additives evenly into plastic raw materials, as well as develop additives that have multiple applications. PolyVISIONS will also convert compounds from a light powder form into pellets, or process compounds that contain light powder ingredients in order to help control dust problems in customer production facilities.

Among the additives that PolyVISIONS uses are pigments, nucleating agents (which accelerate crystallization of plastic compounds), lubricants, surface modifiers that enhance appearance and impact modifiers that make plastic compounds more durable.

PolyVISIONS's capital inventory includes a variety of temperature control equipment manufactured by Advantage, Delta T, TUC, and other companies circulate Paratherm heat transfer fluids are used in every PolyVISION unit to maintain precise temperatures. Among these processing machines is a Readco Continuous Processor, originally designed for food processing but adapted for PolyVISIONS's plastic compounds. PolyVISIONS President and CEO, Larry Bourland said that the mixer's large throat opening, deep flighted screw elements and large diameter barrels are particularly useful in blending compounds that include light, powdery ingredients.



Readco Continuous Processor Barrel Extruder equipped with Three Roll Sheet Stack. Temperature controlled with Paratherm heat transfer fluid.

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Larry Bourland, CEO of PolyVISIONS Inc. inspects quality of extruded profile.



Intimate mixing of polymers by Readco Extruder equipped with vertical sheet die.



Larry Bourland demonstrates PolyVISIONS finished specialty additive products in pellet form.

"Traditional extruders are designed for high-density materials, such as pellets," Bourland said. "The Readco can handle fluffy, low bulk density materials that can be a problem for other extruders." Bourland first encountered the intermeshing, co-rotating twin screw equipment at a Penn State University conference in 1990. Even though it was designed to mix food formulations such as pasta and candy, he recognized the equipment was ideal for blending the powdery ingredients that PolyVISIONS uses in its compounds.

PolyVISIONS adapted the unit by reconfiguring parts, such as segmented screws, internal elements and the drive train. The unusually deep flights of the Readco screw elements have large internal volumes that can accommodate shredded materials from recycled sources more effectively. "Feeding these non-traditional feedstocks, mixing in the molten state, and then converting the materials into traditional solid pellets is simply not a problem," Bourland said. In fact, he was recently called in to help another company adapt a similar piece of equipment to convert recycled telephone books into kitty litter.

The Readco Continuous Processor (or CP) has a closed-loop thermal fluid system that circulates Paratherm NF which maintains the extruder barrel at a pre-set temperature. Bourland states that over the years the Paratherm fluid has proven reliable, durable, and hazard free. "In addition the Paratherm fluid resists oxidation better than competitive fluids so there is a lot less accumulated carbon residue in the equipment. If that residue is permitted to accumulate on the surface of heating elements, heat control becomes crippled. The same thing will happen if residue coats the pumps or the surfaces of the cooling apparatus."

PolyVISIONS uses Paratherm NF for temperature control of applications of up to 550° F. For even higher temperature applications, heating is controlled electrically with metallic bands as heating elements. However, with this direct heating method, a potentially hazardous situation arises if an electrical arc comes

anywhere near the airborne powdery substances. With Paratherm NF, of course, the heated fluid is externally circulated to the equipment removing the risk of electrical arcs. Paratherm also provides a more even distribution of heat than electrical systems. "Removing excess heat from thermal oil is also never a problem. The temperature control units are equipped with heat exchangers that efficiently remove excess heat generated during melt processing," Bourland adds.

In addition to use in the Readco CP, PolyVISIONS regulates the temperature of other mixing equipment by closed loop circulation of Paratherm NF heat transfer fluid. The other types of mixing equipment include jacketed ribbon blenders, which mix materials in the solid state. In this application, thermal fluid is circulated from the control mechanism to the blender at temperatures up to 350° F. The precise uniform temperature provided by the Paratherm NF promotes even integration of all mix components more effectively. "These tend to be long production runs," Bourland said, "so the thermal oil can become exposed to air. If the thermal fluid we used were vulnerable to oxidation it would quickly discolor and thicken. Sooner or later this would compromise thermal performance."

In conclusion, Bourland said, "Paratherm is good but that doesn't mean we can skip routine maintenance. "If you don't perform routine maintenance, it doesn't matter whose products you use. Eventually, your production will come to a halt."

Contact Information:

Larry Bourland

President and CEO

PolyVISIONS, Inc.

25 Devco Drive, Manchester, PA 17345

Phone: 717-266-3031