



# Case Study

## Ultipleat® Polymer Candles Used in Producing Virgin and Recycled PET Resin

### Background

A major producer of PET bottle grade resin in Western Europe produces very high quality resin at a world class facility with over 330MT per year capacity. They operate two production lines to manufacture a wide range of PET resins that are used in beverage containers, as well as thermoforming applications. Below is a summary of the two production lines:

**PET Line 1:** Virgin resins made from PTA and MEG for blow molding, thermoforming applications.

**PET Line 2:** Bottle grade resin with up to 10% recycled material derived from chemical recycling. The origin of recycled content can be both in-house and external. In-house waste is pelletized while outside waste is added in the form of flakes. Recycled material is typically premixed and fed into the polymerization reactor.

A duplex type central filtration system is used for melt filtration in both lines. This filter system is critical for producing a contamination-free and gel-free quality PET resin that is ideal for blow molding applications.

### Challenge

The PET manufacturer operates a central filtration system that uses thirty eight (38) candles per housing. Each candle has a 60 mm (2.4 in) OD and is 1,410 mm (55.5 in) in length, providing 1.17m<sup>2</sup> (12.59 ft<sup>2</sup>) in filter area for a total of 44.08 m<sup>2</sup> (474.47 ft<sup>2</sup>) per filter housing. Historically, the customer had worked with two major European element suppliers of fan pleat element design and found marginal improvements in onstream life while switching from one supplier to another.



Other significant data includes:

### PET Line 1 (Virgin Resin)

- Typical onstream life achieved with existing system was 28 days
- Clean DP was approximately 50 bard (725 psid) and terminal DP was 100 bard (1450 psid)
- On average 13 changeovers per year

### PET Line 2 (Recycled Content Resin)

- Typical onstream life achieved with existing system was 15 days
- Clean DP was approximately 50 bard (725 psid) and terminal DP was 100 bard (1450 psid)
- On average 18 changeovers per year

The goal was to improve the onstream life of the filters, reduce down time associated with changeovers, and save on operating costs.

## Solution

After careful study, Pall recommended its Ultipleat polymer candles for use in each production line. A bundle of thirty eight (38) candles with similar dimensions and the same micron ratings was designed to retrofit the customer's existing housing for each line. Each Ultipleat polymer candle provided 1.61 m<sup>2</sup> (17.3 ft<sup>2</sup>) in filter area, an increase of 38% over the existing candles. Pall's Ultipleat polymer candles were designed for use up to 129.3 bard (1875.3 psid), offering the customer a much more robust design than their existing design. The retrofit did not require a redesign of the filter housing or tube sheet. Pall has taken the necessary steps to ensure the fit and seal.



## Results

### PET Line 1 (Virgin Resin)

- Clean DP was recorded at 38 bard (551 psid), a reduction of 24% over past clean DP
- Onstream life was recorded at 68 days while system terminal DP was only 85 bard (1233 psid). This amounted to a 35% increase in onstream life while still being 15% below typical maximum delta P.

### PET Line 2 (Recycled Content Resin)

- Clean DP was recorded at 30 bard (435 psid), a reduction of 40% over past clean DP
- Onstream life was recorded at 67 days while system terminal DP was only 82 bard (1189 psid). This amounted to a 335% increase in onstream life.

The Delta P curves, as recorded from PET Line 1 and PET Line 2, are shown below in Figures 1 and 2.

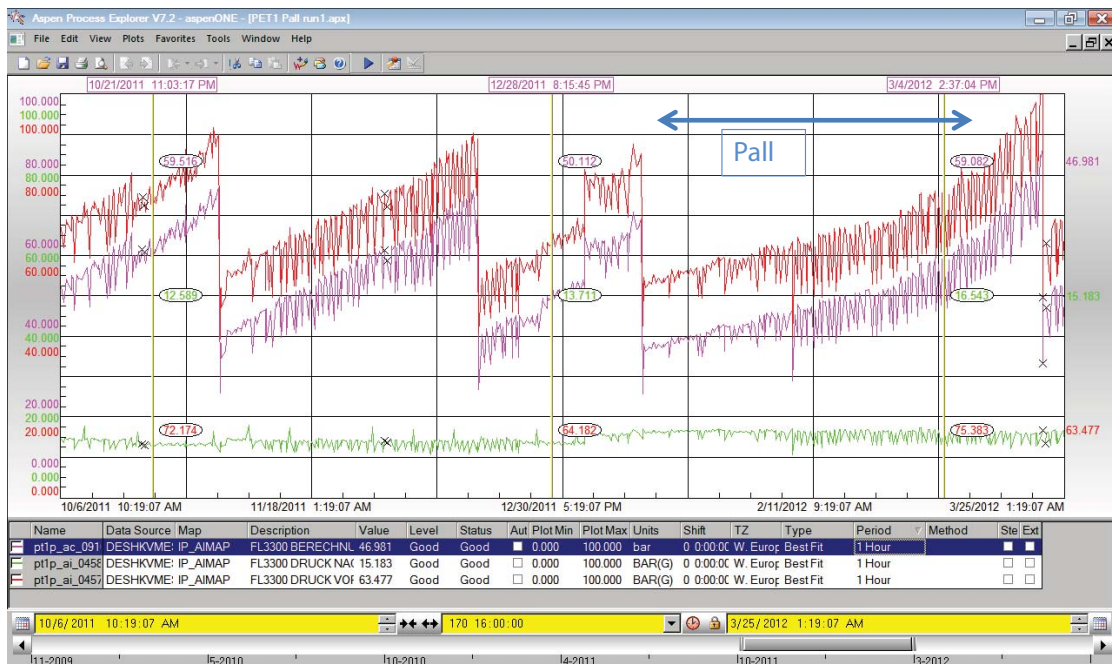
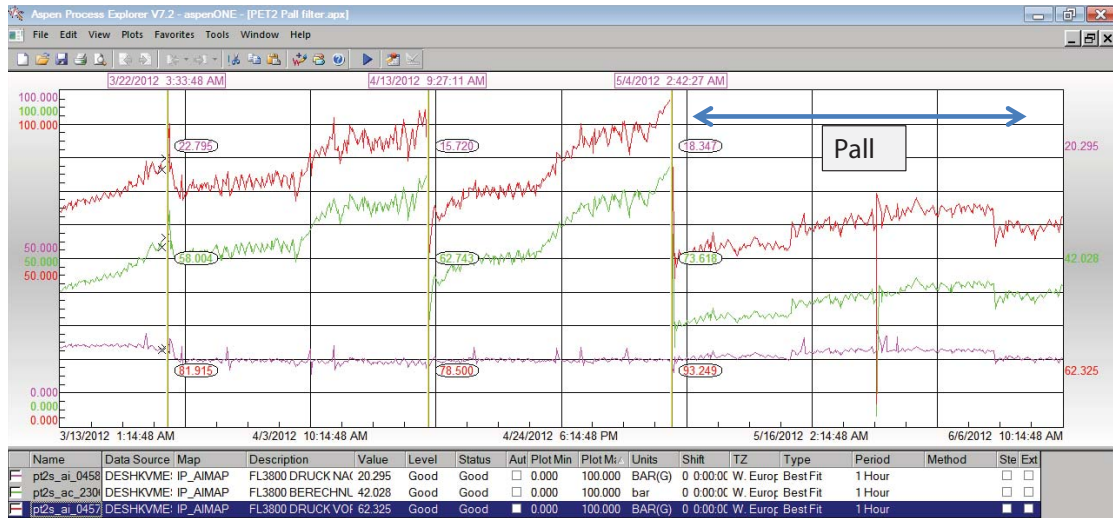


Figure 1: PET Line 1 Performance



**Figure 2: PET Line 2 Performance**

### Customer Benefits

- The customer observed no reduction in quality
- The number of changeovers for PET Line 1 was estimated to be reduced from the existing 13 times per year to only 6 times per year
- The number of changeovers for PET Line 2 was estimated to be reduced from the existing 18 times per year to only 6 times per year
- Each changeover is estimated to cost approximately 13K Euro in cleaning and 3K Euro in maintenance costs. By significantly reducing the number of changeovers per line, the estimated cost savings are over 122K Euro for PET Line 1 and over 200K Euro for PET Line 2.

The customer is satisfied with Pall's Ultipleat polymer candles and is planning to phase out all current fan pleat candles with Pall's Ultipleat polymer candles. When calculated, the return on investment for each candle set is less than one year.



Pall Corporation

#### Fuels and Chemicals

25 Harbor Park Drive  
Port Washington, NY 11050  
+1 516 484 3600 telephone  
+1 888 873 7255 toll free US

Portsmouth-UK  
+44 (0)23 9230 3303 telephone  
+44 (0)23 9230 2507 fax  
processuk@pall.com

#### Visit us on the Web at [www.pall.com](http://www.pall.com)

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