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TO: N. A. Coffey (2)

AT: PVC-PTS

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SUBJECT: FINAL REPORT: BAFFLE POSITION STUDY
LIMITED EVOLUTION P 88-55

INTRODUCTION

Polyvinyl chloride homopolymer resin production from Building 92 has been consistently finer than that of Building 88. Since much of the resin from Building 92 is finer than specifications allow, it is desirable to coarsen this product for two reasons: 1) to increase the R.F.T. and 2) to decrease the yield loss of fine particles in the centrifuge effluent and dryer discharge air streams.

Subject P-Number authorized a baffle position study in order to determine the effect of a change in the agitation flow pattern on homopolymer resin particle size. This study was limited to changes in baffle height and finger direction in order to try to find a relatively fast, inexpensive, short-term solution to this problem. Any major equipment revisions such as new sheaves for an r.p.m. change might not prove to be adaptable to new products which are now being developed.

SUMMARY

The experimental line in Building 88 was equipped with Building 92 type baffles (two large, upward-deflecting fingers per baffle). The SDP for intentional Opalon 345-1 was used for all the batches produced in this study.

Three batches were made at a baffle outage of 75" and the baffle fingers perpendicular to flow. These conditions gave maximum baffling with one finger per baffle completely submerged at static conditions and produced resin having an average SAF of 183.

Four batches were made at a baffle outage of 49" and the baffle fingers in line with the flow pattern. This baffle arrangement gave minimum baffling with two fingers per baffle submerged at static conditions. These batches had an average SAF of 91.

The other two baffle positions authorized for study (two fingers submerged, 49" outage, with fingers perpendicular to flow and a baffle outage of 35 in. with fingers at a 45° angle) were cancelled after water runs showed excessive baffle weave.

CONCLUSIONS

Resin particle size could be increased by changing the baffle position.

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It is questionable based on the limited data obtained whether the desired particle size could be made without any sacrifice in extrusion quality. Further experimentation would be needed to find the optimum baffle position.

RECOMMENDATIONS

It is recommended that the project be dropped due to the advanced timing of X-75.

DISCUSSION

1. SAF

The baffles for this study were positioned at 49" or 75" measured from the top of the baffle nozzle to the top of the baffle. Based on the volume of a standard charge for Opalon 345-1, 3366 gallons, this represents a baffle submergence of 5" above the tip of the top finger and 5" above the tip of the bottom finger respectively. It was felt that this might give more reproducible data than having the fingers partially submerged at static conditions. Estimated effective baffling areas based on a projected surface area were calculated from blueprint data.

An SAF range of 165 - 192 was produced in three batches with only the bottom finger per baffle submerged and the finger direction perpendicular to flow. This condition represents an estimated effective baffling area of 302 sq. in.

For the second set of conditions, the top finger submerged and finger direction in line with flow, an SAF range of 84-107 was produced in four batches. This baffle arrangement represents an estimated effective baffling area of 222 sq. in.

Decreasing the effective baffling area should result in a coarsening of resin particle size. It must be pointed out, however, that for the same static outage the dynamic outages were different for the two baffle conditions based on data obtained from water runs. The liquid level rose 8 1/2 in. from static to dynamic conditions when the baffles were positioned high in the kettle with the fingers perpendicular to flow. For the other baffle position the rise was 13 in. This fact illustrates the different flow pattern obtained by changing the baffle position. In order to produce the desired SAF range in Building 92, further experimental work is needed in order to determine the optimum baffle height and finger direction.

2. EXTRUSION

Extruded ribbon grades were all average to poor with the exception of the first two batches which had a "B" classification. Having only three batches in the first group (the fourth batch was dropped as the particle size was too fine at the first baffle arrangement), makes it possible to analyze that the third batch was just a poor run causing a low grade on extruded ribbon. On studying all the data and batch charts, it was noticed that the first two batches had a 2°C temperature spread for the first two hours and didn't stop cycling until after the

first three hours. This was caused by the fact that the large baffles having a different temperature sensitivity had just been installed in the kettle and the instruments had not been readjusted to compensate for the different response of the baffle thermo-well.

3. CYCLE TIME

Cycle time for the coarse batches was approximately one hour shorter than that for the fine batches. These batches were produced using a smaller effective baffling area and therefore less mixing. During the polymerization the difference between the true reaction temperature of the resin particles and the measured temperature of the suspending medium would be greater than the batches produced with more mixing. The coarse batches, therefore, were produced at a higher reaction temperature which gave a correspondingly shorter cycle. It is assumed that the temperature cycling caused the slightly longer cycle for the first two batches.

4. TRANSLATION STUDY

The advanced timing of the new suspending system due to the promising results of X-75 has killed the justification for any further work on this project.

R. R. Saxton

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BAFFLE STUDY
APPENDIX I

I. Volume

VCM @ 50°C = 1831
Water @ 50°C = 1535

3366 gal.

Outage for 3366 gal = 24 in. dipstick from manhole

II. Difference between manhole and top of baffle nozzle

Nozzle 8 in. higher than manhole measuring point.

III. Dimensions

Tip of top finger = 54 in. from bottom of baffle.
Tip of bottom finger = 28 in. from bottom of baffle.

IV. Desired Submersion

Static Conditions	Distance Liquid to Nozzle	Baffle Outage
59 in.	24 in. + 8 in.	49 in.
33 in.	24 in. + 8 in.	75 in.

V. Projected Surface Area (Calculated from Pfaudler blueprint SE-1376 2-16-55.)

Fingers perpendicular to flow		Fingers in line with flow	
Depth	Surface Area	Depth	Surface Area
7 in.	14 $in.^2$	7 in.	14 $in.^2$
28	282	28	98
33	302	33	118
54	570	54	202
59	590	59	222

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BANNER SEULE
APPENDIX IX
OPALON 345-1

Baffle Cutage	75"			49"			
Finger Direction	Perpendicular			In Line			
RPM	121			121			
Run Number	1	2	3	4	5	6	7
Batch Number	557X	569X	577X	588X	594X	601X	608X
SAF	191	165	192	84	107	87	87
% thru 100	92	81	92	10	27	9	12
Bulk Density	.477	.440	.485	.462	.483	.459	.451
Read Dry Time	10:00	6:00	7:30	7:15	5:45	6:15	6:00
Extrusion Rate	146	145	153	150	145	145	145
Extrusion Grade	B	B	G	G	F	E	D
Cycle Time	12:25	12:14	11:45	10:45	10:30	10:50	10:55
Vortex Data							
Static Outage		24 1/2 in.			24 in.		
Dynamic Outage		16 in.			13 in.		
Rise		8 1/2 in.			11 in.		

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