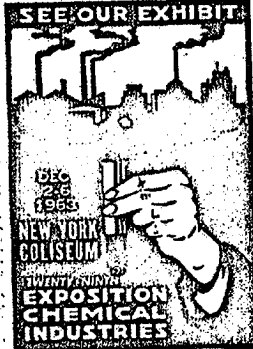


BOWEN ENGINEERING

SPECIALISTS IN SPRAY DRYING

E. I. duPont de Nemours
Newport, Delaware



Inc.



NORTH BRANCH - NEW JERSEY 08856

TEL. RANDOLPH 5-3232

October 23, 1963

Attention: Mr. J. M. Wesley and Mr. H. H. Gyorgy

Gentlemen:

This is to report spray drying test P-63-755 conducted on the Bowen Pilot Plant Spray Dryer located at North Branch Station, New Jersey, on Tuesday, October 15, 1963. Mr. J. M. Wesley and Mr. H. H. Gyorgy represented your firm when your organic red pigment was processed.

The test objective was to determine the optimum spray drying conditions while processing a 30% solids organic red pigment material. The powder collected was to contain less than .5% moisture and have satisfactory pigment characteristics. The customer is going to run complete analytical tests on the powders produced at his laboratory in order to determine whether they are in specification. During this test run we processed the 30% solids paste with very little difficulty during the spray drying operation. We produced a series of samples for customer evaluation purposes using a range of dryer temperature conditions. After the customer has evaluated these samples, it will be possible to determine the optimum design conditions for this product. All of the powders prepared per our analysis were well within the final moisture specification. The paste dried quite readily with good equipment conditions and the only difficulty noted in the drying operation was the accumulation of damp powder on one side of the drying chamber during the run number 4B. The paste processed during run 4B had not been recirculated through the Moyno pump prior to the processing in the dryer but had merely been mixed with a Cowles dissolver. It was noticed during run 4B that the pump pressure ran low with the exception of one period where it increased to a very high value. The pressure dropped off quite suddenly and it is felt that a surge developed in feeding the atomizing device during run 4B due to some localized high solids feed stock getting into the feed system. This might have occurred due to the poor mixing and blending of the paste processed during run 4B. Also in run 4, in order to study the effect of lower atomizing forces, a smaller atomizing wheel was used and this, of course, might have resulted in the localized chamber build-up. It is generally felt that the drying temperatures established during run 4 would be quite satisfactory for commercial production where maximum atomization was employed and the feed stock maintained in a uniform state. Dust loss to the atmosphere was very severe during all of the spray drying runs although the indications

are that in run 4 by the use of lower atomizing forces the degree of recovery in the system increased appreciably. However, visual observations of the exhaust stack made during all of the spray drying runs showed a very high loss of solids through the exhaust stream.

TEST DISCUSSION

(A) Feed Handling

The organic red pigment arrived at a solids concentration of approximately 30%. Of the initial shipment of five drums, two were diluted somewhat with water using a Cowles mixer to blend in the water and these two drums of material were processed during run number 4. This was done so that if difficulty developed in processing the other three drums at 30% solids, we would have available a feed stock which would pump more readily. The other three drums of feed material was pumped through the Moyno pump prior to the test dates so as to thoroughly incorporate the water and pigment solids so that the best pumping conditions would be available to us during the test operation. A Moyno 3L4 pump was used to transfer the material from a suction hopper to the centrifugal spray machine. The normal rotation of the Moyno pump was not used and the unit was rotated in a reverse direction so that the pumping elements could draw material from the side of the suction hopper. The feed rate shown on the test data sheet is the weighed usage of material and the weight was taken at a time when the feed system was at a constant level. Relatively high discharge pressures were required to transfer this material from the suction hopper to the centrifugal device and these pressures were high and steady during all of these spray drying runs with the exception of run number 4B when a blockage occurred in the discharge line due to nonuniform mixing of the paste. At all other times however, the pumping of the paste was quite smooth and it transferred with little difficulty.

(B) Test Run Discussion

In spray drying run number 1 we dried the 30% solids paste from a 600°F inlet gas temperature. We held two different outlet temperatures by adjusting the feed rate accordingly in order to collect powder under these conditions for customer evaluation purposes. The powders prepared during these two runs were composed of very fine light powder and the final moisture content was within specification level. During spray drying runs 2 and 3 the paste was dried from a 550° inlet gas temperature and again two different outlet gas temperature conditions were studied. The powders produced during the first three drying runs were all within moisture specification and the drying chamber ran very clean. A severe and heavy stack loss was noted during

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these first three spray drying runs so therefore in run number 4 we attempted to cut down on this by the use of lower atomizing forces. During run 4 we also used the diluted feed stock and we also studied the effect of drying this material from a higher inlet gas temperature condition. Two samples of powder were produced during run 4 at two different dryer exit gas temperatures and powder within moisture specification was again collected. However during 4B, due to nonuniform pumping and probably nonuniform material, a surge developed in the feed flow and it was not sufficient atomization to take care of this condition and a wet spot developed on one side of the drying chamber. While this material was somewhat damp, it all brushed down for collection at the completion of the test run. It is felt that the material could be dried quite adequately from a 700°F inlet gas temperature and that this particular occurrence developed due to poor feed handling and the fact that we explored the use of lower atomizing forces. The total recovery of material increased during run 4 although the stack discharge was very heavy.

Some of the dried material was returned with your representative and the balance will be shipped via Somerville Transfer to the attention of Mr. Wesley. When you have completed your evaluation of the samples, we would appreciate your completing and returning to us, the enclosed questionnaire, keeping one copy for your files. This questionnaire will aid us in future test work or equipment design for your materials.

Enclosed with this report is a summary of data obtained during these runs.

We wish to thank you for the opportunity of rendering you this test service. Should you desire further information concerning the application of spray drying to your products, please contact our Mr. Ron Bayliss or our representative in your area, T. E. Grimaldi Company, 302 Marlton Pike, P. O. Box 7, Cherry Hill, New Jersey, Telephone: NO 3-4900. Our representative will contact you within a short time to arrange a meeting to review the test results and discuss future steps that you may wish to take.

Very truly yours,

BOWEN ENGINEERING, INC.


Richard S. De Hoff, Manager
Test & Development Department

RSD:dda
Enc.-questionnaires

Test No. P-63-755

For: E. L. duPont de Nemours

Material: organic red pigment

Date: October 23, 1963

TEST DATA SHEET

RUN NO.	1A	1B	2A	3	4A	4B

FEED CONDITIONS:

Identification	Organic red pigment					
Feed Make-Up	As received					Diluted
Type	Slurry					
Wt. % Solids	30.0					28.0
Temperature °F	Room					
Pressure (PSIG)	130	110	122	140	75	90
Average (Instantaneous Feed Rate)	15.0	13.5	13.5	15.5	20.0	21.0
Feed Rate LBS/MIN	12.6					

OPERATING CONDITIONS:

Inlet Temp. °F	600	600	550	550	700	700
Outlet Temp. °F	200	230	200	180	225	200
Type Heat	Direct gas					
Atomizer Type	Centrifugal					
Atomizer Description	7" MGSE				6" MDH	
Atomizing Force, Speed rpm	21,000					
Cold Air Utilization	None					
Chamber Conditions	Clean					
						Wet spot on one side of chamber

MATERIAL BALANCE:

Cyclone Collector, LBS.	41	57	33	194	48	102
Chamber Wall, LBS.						
Startup Purge LBS.	3		1	2		
Total Collected, LBS.		101	34	196		159
Total Feed, LBS.		453	152	809		633
Total Solids Fed, LBS.		136	46	243		177

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PRODUCT ANALYSIS

RUN NO.	1A	1B	2A	3	4A	4B
Source (1)	Cyclone----->					
Color	red----->					
Bulk Density Poured, lbs/ft ³	---	---	6.9			
Tapped, lbs/ft ³	---	---	12.5			
Moisture Content, Genco	Watts 125		Volts 90	Min 15		
Loss, Wt. %	0.3	0.2	0.0	0.1	0.3	
Feed Solids	30.0----->		0.3			