Graf Anlagenbau

Kompetenz in der Aufbereitungstechnik

Versuche

Grundlage einer soliden Anlagenauslegung sind in der Regel Mahlversuche mit dem Originalprodukt des Kunden.
Für diese Versuche stehen in unserem Technikum und Lohnmahlbetrieb ein umfangreicher Maschinenpark zur Verfügung:

- Schneidmühle
- Hammermühle
- Stiftmühle
- Universalmühle
- Wirbelstrommühle
- Turbo-Windsichter
- Sichtermühle
- Strahlmühle
- Zick-Zack-Sichter
- Labormühle
- Cryogen-Kaltmahlanlage
- Taumel-Siebmaschine
- Vibrationssiebmaschine
- Einwellenshreder GS 40 und GS 50
- Zweiwellenshredder M450
- Korngrößenanalyse: Luftstrahlsieb, Lasergranulometrie CILAS

Geschulte und flexible Mitarbeiter sowie die Verfügbarkeit der erforderlichen Werkstattausrüstung ermöglichen es uns während der Versuche bei Bedarf Umbauten und Veränderungen an der Anlage vorzunehmen.

Zum Versuch gehört natürlich die exakte Erfassung und Dokumentierung aller Versuchsparameter und die Erstellung eines fundierten und aussagekräftigen Versuchsberichts.

Beispiel eines typischen Versuchsberichts:

(Kundenspezifische Angaben sind unkenntlich gemacht, von den Analysenausdrucken jedes Versuchs wird im im Beispiel nur einer abgebildet)

Seite 1

Graf Anlagenbau GmbH Tel.: 08282-828993
Schlossberg 6 Fax: 08282-828994
D-86381 Krumbach GERMANY
email: graf.anlagenbau@web.de
www.graf-anlagen.de

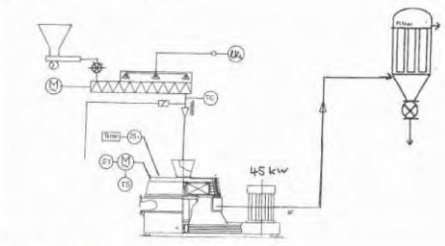
Cryogenic Grinding Test With XXXXXXXX On Whirl Mill UTM 400

Production scale test 6th march 2015

The test was made on 6th march 2015 in our test station

Seite 2

Flow Chart of test plant:



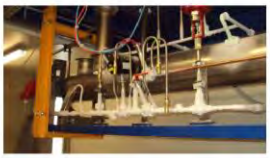
Test Target:
Production of material with fineness 100% below 200µ and low fine-dust content.
Based on the test a plant for 500 kg/h shall be designed

Some photos from the test-station:

Test plant UTM 400:

Feeding station:

Cryo-Screw:



Seite 3

UTM 400 Mill:

TEST REPORT:

Grinding Test on UTM 400 Cryogenic							
Testdate: 6th march 2015							
Material:		XXXXXXX, BulkDensity: appr 350 g/liter, Material contained agglomerates, lumps up to 100x230x50 mm. Lumps by hand breakeable. Material temperature approx 17 degreeC. At bottom of box bigger agglomerates.					
Test-No	unit	1	2	3	4	5	
Date		6.March 2015	6.March 2015	6.March 2015	6.March 2015	6.March 2015	
Mill Speed	Rpm	3960	4100	4100	4100	4100	
Gap	mm	large + 5mm	large + 5mm	large + 5mm	large + 5mm	large + 5mm	
Mill Motor	KW	45	45	45	45	45	
Power Consumption	A	36-40	36-40	36-40	36-40	40-50	
Motor load	%	45-45%	45-45%	45-45%	45-45%	55-60	
Temperature mill Inlet	degree C	minus 87 degree C	minus 87 degree C	minus 87 degree C	minus 88 degree C	minus 88 degree C	
Temperature mill outlet	degree C	minus 5 degree C	minus 5 degree C	minus 5 degree C	minus 5 degree C	minus 5 degree C	
Batch size	kg	appr 5 kg	appr 5 kg	50 kg	50 kg	appr 300 kg	
test time	minutes	not measured	not measured	7min 30 sec	6 min 45 sec	appr. 35 Min	
Capacity	kg/h	not measured	not measured	486	440	515	
Possible capacity at full motor load	kg/h			appr 550 kg/h	appr 550 kg/h	appr 550 kg/h	Test No 5, control analysis on Air jet sieve Hosokawa
Suction		only mill air	only mill air	only mill air	only mill air	only mill air	
Particle Size					Particle Size		
Cilas 920, dry	d 90	196,5µ	183,24µ	181,35µ	182,66µ	182,66µ	4% bigger 0,25 mm
Cilas 920, dry	d97	165,6µ	148,9µ	148,74µ	149,72µ	149,72µ	8% bigger 0,125 mm
Cilas 920, dry	d50	34,61 µ	32,5 µ	34,31 µ	36,31 µ	36,31 µ	36% bigger 0,09 mm
Cilas 920,dry	d10	7,78µ	7,81µ	6,8µ	8,74µ	8,74µ	50% bigger 0,063 mm
Remark		preliminary test	preliminary test	Manual feeding	Manual feeding	Material filled in BigBag	

Seite 4

Analysis Print-outs:

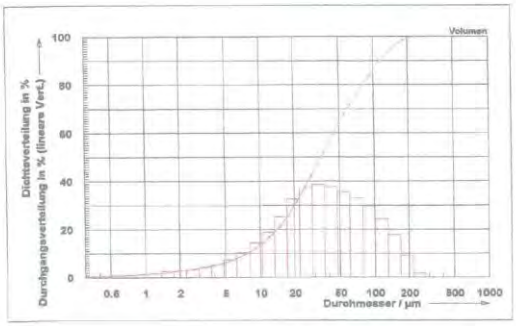
Test 1 at minus 87 degree C

Korngrößenmessung
CILAS 920

Probenbezeichnung : [redacted]
Kommentar : UTM400, -5, 4mm, 33Hz
Messdruck : 1815 mbar
Konzentration : 33
Bearbeiter : jf
Datum : 06.03.2012 11:48:09
Dateiname : d:\...\CILASDATEN\1187GR~1\GRAFCRY4.MES
Spez. Oberfläche : 0.44 m²/cm³ (kugelförmige Teilchen angenommen)
Mittl. Durchmesser : 31.33 µm

K/%	10.00	50.00	97.00	99.00				
D/µm	7.79	34.61	164.56	196.48				
D/µm	0.30	0.70	0.90	1.00	1.40	1.70	2.00	2.80
K/%	0.19	0.73	0.98	1.11	1.93	2.07	2.50	3.27
H/%	0.19	0.55	0.25	0.12	0.82	0.44	0.43	0.76
D/µm	3.20	4.00	5.00	6.00	8.00	10.00	12.00	15.00
K/%	3.99	4.92	6.15	7.46	10.31	13.40	16.58	21.33
H/%	0.72	0.94	1.23	1.31	2.85	3.09	3.18	4.75
D/µm	18.00	23.00	30.00	36.00	45.00	58.00	63.00	70.00
K/%	25.36	34.56	44.49	51.52	59.98	67.66	71.92	75.43
H/%	5.04	8.18	9.95	7.03	8.46	7.88	4.05	3.52
D/µm	90.00	110.00	135.00	165.00	210.00	260.00	320.00	400.00
K/%	83.28	88.81	93.52	97.04	99.45	99.98	100.00	100.00
H/%	7.84	5.53	4.72	3.52	2.41	0.53	0.02	0.00

K: Kumulativ, H: Häufigkeit



Comment to test results:

- Temperature: we saw at the first test that material is easy to grind. Therefor we decided to reduce the temperature in order to reduce the nitrogen consumption.

  We saw that minus 5 degree at mill outlet is a sufficient temperature.

- Particle size: 99% smaller 200 micron was easy to reach.
  In the tests we also put the focus on reducing the fine content.

- Coarse particles in the material: We saw that a small percentage of material (approx 2-4 %) remains on the 250 micron screen deck. This material contains a lot of long fibres which look like wood fibres and/or fibres from the packaging material of the raw material (baskets) .This material is not grindeable. We suggest to separate this material on a screening machine before it is fed to the XXXXXX-production machine.

- Capacity: Our test station is designed for grinding onto very high finenesses. There for our feeding system cannot feed so much material as the mill could process with XXXXXX. If we deliver a system to XXXXXX we will design the feeding system for higher capacity so that the UTM 400 can reach easily the demanded 500 kg/h.

- Nitrogen consumption:
  The test plant was consuming approx 200 litre Nitrogen per hour. Based on a production of 500 kg/h this means:
  0,4 liter Nitrogen per kg final product.

  As the temperatures in XXXXXXXX are higher as in Germany we expect little higher consumption in your plant, but it should not exceed 0,6 liter per kg.