High Precise Classification Technology in Toner Production

墨粉生产过程中的高精密分级技术

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微粉碎和分级是墨粉制造过程的核心部分，直接决定着墨粉的物理形状。影响最终的印刷、复印品的美观程度。其中微粉碎技术直接与墨粉的物理形貌有关，并且是墨粉生产过程中的耗能大户，这一点已被大多数厂家所认识重视；而分级是控制墨粉粒度分布的关键，在直接影响墨粉质量的同时，还有一个重要的作用是在同样的能耗条件下提高产量、或者在同样的产量时降低能耗，直接与企业的收益相关，但这一点似没有引起足够的重视，目前还未见这方面的详尽论述。本文通过具体的分级设备改造例，介绍了一种在国外（特别是日本）被广泛采用的高精密墨粉分级技术和设备。分析了改造前后分级精度的不同对产品质量以及相关的经济效益和节能降耗的影响。阐述了采用高精度分级设备的优越性。

The typical Toner production process is as Figure 1.

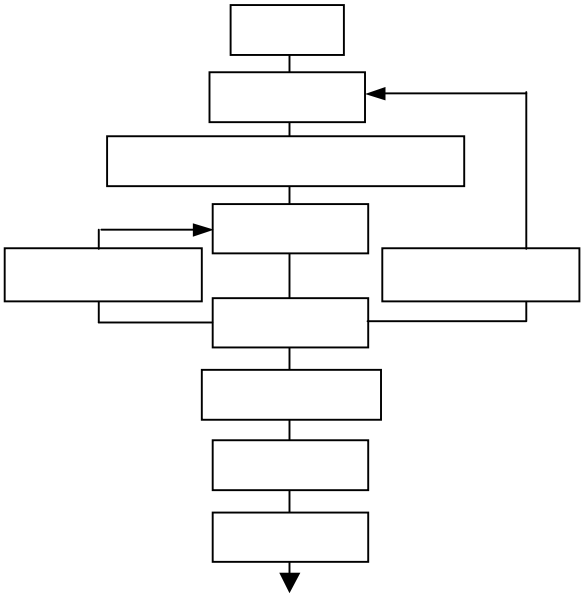

***Figure 1**.*

In this article, one kind of unique classification Technology is introduced. Prof. Rumpf first primarily invented this technology early in 70th. The oldest model published is as Figure 2

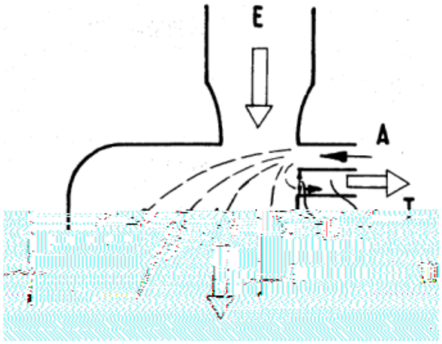

***Figure 2**.*

This kind of Classifier is also called Jet-Flow /or Coanda Classifier. It was successfully commercialized as Japan from the end of 80th, especially as toner production. Many famous producers like Canon etc. adopted this classifier, and developed a lot of new models according to their own experience.

Here one new developed model is introduced. Its classification mechanism is showed as Figure 3: The toner particle with a certain size distribution are shoot out from the feeding pipe by high pressured air. Because the air jet has the feature of flowing toward the wall (This is called Coanda Affect), it flows along the curved Coanda Block. The Large Particle brought by air flow is easier to escape and fly further. So, the particles are separated into three portions: Large, Medium and Small. This

Coanda Classifier is known with some obvious advantages as, Simple Construction; Three Portions of Products at Once; Low Running Cost (without rotating parts, no need motor); No change at Cut-point and Precision when scaled up.

Figure 3. .

The sketch of the whole system is shown as Fig.4

Particles fed from feeder ① are dispersed by special dispersion device ②, and then go through classification zone ③. The coarse portion classified is collected at cyclone ④ and then sent to the mill for pulverization again. The medium size portion is the product and collected at cyclone ⑤. The fine size portion is i60 0 0.24 265.2518 480.86□0 37 0.37 (o) -3 ( ) -1 (io) -3 (n) -3 ( ) -169 (p)□p) -3

A ***D***
B
C ***A***
af e cla ifica ion balanced i h ini ial a ma e ial inp ed.

Fo ome ea on , e en if no changing a o p , he ene g con mp ion can be dec ea ed 22%, beca e he ma e ial amo n need o be kneaded, cooled, c hed and p l e i ed i dec ea ed fo m 429 on o 334 on , a ho n in Ca e III.

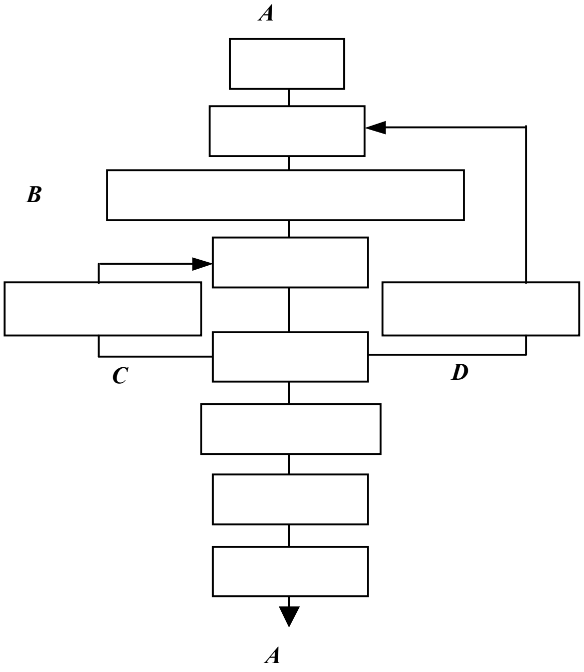

Figure 5.

A			
B			
C			
D	×	×	×

T o SEM pic e of Cla ifica ion e ample a e al o ho n a Fig e 6 and Fig e 7. The bo h ell a e good pa icle i e con ol b he cla ifie in od ced in hi a icle.

The mean pa icle i e of feed one a Fig e.6 i 12.6μm (ol), and Fine/Medi m/Coa e i 14%/85%/1%. The a e 6.29μm (ol), and 15%/83%/2% a Fig e.7,

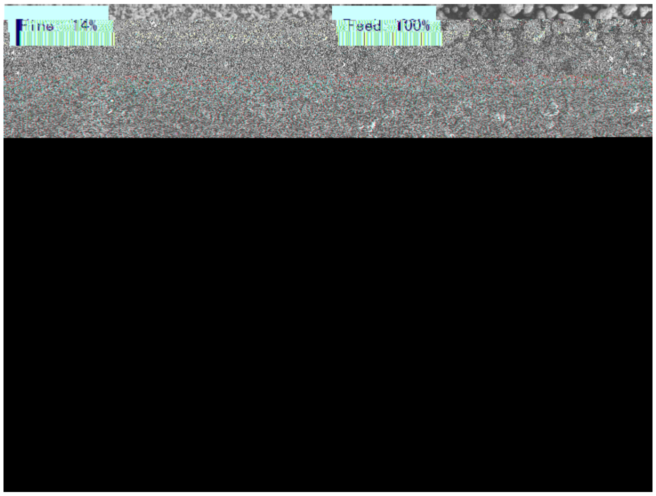

Figure 6. *1*

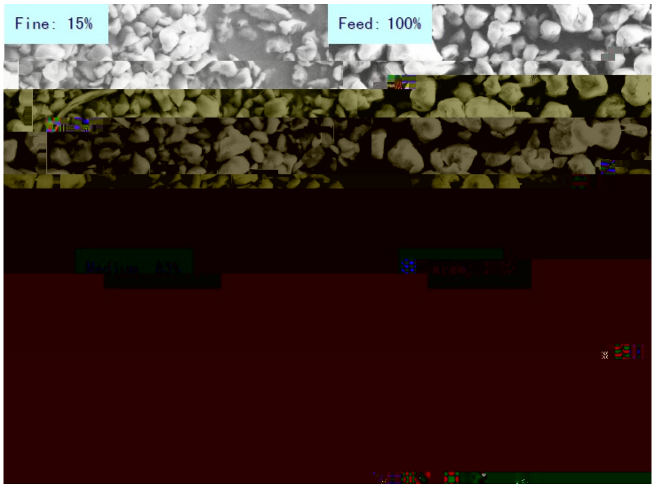

Figure 7. *2*