

重钙在无纺布母粒生产中 常见问题及解决方案

**Problems and Solutions of Heavy
Calcium Used in Non-woven Fabrics
Masterbatch Production**

演讲人：张鹏龙
Penglong Zhang



浙江金淳高分子材料有限公司
Zhejiang Jinchun Polymer Materials CO.,
LTD

关于我们 About us



Zhejiang Jinchun Polymer Material Co., Ltd.
Hangzhou Yujie Chemical Co., Ltd.

- Located in Hangzhou, China.
- China's Hi-tec Enterprise. Approved ISO9001, ISO14001, BS OHSAS 18001.

Products including

- Master batch Series: chemical fiber, plastics special various color master batch; Such as polypropylene chemical fiber master batch; BCF yarn master batch; polypropylene spun-bonded non-woven fiber, special melt-blown non-woven Master batch; polyester filament, silk short master batch; all kinds of plastic master batch;



无纺布

Non-woven Fabrics



无纺布，确切名称应是非织布或叫不织布，因为它是一种不需要纺纱织布而形成的织物。只是将纺织短纤维或者长丝进行定向或随机排列，形成纤网结构，然后采用机械、热粘或化学方法加固而成。由于其成本低廉而应用越来越广泛，到2018年底中国产量达到285多万吨，并且还在以6.7%的速度继续增长。

Non-woven fabrics is a fabric that does not require spinning or weaving. Staple fibers or filaments are arranged in a directional or random manner to form a network structure, which is then reinforced by mechanical, thermal or chemical methods. Due to its low cost, it is increasingly widely used. As reported, it's production scale will reach more than 2.85 million tons by the end of 2018 in China, and still increased at a rate of 6.7%.



中国纺丝成网非织造布工业生产统计(2018年)

Statistics of Nonwovens Industrial Production in China(2018)



类型/Type		生产厂家 (个) Manufacturer	生产线数 (条) Production Line	2018年生产能力 t/a Capacity
纺粘法非织造布 Spunbonded Nonwovens	PP纺粘法非织造布 PP Spunbonded Nonwovens	399	1103	2551600
	PET纺粘法非织造布 PET Spunbonded Nonwovens	37	54	197600
	SMS纺粘法非织造布 SMS Spunbonded Nonwovens	51	77	542300
合计 Total		487	1234	3291500
熔喷法非织造布 Melt-blown fabric		70	145	82240

“ 总量比去年增长了10.22%，近10年平均增长在15.6% ”

The total volume increased by 10.22% compared with last year, and the average growth in the past 10 years was 15.6%

”

2018年中国纺粘法非织造布实际产量
The Actual Output of Spun-bonded Nonwovens in China 2018



序号 NO.	地区 Province	生产线数 (条) Production Line	生产能力 (t) Capability	年增幅 (%) Growth Rate
1	浙江省 ZHEJIANG	421	775800	13.14
2	广东 GAUNGDONG	233	581500	0.94
3	山东省 SHANDONG	169	563300	20.44
4	江苏省 JIANGSU	148	439500	7.56
5	湖北省 HUBEI	80	263000	7.73
6	福建省 FUJIAN	117	202400	3.77
7	河北省 HEBEI	58	164800	3.91
8	四川省 SICHUAN	58	106900	10.67
9	河南省 HENAN	22	79000	10.16
10	辽宁省 LIAONING	30	95400	1.13
11	上海市 SHANGHAI	16	56000	-1.40
12	安徽省 ANHUI	18	33100	—
13	湖南省 HUNAN	10	34500	14.86
14	重庆市 CHONGQING	12	20500	52.33

无纺布的应用

Application of Non-woven Fabrics



APPLICATIONS

1、医疗、卫生用无纺布；2、农业用无纺布；3、家庭装饰用无纺布；4、服装用无纺布；5、工业用无纺布等。

1. Non-woven cloth for medical use; 2. Agricultural use; 3. Home decoration; 4. Clothing; 5. Industrial use, etc.



钙粉含量50%的配方 Formula with 50% Calcium



名称 Materials	数量 (kg)
钙粉 Calcium	50.0
抗静电剂 Antistatic agent	1.4
硬脂酸锌 Zinc Stearate	1.0
聚乙烯蜡 PE Wax	3.0
BBS	0.6
白油 White Oil	1.0
聚丙烯粉料 PP powder	25.0
聚丙烯粒料 PP granule	18.0
合计 Total	100.0

Tips

强调一下，这种配方做产品时都是纳米级钙粉，高档的产品上用，有特殊性能，成本也高，但效果特殊。

This formula is made of nano-scale calcium powder, which is used in high-grade products with special properties.

However, the cost is high, but effects is good .

钙粉含量75%的配方 Formula with 75% Calcium



名称 Materials	数量 (kg)
钙粉 Calcium	75.0
抗静电剂 Antistatic agent	1.4
硬脂酸锌 Zinc Stearate	1.0
EBS	0.6
白油 White Oil	1.0
聚丙烯粒料 PP granule	21.0
合计 Total	100.0

Tips

这一含量配方是正常产品配方，可以做出好产品，一般钙粉目数在2000~3000目间用途比较广泛。吹膜、注塑、纺丝等用途非常广泛，是最佳配方，重钙基础母粒。

This formula is normal product formula with good quality. Calcium powder are selected from 2000~3000 mesh. Its application is wide, such as blown film, injection, spinning.

钙粉含量83%的配方 Formula with 83% Calcium



名称 Materials	数量 (kg)
钙粉 Calcium Powder	100.0
硬脂酸锌 Zinc Stearate	1.2
抗静电剂 Antistatic agent	0.5
弹性体 Elastomer	3.0
EBS	0.5
聚乙烯蜡 PE WAX	2.6
聚丙烯 PP	12.2
合计 Total	120.0

Tips

这一配方中钙粉一般在2000目左右，母粒品质可以，及分散性尚可。用量比较大，成本上用户最能接受的。无纺布、编织袋、注塑用此较多。

The calcium powder in this formula is around 2000 meshes. Masterbatch quality is good too. The market amount of it is larger, can be widely used in non-woven fabric, bags and injection etc.

钙粉含量88%的配方 Formula with 88% Calcium



名称 Materials	数量 (kg)
钙粉 Calcium Powder	100.0
硬脂酸锌 Zinc Stearate	1.0
抗静电剂 Antistatic agent	0.5
弹性体 Elastomer	2.0
EBS	0.5
聚乙烯蜡 PE WAX	2.0
聚丙烯 PP	4.5
合计 Total	110.0

Tips

这一配方中钙粉含量较高，造粒不好看，分散效果也差，粉料较多，钙粉目数较粗，1250目左右，无纺布、编织袋、注塑可用。

The content of calcium powder in this formula is higher, and the granule is not good-looking, also the dispersion effect is poor. As the powder material is more, the number of calcium powder is coarser, about 1250 mesh. Can be used in non-woven cloth, woven bag, injection molding.

原料选择 Raw Material Choosing



重钙粉 Heavy Calcium Powder



也叫重质碳酸钙，主要成分 CaCO_3 ，原料来源于方解石，一般要求白度93%以上，碳酸钙含量96%以上，要求高温加热后（ 200°C ）以上白度不变。最高的碳酸钙含量99%，白度达到97%以上。

碳酸钙在塑料制品中起到一定骨架作用，对塑料制品尺寸的稳定性有很大作用，还能提高制品的硬度，而在无纺布中正好相反，重钙添加越多，无纺布越软。重钙粉不是越白越好，根据用途来选择。



AKA calcium carbonate, the main composition is CaCO_3 . Its raw material comes from calcite, generally requires whiteness above 93%, and calcium carbonate content above 96%. Also heating resistance must be above 200°C . The highest calcium carbonate content can be over 99%, and whiteness can be over 97%. Calcium carbonate plays a role as skeleton in plastic products, has an important effect in the stability of the plastic products, also can improve the hardness. However, in non-woven fabric, the result is just the opposite — the more heavy calcium added in, the softer non-woven fabric is.

Heavy calcium powder is not better even it's whiter, it should be according to the application.

过滤网目数与孔径对照表 Filter Mesh And Aperture



目数 Mesh	20	50	80	110	150	160	180	200	250	310	360	450	540	650
孔径 Aperture ccm	840	297	200	150	110	100	90	80	60	50	40	30	25	21
目数 Mesh	800	900	1100	1300	1600	2000	2500	3000	4000	5000	6000	7000	8000	
孔径 Aperture ccm	19	15	13	11	10	6.5	5.5	5	3.4	2.7	2.5	1.25	1	

粒径与目数对照表 Particle Size And Mesh Number



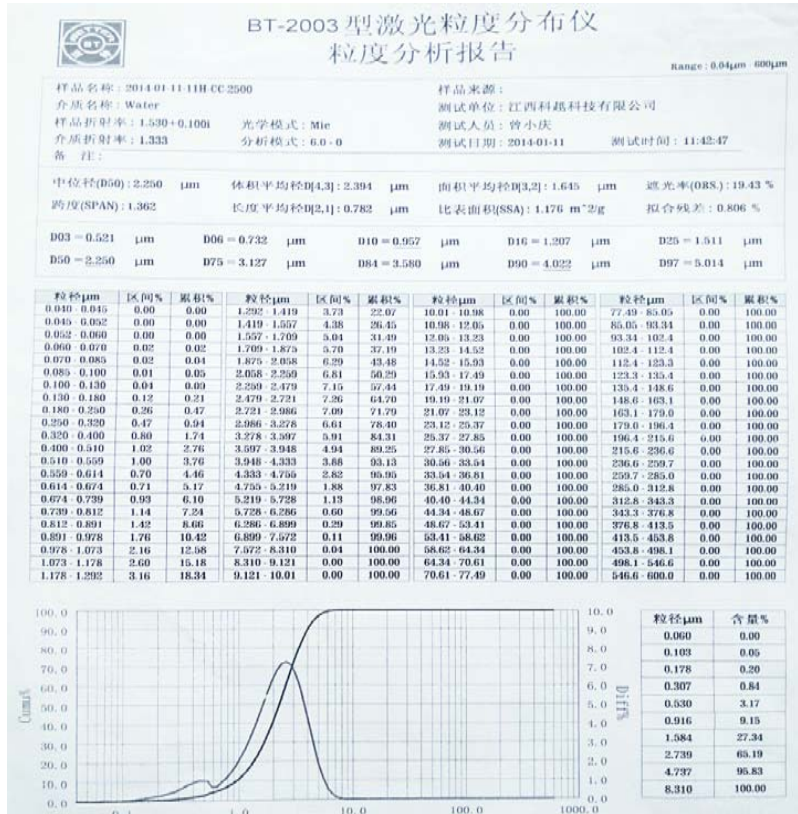
目数(mesh)	微米(μm)	目数(mesh)	微米(μm)
2	8000	100	150
3	6700	115	125
4	4750	120	120
5	4000	125	115
6	3350	130	113
7	2800	140	109
8	2360	150	106
10	1700	160	98
12	1400	170	90
14	1180	175	86
16	1000	180	80
18	880	200	75
20	830	230	62
24	700	240	61
28	600	250	58
30	550	270	53
32	500	300	48
35	425	325	45
40	380	400	38
42	355	500	25
45	325	600	23
48	300	800	18
50	270	1000	13
60	250	1340	10
65	230	2000	6.5
70	212	5000	2.6
80	180	8000	1.6
90	160	10000	1.3

由对照表可见，目数越大，说明粒径越小，反之也成立。
经验公式——目数×孔径
(微米数) \cong 15000

We can see from this table, the larger mesh equals the smaller particle size, and vice versa.
Empirical formula - mesh number \times aperture (micron number) \cong 15000

钙粉粒度分析报告

Analysis Report of Particle Size



分析报告中,若判断助剂的用量可以参考平均粒径D50和比表面积。判断过滤网或压滤值可参考D98。

In the analysis report, the average particle size D50 and specific surface area can be used to determine the dosage of additives. Judge the filter or filter pressure value need to refer to D98.

载体的选择 Carrier Choosing



树脂是做母粒的基本
Resin is the fundamental of masterbatch

聚丙烯 PP

聚乙烯 PE

聚乙烯依聚合方法、分子量高低、链结构之不同，分高密度聚乙烯（HPPE）、低密度聚乙烯（LDPE）、茂金属聚乙烯（MPE）及线性低密度聚乙烯（LLDPE）。

Polyethylene is divided into high-density polyethylene (HPPE), low-density polyethylene (LDPE), metallocene polyethylene (MPE) and linear low-density polyethylene (LLDPE), according to the polymerization method, molecular weight and chain structure.

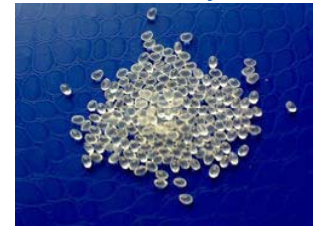
聚丙烯粒料 PP Granule



聚丙烯粉料 PP powder



丙烯酸弹性体 Acryl elastomer



助剂 (分散剂) 的选择

Additive Choosing



费托蜡 Fischer Tropsch



石蜡 Paraffin



聚丙烯蜡 PP WAX



聚乙烯蜡 PE WAX



氧化蜡 Oxidized Paraffin



助剂 (分散剂) 的选择 Additive Choosing



抗静电剂 Antistatic Agent



EBS分散剂 EBS Dispersant



硬脂酸锌 Zinc Stearate



硬脂酸钙 Calcium Stearate APP分散剂 APP Dispersant



助剂 (分散剂) 的选择 Additive Choosing



钛酸酯偶联剂
Titanate coupling agent



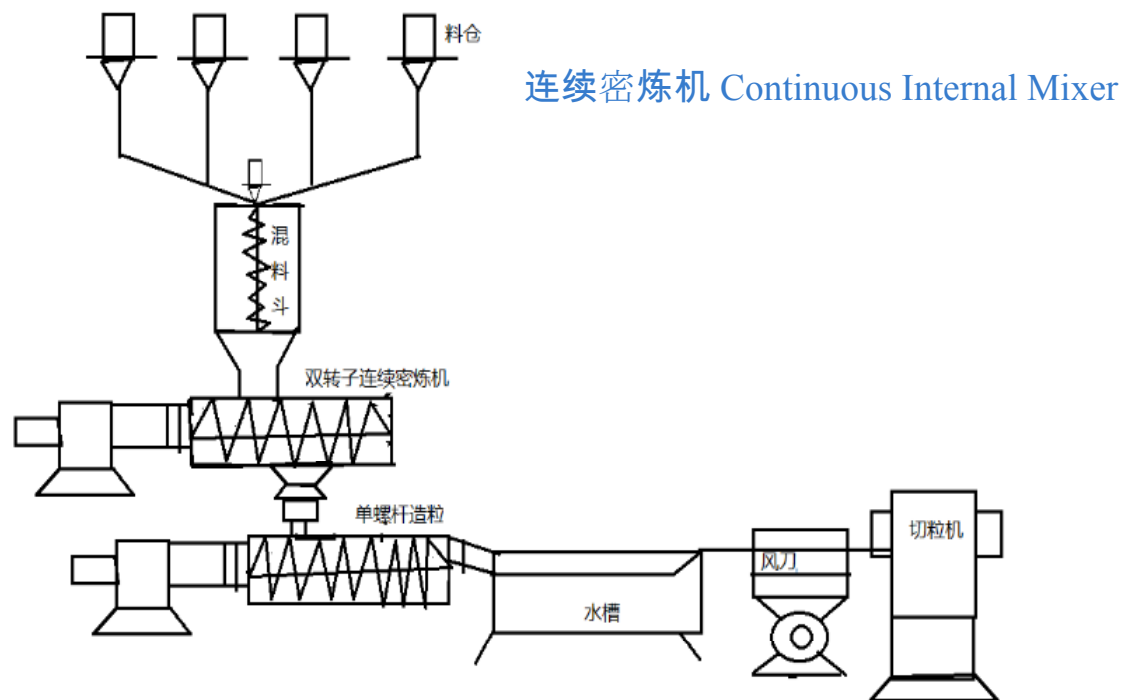
铝酸酯偶联剂
Aluminate coupling agent



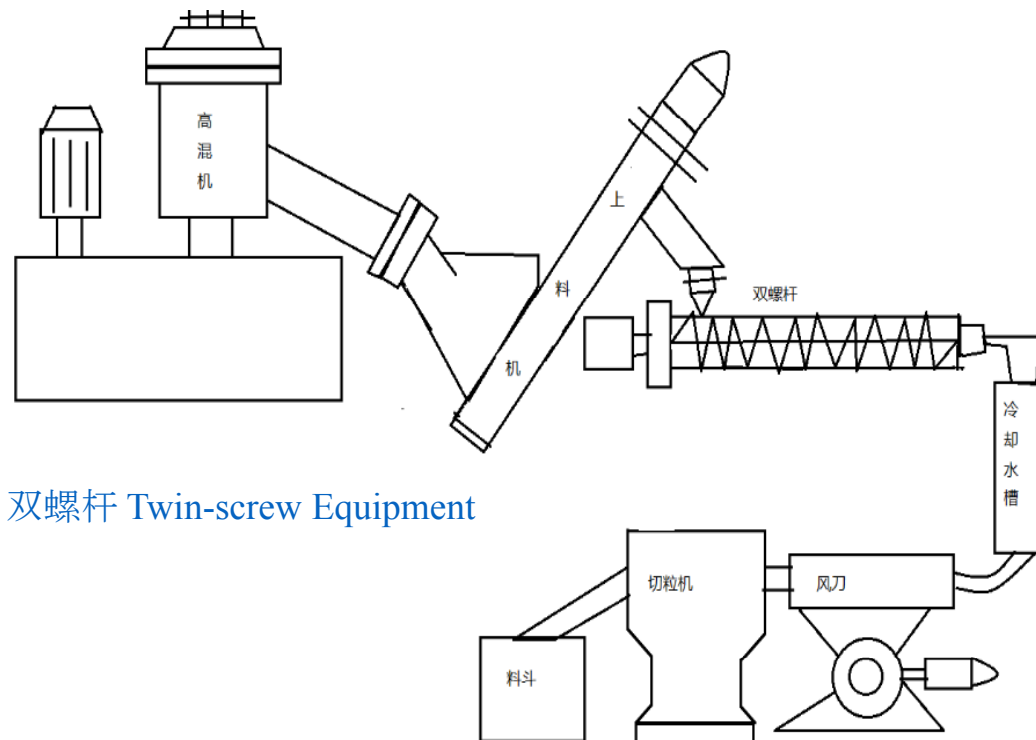
硅烷偶联剂
Silane coupling agent



钙粉含量50%的母粒制作
Machinery for Masterbatch With 50% Calcium
Powder



钙粉含量75%的母粒制作
Machinery for Masterbatch With 75% Calcium
Powder

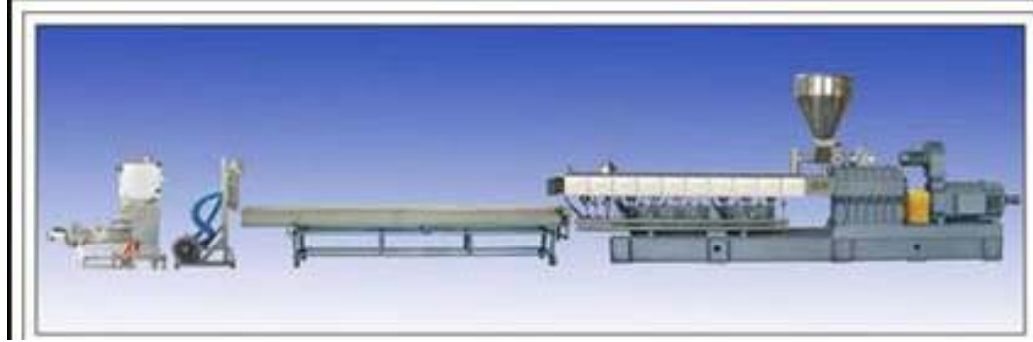


双螺杆 Twin-screw Equipment

钙粉含量83%的母粒制作
Machinery for Masterbatch With 83% Calcium
Powder



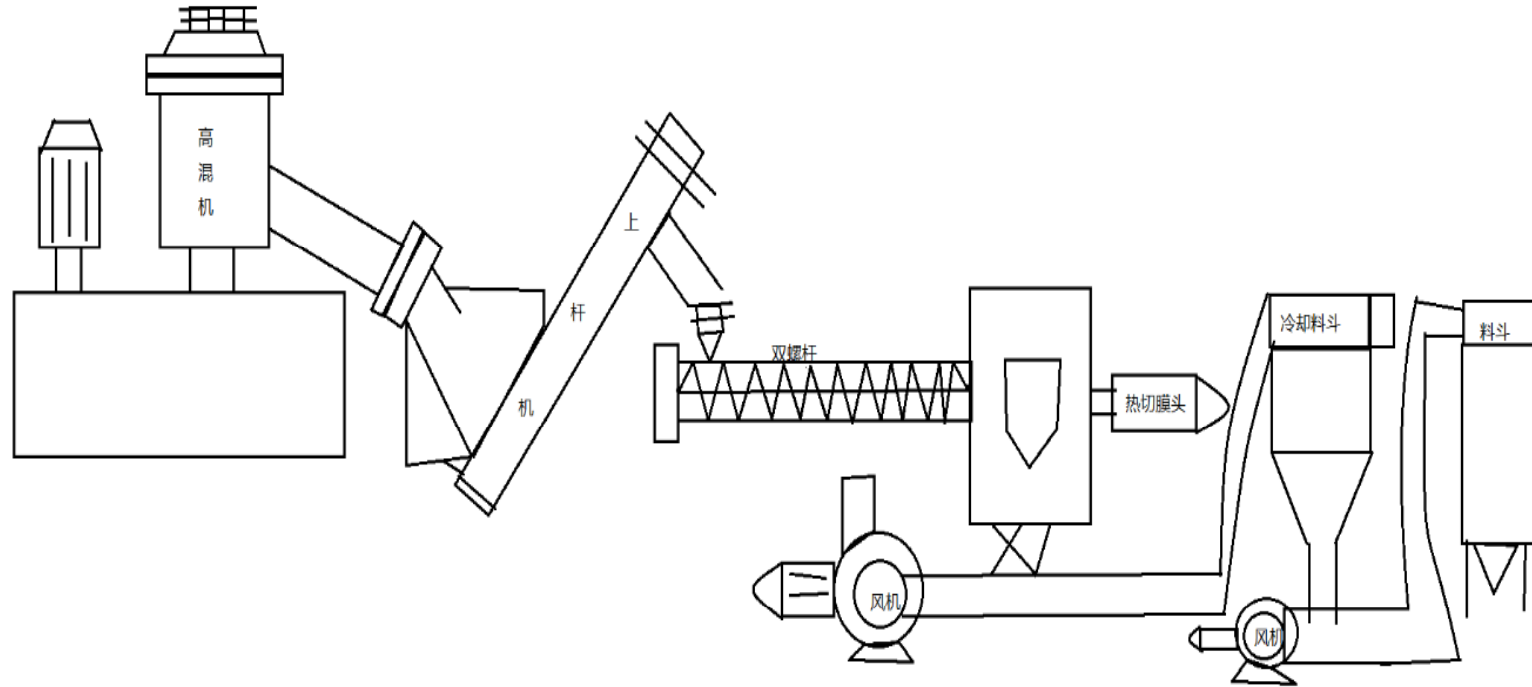
双螺杆挤出机 Twin-screw extruder



水冷机 Water-cooling machine



钙粉含量88%的母粒制作
Machinery for Masterbatch With 88% Calcium
Powder



熔指的控制 Melt Flow Index



熔融指数是一种用来表示塑胶材料加工时的流动性的数值。它是美国标准测量协会（ASTM）根据美国杜邦公司惯用的鉴定塑料特性的方法制定而成。

概念为在固定温度（PP/230°C，PE/190°C）和负荷（2.160Kg）的情况下，热塑性物料10分钟流过标准口模（ $\Phi 2.095 \pm 0.005$ 毫米）的质量。

The melt flow index is a concept used to indicate the fluidity of plastic materials during processing. It was developed by the ASTM, according to the method used by Dupont to identify the characteristics of plastics.

It means the quality of thermoplastic materials in a fixed temperature (PP / 230 °C, PE / 190 °C) and load (2.160 Kg), for 10 minutes through the standard mold mouth ($2.095 + / - 0.005$ mm Φ).



熔指测量仪
Melt Flow Indexer

常用PP型号及熔指

Commonly Used PP and MFR

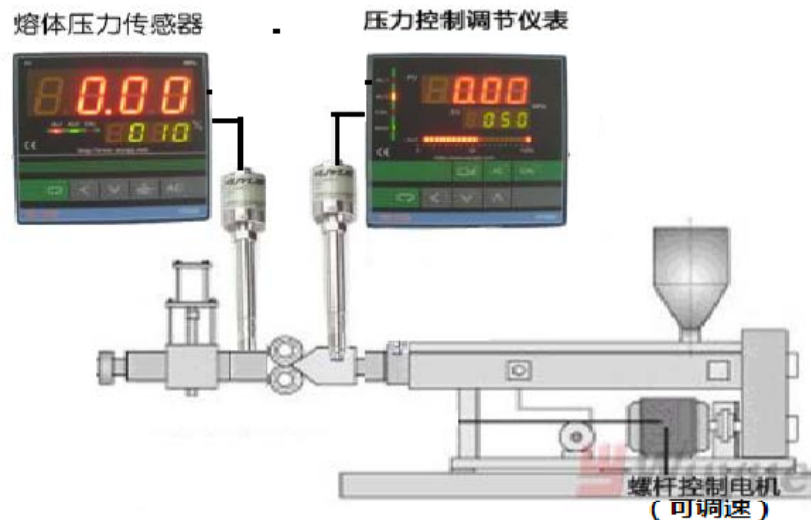


型号 Type	熔指 MFI	用途 APPLICATION
T30S	3.2	编制带丝，用于包装，地毯背衬，人工草坪，捆扎绳，包装绳等。Woven belt silk, used for packaging, carpet backing, artificial lawn, tying rope, packing rope, etc.
C30S	6	流延膜生产工艺生产的编织带丝，捆扎绳，绳，单丝用于刷子和扫帚，针织土工布。Flow film production process for the production of woven belt silk, tied rope, rope, monofilament for brushes and brooms, knitted geotextiles.
Z30S	25	低旦尼尔BCF、CF和短纤，中高纺速生产线上生产的BCF丝用于地毯，CF丝用于捆扎绳，扶手，包装等。Low denier BCF, CF and staple fiber, medium and high spinning speed production line BCF wire for carpet, CF wire for tying rope, handrails, packaging, etc.
71740	40	无纺布专用料、香烟过滤咀专用树脂。Non-woven materials, cigarette filter mouth resin.
S2040	38	无纺布，高速纺、细且短纤、连续细丝、无纺布。Non-woven cloth, high speed spinning, fine denier staple fiber, continuous filament, non-woven cloth.
PP粉	2-3	用于编织袋和编织膜、膜丝、纺织膜丝线、地毯背衬。Used for woven bag and woven film, film silk, textile film silk thread, carpet backing.
1088B	11	薄膜级，用于吹塑膜；一般用作包装膜如食品、服装等。Film grade, for blowing film; Generally used as packaging film such as food, clothing and so on.
4912	12	注塑级，高透明/抗静电；硬包装，媒体包装，家庭用品。Injection grade, high transparency/antistatic; Hard packaging, media packaging, household items.
EP2S12B	1.8	单层或多层挤出吹塑容器，具有良好的透明度。应用于浸液瓶和袋的生产。Single or multilayer extrusion blow vessel with good transparency. Used in the production of immersion bottles and bags.

分散性 Dispersibility



用测压滤值方式来表示填充母粒分散质量
FPV is used to show the dispersibility of masterbatch



熔体压力测试仪



压滤值检测报告

Filter Test Report

STD.: 填充母粒83% CaCO3

- a) According to European standard (EN 13900-5).
- b) Masterbatch: Made by Twin Screw Extruder: Pigment content 83%
LLDPE content 17%
- c) Basic Test Polymer: PP with MFI 180
- d) Mixture: A test mixture of 200g, including 12g masterbatch(6%), 188g PP(94%).
Final Pigment content 10.0 g.

e) Test Details:

Equipment : JR-SSE-20 & JR-FPT-2

Screen Pack:

√	615/108
	615/132
√	165/1400
	200/1400

测试结果 Test Result

Melt Temperature:

230±2 °C

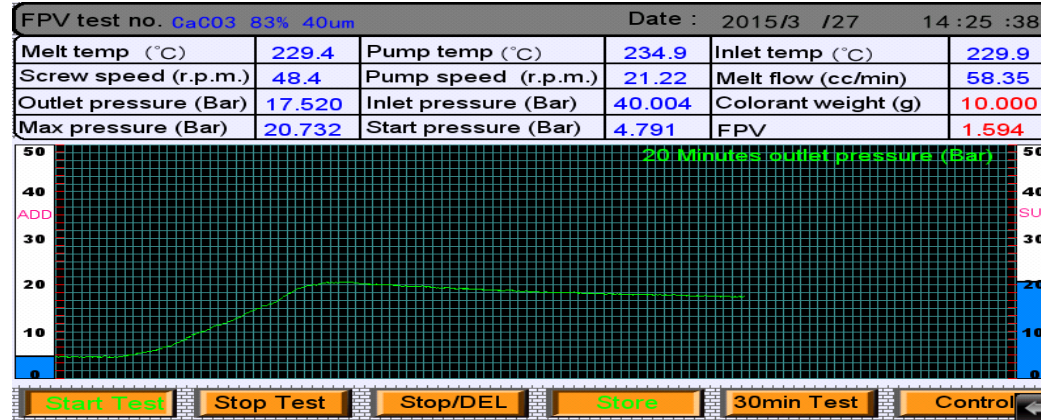
f) Test Result:

FPV=(P_{maximum} - P_{start pressure})/ m_{pigment}

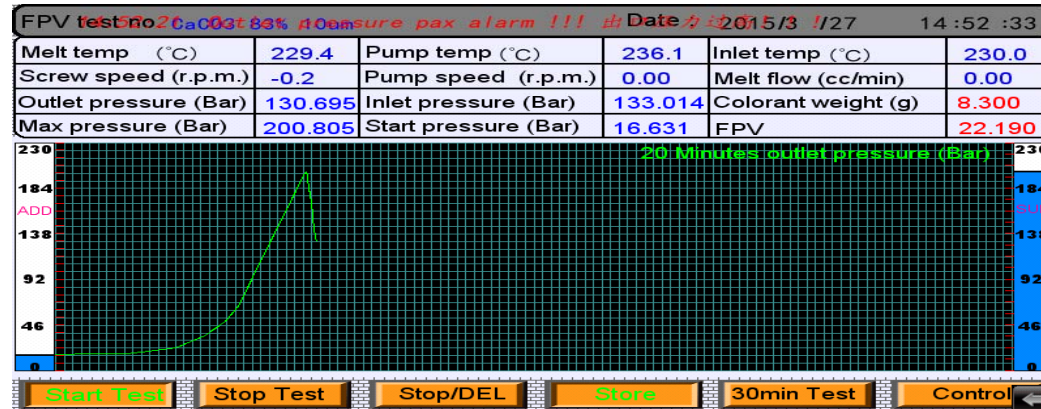
	P _{maximum} (Bar)	P _{start pressure} (Bar)	M _{pigment} (g)	FPV
40um	20.732	4.791	10.00	1.594
10um	200.805	16.631	8.30	22.190



填充母粒 83%CaCO₃ Screen Pack: 615/108×24



填充母粒 83%CaCO₃ Screen Pack: 165/1400×60×24



不同用途添加比例不同
Add Proportion on Different Application



医保材料 Medical materials
8~20%



不同用途添加比例不同
Add Proportion on Different Application



包装材料 Packing Material
20~50%



不同用途添加比例不同
Add Proportion on Different Application



土工布、防水材料 Geotextiles, waterproof materials
40~75%



相关项目和产品 Related Project and Product



柔软母粒在无纺布中的技术开发与应用 Soften Masterbatch Used in Non-woven Fabric And Its Development and Application

中国国内最早开发柔软母粒；
产品受到国内外各大公司的欢迎和好评；
与世界知名的无纺布厂家建立了合作关系，助其改善
了纸尿裤等卫生产品的应用性能和舒适度
Earliest developed soften masterbatch in China
Our Soften Masterbatch are highly valued by many global
companies.
We Cooperate with those well known nonwoven
companies, help them improve quality and comfort level
of their sanitary products

杭州玉杰化工有限公司
Hangzhou Yulie Chemical co.,Ltd
我们一直专业生产

无纺布SMS色母粒, PA, PET, PP,
PE双组份母粒, 功能母粒等母粒
Non-woven SMS masterbatch, PA, PET, PP,
PE two-component masterbatch,
Functional masterbatch

先进生产线 / 高端设备 / 专业团队

杭州玉杰化工有限公司从事塑料改性、色母粒行业，是一家集科、工、贸于一体的综合型企业。公司优选国内外一批先进设备和与之配套齐全的实验和检测仪器，用于研究、开发新产品，确保质量的优质与控制。采用双螺杆水拉条、双转子密炼等先进技术生产各种高浓度色母粒、改性塑料及功能性母料。产品通过ISO 9001: 2000质量认证。坚持客户至上，以质量为本，信誉第一，不断开拓创新，求实求美。公司热忱欢迎国内外朋友来电垂询洽谈业务。

Hangzhou Yu Jie Chemical CO., Ltd is in the field of modified plastics and master batches. It is an enterprise integrating research, manufacture and trade, specializing in modified plastics, color master batch, With advanced equipments and relative experiment measurement devices, we have adopted global advanced technology like twin-screw pelletizing, two-rotor mixer to produce various high-concentration master batches, functional master batches and modified plastics. Our products have achieved ISO 9001: 2000 quality certification. Being custom-oriented, reputable, diligent, with high quality, and continuous innovation, Yulie pursuits customers' recognition. We enthusiastically welcome the guests domestically and abroad to develop long-term cooperation by phone or email.

主要产品/Main Products

1. 彩色母粒系列：丙纶化纤母粒；无纺布色母粒；涤纶长、短丝母粒；各种塑料着色母粒；
2. 功能母粒系列：阻燃母粒、降温母粒、爽水母粒、柔软母粒、防静电母粒、抗菌母粒等；
3. 填充改性：滑石粉填充PP, PS；碳酸钙填充PE, PP；
4. 色油、色砂、SMS母粒、预分散颜料；

1. Color masterbatch: polypropylene chemical fiber master batch, non-woven master batch, polyester filament or staple fiber master batch, all kinds of plastic coloring master batch;
2. Functional masterbatch: flame retardant, cooling, hydrophilic, softening, anti-static, antibacterial, etc;
3. Modified fillers: talcum powder filling PP, PS; calcium carbonate filling PE, PP;
4. Color oil, color sand, SMS masterbatch, pre-dispersed pigment;

医疗行业
Medical Industry

尿不湿
Diapers

面膜
Mask

湿巾纸
Wet Wipes

可行性项目报告 Feasible Project Report

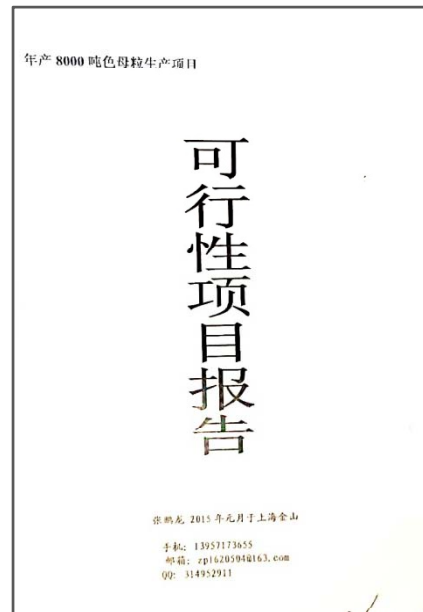


1. 年产8000吨色母粒项目-可行性项目报告

Year Output 8000 Tons Color Masterbatch Feasible Project Report

2. 年产3000吨SMS母粒项目-可行性项目报告

Year Output 3000 Tons SMS Masterbatch Feasible Project Report



Contact

Gary Kuo

Cell: +86 13362883827 (Whatsapp / Wechat)

Email: gary@hzyjchem.com

感谢聆听

THANKS FOR YOUR WATCHING

