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The Study on Process of Terylene and Cotton Blending Yarn with Size

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Abstract

Sizing is an important process before weaving. There are three main processes of sizing: slurring, sizing and quality testing after sizing. The slurry include agglutinant and assistant agent. According different yarn, choose different kind and process of slurry, and parameter of sizing.

In this article, we used two sizing of blending yarns 20×18tex terylene/cotton (64/36), 29×21texterylene/cotton (70/30) as examples. Modified starch, cornstarch, PVA and other slurry was chosen for finding the prescription optimization. We also analyzed defect and control of sizing. Through amount of experiments on viscosity, thermol-property and water solubility of serum, the prescription optimization was confirmed. The effect and parameter of sizing were discussed in the study. It is significance on production exploitation and texterylene/cotton blending yarn process.

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Keywords: texterylene/cotton blending yarn; sizing; slurry prescription

1 Introduction

Quality of slurry will affect the weaving efficiency and fabric property directly. The quality of slurry all depend on the variety, property, prescription and estimating system [1]. So, it is very important for textile manufacture choosing slurry, decreasing cost, arranging production and so on. The texterylene and cotton blending yarn composed of cotton, cation and triangle texterylene that possess light weight, soft and slip handing, good fabric fall, absorption, breathe freely, comfortable dressing, clean surface and gentle bluster. In this study, we analyzed defect and control of sizing. The prescription optimization was confirmed through amount of experiments.

2 slurry choosing and confecting

2.1 Theory of slurry confecting

Prescription of slurry was confirmed, according to fiber, yarn count and property, weave structure and density, slurry quality, process and fabric purpose. If just increase the serous solid percent, density will enhance and infiltration become difficult. Dry dividing and twisting can cause terrible filoplume avulsion and weaving. So, based on the high percent texterylene T/C blending yarn, thin and dense fabric, warp sizing must have good penetrability. It is the basic for adhibitting filoplume in effective, ensuring to produce full, flexible and firmness slurry. All above were the key of weaving this kind fabric. Because of high percent texterylene T/C blending yarn, need higher strength and better flexible than general T/C blending yarn in the weaving. So, enhance strength and keep stretching were not the first important of consideration [2].

2.2 Experiments of slurry prescription

First experimentation: 20×18 tex texterylene/cotton yarn (double path, 2 up 2 down right twill, short fiber) Requirement of slurry process: invariable temperature and volume 75cm/95°C, viscosity of slurry barrel 8-10 s, viscosity of slurry boiler 6-8s, reversion rate 2.5±0.5%, sizing rate 9±1%. Through amount of production testing, we confirm optimal process of modified starch (Fig.1), slurry prescription (Table 1).

Table 1 Modified starch slurry prescription

Experiment method and parameter	Method 1	Method 2	Method 3	Method 4
modified starch(kg)	20.00	25.00	20.00	25.00
PVA(kg)	30.00	30.00	25.00	25.00
A55(kg)	30.00	30.00	25.00	25.00
LMA-95(kg)	8.00	8.00	5.00	5.00
slurry barrel viscosity(s)	10	9	8	8
slurry boiler viscosity(s)	10	9	7	5
Viscosity thermol-prope rty %	88.7	90.2	91.3	86.8
Slurry membrane water solubility	9.7	11.3	9.1	2.89

3. Result analysis

The four methods were all operated according to the requirement. Method 3 was considered as the optimal prescription after tested the viscosity thermol-property of serum and water solubility of slurry

membrane.

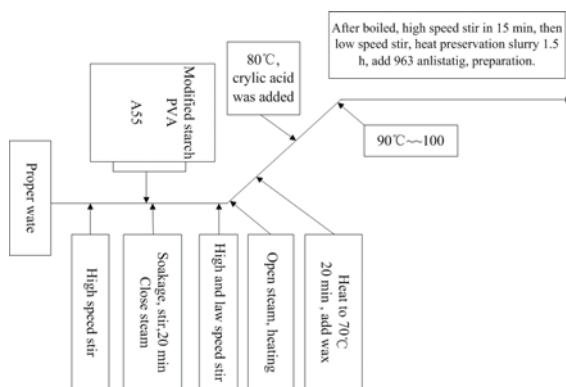


Fig.1 Process of modified starch

Second experimentation: 29×21tex
137×75 texterylene/cotton yarn

Requirement of slurry process: invariable temperature and volume 90/95°C, viscosity of slurry barrel 6-8 s, viscosity of slurry boiler 5-6.5 s, sizing rate 4±1%, reversion rate 3.0±0.5%. Through amount of production testing, we confirm optimal process of modified starch (Fig.2), slurry prescription (Table 2).

Table 2 Cornstarch slurry prescription

Experiment method and parameter	Method 1	Method 2	Method 3	Method 4
cornstarch(kg)	30.00	25.00	20.00	20.00
205MB(kg)	5.00	5.00	5.00	5.00
CMA-66(kg)	8.00	8.00	8.00	8.00
wax(kg)	2.00	2.00	2.00	2.00
963 anlistatig(kg)	3.00	3.00	3.00	3.00
slurry barrel viscosity(s)	6.0	6.5	5.5	5.1
slurry boiler viscosity(s)	8.1	8.2	6.5	7.2
Viscosity	87.4	91.0	89.7	88.8
thermol-property %				
Slurry membrane water solubility	13.5	10.8	11.3	12.1

The four methods were all operated according to the requirement. Method 3 was considered as the optimal prescription after tested the viscosity thermol-property of serum and water solubility of slurry membrane.

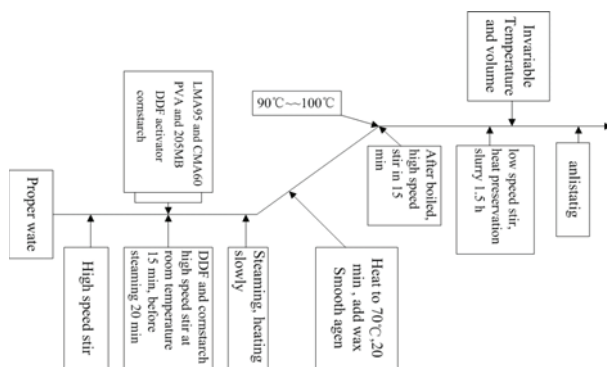


Fig.2 Process of cornstarch

4 The reason and control method of serum defect

The bad quality slurry, incorrect percentage of mixture, asymmetry sizing and impropriety process were all could cause the defect of serum and affect the yarn property. The general reason of serum defect and correct solution were shown as Table 3.

Table 3 The general reason of serum defect and correct solution

Defect	Reason	Solution
Serum spumescence	Mix too much surplus slurry	Embalmmnt, one time mix
Serum deposition	Not enough stiring or damage stirrer cause the uneven slurry	Stirring enough time during even
	Recycle serum improperly	Correct deal with recycle serum
Viscosity disqualification	Use thicker or more french chalk particle, thicker starch	Decrease the french chalk quantity , increase starch slurry property
	Low viscosity	Mix with high viscosity slurry or reduce in grade
	High viscosity	Increase steaming or boiling again
Surface of serum was made skin	Not enough time in boiled or stewed slurry the viscosity of agglutinant slurry was too high	
	Temperature became too low after boiled	Still stirring
Solidify serum	Stop stirring	Remove the skin of serum
	Boiled with cattle oil and french chalk, improper temperature, boiling time and stirring speed	Master the correct method of boiled with cattle oil and french chalk
	Agglutinant did not stirring enough before boiled	Add the raw slowly after remove the solid.
Solidify serum	Improper prescription, sizing, bring the chemical reaction	Correct the prescription and processes
	Steam heavily during the boiling	Increase the steam slowly
Sundries float up	Sundries did not filtrate and remove from slurry	filtrate and remove sundries
	Serum include dreg of starch due to slurry barrel dirty	Wash the slurry barrel carefully
	Temperature of slurry through instable	keep the temperature stable
Degree of acid and alkalinity fall short of requirement	Slurry and serum deposited too long	Serum alkalescence was declined , add proper dilute sodium hydroxide solution
	Neutralization was not good	Confect sodium hydroxide dosage according to serum alkalinity

4 The analysis of effect on sizing quality

Sizing properties will affect the weaving output and quality directly. So, it must be check and control the sizing in time. If sizing rate was so high, it will cause the waste and cost of slurry. Although the strength and abrasability was increased, the flexible and elongation rate was decreased, and elongate declined rate was augmented [3]. During the weaving, the break was enhanced could cause fabric surface coarseness and affect the appearance purpose. Lower sizing rate could make a deficiency of yarn's strength and abrasability, and fluffed easily, increased break rate and affect the production. The main factors to decide the sizing rate were concentration, viscosity and temperature of serum. When change the sizing rate in large range, first should change the concentration. Sizing rate depend on serum concentration and viscosity, and sizing even degree depend on permeated and covered [4]. Serum permeation and cover directly affect the yarn's strength and abrasability at the same sizing condition. Permeated and covered rate were also have the direct relationship with viscosity. At amount of serum concentration, the lower serum temperature will make the higher serum viscosity, good cover and easily sizing. Contrarily, the higher temperature in slurry trough will make the lower serum viscosity, good fluidity and permeability.

Under the stable dry temperature, improving sizing rate could cause dry insufficiency and reversion rate change. The rate of sizing reversion rate was related with warp raw material, yarn count, radial density and sizing rate. The reversion rate of texterylene/cotton blending yarn usually controlled at 3-4 %. Changing sizing speeding through adjusting the sizing reversion rate, then affect the sizing rate, serum permeation and cover.

Through many examinations of process parameter in practice, we achieved better sizing process for 29×21 tex (Mid-fiber texterylene/cotton with polyamide), 20×18 tex texterylene/cotton yarn (double path, 2 up 2 down right twill, short fiber). The sizing quality also was tested (Table 4).

Table 4 Sizing process and quality parameter

Variety		20×18 tex texterylene/cotton yarn (double path, 2 up 2 down right twill, short fiber)	29×21 tex 137×75 (Mid-fiber texterylene/cotton with polyamide)
Process parameter			
Crude sizing temperature (°C)		50°C	
Concentration (Bê)		3.2±0.2	
Sizing process	Slurry trough and serum temperature (°C)	98	95
	Slurry trough and serum viscosity (s)	6	7
	Serum total solidify rate (%)	9	9
	Serum decomposed degree (%)	72	
	Serum PH value	8	8
	Immersed press method	Single immersed press	Double immersed press
	Immersed scale(mm)	432	550
	Press roller running mode	Velvetten (2), carpet(1),delaine(1)	Rubber press roller
	Press roller weight	Spring press 130 kg	Gas press
	Wet twist count	3	3-5
Sizing process	Dry mode	Heating wind	Heating wind with roller
	Dry temperature(°C)	0.3-0.4MPa steam press 115°C	0.3-0.4MPa steam press 115°C
	Convolutingspeed (m.min ⁻¹)	30	50
	beam count/vat	10	9-12
Sizing process	Sizing printing length (m)	40.7	123.2
	Sizing rate(%)	10.12	4±1%
	Reversion rate(%)	4.38	3.0±0.5%
	Elongation rate(%)	0.6	0.8
Sizing process	Break rate(%)	3.1	5.4

5 conclusions

For texterylene/cotton blending yarn, after sizing hope to have good membrane, high abrasability, less strength, proper moisture absorption, clean hatch, soft and smooth handle, little static and easily weaving. Sizing process should accord with little strain and strength, low reversion rate, high concentration and low viscosity of serum, pressure from light to heavy and wet twist protect slurry membrane. Sizing elongated rate was around 0.5% and reversion rate was controlled at 3-4%. For high percent texterylene (texterylene/cotton) blending yarn, the basic was the adhibitting filoplume in effective, ensuring to produce full, flexible and firmness slurry. All above were the key of weaving this kind fabric.

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