



# Wanhua waterborne solutions for textile

Wanhua Chemical  
Emerging Technology Business Group  
Feb, 2021



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01

**Wanhua company –  
Emerging technology BU**

# Wanhua development history



**1978-1983**

Yantai Wanhua  
synthetic Leather  
Factory



**2003-2005**

Wanhua Ningbo  
Industrial Park



**2011-2015**

Wanhua Yantai  
Industrial Park



**2017**

Wanhua Zhuhai  
Industrial Park



**1998-2001**

Yantai Wanhua Polyurethanes Co.,  
Ltd.  
Shareholder restructure (code  
600309)



**2011**

Acquire BorsodChem  
via a 1.26bn Euro M&A deal



**2013**

Wanhua Chemical Group  
Co., Ltd

# Overseas position

**Italy:** BorsodChem Italia s.r.l.

**Czech:** BorsodChem MCHZ, s.r.o.

**The USA:** Yantai Wanhua America Co., Ltd.

**The USA:** Wanhua Chemical US Holding Inc.

**Brazil:** Wanhua BorsodChem Latin America  
Assessoria comercial Ltda.

**Turkey:** BorsodChem (Turkey) office

**Hungary:** BorsodChem Zrt.

**Russia:** Wanhua BorsodChem (Russia) Co., Ltd.

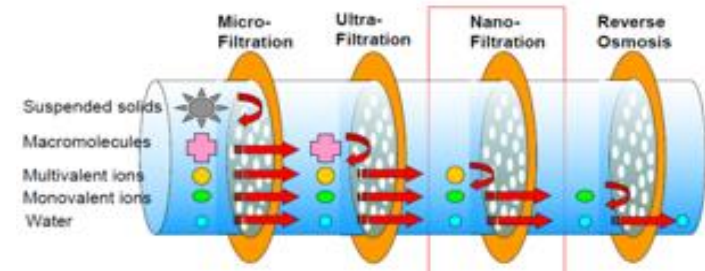
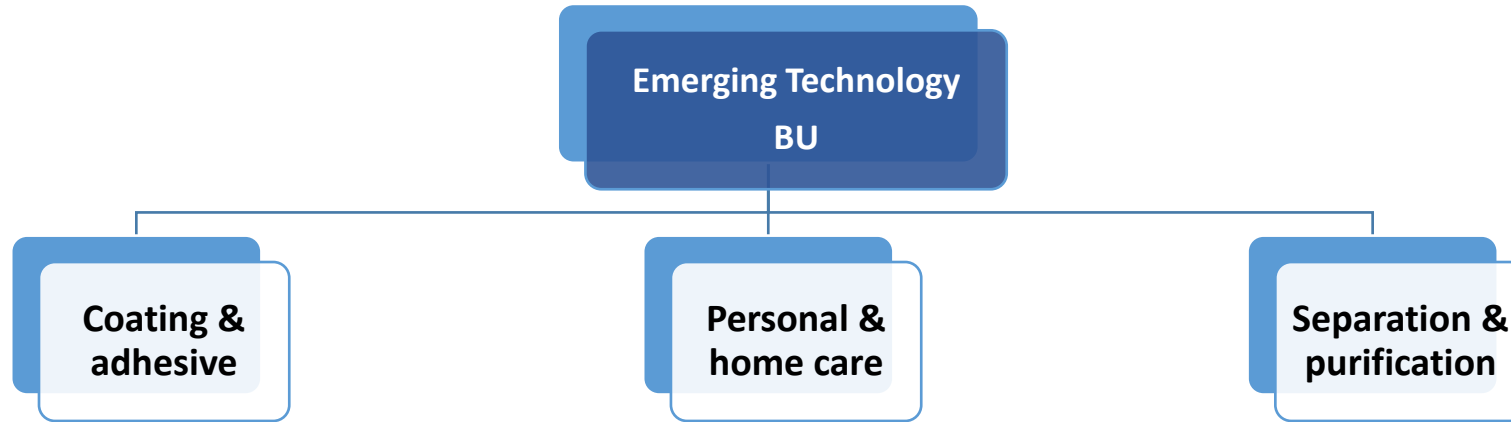
**Japan:** Wanhua Chemical Japan Co., Ltd.

**South Korea:** Wanhua Chemical  
(South Korea) office

**India:** Wanhua International (India)  
Private Limited

**The UAE:** Wanhua Chemical (The UAE) office







## PU

- Global distributed, worldwide scale and with integrated supply chain
- Leading position in the global isocyanate industry. Also coordinated by polyol products

- ✓ MDI
- ✓ TDI
- ✓ Flexible foam polyol
- ✓ Rigid foam polyol
- ✓ Polyester Polyol
- ✓ MDI Variant



## Petrochemicals

- World-class PDH plant, PO/MTBE and ethylene cracking plant
- Focusing on C3/C4 product chain
- Prioritize products that have collaborative effects with PU

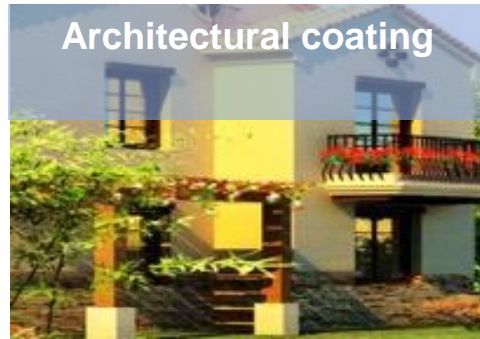
- |             |            |
|-------------|------------|
| ✓ Propylene | ✓ MMA      |
| ✓ PO        | ✓ Ethylene |
| ✓ PP        | ✓ Styrene  |
| ✓ MTBE      | ✓ HDPE     |
| ✓ AA+AE     | ✓ LLDPE    |
| ✓ Butanol   | ✓ PVC      |



## Specialty Chemicals

- Customized materials made of feedstock from the monomers in PU and acrylates industrial chain
- Develop special amine and phosgenation products and special derivatives to be used in other industries

- |                            |  |
|----------------------------|--|
| ✓ <b>Surface materials</b> | ✓ Specialty Acrylate                     |
| ✓ TPU                      | ✓ EOD                                    |
| ✓ PU Catalysts             | ✓ PMMA                                   |
| ✓ SAP                      | ✓ Other C3/C4 derivatives                |
| ✓ Specialty Amine          | ✓ Fine chemicals in Isobutene downstream |
| ✓ ADI                      |  |
| ✓ PC                       |  |
| ✓ NPG                      |  |

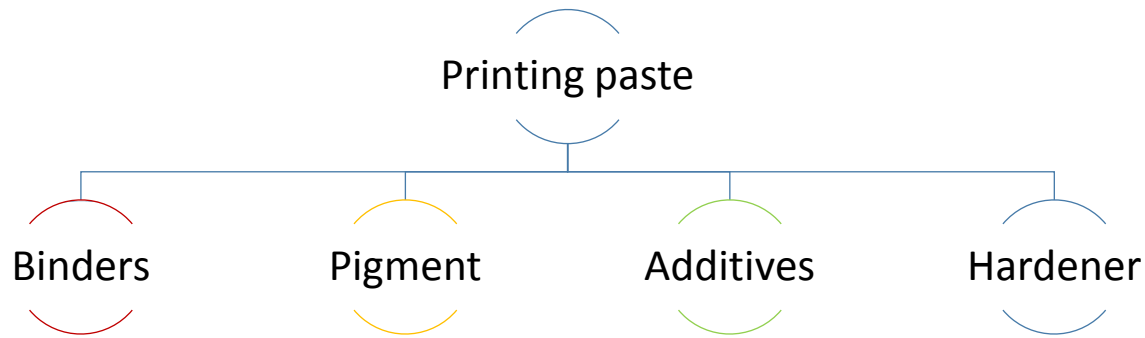




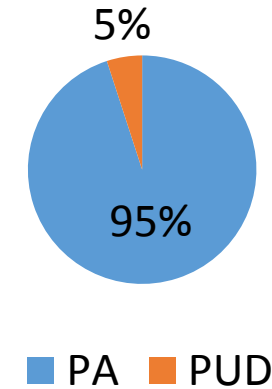


02

**Waterborne textile  
printing solutions**



## Paste market



**Binder is generally PA or PUD**

### PA features

- Good weather fastness and yellowing resistance
- Good washing resistance
- Lower cost
- Poor elasticity, easy to wrinkle
- Poor surface finish
- Difficult to adjust the hand feeling

VS

### PUD features

- Soft and elastic
- Good strength
- Good wear, moisture and dry-cleaning resistance
- Higher cost
- Easy to hydrolyze

# Application of textile printing



T-shirt



Jeans



Swimsuit



Sports shoes



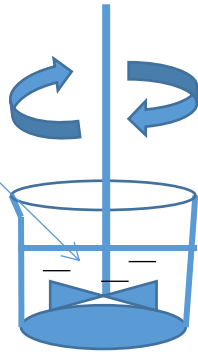
Casual shoes



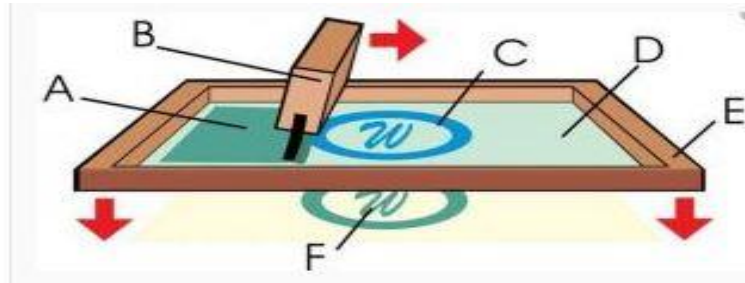
General shoes

## Silk screen printing

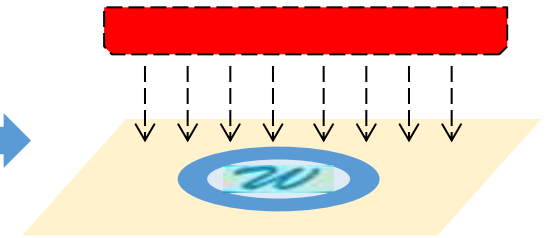
- ✓ Binders
- ✓ Pigment
- ✓ Additives
- ✓ Hardener



Paste mixing



Silk-screen printing



IR flash drying

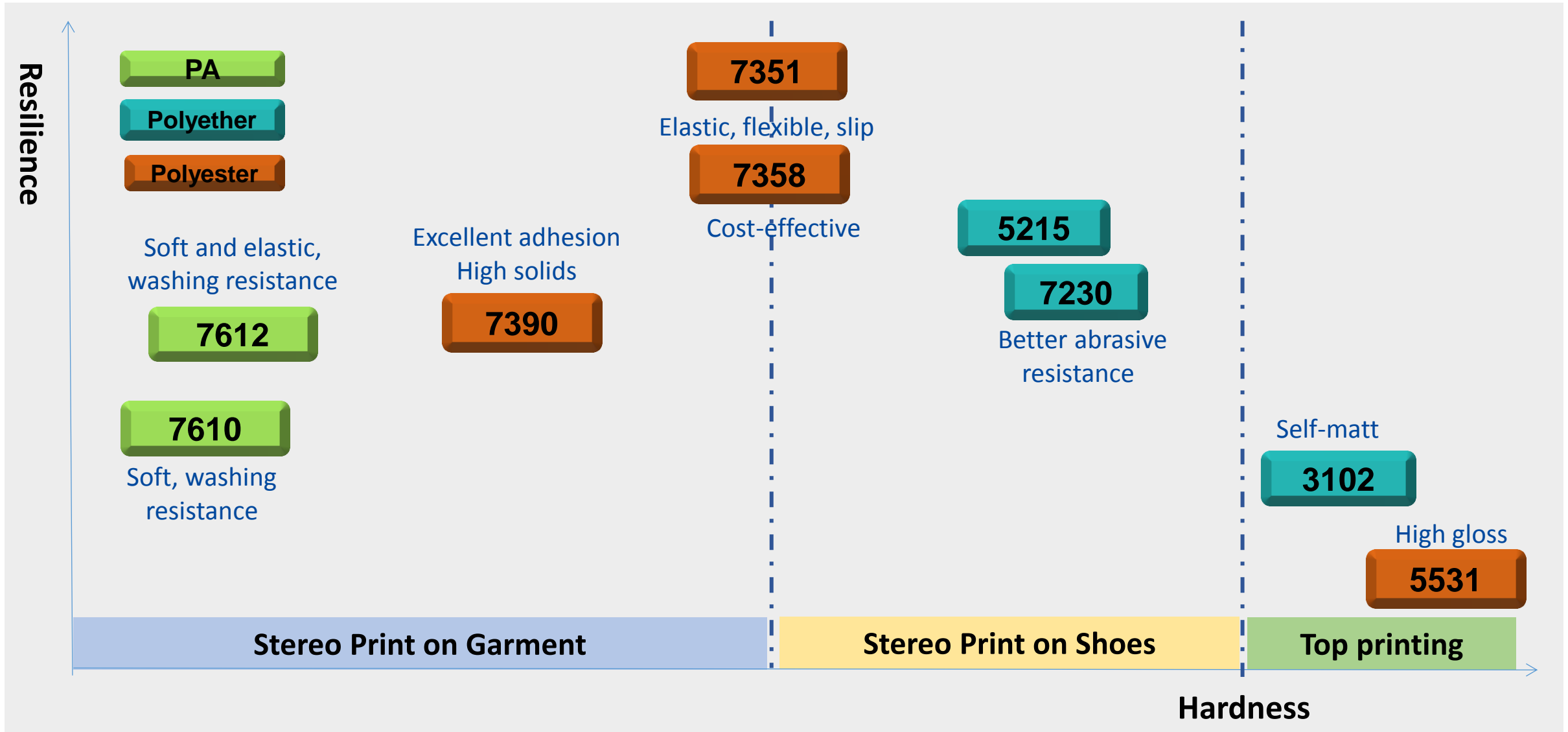
A: Mixed paste   B: Blade   C: Desired pattern   D: Silk screen  
F: Substrate   E: Halftone

# Products guideline of textile printing

Products	REACH	Solid (%)	100%Modulus (Mpa)	Strength (Mpa)	Elongation (%)	Viscosity (mPa.s in 25℃)	Property	Application
Tekspro®7358	√	45	1.4	23	700.00	50-3000	Elastic, soft and smooth; Suitable for a variety of curing agents and high curing efficiency	Clothing/Shoes
Tekspro®7351	√	55	1.5	45	1000.00	50-1500	Elastic; Excellent high resilience; Excellent flexing performance	Clothing/Shoes
Tekspro®7230	√	44	2.5	30	600.00	20-500	Excellent abrasion resistance; Low cost	Clothing/Shoes
Tekspro®7390	N	60	1.2	25	800	20-1500	Soft handle, Excellent resilience; Good adhesion	Clothing
Tekspro®5215	√	49	2.5	35	700	10-1000	Jungle test> 10weeks; Cold flexing; Low cost	Shoes
Leasys®5531	√	35	15	60	300	10-1000	Firm handle; Solvent-free, Alcohol resistance	Clothing
Leasys®3102	√	35	-	-	-	10-1200	Self-matt; Good black fog; Heat resistance; Cold flexing (-20) : >5000	Clothing
Tekspro®7610	√	47.5	PA, Tg=-14℃			20-1000	Soft handle and non-tacky; Excellent yellowing and water resistance.	Clothing
Tekspro®7612	√	55	PA, Tg=-13℃			100-1500	Soft, elastic and non-tacky; Excellent washing resistance	Clothing

Product	Solid(%)	NCO(%)	Properties	Application
Aquolin®166	100	22	Water dispersible isocyanate curing agent , longer pot-life	Universal types
Aquolin®161	100	18	Good chemical resistance and long pot life	Universal types

# Products guideline of textile printing

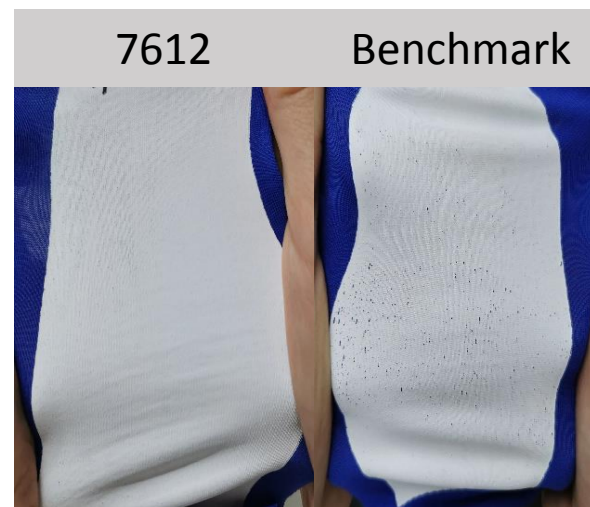
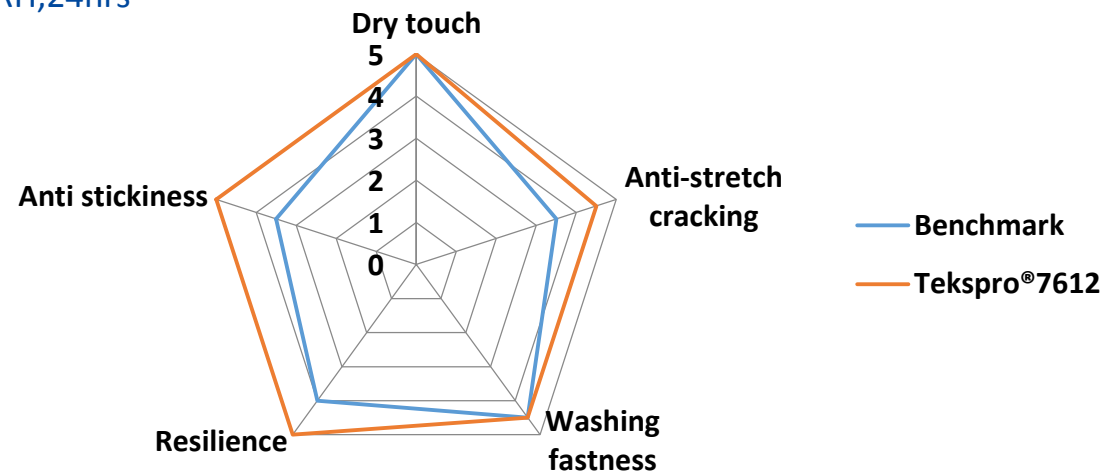


## Recommended formula

Material	Weight/g	Function	Supplier
Tekspro® 7612	50	PA	Wanhua
Ammonia	0.1	pH adjuster	-
BD-109	0.2	Wetting agent	Dow
SN-5040	0.6	Dispersant	Nopco
NXZ	0.1	Defoamer	Nopco
R-996	17	Filler	Longmang
Precipitated silica	2	Filler	
CaCO <sub>3</sub>	16	Filler	
Glycol	8	Moisturizing	-
Vesmodity® U605	0.5	Thickener	Wanhua
Vesmodity® A801	0.5	Thickener	Wanhua

**Substrate** : Cotton elastic

**Curing condition**: Silk screen printing 3 times,140°C\*3min, then 23 °C,50% RH,24hrs



**Stretching picture**



**Anti-stickiness**

## Recommended formula

Component A			
Material	Weight/g	Function	Supplier
Tekspro® PUD	35	PUD	Wanhua
Tekspro® 7610	35	PA	Wanhua
Ammonia	0.1	pH adjuster	-
BD-109	0.2	Wetting agent	Dow
SN-5040	0.6	Dispersant	Nopco
NXZ	0.1	Defoamer	Nopco
R-996	25	Filler	Longmang
Glycol	3	Moisturizing	-
Vesmody® U605	1.0	Thickener	Wanhua
Vesmody® A801	1.0	Thickener	Wanhua
Component B			
Aquolin® 166	2	Hardener	Wanhua



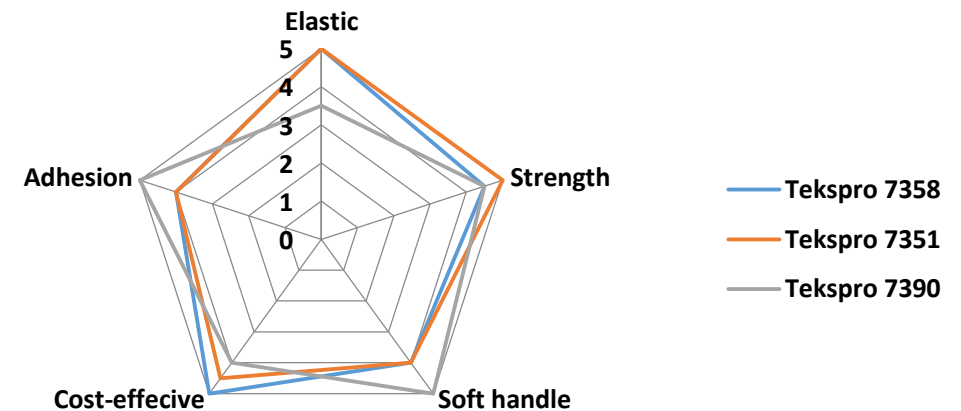
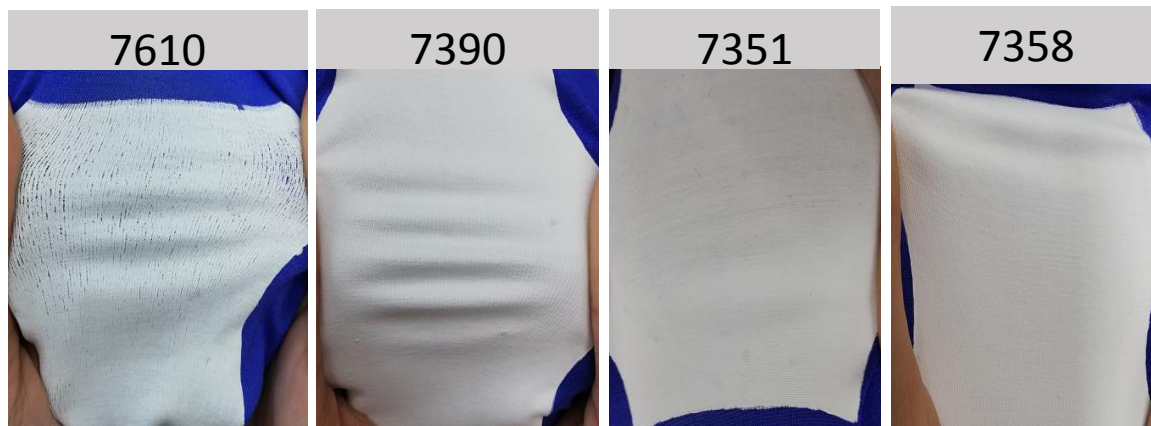
# Clothing printing

## Tekspro® 7351/7358/7390-Elastic clothing printing

**Curing condition:** Silk screen printing 3 times, 140°C \* 3min, then 23 °C, 50% RH, 24hrs



Item	Tekspro_7351	Tekspro 7358	Tekspro_7390	Testing method
Hand Feeling	Soft/3.5	Soft/4.0	Soft/4.0	Score 1-5, the higher the better
Washing fastness	Not shed	Not shed	Not shed	60°C, 8h, washing machine
Resilience	Not crack	Not crack	Not crack	Stretch, 20 times
Dry touch	Not stick	Not stick	Not stick	40°C, 4kg, press, 30min



## Tekspro® 7230-----Jean clothing printing

Tekspro® 7230 is an anionic aliphatic polyether-polyurethane dispersion which can be used on textile printing and coating.

### Features

- Good heat resistance
- Washing fastness, no cracking
- Good handle at low temperature

Curing condition: Silk screen printing 3 times, 140°C\*3min, then 23 °C,50% RH,24hrs

Item	Results	Testing method
Hand Feeling	Soft	
Washing fastness	Not shed	60°C, 8h, washing machine
Resilience	Not crack	Stretch, 20 times
Dry touch	Not stick	40°C, 4kg, press, 30min



## Recommended formula

Component A			
Material	Weight/g	Function	Supplier
<b>Resin</b>	100	PUD	Wanhua
Tego245	0.3	Wetting agent	Tego
SN-5040	0.5	Dispersant	Nopco
NXZ	0.2	Defoamer	Nopco
104B	3	Matting powder	
Glycol	3	Moisturizing	-
Vesmodity® U300	1.0	Thickener	Wanhua
PTF	0.3	Thickener	Silok
Component B			
Aquolin®166	2	Hardener	Wanhua

## Tekspro® 7358-----Superior shoes printing

**Curing condition:** Silk screen printing 8-10 times, 50°C\*16hrs, then 23 °C,50% RH,24hrs



Item	Result
Workability	Thickness of 0.6mm (fry film) without flaw after 8-10 times
Flex resistance(25°C,50% RH)	100 000, without crack or shed
Flex resistance(-15°C)	100 000, without crack or shed
Boiling water resistance(100°C,2hrs)	No whiting, difficult to peel
Peel strength(N/mm)	> 4
Flatness(Visual)	No flaw or warping
Resistance to alkali(alkali:10% NaOH, 24hrs)	No whiting, difficult to peel

Solution: 7358/5215=50/50

Workability:120 mesh number,shore hardness of knife: 65°

Flex resistance



## Tekspro® 7230---General shoes printing

**Curing condition:** Silk screen printing 8-10 times, 50°C\*16hrs, then 23 °C,50% RH,24hrs

Item	Result
Workability	Thickness of 0.6mm (fry film) without flaw after 8-10 times
Flex resistance(25°C,50% RH)	80 000, without crack or shed
Flex resistance(-15°C)	30 000, without crack or shed
Boiling water resistance(100°C,2hrs)	No whitening, difficult to peel
Peel strength(N/mm)	> 4
Flatness(Visual)	No flaw or warping
Resistance to alkali(alkali:10% NaOH, 24hrs)	No whitening, difficult to peel



Solution: 7230/DA102=70/30

Workability:120 mesh number,shore hardness of knife: 65°

## Firm glossy-Leasys®5531

- Firm handle, solvent-free
- Glossy and Alcohol resistance
- Good adhesion on PVC



## Color development

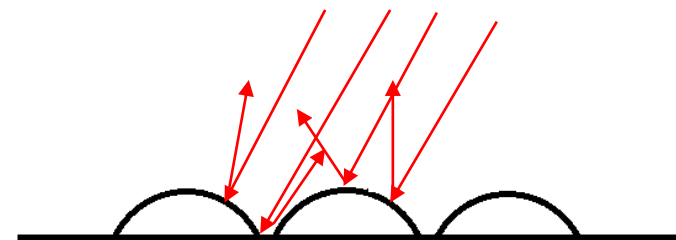


6%Red paste

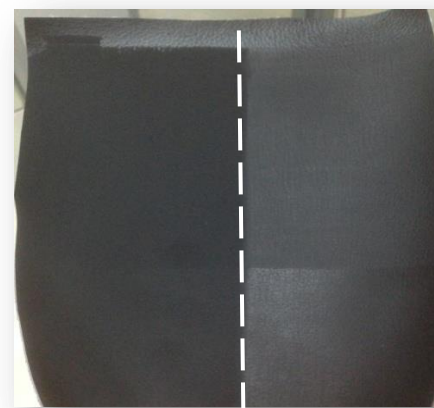


## Matt finishing-Leasys®3102

- No additional matting powder, no extinction angle
- High matte ,no uneven shine after friction
- Feel smooth



Extinction Before



d (Partical Size) =1-2um  
Rough Surface form diffuse reflection



## Formula for glossy finishing

Items	Weight/g	Supplier
Leasys® 5531	92	Wanhua
TEGO 245	0.3	TEGO
BYK-024	0.2	BYK
DPM	3	DPM
propanediol	3	/
Vesmody® 505	1.2	Wanhua
Vesmody® 604	0.3	Wanhua
Aquolin® 161	3	Wanhua

## Formula for matt finishing

Items	Weight/g	Supplier
3102	89	Wanhua
5531	9.7	Wanhua
BYK-024	0.05	BYK
AMP95	0.2	Dow
9166(50%)	0.6	Silok
TEGO 245	0.5	Tego
303	0.6	Guanzhi chemical
Vesmody® U505	0.36	Wanhua

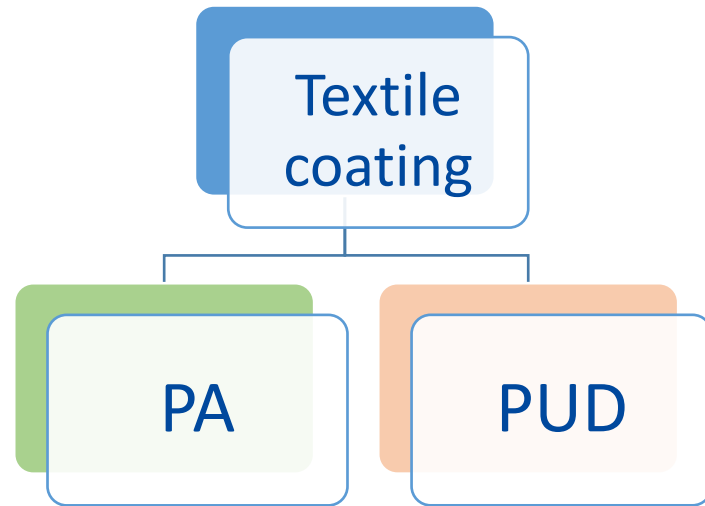


03

**Waterborne textile  
coating solutions**



By chemical composition



Waterproof, breathable



Shading, radiation protection



Smooth, shiny

Functional textile coating

## PA coating

- Hand-feeling
- Windproof
- Drape

## PUD coating

- Full-feeling
- Elastic
- Filmy on the surface



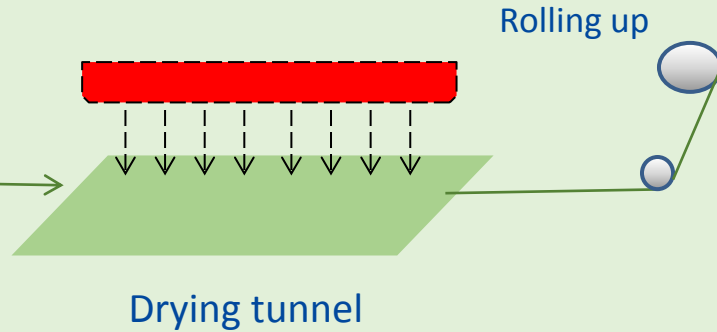
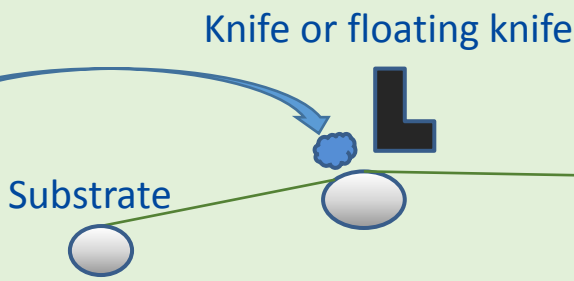
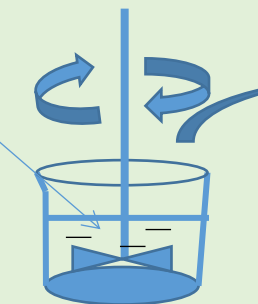
Antifouling, weather resistance



Flame retardant

## Process

- ✓ Binders
- ✓ Pigment
- ✓ Additives
- ✓ Hardener



## Application



Luggage



Clothing

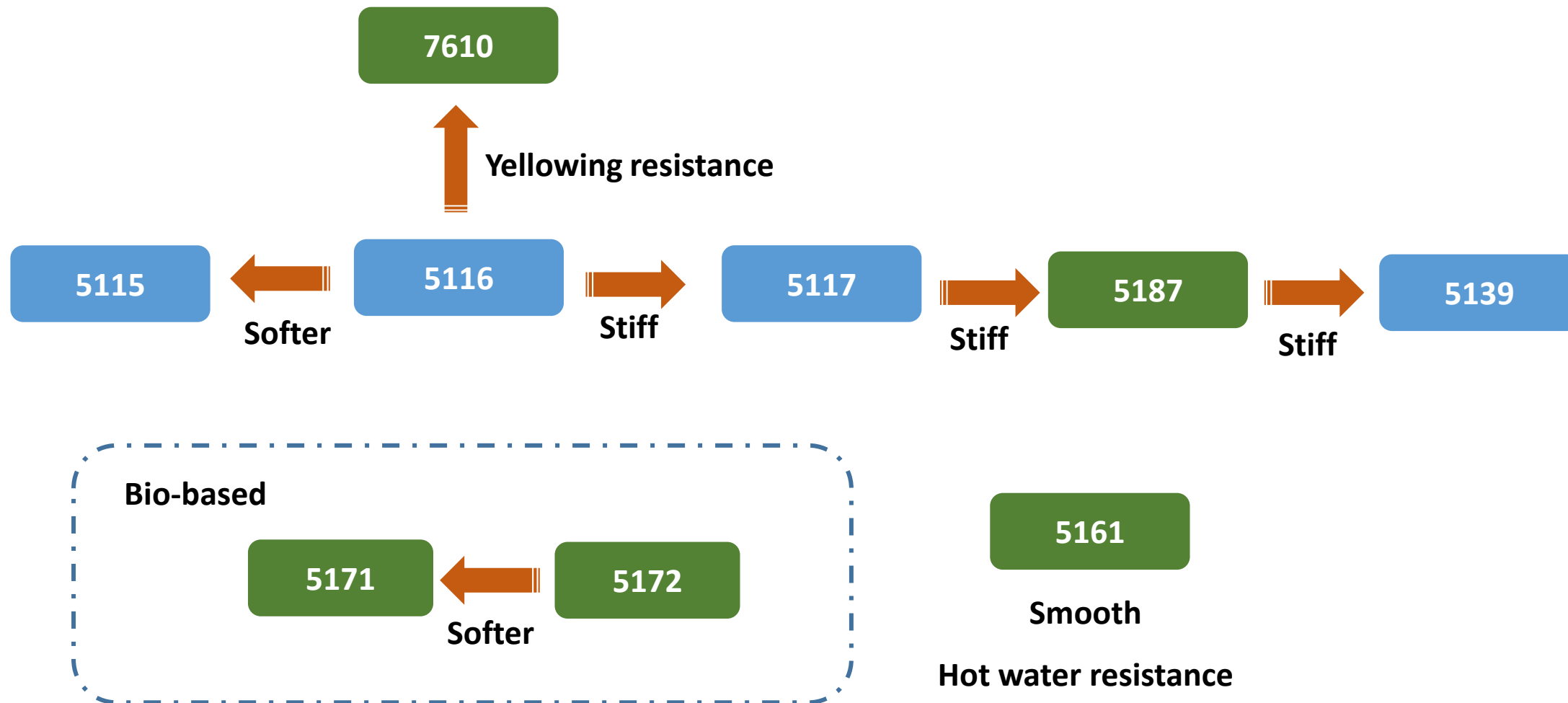


Tent

# Product guideline of waterborne textile coating



Products	Type	Solid/%	Tg/°C	Property	application	REACH registration
Tekspro®5115	Styrene acrylic emulsion	52	-35	Soft handle, cold resistance, good adhesion on polyester Oxford. down-blocked Clothing,	Clothing, luggage coating, generally mixing with stiff binder	Registration
Tekspro®5116	Styrene acrylic emulsion	52	-20	Soft handle, good adhesion on polyester	Clothing, tent coating	Registration
Tekspro®7610	Pure acrylic emulsion	47.5	-14	Yellowing resistance, good adhesion on polyester/Oxford	Printing , coating	Registration
Tekspro®5117	Styrene acrylic emulsion	48	3	Medium soft handle, good adhesion on polyester/Oxford	Various handle textile coating by mixing with soft or stiff binder	Registration
Tekspro®5171	Pure acrylic emulsion	48	5	Bio-based, medium soft handle, good adhesion	Various handle textile coating by mixing with soft or stiff binder	--
Tekspro®5172	Pure acrylic emulsion	48	15	Bio-based, good adhesion	Tent, luggage coating	--
Tekspro®5161	Pure acrylic emulsion	45	12	Heat resistance, no-sticky, smooth	NBR/NR Glove inner coating	Registration
Tekspro®5187	Pure acrylic emulsion	40	32	Excellent stiffness, good tear strength, yarn-fastness, high gloss	Tent, luggage coating	--
Tekspro®5139	Styrene acrylic emulsion	45	55	Excellent stiffness, good water resistance	Luggage, AD coating	Registration



## ❖ Technology

Substrate: 600D elastic Oxford

Construction process: Knife Coating

Sizing amount: 20g/m<sup>2</sup>

## ❖ WANHUA solutions

Cohesive layer: Leasys<sup>®</sup> 5215

Top layer: Leasys<sup>®</sup> 3900



Item		Result
Handle		Smooth
Tear strength(kgf)	Warp	5.5
	Weft	4.4
Hydrostatic pressure(mm H <sub>2</sub> O)		1000
Peel strength after sealing(N/mm)		1
Yarn-fasten strength(kgf)		3

## ❖ Technology

Substrate: 20D polyester

Construction process: Knife Coating

Sizing amount: 5g/m<sup>2</sup>

## ❖ WANHUA solutions

Normal layer: Tekspro® 5115+ 5117

Special layer(seal): 7390

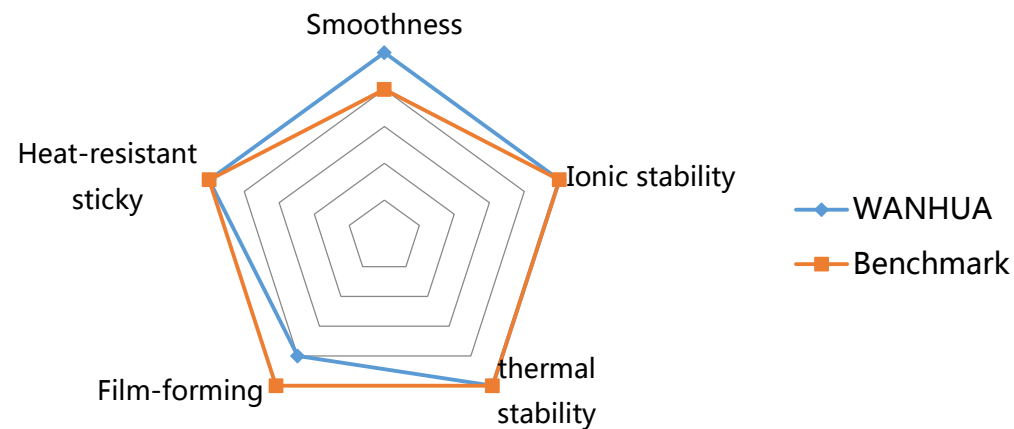


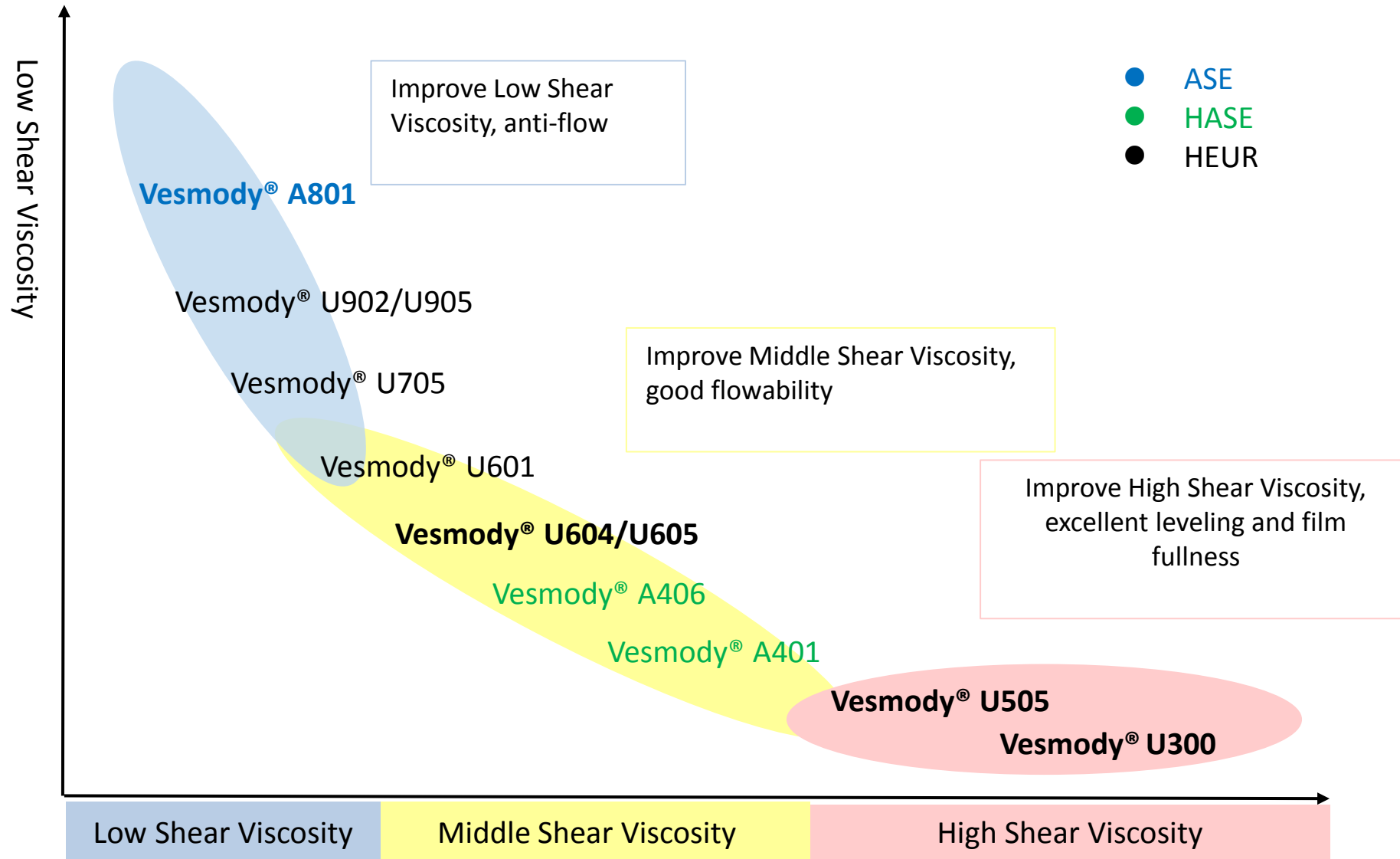
Item		Result
Handle		Skin-touch
Flex resistance	25°C	>10000 times
	-20°C	>5000 times
Rubbing fastness	Dry rubbing	Over 4 grade
	Wet rubbing	Over 4 grade

Product	Type	Solids	100% Modulus(Mpa)	Elongation(%)	Tensile strength(Mpa)	Properties
Tekspro <sup>®</sup> 5161	PA	45%		Tg=12		Smooth, Hot-water resistance
Leasys <sup>®</sup> 3250	PUD	30%	5	700	50	Soft handle, flexibility

## Process:

Coating : water=1:20  
Adjusted appropriately  
Dip coating









创新成就卓越 INNOVATION CREATES EXCELLENCE

