



ESQUEL GROUP

Lean and Innovation in the Traditional Textile Industry

# 传统纺织服装制造业中的 精益与创新

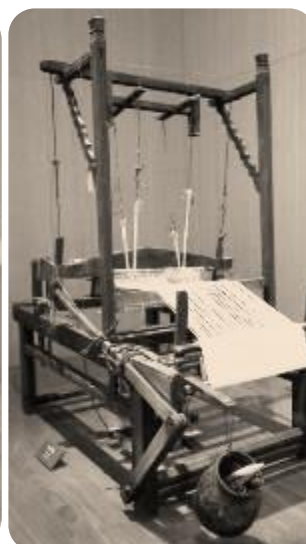
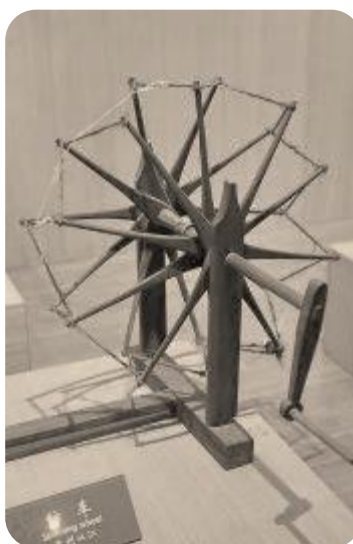
**田野 2019.06.13**  
溢达特纺董事总经理

Tian Ye  
Managing Director  
Esquel Specialty Spinning

# 01

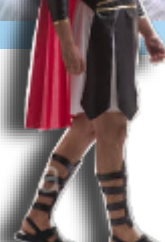
## 纺织服装概要

An Overview of the Textile and Apparel Industry



# 纺织服装与人类文明

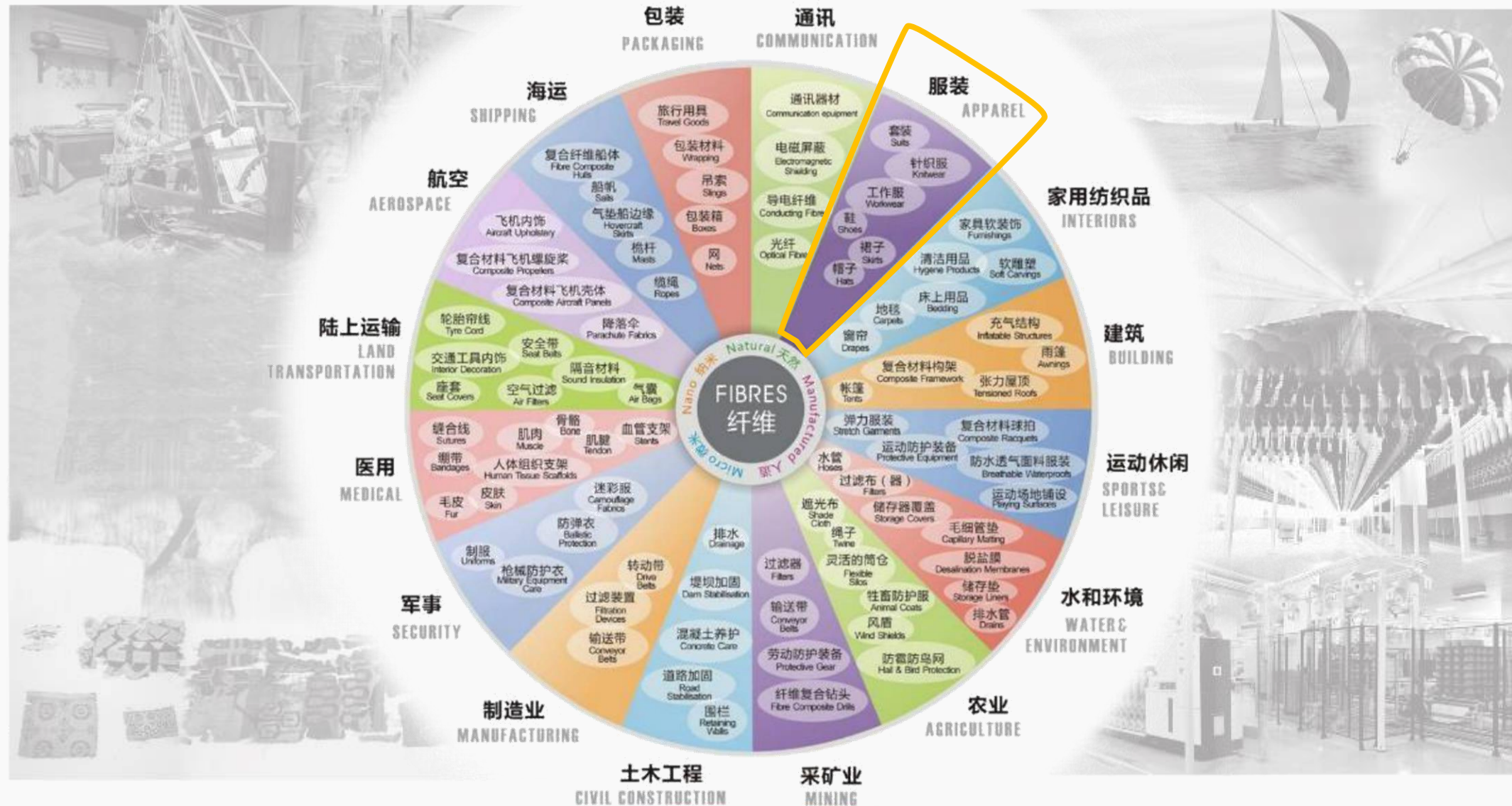
Textile Apparel and Human Civilization





# 纤维与纺织材料的应用

Application of Fiber and Textile Material



## 纺织服装与溢达集团 Esquel Group in the Textile and Apparel Industry

溢达是专注于服装类中男式衬衫产品，并以纵向一体化的纺织服装研发和生产为特色的纺织服装制造商。

Esquel is a vertically integrated textile and apparel company focusing on the manufacturing of men's shirts.



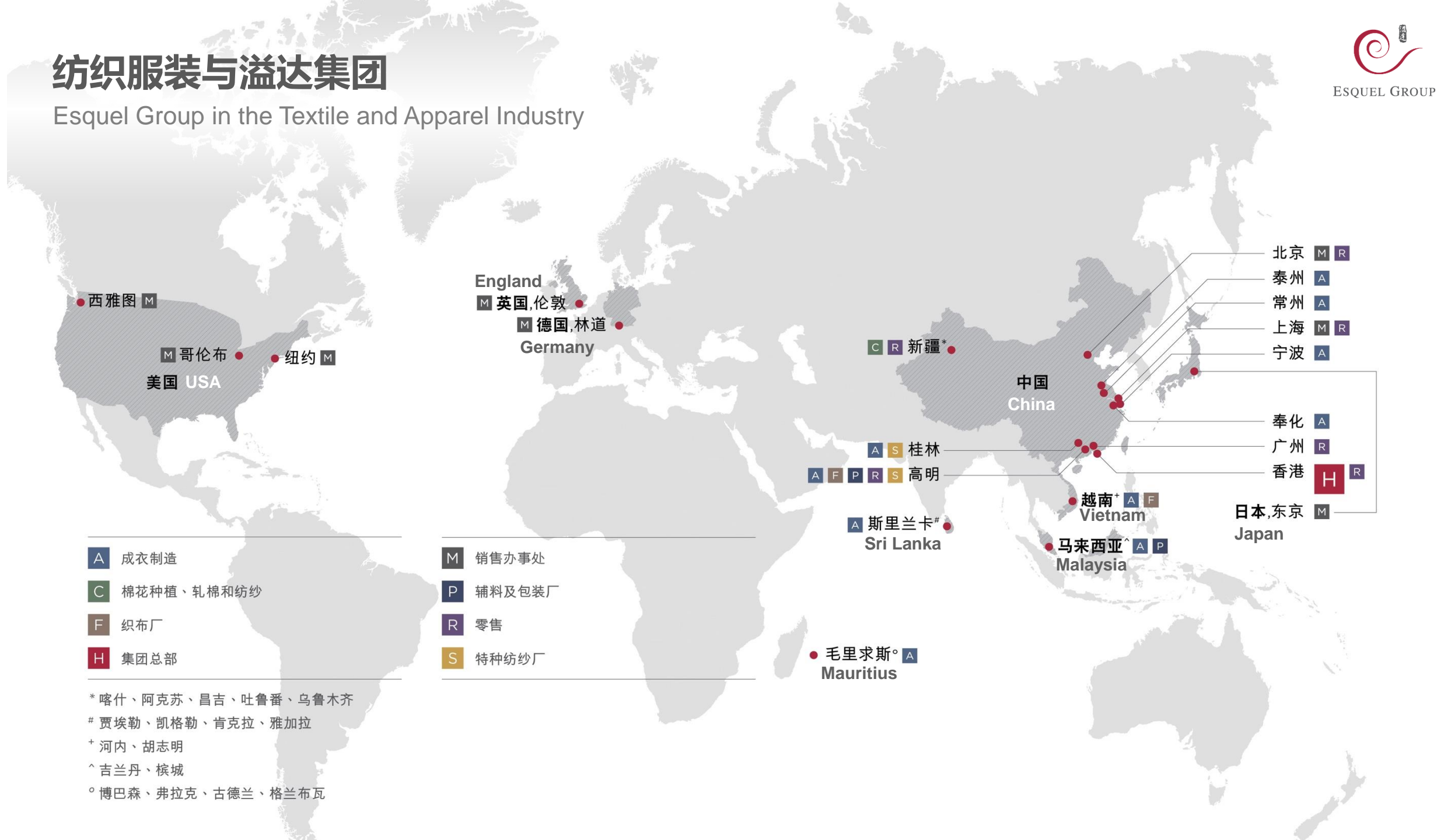
集团成立于1978年，2018年为世界知名品牌生产超过1.1亿件优质衬衫。

Founded in 1978, Esquel supplied over 110 million shirts to leading brands around the world in 2018.



# 纺织服装与溢达集团

Esquel Group in the Textile and Apparel Industry



# 纺织服装与溢达集团

Esquel Group in the Textile and Apparel Industry

## 全球品牌合作伙伴

Cooperative Global Brands



Baleno



CHARLES TYRWHITT  
JERMYN STREET LONDON

Gap Inc.

GIORDANO



J.CREW



KOHL'S

LACOSTE



MARKS &  
SPENCER

MUJI  
無印良品

NAUTICA



RALPH LAUREN

patagonia®

しまむらグループ



TAILORED BRANDS®

TOMMY HILFIGER



# 溢达特纺概况

## Overview of Esquel Specialty Spinning (ESS)

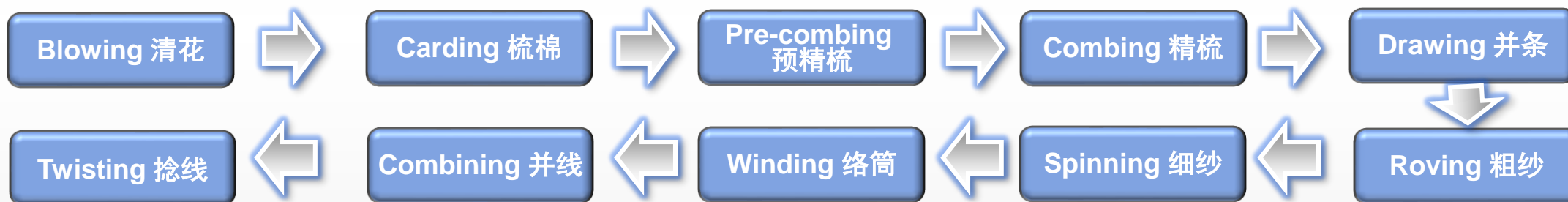
溢达特纺 (ESS) 是溢达集团一体化供应链的其中一个重要环节，致力于通过各种方式创造出各种花色，各种结构，各种手感和质地，及各种功能的特种纱线，从而推动集团价值链，为客户提供各种高附加值的产品以及全面优质的服务。

As a key integrated part of the Esquel Group, Esquel Specialty Spinning (ESS) has the flexibility and versatility to create specialty yarns with diversified color patterns, structures, handles, textures and various functionalities to deliver more benefits to the group's value chain, and provide a wide variety of high value-added products as well as comprehensive services to customers.





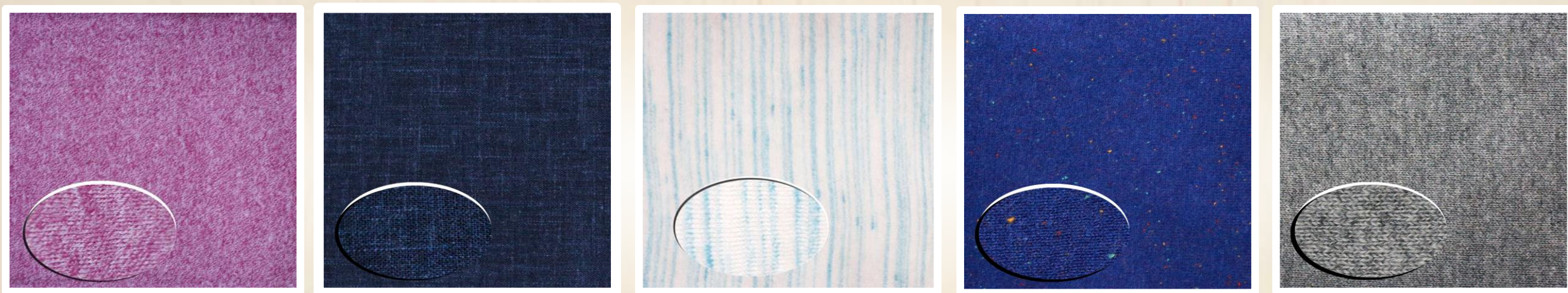
## 纤维变成纱线的十个典型工序 Ten Typical Processes from Fiber to Yarn





# 溢达特纺 Esquel Specialty Spinning

**特之一：纤维混色/色彩/花型变化** Specialty 1: Dyed Fiber Blending/ Color/ Diversified Color Patterns





## 特之二：纤维材料复合 Specialty 2: Fiber Composite



## 特色产品之一：棉丝复合纱线 Typical Product: Cotton Silk Blended Yarn



棉丝复合材料，兼备棉丝优点，既结合了棉的吸湿性，又具有丝的光泽，以及透气亲肤、抗紫外线、弹性恢复性等特点，穿着的舒适性大幅提高。



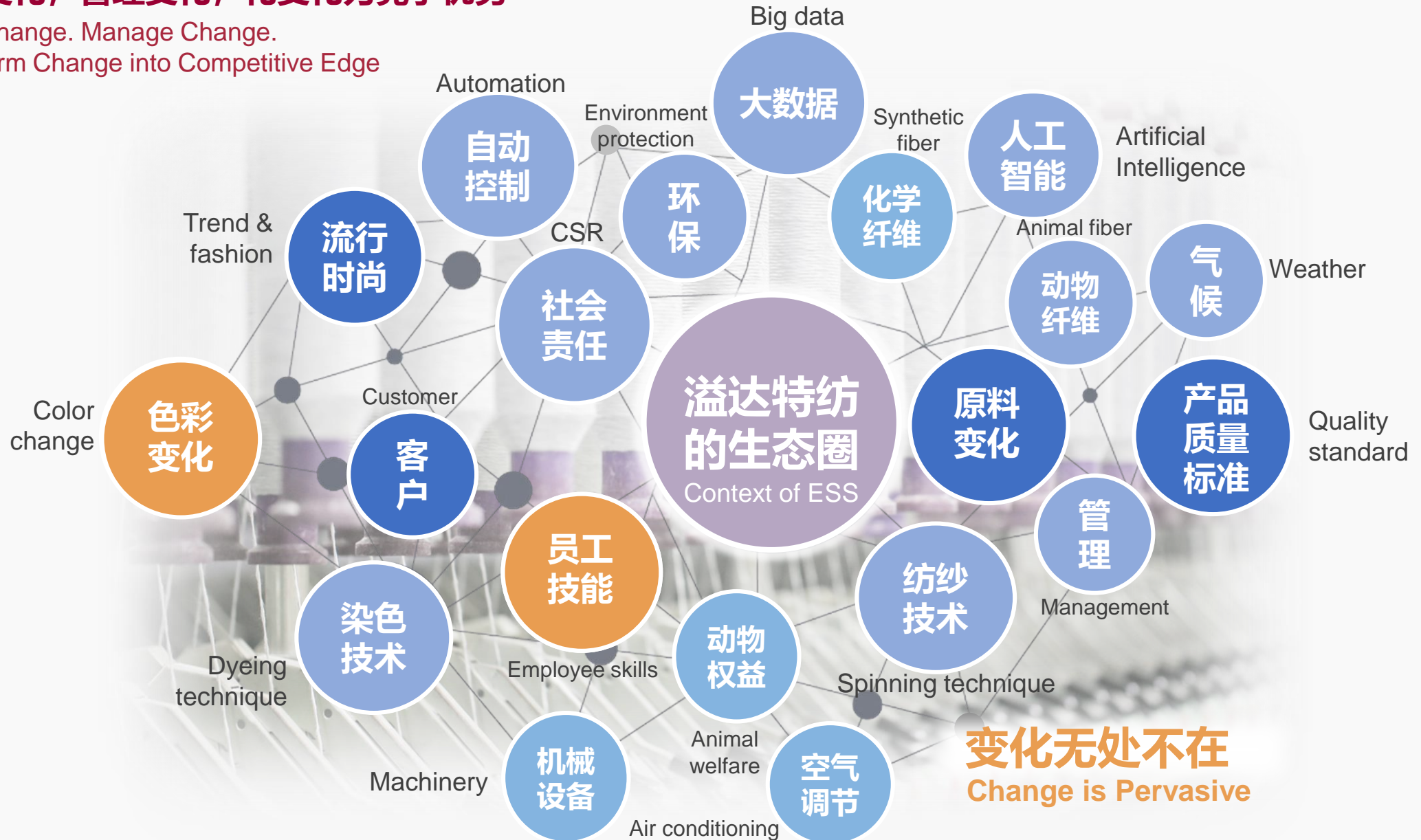
Cotton combine silk is one of the perfect combinations of natural fibers. It provides the natural shininess as well as the comfort of silk fiber. It has better moisture-absorption & water-vapor transmission, better UV protection, better elastic resilience and better skin care.



### 驱动变化，管理变化，化变化为竞争优势

Drive Change. Manage Change.

Transform Change into Competitive Edge

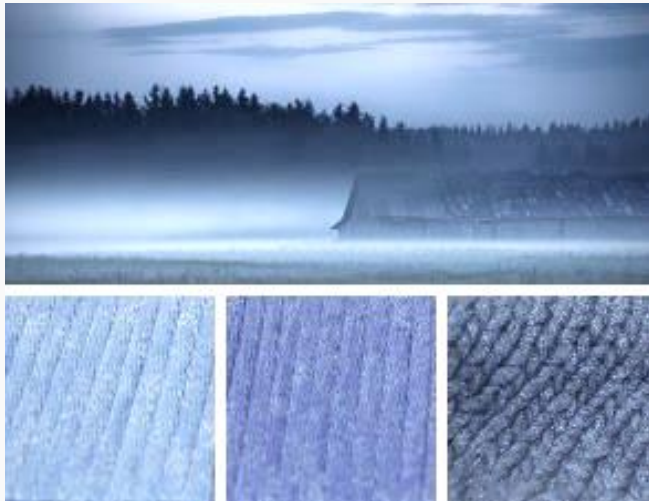


变化无处不在  
Change is Pervasive

# 02

溢达特纺精益实践分享 Sharing on ESS' Lean Practices

**分享1：颜色的精益** Sharing 1: Lean Color Management



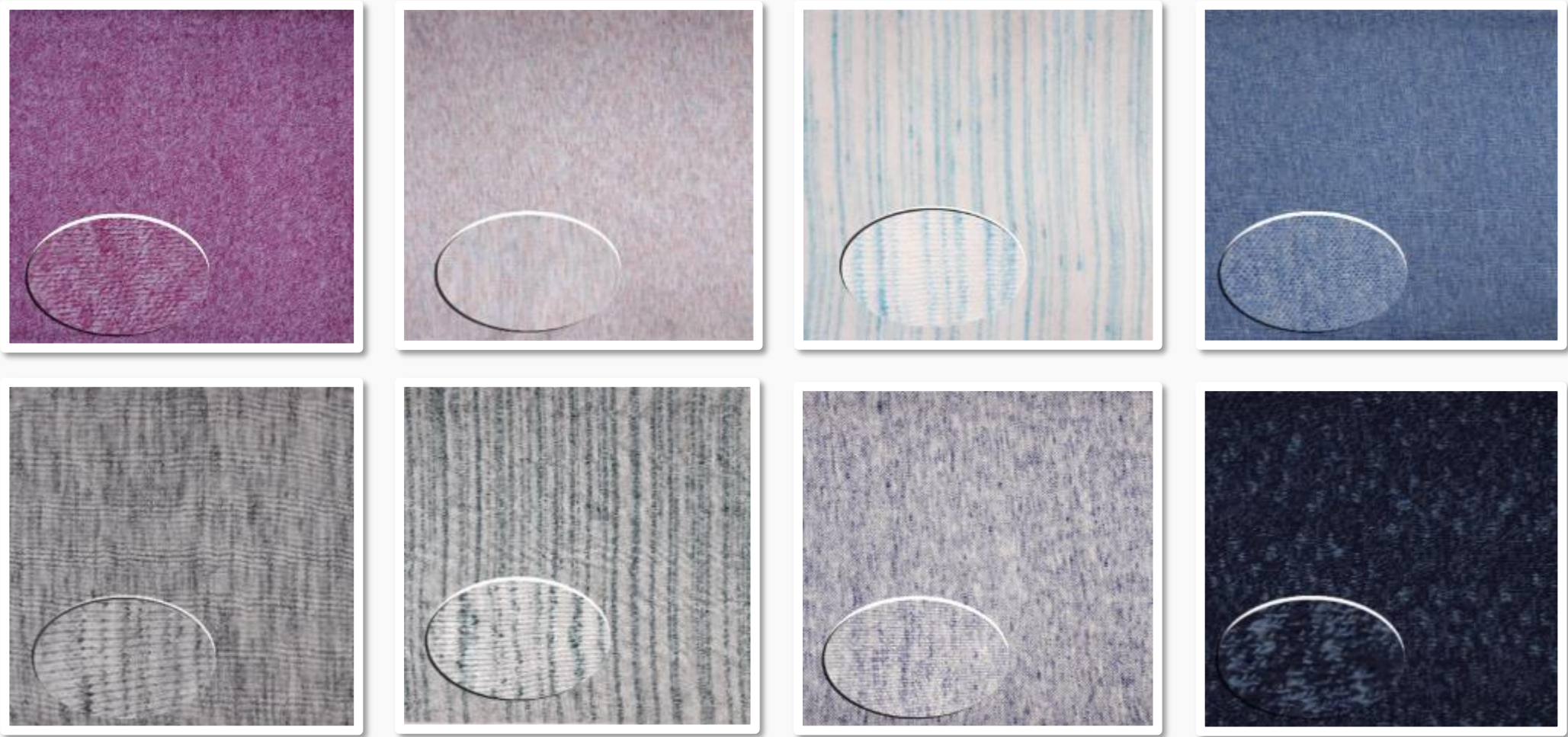


# 特纺产品的特征 - 花型和颜色

Features of ESS Products - Patterns and Colors

## 基于多种颜色纤维混合的多异色彩/花型产品

Products with Diversified and Unique Colors by Blending Various Colored Fibers



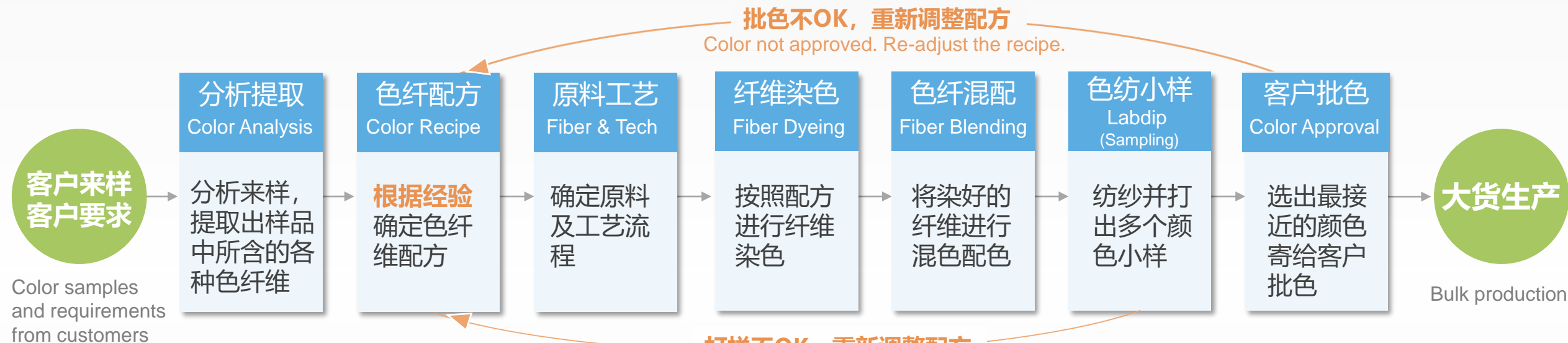
色纺纱 Fiber-dyed Heather Colors

# 颜色的变化与挑战

Color Changes and Challenges

## 颜色精益的背景

Background of Lean Color Management



### 问题一 (Issue 1)

基础色纤维种类因客户来样的长期积累, 数量众多、随意性强、体系性差, 没有建立以颜色科学为基础的原色纤维体系。

Created substantial types of colored fibers through arbitrary and unsystematic practices.

### 问题二 (Issue 2)

配色打样仅依靠经验, 周期长、准确性差, 缺乏混配呈色预测模型。

Based primarily on experience during color mixing and matching process with long cycle time and low accuracy.

### 问题三 (Issue 3)

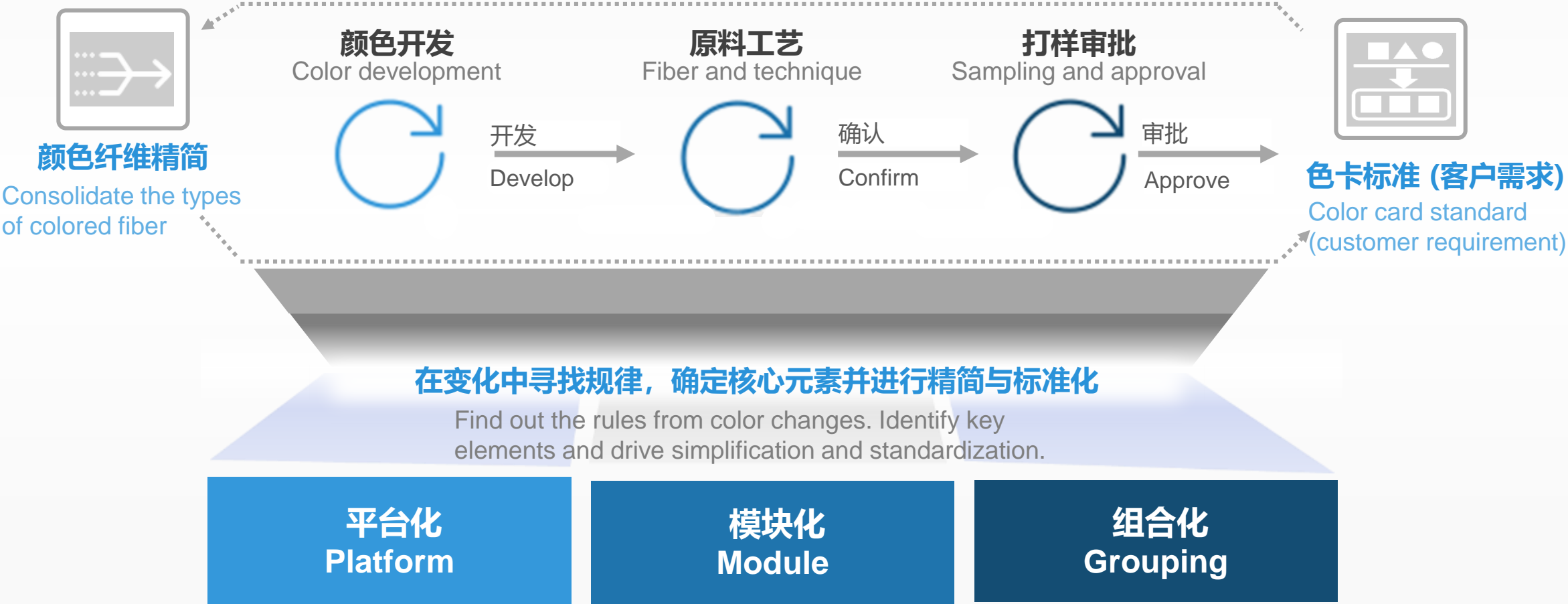
逐步累积形成的颜色样卡, 色域小、颜色分布不匀、规律性差, 缺乏全色域的颜色标准样卡。

Existing color cards are limited to narrow color gamut, unevenly distributed color hue, and lacking of correlation.



解决问题的思路 Concept Chart about the Solution to the Issues

颜色精益思路图  
Concept Chart for Lean Color Management



# 颜色精益的效果

Benefits from Lean Color Management



色纤维数量 (个):

No. of Colored Fiber

672



128

减少 81%

色纤维数量 (个):

No. of Colored Fiber

672



45

减少 93%



色纺颜色数量 (个): 17356

No. of top-dyed colors



2136

减少 88%

溢达特纺 71% 的订单是客人直接从新色纺色卡册里直接挑选颜色

Follow colors from the new color book to go directly for bulk production: 70% of total ESS orders

精益后的最优流程

The optimal process flow after the above-mentioned efforts



# 颜色精益的意义

Values from Lean Color Management



实现了科学配色

Scientific color blending



加快颜色开发速度

Shorten the cycle time of  
color matching & color  
development



提高了打样的FPY  
缩短了打样时间

Shorten the lead-tme of  
color sampling and improve  
First Pass Yield (FPY)



降低了成本

Reduce cost



降低了色纤维  
种类和库存

Reduce the number  
and inventory of  
colored fibers



# 03 溢达特纺 精益实践分享

Sharing on ESS' Lean Practices

## 分享2： 桂林十如特纺 的精益实践

Sharing 2:  
Lean Model in Guilin Integral



# 1. 桂林十如特纺的背景 Background of Guilin Integral Specialty Spinning

缘起： 2010年

Start: 2010

特纺催生并购国有 “桂林银海纺织集团”  
提供了探索新的发展模式和未来工厂的机遇

ESS initiated the acquisition of Guilin Yinhai Textile Group which provided an opportunity for Esquel Group to explore a new development model and model of future factory.





# 1. 桂林十如特纺的背景 Background of Guilin Integral Specialty Spinning

立标：2012年  
Mission set: 2012

探求新的可持续发展模式，实现制造业与自然环境的和谐共生  
探索新的生产和管理模式，成为传统制造业中不传统的企业  
探索绿色环保的发展模式，成为可持续发展标杆  
实现制造业与桂林山水相得益彰的结合。

- Searching for a new development model that manufacturing industry and the natural environment coexist in perfect harmony
- Explore a new operation and management model to become an unconventional company within the traditional industry
- Explore an eco-sustainable development model to set new industry benchmarks
- Ensure manufacturing industry and Guilin landscape integrate harmoniously



# 1. 桂林十如特纺的背景 Background of Guilin Integral Specialty Spinning

构建：2015年  
Construction: 2015

十如第一期工程展开，建设纺纱工艺展示中心、成衣工艺展示中心、能源管理中心、访客中心、创新中心、学习中心，以及配套的办公区、员工餐厅等。

Phase 1 construction including the exhibition center for spinning techniques, the exhibition center for garment-making technologies, the energy management center, the visitor center, the innovation center, the learning center, and fit-in office area and employee canteens.





# 1. 桂林十如特纺的背景 Background of Guilin Integral Specialty Spinning

运营：2018年  
Put into operation: 2018

自然与工业和谐发展的园林式工厂  
实践自然与工业相互交融的可持续发展理念  
A garden-style factory where nature and industry develop harmoniously  
Put the sustainable development concept of integrating industry and nature into practice





# 1. 桂林十如特纺的背景

Background of Guilin Integral Specialty Spinning

Put into operation: 2018 运营: 2018年

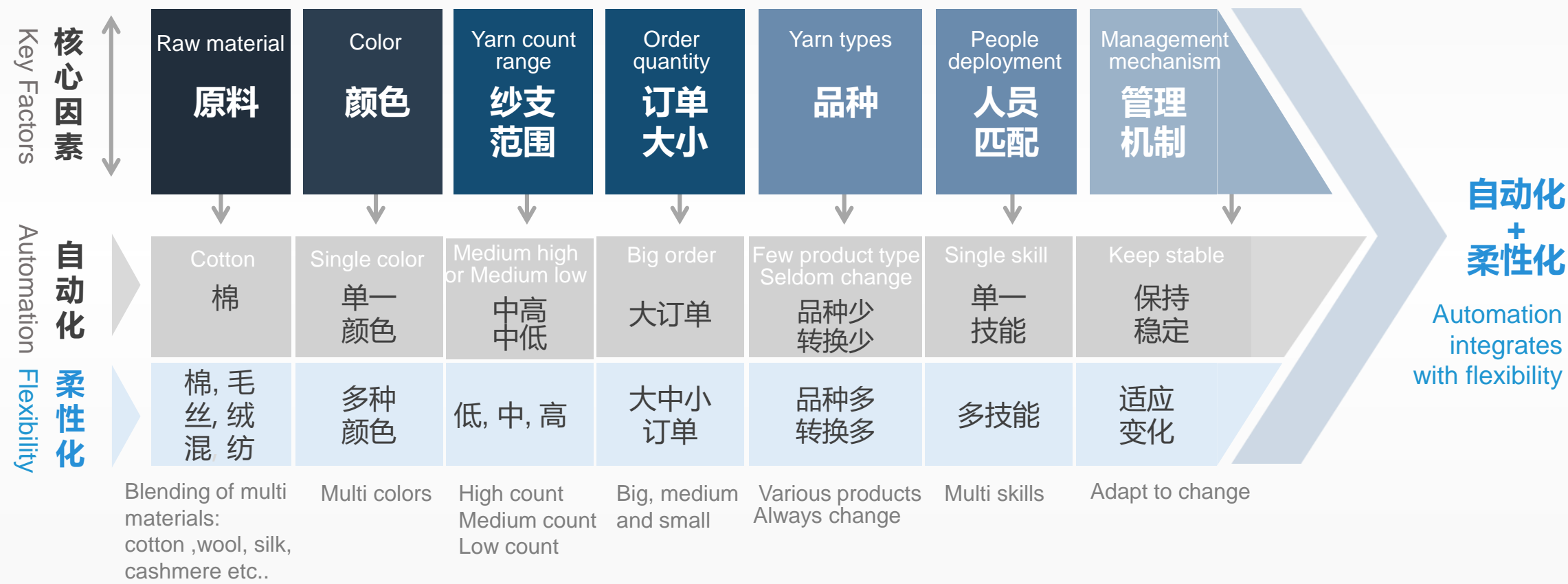
特纺工厂内部实景图 Factory interior view





## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 工厂设计中的挑战 - 自动化 vs. 柔性化 Challenges in Factory Design - Automation vs. Flexibility



## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

**解决方案: 自动化 + 有效人工干预 = 具有柔性的区域自动化**

Solution: Automation + Effective Human Intervention = Regional Automation with Flexibility

### 结果 Result



生产线: 5条  
最大容纳品种数50个

Production line: 5 lines  
Max product type: 50



总人数: 145人  
平均年龄: 23.5岁

Total headcount: 145  
Ave. age: 23.5



订单数: 80-240 张/月

Order items: 80-240/month



日产量: 15-19吨/天

Daily output: 15-19 tons/day



### 目标 Objective

Task  
任务



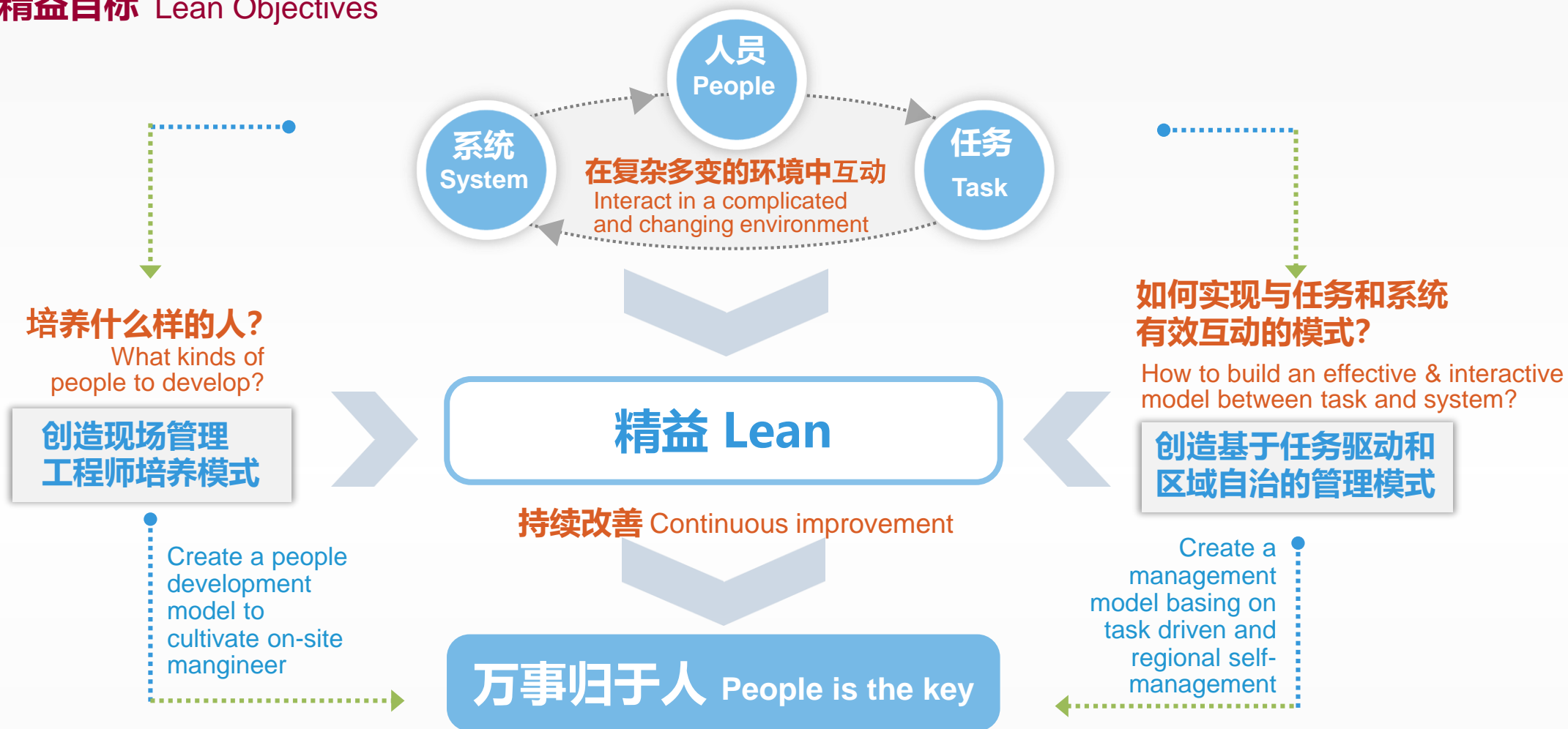
系统  
System

**实现任务、  
人员、系统  
的动态平衡**

Achieve a dynamic  
balance between  
task, people and  
system

## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 精益目标 Lean Objectives



在复杂多变的运转环境之下取得任务系统人员的动态平衡，实现工厂的最精益运转

Create a dynamic & optimized balance between task, system and people within a complication and changing environment to achieve lean operation.



## 2. 十如工厂的精益

Lean Practice in Integral Spinning Factory

### 传统的职能任务分类

Traditional Task Classification basing on Functions



2. 十如工厂的精益

Lean Practice in Integral Spinning Factory

任务与技能匹配 – 培养什么样的人主要取决于要完成的任务，并赋予其应有的技能

Match Tasks with Skills - Develop People basing on Task and Enable People with Necessary Skills

任务类型 Task Type	任务清单 Task List	人员技能清单 Skill List
生产计划 Planning	计划信息	
	排机	
设备 Machinery	确保设备运行状态 (平揩车/维保、清洁)	设备揩车 (T2)
	设备换模 (改纺)	设备改纺 (T3)
	故障的预判与处理	机械维修 (T4)、电气维修(T5) 设备揩车 (T5)、电气基础 (T5)
	设备改善与升级	电气理论知识(T6)
工艺 Tech	订单工艺变更 (开改纺单)	工艺改纺测试 (T2)
	订单在线质量跟踪	工艺调节 (T3)、在线检查 (T5)
	平揩车质量确认	设备原理 (T5)
	工艺升级 (优化)	工艺设计 (T6)
生产 Production	生产操作	前纺操作 (T1)、后纺操作 (T1)
	关键设备操作	关键设备操作(T3)
	工艺测试	工艺测试 (T3)
	设备改纺	设备改纺 (T4)
	生产异常处理	工艺调节 (T6)、设备原理 (T6)
质量 Quality Control	质量监测	工艺测试 (T2) 对色及QC测试标准的运用与掌握(T4)
	质量问题的分析与处理	细纱可纺性的简单处理 (T5)
		投诉分析&录入(T5) 外场问题反馈的简单分析与处理 (T6)
管理 Management	生产现场管理	基础生产管理 (T4)
	跨部门协作与沟通	综合管理技能 (T8)



现场管理工程师

On-site Managineer

## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 基于任务变化特征的任务分类

Task Classification basing on the Changing Characteristics of Tasks





## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 基于应对变化任务的现场管理工程师的培养模式

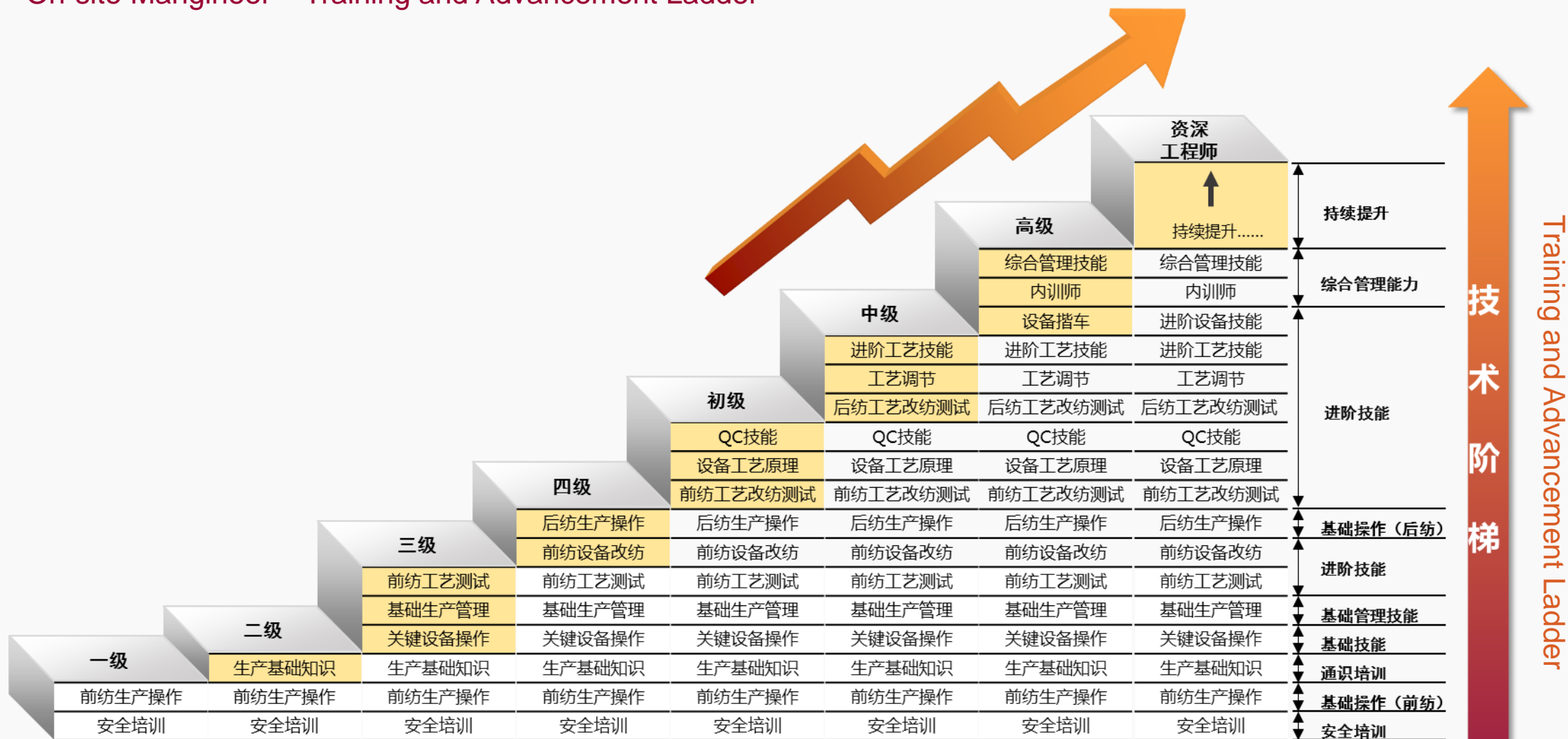
Create a People Development Model to Cultivate On-site Mangingeer to Deal with the Changing Tasks



## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 现场管理工程师 – 培训及晋升阶梯

On-site Mangineer – Training and Advancement Ladder



# 基于任务驱动和区域自治的管理模式

A Management Model basing on Task driven and Regional Self-management

多变任务环境下的精益 Lean Model and Practices within a Dynamic Tasks Context





## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 实例分享一：区域自治 Case Sharing 1: Regional Self-management



## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

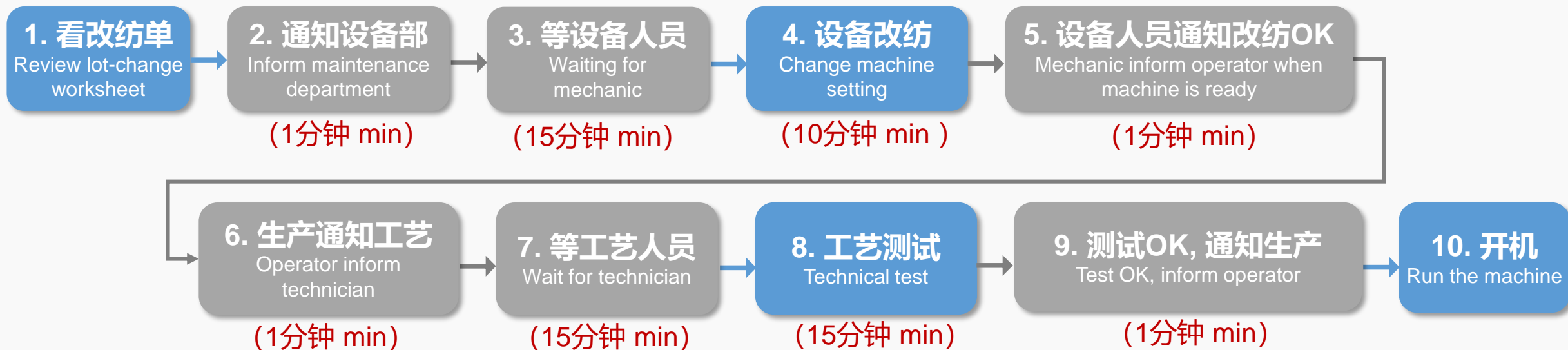
### 实例分享一：区域自治 – 末并改纺及测试流程 Case Sharing 1: Regional Self-management

**传统模式：10个步骤，用时约59分钟**

Traditional model: 10 steps in 59 min

**现状：4个步骤，用时约25分钟**

New model: 4 steps in 25 min



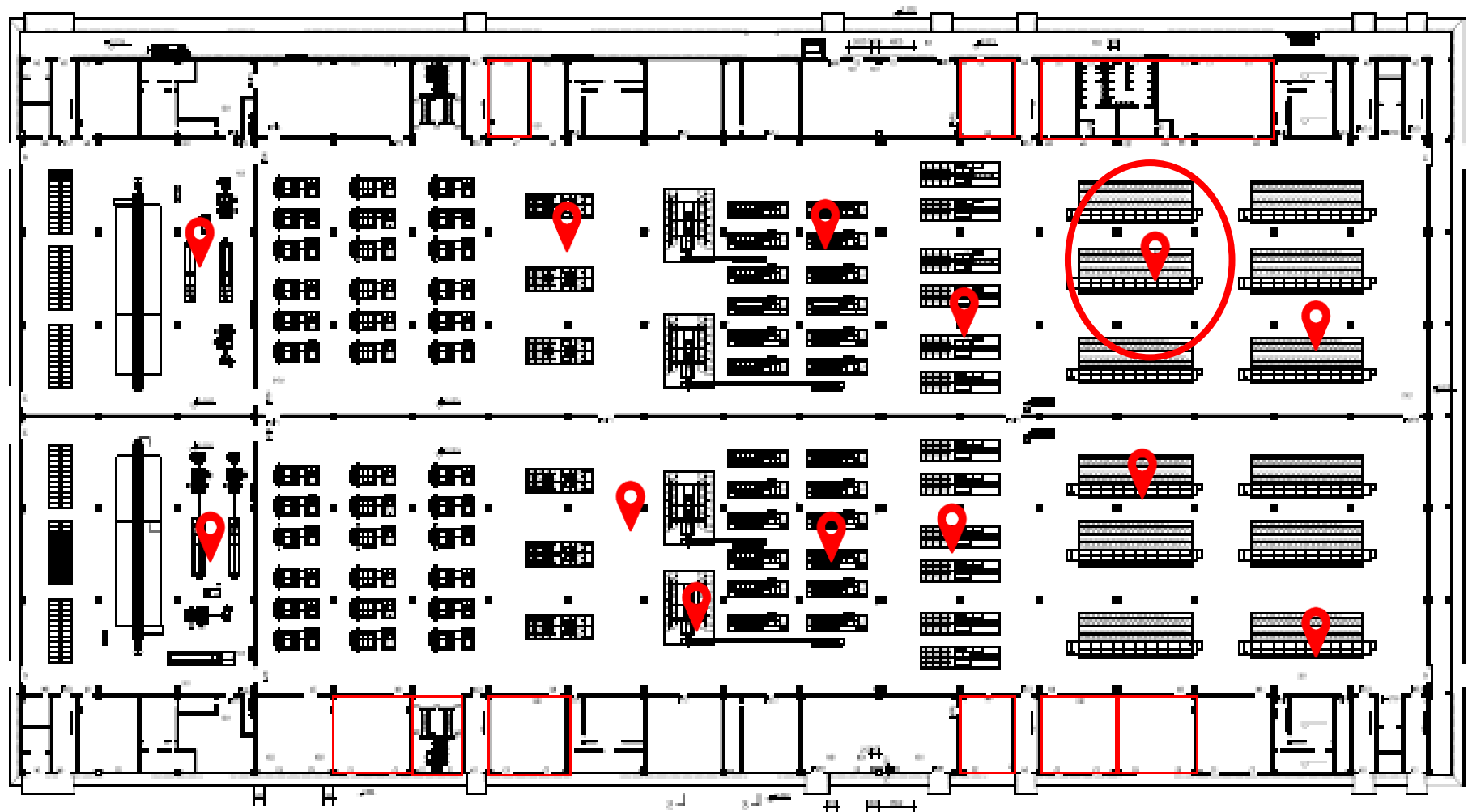
步骤: 10 → 4  
Step (传统 traditional) (现状 new)

时间: 59 → 25 分钟  
Time (传统 traditional) (现状 New)



## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 实例分享二：任务驱动 Case Sharing 2: Task Driven



#### 发现问题

Problem identified

例: 粗细联链车断开报警

Alert : Chain disconnected  
in the auto flow system

#### 系统匹配

System match task with people

系统在人员**列表**中搜索,  
找出与任务最匹配的人员

System search the list to  
identify the most suitable  
person for the task

#### 匹配维度

Criteria for matching

技能匹配程度  
与任务地点距离  
个人任务饱和度

Skills that match  
Distance from the task location  
Individual task workload

## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 任务与技能交互结合，达至动态平衡

Interactions between tasks and capabilities for optimal balanced KPIs



## 2. 十如工厂的精益

Lean Practice in Integral Spinning Factory

### 新旧模式效益对比

Benefit Comparison between the Old and New Model

### 流程优化

Process reengineering



以末并改纺及测试流程为例：时间减少58%，效率大幅提升

In case 1: time reduced 58%, efficiency improved significantly



## 2. 十如工厂的精益 Lean Practice in Integral Spinning Factory

### 新旧模式效益对比 Benefit Comparison between the Old and New Model



**万锭用工 (人/万锭) : 146 → 38**

Headcount per 10,000 spindles

**减少 74%**

Reduced 74%



**人均产量 (公斤/人/日): 30 → 130**

Output per headcount (KG/Person/Day)

**提升 329%**

Increased 329%



**技能提升 (年, 升至一级): 5 → 1.5**

Skill upgrading (No. of year to reach level 1 skill)

**缩短 70%**

Shortened 70%

### 3. 结论 Conclusions

1

在具有柔性化的区域自动化生产环境中实现多品种的高效生产，将面对诸多复杂多变的生产场景

To ensure an effective operation for producing multi products in a manufacturing context with regional automation and flexibility, numerous complicated and changing production scenarios must be met.

2

根据生产场景中任务的变化特征，采用基于任务驱动和区域自治的管理模式，提供了一种比较精益的运转模式。

In response to specific changing features of the task in a production scenario, the management model basing on task driven and regional self-management is blazing a new trail along the lean path.

3

培养具有多种能力的复合型人才 – 现场管理工程师，是在此生产环境中取得精益生产的关键。

It is a key to cultivate compound talents with multi skills, i.e. on-site mangineer, to achieve lean manufacturing within a complicated and changing operation environment.

4

科学及时有效地对各种任务进行最优化动态规划和推送，有助取得动态的精益生产，这种模式仍然在继续探索之中。

The optimal dispatching of the right task to the right people in an scientific and effective way help to achieve lean production and it is under further exploration.

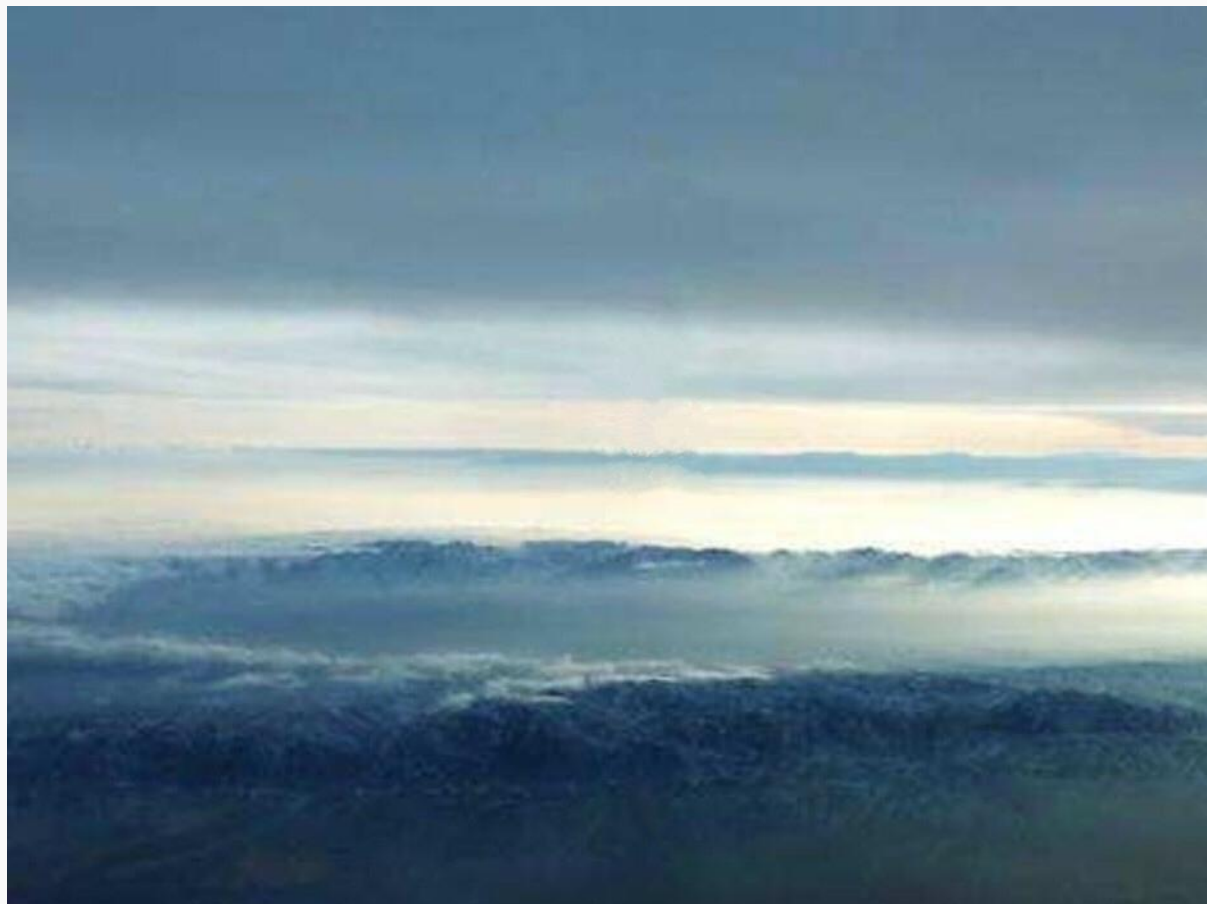
# 04

## 总结

Conclusion

从精益到精易

From Lean to Lean Changes





# 变化与周易 Chang and Yi

一易含三：变易，不易，简易

万事万物 “变化无常” Always Changing

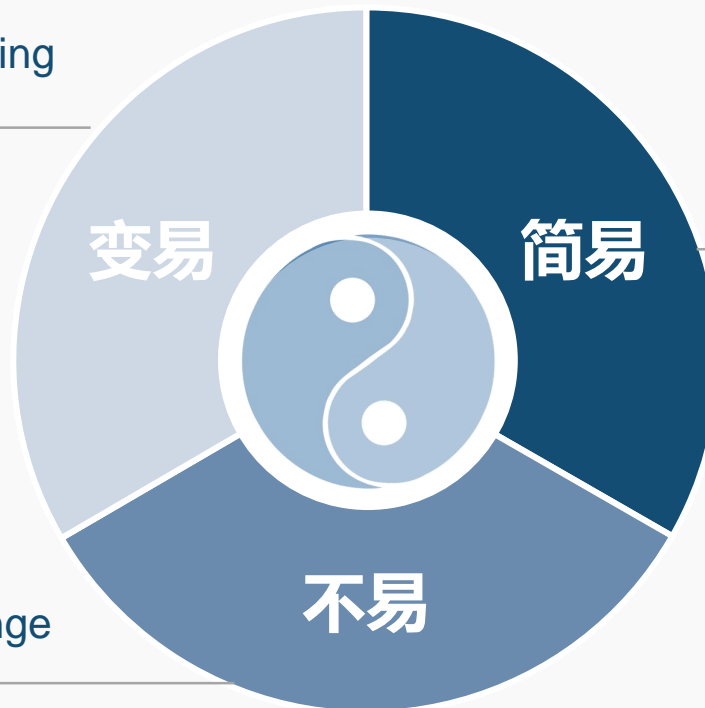
以变化和发展的观点审视万事万物，  
顺应变化，唯变所适

Treat things with dynamic, changing,  
and developing view.  
Always adapt to changing circumstance.

万事万物 “变中有常” No Change

从变化中寻找不变的规律，了知变中之常

Distinguish stable principles and laws from  
changes



复杂背后 “大道至简”  
Change Simplification

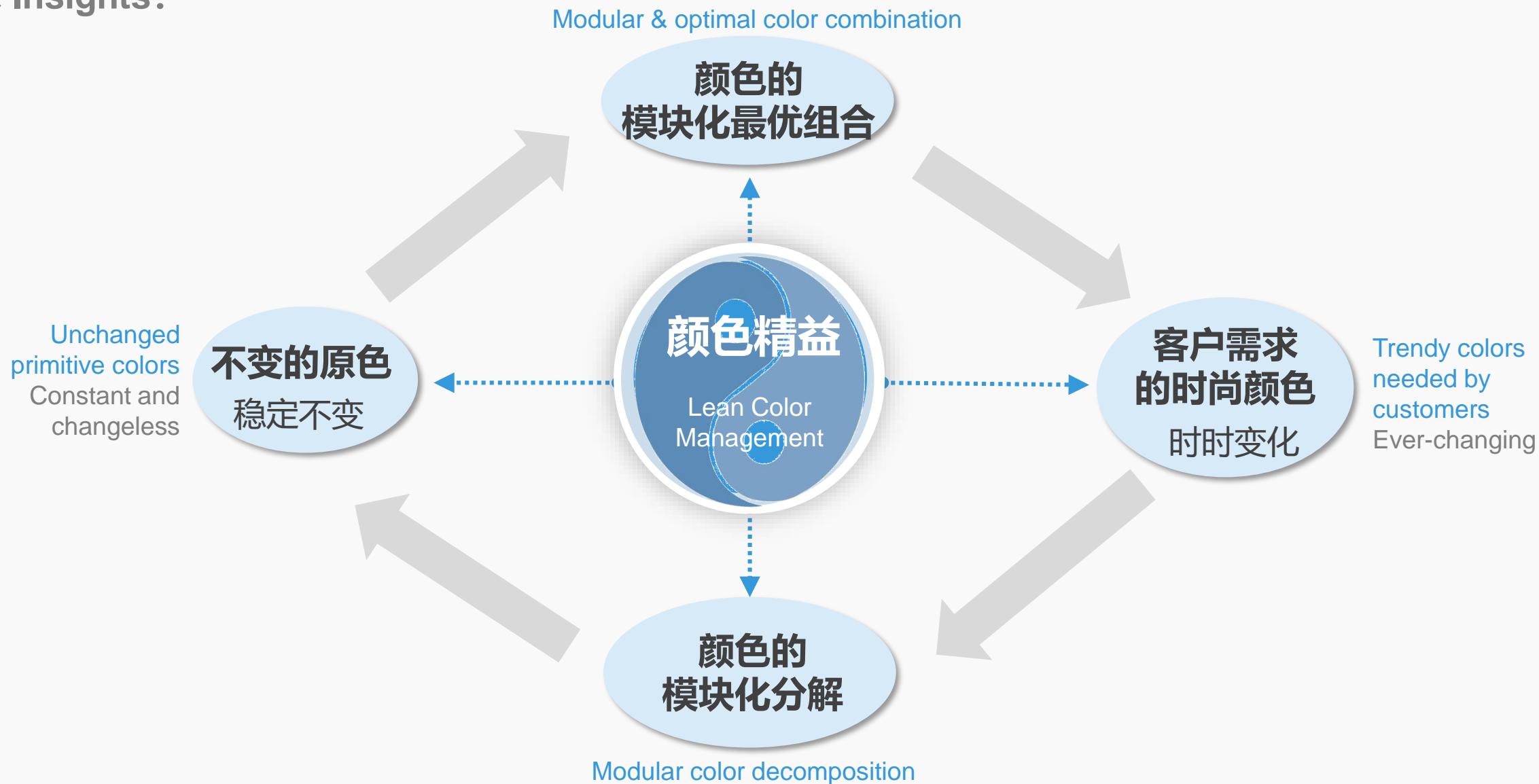
洞悉事物的本质，  
将复杂的变化 “化繁为简”

Gain insights from  
the nature of the change and  
turn complexity into simplicity

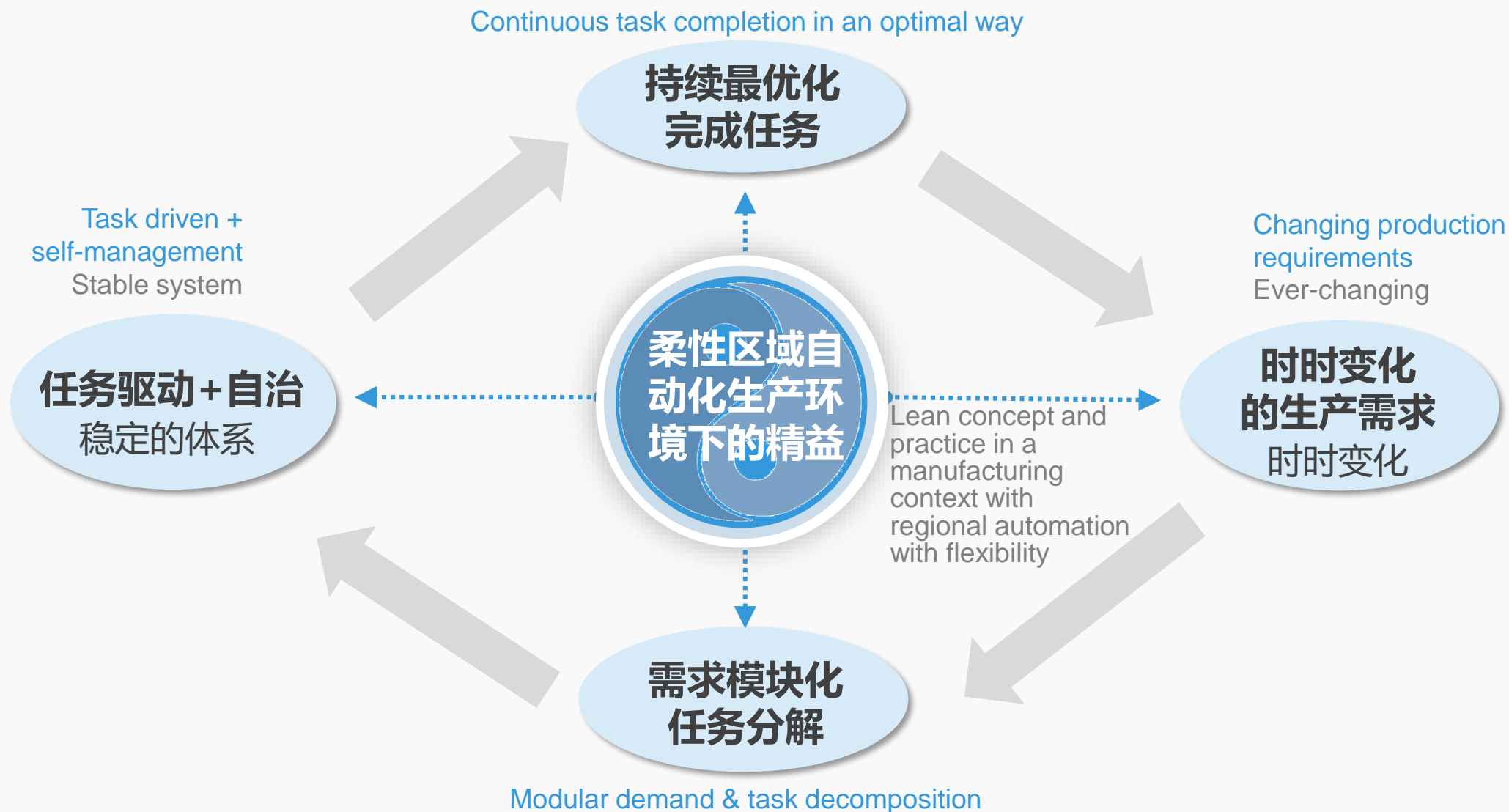
一点体悟：  
Reflection  
& Insights:

精益与精益变化 Lean and Lean Changes

应对多变颜色的精益体会 The Reflection on Coping with Ever-changing Colors



一点体悟：**精益与精益变化** Lean and Lean Changes  
Reflection **应对多变的生产环境的精益体会**  
& Insights: The Reflection on Coping with Ever-changing Manufacturing Environment

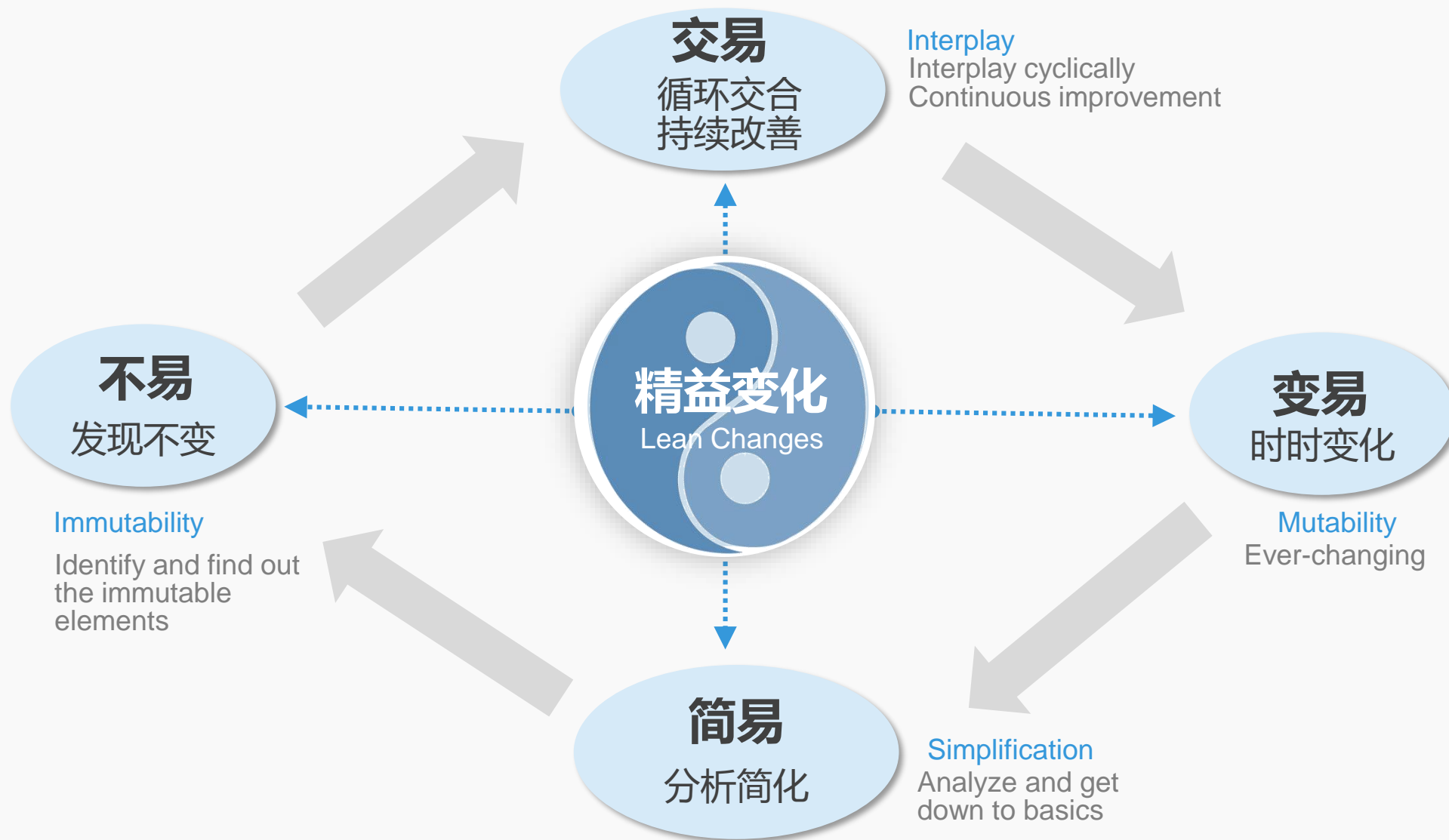




# 一点体悟：精益与精益变化 Lean and Lean Changes

Reflection **在变化的环境下探索精益的体会**

& Insights: The Reflection on Exploring Lean Essence in an Ever-changing Environment



## 结束语 Closing

1

万物皆变，精益无处不在。

All things change. The lean concept is pervasive in these changes.

2

以精益为思想，可追根问底，知其所以然；  
以精益为工具，可持续改善，达至臻境。

Take lean as a mode of thought, we can trace back to the root and understand the nature of a problem; Take lean as a tool, we can achieve continuous improvement to reach perfection.

3

以变易、简易、不易的易学智慧，  
可以洞悉事物变化本质，发现应  
对事物变化的策略。

Taking inspiration from the Yi Jing wisdom of mutability, simplicity and immutability, we can gain insight into the changing nature of everything to find out a right strategy to cope with change.

4

精益万事，精益万物，精益变化。

Pursuit lean on everything, always seeking for simplification and optimization in change situations using Yi philosophy.

5

愿精益思想不断发扬光大，推动中  
国的制造业的可持续发展

With continuous exploration, the lean philosophy will add momentum to the sustainable development of China's manufacturing industry



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