

Lean and Innovation in the Traditional Textile Industry

传统纺织服装制造业中的 精益与创新

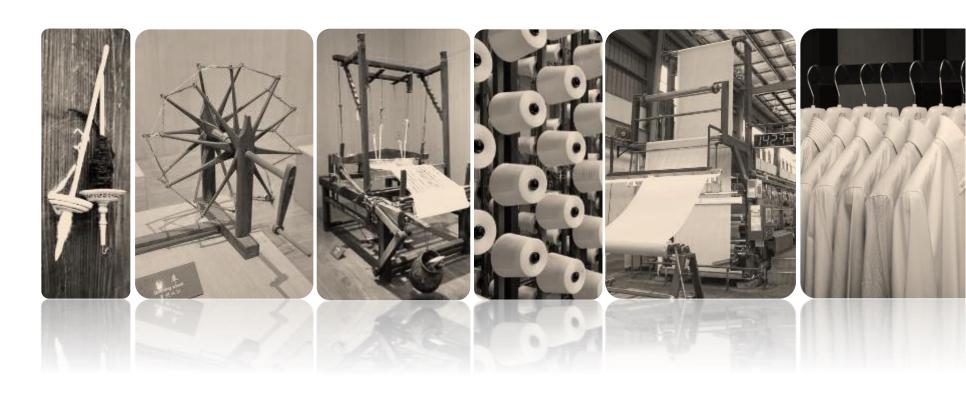
Tian Ye Managing Director Esquel Specialty Spinning



01

纺织服装概要

An Overview of the Textile and Apparel Industry



纺织服装与人类文明

ESQUEL GROUP

Textile Apparel and Human Civilization



纤维与纺织材料的应用

ESQUEL GROUP

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

●西雅图 M

■哥伦布● 纽约

美国 USA

A 成衣制造

€ 棉花种植、轧棉和纺纱

F 织布厂

H 集团总部

* 喀什、阿克苏、昌吉、吐鲁番、乌鲁木齐

贾埃勒、凯格勒、肯克拉、雅加拉

† 河内、胡志明

^ 吉兰丹、槟城

。博巴森、弗拉克、古德兰、格兰布瓦

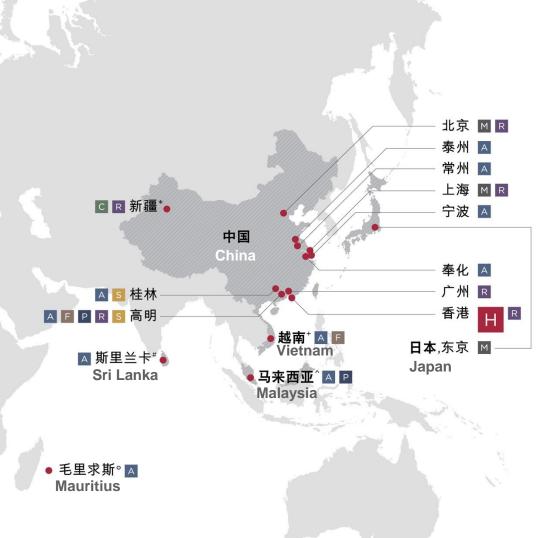
England ▲ 英国,伦敦 • ▲ 德国,林道 • Germany

M 销售办事处

P 辅料及包装厂

R 零售

S 特种纺纱厂



ESQUEL GROUP

纺织服装与溢达集团

ESQUEL GROUP

Esquel Group in the Textile and Apparel Industry

全球品牌合作伙伴

Cooperative Global Brands















Gap Inc. GIORDANO





























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.







溢达特纺 Esquel Specialty Spinning

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











Blowing 清花



Carding 梳棉



Pre-combing 预精梳



Combing 精梳



Drawing 并条

Twisting 捻线



Combining 并线



Winding 络筒



Spinning 细纱



Roving 粗纱





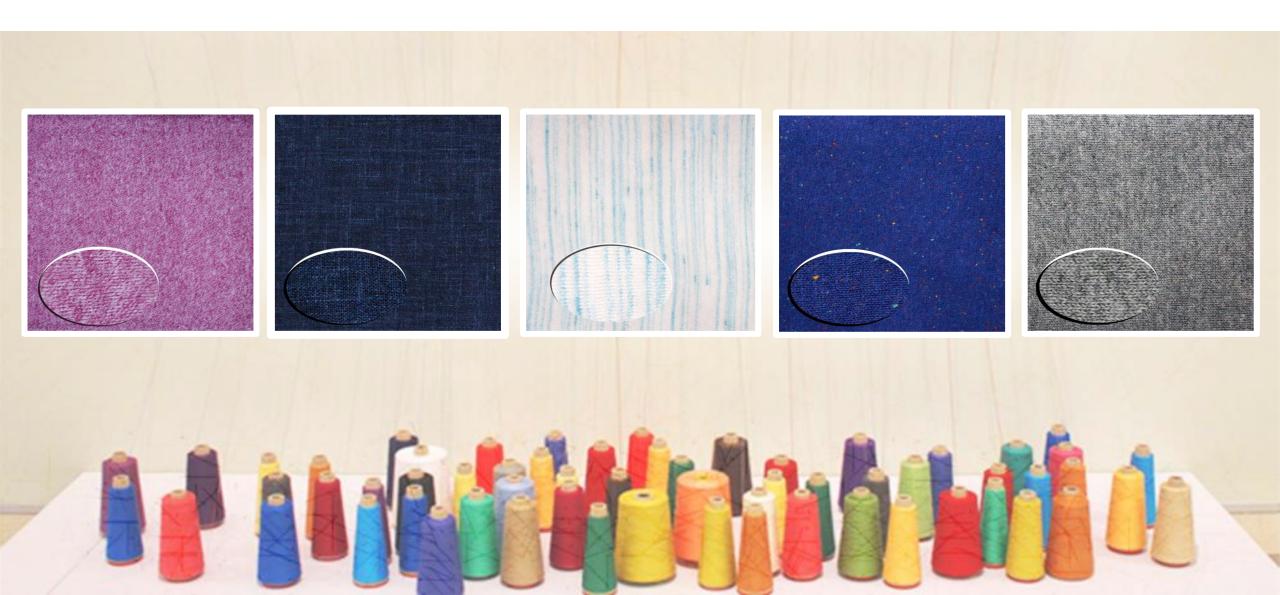






溢达特纺 Esquel Specialty Spinning

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



溢达特纺 **Esquel Specialty Spinning**



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



结构

手感

原料 **Material** 以天然纤维棉毛丝麻为主, 结合多种功能性合成纤维材 料进行各种形式复合加工

Combine natural fibers of cotton, wool, silk, linen, and various functional synthetic fibers to create blended yarns.

产品 **Product**

功能

通过纤维色彩组合,原料组合,并结 合色彩分布、纱线结构、功能的多种 组合, 生产出干变万化的纱线材料。

Creating a great variety of yarns by colored fiber mixing, material compounding, together with the diversification of color distribution, yarn structure, and functionality.

溢达特纺 Esquel Specialty Spinning

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。

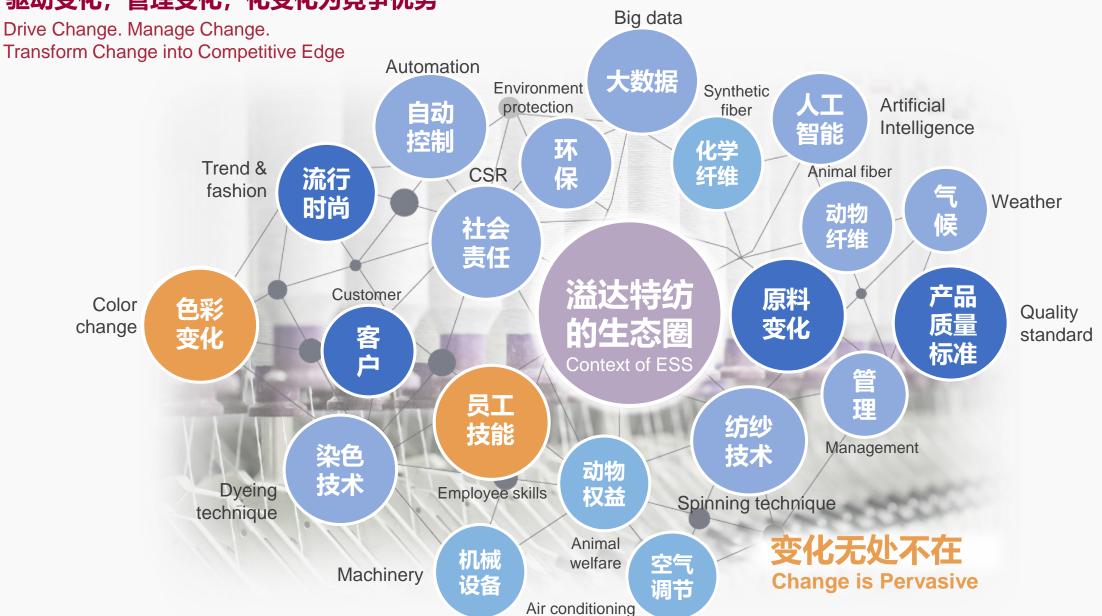


Cotton combine silk is one of the perfect combinations of natural fibers. It provides the natural shininess as well as the comfort of silk fiber. It has better moisture-absorption & water-vapor transmission, better UV protection, better elastic resilience and better skin care.

溢达特纺的生态 The Context of Esquel Specialty Spinning



驱动变化,管理变化,化变化为竞争优势





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



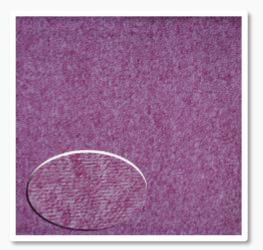


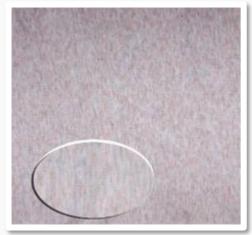


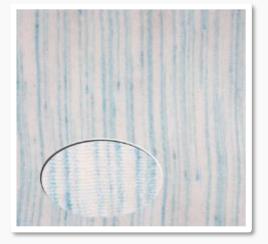
特纺产品的特征 - 花型和颜色 Features of ESS Products - Patterns and Colors

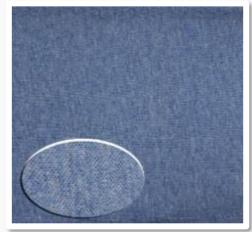
基于多种颜色纤维混合的多异色彩/花型产品

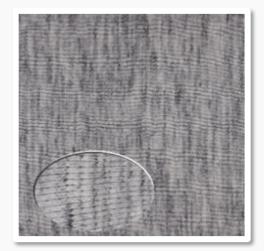
Products with Diversified and Unique Colors by Blending Various Colored Fibers

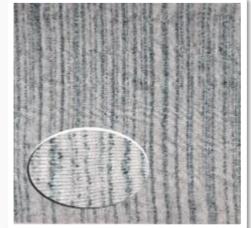


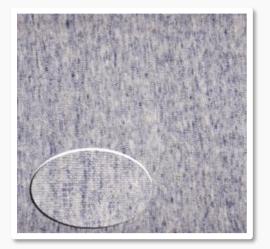


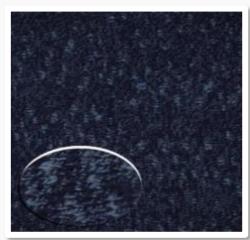










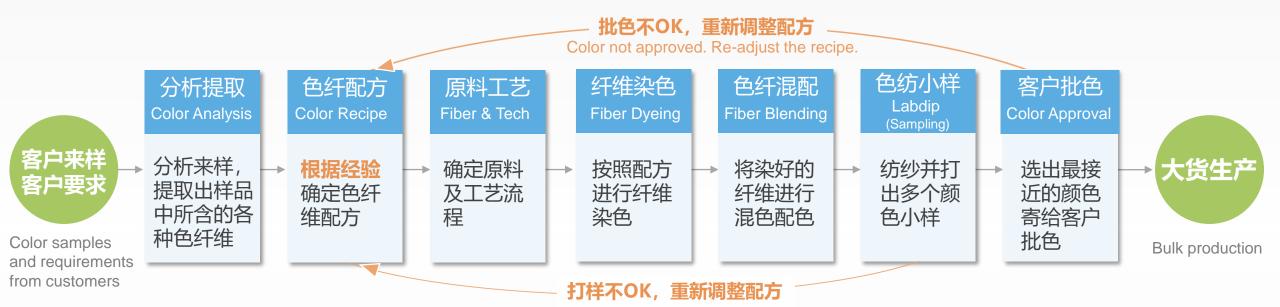


色纺纱 Fiber-dyed Heather Colors

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— (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)

Labdip color unmatched. Re-adjust the recipe.

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。

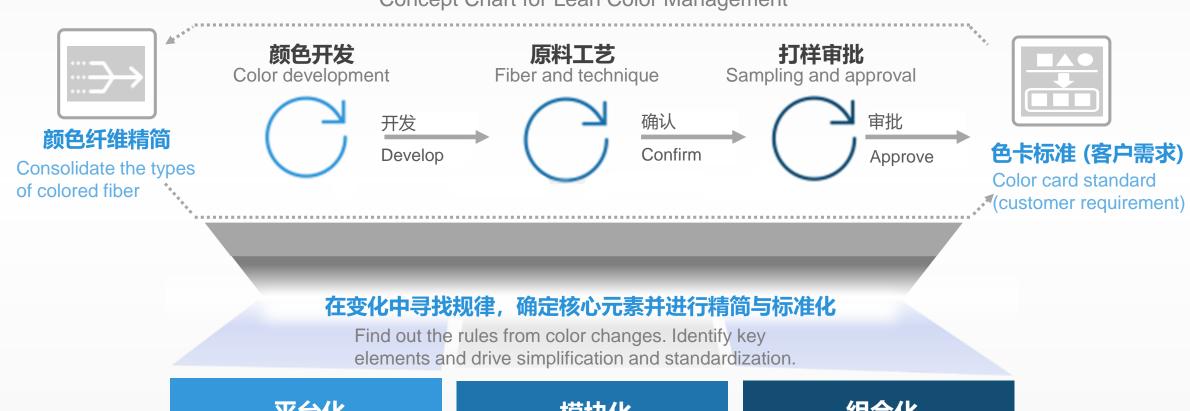
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Existing color cards are limited to narrow color gamut, unevenly distributed color hue, and lacking of correlation.

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

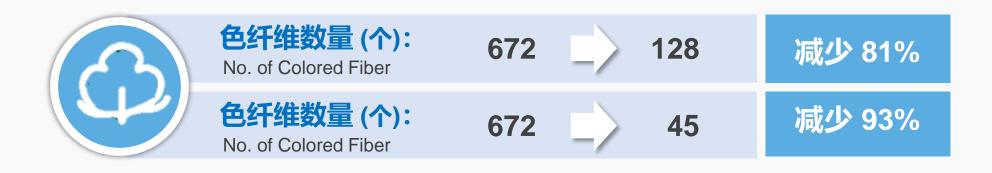


平台化 Platform

模块化 Module 组合化 Grouping

颜色精益的效果

Benefits from Lean Color Management





色纺颜色数量 (个): 17356

2136

减少88%

No. of top-dyed colors

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



颜色精益的意义

Values from Lean Color Management



实现了科学配色



加快颜色开发速度



提高了打样的FPY 缩短了打样时间



降低了成本



降低了色纤维 种类和库存

Scientific color blending

Shorten the cycle time of color matching & color development

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

Reduce cost

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





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.





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









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.









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

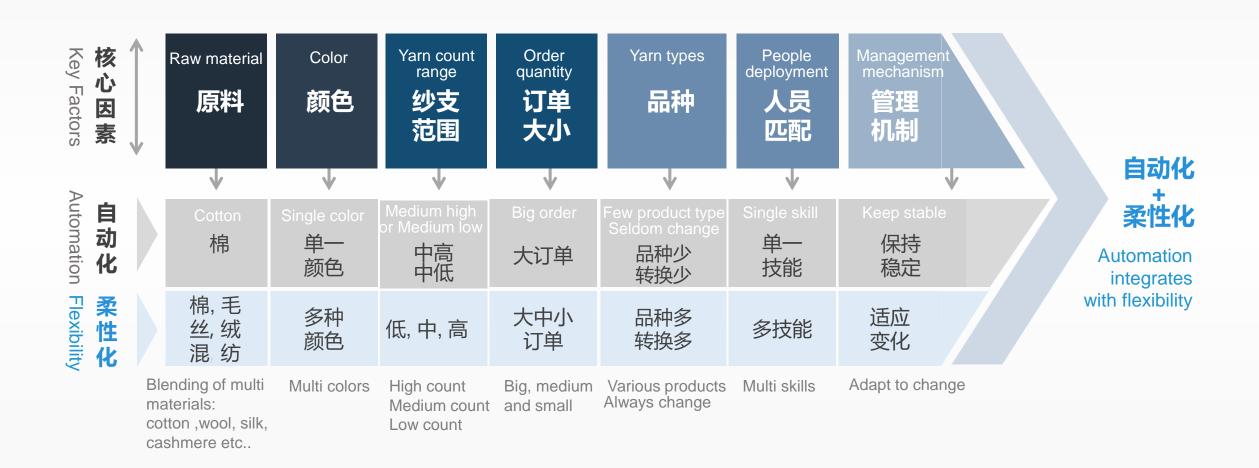








工厂设计中的挑战 - 自动化 vs. 柔性化 Challenges in Factory Design - Automation vs. Flexibility





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

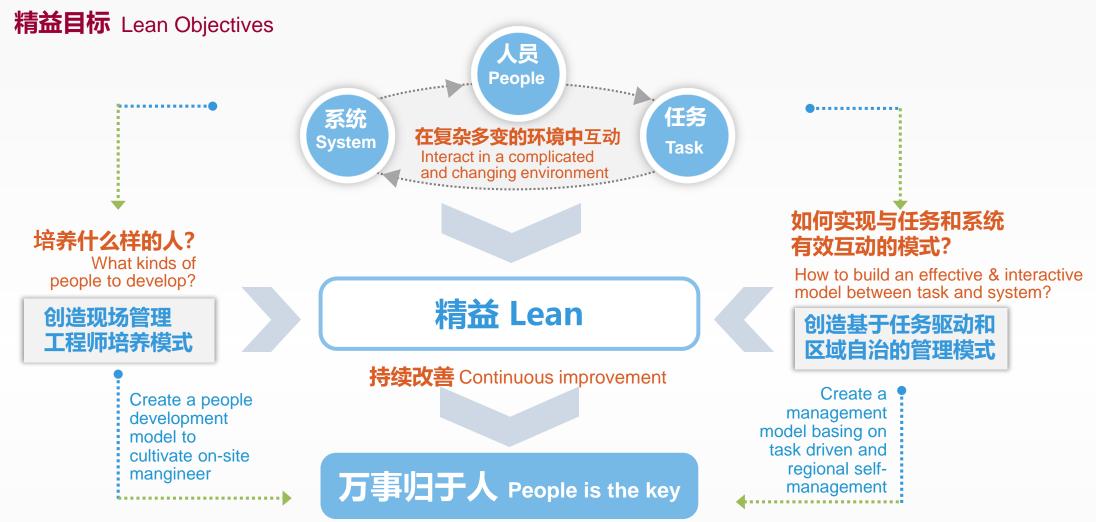
任务



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





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

Task List

计划 Planning

Order information - 订单信息
Line planning for order production - 排产排机

设备 Machinery

- 确保设备运行状态 (平揩车、维保、清洁)
- 设备换模 (改纺)
- 故障的预判与处理
- 设备改善与升级

Ensure machines run in good condition Replace parts to change technical setting Malfunction prediction and handling Machinery optimization and upgrading

工艺 Tech

- 订单工艺变更 (开改纺单)
- 订单在线质量跟踪
- 平揩车质量确认
- 工艺升级 (优化)

Issue job order to change technical Follow up Online order quality

Confirm the quality after maintenance and repair

Parameter optimization and upgrading

生产 Production

- 生产操作
- 关键设备操作
- 工艺测试
- 设备改纺
- 生产异常处理

Production operation
On line parameter testing
Machine adjustment for lot change
Contingent issue handling

质量 Quality

- 质量监测
- 质量问题分析与处理

Quality monitoring

Quality issue analysis and handling

管理

Management

- 生产现场管理
- 跨部门协作与沟通

Production on-site management Cross-functional cooperation & communication

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	生产现场管理	基础生产管理 (T4)
Management	跨部门协作与沟通	综合管理技能 (T8)



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

任务类别

Task Categories

恒常任务 (33条) Constant Tasks

主要涵括基础维护性任务:

- 设备/电气/空调等方面 的例行维保任务;
- 安全/质量/规范操作的日常巡检任务。

Basic maintenance and inspection tasks

- Routine tasks to maintain and repair machine, electricity, and air-conditioner.
- Daily routing inspection tasks to check safety and quality, and ensure compliance to standard operation requirements

条件触发任务 (79条) Condition Triggered Tasks

主要围绕订单在车间按时空流动促发的任务:

- 工艺改纺类任务
- 设备改纺类任务
- 转批操作(埋尾清洁、各 工序上机伸头)类任务
- 转批测试类任务

Tasks triggered by order flow according to time and space

- · Tasks to change technical setting
- Tasks to change machine setting
- Tasks to change lot (cleaning at order final stage, material loading to machine and putting in the right part)
- · Testing tasks for lot change

突发任务 (46条) Contingent Tasks

主要围绕突事件的处理与恢复:

- 设备故障类在线处理任务
- 工艺异常类在线处理任务
- 质量异常类在线处理任务

Task about contingent issue handling and resuming to normal condition

- Task to handle machine malfunction on production line
- · Task to handle technical issues on line
- · Task to handle quality issues on line

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 Mangineer to Deal with the Changing Tasks

Basic operation

Production operation Machine operation

基础操作

生产操作 - 设备操作

生产基础知识

维保基础知识

工艺基础知识

- QC基础知识



- 关键设备原理
- 基础牛产管理技能
- 设备揩车与改纺
- 电气基础

通识能力 General ability

Basic production know-how -

Basic maintenance know-how _

Basic technical know-how

Basic quality control know-how

技能需求 Skills in Need

- 机械与电气维修・
- 工艺知识及 工艺改纺测试
- 软件技能
- 沟通协调与合作
- 问题分析与处理。

Basic skills

- Key machine operation principles
- Basic production management skill
- Machine cleaning and change setting for lot change
- Basic knowledge of electricity

Advanced skills

- Machine and electric maintenance
- · Technical skill and testing skills on adjusting technical settings
- Software skills
- Communication skills and cooperative skills
- Problem analysis & solving skills

Safety knowledge

Safety checking & attention points Safety issue identification & precaution

- 安全检查及注意事项
- 隐患识别与预防

综合管理能力

- 现场管理与项目管理
- 项目规划与开展
- 跨部门合作与沟通

Comprehensive management skill

- On-site management and project management
- Project planning and execution
- Cross-functional cooperation and communication

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Training and Advancement Ladder

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

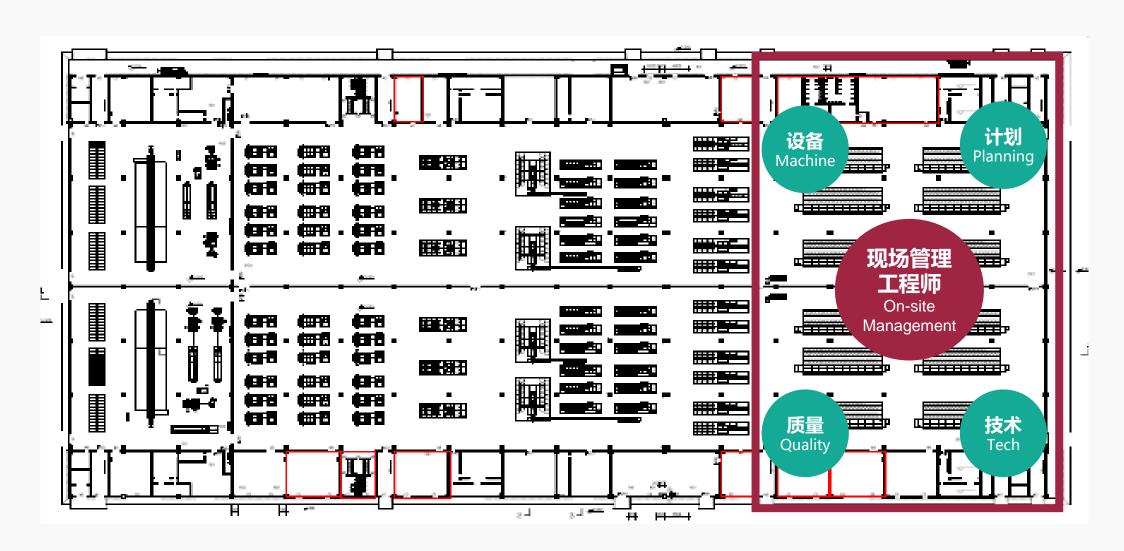
A Management Model basing on Task driven and Regional Self-management

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



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



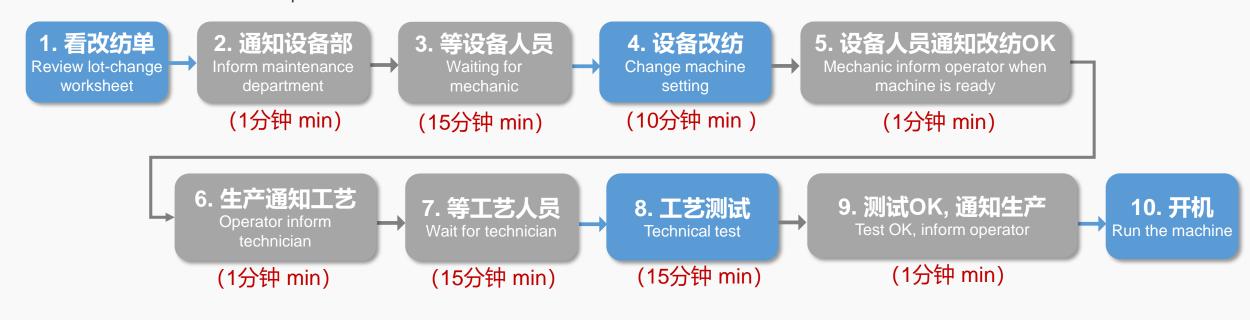
实例分享一:区域自治 – 末并改纺及测试流程 Case Sharing 1: Regional Self-management

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



Step (传统 traditional) (现状 new)

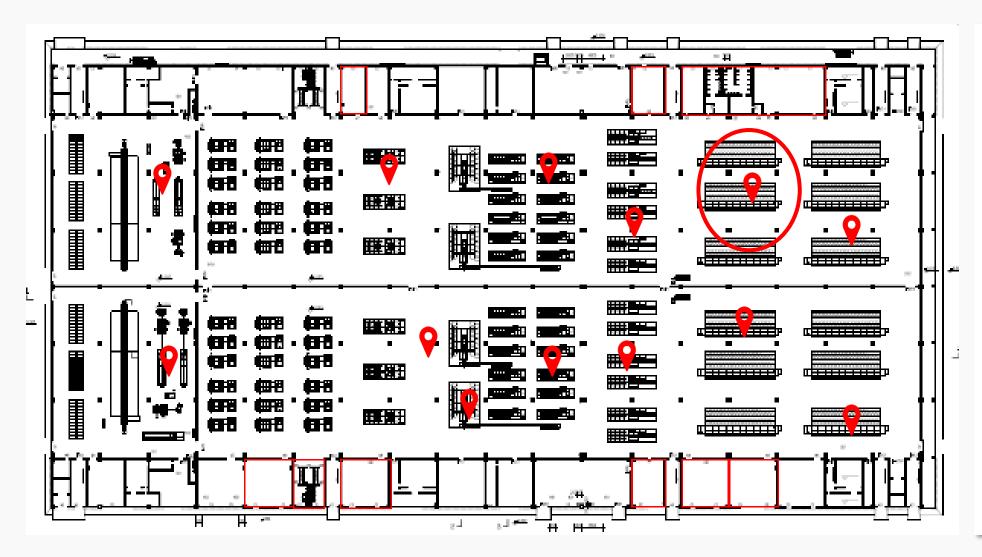
时间: 59分钟 25分钟 (传统 traditional) (现状 New)

2. 十如工厂的精益

Lean Practice in Integral Spinning Factory

ESQUEL GROUP

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

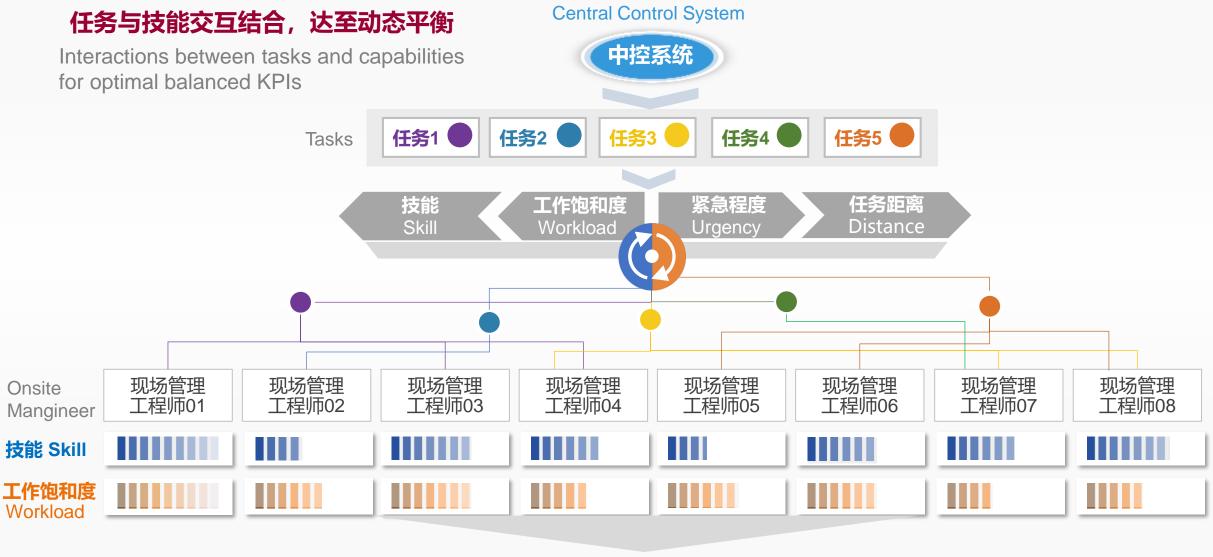
匹配维度

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



结果衡量 KPIs 产量 Output 在线平衡 Line Balance

产能利用率 Capacity Utilization 工作强度指数 Labor Intensity Index 快乐指数 Happy Index

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





开工艺单

Issue technical worksheet

设备改纺Adjust machine setting

现场工程管理师 On-site Mangineer

+



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

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.

变易

不易

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

简易

洞悉事物的本质,将复杂的变化"化繁为简"

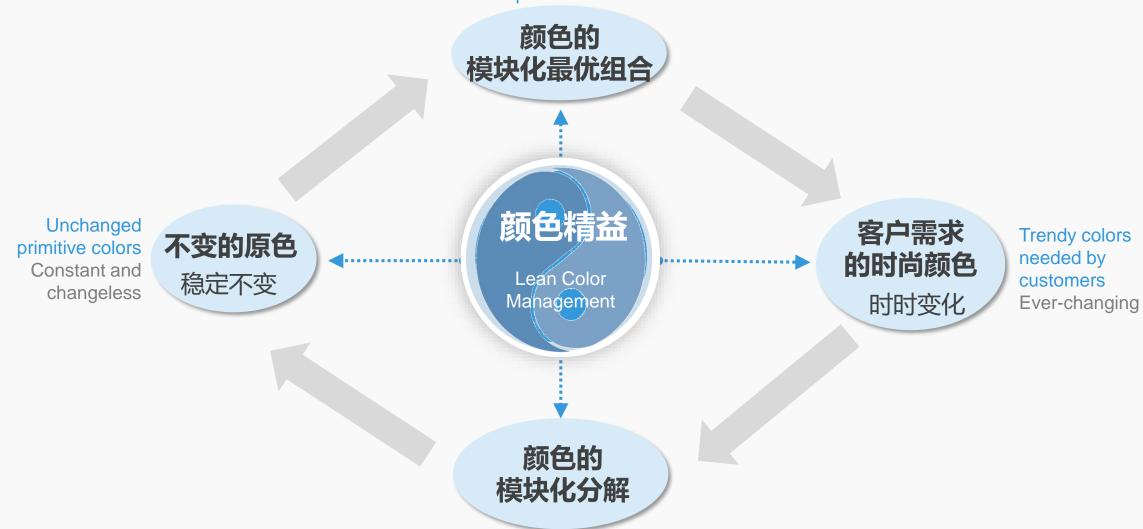
Gain insights from the nature of the change and turn complexity into simplicity Reflection

一点体悟: 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

& Insights:

Modular & optimal color combination



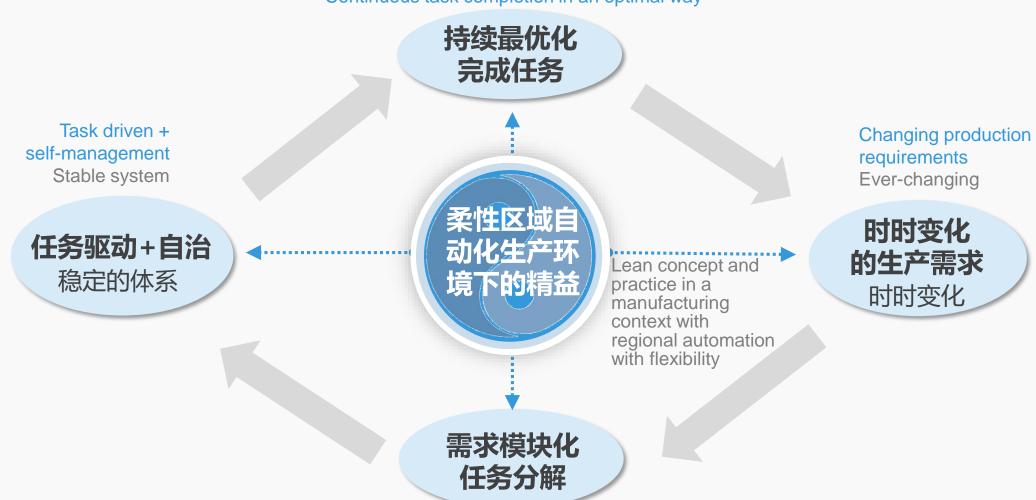
Modular color decomposition

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

Continuous task completion in an optimal way

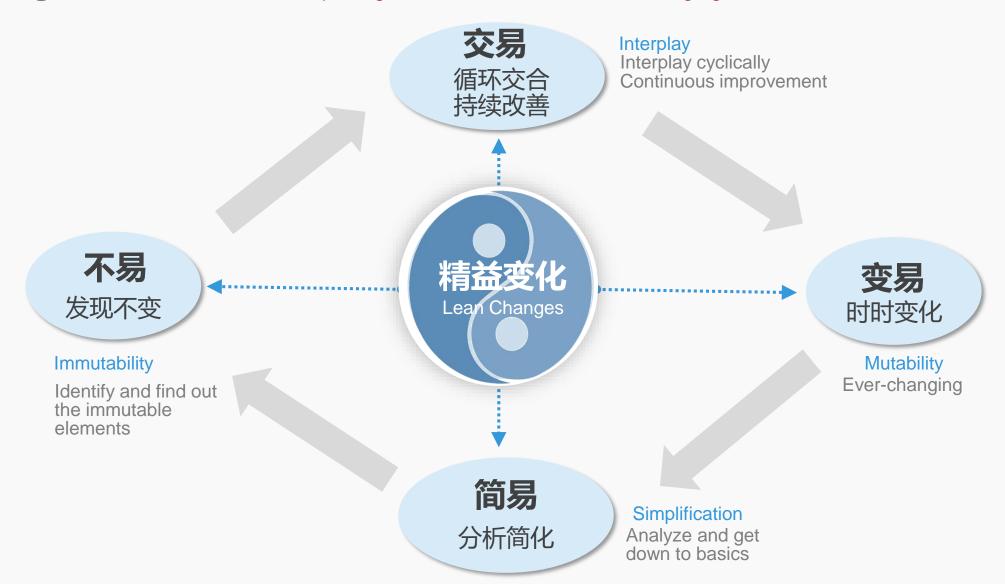


Modular demand & task decomposition

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,精易变化。

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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谢谢!