

博世工业4.0路径及方案

— 曲永雷

博世物联事业部亚太区总经理

Bosch – a global network

Four business sectors

Mobility Solutions



Industrial Technology



Energy and Building Technology



Consumer Goods



Bosch – Four business sectors

Key Figures 2015*

Bosch Group

- ▶ 70.6 billion euros in sales
- ▶ 375,000 associates

Mobility Solutions

- ▶ One of the world's largest suppliers of automotive technology

59% share of sales



Industrial Technology

- ▶ Leading in drive and control technology, packaging, and process technology



Energy and Building Technology

- ▶ Leading manufacturer of security technology
- ▶ Global market leader of energie-efficient heating products and hot-water solutions

41% share of sales



Consumer Goods

- ▶ Leading supplier of power tools and accessories
- ▶ Leading supplier of household appliances



* As of 12.15

Bosch in China



Key Data

In 2015, the sales of Bosch China kept a positive growth

77

billion CNY (around 11.1 billion EUR)

62 legal entities

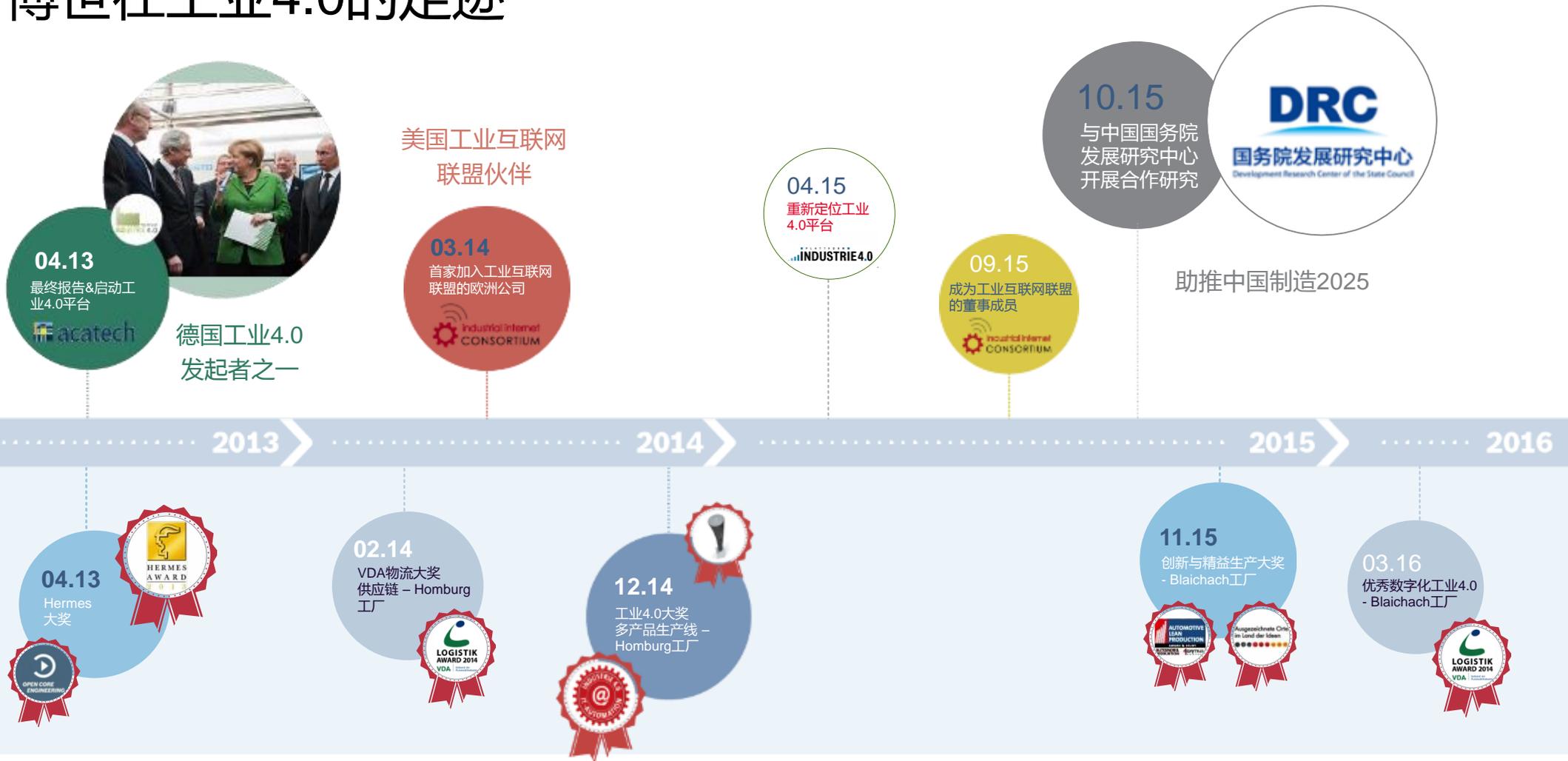
- 1 Investment Holding Company (Shanghai)
- 48 Wholly-Foreign-Owned-Enterprises
- 13 Joint Ventures

Investments in China: **5.2 billion CNY** in 2015, total 10 billion CNY from 2011 to 2015

Associates: **55,000** (as of December 31, 2015)



博世在工业4.0的足迹



博世工业4.0的双重战略

卓越的供应商 系统制造商/ 生产资源视图

直接为外部客户提供解决方案	提供技术或内部解决方案
 驱动与控制技术 (DC)	 工业传感器解决方案 (AE/PJ-I40)
 博世软件创新 (INST)	 博世传感器技术 (BST)
 包装技术 (PA)	 物流创新与数字化 (CP/LOG-I)
 组装系统与特种机械 (PA-ATMO)	 设备平台 (CR/APA)
 博世互联技术&解决方案(BCDS)	 大数据挖掘与分析 (G1/PJ-DM)
 博世客户服务解决方案	 RFID研发中心 (G40/PJ-SPK-RAB)
 博世能源与建筑解决方案	... IT, RBEI等合作
...	

领先的实践者 产品制造商/ 产品视图



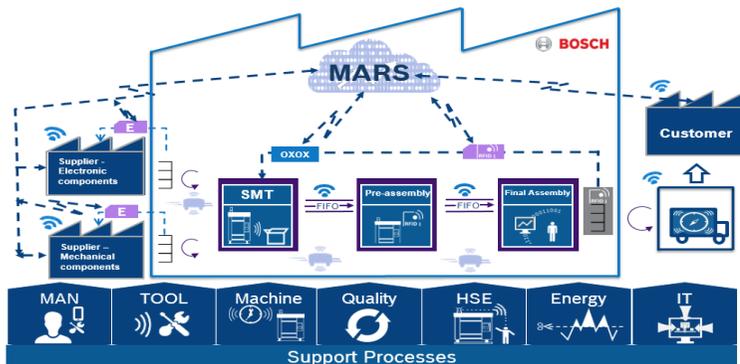
全球范围内250多家博世工厂

- 产品制造
- 机器制造
- 工厂运营
- 客户与供应商的接口

在互联工业方面开展了超过100个试验项目

I4.0 @ Bosch Automotive Electronic China

工业4.0 @ 博世汽车电子中国区



- IT infrastructure build up
IT基础设施建设
- Standard solution roll out at value streams
标准方案在各个价值流的推广
- Usage of connected devices
互联器件的使用



- Spread the use of connected devices to industry-wide
将互联器件的使用推广到整个工业链
- Build up Open I4.0 Cloud Ecosystem
建立开放的工业4.0云系统

试点项目

互联的价值流

互联工厂和互联的全球制造网络

2014

2015

2016

2018

2019

2020

Autonomous Material Transportation by RepCall@SMT

SMT 自动补料



Use Case 应用场景

- I4.0 solution set for autonomous material transportation
自主物料输送的工业4.0解决方案
- Machine self calculate material needs
机器自主计算原材料消耗
- Autonomous transportation
自动化物料运输



Industry 4.0 Approach 工业4.0体现

- Machine talk to machine
机器对话
- Data drive autonomous behavior
数据驱动自主行为发生

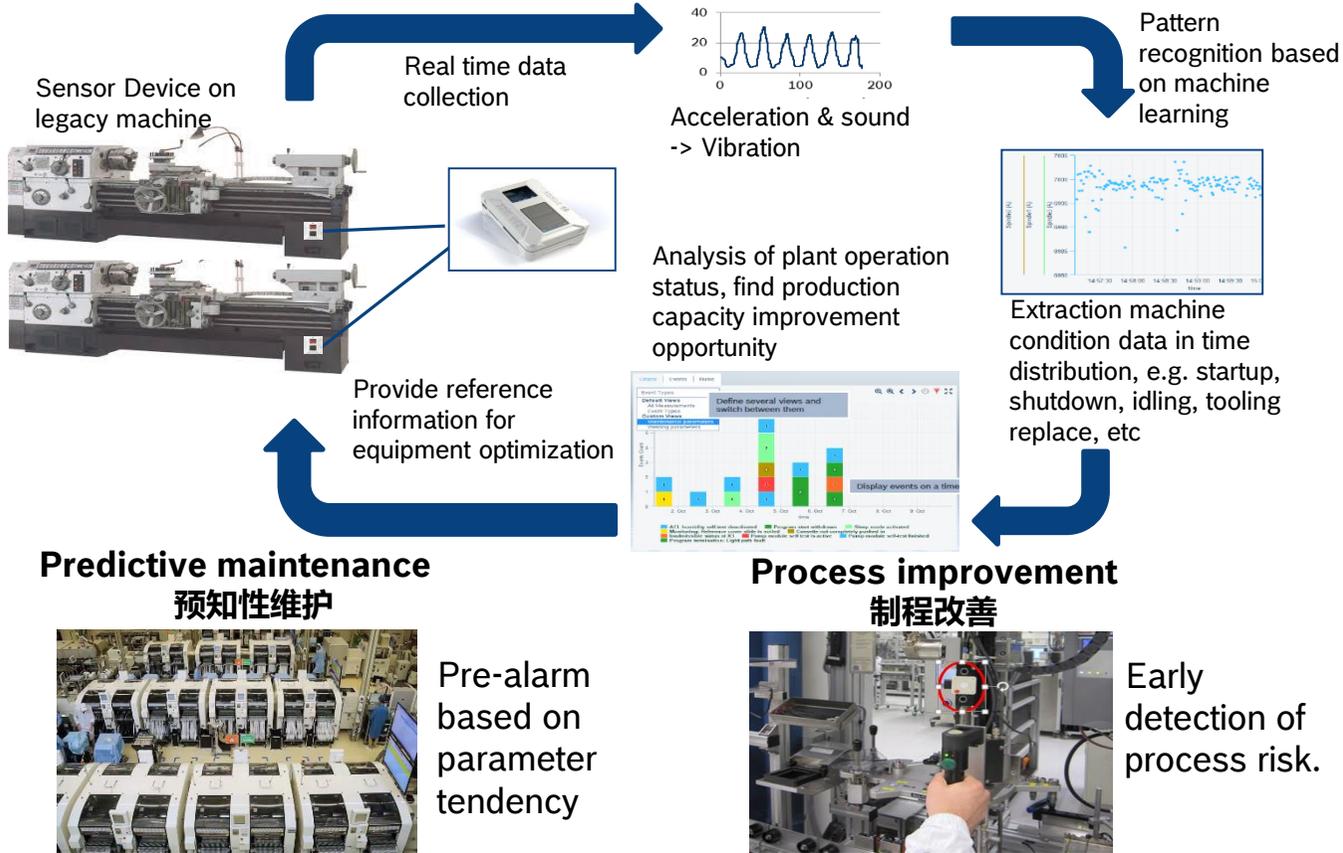


Benefits 成果/目标

- On-line inventory reduction
在线库存缩减
- Direct productivity improvement at SMT Line (Surface Mount Technology)
SMT直接生产力提升

Virtual Reality & Real-time by Web-enabled Sensor (CISS / XDK) 物联传感器：实时反映现实

Example in production 生产案例



Other examples 其他案例

Logistic monitoring 物流监控



Transparency of logistics performance.

Environment monitoring 环境监控



Measurement of humidity, temperature and smoke, air pressure, etc. for electric cabinet

Condition monitoring 状态监控



Use sensor instead of manual to collect equipment condition indicator, to reduce or eliminate machine down risk.

Efficiency & Accuracy by iStation

iStation : 高效&精准

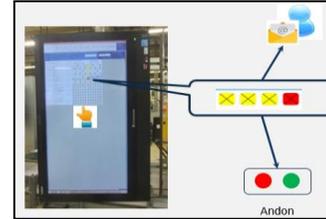
iStation



Early Warning System 早期预警系统:

Manual record
手工记录

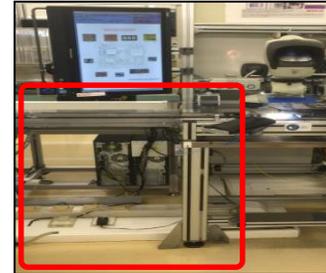
Item	Value	Color
Item 1	0	Red
Item 2	1	Yellow
Item 3	2	Green
Item 4	3	Red
Item 5	4	Yellow
Item 6	5	Green
Item 7	6	Red
Item 8	7	Yellow
Item 9	8	Green
Item 10	9	Red



Auto trigger Andon for quick reaction
自动触发Andon并快速响应

Documentation 文档数字化:

Paper documents online
纸质文档

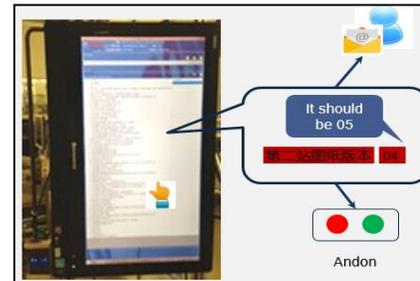


Electronic document management to reduce quality risk
数字化文档管理避免潜在质量风险

Process confirmation 流程确认:

Paper and manual record
纸质手工记录

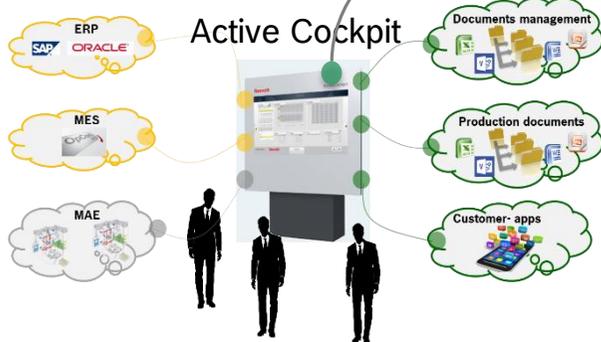
SET UP ITEM	ECU PIN	0265 800
1. 确认物料清单	换型前	0265800775
2. 确认物料清单	准备	00
3. 确认第二级物料清单	工作	2265100611
4. 第三级物料清单	性换型	06
5. 确认第二级Smapy 编号	前 10	NA
6. 确认第七级第八级物料清单	分钟必需	2265100612
7. 确认第七级第九级物料清单	完成	02
8. 确认 QI 数据准备		√
9. 确认安装 governor 零件为换手零件		√
10. 确认 DISEmagister 零件		√



Real time production data to quality control
实时生产数据用于质量控制

- Paperless 无纸化
- Real-time data 实时数据
- Quick Reaction 快速响应

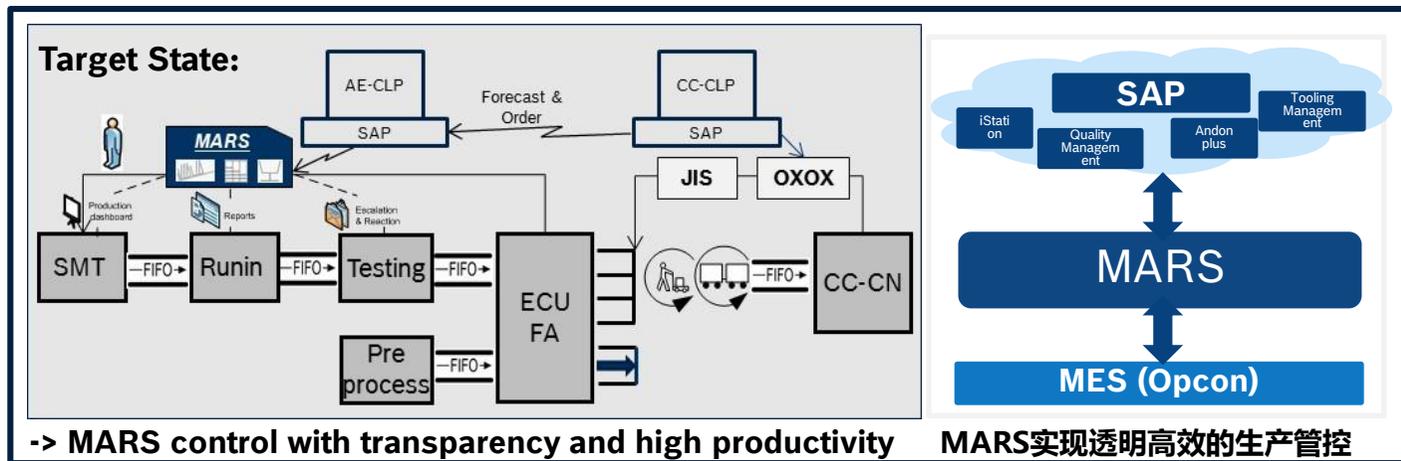
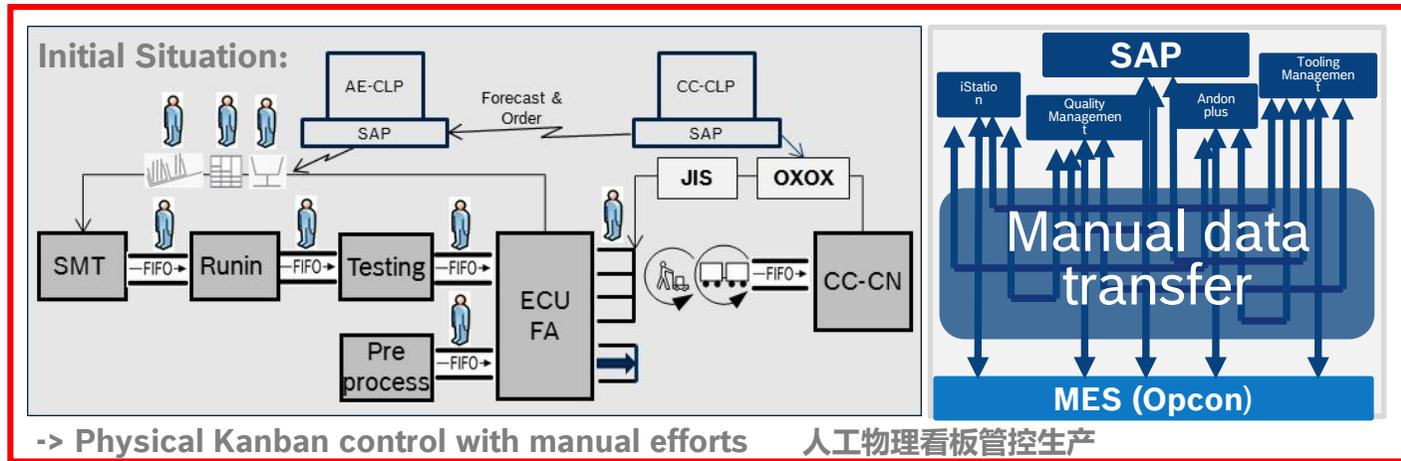
Can be part of Active Cockpit as data enabler



Connectivity & Flexibility by MARS

MARS : 互联 & 柔性

- ▶ **Manufacturing Agile Response System (MARS)生产敏捷响应系统:** 14.0 tool for production controlling. 利用工业4.0工具进行生产控制。
- ▶ Lean information flow after optimizing the lean material flow. 优化物料流后再优化信息流。
- ▶ Enable dynamic consumption control with high productivity. 在高生产力同时实现动态消耗控制。
- ▶ Real-time data is precondition for agile system. 实时数据作为灵活系统的先决条件。



I4.0 and Made in China 2025

工业4.0和中国制造2025

Change in Market 市场变化

Volatile markets
市场波动



Individual customer
requirements 客制化需求



Shorter delivery
times 交货期缩短



Shorter product life cycles
产品生命周期缩短



Customer behavior
客户行为



Change in Manufacturing 制造业变化

- Higher productivity 提升生产力
- High flexibility 高度的灵活性
 - minimize set-up time
 - smart individual work piece in/out
- Quality improvement 改善质量
- Real-time & preventive service 实时和预防性维护
- Low inventory 降低库存
- Reduce dependence on labor 减少对劳动力的依赖

Technology Revolution 技术变革

I4.0 - Enabler of
Made in China 2025
to build a strong and
innovative
manufacturing

工业4.0 – 中国制造
2025的促成者以建立一个
强大创新的生产系统

Summary 总结

China 中国

Most important market with unique characteristics
有特色最重要的市场

Made in China 2025 中国制造2025

First milestone for Chinese Dream
实现中国梦的里程碑

I4.0 工业4.0

Enabler of Made in China 2025
中国制造2025的促成者

Bosch I4.0 Dual Strategy 博世工业4.0双重战略

Lead Operator,
Lead Provider
领先的践行者
卓越的供应商

Bosch
Shaping the Future
of Global
Production with I4.0
and IoTS
博世用工业4.0和
物联网来塑造未来全
球制造

THANK YOU!

谢谢！