

“Monozukuri” Innovation

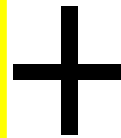
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Industrial 4.0

Monitoring network with the sensor and ICT

Real time control of manufacturing process

Big data analyses ⇒ feedback to Monozukuri



Pursuit of zero defects 0.5

Construct an origin control scheme



TDK Industry 4.5

Implement this innovation to Akita new factory
⇒ Roll out to other factories



Monozukuri innovation

1) Zeroize defect / 欠陥ゼロ化

- **Process designing, how the process should be.**

工程設計のあるべき姿

2) Location Free / ロケーションフリー

- **DSS (Direct sintering system),**

Material and finishing process integrated.

素材 / 製品の統合ライン化

- **Advanced Cell line (Man and Robot fusion process)**

進化したセルライン（人とロボットの融合ライン）

3) モノづくりセンターの新設 (Newly Established Monozukuri Center)

Monozukuri Innovation: Tackling toward zeroizing quality defect

モノづくり改革：品質欠陥ゼロ化への取組み

Zeroize Defect of Design Quality

設計品質欠陥ゼロ化

- **Clarify evidence of product specification.**
仕様の根拠を明確にする
- **Proceed optimized designing, considered how the way of customer's set is used.**
顧客セットの使い方を反映した最適設計を行う。

Zeroize Defect of Raw Material Quality

材料品質欠陥ゼロ化

- **Develop and adopt raw material which maximize Quality (performance and reliability) as finished goods.**
完成品の品質（信頼性・性能）を最大化する材料の開発、採用

Zeroize Defect of Process Quality

プロセス品質欠陥ゼロ化

- **Clarify condition of goods by processes**
プロセス毎の良品条件の明確化

Zeroize Defect of Management Quality

管理品質欠陥ゼロ化

- **Design process, how it should be.**
➡ “Purpose” , “Procedure” , “Performance”
あるべき工程設計 ➡ 目的、手順、出来映え
- **Reinforce foundation of management Quality.**
品質基盤の強化
 - **QC Activity (*Quality bottom up※)**
QC 活動（小集団活動による品質のボトムアップ※）
- **Analyze risk on frequent and infrequent production on operation.**
定常作業と非定常作業におけるリスク分析

*Establish process , operator is able to explain about “Purpose of own process” , “Operation procedure” and “Performance criteria of products” with workshop environment that security and quality are capable to secure.

※安全と品質を確保できる職場環境のなかでオペレータの方が、自工程の目的、手順、出来映えを説明出来る工程を作り上げる。

What is Location free?

Ferrite Core process: DSS line (Direct sintering system)

Conventional / 従来 : Process has been separated by different location / 拠点分担

*Raw material process (Ferrite factory) ← → Finishing product (Coil factory)

素材の生産 (フェライト工場) ← → 製品本体 (コイル生産工場)

Future / 今後 : Make integrated process of Raw material and finish goods (Coil) / 素材 / 製品 統合ライン化

• Input: Ferrite powder → Output: Coil (as finish goods)

Target, needed to achieve

1. Strengthen shortening L/T
2. Maximize space efficiency
3. Supply non-defect from front end process

Integrated process of
“Raw material” and “Finish goods”

素材+製品の 一貫統合ライン

Minimized personnel operation
(Monozukuri not depends production location)
最小人員オペレーション (生産場所を選ばないモノづくり)

Highly utilize Man and Robot / 人とロボットの活用

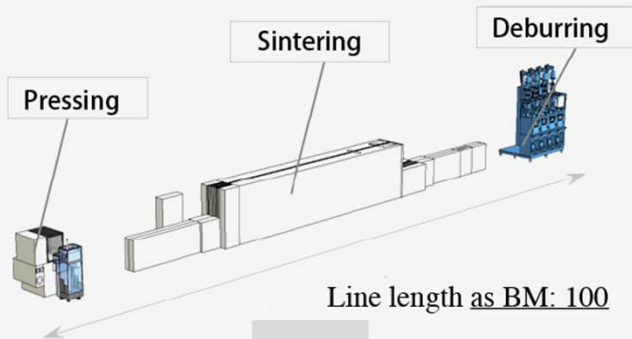
• Conventional Cell line → Man and Robot fusion process / 人とロボットの融合

Target, need to achieve

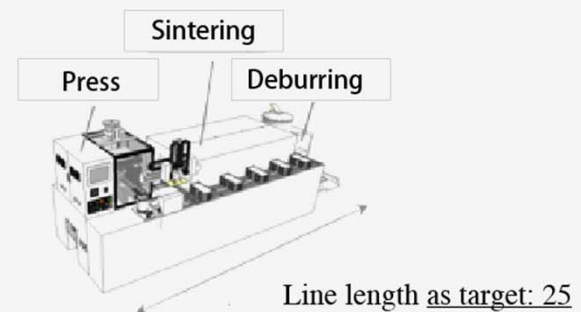
1. Realize versatile Robotization
2. Maximize space efficiency
3. Flexible corresponding production.
4. Maximize productivity of Man and Robot

Advanced Cell line
進化したセルライン

Current process of Ferrite core



DSS (Direct Sintering System) for Ferrite core



Conventional

Ferrite core process in Factory A



100(BM)



Transfer Factory to Factory

Can bus process in Factory B



100(BM)

New



25

45

Line length Target

Effectiveness	Conventional(BM)	New (Target)	Out come
Line length	100	35	65% off
Area	100	20	80% off
Lead time	100	30	70% off
Personnel/ line	100	20	80%off

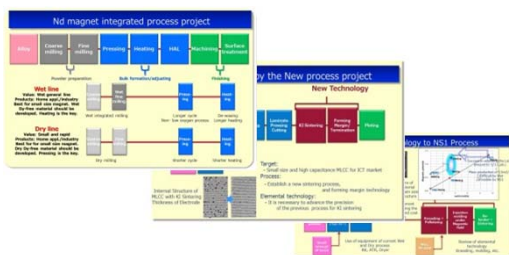
- ◇ Material engineers and process engineers will work together **applying cutting-edge processes negating the status quo to accelerate the development of new products**
- ◇ A dedicated group of process developers will **accelerate process innovation and strengthen core technologies for the entire company**



**Accelerate new product creation
Strengthen Monozukuri process technologies**

■ Accelerate New Product Creation

- ◇ **Form projects** along product commercialization themes for new materials and new processes
- ◇ **Verify new products on the production line with product development** that extends to the trial production line



- Metal magnet (new integrated process)
- MLCC (new integrated process)
- Ferrite magnet (new material, new process) etc.

■ Strengthen Process Technologies

- ◇ Explore core technologies in depth to promote **cutting-edge process innovation negating existing technologies**
- ◇ Strengthen *Monozukuri* and nurture the required human resources for the entire company by upgrading process technology capabilities

- **Process design (IE)** • Material processes • Thin-film technology
- **Coating and printing (R-to-R)** • Thick-film technology
- Molding technology (powder and resin) • Debinding, firing and sintering
- Processing, dicing and flattening • Mounting and packaging • **Surface treatment**
- **Robot application** etc.

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