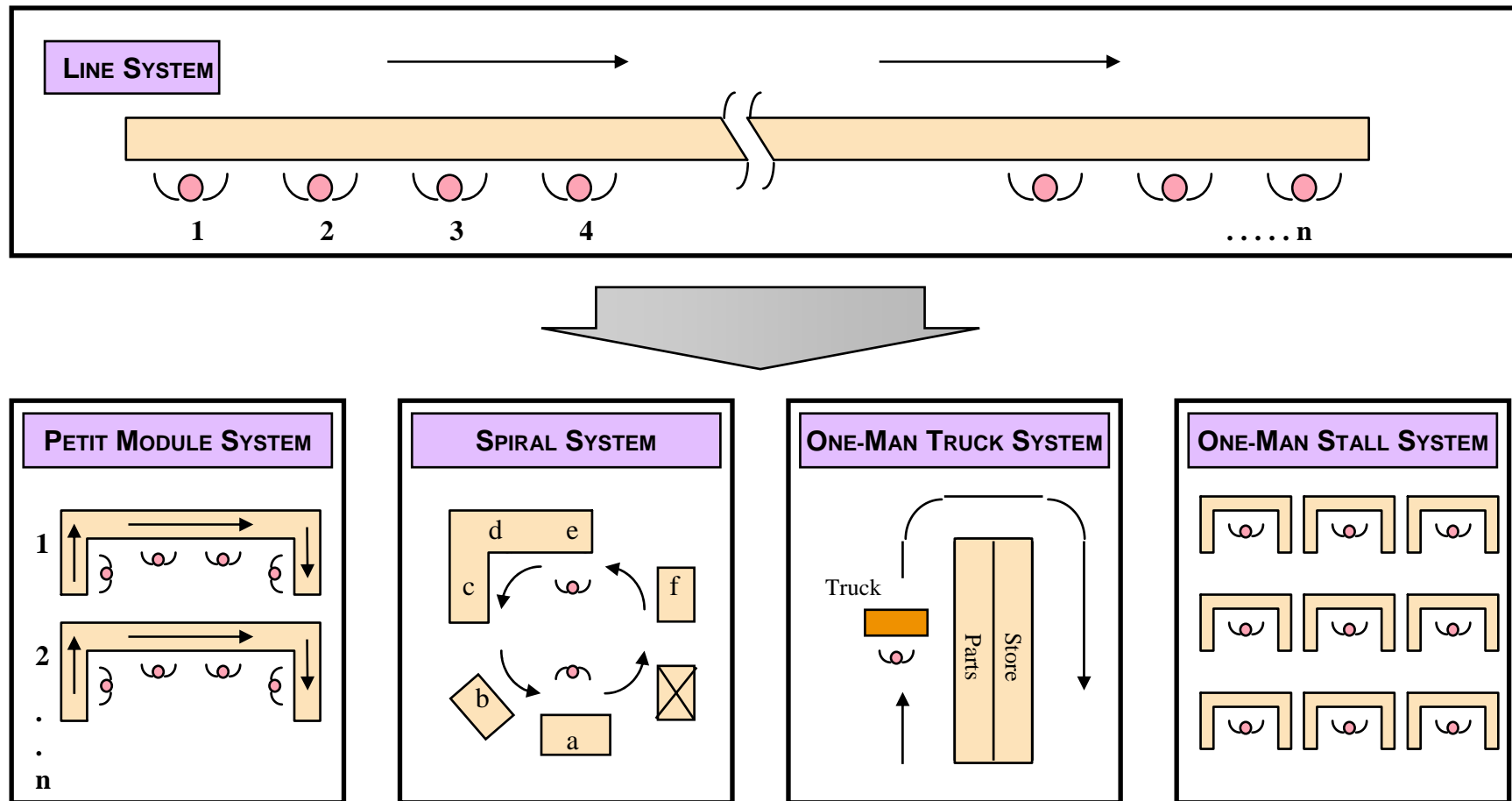


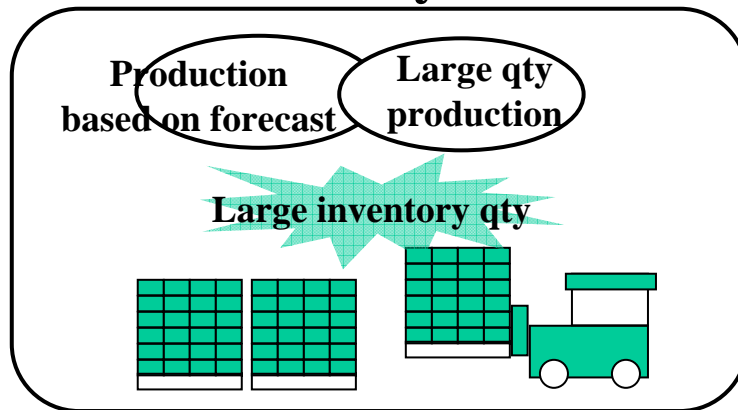
ON DEMAND & LEAN PRODUCTION; CELL SYSTEM



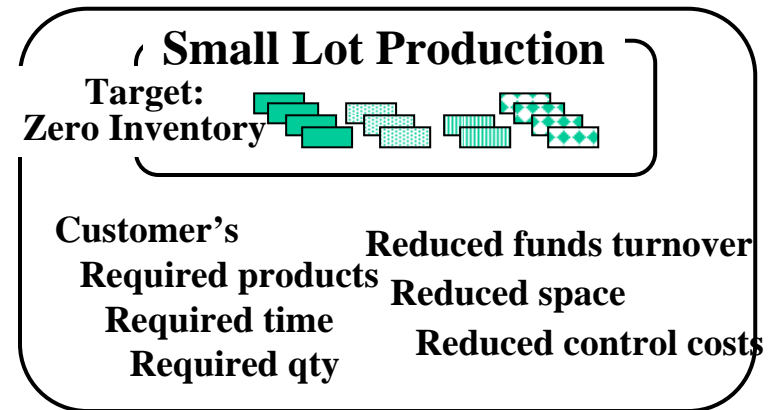
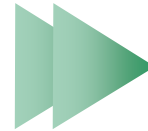
➡ FOR WORKERS' MULTIPLE CAPABILITIES, AUTONOMY AND JOYFUL JOBS

Progress by Production Innovation (1)

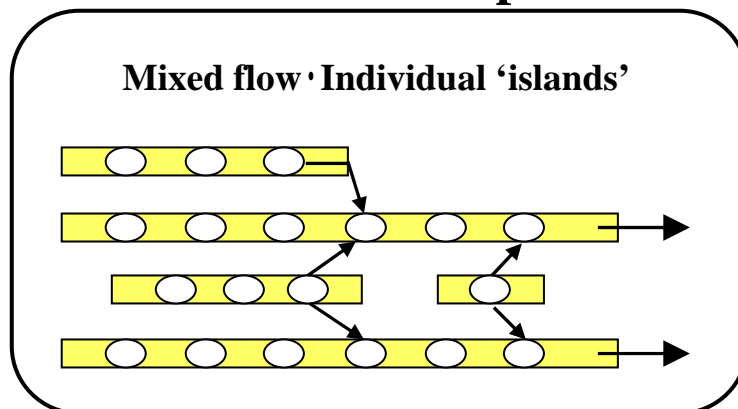
Production style



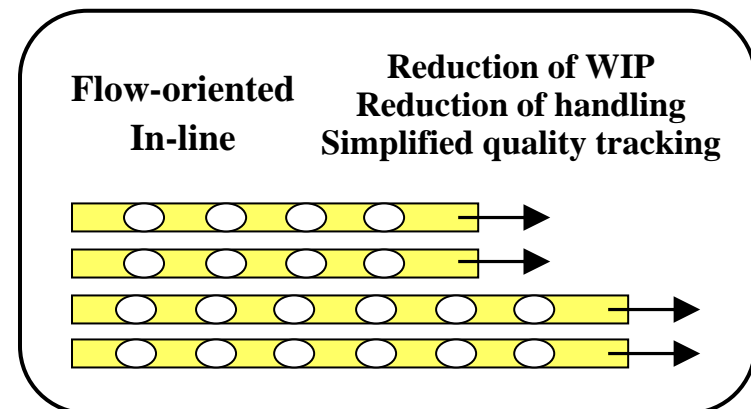
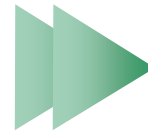
Innovation



Flow-oriented production, information

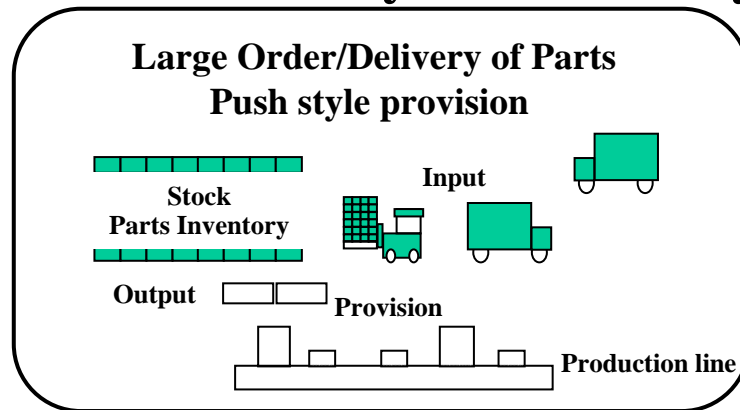


Innovation

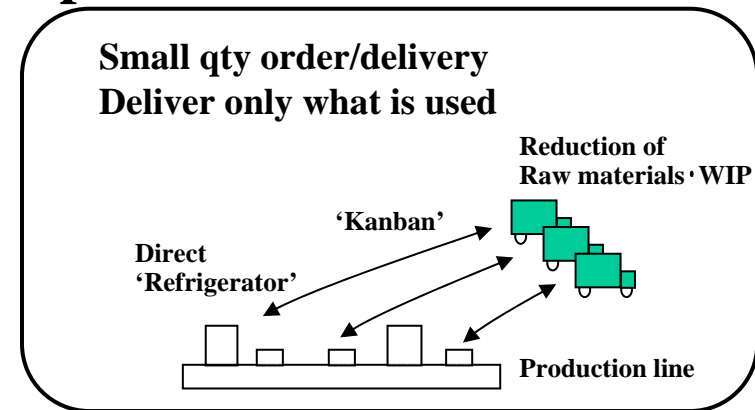


Progress by Production Innovation (2)

Inventory Reduction by Logistic Improvements

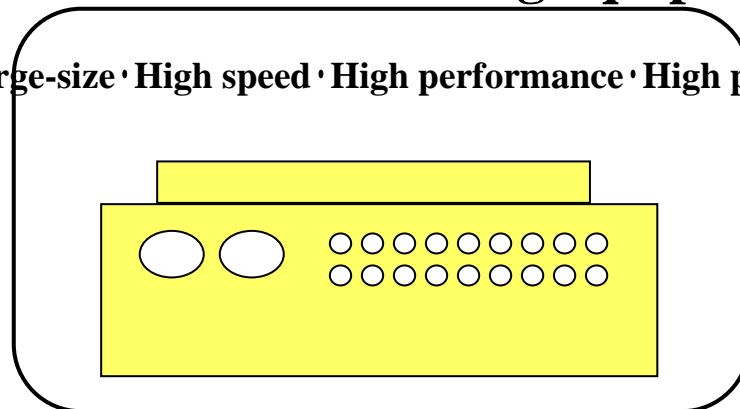


Innovation



Manufacturing equipment

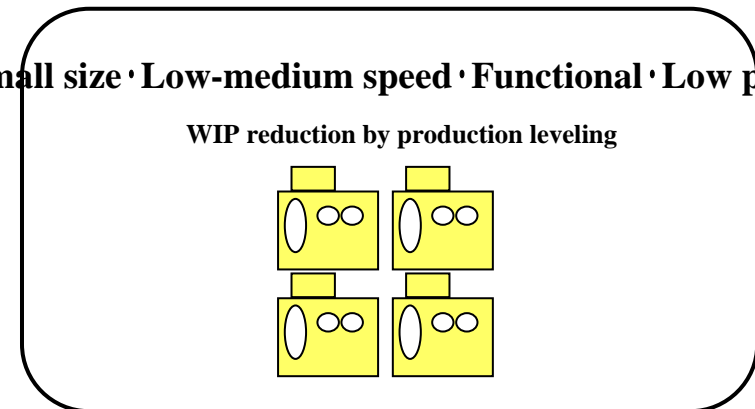
Large-size · High speed · High performance · High price



Innovation



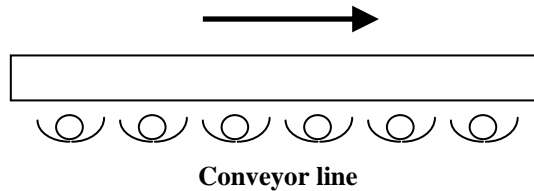
Small size · Low-medium speed · Functional · Low price



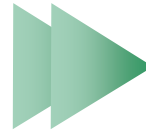
Progress by Production Innovation (3)

From single operation to multi-operation

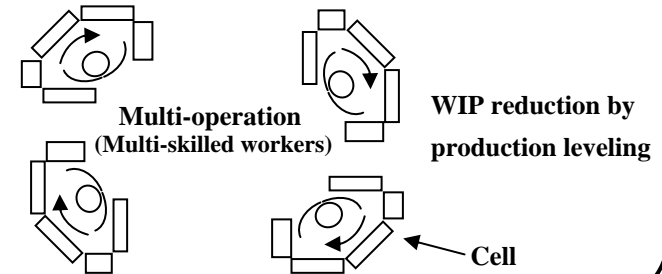
Divided labor conveyor production style
due to single operation



Innovation

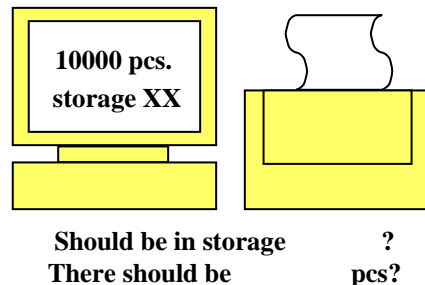


Multi-operation and Cell production method



Control comprehensive for anyone

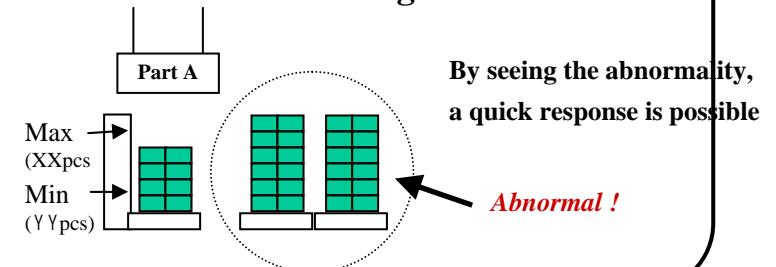
Data management by computer



Innovation



Select&Order · Fixed place · Fixed qty · Fixed marking
Visual management

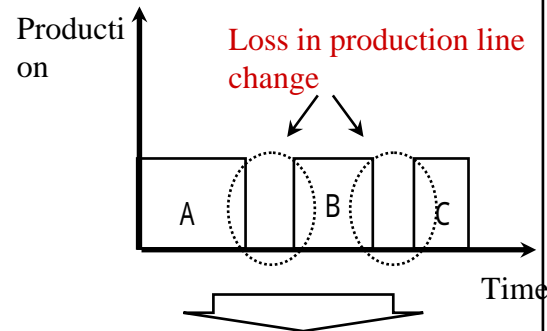


Benefits of Cell Production Method

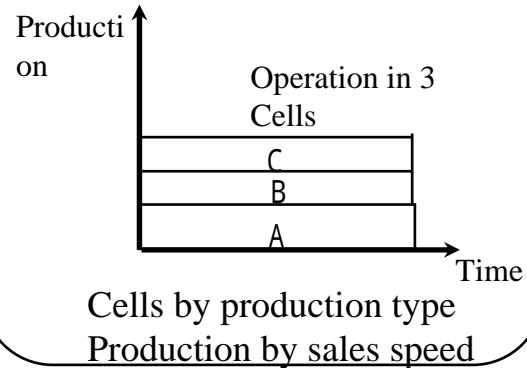
Flexibility Up

Various items

Conveyor line

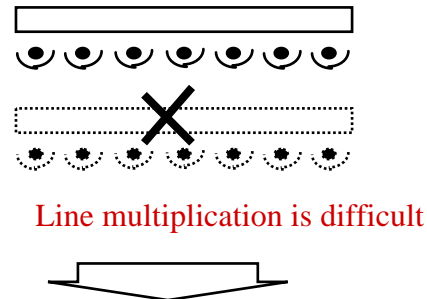


Cell production

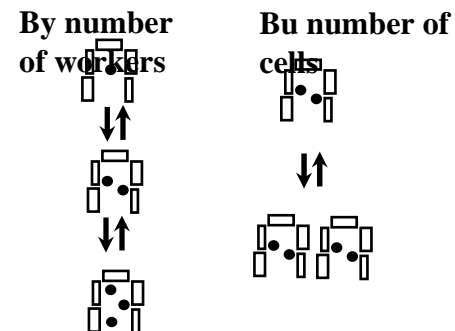


Quantity fluctuation

Conveyor line

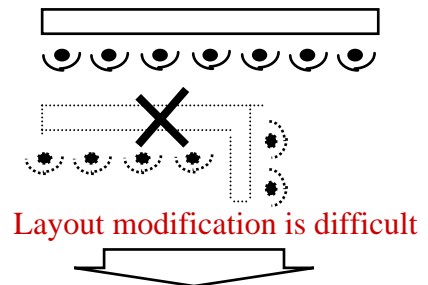


Cell production



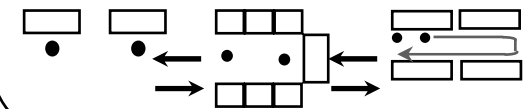
Various layout

Conveyor line



Cell production

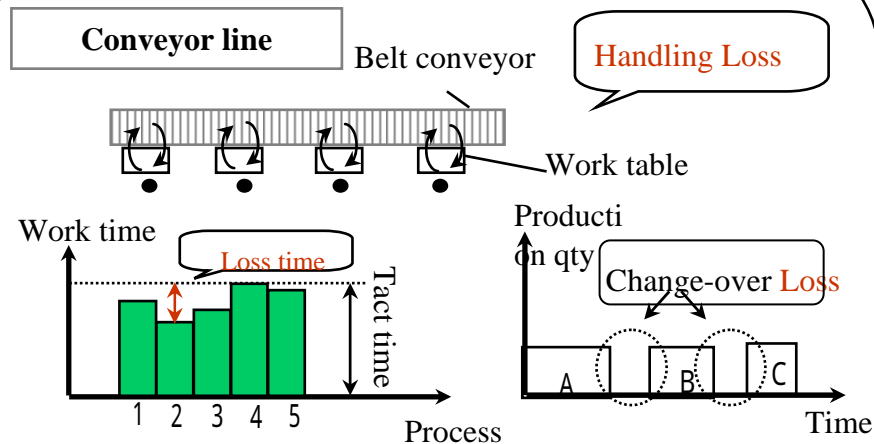
Implementation of various cell types according to products attributes, level of operators, production quantity; layout modifications are possible flexibly



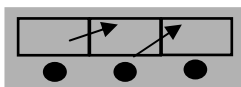
Benefits of Cell Production Method

Manpower · Space reduction

Productivity up manpower reduction



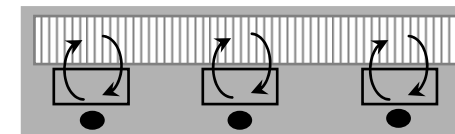
Cell production



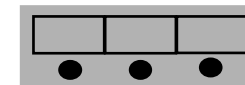
Manpower reduction by elimination of conveyor line loss

Space reduction

Conveyor line



Cell production



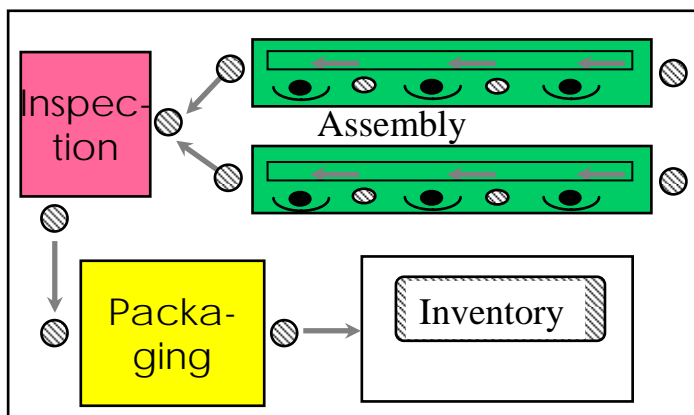
Space reduction by removal of conveyor

Elimination of loss by reducing in-between spaces

Benefits of Cell Production Method

Shortening of production lead time · Inventory reduction · Quality improvement

Conveyor Line

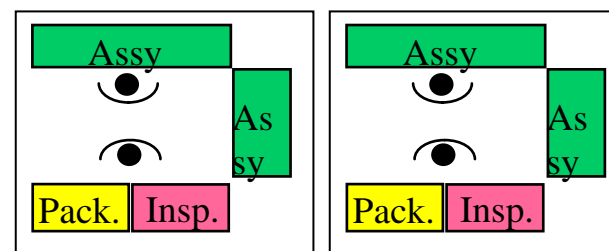


⊗ Stagnation of the products in process
→ Carry

- × Stagnation, transportation loss between or within processes
- × Slow feedback of quality information
- × Unclear responsibility concerning quality

Cell production

Work cell



Reduction of stagnation in processes
Lead time reduction
Reduction of inventory
Fast feedback of quality information
Clear responsibility concerning quality
Quality improvement

➡ **Higher work morale by individual performance**

Basic / Common Muda

3 basic Muda are

- ***Waiting***
- ***Transportation***
- ***Handling***

But the Biggest & "Original" Muda is



... Thus, Production Leveling is important

PI Awareness

Motivated Employee

- **SEE MUDA**
 - *if you can't see, you can't remove it*
- **ACCEPT IT IS A MUDA.**
 - *Stop giving reason why it is necessary*
- **REMOVE MUDA**
 - *Put all energy in removing it, then to justify it*



Drastic Reduction of “Muda”

- *Reduced WIP Inventory*
- *Reduced Processing Cost*
 - *Improved Reliability*

PI Methods

Principles of Kaizen

- E: Eliminate
- C: Combine
- R: Rearrange
- S: Simplify



- ***V: Visual Control***

PI Method

- ***Cell Production***
 - ***Shorten distance***
 - ***Standing Operation***
 - ***Multi-Skill***
 - ***Multi Skill-less***
 - ***Relay Zone***
 - ***Rabbit Chase Production***
- ***Integrated flow (thru-flow)***
 - ***In-line Off-line process***
 - ***Level Production***
- ***Fasting***
 - ***Pulling Method***
 - ***Utilize Kanban***
 - ***Store & Fridge***

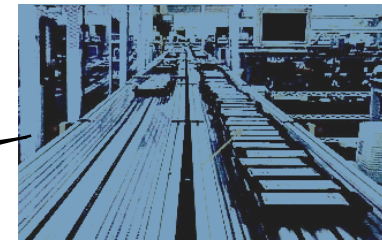
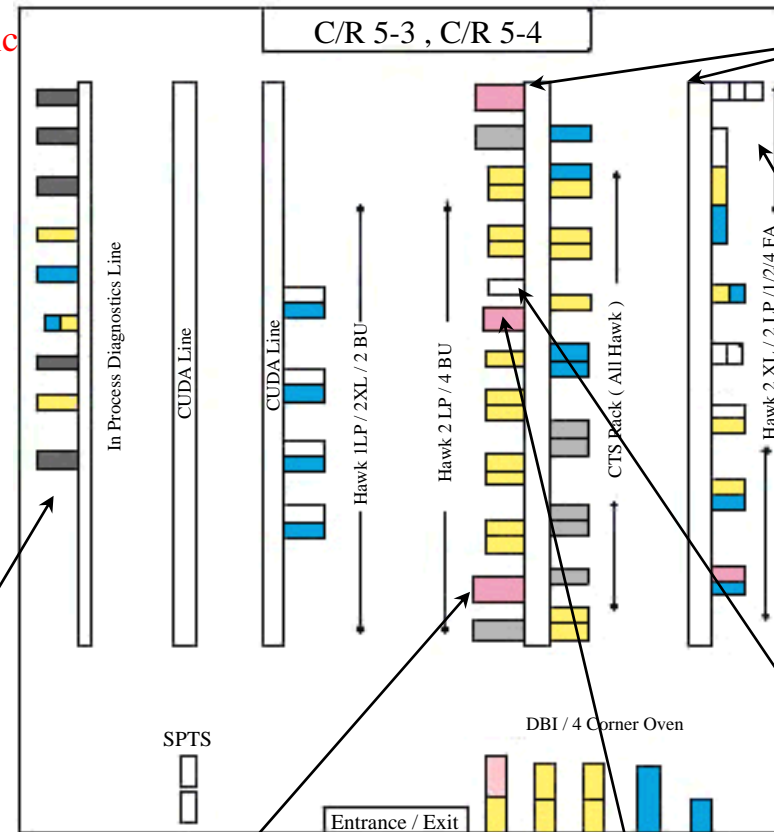
Joint I.E Improvement Project -Before (Sept 98)

Conventional Production System

- Conveyor & Trolley
- Isolated FA, BU & Diagnostic
- Mixed & Complicated Flow

Problem

- High WIP
- Extensive Handling
- Slow Quality Feedback
- High WIP awaiting diagnostic
- No Ownership



1. Conveyor



2. Limited Space



3. High WIP



5. Off-Line Diagnostics



4c. Customer Mode
Sense Arrangement



4b. Sun Cat Arrangement



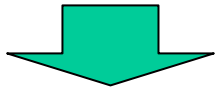
4a. Apple Arrangement



Joint I.E Improvement Project With -Result (Nov 98)

Cellular Manufacturing System (CMS)

- No Conveyor
- Controlled Trolley
- In-Line FA, BU & Diagnostic
- Integrated Flow



Results:

- Manpower Reduction

27% ↓

(70 opr -> 51 opr)

- Space Saving

40% ↓

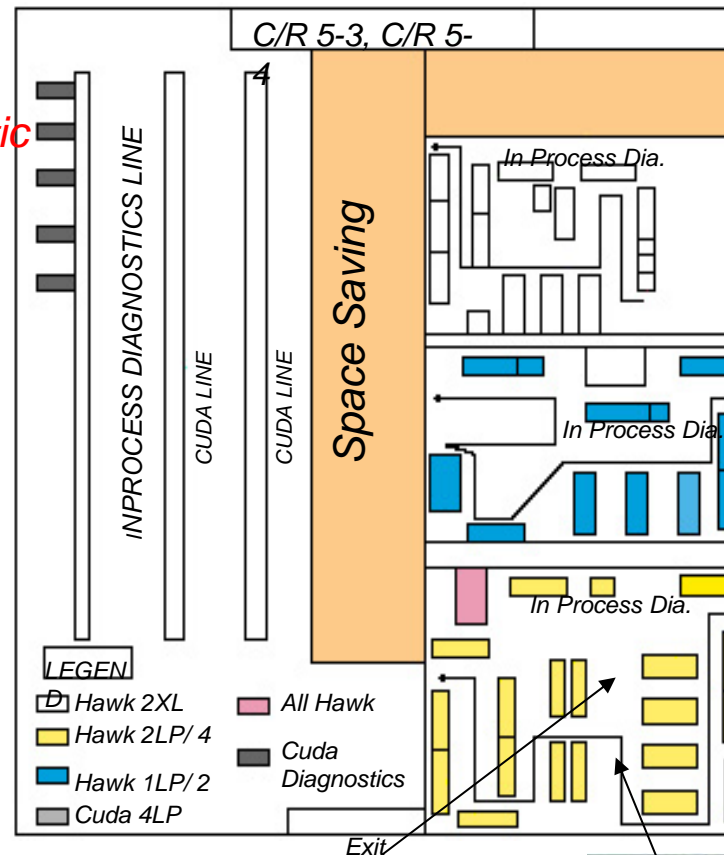
(493 sqm -> 296 sqm)

- Inventory

23% ↓

Intangible Benefits:

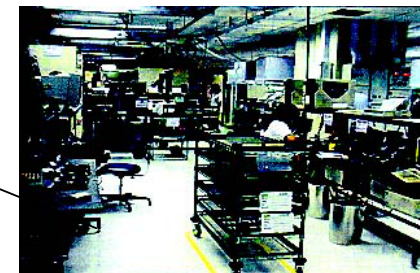
- Prompt Quality Feedback
- Clear Flow
- Product Ownership



1. No Conveyor



2. Better Utilisation Of Space



3. Lower WIP At Stations



5. On Line Diagnostics



4. 3-in-1 Workbench Arrangement