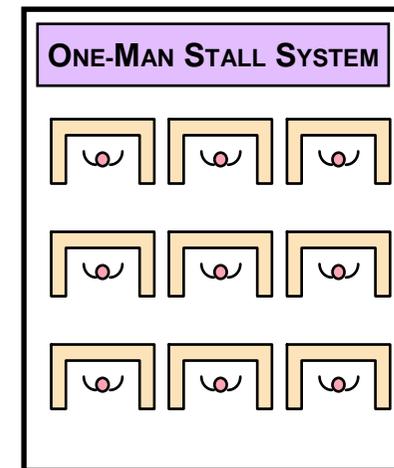
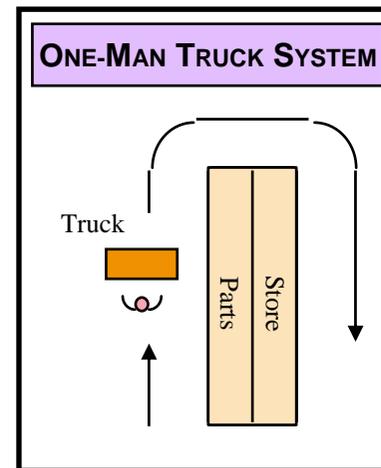
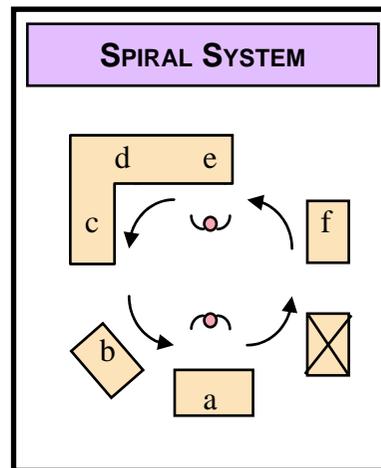
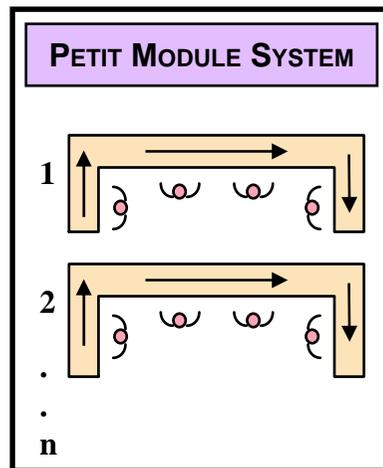
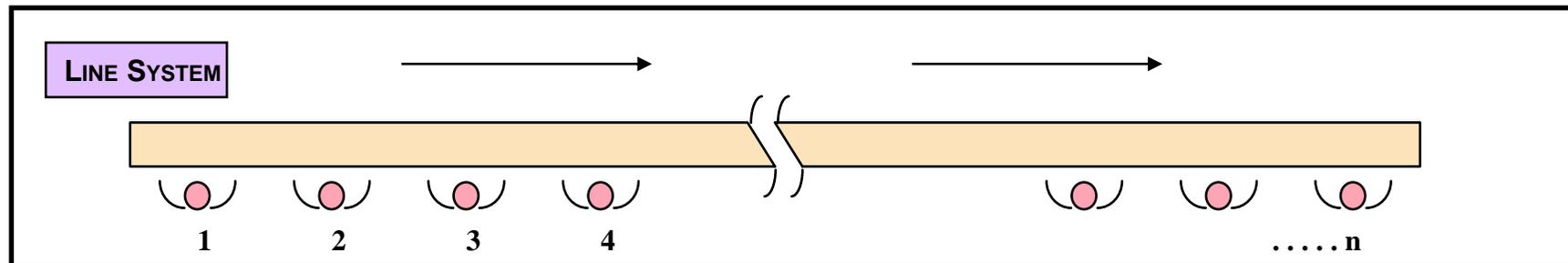


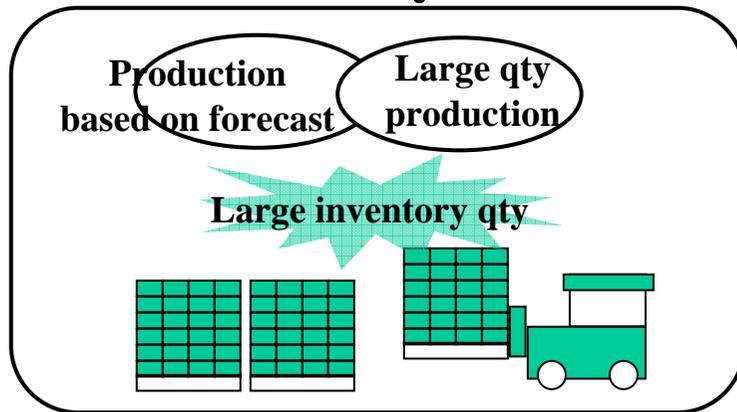
# ON DEMAND & LEAN PRODUCTION; CELL SYSTEM



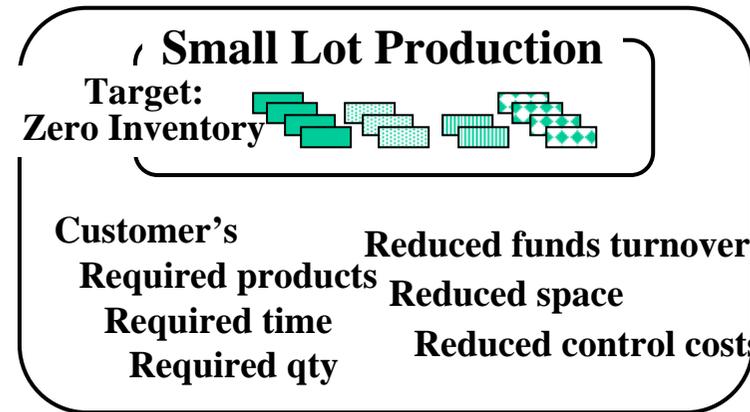
**➔ FOR WORKERS' MULTIPLE CAPABILITIES, AUTONOMY AND JOYFUL JOBS**

# Progress by Production Innovation (1)

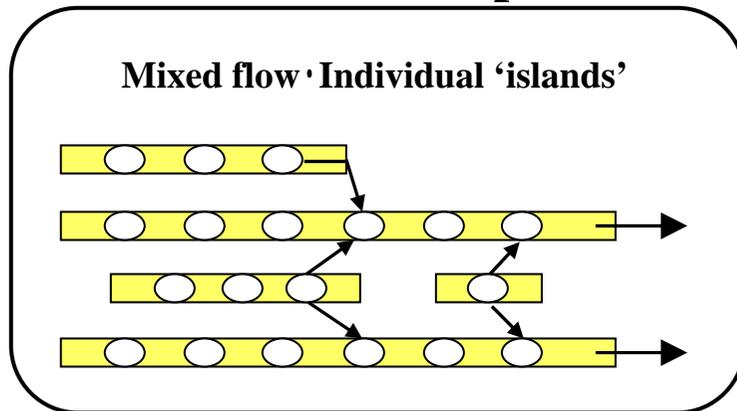
## Production style



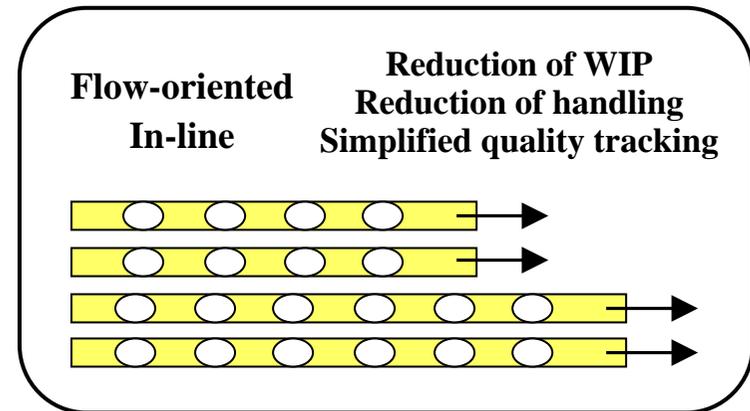
Innovation



## Flow-oriented production, information

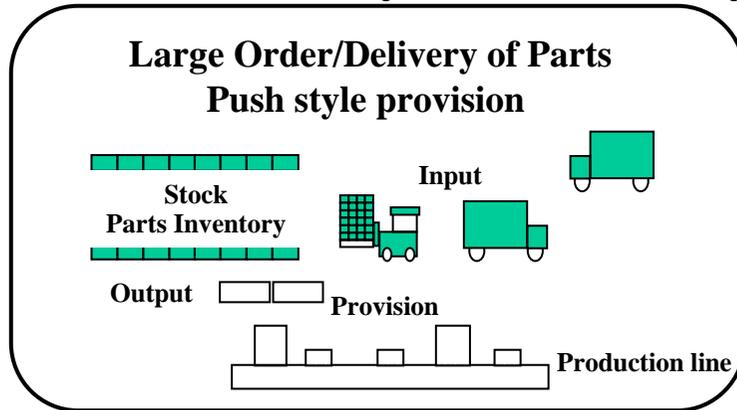


Innovation

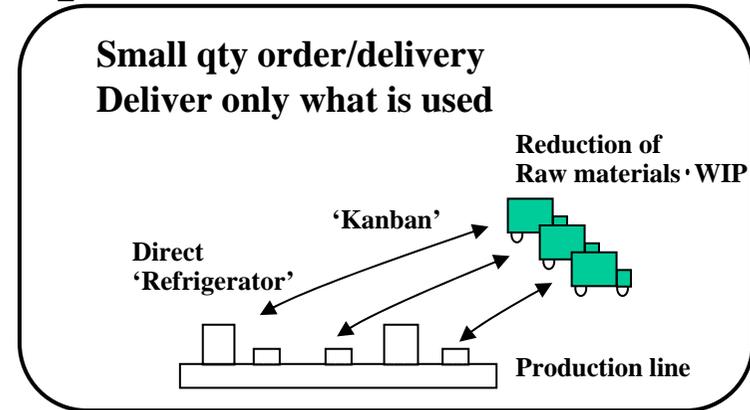
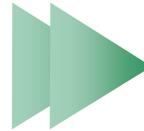


# Progress by Production Innovation (2)

## Inventory Reduction by Logistic Improvements

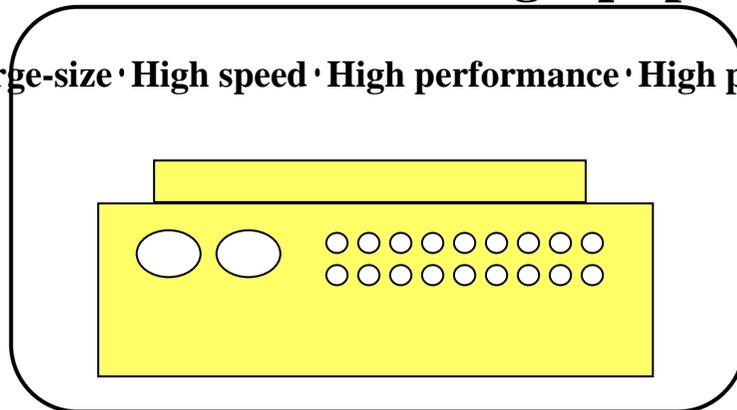


Innovation



## Manufacturing equipment

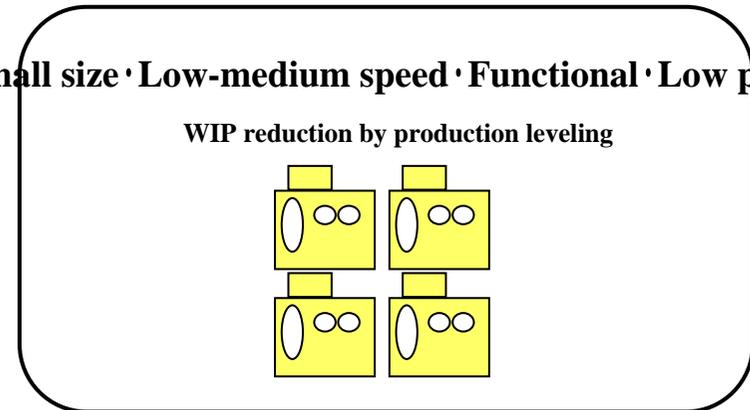
Large-size · High speed · High performance · High price



Innovation



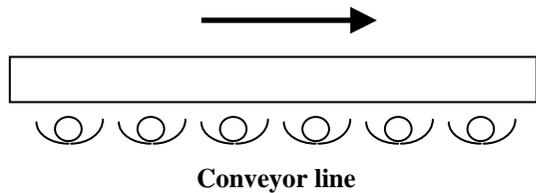
Small size · Low-medium speed · Functional · Low price



# Progress by Production Innovation (3)

## From single operation to multi-operation

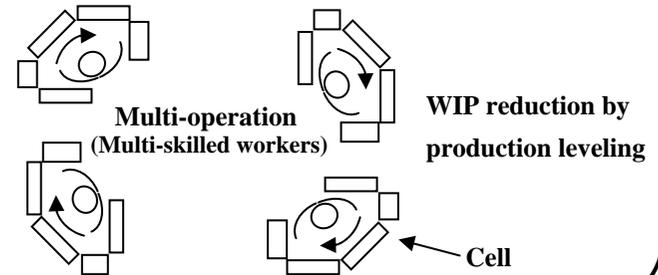
Divided labor conveyor production style  
due to single operation



Innovation

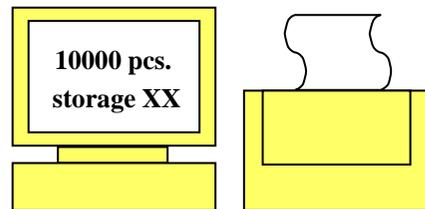


Multi-operation and Cell production method



## Control comprehensive for anyone

Data management by computer



Should be in storage  
There should be

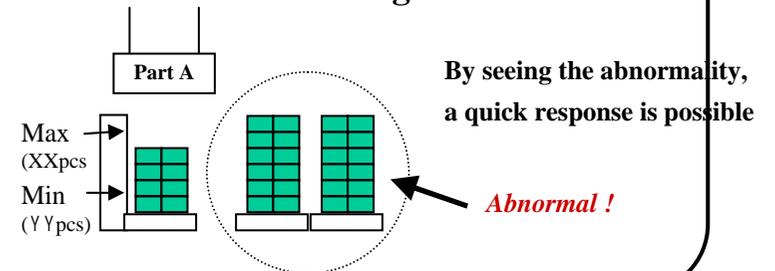
?

pcs?

Innovation



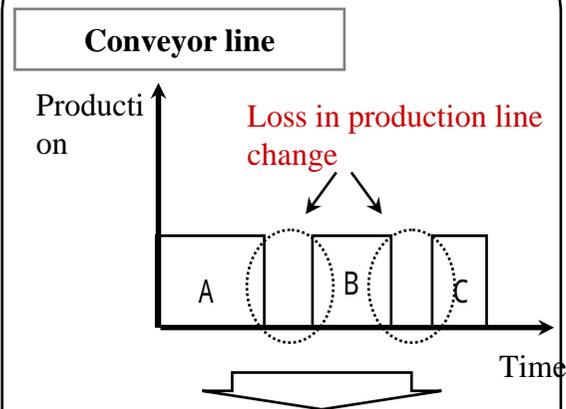
Select&Order · Fixed place · Fixed qty · Fixed marking  
Visual management



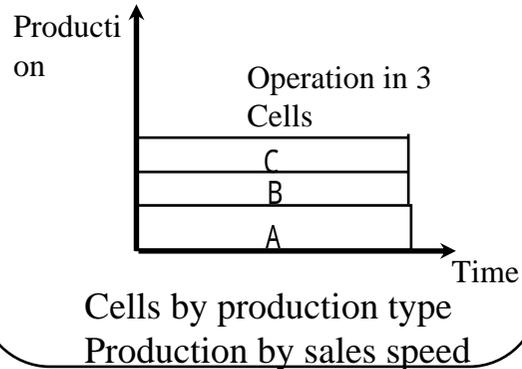
# Benefits of Cell Production Method

## Flexibility Up

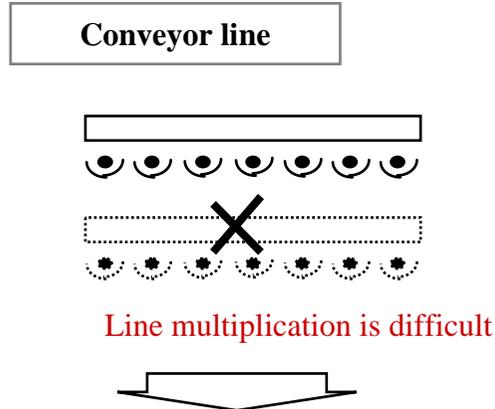
### Various items



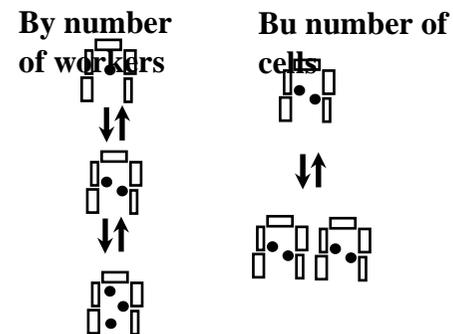
### Cell production



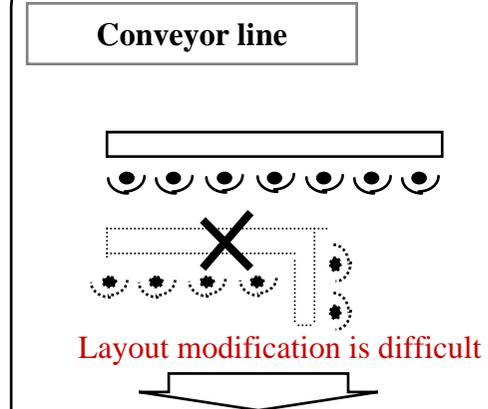
### Quantity fluctuation



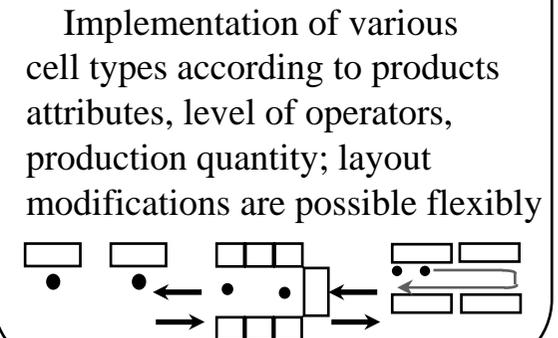
### Cell production



### Various layout



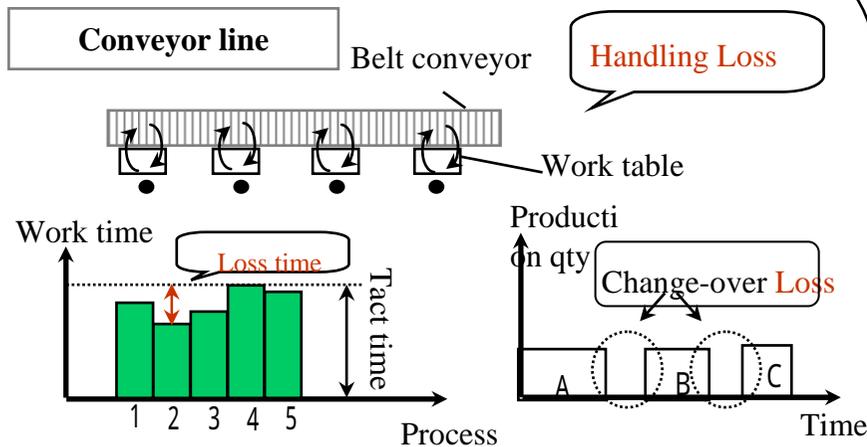
### Cell production



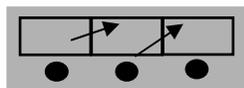
# Benefits of Cell Production Method

## Manpower · Space reduction

### Productivity up manpower reduction

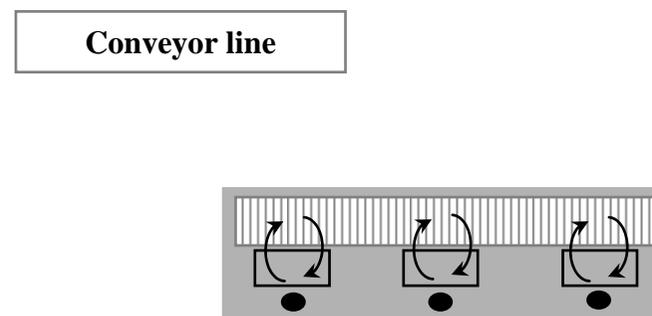


### Cell production



Manpower reduction by elimination of conveyor line loss

### Space reduction



### Cell production



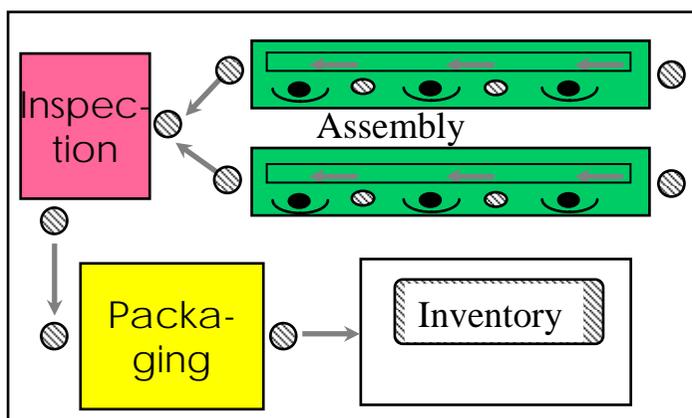
Space reduction by removal of conveyor

Elimination of loss by reducing in-between spaces

# Benefits of Cell Production Method

Shortening of production lead time · Inventory reduction · Quality improvement

Conveyor Line

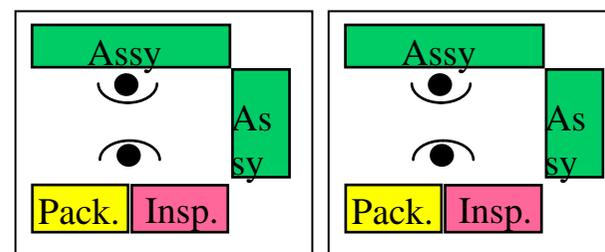


⊗ Stagnation of the products in process  
 → Carry

- × 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***

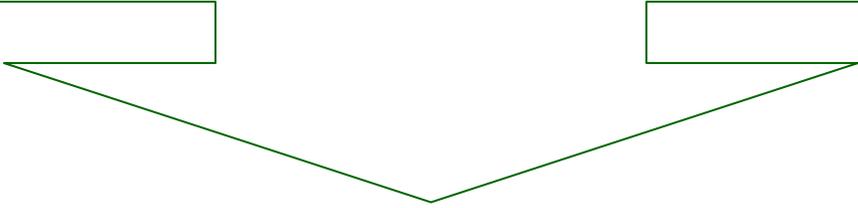


***... Thus, Production Leveling is important***

# 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*



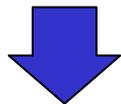
## **Drastic Reduction of “Muda”**

- *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*

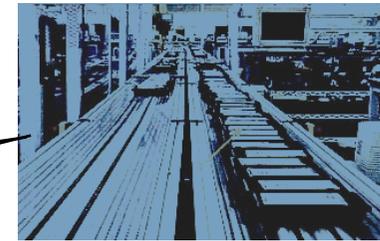
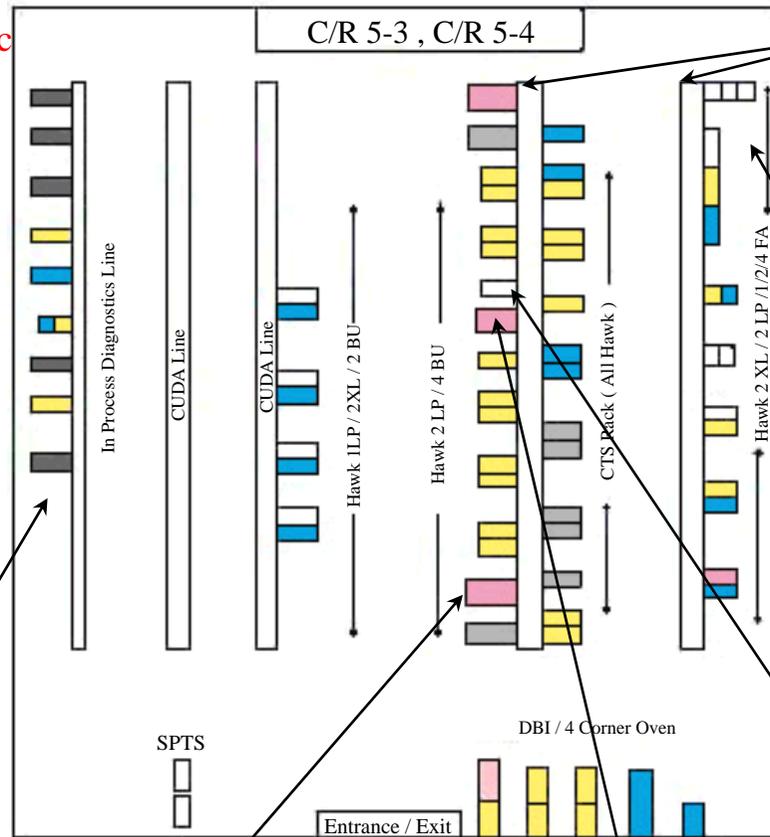
# Joint I.E Improvement Project -Before (Sept 98)

## Conventional Production System

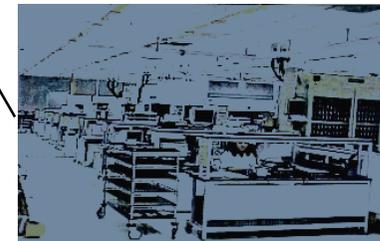
- Conveyor & Trolley
- Isolated FA, BU & Diagnostic
- Mixed & Complicated Flow

### Problem

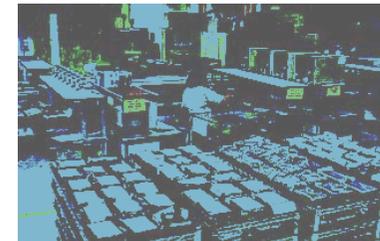
- High WIP
- Extensive Handling
- Slow Quality Feedback
- High WIP awaiting diagnostic
- No Ownership



1. Conveyor



2. Limited Space



3. High WIP



5. Off-Line Diagnostics



4c. Customer Mode Sense Arrangement



4b. Sun Cat Arrangement



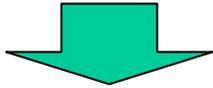
4a. Apple Arrangement



# 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%** ↓

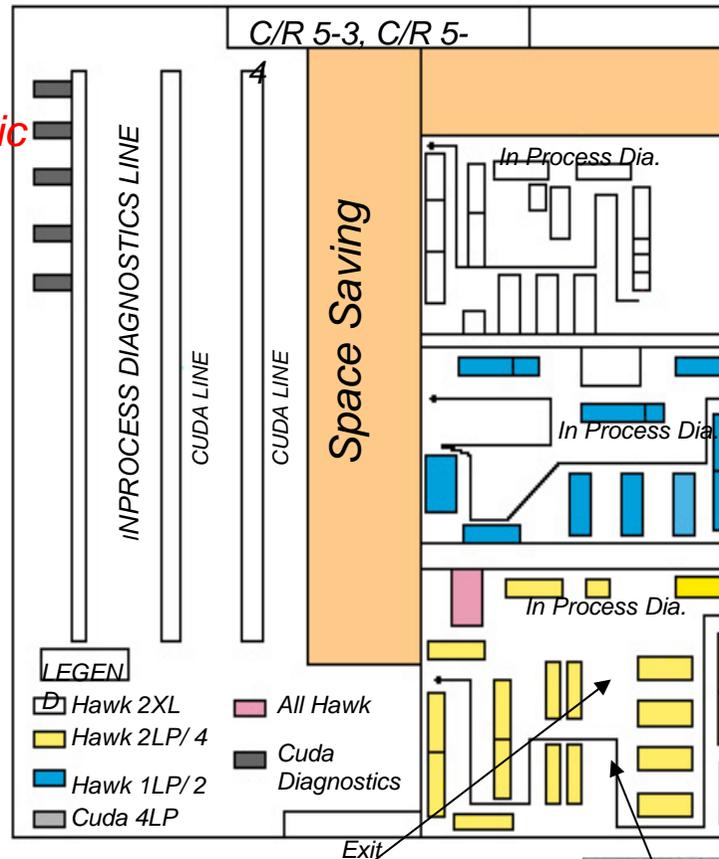
(493 sqm -> 296 sqm)

- 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