ITS (Information Tracking System)

PCB Manufacturing Process Solution Package by JSSystem
I. Company

01 Company Information
02 Organization Chart
03 Solution & Reference Site
## Company Information

<table>
<thead>
<tr>
<th>Company Name</th>
<th>JS-SYSTEM.Co.Ltd</th>
<th>President&amp;CEO</th>
<th>Sang-do Lee</th>
</tr>
</thead>
</table>
| **Address**           | 443-470, FamilyTpwer1110, Yeongtong-dong, Yeongtong-gu, Suwonsi, Gyeonggi-do, Korea  
702-845, Taejin B/D, 1638 Sangyeok 2 Dong, Daegu, Korea |
| **E-Mail**            | jss@js-system.co.kr | Tel.          | 053-943-0154 |
| **Business Registration No.** | 503-81-66460 | Fax.          | 053-943-0156 |
| **Incorporated**      | March 18, 2003   | Number of employee | 20  
capital stock | 150,000,000 ₩ |
| **Business**          | SPC System, MES/POP System, Machine Vision System |
Organization Chart

CEO

USN Dept.
- U2P FA
- Wireless Business
- U2L LED
- Wireless Business

S/W 1 Team
- MES/POP
- Mobile P/G

S/W 2 Team
- SPC System
- Machine Vision System
- Monitoring & Analysis

Research Institute
- Inspect Machine
- INspect P/G
- technical support

Planning Dept.
- System Consulting
- technical support

Employee Table

<table>
<thead>
<tr>
<th>Employee</th>
<th>Superior technician</th>
<th>High technician</th>
<th>Intermediate technician</th>
<th>Low technician</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>7</td>
<td>20</td>
</tr>
</tbody>
</table>
SPC System

Stands for Statistical Process Control and is a system to effectively manage processes using statistical method to manufacture products meeting quality standards

- Optimization of quality-related work & redistribution of time and resources
- Keeping of quality data records & automation of related works
- Real-time monitoring & reliability enhancement
- Immediate analysis & response to field feedback
- Quality certification / response to laws and regulations & enhancement of internal, external competitiveness
- Analysis of the correlation of process management data in connection with existing systems

**Countermeasures**

- Establish a process change management system
- Manage cause variables affecting outcomes
- Activate SPC system
- Respond to changes in customers’ demand promptly

**Establishment of management system**

- Establish a Critical to Quality (CTQ) management system
- Identify cause variables for management & establish management standards
- Establish a prompt, accurate data gathering system
- Manage the progress of corrective measures
- Establish a continuous quality improvement system

**Customer demand**

- Reduce quality variations
- Enhance quality competitiveness compared with other competitors
- Strengthen SPC management system
- Prevent the recurrence of quality problems
- Track and monitor data

**Realization of information-based systems**

- Real-time monitoring system
- Cause variable tracking and monitoring system
- Cause and effect analysis system
- Corrective measures monitoring and history management system

**Customer demand**

- Reduce quality variations
- Enhance quality competitiveness compared with other competitors
- Strengthen SPC management system
- Prevent the recurrence of quality problems
- Track and monitor data

**Realization of information-based systems**

- Real-time monitoring system
- Cause variable tracking and monitoring system
- Cause and effect analysis system
- Corrective measures monitoring and history management system
<table>
<thead>
<tr>
<th>Reference Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWASEUNG T&amp;C SPC &amp; Monitoring SYSTEM</td>
</tr>
<tr>
<td>LG SILTRON SPC SYSTEM</td>
</tr>
<tr>
<td>SAMSUNG SQC Data Analysis SYSTEM</td>
</tr>
<tr>
<td>THN Data Gathering &amp; SPC System</td>
</tr>
<tr>
<td>SAMSUNG ELECTRO-MECHANICS FCB Data Gathering System</td>
</tr>
<tr>
<td>SAMSUNG ELECTRO-MECHANICS PCB Reliability Data Gathering &amp; SPC System</td>
</tr>
<tr>
<td>DAEYANG KOREA Precision Motor Line SPC System</td>
</tr>
<tr>
<td>DAEYANG HANOI Precision Motor Line SPC System</td>
</tr>
<tr>
<td>Patron SPC System</td>
</tr>
<tr>
<td>innochipTechnology SPC System</td>
</tr>
<tr>
<td>SAMSUNG ELECTRO-MECHANICS SPC Plus System</td>
</tr>
<tr>
<td>SAMSUNG ELECTRO-MECHANICS SMES System</td>
</tr>
</tbody>
</table>
It is an essential element for modern automation concept such as CIM. It also provides flexibility corresponding to FMS, in other words, with simple modifications in software, it can immediately respond to various requirements of the current manufacturing environment where fast model changes are made through multi-product, small-lot-sized production. Abundant production information can be provided which is needed for production management, process management and Line Monitoring System (LMS). It will deliver Just-In-Time (JIT) by interfacing PLC which is the core of FA.

Convenient Inspection
- Convenient operating environment: single inspection screen and minimal control buttons
- Bad image storage / spot checking & monitoring function
- Inspection level adjustment function

UI
- Automatic checking of corrective measures for errors
- Setting up of minimum/maximum value for abnormal standards
- Real-time monitoring function

Real Time analysis/Alarm System
- Gathering of measured data/ diagramming and charting / CL management
- Alerts for abnormalities -> immediate response ability

Enhanced data reliability through direct data interface SPC
Foundation for accurate analysis in systems including SPC and POP
### Solution & Reference Site

#### Reference Site

<table>
<thead>
<tr>
<th>Company</th>
<th>System/Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAMSUNG ELECTRO-MECHANICS ITS</td>
<td>THN Fuse Inspect System</td>
</tr>
<tr>
<td>SIMMTECH ITS (Information Tracking System)</td>
<td>TSR Inspect System</td>
</tr>
<tr>
<td>WOOJIN INDUSTRY SMT Reel Swap Error Protect System</td>
<td>HWASEUNG T&amp;C X-Data Monitoring SYSTEM</td>
</tr>
<tr>
<td>UNITRON SMD Reel Swap Error Protect System</td>
<td>THN J-BOX CM Fuse Vision Inspect System</td>
</tr>
<tr>
<td>SAMSUNG ELECTRO-MECHANICS SMT Reel Swap Error Protect System</td>
<td>THN China J-BOX Fuse Vision Inspect System</td>
</tr>
<tr>
<td>HWASEUNG T&amp;C Brake Hose Inspection SYSTEM</td>
<td>KoreaHighTech SMD Reel Swap Error Protect System</td>
</tr>
<tr>
<td>HWASEUNG T&amp;C High Tension Hose PP Extrusion Inspection &amp; SPC SYSTEM</td>
<td>LSU F-Theta Lens Inspect Machine</td>
</tr>
</tbody>
</table>
It is a system which can monitor and control production and distribution flows effectively and economically, collect work in progress (WIP) and production information of processes, and create a database with the information. By monitoring processes on a real time basis, immediately responding to abnormalities and centrally controlling them, it can maximize the reliability of the company.

**Realtime Monitoring**
- Real-time monitoring and record-keeping of measured data and inspection data
- Monitoring of WIP and production information of processes
- Handling and monitoring of NG and SPEC information

**Control and Data History**
- Establishment of a database consisting of operation status and status history of each facility
- Immediate support and feedback from field

- Integrated, consolidated central controls
- Management of production progress through real-time management
<table>
<thead>
<tr>
<th>Reference Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSCO COG Leak Wireless Monitoring System</td>
</tr>
<tr>
<td>LG SILTRON BCR Server System</td>
</tr>
<tr>
<td>SAMSUNG ELECTRO-MECHANICS MLCC OPC SYSTEM (Suwon, Tianjin, Philippines)</td>
</tr>
<tr>
<td>SAMSUNG ELECTRO-MECHANICS Substrate Cognition &amp; Monitoring System</td>
</tr>
<tr>
<td>SL Surface &amp; Injection Molding Monitoring System</td>
</tr>
<tr>
<td>LG SILTRON Factory 2 B2 Line BCR Server System</td>
</tr>
<tr>
<td>POSCO Punching Press Control &amp; Monitoring System</td>
</tr>
<tr>
<td>DOORETECH Aging Simulation System</td>
</tr>
<tr>
<td>S-MAC Sample Management System</td>
</tr>
<tr>
<td>SDT Vending Machine Wireless Monitoring System</td>
</tr>
</tbody>
</table>
ITS (Information Tracking System)

Solution & Reference Site

MES/POP System

It is a real-time point of production and manufacturing management system, and a solution to monitor real-time production status information (such as performance vs. plan, stock, WIP, supply, quality and facility operation) of each line and process by, through a network, enabling real-time gathering, compiling and inquiring of all information and data generated during production based on production plan and work order.

- Immediate feedback on abnormalities through monitoring by work order
- Purchase order release and order inquiry by buyer
- Provision of operating rate and productivity data of facilities
- Provision of productivity analysis on manhours
- Sales order/ input materials by lot/ tracking of component history
- History tracking function such as work history by process
- Management of working conditions and quality standards by process
- Comprehensive analysis information such as performance vs. plan, achievement rate, operating rate and failure rate
- User-defined reporting function
- Real-time process management-100% identification and controlling of dynamic status of job sites
- Enablement of accurate management and visible data and creation of production performance and standard data DB
<table>
<thead>
<tr>
<th>Reference Site</th>
<th>Reference Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSR Factory2 POP System</td>
<td>THN POP System</td>
</tr>
<tr>
<td>INNOCHIPS TECHNOLOGY POP/SPC System</td>
<td>SAE-A POLYMER POP System</td>
</tr>
<tr>
<td>SAE-A INDUSTRY POP System</td>
<td>SEMYOUNG POP System</td>
</tr>
<tr>
<td>PARTRON POP System</td>
<td>Korea M&amp;C POP System</td>
</tr>
</tbody>
</table>
II. System Target and Scope

01 ITS Overview
02 H/W Configuration
03 S/W Configuration
04 System Process Flow
05 ITS Operation Strategy
ITS (Information Tracking System)

01 ITS Overview

- 2D Barcode hallmark and automatic LOT recognition
  Necessity of circuit board LOT real-time information management and process control the within process

- Necessity of major data provided to customers
  Provide cell information only without any marks—such as scratch in defect cells—to marking systems or data provided to customers

- Necessity of PCB Auto Gathering & Process Control System development
  From LOT of 1 Stacker units with LOT of 1Panel units changes

Important Data managements of process
Lot inspect information and data computerization of process customer reliability maximization
Systematization and optimization of production process
ITS Overview

- 2D Barcode hallmark of Lot management
- LOT unit of VRS is optimized for the BCL information automatically collect information
- AOI-AFVI equipment Strip Data interlock
- BCL information Edit and view
- BCL Information connection which is a shipping objective item and end result file creation
- BCL information diagrams which are Panel Strip Each and it is appeared
  (BCL information Location and contents immediate it is confirmed)
- Defect Info. automatically summary and display detail defect info.
- Lot Inspection report and the result report
- Client File FTP transfer and history management
ITS (Information Tracking System)

H/W Configuration

2D Barcode imprint
AOI
VRS
AFVI
VRS
Soldering
Laser Marking
Final Inspection

Backbone

Customer

TCP/IP

Gathering PC

ITS Server
S/W Configuration

ITS (Information Tracking System)

   - History of gathering
   - Error history of gathering

2. BCL Gathering
   - Data send a customer
   - Analysis report of Defects, Defects worst, Defects of panel, Defects of process
   - Auto Gathering, VOI-AFVI Data interlock, Marking Data interlock
   - LOT BCL card, Edit history of BCL

3. Report
   - Processes Registration, Eqp. Group Registration, Management PC for Eqp. Registration, Management PC for Gathering PC Registration

4. User Management
   - User Registration, User Authority Registration
   - User Program Registration
   - Standard Info. for Management Code Registration
   - Defects Registration, Interest Defects Registration

5. Eqp. Management
   - Standard Management
   - Defect Management

6. Defect Management
   - Process Management

7. Customer Send
   - Data Send
## ITS Process Flow

<table>
<thead>
<tr>
<th>Process Flow</th>
<th>이미지</th>
<th>내용</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AOI/VRS (Inner layer)</strong></td>
<td><img src="image1.png" alt="Image" /></td>
<td>- Hole display for AOI defect point</td>
</tr>
<tr>
<td><strong>Stacking</strong></td>
<td><img src="image2.png" alt="Image" /></td>
<td>- UV Laser penetration imprint (@PNL Edge 2ea/PNL)</td>
</tr>
<tr>
<td><strong>Stacking</strong></td>
<td><img src="image3.png" alt="Image" /></td>
<td>- Lot # + PNL #</td>
</tr>
<tr>
<td><strong>PNL penetration imprint</strong></td>
<td><img src="image4.png" alt="Image" /></td>
<td>- UV Laser penetration imprint (@PNL Edge 2ea/PNL)</td>
</tr>
<tr>
<td><strong>AOI/VRS (Outer layer)</strong></td>
<td><img src="image5.png" alt="Image" /></td>
<td>- Lot # + PNL # + Strip info.</td>
</tr>
<tr>
<td><strong>AOI/VRS (Outer layer)</strong></td>
<td><img src="image6.png" alt="Image" /></td>
<td>- Design change (@ 2D imprint)</td>
</tr>
<tr>
<td><strong>SR 2D barcode imprint</strong></td>
<td><img src="image7.png" alt="Image" /></td>
<td>- CO2 imprint (@ Strip Edge 2ea/Strip)</td>
</tr>
<tr>
<td><strong>SR 2D barcode imprint</strong></td>
<td><img src="image8.png" alt="Image" /></td>
<td>- Lot # + PNL # + Strip info.</td>
</tr>
<tr>
<td><strong>SR 2D barcode imprint</strong></td>
<td><img src="image9.png" alt="Image" /></td>
<td>- Design change (@ 2D imprint)</td>
</tr>
<tr>
<td><strong>Router</strong></td>
<td><img src="image10.png" alt="Image" /></td>
<td>- Existence 2D barcode by strip</td>
</tr>
<tr>
<td><strong>AFVI/VRS/FVI</strong></td>
<td><img src="image11.png" alt="Image" /></td>
<td>- Strip recognition (2D) + Defects info. (to Server)</td>
</tr>
<tr>
<td><strong>AFVI/VRS/FVI</strong></td>
<td><img src="image12.png" alt="Image" /></td>
<td>- Defects info. Strip + Defect unit + Defect name</td>
</tr>
<tr>
<td><strong>AFVI/VRS/FVI</strong></td>
<td><img src="image13.png" alt="Image" /></td>
<td>- Outsourcing : DB Server Port Open</td>
</tr>
<tr>
<td><strong>Laser Marking</strong></td>
<td><img src="image14.png" alt="Image" /></td>
<td>- Strip recognition (2D) + Defect info. acquisition</td>
</tr>
<tr>
<td><strong>Laser Marking</strong></td>
<td><img src="image15.png" alt="Image" /></td>
<td>- X- out Marking (Laser)</td>
</tr>
<tr>
<td><strong>OQA</strong></td>
<td><img src="image16.png" alt="Image" /></td>
<td>Strip recognition (2D, Sampling) + Compare real defects and defect info. + Decision (to Server)</td>
</tr>
</tbody>
</table>

**Notes:**
- Working Panel (415 x 515mm)
- **Data input**
- **Defect location Info.**
- **Marking result**
- **Marking/defects Info.**
- **Comparison/Decision result**
04

Nomal Process Flow

ITS (Information Tracking System)

1. Barcode imprint
   - PNL
   - LOT/Panel No., UV Laser

2. Drill
3. Cu
4. Inner layer circuit
5. Inner layer AOI
6. Stacking

- Diamond shape hole

7. Barcode imprint
8. Lot/pnl 정보
9. SR
10. Gilding
11. Outer layer circuit
12. Outer AOI
13. Router

- Good/Bad Mapping

14. 2D AFVI
   - Good/Bad Mapping
   - FCCSP

15. 3D AFVI
   - FCCSP

16. Marking (Ink, laser)

- Marking
- Mapping
- Product

- ① + ② + ③

- DB Server
Carrier-Cu Process Flow

1. **Drill**
2. **Cu**
3. **Inner layer circuit**
4. **Inner layer AOI**
5. **Stacking**
6. **Drill**
7. **Cu**
8. **PNL Barcode imprint**
9. **Outer AOI circuit**
10. **Outer AOI**
11. **SR**
12. **Gilding**
13. **Strip Barcode imprint**
14. **Router**
15. **2D AFVI**
16. **3D AFVI**
17. **Marking (Ink, laser)**
18. **DB Server**

- **Diamond shaped hole**
- ** LOT/Panel info.**
- ** LOT/Panel No., UV Laser**
- ** LOT/Panel/Strip No., CO2 Laser**
- **Good/Bad Mapping**
- **FCCSP**
- **Product**
- **Mapping**

**DB Server**

\[ \text{①} + \text{②} + \text{③} \]
Process Data Flow

**ITS (Information Tracking System)**

- **WIP info.**
- **Master info.**
  - Model
  - Process
  - Defect
  - Lot
- **Parsing Info.**
- **Standard info.**
- **Release request No.**
- **Release request**

**BCL Info.**
- **Processes info.**
- **Release request No.**

**MES**

**ITS**
- **Result analysis**
  - **BCL result analysis**
  - **History data analysis**
- **AOI VRS**
- **AFVI**
- **AFVI VRS**
- **ITS result file**
- **LOT Inspect report**
- **Release request No.**
- **Mapping Data file creation of Customer defect**
- **ITS result file of customer**

**SR AOI**

**Data Gathering**
**AFVI Data creation**

**O**
- Cell data save to text file defect location from AOI, VRS
- Cell Data Rule (Lotnumber, PanelID, Defect location (Col, Row), Defect code)
- Panel Strip No. and each Strip (1,1) position reference of Panel Design Information (COMP)
ITS Operation Flow (Ex : AOI)

- Strip location file (Strip No., Location value(1,1) of a Strip, Strip angle)

※ Strip No : Number or Alphabet
EX > A,B,C,D OR 1,2,3,4

<table>
<thead>
<tr>
<th>Strip No</th>
<th>Strip angle</th>
<th>Location(1,1) of Strip</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>E</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>F</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>G</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>H</td>
</tr>
<tr>
<td>E</td>
<td>90</td>
<td>I</td>
</tr>
<tr>
<td>F</td>
<td>90</td>
<td>J</td>
</tr>
<tr>
<td>G</td>
<td>90</td>
<td>K</td>
</tr>
<tr>
<td>H</td>
<td>90</td>
<td>1,1 Location of strip</td>
</tr>
</tbody>
</table>

Exposure standard hole : Starting point

Strip No.:

Strip array of panel angle:

1,1 Location of strip:

Location(1,1) of Strip:

Strip angle : 0

Strip angle : 90
- COMP basis each Strip top left corner (1,1) position; Sold top right corner (1,1)
※ COMP basis top left corner (1,1) and Sold (1,1) is COMP (1,1) Position Backside.
ITS Operation Flow (Ex: AOI)

- To gathering server data send after measurement finish
  (Server address & path is setting possible.)
  (To real data backup after data save to database)
- Filename: LOTNo._PanelNo._C/S_Inspector_ Workcount (No Extension.)
  ※ Save by Panel
- Path of equipment to save.

Gathering Server folder path

Total defect count of panel, LOT No., Panel No.
Total defect count of strip, LOT No., Panel No.
LOT No., Panel No., Strip No., Col, Row, Defect code
LOT No., Panel No., Strip No., EOS
(End of Strip)

file format
Sample Map File and Description

Strip_ID : B12345678 0101
Origin_Location : 1

Notes) Map File name : “A123456768 0101”
Lot # : A123456768
PNL# 01
Strip ID # : 0101
Origin Location : Upper-Left On the PCB Top Side (Data : 1)
III. System Function & Screen
Registration of file format by facility group
- Management of data parsing rule for inspection file of each facility
Registration of standards by management number
- Functions to store, modify and inquire panel design information by management number
ITS (Information Tracking System)

Two modes (auto/manual) for data gathering
- Manual mode: Operators retrieve the relevant file and handle each file
- Auto mode: Batch processing based on a data gathering list defined in the configuration set-up

DATA Gathering

- Gathering status and error display in progress
- LOG file auto creation
- Manual/Auto provision
01 System function

- Convert SR AOI inspection data into a file in the data management PC to enable the AFVI-VRS inspection management PC to refer to the SR AOI inspection data
- SR AOI data is not generated again once it is created. For re-generation, it can be forcefully created by manual function.

AOI-AFVI data interlock

- Provide equipment & customer after File creation
- AFVI data interlock is once auto process.
- If necessary, providing manual creation.
• Execute marking data linkage to generate a facility linkage and buyer final outcome file.
• Marking equipment must refer to the relevant defect mapping data to do marking job.
• Marking data is also generated once. As for strip, it needs to be manually generated, if necessary.
ITS (Information Tracking System)

Gathering History

- Gathering history search by Search condition (Date, Defect, Management code, LOT, Process)
- LOT inspect report & search
- Gathering error history by Search condition (Date, Defect, Management Code, LOT, Process, Gathering PC, EQP, PC, Error type)

System function

- Save Gathering History and Error History.
System function

Defect search

- Defect Count - Period Analysis
- Panel defect search a LOT
- Defect progress Search by date

- Lot Total Defect Display Defect Count, Panel Defect Display Top / Bottom
- Selected Panel or Lot display defect count information and color information
ITS (Information Tracking System)

Inspect report

- LOT inspect result report auto creation.
- Defect list, Inspect process history, Work state info.
- Display Strip work history diagram.

- Inspect Report is consisted of Lot Base Info, Count Info, Process History Info, Strip Defect Info.
- Strip total defect count check.
- Display Total Defect Info and detail defect Info.
IV. System Development Schedule
**System development schedule**

<table>
<thead>
<tr>
<th>Step</th>
<th>Analysis</th>
<th>Design</th>
<th>Development</th>
<th>Test &amp; Apply</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>M1</td>
<td>M2</td>
<td>M3</td>
<td>M3</td>
<td>M5</td>
</tr>
<tr>
<td>Progress</td>
<td>20</td>
<td>40</td>
<td>90</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**Schedule**

1. **Project Plan**
   - EQP. analysis
   - Analysis report

2. **User V.O.C**
   - User V.O.C analysis report
   - Workshop

3. **System Design**
   - Database design
   - Report
   - Interface design
   - EQP. Customizing & Operation design

4. **Application**
   - P/G development
   - Report
   - Test plan

5. **System modeling**
   - Modeling Sheet

6. **Unit test**
   - Unit test report

7. **Integrating test**
   - Integrating test report

8. **Apply**
   - Migration

9. **Stabilization**
   - Stabilizer report

**Report**

- (1) Project Plan
  - EQP. analysis
  - Analysis report

- (2) User V.O.C
  - User V.O.C analysis report
  - Workshop

- (3) System Design
  - Database design
  - Report
  - Interface design
  - EQP. Customizing (Customer)

- (4) Application
  - P/G development
  - Report
  - Test plan

- (5) System modeling
  - Modeling Sheet

- (6) Unit test
  - Unit test report

- (7) Integrating test
  - Integrating test report

- (8) Apply
  - Migration

- (9) Stabilization
  - Stabilizer report

**Developer**

- 2
- 2
- 6
- 2
- 12 M/M
THANKS

JS SYSTEM Co., Ltd.
443-470, Family Tower 1110, Yountagong-Dong, Yountagong-Gu, Suwon-Si, Kyeonggi-Do, Korea
702-845, Taejin B/D, 1638 Sangyeok 2-Dong, Buk-Gu, Daegu, Korea
TEL: 82-53-943-0154, FAX: 82-53-943-0156
URL: http://www.js-system.co.kr e-mail: jss@js-system.co.kr