PLM System From a Manufacturer’s Perspective

Primax Electronics Ltd.
Presenter: Jason Huang

June 2006
Introduction:
company overview and personal introduction

Drivers and Challenges (external and internal):
business needs and specific requirements we faced, their corresponding management issues and difficulties

The Approach:
how we leveraged the PLM system to increase the efficiency of our management and operation control capabilities

The Application:
��统模块和功能模块强调，展示我们如何实现目标，我们实际从中获得的效率提高和量化数字

The Future Plan:
where do we go from here to support the next generation of product design and development

Seeking Sustainability:
how do we see the progress and development of PLM system from a manufacturer's perspective to be sustainable
Company Overview

1984  Founded (Telephone jack)
1987  Invested in Thailand
1989  Established manufacturing in China
1990  Entered USA
1991  Entered Europe
1992  Acquired Destiny Technology (Embedded software)
1995  Listed Primax on Taiwan Stock Exchange
1997  Established Subsidiary in Japan
2000  Acquired Toptronic (Film/digital camera)
2001  Listed Destiny on Taiwan Stock Exchange
2002  Ranked 102nd Among 1000 Taiwanese Manufacturers by (Business Weekly 4/26/2002)
2004  Ranked 84th Among 1,000 Taiwanese Manufacturers by Business Weekly
2006  Merged Destiny

PRIMAX Corporate Headquarter
Taipei, Taiwan
Global Operation

- **United States**
  - Polaris Inc.
    - Sales, Marketing, JIT

- **Europe**
  - Primax International Holland (HQ)
  - Primax France
  - Primax Germany
  - Primax UK
    - Sales, Marketing, JIT

- **Hong Kong**
  - Primax Industries (HK) Ltd.
    - Sales & Marketing

- **China**
  - Primax Electronics Products Ltd. (Dongguan)
  - Primax Electronics Ltd (Beijing)
  - Primax Electronics Ltd (Guangzhou)
  - Destiny (Beijing)
    - Manufacturing

- **Japan**
  - Primax Destiny
    - Sales & Marketing

- **Taiwan (HQ)**
  - Primax Electronics Ltd
    - Worldwide HQ
    - Corporate management
    - Finance & Admin.
    - Human Resources
    - Sales & Marketing
    - R&D
    - Manufacturing

- **United States**
  - Polaris Inc.
    - Sales, Marketing, JIT

**Total number of employees:** 7436
- **Taiwan:** 456
- **Overseas:** 6980

**Financial results of 2005:**
- **Revenue:** US$ 503 million
- **Assets:** US$ 235 million
- **Capital:** US$ 134 million
<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>World's first motorized handhold scanner (Color Mobile Pro™)</td>
</tr>
<tr>
<td>1998</td>
<td>World's first built-in pc scanner-photo drive (Easy Photo Drive™)</td>
</tr>
<tr>
<td>2000</td>
<td>One Touch Scanner, winner of the Silver National Award of Excellence 2001</td>
</tr>
<tr>
<td>2000</td>
<td>Taiwan's first office-use access point, Blueport™ based on Bluetooth wireless technologies</td>
</tr>
<tr>
<td>2000</td>
<td>Taiwan's first commercial production on 2.3 million pixel high resolution digital still cameras</td>
</tr>
<tr>
<td>2002</td>
<td>World's first optical engine designed for liquid crystal on silicon (LCOS) projectors</td>
</tr>
<tr>
<td>2003</td>
<td>First high performance Laser MFP penetrating sub-$500 retail market</td>
</tr>
</tbody>
</table>
World-class Client Base
Name: Jason Huang (Gwo-Gong, Huang)
Title: Sr. Manager
Company: Primax Electronic Ltd.
Dept.: PDM/IT, Corporate Quality Assurance
Years at company: 6 Years
Address: 669 Ruey-Kuang Rd., 114 Taipei, Taiwan, ROC
Phone: 886+2+27981028
Mobile: 886+936678922
Fax: 886+2+27981565
Email: jsn.huang@primax.com.tw

Personal Introduction: Jason Huang

Expertise:

- **Business Process and Business Standard Consultant (4 years):**
  - ISO 9001:2000 - Quality Management System
  - ISO 14001 – Environmental Management System
  - ISO 1404X – Life Cycle Assessment of Product Design
  - Related industries: Steel, Semiconductor, PWB/BGA, Cement, Resin and lamination, Paper product, Fertilizer, Electronics, Natural Drinking Water, etc.

- **Processes integration and PLM (Primax) (6 years):**
  - First project at Primax was to integrate the Product Development Process (PDP) across 4 business units and 11 product lines.
  - Windchill PLM Implementation:
    - PLM solution survey, function review, corporate core processes integration
    - Manager to a 5 people PLM team and a system owner
    - System fully implemented and sustained
  - Primax is now one of the successful reference sites to PTC on Windchill PLM in the manufacture industry.
Heavy Commitments in R&D

R&D Spending

US$ M

<table>
<thead>
<tr>
<th>Year</th>
<th>Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>95'</td>
<td>6.9</td>
</tr>
<tr>
<td>96'</td>
<td>7.4</td>
</tr>
<tr>
<td>97'</td>
<td>10.3</td>
</tr>
<tr>
<td>98'</td>
<td>12.4</td>
</tr>
<tr>
<td>99'</td>
<td>14.5</td>
</tr>
<tr>
<td>00'</td>
<td>16.4</td>
</tr>
<tr>
<td>01'</td>
<td>20.8</td>
</tr>
<tr>
<td>02'</td>
<td>22</td>
</tr>
<tr>
<td>03'</td>
<td>26</td>
</tr>
<tr>
<td>04'</td>
<td>26.1</td>
</tr>
<tr>
<td>05'</td>
<td>17.2</td>
</tr>
</tbody>
</table>

% of sales

<table>
<thead>
<tr>
<th>Year</th>
<th>% of sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>95'</td>
<td>5.5</td>
</tr>
<tr>
<td>96'</td>
<td>4.5</td>
</tr>
<tr>
<td>97'</td>
<td>3.6</td>
</tr>
<tr>
<td>98'</td>
<td>3.7</td>
</tr>
<tr>
<td>99'</td>
<td>3.6</td>
</tr>
<tr>
<td>00'</td>
<td>3.8</td>
</tr>
<tr>
<td>01'</td>
<td>4.4</td>
</tr>
<tr>
<td>02'</td>
<td>5.9</td>
</tr>
<tr>
<td>03'</td>
<td>6</td>
</tr>
<tr>
<td>04'</td>
<td>5.4</td>
</tr>
<tr>
<td>05'</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Worldwide Patents

<table>
<thead>
<tr>
<th>Year</th>
<th>Granted</th>
<th>Pending</th>
</tr>
</thead>
<tbody>
<tr>
<td>02'</td>
<td>671</td>
<td></td>
</tr>
<tr>
<td>04'</td>
<td>509</td>
<td></td>
</tr>
</tbody>
</table>

* As of 2006 Mar.
Sees Barrier or Finds Driver?

External Forces

- International Competition
- Global Operation
- Standards
- Customer Requirements
- Laws and Regulations
- Market Force
- Pricing
- High Labor Cost
- New Technology

Design and Manufacture Enterprise

- Strategy
- Re-Engineering
- Sluggish process
- Communication
- Quality
- Learning
- Sharing
- Innovation
- Leadership
- Changing Mindsets
- Culture
- Capability
- Productivity
- Efficiency
- Flexibility
- Cut Cost
- Customer Satisfaction
- Service

Internal Forces
What matters? Green Challenges and Pressures

**Regulations / Directives**
- RoHS / WEEE / EUP / IPP / JIG (A,B)
- ELV .. etc.
- Environmental Impact Assessment
- Waste Management
- Packaging Regulation EU
- Toxic substance control
- Product Recycling Policy

**Product Design & Development**
- Life Cycle Assessment
- Design for Environment
- Substance Quantify
- LCA/ISO 1404X
- SETAC

**Cleaner Production / Responsible Care**
- Cleaner Production
- Action Plan
- Environmental Accounting

**TAX, Insurance**
- CO2
- Risk Management
- Waste Management
- Pollutants Control

**Environmental Management System**
- BS 7750
- EMAS
- EMS/ISO 1400X
- EPE/ISO 1403X

**Eco-Labeling**
- RoHS/WEEE
  - EU
  - USA

**Enterprise Manufacturer**
## The Approach: Customized WINDCHILL 5.1 in 2001

### Voices of Top Management

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Process</td>
<td>A solution, not a product</td>
<td>Project Planning Module (PPM)</td>
</tr>
<tr>
<td>loose discipline</td>
<td>Real time Project Management</td>
<td>Part Auto-Numbering (Part Number)</td>
</tr>
<tr>
<td>Human intrusion</td>
<td>Product Data &amp; Information</td>
<td>Approval Vendor List (AVL/AML)</td>
</tr>
<tr>
<td>Paper and forms</td>
<td>Design-centric</td>
<td>Project KPI Report (Project Audit)</td>
</tr>
<tr>
<td>Experienced individual</td>
<td>Team Collaboration</td>
<td>EC Mass Change (Eng. Change)</td>
</tr>
<tr>
<td>No SOP</td>
<td>Just in time project deliverables</td>
<td>Green Module (RoHS/WEEE)</td>
</tr>
<tr>
<td>Non-efficient unheathy...</td>
<td>Improve Process Efficiency</td>
<td>BOM Auth. &amp; Release Control (BRC)</td>
</tr>
<tr>
<td></td>
<td>Electronic process control</td>
<td>Eng. Support Module</td>
</tr>
<tr>
<td></td>
<td>Standard process and discipline</td>
<td>ERP Integration (SAP PR/PO Control)</td>
</tr>
<tr>
<td></td>
<td>Date reference / Information sharing</td>
<td>System Administration Module</td>
</tr>
<tr>
<td></td>
<td>Achieve e-company goal</td>
<td>Audit and Reporting Module</td>
</tr>
<tr>
<td></td>
<td>Cultural integration</td>
<td>Future expansion and development...</td>
</tr>
<tr>
<td></td>
<td>System integration (ERP)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eases ISO compliance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>You are not alone</td>
<td></td>
</tr>
</tbody>
</table>

### OLD SYSTEM

- Manual Process
- loose discipline
- Human intrusion
- Paper and forms
- Experienced individual
- No SOP
- Non-efficient unhealthy...

### NEW SYSTEM

**WINDCHILL 5.1**

- Project Planning Module (PPM)
- Part Auto-Numbering (Part Number)
- Approval Vendor List (AVL/AML)
- Project KPI Report (Project Audit)
- EC Mass Change (Eng. Change)
- Green Module (RoHS/WEEE)
- BOM Auth. & Release Control (BRC)
- Eng. Support Module
- ERP Integration (SAP PR/PO Control)
- System Administration Module
- Audit and Reporting Module
- Future expansion and development...

### FUNCTION MODULE ENHANCEMENT

**WINDCHILL 5.1**

(2003~2006 and beyond)

- Project Planning Module (PPM)
- Part Auto-Numbering (Part Number)
- Approval Vendor List (AVL/AML)
- Project KPI Report (Project Audit)
- EC Mass Change (Eng. Change)
- Green Module (RoHS/WEEE)
- BOM Auth. & Release Control (BRC)
- Eng. Support Module
- ERP Integration (SAP PR/PO Control)
- System Administration Module
- Audit and Reporting Module
- Future expansion and development...

**Voices of Top Management**

- Shorten Time to Market
- Shorten Time to Volume
- Shorten Delivery Time
- Increase Product Quality
- Labor Efficiency
- Inventory Control
- Customer Service
- Innovation

**Success Synchronization**

- Strategy
- Technology
- Information
- People
- Process
- Initiative
- Metrics
The Approach: Key Milestones & Tasks (2002~2003)

Phase I
- Standard Product Development Process (PDP)
- Manage all project related documents
- Control project milestones and reports
- Part/BOM/EC/Production document design

Phase II
- Migrate all Part/BOM data from ERP(SAP) system & SAP Integration
- Control all production-related documents and distribution
- Phase I PDP enhancement & Project Planning Module (PPM)
- Part Auto Numbering Module to replace SAP part numbering system

Phase III

<table>
<thead>
<tr>
<th>Year</th>
<th>Q3</th>
<th>Q4</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Application: What's happening?

Finished Good
Specifications
Drawings
Green Status

.........

Sub Assembly
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Material
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Sub Assembly
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Material
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Sub Assembly
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Material
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Sub Assembly
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Material
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Sub Assembly
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Material
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Sub Assembly
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Material
Part Approval Sheet
Part Specifications
Drawings
Green Status
Substance Content

.........

Maker/Vender 1
General Information

 Maker/Vender 2
General Information
Non-Disclosure Agreement
Declaration Form
Supplier Audit Report
Financial Information
Agreement & Contract

.........
The Application: What have we done (2003~2006~)

Project Management
- Engineering Support Module
- Project Planning Module
- Project Management Module
- Project Document Management

Part/BOM Management
- Numbering Rule Module
- Auto Numbering Module
- BOM Structure Management
- BOM Release Control
- RTP Object Release Control

Part Approval & Drawing
- AVL/AML Supplier Module
- Production Document Management
- Green Procurement Module
- Document Release Control

EC Management
- Mass Change & Where Use Query
- Engineering Change Request
- Engineering Change Order
- Engineering Change Action

Others
- System Admin Module
- Audit & Reporting
- ERP PRPO Integration
- Sales & Eng Support Module
- Archive Purge
- PLM/ERP Part Net & Gross Weight Control

ERP ADAPTER

ERP By Plant

PLANT DCC
PLANT DCC
### Benefits…

**Key R&D Tasks**

<table>
<thead>
<tr>
<th>Task</th>
<th>Time Allocation</th>
<th>Projected Efficiency Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Design / Development</td>
<td>25%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Prototyping</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Create Docs, Search Project info</td>
<td>5%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Create Production Documents</td>
<td>7%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Project Reviews/Discussion</td>
<td>8%</td>
<td>30.0%</td>
</tr>
<tr>
<td>Analyze / Solve Production Issue</td>
<td>11%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Communications with Factories</td>
<td>5%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Vendors Meeting / Phone / Email</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Vendors Visit / Discussion</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Customer Visit / Bug Issue Solving</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Q&amp;A, Department Meeting</td>
<td>7%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Case Study, Self-development</td>
<td>6%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

**Total = 13.7 %**

*Cost allocation: 450 R&D, USD 2.5K monthly payment in average*
### Actual Key Performance Results

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 D</td>
<td>1 D</td>
<td>&lt; 1 D</td>
<td>&lt;4 H</td>
<td>&lt;4 H</td>
</tr>
<tr>
<td>Production Doc. Apprl. &amp; Trans.</td>
<td>3 D</td>
<td>1 D</td>
<td>&lt; 1 D</td>
<td>&lt;4 H</td>
<td>&lt;4 H</td>
</tr>
<tr>
<td>BOM Construct &amp; Approval Cycle Time</td>
<td>7 D</td>
<td>2 D</td>
<td>6.9 D</td>
<td>2.6 D</td>
<td>&lt;2 D</td>
</tr>
<tr>
<td>ECR Cycle Time</td>
<td>8.8 D</td>
<td>3 D</td>
<td>6.0 D</td>
<td>3.2 D</td>
<td>3.1 D</td>
</tr>
<tr>
<td>ECN Cycle time</td>
<td>11 D</td>
<td>3 D</td>
<td>5.0 D</td>
<td>3.4 D</td>
<td>2.8 D</td>
</tr>
</tbody>
</table>

Other:
- RFQ / Cost Analysis cycle Time was 7 Days to less than 3 Days
- RD overall working efficiency improve at least 5 % up
- Project requirement: Suppliers collaboration....
- Increase Customer and Supplier communication
The Future Plan: Keep changing


Here We Are

CONTENT ACCUMULATING  →  CORE KNOWLEDGE BASE

Solving Management Issues  →  Operation Control & Business Changes  →  Experience & Sharing  →  Learning Environment

Data & Information  →  Furnishing & Influencing  →  Question asked & Learning  →  Ability to Develop and Explore

Talents, Practice & Skills  →  Experiences & Beliefs  →  Our version of Knowledge (1st Hand Knowledge)

Here We Are
The Future Plan: (cont.)

- Data
- Information
- Talents
- Practice
- Skills
- Experience

Design Guideline DfX (X=anything)
DFMEA/PFMEA
Product Life Cycle Assessment
Product Green Design (DfE)
Product Validation Guideline
Product Inspection Criteria
Cost / Spec Analysis (RFQ)
Patent Search
Variation and Risk Assessment
Specification Super BOM
EVT/DVT/MVT Plan
QA Control Chart
GR&R, Cpk of Critical Parameter
Quality Test Requirements

………..

PR stage
Get RFQ from sales or customer.
Make sure Ask RD
Enough.

PS stage
Need to have schedule and kick off report.

PD stage
Spec. try to
DFMEA

DD stage
PCB layout
EVT plan
Circuit drawings
Tooling
Mechanical
Mock ups

Project Time Frame
PR: RFQ data
PS: kickoff date, RFQ +2 days
PD: tooling stats, kick off +12 days
DD: T1 date, about 1 month
EVT: ER date, T1 +5 days
DVT: PR date, DQA needs about
MVT: M0 date, DQA report +12
Usually it needs 3-4 months to
*1, assume 6-1 week, model
*If no customer, then probably

EVT stage
EVT report
Mechanical tooling drawing
Production flow chart
DVT plan
QA control table
ER report
PFMEA

MVT stage
MVT report
Pre MP report
Need to check following by MP

-Design Guideline DfX (X=anything)
-DFMEA/PFMEA
-Product Life Cycle Assessment
-Product Green Design (DfE)
-Product Validation Guideline
-Product Inspection Criteria
-Cost / Spec Analysis (RFQ)
-Patent Search
-Variation and Risk Assessment
-Specification Super BOM
-EVT/DVT/MVT Plan
-QA Control Chart
-GR&R, Cpk of Critical Parameter
-Quality Test Requirements

………..
Seeking Sustainability

Management & Business Aspects:
- A Product Company
- Match Corporate Goals
- Outsourcing & Collaboration
- Seamless Process
- Define Capability (QCDSSF)
- Increase Productivity
- Dynamic Changing
- Knowledge Reuse
- Accountable Resources
- Lower Operation Burden

System Aspects:
- More User Friendly
- Easy Maintain & Steering
- Flexibility
- Future Expansion
- Timely Response to Change
- Customer Trend, not Tech. Trend

Asking Fundamental Questions.....
Who we are?
What we work on?
How we work?
.....

Continuous Improvement
Constantly Change
Rapidly Innovate
VISION:

Push Performance, Trigger Innovation, Shorten Time to Market

MISSION:

Timely Information Sharing and Core Processes Control

VALUE:

An Information and Processes Integration Platform to Support, Develop and to meet User/Customer expectation
THANK YOU

Q & A