Improving Global Supply Chain Management

Spring, 2010
Introduction

Sloan Valve

• World’s leading manufacture of water-efficient solutions
• Headquarter: Franklin Park, Illinois
• Founded in 1906
• Facilities in Michigan, Massachusetts, Pennsylvania, California, Arkansas, Mexico, and China
IPRO 306 Project Structure

At Franklin Park, Illinois

• Predictive Preventative Maintenance (PPM)
  – Franklin Park Equipment & Facility Maintenance

• Warehouse Management System (WMS)
  – Central Distribution Center (CDC) Warehouse
IPRO 306 Objectives

- Predictive Plant Maintenance (PPM)
- Proactive Maintenance
- Reduce equipment downtime
- Part of Sloan Lean implementation
IPRO 306 Objectives…

- Warehouse Management System (WMS)
  - Distribute products on-time and accurately
  - Optimize Inventory levels, turns, and accuracy
IPRO 306 Project Plan

- Project Plan
- Midterm Review Presentation
- Ethics Reflective Report
- Final Project Report (Draft)
- IPRO Day Abstract, Brochure & Poster
- IPRO Final Day Presentation
- IPRO Final Project Report
- Project Introduction and Team Meet
- Sloan Valve 1st Visit and Customer Meet
- Warehouse Management System (WMS) Project
  - Data Preparation
    - Development
  - Testing
    - Training
  - System Rollout
- Preventive Product Maintenance (PPM) Project
  - Plant maintenance Knowledge gain
  - Plant maintenance templates creation
  - Study Sloan machin manuals and maintenance logs
  - Preliminary templates for Gnuti machine and Deideshe
  - Maintenance log analysis
  - Maintenance needs research / templates review
  - Maintenance crew consultation
  - Finalize PM templates
  - Transform PM template into SAP format
Overall Team Structure

- Gregory Spoor (Sloan Valve)
  Director, Global Sustaining Engineering

- Steven Rodgers (Sloan Valve)
  VP, Supply Chain Operations

- Brian Capo (Sloan Valve)
  Manager, Global Distribution

- John Caltagirone (IIT)
  Faculty Advisor

- Arthur Wilas
  Team leader (PPM)

- Cong Sun
  Team leader (overall)

- Kunal Sharangdhar
  Team leader (WMS)

- Abhishek Kumar Chandnani
- Anand Thukral
- Anurag Kotha
- Arun Devalam
- David Skiba
- Jutarop (Ben) Limpinyakul
- Cong Sun
- Djordje Lukic
- Suni Smith
- Niles Malpekar
- Tomas Bergland
Project 1: PPM - Rationale

Typical running cycle of a machine - under **reactive maintenance**

- Normal: 100 hrs
- With Wearings: 50 hrs
- Recovered: Normal

*Unexpected Machine Down time - 150 hrs !!*
Project 1: PPM - Rationale

Typical running cycle of a machine - under Preventative / Predictive Maintenance

Normal:
- 100 hrs
- Planned downtime: 8 hrs

With wearing:
- 30 hrs

Planned downtime:
- 8 hrs
Project 1: PPM - Tasks

PM sheets:
What we have done...

- created PM sheets for machines
- created daily PM sheets for operators
- daily procedure sheets with pictures
## Preventative Maintenance Schedule for New Britain 656 and 657

### Daily Schedule

The daily maintenance is to be performed by the machine operator.

1. **Oil Level**

<table>
<thead>
<tr>
<th>No.</th>
<th>PM Description</th>
<th>PM Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check oil level</td>
<td>1. Locate oil level sight gauge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. When not running, ensure oil reaches the top horizontal line</td>
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<tr>
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<td></td>
<td>3. When running, oil does not go below bottom horizontal line</td>
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</tbody>
</table>
Project 1: PPM - Encountered Difficulties

• Old machines with limited amount of information
  E.g. some machines made in 1930s-1940s, with no operator manuals available now

• Manuals written in different languages
Project 1: PPM - Results

Before

After
Project 1: PPM - Return on Investment

• **Investment:**
  o fund for sponsoring the IPRO project
  o effort for training & supervising the IPRO team
  o effort for training the maintenance crew, etc.

• **Return:**
  o saved machine maintenance costs (up to $1,200,000 per year)
  o improved overall equipment effectiveness
  o better predictability in maintenance crew's work
Project 2: WMS - Project Goals

WMS = Warehouse Management System

Goals: **SAP WMS Implementation**
- Put-away process
- Pick process
- Cycle counting
Current Issues:

- Lack of formal procedures
- Items not easily located
- Manual bin card updates
- Sub-optimal inventory storage
Project 2: WMS - Implementation

- Formalized procedures
- Cut-over data
- SAP WMS testing
- Training material
- Beta run
- SAP WMS deployment
Project 2: WMS - Formalized Procedures

- Put-away, pick, and cycle counting
- Warehouse storage control reorganization
  - Fixed bin, pallet, bulk area
  - Physical inspection -> CAD layout -> discussion -> finalize
  - Warehouse signs
  - Bar-coding
  - Use of RF gun
Project 2: WMS - Collecting Cut-over Data

- Item locations
- Rack dimensions (W x H x L)
- Storage types
- Item attributes
Project 2: WMS - Test Environment

- Prepared excel files
- Handed over data to IT for WMS population
- Security testing
- Functional testing
- Feedbacks
- RF gun testing
Project 2: WMS - Training Material

• Prepared training material on the basis of work instructions

• Updated as required

• Tested within team members for improvement

• Incorporated feedback
Project 2: WMS - Beta Run & Deploy

- Allowed actual users to test
  - Formal procedures
  - System information
  - RF guns
  (in pseudo-live environment)

- Deployment
  - Collected feedback from beta-run
  - Incorporated changes as per the change control board
Project 2: WMS - Encountered Difficulties

- SAP functional testing process was longer than expected, making on-site working time insufficient.
- IT difficulties: connection to SAP system could not be established from out of Sloan.
Project 2: WMS - Return on Investment

• **Investment:**
  - fund & effort for sponsoring the IPRO project
  - fund for purchasing RF guns and other new facilities for the warehouse rearrangement

• **Return:**
  - increase in inventory accuracy in Sloan's Central Distribution Center: from 85% (current) to 99% (expected)
  - reduction in the number of returns resulted from picking errors: between 11% and 25%
  - reduction in material handling labor: between 10% and 25%
Gained Experience - Workplace Ethics

• Open communication
  o with the customer
  o within the team

• Exceeding customer's expectations

• Observing the regulations (e.g. Non-Disclosure Agreement)
Gained Experience - Innovation

Automated testing solution

General process:

- Budgeted effort (manual process): 24 person-hours
- Actual effort (automated process, with computer program): 3 person-hours
Gained Experience - Innovation

Automated item slotting:

- Warehouse layout description file (in XML language)
  - XML = eXtensible Markup Language
- List of inventories and their properties
Acknowledgments

• Mr. Steven Rodgers, Vice President at Sloan Valve Company, sponsor of IPRO306

• Mr. Brian Capo - Global Distribution Manager, Mr. Gregory Spoor - Director of Global Sustaining Engineering, and Dean Poulsen - Project Engineer

• All the other stakeholders at Sloan who helped with the projects

• Mr. John Caltagirone, Faculty Advisor

• IPRO Office

• All guests today!
Thank You!

Questions & Suggestions?