#### IPRO306

### Improving Global Supply Chain Management

# Spring, 2010





# Introduction

- Sloan Valve
  - World's leading manufacture of waterefficient 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**

Task Name	27,	'09 M	Jan 10, '10	Jan 2	24, '10 T M	F	b7, 10	F	Feb 21, '10	Mar	7, '10	M	ar 21,	'10 M	Apr 4	, '10	A	pr 18,	10 M	May	2, 10	May	16, '10 T M
IPRO-306 Sloan Valve		m			1 10		1 0		<b>U</b> 1 M	1 100	5											1	
Project Plan	1					6																60 day	s
Midterm Review Presentation	1					1									_	1				1		47 day	/s
Ethics Reflective Report																						30 day	/S
Final Project Report (Draft)	1			8											1							20 day	s
IPRO Day Abstract, Brochure & Poster																1	0					14 day	s
IPRO Final Day Presentation																				5		6 days	5
IPROFinal Project Report						1													0	1			
Project Introduction and Team Meet																	1			-			
Sloan Valve 1st Visit and Customer Meet	1																					74 day	s
- Warehouse Management System (WMS) Project				-		-								_	-		V					19 day	s
Data Preparation				-		_	-7											43	days				
Development	1					C																	
+ Testing									<b>~</b>		_										34 day	s	
Training	1											-			_						_	34 day	/S
+ System Rollout											-	-		_	-		<b>v</b> _			_	_	19 day	s
Preventive Product Maintenance (PPM) Project				-	_	_	_	-		1 100		-	_	_	-	-					_	14 day	s?
Plant maintenance Knowledge gain																						70 day	Is?
Plant maintenance templates creation				(																		67 day	s?
Study Sloan machin manuals and maintenance logs																						62 day	s?
Preliminary templates for Gnuitti machine and Deideshe						-																62 day	s?
Maintenance log analysis						1																52 day	s?
Maintenance needs research / templates review						(		- E	).								1					46 day	/s?
Maintenance crew consultation			1						(	4 1888		F										37 day	s?
Finalize PM templates												1			-		_					27 day	rs?
Transform PM template into SAP format												1							_	_		14 day	s?

# **Overall Team Structure**



## Project 1: PPM - Rationale

Typical running cycle of a machine - under <u>reactive maintenance</u>



Unexpected Machine Down time - 150 hrs !!

### Project 1: PPM - Rationale

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



### Project 1: PPM - Tasks

#### PM sheets:





# Project 1: PPM - Tasks

What we have done...

- created PM sheets for machines
- created daily PM sheets for operators
- daily procedure sheets with pictures

MACHINE #3311		F	lercer	SEF	RIAL #
Location: Machine Shop Mech			lame:	Mechanic Signatu	ire:
Check Appropriate Box and C	omment	whe	ther task is co	emplete or incomplete	
Electrical System	Interval	OK.	NOTOR	COMMENTS	
All switches and emergency stop	1200 hrs.				
Proper line current	1200 hrs.	-	-		
No short circuits	1200 hrs.	-			
No insulation tailures	1200 01%	-			
Proper motor current	11200 hrs.	-			
Proper motor current	1200 hrs.				
Controller	Interval	OK	NOTOK	COMMENTS	
Proper operation of controller	250 hrs.	-			
No dirt or moisture accumulation	250 hrs.	-			
Proper circuit loant coeration	1200 Pes.				
Check power connections for tightness	250 hrs.	The second			
Check for any faults	250 778	1			
and the second second second		-			
Motor	Interval	OK	NOTOK	COMMENTS	
Proper rotation	1600 hrs.	-			
Toper Loncation of motor	1600 005	-			
Proper motor current	1200 hrs.				
	-				
Clean Machine	Interval	OK	NOT OK	COMMENTS	
Dirt, dust, and moisture from controller	600 hrs.	1			
nterior of machine	1600 hrs.	-			
Extensor of machine	loco un	-			
repartion	Interial	Tos	INOT ON	COMMENTS	
Variation of machine for physical detects	(200 hrs.	-			
nterior of machine for physical defects	200 hrs.				
Controller operation	200 hrs.				
Audio-Visual check when running	200 0/8	-			
ubbel untrause cheration	Territoria	-			
Additional Comments					
Controllar Continents.					
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	Mpc	Marie	Name	Mechanic Signature	Date
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	Max	Nerk.	Name	Machanic Signature	Date
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	-	-	Norm	Mechanic Signature	Date

### Project 1: PPM - Tasks

#### 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

No.	PM Description	PM Details
1	Check oil level	1.Locate oil level sight gauge 2.When not running, ensure oil reaches the top horizontal line 3.When running, oil does not go below bottom horizontal line



#### 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  $\rightarrow$ 

## 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:

- saved machine maintenance costs (up to \$1,200,000 per year)
- 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







# Project 2: WMS - Current Issues

#### 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
  - o 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

   with the customer
   within the team
- Exceeding customer's expectations
- Observing the regulations (e.g. Non-Disclosure Agreement)

## **Gained Experience - Innovation**

#### **Automated testing solution**

#### General process:

Menu Edit Favorites Extras System Help
SAP Easy Access
SAP menu
Cross-Application Components
Logistics
👂 🗋 Accounting
🕑 🧰 Human Resources
👂 🛄 Information Systems
🕑 🗀 Tools
🗢 🔂 Favorites
D 🗀 SHIPPING
D 🗋 INVENTORY ADJ
DAILY TRANSACTIONS
ME2M - Purchase Orders by Material
* 7MM13 - Display Material Movements



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

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	A	B	C	D	G H K
1	T Code	TRANS. CODES	Logistics Mg	Ship Cleri	k Notes
35	LM03	Put Away - by TO	х	Х	
36	LM04	Put Away -System Guided	X	Х	
37	LM05	Picking by TO ID	х	Х	
38	LM06	Picking - by Delivery ID	X	Х	
39	LM07	Picking - System Guided	х	Х	
40	LM09	Put Away by Delivery ID	x	Х	
41	LM11	Posting Changes	х	Х	SAP alerts "User SUNC9 has no profile definition"
42	LM12	Material Inquiry	x	Х	
43	LM13	Put Away Clustered	X	Х	
44	LM18	Handling Unit Inquiry	х	Х	
45	LM19	Handling Unit - Pack	x	Х	
46	LM22	Handling Unit - Unpack	x	Х	
47	LM24	Packing HU by Delivery	х	Х	
48	LM25	Unpack HU by Delivery	X	Х	
49	LM26	Picking by Delivery - W/O sel scree	х	Х	
50	LM27	scree	► X	Х	
51	LM30	Load Control - Load by Shipment	X	х	

### **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?**