Hierarchical Process Maps

Top Level Map:
- Pre-Press 1
- Press 2
- Post-Press 3

Second Level Maps:
- Image Prep 1.1
- Plate Processing 1.2
- Plate Developing 1.3
- Plate Washing 1.4
- Load Plate on Press 2.1
- Apply Fountain Solution 2.2
- Apply Ink 2.3
- Image Transferred to Blanket 2.4
- Image to Paper 2.5
- Paper Out of Press 2.6
- Cutting 3.1
- Folding 3.2
- Assembling 3.3
- Binding 3.4
- Packaging 3.5

Resource Accounting

1.3 Plate Image Developing
Plate is developed by washing with developer

Undeveloped Plate
Plate Image Developing
Plate with developer

Supporting processes: Purchasing of developing solution, storage of developing solution, disposal of waste solution.
Determine Target

• Discussion with client indicated that hazardous waste was of more of a concern than solid paper waste.
  – Solvents that posed risks to human and environmental health were known to be contained in the press cleaning solutions (naphthalene and benzene)
  – Costs of disposal of hazardous waste posed a significant financial burden

<table>
<thead>
<tr>
<th>Hazardous Waste</th>
<th>Quantity</th>
<th>Workstep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer for plate (KOH, NaSO4)</td>
<td>30 gallons/yr</td>
<td>1.3</td>
</tr>
<tr>
<td>Fixer for Plate (Silver Waste)</td>
<td>30 gallons/yr</td>
<td>1.3</td>
</tr>
<tr>
<td>Contaminated Fountain Solution</td>
<td>68 gallons/yr</td>
<td>2.2</td>
</tr>
<tr>
<td>Contaminated Ink</td>
<td>small</td>
<td>2.3</td>
</tr>
<tr>
<td>VOCs from ink applied to plate</td>
<td>small</td>
<td>2.3</td>
</tr>
<tr>
<td>VOCs from contaminated ink</td>
<td>small</td>
<td>2.4</td>
</tr>
<tr>
<td>VOCs from blanker</td>
<td>small</td>
<td>2.5</td>
</tr>
<tr>
<td>VOCs from ink on paper</td>
<td>small</td>
<td>2.6</td>
</tr>
<tr>
<td>Contaminated ink</td>
<td>.01 gallons/yr</td>
<td>2A</td>
</tr>
<tr>
<td>Used fountain solution</td>
<td>.68 gallons/yr</td>
<td>2A</td>
</tr>
<tr>
<td>VOCs from makeready</td>
<td>small</td>
<td>2A</td>
</tr>
<tr>
<td>Dirty Rags saturated with solvent</td>
<td>55 gallon drum/3 mo</td>
<td>2B</td>
</tr>
<tr>
<td>Spilled cleaning solution</td>
<td>small</td>
<td>2B</td>
</tr>
<tr>
<td>VOCs from cleaning solution</td>
<td>larger</td>
<td>2B</td>
</tr>
<tr>
<td>VOCs from saturated rags</td>
<td>large</td>
<td>2B</td>
</tr>
<tr>
<td>Dirty Gloves</td>
<td>365 pairs +/yr</td>
<td>2B</td>
</tr>
<tr>
<td>Contaminated Ink</td>
<td>small</td>
<td>2B</td>
</tr>
<tr>
<td>Contaminated fountain solution</td>
<td>small</td>
<td>2B</td>
</tr>
<tr>
<td>Used fountain solution</td>
<td>small</td>
<td>2B</td>
</tr>
</tbody>
</table>
Pareto Analysis

Root Cause Diagram

- Once solvent use in the cleaning process (2B) was targeted as the waste product to be reduced, a root cause diagram was created to attempt to examine the root causes of solvent waste in the press cleaning process.
How can we reduce the amount of solvents used in the press cleaning process?

**Brainwriting & Rank Ordering**

**Quick Wins**
- Train and educate press operator to use less solvents
- Dilute solvents with water until maximum dilution with equal cleaning efficiency
- Efficiency training on the press by manufacturer
- Create an incentives within the company to use less solvents
- Rags that absorb more solvent so that less can be used
- Lobby EPA/Printing guilds/Press manufacturers so that they work with solvent manufactures to come up with better solvents or alternatives to solvents in the cleaning process
- Lobby EPA/Printing guilds/Press manufactures to re-design press so that it cleans throughout the day
- Educate customers on value of using single color prints
- Have specials that encourage customers to bring or use a the same color for a day/week (i.e. Crimson Day)
Brainwriting & Rank Ordering

Crown Jewels:
- Recover solvent from used rags so solvent and rags can be re-used
- Use solvent free wash solutions
- Have an ink tray that can be removed and sonicated in water for cleaning
- Research existing oil based paints on their ease of cleaning
- Research UV-light fixing inks
- Use only colors that only don’t need solvents for cleaning
- Use water based inks
- Use more soluble inks
- Use only UV-light fixing inks
- Have ink tray liner for each color
- Disposable ink tray liner that can be recycled
- Line clean up tray
- Have ink come in its own ink tray (cartridge)
- Disposable ink trays

Brainwriting & Rank Ordering

Research and Development:
- Absorbent paper or sheet that can be run through press to absorb ink
- Have jackets on rollers that can be removed at the end of the day and recycled
- Have a separate press for each color
- Power-based inks (research this to see if it exists- if it does it should move up the ladder)
- Re-design roller so that it can be washed without using solvents
- Re-design press so that it has fewer rollers but same printing ability
- Be able to remove rollers for cleaning and have easy reassembly
- Single color ink that can react with plate to change color
- Ink pellets that are administered as used to eliminate ink tray cleanup
- Use invisible ink that will change color upon exposure to different wavelengths of light
- Mix ink colors on the press from the previous color run
- Have lower disposable costs based on the amount of solvent used to provide an incentive for press to use less solvent
- Use inks that do not need solvents to dissolve them
- Use ink that reacts with a cleaning solution and then just flakes off rollers
- Leave the press dirty
- Water-less printing
Role of Research

"It is [MA] DEP's position that non-saturated, solvent-contaminated industrial wipers do not pose a significant threat to human health or the environment when managed properly. As such, DEP will allow a conditional exemption from regulation as a hazardous waste, under 310 CMR 30.000, for non-saturated, solvent-contaminated industrial wipers that are managed according to the practices described in this policy."

http://www.mass.gov/dep/recycle/laws/solwiper.htm

Action Plan #1

**Problem to be addressed:** How to minimize the amount of solvents used in the end of day press cleaning operations

**Solution #1:** Train and educate press operator to use less solvents

**Description:** Have press manufacturer or senior press man create training program for press operator that specifically stresses using the minimal amount of solvents during the end of day clean up.

**Step 1:** Contact press manufacturer and request all information on how to clean the press with the minimal amount of solvent (hours: 1)

**Step 2:** Contact EPA and request all information on how to clean the press with the minimal amount of solvent (hours: 1)

**Step 3:** Contact press guilds and request all information on how to clean the press with the minimal amount of solvent (hours: 1)

**Step 4:** Have designated person read and compile the provided information and create training program. (hours: 20-40)

**Step 5:** Schedule training session for all press operators (hours: 1)

**Step 6:** Conduct training session at the end of the day when the press needs cleaning (hours: 2)

**Step 7:** Periodically monitor the press operators cleaning practices to ensure compliance (hours: 4/year)

**Step 8:** Evaluate effectiveness of solvent reduction program by comparing amount of solvent purchased and disposed of before and after awareness campaign. (hours: 2)

**Total cost of action plan:** 53 man hours first year at $10/hr = $480/year

6 man hours each additional year at $10/hr = $60/year

(Unless new press operator needs training: cost = 2 man hours)
Action Plan #2

Problem to be addressed: How to minimize the amount of solvents used in the end of day press cleaning operations

Solution #2: Recover solvent from used rags so solvent and rags can be re-used

Description: Purchase a rag roller to recover solvents from rags and reuse solvent and rags.

<table>
<thead>
<tr>
<th>Step</th>
<th>Activity</th>
<th>Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Contact press manufacturer and request all information on reusing solvent.</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Contact OSHA and request all information on the necessary health and safety precautions</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Designate a storage site for the rag roller and reused solvent.</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Purchase rag roller and storage containers for used solvent.</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Schedule training session for all press operators on the use of the rag roller.</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Conduct training session</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Use the rag roller to recover solvents from rags after use. Store rags and solvent in appropriate airtight containers between uses.</td>
<td>15-30 min/day</td>
</tr>
<tr>
<td>8</td>
<td>Periodically monitor use of the rag roller to ensure reuse of solvents as well as health and safety compliance.</td>
<td>4/year</td>
</tr>
<tr>
<td>8</td>
<td>Evaluate effectiveness of solvent reduction program by comparing amount of solvent purchased and disposed of before and after solvent reuse.</td>
<td>2</td>
</tr>
</tbody>
</table>

Total cost of action plan: 111 man hours first year at $10/hr = $1111/year + $1100 in capital investment into machinery = $2211

6 man hours each additional year at $10/hr = $60/year

(Unless new press operator needs training: cost = 2 man hours at $10/hr = $20)

Now let's open it up to the discussion.

Do you have any suggestions for a mission statement or core values.

Student: I would make it broad – zero limit. Being environmentally sound would be part of the statement

Molly: Do you think printed material should be part of the statement?
• Student: I think that would no allow for flexibility.

Molly: Anyone else

Student: Use the statement to guide decision making. Minimize ecological impact while maximizing staff satisfaction.

• Student: What do they hope to achieve within the next 5-10 years. This would be in the mission statement while the vision is what they can be more vague.

• Molly: It can meet and exceed environmental protection. Would you limit your economic profit in the mission statement?
• Student: We are not just here to make money. We need to more. In some vision statements, profit is not mentioned.

• Molly: Of course companies are there to make money, but it should not be viewed as greed. There should be no problem with a company in a free market making money.

• The other part is why is it important to align the two?
  • Student: They need to be credible. No limitations on profit levels so long as they protect the environment. They need to be consistent.
  • Molly: We all know that BP is a oil company, but they have been trying to repackage themselves as an environmental company. The need to walk the walk.
• Molly: A mission statement shows to the employees that you are walking the walk.

• Do people know what “quality of management” means?

• Student: In the 1990’s you had to have ISO9001. So that you use process mapping, pareto rule etc. to run a project or customer service.

• Molly: It is a way to avoid mistakes. Environmentalist are starting to tie into this because they are often talking to CEOs and you need to talk their language.

• The second question What aspect are helpful in the early stages?
• Baldrige is a survey tool – leaders, stakeholders, employees. Who do you want on your environmental team? Would it be an open invitation or would you be selective?

• Student: I would have one who is involved in running the press. Every one should be aware of what is going on, but they will not all go to the meetings.

• Molly; would the owners be directly involved?
• Student: They can be involved, but they need to be open to employee input. They should not tell employee that this is our vision and this is what we are going to do.
• Molly: How would you involve baldrige?
• Student: Rewrite questions to be more specific and add additional interests.
• They should not answer each question at the first meeting.

• Molly: They can use Baldrige as a framework. How does involvement of employees help score points on Baldrige?

• Student: This is not an answer to this question. Where are we conceptually?

• Molly: other companies take a process view. Value your employees. If employees are excited to come to work, you get so much more out of them. Someone who is happy will stick around longer. You do not have to pay to rehire people. You do not have to pay for sick-days. Does the leader walk the walk? Do the owners take the “T” or do they drive their Hummer to work.
• This is quality management. This is why an environmental class is teaching you management tools. In order to communicate my job skills I have to speak like a doctor. This is in an effort to get things done. It is learning a language. This is why environmentalist need to talk like CEOs.

• Molly: Does Baldridge make more sense?
• Student: Would you supply a 1 sentence response to each question?
• Molly: No. You do get something that is kind of lofty when you involve environmental, economic and social aspects to a core values statement.
• The mission statement should be more specific and show the steps you will take to support the core/vision
• I always like to use the example of training for a marathon. You need to take small steps. If I try to run 26 miles tomorrow I would die, but if I have smaller goals I can achieve the overall goal. The same can apply for printing.
• I think it would be way too much to launch Baldrige at this point. You have all these people that you can bounce ideas off of.

• The fact that they played it safe and did not choose another printing company off of, but used a similar type of company allowed them to ask where ink could come from, etc.
• Question 3 who do you think could be a good stakeholder at this point.
• Student: A customer.
• Student: It is too big of a risk because at this stage you do not know what you are doing and to do this in front of an important customer is risky.
• Student: The customer is one of the top priorities. They are the reason you are in business.
• Molly: It is a risk, but there is some payoff.

• Use them as a sounding board. Get them to give ideas.
• Student: I feel that reaching out to customers can be done a little later.
• Molly: How about having early conversations with a regulator.
• Student: The person who should do that is Stacey. One of the customers was asking about sustainability. They should approach him.
• You need to find out if there is a need out there.
• Molly: Who do you think could do this.
• Student: Charlie
• Molly: That person should be your front man. Anyone else?
• I wanted to make a comment that it might be god to include the city and get their ideas. They might be aware of ideas that have not been thought of yet.

• Molly: The nice thing with that is that there is no risk. With the customers, there is some risk when asking questions like this.
• Student: In certain situations there is risk to including regulators early. This could compromise the professionalism of the regulators and this could cause a lot of problems.
• Molly: Your right, however one of the values
• Of the statement was transparency and you do need to stick your neck out a little bit. If you are audited this will help in the end.

• Student: I am not sure that I agree with you. It is not always the case that the regulators will be ethical.

• Molly: It is possible which is why you do not go there with a problem that has not been addressed.

• Student: We might want to check with the marketing dept. There is a middle ground that the marketing dept. can take care of.

• Molly: It could help. This could be a point when CRP could get an independent survey.

• Student: I found a brochure at Starbucks that is informative on social aspects that they are involved in. This is another way to reach out to customers.
• Molly: You should promote what you do well. Kevin just figure out a way to save the company 20 pages of paper per project. Because of this he gets two paid days off.
• Does anyone think there is a stakeholder that we missed?
• Student: The NGOs have a good sense of the community.
• Molly: NGOs can give a lot of advise for projects that are cheap.

• Student: You have to be careful of peoples agendas.
• Student: You don’t have to use everything they suggest. Extremists can be great.
• Molly: This can lead to a more educated employee. It is a way for employees to engage in the business.
• Student: If people do not have the time or money to do these things than they won’t.
• Student: A company has to have a budget for these and they have to have a team. It is a bad idea to get started without having the financial dept. involved.

• Molly: If you can save the company several thousand dollars a year, the savings can be reinvested.

• Student: Green loan fund, - money saved through environmental projects get put back into paying for other projects.

• Molly: A lot of projects pay for themselves so that you are only paying labor costs. It is important to have a true financial commitment up front.

• Student: To prevent overwhelming you don’t want to talk too much about money and legal goals. These can seem unattainable.

• Molly: Keep it simple.
• Student: have a bulleted agenda in the meeting. So that people know what the objectives are.
• Molly: would you give them additional material so that they know what a mission statement is.
• Student: Before the first meeting set up some resources that are useful.

• Molly: Should the meeting be voluntary?
• Student: I don’t know how voluntary it should be, but they should have an idea of what’s going on. Charlie and Nancy should be talking at each meeting.
• Molly: They should be up there absolutely.
• Student: Stake out action plan and timeline.
• Molly: the first meeting should be an hour so that you don’t overwhelm the employees.
• Student: give them incentive with rewards after the meeting.
• Student: You want people to be fresh so if you keep them short this will help. One option is to move the reward to before the meeting. Employees will be involved ahead of time. Need some background info to keep people focused.