IPro 307

PROJECT PLAN

Intermodal Container Transport

Fall 2008

Advisors:

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Team Members:

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Christopher Brewin
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Kwong Cheung
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Tomasz Lis
Plamen Marinov
Bradley Suik

A. **Objective**:

The direction IPro 307 "Intermodal Container Transport" is taking for the 2008 semester is geared toward alternative energy technologies as well as expansion of the capacity and efficiency of a designated rail transfer yard. The selected exploration site is the Norfolk Southern rail transfer yard at 47th street near the Dan Ryan Expressway. Since there is a large amount of on-site equipment (Mi-Jack side loaders, cranes, and yard hostlers), the possibility of introducing alternative fuel technologies exists and can provide a cleaner and more cost-effective solution to air pollution and rising fuel costs. The group will be focusing efforts on using wind power in parallel with compressed natural gas as an alternative fuel, as well as designing innovative ways to improve yard capacity and efficiency. The ultimate goal of this IPro is to develop a plan to increase yard efficiency and output, while at the same time incorporating green technology as an alternative energy source for the facility equipment.

B. **Background**

One of the largest transportation industries in the United States is the railroad industry. Although this industry is linked with the trucking industry to help deliver containers, it stands out as one of the most effective ways to transport large amounts of cargo across the nation. The railroad network consists of intermodal yards at which the containers can be loaded and unloaded for further transportation. These yards are often inefficient as they have tendencies to waste space, create pollution, and provide an influx of traffic to a region. To make the situation worse, future predictions state that the intermodal business will in fact double in the next 5-8 years.

Since Chicago is the 3rd largest intermodal port in the world, these congestion and pollution problems are a rather large issue. The specific yard in question is the 47th street Norfolk Southern intermodal yard located near the Dan Ryan Expressway. However, this IPro will not encompass all issues that are introduced by the intermodal yard. The two main purposes of the Fall 2008 IPro will be introducing green wind power technology and providing a plan and/or design for increasing the yard's capacity, reducing its clutter, and increasing overall efficiency. The equipment provided in this facility is largely that of Mi-Jack, who will also be sponsoring our IPro. Mi-Jack is a large provider, and in fact leader, of intermodal yard equipment manufacturing, sales, service, and support and could benefit from proposals given by the IPro on improving the yard itself.

The Fall 2008 Semester IPro is technically different from previous semesters as it will focus on the improvement of a specific site (47th street) by implementing new and rising technologies. The IPro group will be doing research of several pollution problems caused by the engines used at these sites, the main contributors being diesel engines – on and off road. Also, the group, having taken a trip to the actual site, will use the input provided by the yard personnel to propose ideas for new equipment, site expansion, and storage for containers.

C. **Methodology**

- **a.** Define the Problem:
  - **i.** Double the capacity/efficiency of the Norfolk Southern rail yard.
  - **ii.** Implement alternative energy technology.
- **b.** Describe how the team will go about solving the problems:
  - **i.** The group will be divided into sub-groups with two major areas of focus.
  - **ii.** Sub-Group foci will be Resource Management/green technology and Facility Capacity/Efficiency Expansion.
- **c.** Explain how the potential solution be tested:
  - **i.** The installation of a wind turbine on the IIT campus and the proposed application to be powered by it will demonstrate alternative energy technology.
- **d.** Describe how results of research and testing will be documented:
  - **i.** The wind turbine will have an integrated telemetry system (wattage and amperage output measurement).
  - **ii.** Wind direction testing on top of Machinery Hall at IIT, in order to determine the optimum position for the placement of the wind turbine.
- **e.** Define how analysis of the test results will be conducted:
  - **i.** The results of the wind direction testing will provide an ideal location for the placement of the wind turbines.
- **f.** Explain how the IPro deliverable reports will be generated:
  - **i.** The deliverables will be assigned to teams and/or individuals. They will then be submitted to iGroups for peer review and final submission.
  - **ii.** Assignment of deliverables will be decided by the IPro group as a whole.
  - **iii.** Individual research and presentations will be prepared and presented at specified dates established by the group. They will be reviewed and discussed by the group as a whole.

D. **Expected Results**

a. Working windmill which will power a specific application
b. Telemetry system to display watt and amps generated
c. Wind mill applications: lighting systems, compressors for CNG
d. Reduction in air pollution on-site; cost efficiency for the yard
e. A functioning wind mill with direct application
f. Sponsor expects green technology implementation which will be available at the end of the semester.
g. Wanted to convert diesel engine in yard equipment to run on CNG compressed by wind energy.
h. Design of compressed natural gas pumping station
i. Improvement of yard capacity/efficiency

E. **Project Budget – Sponsored by Mi-Jack**

Itemized budget for IPro 307:

24 Volt Wind turbine (400 Watt)	$500
48 Volt Wind turbine	$500
24 Volt inverter	$40
Deep cycle batteries x2	$67 each
Voltmeter	$20
Printing/Plotting costs	$35
Total:	$1229

F. **Overall Schedule/ Schedule of Tasks**

- General Deliverable Schedule

Ipro Faculty Orientation	8-20,21,25-08
First 307 group meeting	8-26-08
Team building session	8-26-08
Turn in curriculum vitae	8-26-08
Project management seminar	9-4-08
NS railroad site visit	9-9-08
Business planning seminar	9-11-08
Innovation and design seminar	9-18-08
Project Plan	9-19-08
Midterm review presentation	10-6 - 10-15 TBA
Ethics statement	10-15-08
Poster / Exhibit	11-26-08

Brochure / Abstract	11-26-08
Final Presentation	12-3-08
Final Report	12-4-08
Ipro Day	12-5-08
Ipro Deliverable CD	12-5-08

	Start Date		Finish Date
Alternative Fuel Technologies			
Diesel Engine Mandates	8/26/2008		9/2/2008
(Tier Designations)			
LNG CNG fuel alternatives	8/26/2008		9/2/2008
Assembly of 400 Watt wind mill	8/26/2008		9/4/2008
(IIT site)			
Research of required permits	8/26/2008		
Design of wind-mill telemetry system	9/2/2008		
(voltage/amperage output)			
Compressed natural gas storage area	9/2/2008		9/4/2008
Pumping station research			
Compressed natural gas storage area	9/2/2008		
Pumping station design			
Wind mill preliminary tests	9/2/2008		9/4/2008
Purchase of deep cycle batteries	9/2/2008		
Purchase of inverter	9/2/2008		9/11/2008
Natural gas pipeline national research	9/4/2008		9/16/2008
Comparison of Mijack and yard trucks:	9/4/2008		
CNG vs. current fuel			
Mijack subsidiary - Q-sales site visit	9/11/2008		
Proposal for purchase of second windmill	9/11/2008		
Freight transportation statistics presentation	9/11/2008		9/16/2008
Natural gas pipeline international research	9/16/2008		

NS Site Exploration					
Preparation for site visit			8/26/2008		9-9-08
Configuration and printing of aerial map			8/26/2008		9/2/2008
		(large scale)			
Research on NS. Site/neighborhood zoning			9/2/2008		9/11/2008
		designations			
Determination of building uses in			9/2/2008		
		neighborhood			
Occupancy survey of surrounding			9/11/2008		
		neighborhood			
Audio to mp3 conversion of NS site meeting			9/11/2008		
Follow up questions for NS railyard			9/11/2008		

Estimate of hours needed:

- Roughly 4.5 hours needed for each task which included research and presentation.

Task member requirement:

- So far, each task has been completed individually.
- Subgroups have been established to deal with task-specific items on the agenda.

G. **Individual Team Member Assignments**

Name	**Major**	**Task Responsibility**
Xavier Alacron	Civil Engineering	Sub-Group 2 Team Leader; CNG station design, along with safety and efficiency improvements.
Kwong Cheung	Civil Engineering	Research and collection of data for transportation nationwide
Michal Kaska	Mechanical Engineering	Sub-Group 1 Team Leader; In charge of emission mandates, wind turbine implementation, and project management.
Irina Magdel	Civil Engineering	CNG distribution and storage research.

Linh Nguyen	Architecture	In charge of obtaining permit requirements for construction of wind turbine.
Bradley Suik	mmae	Development of the "flipper" for yard truck traffic improvement.
Daniel Fuentes	Architecture	Site analysis -zoning and habituation- to increase yard capacity
Andrew Kedzuch	Architecture, mmae	Wind turbine assembly and circuit design as well as intermediary with Zero Energy Ipro.
Plamen Marinov	Mechanical Engineering	Design of new locking mechanism or coupling device for joining stacked containers together.
Christopher Brewin	Mechanical Engineering	Wind turbine assembly and installation; CNG engine conversion research for yard equipment.
Krzysztof Slomiany	Mechanical Engineering	In charge of emission mandates, wind turbine implementation, project management, master schedule maker
Tomasz Lis	Architecture	Expansion process for the facility; 'leveling floor space' concepts and design
Ryan Loquidis	Engineering management	

Group 1 – Resource Management – This group is responsible for setting up the provided/purchased wind mill to help power developed applications. This group will assemble a demonstration of wind technology.

Key Objectives Include:

1. Setting Up Wind Mill on flag pole or iit building.
2. Attaching wind mill to established circuit from zero energy lab.
3. Demonstration of working circuit as green wind power technology.
4. Possible integration of technology into railroad yard.

Members of this group are (may change throughout semester):

- Michal Kaska
- Plamen Marinov
- Krzysztof Slomiany
- Andrew Kedzuch
- Kwong Cheung

Team Leader: Michal Kaska

Group 2 – Facility capacity expansion – This group is responsible for increasing the capacity and efficiency of the yard, along with developing the applications for green power. This group will plan out the use of and utilize the green(er) power provided by the resource management group.

Key Objectives Include:

1. Design of a "Flipper" (unassisted container release from chassis).
2. Implementing a design to increase the yard size (by reducing clutter, improving storage, etc.).
3. Floored Parking
4. Limit International Storage for containers.
5. Permit requirements for raising wind mill.
6. CNG pumping station designs; CNG conversions.

Member of this group are (may change throughout semester):

- Xavier Alarcon
- Tomasz Lis
- Linh Nguyen
- Bradley Suik
- Daniel Fuentes
- Ryan Loquidis
- Irina Magdel

Team Leader: Xavier Alarcon

The two groups will coordinate their efforts to reach the general goal of improving the capacity and efficiency of the yard while implementing green energy technology..
IPro Team Leader and Advisor is Laurence Rohter.

H. Designation of Roles

- Teamwork is an important part of the process required to arrive at a final goal. The necessary skills needed to become a leader for a project in the future will be learned during the various tasks assigned in this IPro. Therefore, IPRO 307 implements a form where every member of the group will be a meeting leader as well as minute taker at some portion of the project; the position will be rotated using an indexing method.

- The subgroups are identified in section G. The time keeping process was done using a secretarial position for each meeting where the secretary would record the discussion and would assume the responsibility of session leader for the next meeting.

- The IPro Team Leader would request and/or provide tasks to be completed and assign specific agendas for the entire group. From there, tasks would be divided

amongst people and “deliverables” such as presentation would be shown the following session or whenever they were scheduled. “Time keeper” in this IPro is assumed by the position of session leader.

- Master Schedule maker role was taken up Krzysztof Slomiany as listed in previous section.

- iGroups was used jointly whenever project or presentation needed to be posted for reference for the rest of the group. This was and is an effective communication tool for this IPro.