EDSGN 100
Section 001

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Spring 2015

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Submitted to:
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25 Apr 2015
ACKNOWLEDGMENTS

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SECTION 1  EXECUTIVE SUMMARY

Nearly 50% of the hardwood in America is used to produce wood shipping pallets. A large positive environmental impact can result from recycling wood from broken pallets to make new pallets and shipping the scrap to a mulching plant. Located just 40 miles south east of Steelton, PA is the pallet recycling plant IFCO. An exchange program can be set up between ArcellorMittal and IFCO to allow for broken pallets to be replaced with new pallets. And scrap from the IFCO plant can then be sent to H&H Excavating in Spring Creek, PA where it can then be turned in to mulch and sold all across Pennsylvania. This plan will completely eliminate waste from being diverted to local landfills.
SECTION 2  

INTRODUCTION

2.1  PROJECT OBJECTIVES.
Reduce ArcelorMittal’s waste stream at one of its facilities by designing an opportunity to reuse and/or recycle one or more of the largest sources of refuse: pallets from incoming material delivery, empty drums or totes received from delivery of fluids, and waste refractory brick.

2.2  PROJECT BACKGROUND.
Steel is one of the most common materials used by modern societies. It is also a good example of a resource with large known reserves that are finite. As with most of the finite resources we utilize, our industries that use iron and steel initially developed a linear production cycle (see figure below, from www.storyofstuff.org), often referred to as “Cradle-to-grave.” Given that iron is seemingly abundant in the Earth, it was common for steel to be disposed of like everything else: in a landfill.

2.3  SPONSOR BACKGROUND.
Our partner in this project is ArcelorMittal USA, the largest steel producer in North America and the largest integrated steel producer in the United States. ArcelorMittal is the leader in all major global steel markets, including automotive, construction, household appliances, and packaging. It is the world’s largest and most global steel company by both revenue and production, with over 285,000 employees in 60 countries.

ArcelorMittal operates in three divisions in the USA: Flat Carbon, Long Carbon, and Tubular. The Steelton, PA, plant is in the Long Carbon division. Similar to the other Long Carbon plants, the Steelton plant manufactures steel from recycled scrap metals. This plant has a liquid steel making capacity of about 1.1 million net tons of steel per year. Product lines include cast and rolled blooms for the forging and re-rolling industries; rails for railroad, transit, and crane application; rolled billets, squares, and flats; construction equipment sections; and large diameter specialty ingots.

2.4  PROJECT CATEGORIES.
- Technical report containing the following elements
  - Team-generated definition of sustainability
  - Rationale for the opportunity identified
  - Description of alternative concepts and their evaluation
  - Implementation plan
  - Assessment of the amount of waste diverted from landfill
  - CAD drawings detailing the design solution(s)
- Systems diagram
- Prototype/model of system
- Complete list of design concepts
2.5 PROBLEM STATEMENT.
Reduce ArcelorMittal’s waste stream at the Steelton, PA plant to promote sustainability and reduce the amount of waste sent to local landfills.
SECTION 3  METHODOLOGY

3.1 SUSTAINABILITY.
Conserving an ecological balance by avoiding depletion of natural resources.

3.2 RATIONALE FOR SELECTION.
Of all the hardwood logged in the United States, nearly 50 percent is used for pallets which are frequently used only once and then sent to a landfill. This amount of consumption in resources isn't sustainable. A small difference in how pallets are recycled and maintained can result in a large positive impact on the environment.

3.3 DESIGN CONCEPT.
To increase the number of uses for each pallet and re-purpose scrap wood from broken pallets. The company IFCO, located 45 minutes from Steelton, repairs pallets that would otherwise be used once and sent to a landfill. The scrap wood from pallets that can’t be repaired can then be sent to the mulching company H&H General Excavating, located 20 miles east of the IFCO plant. After the wood is processed into mulch, it will be sold to consumers all across Pennsylvania.

3.4 REGULATORY ISSUES.
This process passes all of the regulatory issues onto IFCO as they will be in charge of the refurbishment and redirection of waste to the mulching facility, H&H General Excavating.
3.5 **STAKEHOLDERS.**

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Stakeholder’s Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>Job security</td>
</tr>
<tr>
<td>Customers</td>
<td>Constant supply of pallets</td>
</tr>
<tr>
<td>Suppliers</td>
<td>Provides pallets that can be refurbished or chipped down to create mulch</td>
</tr>
<tr>
<td>Creditors</td>
<td>Supplying credit</td>
</tr>
<tr>
<td>Community</td>
<td>Reduction in landfill use of the local area, provides jobs</td>
</tr>
<tr>
<td>Trade Unions</td>
<td>Employee protection, employment</td>
</tr>
<tr>
<td>Owner(s)</td>
<td>Profitability, company growth</td>
</tr>
<tr>
<td>Investors</td>
<td>Return on investment</td>
</tr>
</tbody>
</table>

3.6 **ASSESSMENT OF AMOUNT OF WASTE DIVERTED FROM LANDFILLS.**

If ArcelorMittal were to recycle 10,000 pallets to IFCO and estimated 250 tons of scrap would be diverted from landfills and 610 trees saved. This estimate comes from the environmental impact calculator on the IFCO website.

3.7 **ECONOMIC ASSESSMENT.**

This estimate is based on ArcelorMittal recycling 10,000 pallets. The Pennsylvania IFCO location is 45 miles away from Steelton, PA. A standard 53’ trailer can hold approximately 920 pallets. This would allow for 12 trips, once a month, per year. Assuming the trucks get 8.5 mpg, the yearly cost for the transfer of pallets would be $465.90 for fuel plus the cost of the driver.

3.8 **SYSTEM DIAGRAM/MODEL.**

< Provide both a physical or virtual conceptual design model that describes and represents the proposed solution; and a systems model of the waste stream process with your design team’s conceptual design solution.>
3.9 ENVIRONMENT IMPACTS.

Pallets typically received by ArcelorMittal are scrapped after only one use, filling up local landfills and having a negative impact on the environment. In this plan, pallets that would typically be scrapped would be sent to the IFCO recycling plant. At the plant, pallets are disassembled and the good boards are re-purposed into new high quality pallets. An exchange program (InXchange) would be set up between IFCO and ArcelorMittal so that as ArcelorMittal drops off broken pallets, a number of re-purposed pallets could be taken back to the Steelton. The boards that are beyond repair are sent to a mulching plant (H&H General Excavating). The boards are then broken down and sold as mulch to consumers all across Pennsylvania. This redirection of the waste stream allows for 100% recycling of all pallets and will generate no waste sent to local landfills.

3.10 PRODUCT DEVELOPMENT AND MARKETING.

The process of recycling these pallets starts when they leave the ArcelorMittal plant and shipped to the IFCO plant. From there, they disassemble the pallets to determine which pieces of wood are reusable and which ones will be shredded for further recycling. ArcelorMittal will have a meeting with IFCO to create a contract that will determine their monthly excess of pallets which will be given to IFCO through their InXchange program and how many recycled pallets IFCO will return. From there, IFCO can do what they please with the remaining pallets.
SECTION 4 SUMMARY

There are many benefits for this concept design upon its implementation. The biggest one is that cuts back on the waste of these pallets. Just by recycling the pallets used in a year, over 250 tons of waste will be diverted from landfills while over 600 trees will be saved. The only possible shortcomings would be on IFCO if something were to happen on their end where they couldn’t hold up their part of the deal. By implementing this design, ArcelorMittal would see a decrease in their operating costs since they would be recycling pallets, not replacing them. The adoption of this plan is a breeze for ArcelorMittal. They have absolutely nothing to lose by implementing this design. All they have to do is create a contract with IFCO on the exchange of pallets and they are done. They just have to ship pallets to IFCO and they will get recycled ones in exchange. It’s that simple.