ArcelorMittal-Concept Solution Presentation

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Preliminary Ideas

• **Purchase and Preparation-Jose**
  - Purchase automobiles and used equipment.
  - Pass it through Heavy machinery to shear and bale metal

• **Magnetic Separation-Yu Jin**
  - Use large Electromagnet to sort Ferrous and non ferrous material.
  - Further sort metals based on conductivity.
Preliminary Ideas (2)

- **Electrolysis – Len Metkowski**
  - First create an aqueous solution of all metals.
  - Pass a direct current through mixture causing ions to be drawn to a positive cathode.
  - Solid metal will sink to the bottom.

- **Melting Point Separation - R.J. Carswell.**
  - Separate all metals by melting point.
  - Tin and other impurities will be removed.
Final Solution

- We chose to integrate two solutions into one final.
- First separate ferrous and non-ferrous metals via electromagnetic drum.
- Second, Use properties of Melting Points to further purify and sort metals.
# Solutions Matrix

<table>
<thead>
<tr>
<th>Criteria/Requirements</th>
<th>Weight Factors (WF)</th>
<th>Chemical Separation</th>
<th>Electrolysis</th>
<th>Magnetic Separation</th>
<th>Collection Of Scrap</th>
<th>Concept Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate Alloy From Scrap</td>
<td>0.3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Scarp Cycle Management</td>
<td>0.1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Avoid Off-Chemistry Heat</td>
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<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Material Usage</td>
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<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Energy Usage</td>
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<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Totals</td>
<td><strong>2.6</strong></td>
<td><strong>3</strong></td>
<td><strong>2.1</strong></td>
<td><strong>1.3</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Separation By Melting Point*
Magnetic Separation

- This magnetic separation consists on a belt that end up in three different recipients which each have different levels of magnetic strength. The high iron metals get attracted to one, the low iron metals to another and the non-metals to the last one.
Magnetic Separation

- Material moves on a rotating belt.
- High iron sticks to the belt and is further processed.
- Non iron is disposed of in a separate bin.
Melting Point Separation

Pros:
- Separate all alloys from steel and/or pig iron
- Easier to make new products and more
- Product is pure steel

Cons:
- Slower
- More expensive
- Needs very accurate precision, easy to go past temperatures