Recycling of Advanced High Strength Steel (AHSS)

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Definition of Needs & Requirements

ArcelorMittal USA is attempting to add improve their recycled steel making process in order to cope with the increased amount of high alloy steels present in the new influx of modern automobiles. Our partner company uses a basic oxygen furnace (BOF) to convert scrap steel into pig iron, which acts as a 'pure' base for the rest of the steelmaking process.

The 2012 Spring PSU Engineering Design student teams have been given the task of identifying a method for separating and identifying the steel scrap in order to prevent Off-Chemistry Heats in the BOF steelmaking process. This is the priority task. If possible, teams should also attempt to decrease Alloy Costs by ensuring that a particular amount of desired alloy is already present in the Low Carbon Aluminum Killed (LCAK) Steel charge.

Priority Task: **Prevent Off-Chemistry Steel -- (Creating LCAK Steel)**

- Create a scrap separation technique that will allow us to identify an accurate quantity of maximum scrap steel that can be thrown into the melting pot / oxidizable charge of Iron Oxide & Scrap mix
- Calculate the maximum amount of this scrap that can be added "utilizing a heat size of 440,000 lb with up to 15% scrap charge.
    - Using the BOF Steelmaking Ellingham diagram, we can identify the 'breaking point' at which

Secondary Task: **Decrease Alloy Costs -- (Creating Line Pipe)**

- Calculate the maximum amount of scrap that can be implemented to create line pipe (which has a higher alloy content, particularly in Manganese, than LCAK)
    - "Use chemistries of AHSS & Line Pipe to demonstrate the model"