Reducing Internal Fuel Cost by Improving Operational Procedures

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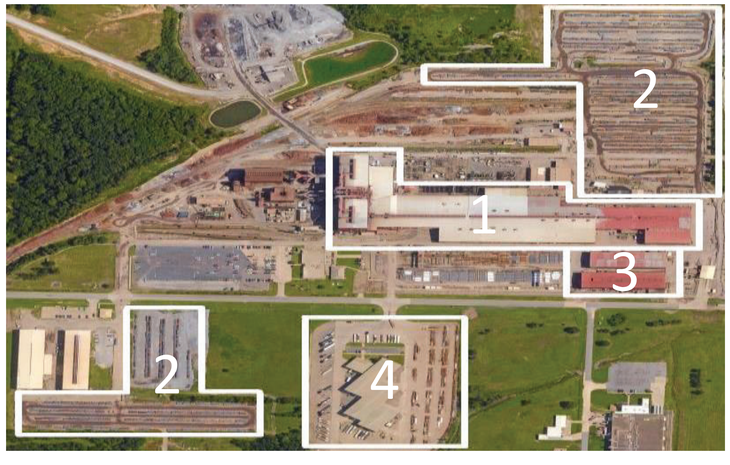
Project Overview

- Gerdau is a steel manufacturer headquartered in Sao Paulo, Brazil and is the 18th largest steelmaker in the world
- Our project goal is to reduce the amount of fuel used to transport material within the North and South stockyards at the Fort Smith, AR facility by 5%
- On average, the facility uses 241 gallons of fuel per day and spends $233,000 annually on fuel
- Fuel consumption was reduced by creating an improved stockyard layout with operational procedures for the material handlers
- A VBA tool was provided that identifies the ideal location for each new bundle entering the yard and tracks progress throughout the implementation process

Current Process

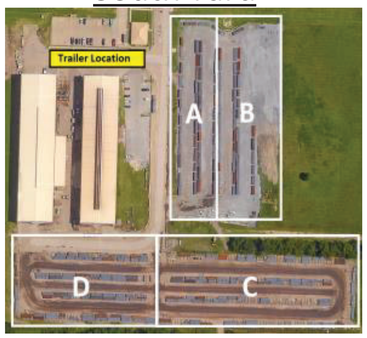


1) Steel bars are cast in the main rolling mill and wrapped into bundles
2) Steel bundles are transported via trailer to North or South stockyard to be held as inventory until time to undergo finishing process
   - Bundles are then unloaded from trailer by forklift and placed in a random, open yard location, then reloaded on the trailer later when further movement is required
3) Bundles are taken to their scheduled finishing process via trailer and returned to stockyard after completion where forklifts place them in the yard again
4) Once the entire customer order is complete, bundles can be transported to the customer by rail, shipped to them via Maverick Shipping, or picked up by the customer themselves

Alternative Generation

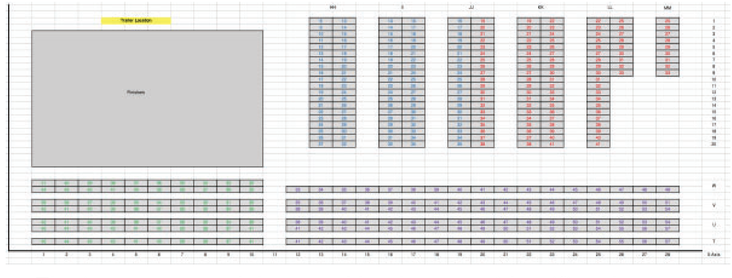
North Yard

South Yard



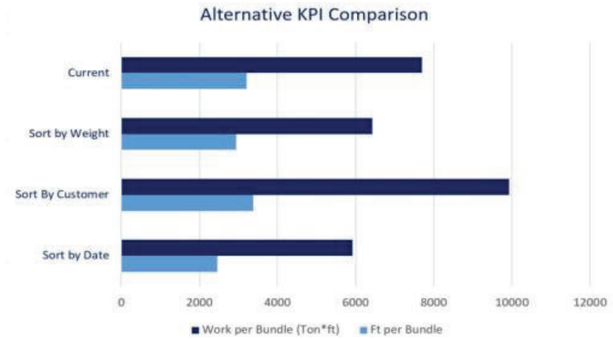
- Bundles are transported via forklift from the highlighted trailer location to one of the labeled areas
- The section closest to the trailer location (Area A) is the forward area that is dedicated to high priority steel bundles
- Steel bundles with the highest priority will travel the shortest distances, while the low priority bundles will travel longer distances to the reserve area (Areas B-D)
- Priority for the three alternatives evaluated was determined by weight for better fuel efficiency, due date for better travel distance, and customer for easier batching of orders
- The current process allows for greater utilization of space using a random storage policy, but it sacrifices travel distance

Evaluation



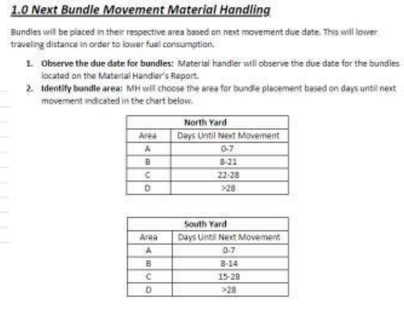
- The inventory model created by the team identifies the rectilinear travel distance from the trailer location to each potential storage location with units of bundle widths where 1 unit equals 25 feet
- The model takes current inventory levels and evaluates the locations where each bundle could be placed to minimize travel distance of the forklifts in a single command system
- After assigning locations to the bundles, the model takes the current layout and outputs several KPIs including feet traveled per bundle and forklift work per bundle

Results



- Organizing the stockyard by due date resulted in the lowest distance travelled by the forklifts and the least work done by the forklifts allowing for better fuel efficiency
- The due date alternative will result in a decrease in travel distance of 15% after complete reorganization of the yards
- The fuel consumption will approach a decrease of 15% as the reorganization progresses, surpassing our goal of a fuel reduction of 5% with an ideal cost savings of $20,970 per year

Deliverables



1.0 Next Bundle Movement Material Handling

Bundles will be placed in their respective area based on next movement due date. This will lower traveling distance in order to lower fuel consumption.

1. **Observe the due date for bundles:** Material handler will observe the due date for the bundles located on the Material Handler's Report.
2. **Identify bundle area:** MH will choose the area for bundle placement based on days until next movement indicated in the chart below.

North Yard	
Area	Days Until Next Movement
A	0-7
B	8-21
C	22-28
D	>28

South Yard	
Area	Days Until Next Movement
A	0-7
B	8-14
C	15-28
D	>28

- The VBA decision support tool combines current inventory data with new bundles entering the yards to output the suggested location of all new bundles entering the yard based on due date
- The tool calculates the percentage of the ideal travel distance that Gerdau is currently achieving and plots it on a line graph to easily monitor progress
- A Date Specific Material Handling Procedure provides an eight-step operational instruction guide to implement the new layout based on criteria from the VBA tool
- The procedure incorporates the same formatting as their current instructions to ensure an easier transition for the material handlers