

**Michigan State University**  
**College of Engineering; Dept. of Electrical and Computer Eng.**  
**ECE 480 Capstone Design Course Project Charter**  
Optical Verification of Steel Coil Rail Car Loads

**Sponsoring Company: ArcelorMittal USA**

**Contact Information:**

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**Background Information:**

Steel coils produced at the Indiana Harbor facility are transported in a handful of methods. One of the most utilized methods is rail. Tracking the correct coil into the correct rail car is primarily a manual process – and there are occasional errors. These errors can result in lost product and late deliveries.

**Business Case:**

- Occasionally, coils are not placed into the correct rail car resulting in lost coils or late deliveries.
- Currently, the method to record Rail Car Identification Numbers is largely manual – the number is written down and typed into the computer – and inefficient when compared to automated methods. Errors do occur using this system. Time is lost if the user realizes an error and must return to the rail car to verify the ID number.

**Project Intellectual Property Considerations:**

- Will the student Design Team be required to sign a Non-Disclosure Agreement?
  - No
- Will the Design Team be able to post their work on the course web site?
  - Yes
- Will the student Design Team be working with technology contained in pending patents not yet granted?
  - No
- Can the electronic design be shown, but the embedded software protected?
  - Yes

**Opportunity Statement:**

- Automated recording of rail car ID numbers and steel coil ID numbers can eliminate manual data recording and entry errors that result in lost or late shipments. By reading the general area of the rail car ID number and scanning the bar coded tag of each coil, software within the tablet will confirm or flag the rail car prior to exiting the loading facility.

- This is an ongoing issue that can be resolved with the 13 week semester.
- The initial benefactor of this project will be the ArcelorMittal Finishing & Coating Division at Indiana Harbor.
- The benefits of this project will be automated verification that coils are loaded into the correct rail car in an efficient and accurate manner.

#### **Deliverables:**

- The Design Team will deliver the project to either Jim Lang or a representative of ArcelorMittal Indiana Harbor at the Spring Design Day (May, 2017).
- Project report as delivered to the Professor of this class.
- Working prototype / Demonstration (at Design Day) that the software works as designed.
- Software or Application in electronic and written format.
- “User Manual” for the End User of this user friendly software.

#### **Goals:**

- Electronic confirmation of rail car loading of steel coils.
- Confirmation is immediate (After scanning all coils in the rail car) and is obvious to the user that the load is either verified or rejected..
- Tablet optical character recognition (OCR) software that can read a Rail Car ID number (Similar to cameras at intersections recording license plate information).
- The Tablet will scan the coil ID stickers (Bar Codes) for coils loaded in the or on the rail car (Examples will be provided at a later date).
- Ability to manually enter the Car ID number if the automated function fails. But only the rail car information can be entered manually, all coils must have a bar code tag that is scanned.
- Time and date and results of the verification is recorded and later transferred to the server..
- Data is stored within the Tablet and transferred to a host server on demand over Wi-Fi (Tablet may not be in range of Wi-Fi when recording data).
- All User interfaces are simple – user friendly.

#### **Scope:**

- The Rail Car Loading information will be generated by ArcelorMittal systems (What coils should be loaded in each rail car) and synchronized on demand with the Tablet. Students will be given sample data to work with; the actual synchronization will be engineered by ArcelorMittal.
- Rail Car ID Numbers can vary in color (Black or White) and font. Rail Car Backgrounds can be black, gray, brown and there is a possibility of interference via graffiti. The software must recognize the ID number (Examples provided).
- Rail Car ID Numbers may be linear (All in one line) or the ID may take up two lines.
- The user will take a picture of the rail car in the vicinity of the ID number.
- The user will also scan each of the coil Shipping Tags that are loaded in each car.

- Data gathered at the inspection site will be stored within the device until it can be transferred via Wi-Fi (preferred) or a docking station.
- Use any free PC based database software like MYSQL Community that is able to upload the data to a server based system.
- ArcelorMittal will manage the data once it is uploaded into the server. There are no provisions needed for long term storage of the data in the tablet – once uploaded the data in the tablet can be erased.
- Tablet make and model will be provided at a later date.

**Project Team:** (Completed once semester begins)

Name	Responsibility

**Faculty Advisor:** (Assigned by ECE Dept . based on project requirements)

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See next page for examples of rail cars







