The speed read by Symeo was compared to the values read by the ground truth system to verify the accuracy of the sensor under the harsh conditions found at Essar (winter climate, extreme heat, interference, dust, etc.). The functional limits of the sensor in terms of maximum operating speed, distance, and height were also explored. The team also developed prototype programmable logic controller (PLC) code for integrating the Symeo radar into a collision avoidance system to be used on the locomotives in the coke-making process at Essar.

**Project Statement:**
Fully research and test a radar-based position sensor, made by Symeo GmbH, to determine if it is appropriate for use at Essar Steel Algoma Inc. The purpose of the testing was to verify the accuracy of the sensor under the harsh conditions found at Essar (winter climate, extreme heat, interference, dust, etc.). The functional limits of the sensor in terms of maximum operating speed, distance, and height were also explored. The team also developed prototype programmable logic controller (PLC) code for integrating the Symeo radar into a collision avoidance system to be used on the locomotives in the coke-making process at Essar.

**Project Benefits:**
The collision avoidance system using the Symeo position sensor will greatly reduce the risk of collision on the track between the two locomotives. The project also sets the stage for possible automation of the coke-making process by future senior project teams.

**Project Outcomes:**
Symeo radar-based position sensor was found to be accurate enough for use in a collision avoidance system
- Reports on the testing results, and the interfacing of the Symeo radar-based position sensors
- Baseline analysis of the current coke-making process to help with a possible future automation of the locomotives
- Prototype PLC code of a collision avoidance system

**Testing Description:**
- To simulate the locomotives on the track, one Symeo antenna was placed in the back of a truck and a second one was mounted on a static stand
- The tests were run at different speeds and under static conditions
- A proximity switch triggered the saving of the values read by Symeo at known distances for comparison
- The speed read by Symeo was compared to the value obtained from a GPS
- Tests performed include maximum distance, maximum speed, minimum height, operation under extreme weather conditions, and various interferences

**Prototype Code Description:**
- Indicates the location of both locomotives, their status on the track and the separation between them
- Alert the operator if the distance between the locomotives is less than 200 feet
- Alert the operator of any communication issues between the Symeo radar, the PLC, and the HMI