AGV (Automated Guided Vehicle) On Board Charging

**KUBOTA**

**PROBLEM STATEMENT**
- Kubota wants a way for their AGVs to be able to charge while working.
- Current solution requires workers to manually move AGVs to a drop cord to charge.
- With 2nd 10-hour shift added, that only leaves 4 hours of charging for roughly 100 AGVs.
- AGVs have two 12-volt batteries that are in series which works as a 24-volt battery.

**REQUIREMENTS**

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<th>Description</th>
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<td>1</td>
<td>Safety is Kubota’s #1 priority. Concepts must follow Kubota safety guidelines. Concept ideas must be safety guards to prevent anyone from hurting themselves accidently and intentionally.</td>
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<td>2</td>
<td>Positive net power output</td>
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<td>Must not affect cycle time</td>
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<td>Must be able to withstand harsh environments including dirt, dust, minor impacts, and damp environments</td>
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<td>5</td>
<td>Concept must be adjustable. That way in the future if Kubota makes any modifications to AGVs (x, y, z) coordinates, maintenance can easily change height/position.</td>
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**FINAL DESIGN, APPROACH, PLAN**
The team created two separate boxes, as well as an adjustable arm to enable adjustability in 3 different directions per Kubota’s request.

**CONCEPTS**
- Initial concepts that were considered approaches
  - Alternator/Belt
  - Wireless Charging
  - Copper Bar Contact

**RESULTS**
The construction of the station went mostly as planned. However, due to a lack of testing in the PLC and electrical components, the product does not fully work.

**SUMMARY AND CONCLUSIONS**
The team anticipates a complete product. The mechanical components of the project are complete, and the electrical components are complete, but the bus bars are not getting as much power as they should be.

Many requirements set in place for the project were completed such as the adjustability in three different directions, as well as an out of the way product solution that will charge the AGV while it is still on its route.

With more time, the team would expect to be able to see the product working alongside an AGV at Kubota.

**FUTURE WORK**
The Charging box and the guarding box will need to be made from a heat resistant plastic so the heat and electricity from the bus bars will not be dangerous. The contacting mount will need to be machined to prevent breaks from collision and wear. The interfacing from the contact and the bus bars will need to be perfected.

On the electrical side, the problems with the bus bars not getting enough power will need to be addressed. There will need to be more testing so the problem can be found and fixed.

**TEAM & ACKNOWLEDGEMENTS**
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