

QuickLoadz Intermodal Robotics: Automated ISO Container Handling Facilitates Faster, Safer, More Efficient Transport of Global Resources

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Background/Objectives. Ninety percent of the world's freight travels in ISO sea shipping containers, a process referred to as Intermodal Freight. The intermodal system created world trade by decreasing freight cost more than 90 percent. However, the handling of shipping containers has not changed in the 50 years since their invention. It remains inefficient and energy intensive making it ripe for technology disruption. Traditional freight infrastructure requires expensive gantry cranes, loading docks and millions of truck chassis. Introducing automation, ground-level loading and hybrid-electric power trains fundamentally improves freight and logistics by creating efficiencies, savings and new opportunities. Not only do these changes reduce the carbon footprint of global trade, they expand access to commercial and institutional resources previously available only in limited geographies with vast infrastructure. Automated ground-level loading increases efficiency and reduces waste. The current intermodal freight system requires trans-loading from sea shipping containers to dry freight vans and into and out of warehouses. This multi-step process requires additional handling, delays and carbon intensive infrastructure. If ISO containers can be picked up and put down directly with the truck trailer without additional equipment it is estimated that 19 out of 20 trailers would not need to be built. It is further estimated that one-half of delivery trucks and two-thirds of loading docks could be eliminated. These increased efficiencies expand beyond just the handling of the materials in the container. Worldwide, farmers can load directly into field-side ISO containers and send those containers onto the intermodal system. The time savings mean less food and fuel waste. Humanitarian aid distribution takes a giant leap forward when containers full of relief supplies can be dropped directly where they are needed in a secure ISO container warehouse. An automated container chassis that requires no additional equipment to move freight is the next step in handling. Coupled with the autonomous truck, automated handling facilitates truly autonomous movement of freight. In addition, hybrid electric power and regenerative braking creates energy storage that can provide additional auxiliary power for communications or extend the lifetime of refrigerated units. Current research indicates a gain of at least a 25 percent fuel savings for traditional vehicles – making any vehicle essentially a hybrid.

Approach/Activities. QuickLoadz Intermodal Robotics developed, patented and commercialized an automated system that can move loaded 40-ft ISO containers at the ground level with the push of a button. The company is working to integrate an electric power pack and hybrid-electric regenerative braking at its Athens, Ohio advanced manufacturing facility. The project requires electric and mechanical engineering, advanced robotics and design materials. The company is also working to launch the existing technology in a port or military installation to evaluate its applications and savings. This technology has been improving efficiencies in transport for more than 5 years. The next generation will expand those savings even more.

Results/Lessons Learned. Current users include INL and U.S. PACCOM as well as enterprise providers of sanitation equipment, recyclers and food services. Commercial users report a 30% increase in efficiency as well as greatly improved ease of use. QuickLoadz technology has interest from myriad users including UNDP, U.S. Armed Forces, and major maritime enterprises. QuickLoadz aims to capture more data to quantify the energy savings.