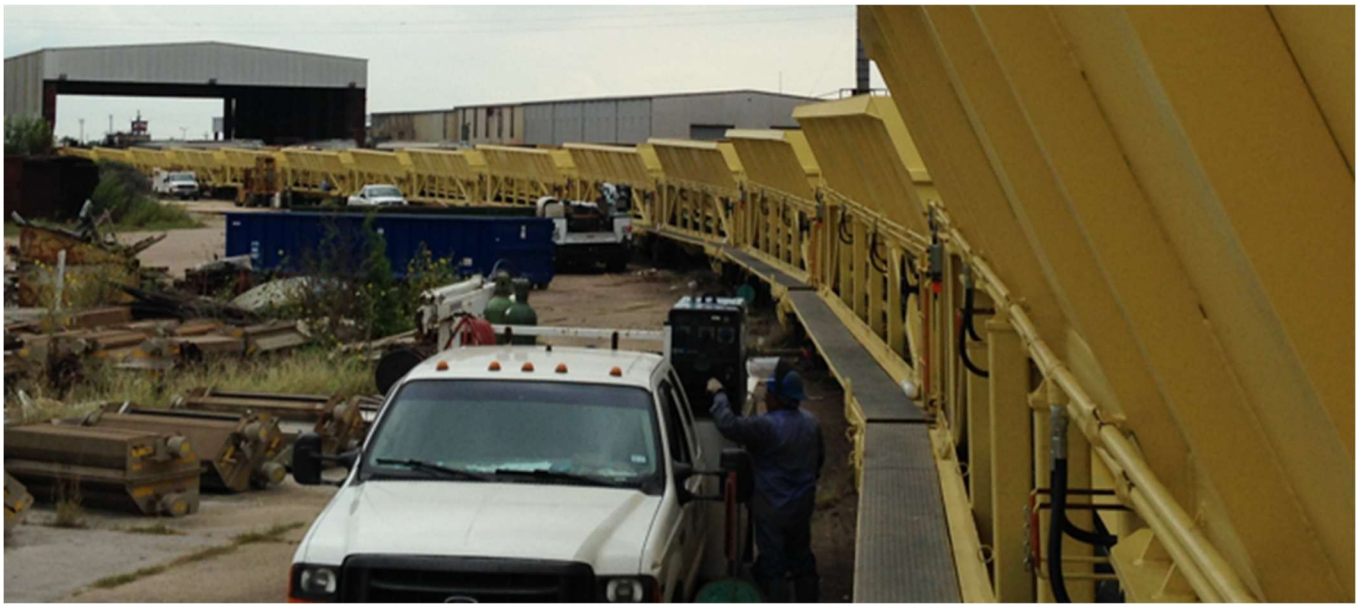
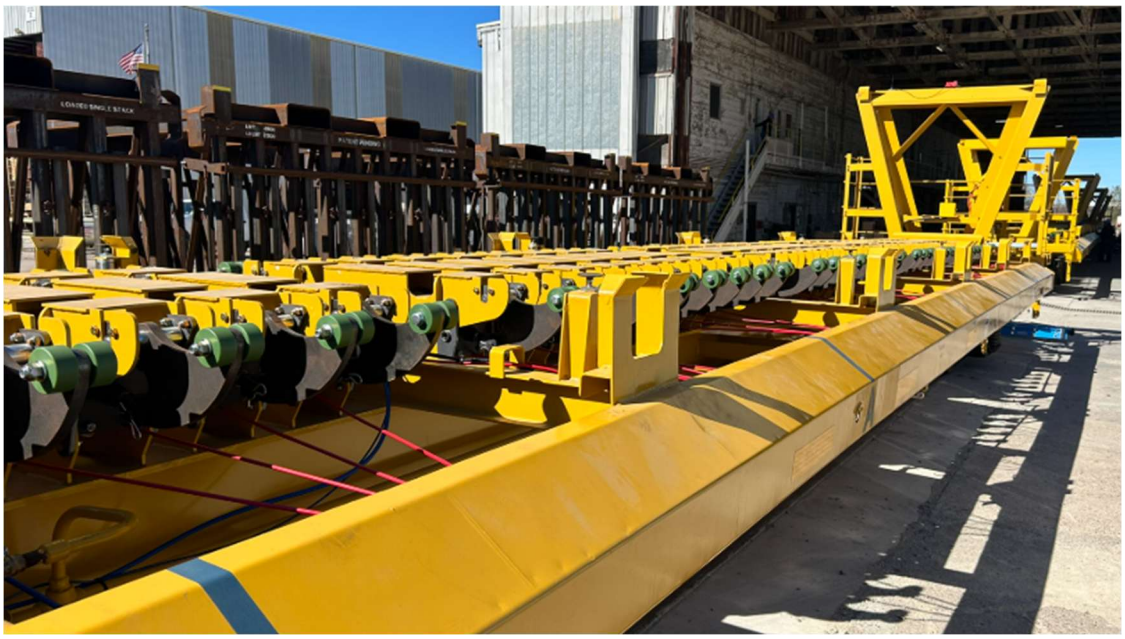
Charles Aaron P. E. Design and Innovation Portfolio

Dump Train for Curves ®: Self-Unloading Aggregate Delivery Train which can operate in any degree of railroad curvature, along with many other improvements over its predecessor the original Dump Train ®, but one of the limitations of the original Dump Train was it could only operate in relatively straight track. GREX had attempted and failed to design a Dump Train which could operate in a curve prior to my involvement in the product line. I innovated, developed, designed, built and patented the GREX Dump Train for Curves. The success of this project played a large role in my promotion to Director of Engineering.
US Patent: 9868451, https://www.freepatentsonline.com/9868451.pdf
Weblink: https://loram.com/maintenance-of-way/material-handling/dumptrain/ (click Video tab)



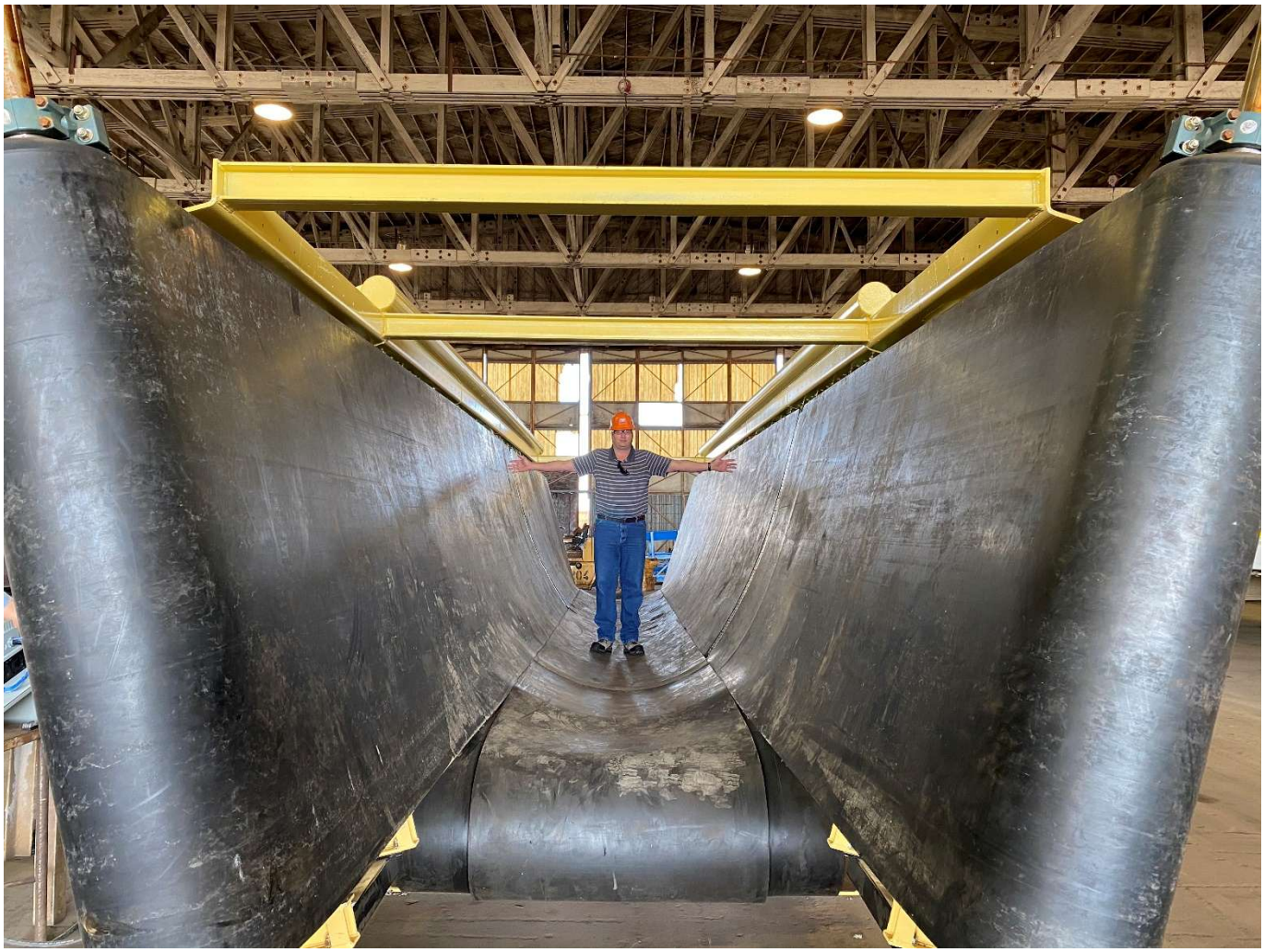
Automated Tie Delivery Train: A revolutionary system for automated delivery of wooden and composite railroad cross ties at rates ten-fold faster than traditional methods. Union Pacific Railroad (UP) envisioned and developed the concept of delivering stacks of ties out the side of rail cars at 4 to 8 MPH. UP turned to me GREX/LTI, thus me, to develop and provide the automated control system for this Tie Train. Additionally, I redesigned the dumping mechanism to be much more cost effective, which resulted in LTI winning the contract to build and install the dumping mechanisms and saved UP over $3 million in build and installation cost for the first Tie Train fleet. This automated control system utilizes GPS, HMI's (Human Machine Interface displays), PDM's (Power Distribution Modules), custom designed circuit boards, custom designed wiring harness, pneumatic system, air cylinders, solar powered systems, and wireless mesh network communication.
Weblink: https://www.youtube.com/watch?v=Qhy-deN1v58



Rapid Aggregate Delivery Train: A Self-Unloading Aggregate Delivery Train which can be top loaded over its entire carry section with aggregates ranging in size for 18" rip rap to ballast, to crushed fines, to sand to muddy spoils. This design uses an innovative conveying solution, where dual thickness center belt, locks together with 2 side belts to for a extremely large cross section, deep trough conveyor belt to form the "carry section" of the Rapid Aggregate Delivery Train, while also having head and tail pulleys narrow enough to be used on a rail car. This solution can offload aggregates at rates as high as 3000 tons an hour. This design also used a patented extremely high impact resistant catenary idler through its carry section.

US Patent: 10,717,451 https://www.freepatentsonline.com/10717451.pdf

US Patent: 10,941,003 https://www.freepatentsonline.com/10941003.pdf



Balance Crane: is a railroad bridge beam crane designed to operate on railroad bridges without the need for outriggers. Early in my career, the founder of Georgetown Rail Equipment Company, Ned Snead, had the concept of a rail bound crane that could be used in conjunction with a "Beam Delivery Train" to deliver and set railroad bridge beams and other heavy railroad bridge components. The concept was a crane which had a counterweight that translated a significant distance to balance the load of what is lifted such that the center of gravity stays very near the center of pivot. On Monday I showed up for work and over the weekend Ned and one of his colleagues had started to build a ¼ scale version of this concept, and Ned said finish it, and then design one that can handle a 35-ton bridge beam. While I am not a named inventor of this invention because the concept was Ned's, I am quite proud of the engineering I conducted to bring this concept to reality. This was my first full system multi-disciplinary engineering projects which I had the opportunity to undertake on my own, beside occasional design reviews with Ned Snead and the VP of Engineering of GREX. I spent the next few years of my engineering career designing and working with a fabrication shop in Victoria Texas to build and test the first prototype of this innovation. The result was a cost-effective rail bound crane that worked extremely well.

Ramp Car: is a railroad car that has a integrated ramp to facilitate the loading and unloading of rail bound work equipment to and from a rail train designed to transport the work equipment long distances. The Ramp Car was the second multidisciplinary project I engineered. I was the named inventor for the patent of the Ramp Car system and a second patent for a novel rack and pinion system I developed to reduce the construction of rack deployment system. The design of the Ramp Car included a low cost set of ramps which stored under the deck of the car, which allowed some equipment to be stored on the car for transport.

US Patent Ramp Car: 7690878 https://www.freepatentsonline.com/7690878.pdf,

US Patent Load Bearing Sprocket: 8104368 https://www.freepatentsonline.com/8104368.pdf

Aurora, Aurora Xi, and Aurora Tie Marking: Aurora is a track inspection technology used to automate the inspection and assessment of railroad cross ties. Aurora Xi is the next generation of this technology that adds back-scatter X-ray inspection as part of the crosstie assessment. As a Project Engineer at GREX, I was the Lead Engineer for the development of the production version of the data collection vehicle of the Aurora system. As a Senior Project Engineer and Director of Engineering, I led the engineering effort for the development of the protype and 2 production versions of the Aurora Xi collection vehicles and the Aurora Tie Marking system. These vehicles are complex fully integrated mechanical, electrical, hydraulic, embedded, and software systems, which resulted in multiple US patents, many of which I am one of the named inventors.
US Patents: 8958079 https://www.freepatentsonline.com/8958079.html ,
US Patents: 9441956 https://www.freepatentsonline.com/9441956.html ,
US Patents: 8405837 https://www.freepatentsonline.com/8405837.html ,
US Patents: 8711222 https://www.freepatentsonline.com/8711222.html ,
US Patents: 9031188 https://www.freepatentsonline.com/9031188.html ,
US Patents: 10714227 https://www.freepatentsonline.com/10714227.html .
Weblink: https://loram.com/inspection-and-optimization/inspection-services/tie-inspection-services/

Others: I have many years of experience designing for manufacturing, prototyping, testing and supporting many other machines, and subsystems, and managing a team of engineers that did the same, which resulted in other patents and product or service offerings for Georgetown Rail Equipment Company (GREX), now known as Loram Technologies Incorporated, when GREX was combined with other Loram Maintenance of Way subsidiaries and renamed. Some of these include the second generation Solaris kit and GateSync automated ballast delivery system, ballast gate, ballast plow, 2 versions of material handling Car-Crawlers, wireless mesh network automated control for commodity delivery control system, 2nd generation HydraDump ®, modular family of friction modifier distribution systems, and many more.

US Patents: 9175998 https://www.freepatentsonline.com/9175998.html,
US Patents: 8875635 https://www.freepatentsonline.com/8875635.html,
US Patents: 8328171 https://www.freepatentsonline.com/8328171.html,
US Patents: D638751 https://www.freepatentsonline.com/D638751.html,
US Patents: D608278 https://www.freepatentsonline.com/D608278.html,
US Patents: 10717451 https://www.freepatentsonline.com/10717451.html,
US Patents: 10286929 https://www.freepatentsonline.com/10286929.html,
US Patents: 10941003 https://www.freepatentsonline.com/10941003.html.
Weblink: https://loram.com/inspection-and-optimization/ballast-technologies/