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## CASE STUDY : Crushed Stone

*A major aggregate producer in the southeastern United States transports crushed stone from quarry to yard by rail (approximately 140 miles). These cars transport crushed stone ranging from 3/8" diameter to 200 mesh used in the production of concrete and asphalt.*

### TIVAR® 88-2 RAILCAR END WALL LINERS ENHANCE AGGREGATE FLOW, REDUCE COSTS

Application:	Railcars
Quantity:	52 Railcars
Liner:	TIVAR® 88-2, 3/8" Thick
Bulk Material:	Crushed Stone (limestone)
Substrate:	Mild Steel
Problem:	Excessive railcar damage, long unloading time
Date Installed:	1995 & 1996

### The Challenge



TIVAR® 88-2 end wall liner installation in progress.

Due to the 60° from horizontal end wall angle and the flow characteristics of the bulk material, serious problems were experienced during unloading at the yard. Railcars spent an average of 7 to 10 minutes in the car shaker to unload product. Excessive maintenance costs were encountered due to the physical abuse of the railcars caused by the shaker. The lengthy shaking time also created a decibel (dB) level that averaged 90 to 95 dB. Dual hearing protection (earplugs and muffs) was required for individuals working in this area in order to comply with OSHA's occupational noise exposure standards.

### Quadrant's solution

Due to its low coefficient of friction, abrasion resistance and corrosion resistance, 3/8"-thick TIVAR® 88-2 end wall liner kits were selected to line the end walls of the railcars to enhance the flow characteristics of the car.

The railcars lined with TIVAR® 88-2 end wall kits spent an average of 45 seconds in the car shaker for unloading. Maintenance costs associated with shaker time decreased by more than 50%. Unloading time was reduced by two to three hours per shift. In addition, the decibel level now averages between 50 and 60 dB, eliminating the need for dual hearing protection. According to the plant maintenance manager, the TIVAR® 88-2 liners are a huge success. Three major problems involving railcar maintenance, unloading time, and safety were solved. The liners have been in service for over five years and show no signs of wear.

Important: Most plastics will ignite and sustain flame under certain conditions. Caution is urged where any material may be exposed to open flame or heat generating equipment. Use Material Safety Data Sheets to determine auto-ignition and flashpoint temperatures of material or consult Quadrant Engineering Plastic Products. WARRANTY: Characteristics and applications for products are shown for information only and should not be viewed as recommendations for use or fitness for any particular purpose. TIVAR® and SystemTIVAR® are registered trademarks of Quadrant Engineering Plastic Products, Inc.

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