

MAGNETEK ENGINEERED SYSTEMS

Milwaukee Brewers Retractable Roof Redesign



Project — Milwaukee Brewers Retractable Roof Redesign

Application — Miller Park Roof End Trucks

Location — Milwaukee, Wisconsin

Product Used:

- Mondel AIST Mill Duty AC Thruster Brakes

CHALLENGE

- Update fan-shaped retractable roof to improve performance
- Contribute to redesign of bogie system that operates roof
- Provide a solution that could operate under harsh weather conditions
- Supply products with reliable operation and minimal maintenance and downtime

SOLUTION

- Magnetek's 10" AIST Mill Duty AC Thruster Brakes were chosen for their proven reliability, high quality, and advanced design features
- Installed thruster brakes to new four-wheel bogie end trucks
- Nitrided steel components offer protection and consistent performance in harsh environments and applications
- Mondel brakes offer easy installation, adjustment, and startup, along with three limit switches for control system feedback

Milwaukee's one-of-a-kind ballpark features traditional architecture with a unique fan-shaped retractable roof. The 25-million pound, seven-panel design opens and closes in approximately 10 minutes. Each moveable panel is supported at its pivot end behind home plate and at its running end beyond the outfield. 10 bogies (referred to as end trucks in the crane industry because they consist of the truck frame, wheels, bearings, and axles that support the bridge girders) open and close the roof. These bogies run on a curved rail system. Although Miller Park's retractable roof is unique and provides protection from the elements, it has required design changes to improve performance.

In 2003, the retractable roof at Miller Park required improvements at the running end of each of the moveable panels. The Southeast Wisconsin Professional Baseball Park District, part owners of Miller Park, hired the engineering firm Hardesty & Hanover, LLP, of New York to analyze the situation and provide a recommendation.

After extensive evaluation, Hardesty & Hanover (H&H) recommended a redesign to the bogie system to improve performance. All 10 of the existing two-wheel bogies would be replaced with four-wheel bogies containing the drive train assembly. The drive train consisted of a new motor, brakes, and gear box assembly. The new bogie would now allow the weight of the load, the roof panels, to be equally distributed over four wheels versus the original two wheels—all within the height, width, and length restrictions defined by the existing structure.



ADVANTAGES OF USING MAGNETEK'S ENGINEERED SYSTEMS GROUP

- Expertise in crane, hoist, and monorail control systems
- Experience in waste-to-energy systems
- Turnkey design, programming and field start-up
- 100 years of combined experience in the Engineered Systems Group providing automated crane, hoist, and monorail systems

Brakes are an integral component of the bogie drive train systems. They assist with the stopping and holding of the stadium roof panels. It was essential that the brakes used in this project feature a rugged design that could consistently perform in harsh environments. H&H selected Magnetek's Mondel 10" AIST Mill Duty AC Thruster Brakes because of our proven reliability on previous H&H moveable bridge projects. Our high quality and cost-competitive brakes offered easy initial installation, adjustment, and startup, as well as three limit switches that provided feedback to the control system. Our nitride steel components were also viewed as critical to future performance.

"Because of our extensive application expertise, quality, and service, we were chosen over other brake companies," said Mike Astemborski, business development manager for Magnetek's Mondel brakes. "It was a great win that a Milwaukee-based company was selected to be a part of such an important project. We are now associated with a major Milwaukee landmark!"

Initial testing of the new bogie system was successful. Miller Park's new roof and the Milwaukee Brewers were ready for a fantastic 2007 season. Play ball!

WHAT IS A BOGIE?

A bogie is a type of short end truck that is attached to the end of one girder or to a connecting member if more than one truck is utilized per girder. Bogies are used when the design of the runway necessitates more than four wheels on the crane.

MILLER PARK'S BOGIE SYSTEM

A bogie system moves each roof panel at Miller Park back and forth and is comprised of three basic systems:

1. The guide system
2. The 4-wheel bogie containing the drive train assembly
3. The rail support system

The guide system guides the bogies as they travel along their circular path and provides restraint against tipping over. In turn, the bogies transfer the weight from the moveable panels to the fixed structure through the rail support system. Thruster brakes stop and hold this movement. The bogie's frame support subsystems such as wheel assemblies, expansion assembly, drive machinery, upper guide rollers, and lower guide rollers. The rail support system transfers the weight of the roof from the bogie wheels to the fixed structure.