



PREMIER ENGINEERING TECHNOLOGIES

14701 Detroit Rd. Suite 460, Lakewood Ohio 44107

March 5, 2005

Mr. David Klein
Metal & Cable Corp.
9337 Ravenna Rd. Unit C
Twinsburg, Ohio 44087

Reference: The Magnemount, Magnetic Mounting System

Dear Mr. Klein:

I am writing this to report my opinion on the above referenced mount. I have engineered and managed the rehabilitation of many tanks of various sizes with a total cost of over 18 million dollars. Exercising caution when a new product is introduced, a number of issues were studied as follows:

- Cost advantages of the mount's installation cost and the elimination of the need to repair the internal or external coatings due to welding of the mount are evident, especially if the tank already has the cable trays attached as part of its original construction or a previous antenna installation. Not having to repair internal coating eliminates interruption of the tank's operation, which is paramount.
- Breakaway force of the magnets as shown in the tests conducted by Stork Materials Technology is more than sufficient for typical installations. Also the flexibility provided for magnet deflection and provision for normal magnet movement are adequate to provide the required magnet to steel contact for most if not all tanks. This was demonstrated in your facility on a curved plate.
- Magnemount's mode of failure is superior to a welded mount. The disengagement of the magnets, at extremely high and unforeseen loads, acts as a structural safety mechanism minimizing the amount of structural analysis and design needed. If a mount is subjected to extremely high loads it will topple over to the most aerodynamically neutral orientation and is held onto the tank by the securing cable. However, in the case of a welded non-magnetic mount, high loads may cause failure of the mount or cause local damage to the tank. Repair of the Magnemount is quicker and less expensive.
- A major issue is whether the magnets' metallic shell causes damage to a typical tank's coating. This was tested using five metal plates coated with five different epoxies typically used on tanks. We attached a magnet and slid it across the coated plates repeatedly. The magnet did not damage the coating when fitted with the adhesive protective film. The adhesive film is further held in place by the magnetic attraction between the magnet and the steel plate. The affect of the film thickness has been studied as shown by another experiment conducted Stork Materials Technology, and determined

to produce a quantified minimal reduction in the magnetic force. We subjected the magnet with adhesive film to complete immersion in approximately 109 degrees Fahrenheit water for 30 minutes then cooled it off with a cold-water rinse. The magnet was then attached to a coated plate and slid it rapidly back and forth six inches for twenty cycles without any apparent damage to the film or coating. We then subjected the same magnet and film to running cold water of approximately 45 degrees Fahrenheit temperature at 75 gallons per minute for two hours. The film remained attached to the magnet. We followed that with another twenty cycles of rapid back and forth sliding of the magnet against a coated plate. Again there wasn't any apparent damage to the coating. It also appears that wetness causes a small film to form between the magnet and steel plate due to the shear forces created by the fast sliding surfaces. The aluminum frame of the mount will not cause any rust stains. Also the magnets' shells are plated and powder coated almost eliminating the possibility of any corrosion. In addition the magnets' powder coating is protected from direct ultraviolet rays by the mount's aluminum base. Hence if the mount is sized properly it should not move but even if it moved due to an unforeseen condition the adhesive film will protect the coating.

- If a tank's owner is more conservative, then I recommend they consider one of the many tank coatings that are highly resistant to scratching and can withstand the sliding action of the magnets even without the recommended adhesive protective film. Those coatings are desirable regardless of mount type, especially in the areas where foot traffic can occur to prevent damage to the coating by people's boots, equipment and tools. If proper color matching is done, the whole tank need not be coated with the mentioned coating. Making this a very economical option with a longer coating lifespan. I have used such coatings almost exclusively in the past with a lot of success. The extra cost of the coating materials is more than offset by the coating thickness needed and the longevity of the product. This is not to mention the considerable savings from mount installation.
- Magnemount will attach with a small gap between its plate and the tank's surface. This gap allows water to drain between the magnets and prevents it from accumulating under the mount. Hence there isn't a need to seal weld or caulk the perimeter. The seal weld requirement is intended for permanent plates that are attached to the tank which prevent access to the tank or plate surface for proper coating. The mount can be easily removed during scheduled tank rehabilitation projects then reinstalled with ease. This allows for coating repair and complete coating of the tank surface with the antennas out of the way. Reinstallation after rehabilitation introduces more savings.

In my opinion, as listed above, there are many benefits to this product. The failure mode by disengagement is especially attractive to me. I highly recommend the Magnemount for consideration as an alternative to welded in place mounts. If I can be of any help or if there are any questions please feel free to contact me.

Sincerely yours,



Sami Sarrouh

Sami F. Sarrouh, P.E.

Mr. Sarrouh has nineteen years of experience in applied research and design. Areas of expertise include mechanical and process systems, computational fluid dynamics, fluid structure interaction, machine design, turbo machinery, hydraulics, pneumatics, H.V.A.C., plumbing, plant layout, process piping and controls, water tank rehabilitation, tank mixing/baffling for water quality, tank and pump-station design and automation.

Having served fifteen of those years in the Cleveland Division of Water, Mr. Sarrouh completed work on more than seventy different projects. As a lead engineer in charge of a multi-discipline design and inspection team he was responsible for the design and construction management of all new or renovated pump stations and water storage facilities. As part of his responsibilities he researched, conceptualized, set design standards, worked on the design and managed construction, troubleshooting and startup of three new stations that were by scope trend setters in technology for all future designs. As a Project Manager he managed the design, construction and commissioning of a number of project in excess of \$40 million about \$18 million of which are on tank rehabilitation and coating.

Mr. Sarrouh has a track record of innovation including a number of patents and publications introducing new methodologies or mathematical algorithms. He is contributing member of the AWWA standard Committee on rate of flow meter.

Since Fall 2002 he teaches senior level courses at Cleveland State University. The evening courses include machine design, thermal systems, mechanical systems design and senior year design projects.