

CASE STUDY



PROJECT: Charter Steel Mill | Wisconsin, USA

ESTER TYPE: MIDEL 7131 synthetic ester

PURPOSE: Safeguard assets and business continuity

[OVERVIEW]

Charter Steel is a fully integrated mini mill headquartered in Saukville, Wisconsin, where it melts scrap metal into molten steel for casting into billets. The facility includes an electric arc furnace melt shop, state-of-the-art rolling mill and a processing facility. This operation is powered through a single electric arc furnace, fed by two rectifiers – a DC furnace operating at 100,000 amps/620 volts, delivering 62 megawatts at full power. Each time the mill taps out, the furnaces shut off - it must then restart at a lower power and eventually ramp back up to the full 62 megawatts. This routine is repeated continuously around the clock.

Such an environment requires a high degree of fire safety to protect employees, the manufacturing plant, and to ensure business continuity - any downtime is calculated in thousands of dollars per hour.

Charter Steel's insurer, FM Global®, reviewed the operations and recommended a change in the risk mitigation associated with the company's two electrical arc furnace (EAF) rectifiers and their paired transformers.



CASE STUDY



[SITUATION]

With Charter Steel's two transformers mounted in relatively close proximity to each other, FM Global® was concerned that a failure in one could lead possibly to an explosion or fire that would affect the other transformer and rectifiers. As Mike Sauer, Electrical Engineer at Charter Steel explains, "The insurer's recommendation was to introduce extensive physical separation; a very expensive, difficult and time-consuming option. An alternative was a fire suppression system with massive quantities of water. However, with the rectifiers being bolted directly to the transformer, they would be destroyed if flooded with water". Charter Steel's engineers also cited a concern over the concept of a pressurized water deluge system in their cold winter climate.

The best option, endorsed by FM Global®, was to use an FM Global-approved "less flammable" fluid such as MIDEL 7131. This could be accomplished by replacing the mineral oil ("retrofilling") with MIDEL 7131. Charter Steel retrofilled two transformers (51.1 MVA, 26.4kV) and replaced one transformer with MIDEL 7131 (49.6 MVA, 26.4kV). The retrofilling exercise took place based on scheduled downtime and was completed quickly, enabling Charter Steel to resume operating as normal.

In a separate location in the same facility, Charter Steel replaced a mineral oil filled transformer with a MIDEL 7131 transformer as FM Global considered the Halon fire suppression system was not an acceptable fire mitigation solution anymore .

MIDEL 7131 synthetic ester liquid was selected by Charter Steel due to its forty-plus year history being used in transformers, its low pour point of -56°C (most appropriate for Wisconsin's climate), the low cost of maintenance and similarity to mineral oil in handling the liquid.

[RESULT]

Anthony Coker, head of MIDEL operations in the Americas, commented "Retrofilling is increasingly recognized as an effective risk mitigation solution, especially in industries where fire safety is critical. We see process industries like oil and gas, petrochemicals and mining and metals, are really putting fire safety first. The second major advantage of retrofilling is that it gives our customers an environmentally safe fluid. MIDEL is non-toxic, it's biodegradable and in addition extends transformer life in most cases".

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“The lower flammability, the cost and timing benefits made retrofilling the right solution. Being able to keep our uptime was important. If we blew a transformer, we’d be looking at a lead time for a new unit of six months to a year, not to mention that would be a huge capital expense. So we took these precautions to reduce any kind of risk.”

Bob Heil
Senior Process Metallurgist, Charter Steel

The use of MIDEL ester fluids in this project supports the following UN Sustainable Development Goals:

