TECHNICAL ARTICLE 2

Using Vapor Corrosion Inhibiting Oil Additives for the Corrosion Protection of Refurbished Equipment in Long-Term Storage

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Corrosion is one of the most persistent and costly challenges faced by industries that rely on metal assets, especially in the heavy equipment, automotive, and energy sectors. When metal surfaces are exposed to moisture, oxygen, and contaminants such as chlorides, they undergo electrochemical reactions that lead to rust and degradation. This is particularly problematic for internal systems such as engines, gearboxes, and hydraulic components, which are challenging to inspect and costly to rework once corrosion sets in. Therefore, effective corrosion management is essential to extend equipment lifespan and reduce downtime, maintenance costs, and safety risks.

In one case, a heavy-duty equipment service center in the Pacific Northwest—known for high humidity and fluctuating temperatures—was tasked with rebuilding several large engines, axles, and hydraulic systems for a construction equipment fleet. After refurbishment, the equipment was to be stored for up to one year before being put back into service. This presented a significant corrosion risk, particularly to the internal surfaces of oil-filled components that could not be easily accessed once assembled. To address this, the maintenance team explored Vapor Corrosion Inhibiting (VCI) oil additives as a protective measure during storage (Figure 1).

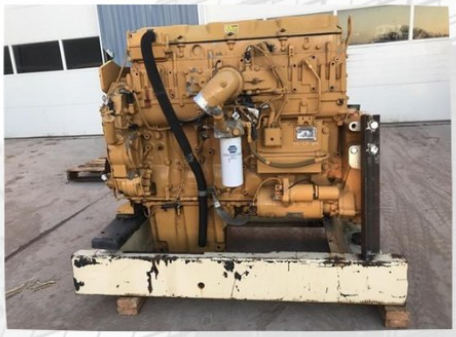

Figure 1: Refurbished Equipment in Long-Term Storage

VCI technology releases corrosion-inhibiting molecules into enclosed spaces, forming an invisible, molecular-level shield on the metal surfaces that interrupts the corrosion process. Unlike surface-applied oils or coatings that require post-storage cleaning, VCI oil additives are designed to remain suspended in the host lubricant—such as engine oil, axle oil, or hydraulic fluid—providing ongoing protection without affecting the base fluid's performance. The additive is flushed out once the equipment is put back into service.

In this particular application, the VCI oil additive was introduced directly into the crankcase, rear axle, and hydraulic systems during the final stages of the rebuild. Initially, the additive was intended only for use in the engine crankcase. However, after consultation with a corrosion specialist, the team expanded its use to include other systems that presented similar corrosion risks. This approach allowed uniform protection across multiple critical components with minimal process changes or additional labor. Because the additive is delivered through existing oil circulation, it provides complete internal coverage without requiring additional coating or wrapping procedures.

Over the course of nearly a year in storage, the refurbished equipment remained in a climate-controlled facility. Periodic inspections revealed no signs of corrosion or degradation in the protected components. This outcome validated the VCI oil additive's performance and reinforced the importance of integrating corrosion protection into preventive maintenance and storage workflows. The success of this strategy has since encouraged the service center to adopt similar protective measures across other sites and equipment categories.

This case highlights how VCI oil additives can be an effective and efficient tool in comprehensive corrosion management plans. Their compatibility with standard lubricants, ease of application, and ability to protect complex internal geometries make them particularly useful for long-term storage scenarios, equipment mothballing, and intermodal shipping. As industries face increasing pressure to reduce waste, extend asset lifecycles, and optimize maintenance practices, adopting such protective technologies offers economic and operational benefits.

ZERUST® VCI Oil Additive Protects Refurbished Engines While Left in Storage

Who? A service center and dealer specializing in heavy-duty construction equipment.
What? Applied corrosion inhibiting oil additives to protect refurbished engine, axle, and hydraulic systems.

Why? To maintain the integrity of rebuilt components during extended indoor storage for up to one year.

How? A VCI oil additive was blended into the crankcase, axle, and hydraulic oil systems before storage to protect internal metal surfaces from rust and corrosion.

Case Summary

A heavy-duty equipment dealer located in a humid region of the Pacific Northwest was refurbishing several large engines for storage prior to reinstallation. Recognizing the risk of corrosion during downtime, the maintenance team sought an oil-based corrosion protection method that would integrate seamlessly into existing lubrication systems. After consulting with a corrosion specialist, they applied a VCI oil additive not only to the engines but also expanded its use to include rear axles and hydraulic systems. The use of the additive provided a protective vapor layer that inhibited corrosion without requiring component disassembly or additional cleaning steps post-storage.

Results

After nearly a year in storage, the refurbished equipment remained corrosion-free, demonstrating the effectiveness of VCI oil additives in preserving internal systems during idle periods. This approach highlights a practical corrosion management strategy that can be adapted for similar applications in equipment maintenance, refurbishment, and storage planning.

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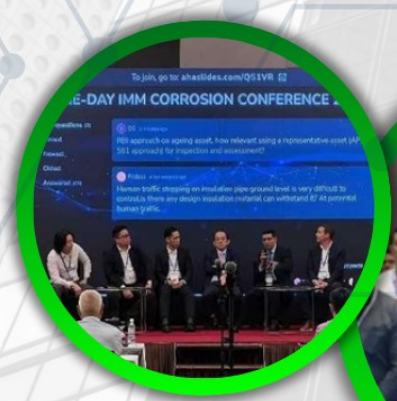
HIGHLIGHT



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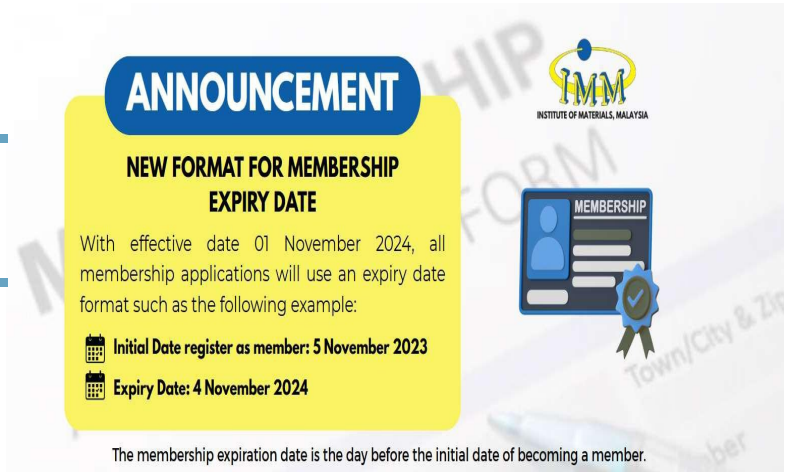

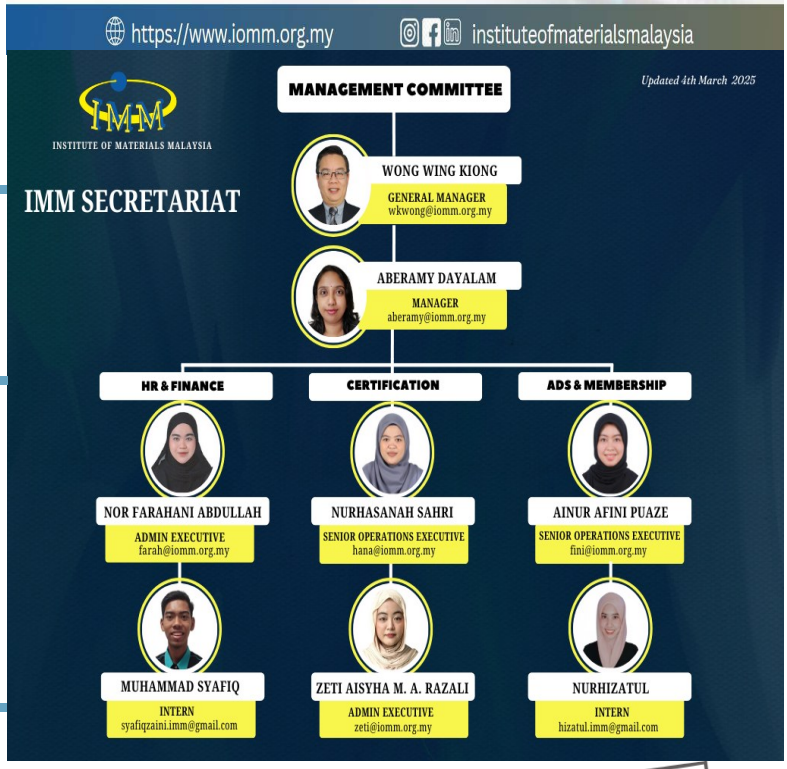

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