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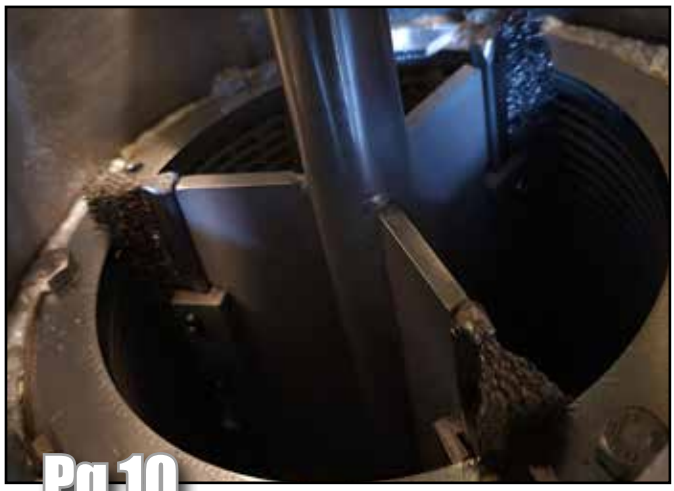

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By Del Williams

In War Against Industrial Corrosion, Clean Lasers Prove Very Effective

Clean technology lasers offer superior industrial corrosion removal in myriad applications, helps solve some of industry's most costly corrosion problems

Industries have been fighting a war against corrosion in metal infrastructure, equipment, and products at great expense for generations. "The global cost of corrosion is estimated to be US$2.5 trillion, which is equivalent to 3.4% of the global Gross Domestic Product (GDP) (2013), according to a NACE International IMPACT study to examine the current role of corrosion management in industry and government and to establish best practices.

Given the massive industrial outlay, proactively controlling corrosion is imperative and can have an equally impressive ROI.

"By using available corrosion control practices, it is estimated that savings of between 15 and 35% of the cost of corrosion could be realized, i.e., between US$375 and $875 billion annually on a global basis…The fact that corrosion control provides a cost benefit is a lesson learned over and over again by industry, often too late and following catastrophic events," continues the NACE International IMPACT study.

However, traditional methods of removing corrosion can be messy, laborious, time consuming, and can even pose serious health hazards.

Today, one of the easiest to use and most effective alternatives in the war against corrosion is the increasingly

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important category of industrial-grade, clean technology lasers.

With this approach, precision laser-based systems are used to remove corrosion, contaminants, paint, and residues with a high-energy laser beam that leaves the substrate unaffected. Preparation and cleanup time are minimal, and the low-maintenance equipment can last decades. The technology minimizes operator exposure to potential environmental health hazards. In addition, no consumables are necessary.

Corrosion and the Limits of Conventional Control
Any industry with metal infrastructure, processing equipment, or products exposed to water, fluids, moisture, or atmospheric humidity continually fights corrosion, which causes the deterioration and loss of a material and its critical properties due to chemical, electrochemical reactions of the exposed surface with the surrounding environment. Corrosion affects the microstructure, mechanical properties, and physical appearance of the materials.

The direct cost of corrosion includes a loss of materials, equipment, and production, plus the cost of repair, maintenance, and replacement. Additional losses can result from accidents, injuries, and even loss of life as well as payments to repair environmental damage.

Within the continual struggle against industrial corrosion, one important niche area of corrosion control involves the pretreating of metal surfaces to remove corrosion and contaminants before coating or welding.

Although metal surface pretreatment is a small portion of industrial corrosion control, it is crucial to ensure the safety, performance, and longevity of products and structures.

Insufficient coating pretreatment can lead to inadequate protection from the environment, leading to potential coating failure, moisture entry, and accelerated corrosion as well as increased maintenance, early replacement, and warranty issues. Similarly, insufficient weld pretreatment to remove corrosion and contaminants can lead to weakened or failed welds and necessary rework as well as substantial safety, liability, and litigation risk.

A More Effective Weapon to Eliminate Corrosion
In many industries, it is necessary to remove corrosion, residue, oil, grease, or paint before coating a product or infrastructure to improve coating adhesion.

Toward this end, laser-based systems have significant advantages over traditional methods, starting with ease of use.

“With laser-based systems, an operator simply points and clicks a high-energy laser beam at the surface. The substrate is not affected by the laser, and the systems do not create any mess or byproducts. The approach is eco-friendly, energy-efficient, and completes the job in approximately half the time of traditional methods when preparation and cleanup are considered. Also, no consumables are required,” says Wayne Tupuola, CEO, Orlando, Florida-based Laser Photonics, a leading provider of patented industrial grade CleanTech® lasers for cleaning and surface conditioning. The company’s systems function either as mobile standalone units or can be integrated into production lines.

In the case of Laser Photonics, the laser systems are available in portable and stationary models ranging from 50 to 3,000-watts (a 4,000-watt version is in development) with chamber sizes from 3’ x 3’ in size to 6’ x 12’. The systems can also be installed in manufacturing lines in cabinets or operated by a robotic arm.

In industry, the laser pre-treatment of metal surfaces can be used to streamline various manufacturing processes. For instance, it has been used to remove rust from hundreds of automotive transmissions per day. It has also been utilized to eliminate corrosion from conveying system components.

The CleanTech lasers are also used to refurbish industrial infrastructure, such as when removing a previous coating along with any corrosion to facilitate the new

coating's adhesion to the surface.

Another common laser application involves pre-weld treatment to remove corrosion, mill scale, residue, and any impurities on the surface of the base material that would compromise the weld's effectiveness. It is essential to avoid any such contamination on a weld's surface, which could otherwise lead to a weakening of the weld's mechanical properties, requiring rework.

Laser treatment is also used for post-weld cleaning to increase the life expectancy and corrosion resistance of a welded joint. Post-weld cleaning is important for stainless steel as well. Welding can cause a "heat tint," a discolored, thickened top layer on the stainless steel around the weld bead within the heat affected zone that compromises corrosion resistance. Removing the heat tinted top layer is necessary to restore stainless steel's full corrosion resistance and aesthetic value.

A further benefit of the laser systems is that some of the most advanced units are designed to last for decades. For example, CleanTech laser systems can last for 50,000 to 100,000 hours. In addition, virtually no maintenance is needed after purchase and no consumables are required.

Given the devastating cost of corrosion to industry and the inherent limitations of typical control methods, lasers are becoming a best practice technique to combat it in facilities and in the field. Laser treatment effectively removes corrosion for many industrial applications, minimizes cleanup time and operator exposure to potential environmental health hazards, lasts for decades, and requires no consumables.

For more information on laser cleaning solutions for surface preparation, contact Laser Photonics at (407) 804-1000 or visit ***www.laserphotonics.com*** •

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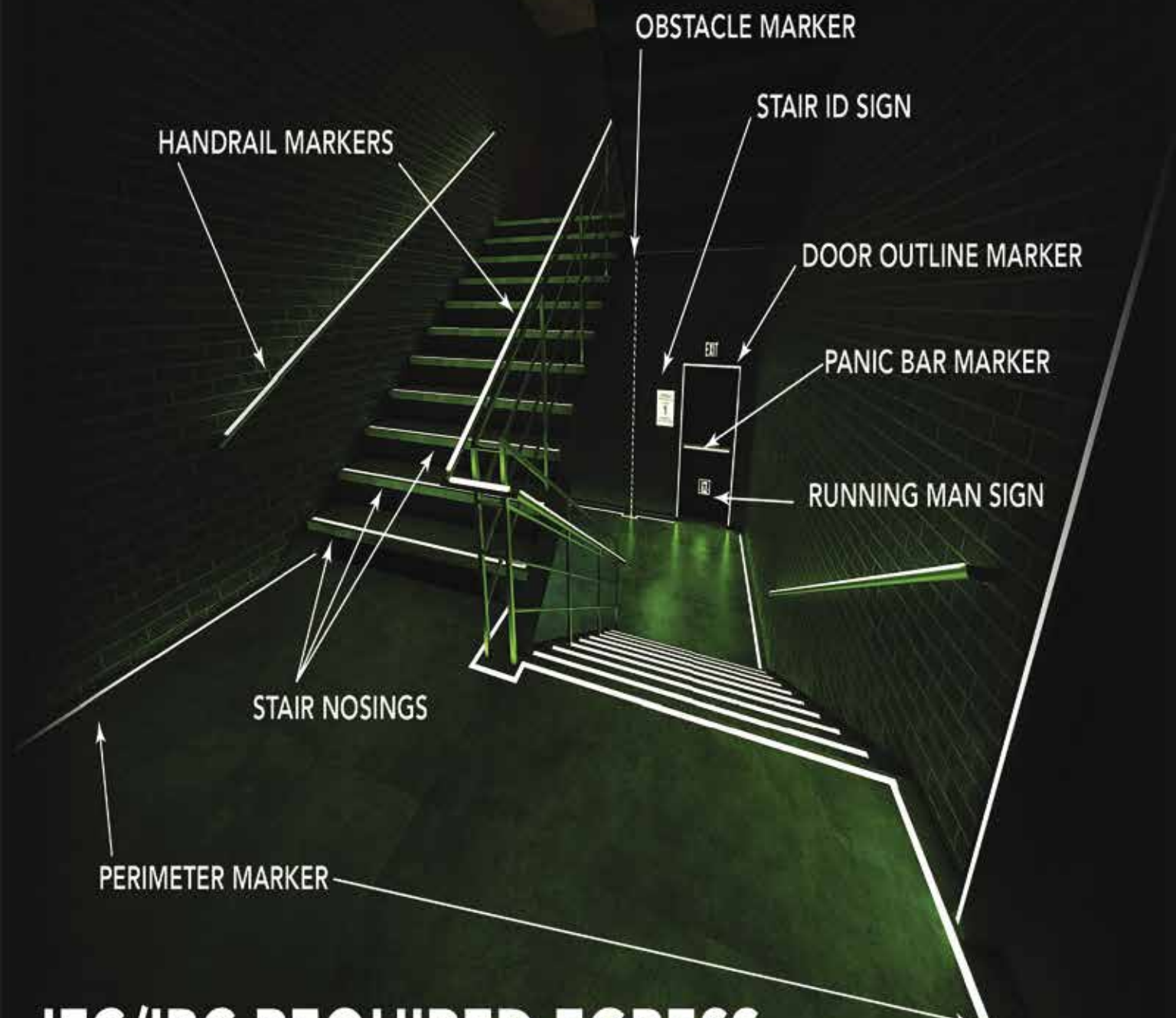

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Unlikely Technology Combo KOs Large Suspended Solids

Automated scraper strainers paired with macerators eliminate high volumes of large, suspended solids from slurries for "set it and forget it" approach.

Various industries including wastewater treatment, power generation, food processing, and chemical manufacturing depend on industrial strainers to separate unwanted suspended solids from liquids and slurries. However, conventional strainer methods can prove to be unreliable and lead to extensive maintenance, particularly in cases where the debris or solids are of substantial size and there is a significant amount of suspended solids present.

Fortunately, the utilization of a novel blend of industrial wastewater technologies now allows for the efficient removal of solids without the need for extensive manual labor, worker exposure to messy or potentially hazardous substances, or constant maintenance. Specifically, the design involves a one-two punch combination of a macerator, which breaks down large solids into smaller fragments, and an automated scraper strainer flexible enough to efficiently filter out larger debris along with tiny particles. This innovative solution can even accommodate high solids loading without clogging.

The combination of these two established technologies is already being applied to some of the toughest, dirtiest straining applications including wastewater debris, power plant boiler water slag, asphalt transloading, and meat processing waste streams.

Overcoming Traditional Limitations

Duplex strainers are often used in continuous flow processes that cannot be shut down for cleaning purposes. Duplex basket strainers employ two distinct chambers that function independently. When one chamber needs cleaning, the flow is seamlessly diverted to the alternate chamber, enabling the removal and cleaning of the first basket.

Cleaning is a messy, laborious process that involves equalizing pressure between the baskets, diverting flow to the off-line chamber, opening the cover, manually removing the clogged basket, and cleaning it before

refitting the basket, ensuring the seal, and tightening the fasteners.

If an operator fails to adequately clean the basket strainers for any reason, both strainers can become clogged at the same time. This compromises the filtration process, resulting in quality issues or unexpected downtime until the problem is resolved. For many processors, this can occur simply due to having insufficient personnel to keep basket strainers clean along with their other duties.

"As an alternative, a combination of established complimentary technologies such as a macerator and an automated scraper strainer can essentially 'knock out' even the toughest problems related to large solids and high solids loading in an automated way," says Robert Presser, Vice President of Acme Engineering Prod., Inc., a North American manufacturer of industrial self-cleaning strainers. The company is an ISO 9001:2015 certified manufacturer of environmental controls and systems with integrated mechanical, electrical, and electronic capabilities.

In this configuration, a macerator would be installed upstream to reduce large solids down to a manageable size. The capabilities of the automated strainer are crucial to the process as well, according to Presser.

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"Although the macerator cuts up the biggest solids, the strainer must still be able to separate both relatively large pieces and tiny particles while handling high solids loading without becoming obstructed," explains Presser.

In the case of Acme, the OEM's automated scraper strainer is designed to continually remove both very large and very small suspended solids from liquids and slurries. Cleaning is accomplished by a spring-loaded blade and brush system, managed by a fully automatic control system.

Four scraper brushes rotate at 8 RPM, resulting in a cleaning rate of 32 strokes per minute. The scraper brushes get into wedge-wire slots and dislodge resistant particulates and solids. This approach enables the scraper strainers to resist clogging and fouling when faced with large solids and high solids concentration.

Blowdown typically occurs only at the end of the intermittent scraping cycle when a valve is opened for a few seconds to remove solids from the collector area. Liquid loss is well below 1% of total flow.

If additional pressure is required to clean the screen, Acme Engineering can add an inexpensive trash pump to the blowdown line to assist in removing the solids from the strainer sump.

"Since the solids are small, a little trash pump can pressurize the blowdown line to evacuate solids from the strainer. The combination provides quick ROI because operators no longer have to monitor and clean out heavily loaded basket strainers, resulting in substantially less labor and downtime," says Presser.

Alternatively, the sump can be replaced by a cylinder bracketed by two gate valves that open and close as needed to remove the solids waste.

"When you are ready to empty the cylinder, you close the top gate valve momentarily and open the bottom one by depressing a button to dump the accumulated solids into a receptacle like a dump truck or a conveyor bucket so there is no manual handling required," says Presser.

According to Presser, Acme has already worked with plant operators and managers to implement a wide range of specialized straining systems for difficult applications with exceptionally large solids or very high solids loading, including:

Power Plant Boiler Water Slag
To maintain optimal functionality of power plants using fuels other than natural gas, regular boiler cleaning is vital. Over time, boilers accumulate ash that forms slag deposits, which act as insulation on the boiler tubes. Consequently, more fuel is needed to achieve the desired temperature and output compared to a clean boiler. By removing slag deposits, boiler efficiency can be improved by 1 to 4 percent, leading to reduced emissions from power plants due to decreased fuel consumption.

In a power plant application, Acme Engineering addressed the slag issue by employing large cylinders and gate valves to strain out slag from a waste slurry produced during boiler washouts. The size of the cylinders used exceeded typical dimensions, with the largest cylinder measuring six feet tall and 18 inches wide.

Bunker C Fuel Oil
In another application, the OEM employed a strainer, cylinder, and gate valve configuration to eliminate solid impurities and debris from Bunker C fuel oil. Bunker C, a low-cost residual byproduct derived from the crude oil refinement process, is a viscous substance with a high asphalt content that includes concentrated trace minerals. In this scenario, Bunker C fuel was supplied to burners for power generation, necessitating the removal of any large clumps or oversized particles that could potentially obstruct the nozzles. Failure to do so could result in decreased production and unscheduled downtime for maintenance or repairs.

Asphalt Transloading at a Rail Facility
The OEM has installed equipment to strain asphalt slurries at intermodal terminals providing rail-to-truck and truck-to-rail transloading services. For transloading, asphalt is heated to a liquid form and transferred from tank cars to trucks or from trucks to tank cars. One application involved using multiple cylinders with gate valves to appropriately strain liquid asphalt to the correct specification for rail to truck loading.

Meat Processing Wastewater
In a poultry processing application, the OEM designed an automated strainer for a chicken producer to remove unwanted waste solids from a thick slurry. Although a macerator was not used in conjunction with the strainer for this application, it could have significantly improved the efficiency of the process with increased automation and reduced labor.

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According to Presser, adapting strainers for the specialized filtration of uncommon liquids and slurries requires not only expertise but also collaboration with the processor as well as some design iterations.

“For unusual applications, it may take a few attempts to get it right. You may have to adjust the timing and frequency of cleaning as well as adjust the screen slot size. There are quite a few variables involved,” concludes Presser.

In various industries, processors depend on the filtration of liquids or slurries to meet quality and regulatory standards. When the removal of large solids or managing excessive solids loading exceeds the feasibility of manual basket strainer cleaning, integrating a combination of highly effective technologies may be the best decision.

For more info, visit Acme Engineering Prod. Inc. at acmeprod.com or in the U.S.; phone Robert Presser, Vice President at: 518-236-5659; fax: 518-236-6941; mail Acme at Trimex Building, Route 11, POB 460 PMB 10, Mooers, New York 12958. In Canada phone: 514-342-5656; fax: 514-342-3131; mail them at 5706 Royalmount Ave., Montreal, Quebec, H4P 1K5.

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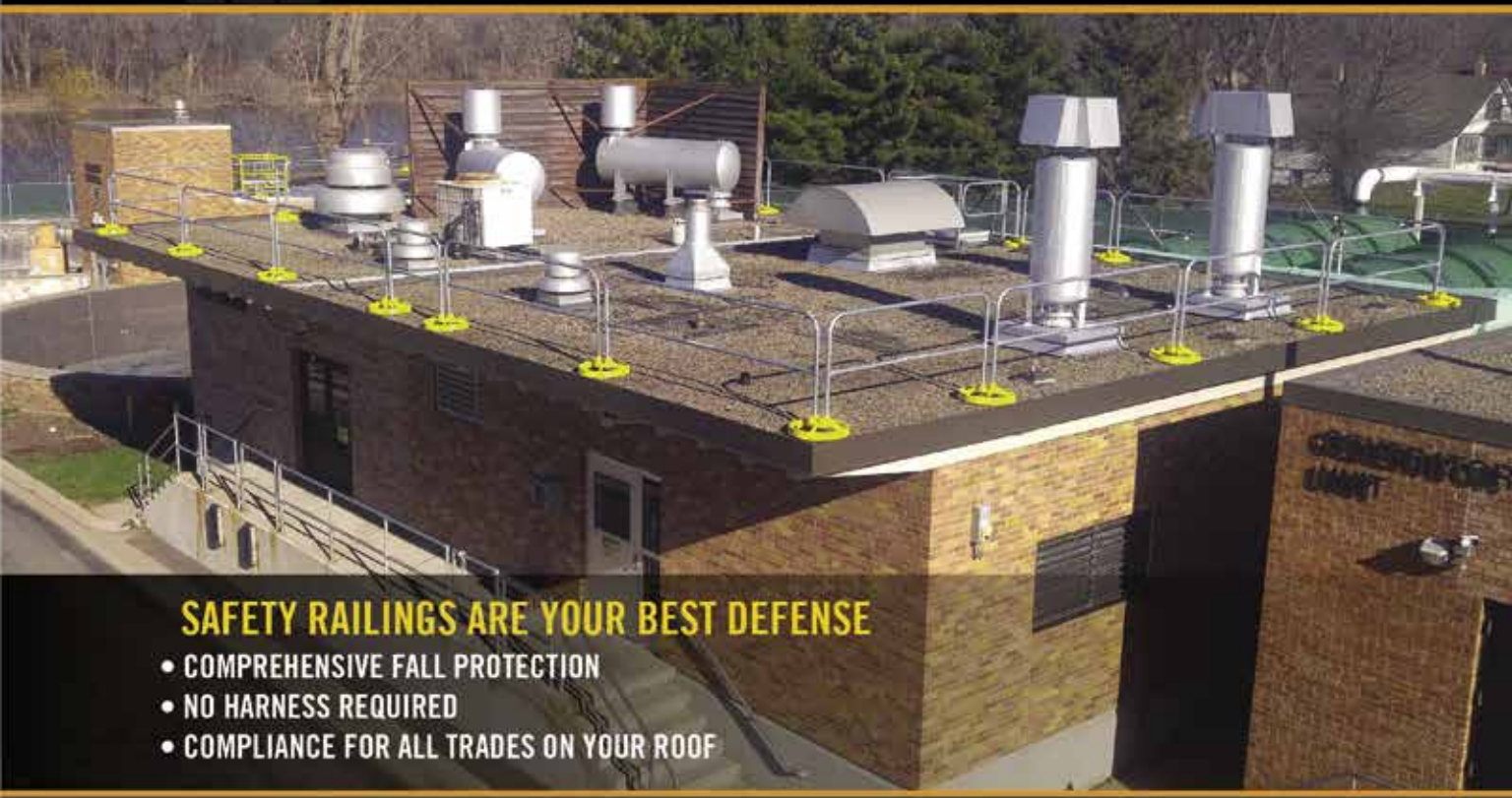

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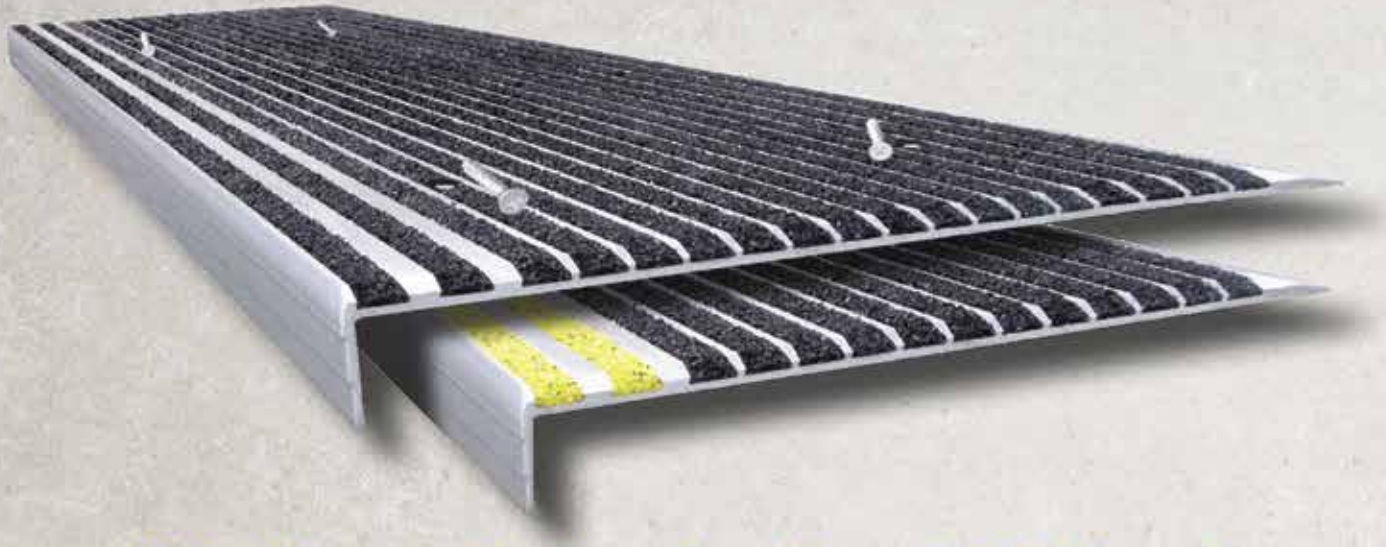

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