A close-up, high-resolution photograph of a metal chain-link mesh. The mesh is composed of interlocking oval-shaped links, creating a dense, repeating pattern. The metal has a matte, slightly weathered appearance with some variations in tone from light gray to dark gray, suggesting it might be galvanized steel. The lighting is even, highlighting the texture and three-dimensional quality of the links.

***STRONGER  
'SHAPED' WIRE  
BELT STANDS  
UP TO THE  
RIGORS OF HEAT  
TREATING***

# Engineered geometry increases strength, decreases stretch, and withstands thermal cycling.

By DEL WILLIAMS

**W**hether for automotive, aerospace, or heavy equipment, manufacturers using heat treatment — which can reach temperatures up to 2,400°F and vary from a few seconds to 60-plus hours — need conveyor belting that can withstand the rigors of the process. However, traditional round balance weave wire belting has changed little in 100 years and often requires annual replacement, causing costly production downtime.

Heat treating is essential to improve the properties, performance, and durability of metals such as steel, iron, aluminum alloys, copper, nickel, magnesium, and titanium. This can involve conveying to hardening, brazing, and soldering, as well as to sintering furnaces, carburizing furnaces, atmosphere tempering furnaces, and heat processing in annealing and quenching furnaces. Parts treated can range from bearings, gears, axles, fasteners, camshafts, and crankshafts to saws, axes, and cutting tools.

## PROLONGING BELT LIFE

Heat treat-grade balance weave belts — made of temperature-resistant stainless steel or other heat-resistant alloys suitable to be run on a conveyor with friction drive — can cost thousands of dollars, depending on the dimensions and quality. So, even though wear and premature replacement seems inevitable, such wire belting should not be considered a low-cost consumable. While many manufacturers using heat treating consider periodic replacement of wire belting simply a cost of doing business, today, innovative alternatives have been developed that can significantly prolong its life and drive down operational cost.

Although heat-resistant wire belting is available, repeated thermal cycling between heating, soaking, and cooling while carrying substantial loads can continually weaken its structure until it fails. The greater and more frequent the temperature fluctuations in heat treatment steps, the shorter the wire belt's usable life becomes.

In addition, on conveyor belts, belt stretch accelerated by heat and dynamic loading forces on the belt is typically the main cause of breakage and failure.

Fortunately, industry innovation in the form of engineered, “shaped” wire belting has minimized these challenges. The design vastly prolongs usable life with increased strength and decreased stretch, which dramatically curtails replacement costs and production downtime.

This approach can also help to extend the longevity of wire belting used with increasingly popular powder metal parts, particularly sintered parts that may be heat treated to enhance strength, hardness, and other properties. In such cases, powder metal serves as a feed stock that can be processed into a net-shape without machining.

## RESOLVING THE CORE ISSUES

Although conventional round wire belt has been the industry standard for generations, the geometry of the wire itself contributes to the problem.

Traditional round wire belt and even top-flattened wire belting is prone to belt stretch and premature replacement, particularly under high heat treatment temperatures. In testing, typical round and top flattened conveyor wire belt have been observed to stretch approximately 7 percent.

Even though many producers of conveyor wire belting simply import semi-finished product and finish it domestically, at least one U.S.-based manufacturer has gone to the root of the problem.

“Shaped” wire is designed to provide more strength in wire belt of a given diameter that can better withstand high heat processing



Heat treat-grade balance weave belts can cost thousands of dollars, depending on the dimensions and quality. (Courtesy: Lumsden)

*The innovative design is significantly extending the usable life of wire-belt conveyors used in a variety of heat-treat processes. This ranges from hardening, brazing, and soldering to sintering, carburizing, and atmosphere tempering furnaces.*





Many manufacturers using heat treating consider periodic replacement of wire belting simply a cost of doing business. (Courtesy: Lumsden)

conditions. This significantly prolongs its usable life up to eight times or more.

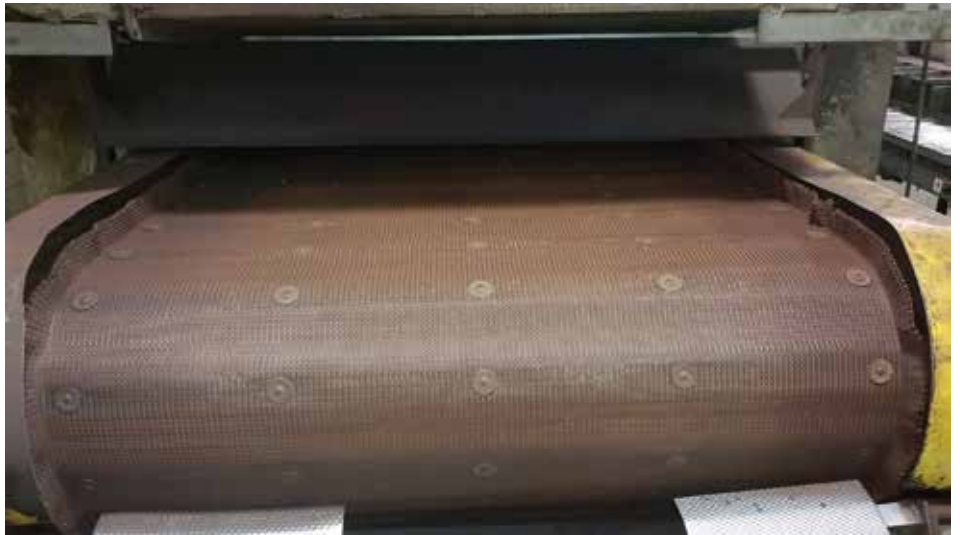
As an example, one engineered wire belt, called Sidewinder by Lancaster, Pennsylvania-based Lumsden Belting, a manufacturer of metal conveyor belts for industrial heat treatment, compresses and expands wire so it is taller than it is wide with flat sides.

To begin with, the patented side flattened wire's "I-beam" design provides three times greater structural support for heat-treated parts compared to standard round wire. The added height of the wire also provides a longer wear life without needing heavier wire. Together, the design limits belt stretch to only 1 to 2 percent. This minimizes the potential for damaged belt. Minimal belt stretch also helps the conveyor belt to track straighter, improving production throughput with less required maintenance.

## INNOVATIVE DESIGN

The innovative design is significantly extending the usable life of wire-belt conveyors used in a variety of heat-treat processes. This ranges from hardening, brazing, and soldering to sintering, carburizing, and atmosphere tempering furnaces.

It is also prolonging wire-belt conveyor life in secondary powder-metal processes used to improve hardness and other mechanical properties. In this vein, it could be used in a mesh belt sintering furnace, where compacted parts are placed in a controlled atmosphere and heated. It could also be used in processes such as quench and temper, case carburizing, and induction hardening.



Wire belting should not be considered a low-cost consumable. (Courtesy: Lumsden)

When heat treatment is used for hardening, followed by rapid cooling submerged in a medium such as oil, brine, or water, the shaped wire belt also enhances the open area for the same gauge wire. This reduces residue build up and eases cleaning while minimizing drag.

Although the cost of the shaped wire belt is slightly more than traditional round wire, for manufacturers relying on heat treatment, the gains in lifespan and production uptime can provide a speedy ROI. 🔥

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## ABOUT THE AUTHOR

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