

Bottle producers drive conveying chain innovation

William C Hall discusses how manufacturers of bottle conveying chain have developed products to meet today's bottlemakers' requirements.*

For more than 70 years bottle producers have relied on silent conveying chain, also known as inverted tooth chain, to transport bottles in both hot end and cold end applications. Although silent chain was originally designed for power transmission applications, chain designs have evolved to meet the specific challenges encountered in bottle transport. These chains offer many benefits in glass conveying; they are durable, smooth running, heat resistant, and provide a flat, uniform, non-slip conveying surface.

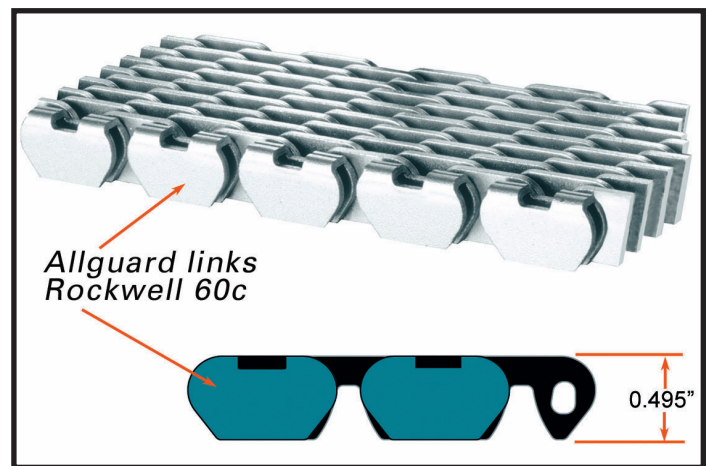
Ramsey Products has manufactured silent chain for more than 80 years and supplies conveying chain to bottle producers and equipment makers throughout the world. By working closely with customers and industry engineers, and analysing their comments and suggestions, Ramsey engineers identified four

► Allguard links are case-hardened to Rockwell 60c.

areas where changes were needed to improve chain life and performance:

- More consistent chain pitch - this should minimise variations in chain velocity and provide more consistent bottle spacing and less breakage.
- More wear resistant chain - this should prolong chain life and reduce the maintenance associated with shortening and re-tensioning chain.
- Reduced pin head projection - less pin head projection decreases the possibility of pins being damaged by rubbing or impacting chain guides.
- Better protection of pin heads - by guarding and concealing pin heads, chains can be operated closer to transfer plates and wear handling is improved.

Ramsey engineers set out to make the design and manufacturing improvements that were required to produce a chain that satisfied all of these goals; half-an-inch pitch, the most common chain, was selected for the project. Building on techniques used to produce high-performance chain for power transmission, specialised tooling was developed to improve the quality of individual chain links. The improved links have smoother surfaces in the link aperture and significantly greater bearing area for pin support. More than 80%



Allguard links Rockwell 60c

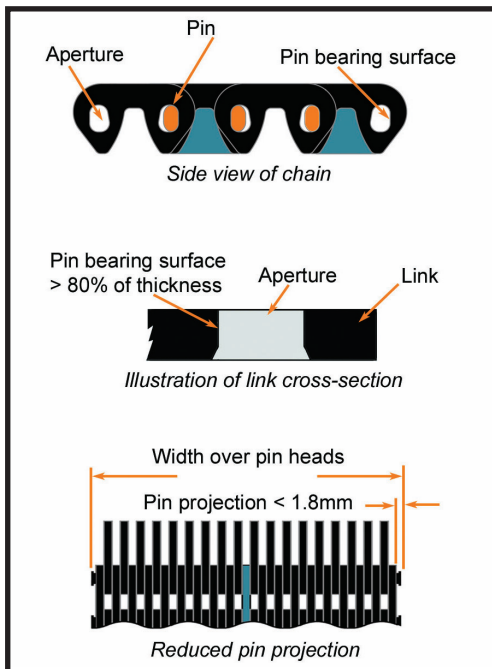
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of the link cross section is available as a bearing surface in the improved links; the increased area reduces bearing stresses by approximately 20% and decreases the rate of wear in the chain joint. An additional benefit of the improved link production method is better control of chain pitch. Since there is less variation in the pitch of individual chain links, the pitch of assembled chains is also more consistent.

More change

Other manufacturing process changes were made to further address the first three areas for improvement. Average link hardness was increased to improve abrasion and wear resistance, and link finishing processes were modified to increase link uniformity. Pin heading, or riveting, processes were also modified to reduce the amount of pin head extension. The maximum pin head projection was reduced to 1.8mm, a reduction of 22%. With three of the four areas for improvement addressed, test chains were evaluated at Ramsey and then sent to a glass production plant for further testing. The chain was installed on an IS machine producing 360ml beer bottles, at a rate of approxi-

▼ The quality of individual links was improved.



mately 470 bottles per minute. The conveyor speed was about 1 metre per second and operation was continuous. The improvements in the new chain, trade named 'Ultralife', were soon noticed.

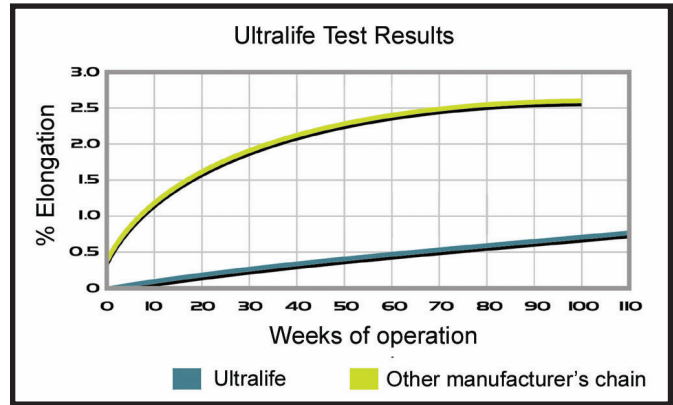
Initial monitoring of the test chain showed that efforts to better control chain pitch had been successful. The variation in chain surface velocity was reduced by 60%. Over the next 34 months of operation the improved performance of the chain became even more evident. During this period of time the chain was re-tensioned twice as the machine ran, but there were no shut downs required for chain maintenance or replacement. When the chain was finally removed after nearly three years of operation, it had far surpassed the 12 month life formerly delivered by chains in the same operation. "After 33 years in the glass business the Ultralife chain is the finest conveyor chain I've ever worked with," says the maintenance supervisor.

Given the success of this and subsequent trials, Ramsey then turned

► **Ultralife test results.**

to addressing the fourth area for improvement, protection of pin heads. Detailed market analysis revealed that there were no chains available with completely protected pin heads and increased lateral wear resistance. Recognising the need for such a product, Ramsey engineers then developed the Allguard link.

Allguard links (patent pending) act like a coat of armour, completely covering pins and protecting the side of a chain. Because each link is case-hardened to Rockwell 60c they provide exceptional resistance to lateral wear. This allows chains with Allguard protection to run for extended periods, in direct contact with lateral guides or transfer plates. For additional benefits, Allguard links can also be incorporated into Ultralife chain.



Ultralife and Allguard are just two examples of products introduced to meet the needs of high-volume glass production. In the future, industry wide emphasis on efficiency and productivity will continue to drive chain manufacturers to develop products that improve performance and minimise maintenance downtime.



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