Three ways to improve bottle conveying

Higher transport speeds, less downtime, decreased maintenance, and reduced breakage are key factors in improving bottle production. William Hall* highlights three new types of glass conveying chains designed to help producers meet these needs.

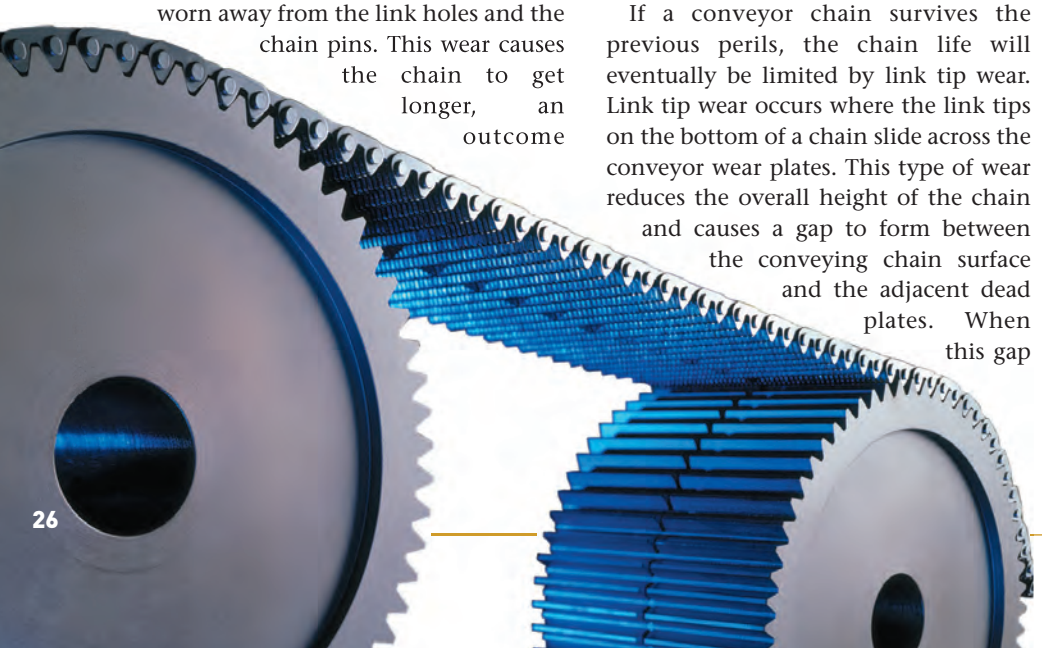
Fifty years ago, when Ramsey Products began supplying chain to glass manufacturers, silent chain was just beginning to be used as a conveyor. At the time, transport speeds were relatively slow, precise bottle placement was less important, and conveyor wear was not a major concern. However, through the years, as production speeds steadily increased, a number of new problems were encountered.

Problems

Among the first problems were inconsistent bottle location on the conveyor and reduced chain life. These problems were mostly due to chain pitch variation and chain elongation. As a conveyor chain runs, steel is gradually worn away from the link holes and the chain pins. This wear causes the chain to get longer, an outcome commonly referred to as 'stretch'. As the chain gets longer, its velocity steadily increases. The increased velocity causes bottle spacing to vary, leads to product mishandling and eventually requires the conveyor chain to be replaced.

Another problem that can adversely affect productivity is pin head wear or pin snagging. Each chain joint contains a pin, which is 'headed' on the end, to hold the chain assembly together. These pin heads typically extend beyond the sides of a chain, where they can be subject to rubbing and wear due to contact with chain guides. These heads can also hang up, or snag, on projections along the chain's path. Both pin head wear and snagging can cause a chain to fail prematurely and lead to product breakage.

If a conveyor chain survives the previous perils, the chain life will eventually be limited by link tip wear. Link tip wear occurs where the link tips on the bottom of a chain slide across the conveyor wear plates. This type of wear reduces the overall height of the chain and causes a gap to form between the conveying chain surface and the adjacent dead plates. When this gap gets too large bottles tend to tip as they are moved to the chain. Once again, the chain must be replaced.



Developing conveyor chains

Recognising the new challenges inherent in higher conveying speeds, as well as the customer interest in improved productivity, Ramsey began designing and producing conveying chains that provide longer life, with less frequent maintenance, and with smaller variations in surface speed. The result is three types of glass conveying chain and seven US patents over the past six years.

A solution to 'stretch'

The UltraLife chain was developed specifically to reduce chain wear and minimise chain velocity variations. Utilising the company's proprietary link and chain production techniques, specialised tooling was developed to improve the quality of the conveyor link apertures. The improved links have a smoother aperture surface and a higher bearing area for pin support. Unlike standard conveyor chains, where approximately 65% of the link thickness is in contact with pins, the new links provide more than 80% of the link thickness as a bearing surface. The increased bearing area reduces bearing stresses by nearly 20% and decreases the rate of link joint wear. An additional

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benefit of the improved link production method is better control of chain pitch. The pitch of individual links is more consistent, which results in more consistent chain speed.

Field tests of the chain have shown that chain surface velocity variation can be up to 60% less than that measured in typical chains. Chain life has been extended and the need for periodic adjustments has been reduced.

Solutions to pin head wear

To prevent pin head wear and chain snagging, Ramsey developed two wear-protected conveying chains - Allguard FX and Lifeguard. With each of these chains, pin heads are recessed in special links that cover the sides of the chain. This prevents the pins from directly contacting lateral obstructions. As a result, head wear is virtually eliminated, snagging is prevented, and conveyor life is improved. Also, with the pins protected in this manner, chains can be run in direct contact with lateral guides. This provides for smoother ware transfer and allows for simple, less expensive chain guide designs.

Lifeguard chains provide an added benefit. By utilising patented, interlocking side links, the sides of the chain present a smooth, continuous profile. With virtually no gaps between the adjacent side links, smooth product transfer on and off the conveying surface is assured and the potential for snagging on lateral guides is further reduced.

A solution to link tip wear

Testing has shown that link tip wear can be reduced by incorporating chain links made from special wear resistant steels. Some tested materials have been found to wear at half the rate of standard chain materials. Although such materials offer the possibility of longer chain life, they are costly and using them throughout a chain can be cost prohibitive. Ramsey engineers found a way around this dilemma: By placing wear resistant links only in the locations where the chain loads are greatest, and then using more typical links elsewhere, chain wear resistance can be improved with minimal increase in chain cost.

The company is currently developing the concept of patterns of dispersed wear resistant links. Such dispersions offer the promise of advances in chain life with minimal change in cost. This concept, recently awarded a US patent, can also be used to develop chains especially suited to certain size bottles and production settings. ■

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