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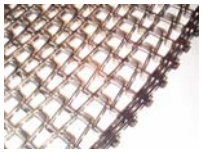


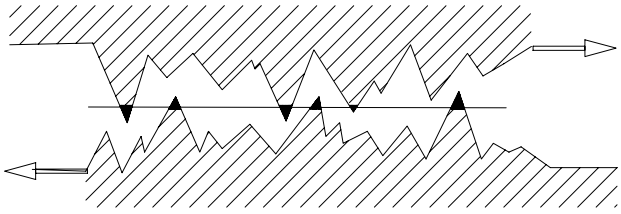
T E C H N I C A L B U L L E T I N

BLACK RESIDUE IN CONVEYOR SYSTEMS

The "Black Speck" Phenomenon

Causes of black residue build up in Turn Curve and Lotension Systems are identified in this technical update, with recommendations to reduce and eliminate debris.

1) ***Expect a small amount of "break in" wear debris***. This is a normal phenomenon, which occurs at all wear surfaces. Although the metal surfaces of the wear strips and belt components appear smooth to the eye the surfaces actually have microscopic peaks and valleys. Movement between the two surfaces result in constant bending of the peaks. The tips of the peaks, submicron in size, break off due to fatigue fractures and collect in the valleys.



These particles typically become airborne throughout the system and can coalesce into grains (not unlike household pepper) visible to the naked eye. These can collect on the belt or conveyor structure and fall on product and work surfaces.

2) ***Black debris is not "dirt".*** The particles are most often iron or nickel oxide, formed from the high boundary heat of friction due to the rubbing action of the stainless steel pickets. Sometimes, belt contact with the metal frame of the system or metal sprockets will produce this condition. This phenomenon is more prevalent in Omniflex style belts than in Omni-Grid. Ashworth's Hybri-Flex 150 plastic hybrid belt was designed to eliminate this condition in spiral systems.

3) ***While the above is the most common form of black residue, it is not the <u>only</u> form.*** Black or gray particles can result from residues of high pH cleaners, improper rinsing after cleaning, chlorine corrosion, or vegetable oils and animal fats trapped in the belt. Shiny metallic residue is not "black speck" per se, it is rather the effect of gross metal-to-metal contact in the system or along the belt path.

4) ***The first 200 hours of operation are critical.*** Conveyor belts need a break-in period to ensure that the wear surfaces on the facing areas of metal belts "polish in". During this process the microscopic peaks and valleys of wear surfaces are gently abraded and filled to form a smooth surface. Over cleaning during this period, particularly with heavy caustics, can lead to "galling" due to the removal of protective oxides. Should a belt become galled during this critical period it will result in the self-perpetuating generation of wear debris. To avoid this condition, the belt should be broken in at optimum tensions and cleaned only in accord with your manufacturer instructions (see page 2).

5) ***Prior to starting a system*** the belt and the spiral enclosure (including coils and fans if applicable), should be washed with a mild detergent and clean water rinse to remove any dirt and other debris from shipping and installation. If caustic solutions are required to sanitize a particular application, use caution not to select a solution any stronger than necessary. Harsh chemicals may etch the belt and support materials and strip the belt of all lubrication. This can lead to the "galling" phenomena described previously. Further, poor quality or roughened wear strips can be abrasive and become generators of metal debris.

6) ***Follow all cleaning*** with a thorough, clean water rinse, as soon as possible. This will neutralize any mildly caustic residue and remove soap scum from the belt and system. Mild, food-grade lubricant applied sparingly to the belt and support rails will help the belt components to polish themselves without the risk of galling. The lubricant acts as a film to separate the two rubbing surfaces and reduce contact wear. Lubricants should not be used on the inside edge of belts on Spiral Systems, as this may result in loss of drive between the spiral cage and the belt.

7) ***Optimum tensions*** need to be maintained during this break-in period. Tensions that exceed manufacturers recommendations for the belt on your system can cause belt components to compress and/or "grind" against one another, accelerating wear and debris generation. In Lotension Systems, carefully check for proper overdrive, unusually high amp readings or general "tightness" of the belt on the cage. Consult your spiral manufacturer or Ashworth Engineering if any of these conditions exist.

8) ***After start-up continue to clean the system and belt periodically.*** To remove dirt and debris trapped between the support rails and belt attach rags or nonabrasive pads to the underside of the belt and run these through the system. Remember to remove these before the belt and pads go over the sprockets. Allowing wear debris to accumulate on the rails can cause a severe abrasive condition wherein metal embedded in the plastic wear strip forms a sandpaper-like surface. This can both raise tension and act as a debris generator.

9) ***Generally speaking, black residue generation*** in a conveyor system (depending on the cycle time of the unit) reaches its' peak between fifty and one hundred fifty hours of operation. Generation of residue should, if proper cleaning of the belt, cage, and supports is in place, fall off sharply at the 150 to 200 hour mark. After a thorough cleaning at this point, the residue normally subsides to a negligible level. Again, consult your spiral manufacturer or Ashworth Engineering for any questions on continued maintenance.

CAUSES OF WEAR DEBRIS "BLACK SPECK"	MEASURES TO REDUCE DIRT & WEAR DEBRIS
• Compression of pickets on the inside edge as a belt opens and collapses (normal). • Hinging of flat wire pickets or Omni-Grid link around rods (normal). • Contact between cage bars or hold downs and metal belt edge. • High-tension operation during break in period. • Belt dragging over support rails or cage bars, metal or plastic. • Overcleaning a belt such that all lubricant is removed between two mating surfaces. The lubricant acts as a film to separate the two rubbing surfaces reducing the contact wear. • Burrs left in slots or holes, which are milled off by nesting of the flat wire pickets or Omni-Grid links in a turn. • Metal sprockets engaging metal belt. • Oils used in fried products, which are then carried onto the freezing or cooling conveyor.	• Schedule a break-in period for the spiral. Plan to run the spiral at least 200 hours before production begins to pass through the "break-in" wear without contaminating product. Wash the system and belt periodically during this time to assess the amount of new wear occurring. • Develop a rigorous maintenance regimen for washing down both the belt and system. • Light lubricant coating on the belt and support rails to lessen the formation of wear debris and to trap any debris formed (avoid inside edge and cage area). • Cover metal cage bars and support rails with plastic wear strips. Make sure the support rails are cleaned and free of metal debris. • Keep belt tensions within prescribed levels. • Installation of an air knife/magnet apparatus at the infeed and/or discharge can shorten the break in period by reducing airborne debris. • Replace metal drive and idler components with plastic. • Ground the spiral to inhibit electromagnetic attraction of charged debris. • Include a separate conveyor of sufficient length to allow the oil in fried products to drain off the product before transferring to the spiral.

Ashworth Jonge Poerink bv
Borne, The Netherlands
Tel: +31-74-265-6565
Fax: +31-74-266-1134
Email: ashworth@ashworth.nl

Ashworth Bros., Inc.
Winchester, VA U.S.A.
Phone: 540-662-3494
Fax: 800-532-1730
Email: ashworth@ashworth.com
Website: www.ashworth.com

Ashworth Europe Ltd.
Kingswinford, United Kingdom
Tel: +44-1384-355000
Fax: +44-1384-355001
Email: ashworth.europe@ukgateway.net